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Délivrable du programme européen MIAUCE - 5.1.1, Ethical, legal and social issues : from analysis to méthodology

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MIAUCE

Multi modal Interaction Analysis and exploration of Users within a Controlled Environment
IST Call 5, FP6-2005-IST-5
www.miauce.org

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From analysis to methodology

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ABSTRACT

The MIAUCE (Multi-modal Interactions Analysis and exploration of Users within a controlled Environment) project is part of the sixth Framework program. The University of Namur, through the involvement of both the Interdisciplinary Centre for Technology Assessment (CITA), and the Research Centre for Computer and Law (CRID), as leader of the fifth work package of the Miauce project, is in charge of the ethical, legal and sociological aspects and plays many roles all along the project. The two axes of the University of Namur's involvement in the project focus on the internal aspect of governance (how to design Miauce applications taking into consideration the ethical, legal and societal aspects) on the one hand, and on the external aspect of governance of the project (How to integrate legal, ethical, sociological issues in the European technological policies).

A major challenge of this project is to integrate human values (legal social and ethical aspects) as central design criterion along with more classical or traditional criteria of usability, economy, reliability and correctness.

The Miauce project relies on a vision of human-centred computation, totally integrated within the physical environment. This project enables "designers" - business companies active in their sector -,to envision many new applications, especially but not exclusively (one might think of applications for elderly persons) in the fields of security and of customized marketing, and will allow users to experience new ways of leading their life based on knowledge extracted from their behaviours. Even though the technology considered within the MIAUCE project does not cover all the characteristics of what is considered as "Ambient Intelligence technologies", the Miauce project does constitute an early instance of AmI to the extent that the identified technology supports electronic environments that are sensitive and responsive to the presence of human beings, and involves inter-operating devices exploiting information and intelligence "hidden" in the network through which the devices are connected.

The AmI project aims at enriching the total user experience through the support of "natural" and intuitive user interfaces. The concept raises many ethical, legal and social issues. Addressing those concerns from the very first stage of the design process, it means starting from the research laboratories, is critical for ensuring the social acceptability of this project's resulting applications. The present deliverable acknowledges the diversity of issues implied. Although our work has so far focused more specifically on the critical issues of individual autonomy and privacy, human responsibility, individual and collective reflexivity, we acknowledge the importance of other issues such as the potential impact of AmI on the "digital divide", the challenges that AmI raises for identity and for intellectual property. Those and other concerns one might identify in the course of the Miauce project will be further addressed in due time.

The present deliverable has to be considered as a work in progress. It is structured along five exploratory chapters.

- *As a matter of introduction, the first chapter ("Technical analyses of the laboratories") consists of a description of the technical building blocks of the project and in an exploration of their respective involvements in the construction of a full AmI system. One of the aims of this chapter is to set up a common understanding of the technical specificity of the three scientific laboratories (the "Laboratory of Computer Science of Lille (LIFL), University for Sciences and Technologies*

of Lille", the "Informatics Institute of the Faculty of Science, University of Amsterdam" and the "Department of Computing Science, Information Retrieval Group (IR Group), University of Glasgow").

- *The second chapter, ("Ambient Intelligence: from concept to vision") aims at recalling the historical emergence of that concept and at identifying the social and political meanings it implies. Although we realize that this may at sight appear to the reader as an expendable detour, this historical and socio-political analysis is what allows us to maintain that technique by itself is not determining how the society is like. On the contrary we will demonstrate that the proactive techniques came historically after a societal vision which was developed by their promoters and by science policy makers before their actual technical implementation. The demonstration is fundamental: it emphasizes that, notwithstanding the impressive pace of technological developments, we remain free and keep full responsibility to define ourselves the meanings of the techniques we are equipping ourselves with, and it founds the possibility and the legitimacy of an ethical approach.*
- *The third chapter's ("Ambient Intelligence: ethical and societal issues") purpose is to identify and analyze the necessary preconditions for an open deliberation oriented towards the democratic construction and social acceptability of the project. It also emphasizes the major ethical concerns raised by AmI, and reminds the fundamental ethical principles that should be taken on board in the design of the Miauce technologies and of its applications.*
- *The fourth chapter, ("Privacy and data protection in multi-modal behaviour analysis and exploration of users in controlled environments"), identifies the unprecedented threats that AmI visions carry from the points of view of "privacy" and "data protection". Privacy and data protection are identified as complementary legal instruments aimed at protecting both individual and collective autonomy. The "performativity" and the distribution of agency that characterize AmI systems are exposed as transversal concerns. The relevance, applicability and adequacy of the European privacy and data protection legal frameworks to deal with those unprecedented challenges are then assessed. That assessment required us to re-think about the scope and the normative grounds of what is meant by the "right to privacy", to critically explore the applicability of the European data protection scheme to the data processing in the Miauce project, and to assess the compatibility of the technical visions involved in the Miauce project with the fundamental data protection principles.*
- *The fifth chapter, ("From social acceptability to scenarios building: Guidelines for the project's governance's methodology"), sets up methodological guidelines for the internal governance of the Miauce project. In line with the previous chapters, it defines our approach of social acceptability based on theoretical backgrounds and a "philosophy" for IT design and project governance. The chapter discusses competing concepts of "scenario" in order to identify a suitable methodology to support a democratic building process of the project. The chapter concludes by accurately reassessing the multiple and specific roles that the Namur team is to play within the project, besides the development and implementation of the above-mentioned methodology.*

SCOPE AND OBJECTIVES

SCOPE OF WP5

A major challenge of WP5 is to integrate human values (legal social and ethical aspects) as central criteria for project design and for technological policy along with more classical or traditional criteria of usability, economy, reliability and correctness. This challenge is a political one since it regards the internal governance of the MIAUCE project but also the external governance regarding the integration of those issues into the European technological policies.

According to this challenge, WP5 has to deliver two main results : the first one is a “product” result regarding the ethical, legal and social shaping of the MIAUCE foreseen applications. The second one is a “process” result that concerns political and methodological recommendations for the internal and external governance of European technological policies.

STATUS AND OBJECTIVES OF THE DELIVRABLE

The status of this deliver is a work in progress that will evolve all along the MIAUCE project.

According to the technical annex of the MIAUCE project, the first year of the WP5 is devoted to the state of the art and to the setting up of methodological first insights to support the MIAUCE project’s design.

The state of the art aims at understanding the main societal issues related to the technologies endorsed into the MIAUCE project. That is the reason why the chapter 1 is devoted to the setting up of a common understanding regarding all the technological developments worked by the three associated laboratories of the MIAUCE project.

Based on this common understanding, the second chapter views those technologies as components of an emerging technological paradigm based on AmI concepts. It aims at drawing the main features of this emerging paradigm in order to better understand its related societal issues.

The third chapter does concern the ethical issues related to the MIAUCE technologies and more broadly to the emerging AmI paradigm. It also draws the necessary conditions needed to support an ethical questioning all along the MIAUCE project.

The fourth chapter regards the legal issues addressed by MIAUCE technologies. In this legal approach, the chapter focalizes on issues related to the privacy.

The chapter five addresses the question of the social acceptability of the foreseen MIAUCE applications by discussing the concept of acceptability and by drawing the first paths of a scenario building methodology suited to support a societal shaping of MIAUCE future applications.

CHAPTER 1:

TECHNICAL ANALYSIS OF THE LABORATORIES

LABORATORY OF COMPUTER SCIENCE OF LILLE (LIFL), UNIVERSITY FOR SCIENCES AND TECHNOLOGIES OF LILLE

INTRODUCTION

The Laboratory of Computer Science of Lille (LIFL), part of the French National Center for Scientific Research (CNRS), is mainly concerned by the studying of eye-gaze, eye-blink and body moving capture from videos and mining multimodal interface. Within LIFL, the research group (FOX) Mining complex and multimedia data is dealing with representation of 3D, data mining, pattern recognition and user behaviour analysis in multimedia data, including video, and multimedia content analysis for tracking, indexing and retrieving, 3D modelling, pattern recognition and multimodal human computer interface.

Concerning Miauce, LIFL laboratory will mainly consider the Tracking of Human Body, the Human Motion Analysis and Capture and the Eye Tracking

1. - HUMAN MOTION ANALYSIS

In human motion analysis[1], three aspects have to be considered: the motion analysis of the human body structure, the tracking of human motion using a single or multiple cameras, and the recognition of human activities from image sequences.

- .Human motion analysis of the human body structure usually involves the extraction of the low-level feature, such as body part segmentation, joint detection and identification, and the recovery of 3D structure from the 2D projections in an image sequence.
  The techniques of human motion analysis are based on the representation of the human body, evolving from stick figures to 2D contours to 3D volumes as the complexity of the model increases. The stick figure representation is based on the observation that human motion is essentially the movement of the supporting bones. The use of 2D contours to represent the human body is directly associated with the projection of the human figures in images. Volumetric models, such as generalized cones, elliptical cylinders, and spheres, attempt to describe the details of a human body in 3D and thus require more parameters for computation. Two general strategies are used, depending upon whether information about the object shape is employed in the motion analysis, namely, model-based approaches and methods which do not use a priori shape models.

---

[1] Human Motion Analysis : A review, J.K. Aggarwal and Q. Cai, Computer and Vision Research Center, Department of Electrical and Computer Engineering, The University of Texas at Austin

Both methodologies follow the general framework of: 1) feature extraction, 2) feature correspondence, and 3) high-level processing. The major difference between the two methodologies is in the process of establishing feature correspondence between consecutive frames. Methods which assume a priori shape models match the 2D image sequences to the model data. Feature correspondence is automatically achieved once matching between the images and the model data is established. When no a priori shape models are available, however, correspondence between successive frames is based upon prediction or estimation of features related to position, velocity, shape, texture, and colour.

- Tracking moving individuals using a single or multiple cameras involves applying visual features to detect the presence of humans directly, i.e., without considering the geometric structure of the body parts. Motion information, such as position and velocity incorporated with intensity values, is employed to establish matching between consecutive frames. After feature correspondence between successive frames is solved, the next step is to understand the behaviour of these features throughout the image sequence.

- Two types of approaches are used to recognize human activities from an image sequence: approaches based on a state-space model or ones which use a template matching technique.In the first case, each static posture is defined as a state. These states are connected by certain probabilities. Any motion sequence as a composition of these static poses is considered a tour going through various states. Joint probabilities are computed through these tours, and the maximum value is selected as the criterion for classification of activities.

Methods using template matching techniques compare the feature extracted from the given image sequence to the pre-stored patterns during recognition process.

2. - EYE TRACKING

Eye tracking[2] measures the special direction (gaze and eye fixation) where the eyes are pointing. It returns information into what observer found interesting, and how the observer perceived the scene he was viewing. Eye tracking follows the path of an observer visual attention. The intuitive sense of visual attention, from psychology point of view, is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalisation, concentration, or consciousness are of its essence.

Eye tracking systems can be grouped into wearable or non-wearable, and infrared-based or appearance-based.

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[2] State of art of Eye Tracking, Chabane Djeraba, Laboratoire d'Informatique Fondamentale de Lille (LIFL), publication interne n° 07 - 2005

In infrared-based systems, light shining on the subject whose gaze is to be tracked creates a “red-eye effect”: the difference in reflection between the cornea and the pupil is used to determine the direction of sight. In appearance-based systems, computer vision techniques are used to find the eyes in the image and then determine their orientation. While wearable systems are the most accurate, they are also the most intrusive. Infrared systems are more accurate than appearance-based, but there are concerns over the safety of prolonged exposure to infrared lights. In addition, most non-wearable systems require (often cumbersome) calibration for each individual.

Appearance-based systems use both eyes to predict gaze direction, so the resolution of the image of each eye is often small, which makes them less accurate. Infrared-based systems usually use only one camera, but multiple cameras can be used to improve accuracy.

Generally, the current non-wearable eye tracking systems are based on two cameras, one being a narrow field camera (which provides a high resolution image of the eyes by tracking a small area) and the second being a large field camera (which tracks the whole face). Limiting the head position is typical for systems that utilize only a single camera.

Eye tracking systems[3] analysis can be divided in diagnostic applications or interactive applications.

In the diagnostic role, the eye tracker provides objective and quantitative evidence of the user’s visual and (overt) attentional processes. In this capacity, eye movements are generally recorded to ascertain the user’s attentional patterns over a given stimulus. Diagnostic applications are typically represented by the unobtrusive use of the eye tracking device.

An interactive system must respond to or interact with the user based on the observed eye movements. It considers the user’s gaze as a pointing device. This type of ocular interaction is considered as a modality input strategy, which may be complementary to other modalities (gesture, mouse, speech, keyboards). Such interactive systems may fall into two application subtypes: (1) selective and (2) gaze-contingent. Selective systems use the point of gaze as analogous to a pointing device such as the mouse, whereas gaze-contingent systems exploit knowledge of the user’s gaze to facilitate the rapid rendering of complex displays (e.g., graphical environments).

3. - KNOWLEDGE DISCOVERY IN DATA BASES

Following Stephane Tufféry[4], the data mining is the set of methods and techniques used to explore and analyse, automatically or semi-automatically, big data bases, for detecting in those data, rules, associations, unknown or hidden tendencies, special structures providing essential information and reducing the set of data in the same time.

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[3] A Breath-First Survey of Eye Tracking Applications, Andrew T. Duchowski, Behavior Research Methods, Instruments, and Computers, volume 34, number 4, 1 november 2002, pp 455-470

[4] Data mining et statistique décisionnelle, Stéphane Tufféry, Editions Technip, 2005, Chapitres 1 et 2

The data mining is either descriptive or prescriptive. The descriptive techniques – or exploratory methods – want clearly to underline available information hidden inside the amount of data; the predictive techniques aim to extrapolate new information from present one. In the case these informations are qualitative, one speaks about scoring; in case they are quantitative, one speaks about prediction.

INFORMATICS INSTITUTE OF THE FACULTY OF SCIENCE, GROUP ON SENSORY INFORMATION ANALYSIS (ISIS), UNIVERSITY OF AMSTERDAM:

INTRODUCTION

Multimodal Human computer interaction (MMHCI) lies at the crossroads of several research areas including computer vision, psychology, artificial intelligence, and many others. As computers become integrated into everyday objects, effective natural human-computer interaction becomes critical: in many applications, users need to be able to interact naturally with computer the way face-to-face human-human interaction takes place.

The University of Amsterdam participates in the Miauce project through the Informatics Institute of the Faculty of Science, more precisely with its group on sensory information analysis (ISIS). Their main research activities are in multimedia information processing, annotation of and retrieval from images and video data repositories, data space visualization, theory of computer vision, colour and colour invariants in computer vision, multimedia and data mining, multimodal human-computer interaction and cognitive vision.

Regarding the Miauce project, the University of Amsterdam is mainly interested by the facial expression analysis.

1. - AN IDEAL SYSTEM FOR FACIAL EXPRESSION ANALYSIS

Advances[5] in image analysis and pattern recognition open up the possibility of automatic detection and classification of emotional and conversational facial signals. Automating facial expression analysis could bring facial expressions into human-computer interaction as a new modality and make this interaction tighter, more efficient. Giving a machine one of the key skills of emotional intelligence[6] – the ability to recognize emotional information and affective feedback expressed by a person – could make the computer more intelligent by recognizing and appropriately adapting to the user's emotion response.

---

[5] Automatic Analysis of Facial Expressions : the State of the Art, Maja Pantic, Student Member, IEEE, and Leon J.M. Rothkrantz, vol 22, n° 12, December 2000

[6] Toward Machine Emotional Intelligence : Analysis of Affective Physiological State, Rosalind W. Picard, Senior Member, IEEE, Elias Vyzas, and Jenifer Healey, IEEE Transactionson pattern analysis and machine intelligence, vol 23, n° 10, october 2001

Similarly to the best known facial expression analyzer, - the human visual system - , an automated facial expression analyzer would be universal, i.e. it should be capable of analyzing subjects of both sexes, of any age and any ethnicity. It would “fill in” missing parts of the observed face and “perceive” a whole face even when a part of it is occluded. It should be able to perform analysis of all visually distinguishable facial expressions. Well-defined face representation is a prerequisite for achieving this. The face representation should be such that a particular alteration of the face model uniquely reveals a particular facial expression. In general, an ideal system should be able to distinguish:

- all possible facial expressions (a reference point is a total of 44 facial actions defined in FACS (Facial Action Coding System) whose combinations form the complete set of facial expressions);
- any bilateral or unilateral facial change, and
- facial expressions with a similar facial appearance.

In practice, it may not be possible to define a face model that can satisfy both, to reflect each and every change in facial appearance and whose features are detectable in a facial image or image sequence. Still, the set of distinct facial expressions that the system can distinguish should be as copious as possible.

If the system is to be used as a part of an advanced multimodal/media Human Computer Interface, the system should be able to interpret the shown facial expressions (e.g., in terms of emotions). Since psychological researchers disagree on existence of universal categories of emotional facial displays, an ideal system should be able to adapt the classification mechanism according to the user’s subjective interpretation of expressions.

2. - THE TECHNICAL STEPS OF THE FACIAL EXPRESSION ANALYSIS

The facial expression analysis is divided into three steps[7] :

(1) the face detection in a scene;
(2) the facial expression data extraction, from the observed facial image or image sequences; In the case of static images, the process of extracting the facial expression information is referred to as localizing the face and its features in the scene. In the case of facial image sequences, this process is referred to as tracking the face and its features in the scene. A clear distinction should be made between two terms, namely, facial features and face model features. The facial features are the prominent features of the face – eyebrows, eyes, nose, mouth, and chin. The face model features are the features used to represent (model) the face. The face can be represented as a whole unit (holistic representation), as a collection of the facial features (analytic representation) and the location of the features in correspondence with each other determines then the overall location of the face or as a combination of these (hybrid approach);
(3) the facial expression classification and/or facial expression interpretation, requiring to define some set of categories and to devise mechanism of categorization.

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[7] Automatic Analysis of Facial Expressions : the State of the Art, Maja Pantic, and Leon J.M. Rothkrantz, IEEE vol 22, n° 12, December 2000

The automatic detection of the face based on computer encounters many difficulties, without any complete solution so far.Those difficulties are related to the following factors[8]:

(1) The pose: the images of a face vary due to the relative camera-face pose, and some facial features such as an eye or the nose may become partially or wholly occluded;
(2) The presence or not of structural components: facial features such as beards, moustaches, and glasses may or may not be present and there is a great deal of variability among these components including shape, colour, and size;
(3) The facial expression: the appearance of faces is directly affected by a person's facial expression;
(4) The occlusion: faces may be partially occluded by other objects. In an image with a group of people, some faces may partially occlude other faces;
(5) Image orientation: faces images directly vary for different rotations about the camera's optical axis;
(6) Imaging conditions: when the image is formed, factors such as lighting (spectra, source distribution and intensity) and camera characteristics affect the appearance of a face.

The face detection[9] and localization methods can be classified within four categories: the knowledge-based methods; the features invariant approaches; the template matching methods and the appearance-based methods.

The knowledge based methods

The methods aim at translating the human knowledge of what constitutes a typical face into well-defined rules, describing the features of a face and their relationships. The relationships between features can be represented by their relative distances and positions. Facial features in an input image are extracted first, and face candidates are identified based on the coded rules. A verification process is usually applied to reduce false detections.

One problem with this approach is the difficulty in translating human knowledge into well-defined rules. If the rules are detailed (i.e., strict), they may fail to detect faces that do not pass all the rules. If the rules are too general, they may give many false positives. Moreover, it is difficult to extend this approach to detect faces in different poses since it is challenging to enumerate all possible cases. On the other hand, heuristics about faces work well in detecting frontal faces in uncluttered scenes.

The feature invariant approaches

Those approaches try to find invariant features - like facial features, skin, hair or colour information - of faces for detection. The underlying assumption is based on the observation that humans can effortlessly detect faces and objects in different poses and lighting conditions and, so, there must exist properties of features which are invariant over these variabilities. Based on the extracted features, a statistical model is built to describe their relationships and to verify the existence of a face. One problem with these feature based algorithms is that the images features can be severely corrupted due to illumination, noise and occlusion.

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[8] Detecting Faces in Images : a Survey, Ming-Hsuan Yang, David J. Kriegman and Narendra Ahuja, IEEE, vol 24, n° 1, January 2002

[9] Detecting Faces in Images : a Survey, Ming-Hsuan Yang, David J. Kriegman and Narendra Ahuja, IEEE, vol 24, n° 1, January 2002

The template matching methods

These methods predefine a standard face pattern (usually frontal) or parameterized it by a function. Given an input image, the correlation values with the standard patterns are computed and used to determine the existence of a face. This approach has the advantage of being simple to implement. However, it has proven to be inadequate for face detection since it cannot effectively deal with variation in scale, pose, and shape.

The appearance-based methods

These methods are based on models learned from examples in images. These methods rely on techniques from statistical analysis and machine learning to find the relevant characteristics of face and non-face images. One of these methods is called the Eigenface10 method. The goal is to extract the relevant information in a face image, encode it as efficiently as possible, and compare one face encoding with a database of models encoded similarly. A simple approach to extract the information contained in an image of a face is to somehow capture the variation in a collection of face images, independent of any judgment of features, and use this information to encode and compare individual face images. So faces are transformed into vectors representing points inside a multidimensional space. Each vector is a linear combination of the original faces images; they have a face-like appearance and are called eigenfaces.

Many appearance-based methods can be understood in a probabilistic[11] framework. An image or feature vector derived from an image can be viewed as a random variable X, and this random variable is characterized for faces and nonfaces by the class-conditional density functions p(X|face) and p(X|nonface). Bayesian classification or maximum likelihood can be used to classify a candidate image location as face or nonface.

Another approach in appearance-based methods is to find a discriminant function (i.e., decision surface, separating hyperplane, threshold function) between face and nonface classes. Conventionally, image patterns are projected to a lower dimensional space and then a discriminant function is formed (usually based on distance metrics) for classification, or a nonlinear decision surface can be formed using multilayer neural networks.

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[10] Eigenfaces for Recognition, Matthew Turk and Alex Pentland, MIT, Journal of Cognitive Neuroscience, Volume 3, number 1

[11] Detecting Faces in Images : a Survey, Ming-Hsuan Yang, David J. Kriegman and Narendra Ahuja, IEEE, vol 24, n° 1, January 2002

After the presence of a face has been detected in the observed scene, the next step is to extract[12] the information about the encountered facial expression in an automatic way. One of the fundamental issues about the facial expression analysis is the representation of the visual information that an examined face might reveal. The face can be represented in various ways, e.g., as a whole unit (holistic representation), as a set of features (analytic representation) or as a hybrid approach, which typifies a combination of analytic and holistic approaches to face representation.

- In the holistic approach to face representation, the face is represented as a whole unit. A 3D wire-frame with a mapped texture and a spatio-temporal model of facial image motion are typical examples of the holistic approaches to face representation.

- In the analytical approach, the visual properties of the face, regarding the information about the shown facial expression, could be made clear by describing the movements of points belonging to the facial features and then by analyzing the relationships between those movements.

- In the hybrid approach, a set of facial points is usually used to determine an initial position of a template that models the face. Irrespectively of the kind of the face model applied, attempts must be made to model and then extract the information about the displayed facial expression without losing any (or much) of that information. Several factors make this task complex. The first is the presence of facial hair, glasses, etc…, which obscure the facial features. Another problem is the variation in size and orientation of the face in input images. This disables a search for fixed patterns in the images. Finally, noise and occlusion are always present to some extent.

The last step is the facial expression classification[13] (identification and interpretation). The analyzers classify the encountered expression either as a particular facial action or a particular basic emotion. The Facial Action Coding System (FACS)[14] has been developed to facilitate objective measurement of facial activity for behavioural science investigations of the face. It provides a linguistic description of all possible, visually detectable, facial changes in terms of 44 so-called Action Units. The most known and the most commonly used study on emotional classification of facial expressions is the cross-cultural study on existence of universal categories of emotional expressions. Six categories were defined by Paul Ekman[15], referred to as the basic emotions: happiness, sadness, surprise, fear, anger and disgust. He described each basic emotion in terms of a facial expression that uniquely characterizes that emotion; those facial expressions can be combined to describe all facial expressions. Despite many questions about the effective universality of the basic emotional expressions, or about the certainty that each facial expression able to be displayed on the face could be classified under the six basic emotion categories, most of the studies on vision-based facial expression analysis rely on Ekman's emotional categorization of facial expression.

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[12] Automatic Analysis of Facial Expressions : the State of the Art, Maja Pantic, and Leon J.M. Rothkrantz, IEEE vol 22, n° 12, December 2000

[13] Idem 11

[14] P. Ekman and W.V. Friesen, Facial Action Coding System (FACS) : Manual. Palo Alto : Consulting Psychologists Press, 1978

[15] Toward Machine Emotional Intelligence : Analysis of Affective Physiological State, Rosalind W. Picard, Senior Member, IEEE, Elias Vyzas, and Jenifer Healey, IEEE Transactionson pattern analysis and machine intelligence, vol 23, n° 10, october 2001

The facial expression analyzers classify the encountered expression either as a particular facial action or a particular basic emotion. Some of the systems perform both. Independent of the used classification categories, the mechanism of classification applied by a particular expression analyzer is either a template-based- or a neural-network-based- or a rule-based- classification method.

If a template-based classification method is applied, the encountered facial expression is compared to the templates defined for each expression category. The best match decides the category of the shown expression. In general it is difficult to achieve a template-based quantified recognition of a nonprototypic facial expression. There are infinitely a lot of combinations of different facial actions and their intensities that should be modelled with a finite set of templates.

In a neural-network-based classification approach, a facial expression is classified according to the categorization process that the network "learned" during a training phase.

The ruled-based classification methods classify the examined facial expression into the basic emotion categories based on the previously encoded facial actions. The prototypic expressions, which characterize the emotion categories, are first described in terms of facial actions. Then, the shown expression, described in terms of facial actions, is compared to the prototypic expressions defined for each of the emotion categories and classified in the optimal fitting category.

DEPARTMENT OF COMPUTING SCIENCE, INFORMATION RETRIEVAL GROUP (IR GROUP), UNIVERSITY OF GLASGOW:

INTRODUCTION

The University of Glasgow, with its Information Retrieval Group (IR Group), member of the Department of Computing Science, wants to investigate approaches to capture the changing user profile, by capturing and representing user context. These will be used to adapt the information to the user needs. The user profile will also be enriched with affective features.

When the humans interact with other persons and the surrounding environment they make use of implicit situational information. They intuitively deduce and interpret the context (for instance the gestures and voice tone in a discussion) of the current situation and react appropriately.

Computers are not as good as humans in deducing situational information from their environment and in using it in interactions. They cannot easily take advantage of such information in a transparent way. This is a challenge for human computer interaction. There are different ways how context information could be used to make computer systems and applications more user-friendly, flexible an adaptable. The use of context information is especially important in a mobile environment, where the environment of interaction, execution, and usage needs change rapidly. Areas where increased use of context information can bring added value and where research work is conducted include human computer interaction, adaptable user interfaces, virtual and augmented reality, mobile, ubiquitous, handheld and wearable computing.

Concerning Miauce, the University of Glasgow has to investigate approaches to capture the changing user profile, in order to adapt the information to the user needs. Glasgow will enrich the user profile with affective features, will make situation sensitive summarisation and presentation strategies for displaying multimedia documents and will study personalized multimedia document content and methods to extract the most representative pattern of user transaction behaviors. In order to fulfil those goals, Glasgow relies on the video data generated by Lille and Amsterdam partners.

1. - INFORMATION RETRIEVAL[16]

Information retrieval (IR) is concerned with the process involved in the representation, storage, searching and finding of information which is relevant to a requirement for information desired by a human user.
The evaluation of IR performance is based on the concept of "relevance". Relevance is an inherently subjective concept in the sense that satisfaction of human needs is the ultimate goal, and hence the judgment of human users as to how well retrieved documents satisfy their needs is the ultimate criterion of relevance. Moreover, human beings often disagree about whether a given document is relevant to a given query. Disagreement among human judges is even more likely when the question is not absolute relevance but degree of relevance. Relevance depends not only on the query and the collection but also on the context, e.g., the user's personal needs, preferences, knowledge, expertise, language, etc.

There are two major categories of IR technology and research: statistical and semantic.

The statistical approaches

In statistical approaches, the documents that are retrieved or that are highly ranked are those that match the query most closely in terms of some statistical measure. Statistical approaches break documents and queries into terms. These terms are the population that is counted and measured statistically. The terms are words that occur in a given query or collection of documents. The words are pre-processed and stemmed to extract the "root" of each word, in order to eliminate the variation that arises from the occurrence of different grammatical forms of the same word. Another pre-processing is the elimination of common words that have little power to discriminate relevant from non-relevant documents.

Some sophisticated engines also extract "phrases" as terms. A phrase is a combination of adjacent words which may be recognized by frequency of co-occurrence in a given collection or by presence in a phrase dictionary.

Some engines also break documents and queries into "n-grams", i.e., arbitrary strings of n consecutive characters, by moving a window of n characters in length through these documents and queries one character at a time. Since a single word or phrase can generate multiple n-grams, statistical clustering using n-grams has proved to be language-independent, and has even been used to sort documents by language, or by topic within language. N-gram statistics appear also to be relatively insensitive to degraded text.

Numeric weights are commonly assigned to document and query terms, each term being able to receive a different weight in each distinct document in which it occurs. The weight is usually a measure of how effective the given term is likely to be in distinguishing the given document from other documents in the given collection. In case of a query, the weight is usually a measure of how much importance the term is to be assigned in computation of the similarity of documents to the given query. As with documents, a given term may have a different weight in one query than in another.

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[16] This paragraph has been written based on : Ed Greengrass. Information retrieval: A survey. A DOD Technical Report TR-R52-008-001, 2001. http://citeseer.ist.psu.edu/greengrass00information.html

Statistical approaches fall into a number of categories: boolean, extended boolean, vector space, and probabilistic.

Boolean approach

In the boolean case, the query is formulated as a boolean combination of terms. A conventional boolean query uses the classical operators AND, OR, and NOT, and complex boolean queries are built up out of these operators and evaluated according to the classical rules of boolean algebra. A Boolean query is either true or false and a document either satisfies such a query (is "relevant") or does not satisfy it (is "non-relevant"). No ranking is possible but in case of stemming, variation due to different grammatical forms can be eliminated. Several kind of refinement of this classical boolean query are possible when it is applied to IR: the query may be applied to a specified syntactic component of each document; it may be specified that the condition must apply to a specified position within a syntactic component; an additional boolean operator, called a proximity operator, may be added to the classical set to specify how close in the text two terms must be, or in what order they must occur, to satisfy the query condition.

Extended Boolean approach

A number of extended boolean models have been developed to provide ranked output, i.e., provide output such that some documents satisfy the query condition more closely than others. These extended boolean models employ extended boolean operators, also called "soft boolean" operators. Extended boolean operators make use of the weights assigned to the terms in each document.A classical boolean operator evaluates its arguments to return a value of either true or false, numerically represented by 1 or 0. An extended boolean operator evaluates its arguments to a number in the range zero to one, corresponding to the estimated degree to which the given logical expression matches the given document. Among all developed models, the best one, regarding its ability to evaluate the degree to which a document satisfies a query more in accordance with a human user's judgment, is called the "p-norm" model. "p" is a parameter that can be used to tune the model and can vary from one to infinity; at p = infinity, the p-norm model is equivalent to the classical boolean model.

Vector space approach

One common approach to document representation and indexing for statistical purposes is to represent each textual document as a set of terms. Most commonly, the terms are words extracted automatically from the documents themselves, although they may also be phrases, n-grams, or, manually assigned descriptor terms. This process can be applied to each document in a given collection, generating a set of terms that represents the given document. The union of all these sets of terms generates the set representing the entire collection. This set of terms defines a space such that each distinct term represents one dimension in that space. Since each document is represented by a set of terms, this space can be seen as a "document space".

A numeric weight can be assigned to each term in a given document (even different from one document to another), representing an estimate of the usefulness of the given term as a descriptor of the given document, i.e., an estimate of its usefulness for distinguishing the given document from other documents in the same collection.

In document space, each document is defined by the weights of the terms that represent it. Sometimes, it is desirable to define a “term space” for a given collection. In term space, each document is a dimension. Each point or vector in term space is a term in the given collection. The coordinates of a given term are the weights assigned to the given term in each document in which it occurs. A term receives a weight of zero for a document in which it does not occur.

The “document space” and the “term space” perspectives can be combined by viewing the collection as represented by a document-by-term matrix. Each row of this matrix is a document (in term space) and each column is a term (in document space). The element at row i, column j, is the weight of term j in document i.

A query may be specified by the user as a set of terms with accompanying numeric weights. It may also be specified in natural language, making it able to be processed exactly like a document. This means that, like previously explained, after stemming and removal of noise words, a query can be transformed into a set of terms interpreted as another document in document space. If the query contains terms that are not in the collection, these represent additional dimensions in document space.

A variety of schemes are used to assign weights to terms in documents or in queries. Once vectors have been computed for the query and for each document in the given collection, e.g., using a weighting scheme, the next step is to compute a numeric “similarity” between the query and each document. The documents can then be ranked according to how similar they are to the query. While it would be too much to hope that ranking by similarity in document vector space would correspond exactly with human judgment of degree of relevance to the given query, the hope is that the documents with high similarity will include a high proportion of the relevant documents, and that the documents with very low similarity will include very few relevant documents.

There is another vector space approach called Latent Semantic Indexing (LSI). This approach comes from the observation that the traditional approach is oversimplified and limited, in the way it assumes the terms of the algebraic base of the space vectors as independent, or said in another way, that the dimensions of the space are orthogonal. The relationships among the terms are ignored. The LSI approach attempts to capture the term-term statistical relationships.

In LSI, the document space in which each dimension is an actual term occurring in the collection is replaced by a much lower dimensional document space called k-space (or LSI space) in which each dimension is a derived concept, a “conceptual index”, called an LSI “factor” or “feature”. These LSI factors are truly independent statistically, i.e., uncorrelated, in a way that terms are not. Hence, LSI factors are “information rich” in the sense that they capture the term-term relationships that ordinary term-based space does not. Documents are represented by LSI factors in k-space just as they are represented by term vectors in traditional term-based document space. Vector similarity can be calculated in the same way in k-space as in traditional document space. However, documents and queries dealing with the same topic that would be far apart in traditional document space (because they use different but synonymous terms) may be close together in k-space. So since there are strong associations between terms in language, LSI attempts to capture some of these semantic term dependencies using a purely statistical and automatic method, i.e., without syntactic or semantic natural language analysis and without manual human intervention.

In the n-gram approach, the dimensions of the document space are n-grams, strings of n consecutive characters extracted from the text without regard to word length, and often completely without regard to word boundaries. The n-gram approach is a remarkably “pure” statistical approach, one that measures the statistical properties of string of text in the given collection without regard to the vocabulary, lexical or semantic properties of the natural language(s) in which the documents are written. The n-gram length (n) and the method of extracting n-grams from documents vary from one author and application to another. We find trigram (n = 3) analysis for spelling error detection, n-grams of length and 6 for clustering of text by language and topic, 5-grams to support a dynamic hypertext system or n-grams that cross or not the word boundaries.

Each document can be specified as a vector of n-grams, one for each distinct n-gram in the document. Each component can be weighted just as the components of a conventional term vector are weighted. Normalized n-grams frequency, the number of occurrences of the given n-gram in the given document divided by the total number of occurrences of all n-grams in the document are used and the similarity between two documents is computed, which is just as useful in an n-gram document space as in a term-based document space. Once the similarities among the n-gram-based document vectors have been computed, the document can be clustered hierarchically, i.e., by language group and by individual language within group, and this without any prior linguistic knowledge.

Probalistic approach

In a probabilistic method, one usually computes the conditional probability P(D|R) that a given document D is observed on a random basis given event R. If query and document are represented by sets of terms, then P(D|R) is calculated as a function of the probability of occurrence of these terms in relevant vs. non relevant documents. The term probabilities are analogous to the term weights in the vector space model, and may be calculated using the same statistical measures. A probabilistic formula is used to calculate P(D|R), in place of the vector similarity formula used to calculate relevance ranking in the vector space model. The probabilistic formula depends on the specific model used, and also on the assumptions made about the distribution of terms, e.g., how terms are distributed over documents in the set of relevant documents, and in the set of non-relevant documents. More generally, P(D|R) may be computed based on any clues available about the document, e.g., manually assigned index terms (concepts with which the document deals, synonyms, etc.) as well as terms extracted automatically from the actual text of the document.

The semantic approaches

The second category of IR technology and research is the semantic one.

Semantic approaches attempt to implement some degree of syntactic and semantic analysis, trying to reproduce to some degree the understanding of the natural language text that a human user would provide.

The Natural Language Processing (NLP) approaches refer to all methods based on knowledge of the syntax and/or semantics of the natural language in which document text is written, or knowledge of the world, e.g., the applications domains, to which the documents refer. Many NLP techniques employ statistical techniques. They are rarely used by themselves in IR .More commonly, they are used to supplement statistical techniques.

A classification of NLP techniques has been made, according to the level of linguistic unit processed, and (correspondingly) to the level and complexity of the processing required. The identified levels are the following: phonological, morphological, lexical, syntactic, semantic, discourse, and pragmatic.

The phonological level is the level of interpreting speech sounds. The morphological level is concerned with analysis of the variant forms of a given word in terms of its components, e.g., prefixes, roots, and suffixes. The lexical level is concerned with analysis of structure and meaning at the purely word level. The syntactic level is the level at which the syntactic structure of sentences is determined, in terms of the parts of speech of the individual words. The semantic level is the level at which one tries to interpret meaning at the level of clauses, sentences, rather than just individual words. The discourse level is the level at which one tries to interpret the structure and meaning of larger units, e.g., paragraphs, whole documents, etc., in terms of words, phrases, clauses, and sentences. The pragmatic level is the level at which one applies external knowledge (that is, external to the document and original query). The knowledge employed at this level may include general knowledge of the world, knowledge specific to a given application domain, and knowledge about the user's needs, preferences, and goals in submitting a given query.

The most important source of semantic content in traditional IR is relevance feedback, the refinement and expansion of a query based on human judgments of which of the documents retrieved by the query are relevant to the given query.

2. - VISUAL INFORMATION RETRIEVAL

The model used in Visual Information Retrieval (VIR[17]) is an application of the vector space model of text information retrieval. Since digital representations of visual media cannot be easily compared in computer systems, there is a need to represent visual content in a form that allows simple but effective (in comparison to human judgement) similarity measurement. In VIR, this is performed classically by extracting visual media properties as number vectors that can be seen as points in a vector space.

Two types of features can be distinguished in VIR: quantitative (low-level) features and qualitative (high-level) features. Only those of the first type can be extracted easily. For the second group semantic understanding would be needed. But as software is still far from being able to reason semantically, semantic enrichment of low-level features is the mostly adopted course to compute high-level features.

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[17] A new perspective on visual information retrieval, Horst Eidenberger, Vienna University of Technology – Austria , Institute of Software Technology and Interactive Systems.

Generally, three source of information can be used to enhance low-level features: (1) information on the application domain, (2) information on the user and (3) information on the characteristics of the feature.

Generally, the visual retrieval process aims at finding media objects that are similar to given examples. “Similarity” is a weakly defined term and, consequently, difficult to implement in computer systems. Matching by similarity should definitely be less strict than hard pattern matching but still result in comprehensible results. A handful of retrieval processes exists for implementing similarity matching in VIR. Two requirements have to be fulfilled by a model: similarity matching has to be performed on media objects represented by feature vectors and the user (his feedback) has to be integrated in the retrieval process. Therefore, retrieval is necessarily an iterative communication process between man and machine.

Evaluation of VIR systems is needed for various purposes: it has to be possible to judge the quality of new feature extraction methods in relation to existing ones, to compare the quality of novel querying paradigms, to judge the usability of user interfaces for retrieval, etc. The most interesting problem is measuring the quality of similarity measurement compared to human visual similarity perception. For this purpose, the recall and precision quality indicators of text information retrieval evaluation were adopted. The recall[18] indicator is the ratio between the number of relevant documents retrieved by the Information Retrieval Systems and the total number of relevant documents among all the documents indexed; it may be seen as the probability that a relevant document is retrieved. The precision indicator is the ratio between the number of relevant documents retrieved by the Information Retrieval Systems and the total number of documents indexed; it may be seen as the probability that a retrieved document is relevant.

3. - INFORMATION RETRIEVAL AND CONTEXT[19]

There is a growing realisation that relevant information will be increasingly accessible across media and genres, across languages and across modalities. The retrieval of such information will depend on time, place, history of interaction, task in hand, and a range of other factors that are not given explicitly but are implicit in the interaction and ambient environment, namely the context. Information Retrieval (IR) research is now conducted in multi-media, multi-lingual, and multi-modal environments, but largely out of context. However, such contextual data can be used effectively to constrain retrieval of information thereby reducing the complexity of the retrieval process. To achieve this, context models for different modalities will need to be developed so that they can be deployed effectively to enhance retrieval performance.

Context implies interactive IR and there may exist a stratification of contexts in association to IR engines and systems. For example, knowing where a user is focusing his or her attention during image retrieval can enhance the operation of relevance feedback to the system. The underlying hypothesis (and belief) is that by taking account of context the next generation of retrieval engines dependent on models of context can be created, designed and developed delivering performance exceeding that of out-of-context engines.

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[18] Loupy, C. and Bellot, P. (2000) Evaluation of Document Retrieval Systems, LREC’2000, Satelitte Workshop

[19] ACM SIGIR 2004 Workshop on « Information Retrieval in Context », 27th Annual International ACM SIGIR Conference, P. Ingwersen, K; van Rijsbergen, N. Belkin, July 25-29, Sheffield, UK.

Context and research

In research, context is generally acknowledged to be an elusive construct and particularly so in studies of information retrieval (IR). In IR, context represents a constraint on the interpretation of the situation: a searcher may implicitly (or explicitly) choose which elements of context to use for any single problem, in any single search situation, for any single search task, and indeed for any single event within that search task. The problem is in detecting which of the many contextual elements actually make a difference to search outcomes.

A taxonomy of contextual elements

The search process contains three key ingredients[20]: individual or group who seek(s) the information for some purpose, the information resource(s) – the content – in which the information is being sought, and a system to facilitate the exchange. These elements belong to an information ecology, a system of people, practices, values, and technologies in a particular environment.

An individual has a set of cognitive abilities, from inductive reasoning to perceptual speed and accuracy. In addition, the individual has experiences that are socially and culturally induced, a certain knowledge base, a language, and a learning style. All of these are contextual factors that affect to some degree a user's interaction with the system and a user's interpretation of what is presented.

The content resource also has a set of characteristics that add additional contextual elements. A content source is represented in a particular medium such as video or text, is of a certain age, is presented in a certain language, is of a genre (as defined by its format, content and function), and is from a particular domain. The resource is created for a particular purpose or use by an individual or organization which also contributes to its authoritativeness and authenticity.

The transactions between individual and content take place using some form of system – a medium – from paper and papyrus to digital. All three interact under a set of conditions: within a particular environment, and situation as well as a work task that normally but not necessarily brought the individual into the interaction.

Complicating the assessment of these interactions are desired outcomes, as not all search results can be characterized in the same way. Relevance means different things to different people in same or different situations. While novelty may be the goal in one situation, interestingness may be the goal in others, and the goal may change over multiple interactions within the same task. One situation may be "mission critical" while another may be perceived as somewhat frivolous. Often there may be no goal at all – in this case this is the experience that counts from the individual's perspective.

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[20] Identifying the Significant Contextual Factors of Search, E. G. Toms, J. Bartlett, L. Freund, C. Dufour, S. Szigeti, ACM SIGIR 2004 Workshop on "Information Retrieval in Context", July 25-29, Sheffield, UK

From a research perspective, all of these factors and their elements potentially impact search, and this list is by no means complete. The challenge is to identify the ones that have the most significant impact.

Context capture and adaptive systems

In order for adaptive systems to be effectively used it is important to build the trust from the users. Among other elements, accuracy and consistency are key elements to build the trustful relationship between the users and adaptive systems, highlighting the importance of leveraging contexts to achieve it.

Regarding the context, we can consider the following key questions: (1) “what are elements of contexts, which are potentially significant to IR?”, (2) “which of these elements are, or could be useful in improving IR?”, (3) “how can features of context be used to improve IR?”.

The elements of context features depicted include Work of daily-life task or interest features, searcher features, interaction features, system features, document features, environmental or physical features, and temporal features. A long term goal of the research is therefore to study the methodology of capturing these features accurately, of leveraging the features to be adaptive, and of evaluating the significance of the features in appropriate tasks and contexts. Finding the relationship (or dependency) of the features is also an important aspect of the research. Of particular interest is the implicit measure of relevance through the user interaction with system’s interface.

Studies show that while a range of implicit measures can be recorded through the interaction, the degree to which user behaviours implicate about object’s relevance varies. More importantly, the strength of relevance implication tends to be in inverse proportion to the frequency of occurrence of such behaviours. This leads researchers to investigate more frequently occurring interactions such as click-through data, reading (display time), and mouse operation. However these frequently occurring interactions are difficult to leverage as the relevance indication. More robust indication of relevant objects should be derived from effective use of multiple implicit measures of user contexts. Studies indicate that a particular sequence of interactions might be well associated with the contexts and relevance measures.

Another aspect of leveraging contexts is user profiling, especially in the form of collaborative filtering. Collaborative filtering is a process of exploiting existing user preferences to predict additional topics or products a new user might like. One of the issues in user profiling is how to capture the profiles. The most commonly used approach is to use explicit profile. In this approach users provide their interests explicitly. However, this approach has many shortfalls. Uses are reluctant o do his due to the cognitive issues associated and also due to uncertainty involved in this process. Another issue is that the profiles a temporal dimension. User interests change as the time goes by and it is difficult to capture this change. In addition, most profiling systems use a single profile corresponding to user interest, however, user interests encompass multiple facets.

CONCLUSION

To conclude, one can observe a "gradation" in the scientific partners' respective implication in the construction of an AmI system: not all the work conducted by each of those partners may *per* se be considered as consisting in the implementation of an AmI system. Lille's main focus is on the modelization and representation of the body; Amsterdam concentrates more specifically on the detection of facial expressions and their interpretations in terms of emotions, thereby complexifying the interpretative analysis of human motion and behaviours; finally, Glasgow's input allows the Miauce project to reach what is called AmI. The Glasgow team uses video streams generated by Lille and Amsterdam as inputs to analyse the human inside and in feed-back interaction with his context. The gradation amounts to a gradual shift and complexification of focus from the human body, conceived essentially as a physical body in movement, to the human body (face) perceived as the siege of emotions, and, finally, to the human person, captured in her societal context. The gradation attests of the developing construction by the technology of the interpretation and construction of meaning about and around the human action. It also attests to the uncertain and unpredictable character of the future applications of those technologies. Furthermore, each component of the technical apparatus carries specific assumptions about the relationships existing between the human being and his environment. It also demonstrates that the modelling process (from the body, the face and the connection with someone else) is always somewhat reductionistic as the technical options unavoidably imply reducing the complexity of reality.

CHAPTER 2:

THE AMBIENT INTELLIGENCE: FROM CONCEPT TO VISION

Abstract

"The most profound revolutions are not the ones trumpeted by pundits, but those that sneak in when we are not looking" (M. Weiser)

The MIAUCE project involves the development of technologies aimed at capturing on video streams and analysing multimodal interactions by users in a controlled environment Those multimodal interactions consist of eye gaze, eye blink, gesture and body move. The project can therefore be described as an instance of proactive computing [Tennenhouse, Want et al]. As described by L Venter, MS Olivier and JJ Britz (2005, p.1), "proactive computing envisions networks of computing devices, sensors and actuators that dynamically configure and maintain themselves, monitor the environment and respond to or even adapt to the environment. They may even change the environment itself. These networks of devices will operate with very little human supervision. As such they will no longer be interactive and can therefore operate at faster-than-human speeds." This in turn leads to the concept of ambient intelligence. Although we acknowledge that the MIAUCE project is far from reaching the characteristics of AmI, and that its technical and industrial objectives are not going as far as the realization of a genuine AmI system, they nonetheless constitute technological and industrial developments that are clearly inscribed in the long term perspective of realizing an AmI system. The unpredictability of the developments in such forefront researches makes it crucial to adopt a prospective attitude in the ethical, legal and social analysis. A prerequisite to our attempt to define the conditions that should preside to an ethical assessment in the Miauce project was to avoid a technological deterministic posture. This could only be done through a preliminary exploration of the historical, social, and political emergence (the 'genealogy') of those proactive techniques. Although we realize that this may at sight appear to the reader as an expendable detour, this historical and socio-political analysis is what allows us to reaffirm that technique by itself is not determining how the society is like. *On the contrary we will demonstrate that those proactive techniques came historically after a societal vision which was developed by their promoters and by science policy makers before their actual technical implementation. The demonstration, even if based on mere reminders of known facts, is fundamental: it emphasizes that, notwithstanding the impressive pace of technological developments, we remain free and keep full responsibility to define ourselves the meanings of the techniques we are equipping ourselves with.*

It is thus the objective of this second chapter to define the AmI concept, and to recall its historical and political roots. It is not intended, in this chapter, to provide a systematic and exhaustive account of the AmI concept nor to outline the official EU position about the development of AmI technology. Our aim here is merely to provide a historical sketch of its emergence and development, as to contextualize the

contemporary technological visions, and to expose, through the analysis of some previous projects in the field, the various visions encompassed under the guise of AmI.

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2.1 - THE AMI ‘CONCEPT’

2.1.1 – General definitions

“Ambient Intelligence refers to an exciting new paradigm in information technology, in which people are empowered through a digital environment. This digital environment is aware of their presence and context and is sensitive, adaptive and responsive to their needs, habits, gestures and emotions.”(The Ambience Project)

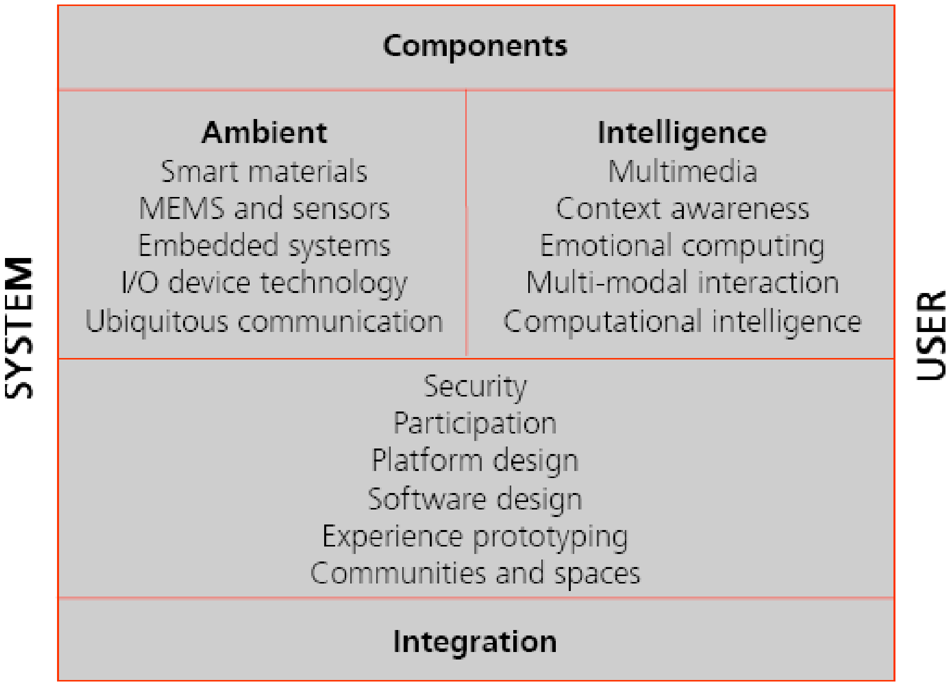
Components
Ambient
Smart materials
MEMS and sensors
Embedded systems
I/O device technology
Ubiquitous communication
Intelligence
Multimedia
Context awareness
Emotional computing
Multi-modal interaction
Computational intelligence
Security
Participation
Platform design
Software design
Experience prototyping
Communities and spaces
Integration
SYSTEM
USER

Fig. 1 - ambient intelligence concept: presentation of its components (Bullinger Hans-Jörg, ppt)

As underlined by the AmiGo white paper on mobile intelligent ambience titled *Ambient Intelligence to go* edited by Stefan Holmlid and Andreas Björklind “One common vision for ambient intelligence is that the user is provided with applications and services with which s/he interacts in an enjoyable and unobtrusive manner. All senses are supposed to be supported and utilized in this interaction, and applications and services should be consistent, easy to handle and easy to learn. This vision can be used for technology centred as well as user centred research and development. One way of trying to define the field is to take the networks that will surround us as a starting point. The central idea of these networks is to create environments in which people are surrounded by intelligent intuitive interfaces that are embedded in all kinds of objects. It is an environment that is capable of recognizing and responding to the presence and actions of different individuals in a seamless, unobtrusive and often, invisible way using several senses" (Holmlid and Björklind, 2003, p.18).

The term *ambience* is defined by Merriam-Webster's dictionary (Mish and Morse eds., p. 36) as "existing or present on all sides" and in AmI concept refers to the environment and considers the needs of digital devices to be embedded and integrated into the environment of the user. *Intelligence* refers to the fact that the digital surroundings exhibit specific forms of intelligence or interaction: it should be able to recognize the people that live in it, adapt themselves to them, learn from their behaviour, and adapt themselves to them. Consequently, it promotes the integration through large-scale embedding of electronics into environment, context-awareness through user, situation and surroundings, adaptation and anticipation through the multiple processes of user – interface interaction. Ambient Intelligence as developed in the ISTAG report provides a vision of the Information Society where the emphasis is on user friendliness, efficient and distributed services support, user-empowerment, and support for human interactions. It claims to place the user at the centre of future development. It provides guiding principles for how technologies 'should' be developed, thereby implying that in current-day technology development, this is not the case:

Technologies should be designed for people rather than making people adapt to technologies. AmI should also be unobtrusive, often invisible: everywhere and yet in our consciousness nowhere unless we need it. Interaction should be relaxing and enjoyable for the citizen, and not involve a steep learning curve (ISTAG 2001:11).

In short, AmI implies a shift towards 'human centered computing. Concerning the vision of Ambient Intelligence, it is fundamental to underline that many different shifts are assumed:

- "A shift in computing systems from mainframe computing (1960-1980) over personal computing (1980-1990) and multiple computing devices per person (PC, phone, PDA, etc.) (2000 onwards) to invisible computing (2010 onwards).[6]
- A shift in communication processes from people talking to people over people Interacting with machines to machines/devices/software agents talking to each other and interacting with people.
- A shift in using computers as a tool to computers performing tasks without human intervention.
- A decoupling of technological artifact and its functionality/use to multi-purpose devices/services.
- A shift in accessibility and networking from on/off over may access points to always on, anywhere, anytime." (Punie, EMTEL2 p. 12)

Table 1- Different shifts implied by the AmI vision

Those shifts and the vision that is underlying the Ami concept are far-reaching and encompassed different techniques and vision that have recently converged.

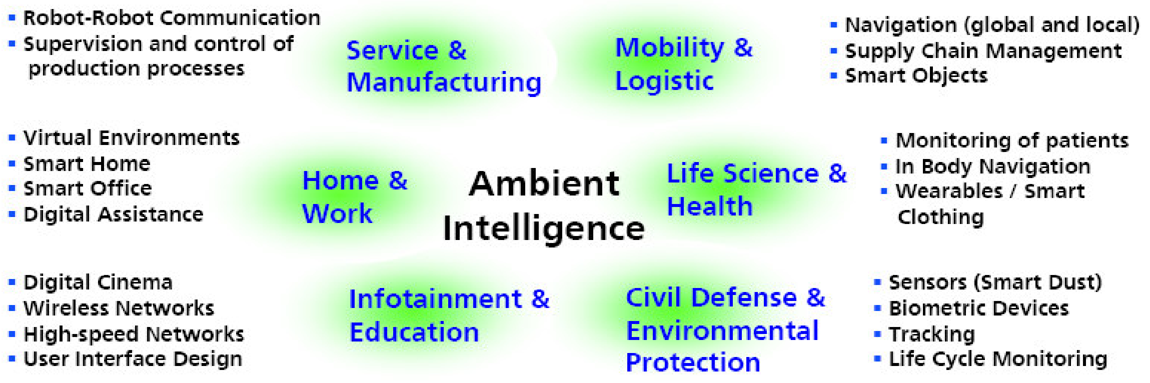
Robot-Robot Communication
Supervision and control of production processes
Service & Manufacturing
Mobility & Logistic
Navigation (global and local)
Supply Chain Management
Smart Objects
Virtual Environments
Smart Home
Smart Office
Digital Assistance
Home & Work
Ambient Intelligence
Life Science & Health
Monitoring of patients
In Body Navigation
Wearables / Smart Clothing
Digital Cinema
Wireless Networks
High-speed Networks
User Interface Design
Infotainment & Education
Civil Defense & Environmental Protection
Sensors (Smart Dust)
Biometric Devices
Tracking
Life Cycle Monitoring

Fig. 2 – AmI field (Bullinger , ppt)

The Ambient Intelligence concept was defined by the Advisory Group to the European Community's Information Society Technology Program as "the convergence of ubiquitous computing, ubiquitous communication, and interfaces adapting to the user" (Intelligent User Interfaces) (Gupta, M. (2003) .

- **Ubiquitous Computing: The ubiquitous computing concept was** coined by Mark Weiser (Weiser, 1991) who defined "Ubiquitous computing as the method of enhancing computer use by making many computers available throughout the physical environment, but making them effectively invisible to the user" (Weiser, 1993). The ubiquitous computing concept is very often associated with the *Calm Computing* concept. The calm computing concept itself can be referred to the calm technology concept.

Calm technology can be specified as having three characteristics:

"**Calm technologies shift the focus of our attention to the periphery.** This technological orientation can be achieved either by smoothly and easily shifting from the centre to the periphery and back, or by transferring more details to the periphery. An example is a video conference that, by comparison to a telephone conference, enables us to attune to nuances of body posture and facial expression that would otherwise be inaccessible.

1. **A technology is calm when it increases peripheral perceptions** with direct implications on our knowledge, which increases abilities to act adequately in various circumstances without being overburdened with information. Thus, the use of calm technology develops a pleasant environment.
2. **Technological connectivity** enables a quick anchoring in certain circumstances against the background of a quick shifting from the centre to the periphery of our attention, which determines a quick perception of the past, present and future of the subject. This characteristic leads to what Weiser and Seely Brown call "locatedness"(Turgui, 2004, p.11).

Table 2- Calm technology characteristics

As recalled by Alexandru Tugui (Tugui, 2004,p.2) "the idea of calm technology originates in the publication of the book "Designing Calm Technology" by Weiser and Seely Brown in December 1995 " (Weiser and Seely 1995) and 1998, when Weiser coined the term "Calm Technology" to honour the fact that what he wished for the future was to focus on designing technology that would act in the periphery for us. As he stated in a keynote speech "Unlike ubiquitous computing, 'calm technology' *does not name a method, but a goal..*"

These publications laid the conceptual basis of a future society dominated by *calm technologies and the Internet",* a vision which assumes that computers should disappear into the "background" of our architectural space and easily switch between the centre and the periphery of our attention much like ambient displays. It refers" to omnipresent computers that serve people in their everyday lives at home and at work, functioning invisibly and unobtrusively in the background and freeing people to a large extent from tedious routine tasks. The general working definition of ubiquitous computing technology is "any computing technology that permits human interaction away from a single workstation" (Kovács. and Kopácsi 2006, p.45) and includes the integration of microprocessors into everyday objects like furniture, clothes or toys.

The "calm computing concept" seeks to apply those characteristics to the computing field. The focus here is not, as in the case of ubiquitous computing, on technology but on human. There is a transition from technology-centred work to human-centred work. The term *calm computing* describes the role of user face to AmI. It is not a matter of size or a challenge of seamless integration of hardware; it's about the human perception of the computer: the user – interface interaction has to be seamlessly integrated with the primary task of the user. The user still interacts with the tools that help them to do a certain job, but their focus is on the task itself. This is in contrast to typical usage of a computer as a tool, where the focus usually ends on the computer not on the task. In a ubiquitous and calm computing world, "everyday objects will be augmented with sensors and/or activators in order for them to be able to sense physical activity and consequently, to act or communicate this information" (Holmlid and Björklind, 2003, p. 40).

- **Ubiquitous Communication** should enable these objects to communicate with each other and with the user in an easy and transparent way. As underlined by Punie (Punie, EMTL2, p.41), "for such a heterogeneous distributed system, computing nodes may join or leave the network at any moment and then becoming unreachable due to users' mobility, energy sources depletion, intermittent failures, etc. Consequently, designing embedded systems for such environments characterized by high volatility of the network topology is going to be very different compared to standard practice in digital design. It implies a lot of flexibility and adaptability on the part of the appliances and the networks. Also, it will put a high emphasis on the aspect of interoperability and standards (Lindwer et al. 2003, ITEA 2001: 60-63).

Within an AmI environment, a seamless interoperability between different network levels needs to be realized. Generally, the following network levels are to be identified:

- Body area network (BAN) connecting sensors, chips or devices attached to the body/clothes or implanted in the body;
- Personal area network (PAN) consisting of personal and/or shared devices or peripherals;
- Local area network (LAN) for the nomadic access to fixed and mobile networks, and to the Internet;

- Wide area network (WAN) for the access and routing with full mobility;
- The "Cyberworld" where users and their intelligent agents (avatars) interact.

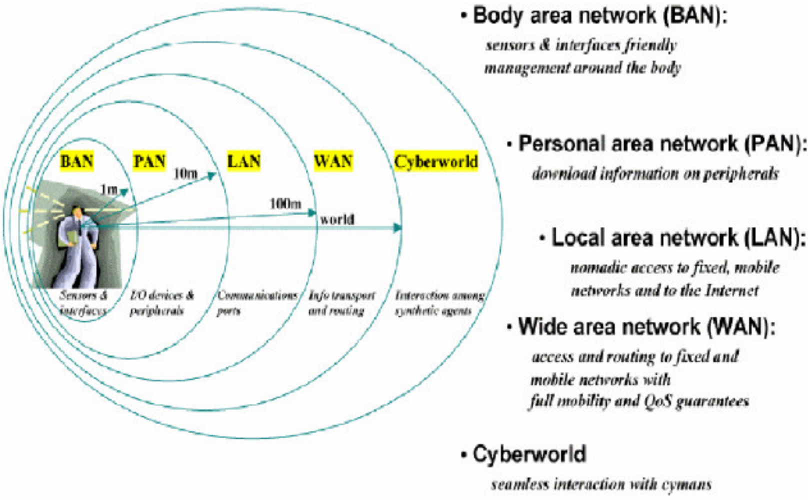
BAN
PAN
LAN
WAN
Cyberworld
1m
10m
100m
world
Sensors & interfaces
I/O devices & peripherals
Communications ports
Info transport and routing
Interaction among synthetic agents
• Body area network (BAN):
sensors & interfaces friendly management around the body
• Personal area network (PAN):
download information on peripherals
• Local area network (LAN):
nomadic access to fixed, mobile networks and to the Internet
• Wide area network (WAN):
access and routing to fixed and mobile networks with full mobility and QoS guarantees
• Cyberworld
seamless interaction with cymans

Fig. 3- Communication network levels in AmI

The model is proposed as a reference model for the interaction between the user and the surrounding technologies" (Riva et al., 2003, p.12)".

- **Intelligent User Interface:** the Intelligent User Interface should enable the inhabitants of the AmI to *control* and *interact* with the environment in a natural and personalized (preferences, context) and easy way. Enabling flexible and natural communication with the computing environment or with other users. The affective computing field will certainly help to develop new interaction between computer and people. The affective computing concept created by Picard (Picard, 1995) can be specified as" *human-computer interaction* in which a device has the ability to detect and appropriately respond to its user's emotions and other stimuli. A computing device with this capacity could gather cues to user emotion from a variety of sources. Facial expressions, posture, gestures, speech, the force or rhythm of key strokes and the temperature changes of the hand on a mouse can all signify changes in the user's emotional state, and these can all be detected and interpreted by a computer. A built-in camera captures images of the user and *algorithms* are used to process the data to yield meaningful information. *speech recognition* and *gesture recognition* are among the other technologies being explored for affective computing applications."(Whatis?com definition)

According to the affective computing lab of the MIT: the affective computing research aim to: "(1) Designing new ways for people to communicate affective-cognitive states to machines, especially through creation of novel wearable sensors and new machine learning algorithms that

jointly analyze multimodal channels of information; (2) Creating new techniques to assess frustration, stress, and mood indirectly, through natural interaction and conversation; (3) Showing how computers can be more emotionally intelligent, especially responding to a person's frustration in a way that reduces negative feelings; (4) Inventing personal technologies for improving self-awareness of affective state and its selective communication to others; (5) Increasing understanding of how affect influences personal health; and (6) Pioneering studies examining ethical issues in affective computing." (http://affect.media.Mit.edu/)

Table 3- Affective computing research aim

Further developing these points, ISTAG introduced the concept of *AmI Space (ISTAG, 2002)*. The Ami Space is composed of *networked* (using a changing collection of heterogeneous network) *embedded systems* hosting *services* which are dynamically configured distributed components The *AmI Space* can be seen as the integration of functions at the local level across the various environments, and enables the direct natural and intuitive dialogue of the user with applications and services spanning collections of environments - as well as at the cyberspace level - allowing knowledge and content organization and processing.

In particular they should offer capabilities to: • *Model the environment and sensors available to perceive it*, to take care of the world model. This deals with the list of authorized users, available devices, active devices, state of the system, et cetera. • *Model the user behaviour* to keep track of all the relevant information concerning a user, automatically builds the user preferences from his past interactions and eventually abstracts the user profile to more general community profiles. • *Interact with the user* by taking into account the user preferences. Natural interaction with the user replaces the keyboard and windows interface with a more natural interface like speech, touch or gestures. • *Control security aspects* to ensure the privacy and security of the transferred personal data and deal with authorization, key and rights management. • *Ensure the quality of services* as perceived by the user

Table 4- AmI space capabilities

This world where computing devices are everywhere communicating between them and with human being can be also characterized by the word pervasive computing which mustn't be confound with the ubiquitous computing concept. *Pervasive* and *ubiquitous computing* (for details about ubiquitous computing, see Schmidt, 2002) are notions that are often used together, but describe different situations. Pervasive is used in the sense of information and communication technologies that are "everywhere, for everyone, at all times" (Centre for Pervasive Computing), whereas ubiquitous refers to computers that are disappearing and becoming invisible (UbiComp conference 2001).

The main assumption that we can assume is that the AmI tends to approach a kind of 'naturality': the AmI *dispositif* requires to be felt as natural as possible. Indeed, due to the visions related supra, the objectives of AmI seem to become a part of the nature, the environment of the people. This vision is far-reaching and embraces some phantasms of transformation and appropriation of Nature (Holm Sørensen, 2004).

From a technological perspective, the following 'Key Enabling Technologies' are generally considered as a basis for the emergence of an intelligent environment:

* Embedded Intelligence
* Middleware and distributed systems
* IP mobile and wireless
* Multi-domain network management
* Converging core and access networks
* Micro and opto-electronics
* Trust and confidence enabling tools
* Cross-media content
* Multi-modal and adaptive interfaces
* Multi-lingual dialogue mode.

2.1.2 – Fundamental core technology at the source of AmI development

At the most basic level, AmI is enabled by three fundamental core technologies: cheap, low-power computers, a network that ties them all together and software systems implementing ubiquitous applications. With AmI systems, computing is reaching a new level of complexity, which poses challenging research efforts for their robust operation. When developing such systems, the scientist and engineers have to face with the following peculiarities[21] :

- **« AmI systems are embedded**
  This means that they are an integral part of surrounding applications which they control. People using the application are usually unaware of the existence of embedded systems, i.e. an AmI system cannot be accessed by humans in the traditional way by a key board, mouse and screen.

- **AmI systems are mobile**
  AmI systems are usually part of a moving application, e.g. a person, a car, a bicycle or a mobile robot. This poses the general problem of continuous electric power supply if the application requires non-stopping operation. It also poses the problem of network connectivity. AmI systems can never rely on a stable network platform with guaranteed connectivity to other network nodes. Instead,

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[21] Those peculiarities are taken from Belami project definition http://www.belami-project.org/definition

AmI nodes will form so called *ad-hoc*-networks which are dynamically formed by all AmI nodes having direct or indirect connectivity to each other.

- **AmI systems are distributed**

An AmI node receives its intelligence from its interaction with other AmI nodes in its direct neighbourhood by exchanging useful information and services with them. As such, all AmI nodes which potentially cooperate to fulfil their mission constitute a distributed system interacting via ad-hoc-networks.
AmI systems heavily rely on environmental information.
Environmental information concerns facts and objects in the surrounding neighbourhood of an AmI node such as buildings, cars, people, barriers, temperature, etc. The detection and interpretation of such environmental information require appropriate sensor interfaces. Sensors may be grouped to form intelligent sensor Network.

- **AmI systems communicate spontaneously and without explicit order**

AmI systems are under continuous pressure to keep their internal information cache up-to-date and comprehensive in order to fulfil their mission. This requires using every opportunity to get in touch with other AmI nodes joining the same *ad-hoc* network and exchange useful information with them.

- **AmI systems have unconventional human-computer interfaces**

Being embedded systems, AmI systems interact with humans via the application they control. The application dictates the necessary way of interaction between the AmI system and the human and requires unconventional interfaces which are customized for the given application scenarios. For example, let us consider a smart blind stick. A smart blind stick communicates with AmI systems in its neighbourhood in order to detect the next safe road crossing. As soon as this information is available, the smart blind stick sends a message to a voice generation component which sends the voice output to the earphones of the handicapped person. It is obvious that it would not make any sense in this application scenario to send this information as text to a screen. In general, AmI systems communicate with humans in the most natural way. This dictates voice and gestured input/output as the preferred media.

- **AmI systems have to be highly adaptive**

Because of missing stable connectivity to services and information sources in ad-hoc networks, AmI systems can never base their operation on the availability of complete and up-to-date information and services. This has the consequence that AmI systems have to organize their services in an adaptive way, i.e. the degree of service varies with the amount of information available and the reach-ability of external services.

- **AmI systems are of highly heterogeneous nature**

In AmI distributed systems, communication requirements can range from few bit/s to several Gbit/s, computational requirements from some kop/s to several Top/s and the power requirements from microwatt to watts. To face this problem AmI architectures are layered architectures i.e. they are based on different types of nodes with various communication bandwidth, signal processing capabilities, and power constraints, respectively. Moreover, AmI nodes from different vendors will frequently join the same ad-hoc network. These nodes are usually based on different processors, operating systems and application software approaches, i.e. we are faced with a highly heterogeneous nature of distributed AmI systems. This poses a challenging burden on the development of international standards for protocols and interchange data formats in order to retain node interoperability".

At the most basic level, AmI is enabled by three core technologies: cheap, low-power computers, a network that ties them all together and software systems implementing ubiquitous applications. However, there are many permutations of these technologies, including RFIDs and their readers, sensors, actuators, displays, power sources, including those that ‘‘scavenge’’ power, etc. As a result, one ends up with many heterogeneous components in diverse networks which somehow have to interconnect as part of vast new architectures enabling context awareness, machine learning and personalisation of services on a hard-to-imagine scale

Synthesis:

- AmI is more a vision of the future than a reality
- Obviously Ami is not just a new techniques it encompasses a new conception of the relation between human society and techniques
- AmI is related to new vision of society promoting techniques which is focuses on people, not technologies
- AmI results of the convergence of three trends: "ubiquitous computing" “Ubiquitous Communication” and " Intelligent User Interface

From those analyses, AmI techniques appear as a technology which implies some conceptions of the society in which technology is seen as a means to enrich and facilitate our daily life. However the conception of the society emerging cannot be simply considered as a result of technical mutations. AmI technical development is the result of many discourses, visions, utopias that are supported in order to promote a new kind of society. It is possible for that reason to consider the ‘Ambient Intelligence’ concept as a *dispositif*[22]. According Foucault (Foulcault, 1977, p. 299 sq) and Agamben (Agamben, 2007), in a broad meaning a *dispositif* could be understood as an heterogeneous unit, which includes each thing virtually, that it is discursive or not: speech, institutions, buildings, laws, administrative rules, scientific assumptions, philosophical proposals... It concerns as much what is said than what is not said. The *dispositif* functions as network between these elements. It has a concrete strategic function and always fits in a relation of being able like such, it results from the crossing of the relations of power and knowledge. The *dispositif* is a whole of praxis, knowledge, institutions whose the goal is to manage, govern, control and orient human behaviours, gestures and thoughts. Therefore, it always implies a process of subjection for the people embedded in.

The ‘Ambient Intelligence’ concept can be considered according to the proposed definition of the “*dispositif concept*” as a *dispositif*, because even if it is a technical concept born from the convergence of several computing techniques, it is also the convergence of what each technology produces as a unit of senses and social significations; it raises some visions. The genealogy of the visions of AmI will demonstrate that those visions are far-reaching and all encompassing. They assume a paradigmatic shift – not only in computing, but also in society – towards what is described as "human-centred computing" where the emphasis is on user-friendliness, a shift that was portrayed in industrial and political vision.

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[22] “The concept of an *episteme* is insufficient and dispositif fills in the gap. An episteme is researched through the analysis of discourse (text), but there are practices (institutions, architectural arrangements, regulations, laws, administrative measures, scientific statements, philosophic propositions, morality, philanthropy) in addition to discourse which we may use to do a genealogical analysis of some particular situation (Dreyfus, Hubert L. & Rabinow, Paul. (1982). *Michel Foucault: beyond Structualism and Hermeneutics*. Chicago: The University of Chicago Press. p.121). These practices form an intensified surveillance and control mechanism, creating policy which polices and disciplines and which leads to resistance among certain groups” Dictionary for the Study of the Works of
Michel Foucault
http://users.california.com/~rathbone/foucau10.htm#episteme

2.2 - GENEALOGY OF THE AMI CONCEPT AND TECHNOLOGY

2.2.1 – The normativity of AmI visions

Traditionally when talking about the relation between technology and society there is a general tendency to think that technology determines the society, it is the so called technological determinism – the focus here is on technology. This technological determinism is in particular obvious in the discourse surrounding the promotion of a new technology. When one seeks to bring a new technology into fashion, revolutionary and positives social changes are promised and promoted. The problem with these visions is that they are, for the most part, technologically deterministic. Technologies are supposed to impact directly on society by causing social change (for the better). In the case of the Ami even if there is still the fundamental believe that technology can transform and shapes the society, Ami vision is, from the start, human centred[23] as we will put in evidence in the next paragraphs concerning the genealogy of the Ami concept. From the first evocation of the concept and its associated techniques as underlined by Punie "it also proposes to embed IST RTD in its socio-economic and user context." AmI being more a vision of the future than a reality, a vision that is promoted by scientists, companies and institutions, *AmI vision implies a normativity that has to be acknowledged.* AmI implies a certain conception of what must be the world. Being a vision concerning the future, this normativity is normal but to understand it, that is to say to make explicit what is implicit in the industrials and scientists' Ami vision, its history and context of development should be recalled. In the following section of this chapter we will summarized the genealogy of the AmI concept having as objective to underline the visions associated with it and their meaning, consequences and limits.

The Ambient Intelligence vision is not recent. As recall by B. van den Berg (van den Berg Bibi), it fits into a historical line of technological visions that has started in the late 1980s and early 1990s. In the United States Mark Weiser (Weiser, 1991, 1993), chief scientist at the Xerox Palo Alto Research Center (PARC) in California, first spotted in 1991 this future world vision. He published a paper in Scientific American, which spoke of a third generation of computing systems. Essentially, the vision described the historical transition from the large mainframe computers of the 1960s and 1970s to the detached desktop personal computer (PC) of the 1980s and 1990s, and finally toward the networked computing device of the future. Third generation computing was presented as an integrated system of advanced computing devices, intelligent interface design, and anytime, anywhere data communications (Weiser, 1991). He invented the term ubiquitous computing to describe an era when computers would vanish into the background. The article "The Computer for the 21st Century" (Weiser, 1991) grew to be a keystone in the foundation of Ubiquitous Computing research.

"The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it." (Weiser, 1991).

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[23] In the AmI case it is not the society that must adapted itself to the technique it is the technique that has to focus on human and society.

The central characteristics are that technology does not require active attention and is ready to use at a glance. The vision is that computers become a part of the "natural human environment" and that they "vanish into the background". These features are not only achieved by creating technologies but also by changing the way of life.

The idea of ubiquitous computing first arose from contemplating the place of today's computer in actual activities of everyday life. In particular, anthropological studies of work life (Suchman 1985, Lave 1991) teach us that people primarily work in a world of shared situations and unexamined technological skills. However, the computer today is isolated and isolating from the overall situation, and fails to get out of the way of the work. In other words, rather than being a tool through which we work, and so which disappears from our awareness, the computer too often remains the focus of attention. And it is true throughout the domain of personal computing as currently implemented and discussed for the future, whether one thinks of PC's, palmtops, or dynabooks. The characterization of the future computer as the "intimate computer" [Kay 1991], or "rather like a human assistant" (Tesler 1991) makes this attention to the machine itself particularly apparent.

2.2.2 – Weiser's conception

According to Weiser, "*Getting the computer out of the way is not easy. This is not a graphical user interface (GUI) problem, but is a property of the whole context of usage of the machine and the affordances of its physical properties: the keyboard, the weight and desktop position of screens, and so on. The problem is not one of "interface". For the same reason of context, this was not a multimedia problem, resulting from any particular deficiency in the ability to display some kinds of real-time data or integrate them into applications. (Indeed, multimedia tries to grab attention, the opposite of the ubiquitous computing ideal of invisibility). The challenge is to create a new kind of relationship of people to computers, one in which the computer would have to take the lead in becoming vastly better at getting out of the way so people could just go about their lives (…) The approach I took was to attempt the definition and construction of new computing artefacts for use in everyday life. I took my inspiration from the everyday objects found in offices and homes, in particular those objects whose purpose is to capture or convey information. The most ubiquitous current informational technology embodied in artefacts is the use of written symbols, primarily words, but including also pictographs, clocks, and other sorts of symbolic communication. Rather than attempting to reproduce these objects inside the virtual computer world, leading to another "desktop model" (Buxton 90), instead I wanted to put the new kind of computer also out in this world of concrete information conveyers. And because these written artefacts occur in many different sizes and shapes, with many different affordances, so I wanted the computer embodiments to be of many sizes and shapes, including tiny inexpensive ones that could bring computing to everyone*".

In short, instead of making technological devices ever more complex and difficult to use, what Weiser envisages is new kind of computer that allows easy natural human-computer interactions.

Research issues where interconnecting of devices is the central issue, is also associated with the term "pervasive computing" (Burkhardt et al., 2001). In his statement, Weiser identifies two crucial issues: physical location of the usage of such devices and the size and scale of the devices. The knowledge of physical location in later work referred to as "context awareness" is a very central concept to make devices adaptive to their physical environments, which seems central for interweaving the technology with its environment.

The concept of information appliances, as described by Don Norman in his book *The Invisible Computer* shows great similarities to Weiser's idea of Ubiquitous Computing (Norman, 1998). The idea of information appliances is generalized to the notion of an invisible computer, which is human-centred and task-oriented. However Norman's motivation and approach is very different as he is coming from a design and psychology background.

Weiser's vision has launched a number of less ambitious models, in particular the IBM pervasive computing vision (IBM. 1999), where computing function would be available whenever and wherever needed.

2.2.3 – Philips company's AmI concept

Philips Company developed the concept of AmI in a series of internal workshops, which aimed to investigate a number of different scenarios that would lead a high-volume consumer electronic industry from the current world, which was called fragmented with features into a world near 2020 with fully integrated user-friendly devices supporting ubiquitous information, communication and entertainment.

A Vision During the past decade, computer scientists have developed the notion of ubiquitous computing to situate a world in which it would be possible to have access to any source of information at any place at any point in time by any person. Such a world can be conceived by a huge distributed network consisting of thousands of interconnected embedded systems that surround the user and satisfy his needs for information, communication, navigation, and entertainment. This concept can be viewed as a first approach to the development of third generation computing systems, where the first and second generations are given by the main frame and the personal computer, respectively.

The ongoing distribution of storage and processing may move the computer as a standalone system into the background, yet maintaining its functionality as a computing device. This development provides the consumer electronics industry with a challenging opportunity by replacing the disappearing computer with a new user experience through the addition of ambience intelligence.

A New Paradigm: Ambient intelligence refers to the presence of a digital environment that is sensitive, adaptive, and responsive to the presence of people. Within a home environment, ambient intelligence will improve the quality of life of people by creating the desired atmosphere and functionality via intelligent, personalized inter-connected systems and services. Ambient intelligence can be characterized by the following basic elements: ubiquity, transparency, and intelligence. Ubiquity refers to a situation in which we are surrounded by a multitude of interconnected embedded systems.

Transparency indicates that the surrounding systems are invisible and moved into the background of our surroundings. Intelligence refers to the fact that the digital surroundings exhibit specific forms of intelligence, i.e., it should be able to recognize the people that live in it, adapt themselves to them, learn from their behaviour, and possibly show emotion

Table 5- Philipps "Ambient Intelligence vision" and paradigm (Aarts, 1999)

2.2.4 – The book of visions approach

In December 2000, industry leaders, Alcatel, Ericsson, Nokia and Siemens, announced the creation of "Wireless World Research Forum" (WWRF, 2001). The objectives of that forum were to formulate visions on strategic future research directions in the wireless field, among industry and academia, and to generate, identify, and promote research areas and technical trends for mobile and wireless system technologies. It is intended to constructively contribute to the work done within the UMTS Forum, ETSI, 3GPP, IETF, ITU, and other relevant bodies regarding commercial and standardisation issues derived from the research work.

The work on "Visions of the Wireless World" began to be supported by the European Commission under the IST programme, contract number 1999-12300, the Wireless Strategic Initiative (WSI). The "Book of Visions" (WWRF, 2001) was born from that encounter and provides a vision of our technological future. The first version of the Book titled *Visions of the Wireless World An invitation to participate in the making of the future of wireless communications* appeared in 2000.

The introduction of *the book of vision* acknowledges:" At this early stage of reflection one can only express a feeling that a driving and shared vision is needed, rather than to spell out the vision in detail. The success of mobile communications so far has been made possible only by shared and stable visions and principles, at the system level and among a wide set of players.

It has become clear in the discussions that the development of a purely "technical" vision, debating, say, new network concepts or radio interfaces, will not be sufficient to come to grips with the future[24]. Rather, such a technical view has to be complemented by:

- An user centred approach, looking at the new ways users will interact with the

  Wireless systems

- New services and applications that become possible with the new technologies,
- and new business models that may prevail in the future, overcoming the by now traditional user, server, provider hierarchy.

It is expected that the major innovative thrust will come from new ways of interaction with the system or among systems."(Visions of the Wireless World, 2000,pp.1-2)

Doing so it settle one of the main characteristic and approach of the AmI development, the necessity to complement the technical development by societal, political and economic vision.

"Through a Think Tank approach, independent experts called by the project WSI (Wireless Strategic Initiative) have met to bring together experts of a wide variety of domains, to explain their individual area's of expertise vision of evolution and to address the question of a common Wireless World vision at the same time. This approach has been accompanied by an open call for contributions. The result is a number of ideas, evolution roadmaps and research issues put together in this report. The exercise of summarizing key issues of the Wireless World from a number of complementary perspectives has revealed a number of common themes (like ad-hoc configuration, multiple radio environments integration and multihop capabilities) but also shown the need for a consistent system (or world) level approach driving the definition of the Wireless World to come." (Visions of the Wireless World 2000, p.2)

It described five 'MultiSphere' levels (Personal Area Network (PAN), The Immediate Environment, Instant Partners, Radio Accesses, Interconnectivity, CyberWorld[25]) a very flexible and seamless interoperation of many different devices on many different networks, as a key requirement that there is a set of common platforms or de facto standards to permit this interoperation to take place. The scale of this issue is highlighted by examining the levels of interaction that may occur between the user and the technology within this AmI context.

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[24] underlined by the author of the deliverable

[25] For a detailed description of those different multispheres see WWRF (2001., pp. 4-7)

2.3 - THE PROMOTION OF AMBIENT INTELLIGENCE IN EUROPE[26]

2.3.1 - The European framework program

As underlined by David Wright in his article titled "*The dark side of Ambient Intelligence*", the principal AmI sponsor in Europe has been and continues to be the European Commission. In pursuit of the Lisbon strategy to become an inclusive, dynamic, competitive and secure knowledge-based society, the European Union by the means of the FP5 provided important foundations for the vision of ambient intelligence, upon which the work in FP6 is being built. Industry, universities and some member states have also devoted time and money to AmI research, but by far the biggest sponsor has been the Commission, notably under its Fifth and Sixth Framework Programmes (FP5, FP6). Since the 1999 IST Programme Advisory Group (ISTAG) vision statement for Framework Programme 5 challenging to create an AmI landscape for seamless delivery of services and applications in Europe, it rapidly became widely embedded in the work programme for years 2000-2001. The FP6 is the Union's main instrument for funding of research in Europe. The specific programme aiming at integrating European research (the largest component of FP6) defines Information Society Technologies (IST) as a thematic priority with the objective to ensure European leadership in the generic and applied technologies in the heart of the knowledge society. FP6 cover the time horizon 2002-2006. In this FP, AmI is also recognised as one of the key concepts related to Information Society since the European Union has set the principal focus for its FP6 Information Society Technologies (IST) program on the creation of this AmI world. Of the 60 EC-sponsored projects which SWAMI partners have reviewed, the largest project in euro value has a budget of e24 million and the smallest had a budget of e200,000. The average value was e4.7 million. Based on the 'ubiquitous computing' vision from Weiser, the AmI *dispositif* or paradigm is supposed to be more human-centred. The Framework Programme emphasises the importance of taking the human dimension into account in AmI. In doing so, it echoes the eEurope 2005 and the 2010 Action Plans which underline that Europe should have a secure information infrastructure. To that end, they identify priorities for FP6 and FP7 as including trustworthy network and information infrastructures with an emphasis on emerging technologies like ambient intelligence which in the FP evolution has acquired an obvious importance.

2.3.2 – AmI's presentation, representation and challenges for Europe

AmI is generally presented as a paradigm[27] and [28] easily accepted by the majority. The information technology evolves at an incredible pace. This development can nevertheless raises fears and social acceptance issues. In general lack of trust due to their apparent complexity, the problem of violation of privacy may threaten the introduction of these technologies into our day-to-day life and put in question their social acceptance. Ambient Intelligence is conceived as a way to remove some of the barriers for the acceptance of new technologies and thus challenges current thinking on use and acceptance of ICTs. The vision of Ambient Intelligence has been conceptualized from the initial and first rapports and propositions as a mean to provide an answer to this general problem of trust and social acceptation and acceptability of the new information techniques. As underlined by Bohn (Bohn et al., 2004, p.2) AmI was from the start oriented towards the public as well as the private, the personal as well as the commercial, and as a technology that will accompany us throughout our entire lives, day in and day out. It is perceived as a way of making our whole lives relaxing and allows overcoming the barriers of time and space: one can communicate what, where, with whom and when we want, and it makes the environment functional to human (communication) needs and not vice-versa. So, AmI being context aware, facilitating human contact, being orientated towards community and cultural enhancement, helping to build knowledge and skills for better quality of work, citizenship and consumer choice, inspiring trust and confidence, being conceived as consistent with long term sustainability –personal, societal and environmental -and with life-long learning, being ‘convivial’, easy to live with be controllable by the user was perceived as a really promising technology allowing to resolved the problem of social and human acceptation of new IT technology.

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[26] For more details, see: Aarts, E. and Encarnaçao (J.L) (Eds) (2006, especially pp. 17-33). Burgelman, J.-C. & Punie, Y. (2006).We focussed on the European context but of course AmI has attracted a lot of interest outside Europe, in the USA, Japan and other countries, from their governments, industry, universities, research institutes and other stakeholders. (see for a survey of ambient intelligence research in Europe, the USA and Japan: Wright David (2005) The dark side of ambient intelligence, *The journal of policy, regulation and strategy for telecommunications*, VOL. 7 NO. 6 2005, pp. 33-51, This paper references only a limited set of the research projects being carried out in Europe, the USA and Japan. More detailed information can be found on the SWAMI web site (http://swami.jrc.es)

[27] See for example Burgelman (2004).

[28] "AmI promises to transform the role of information and communication technologies (ICTs) in society and ultimately, to transform the way people live, work, relax and use their leisure time. "It is probably one occasion where the overused phrase 'paradigm change' is appropriate" because it implies a radical shift in such dimensions as the users of the technology, its incorporation into different spheres of living and working, the skills required, the

Indeed, AmI should offer attractive and helpfulness technologies concerning the future needs and challenges for Europe, because it is confronted to doubling of its customers and citizens, manage deep socio-economic differences (East/West, cities/regions, etc.), extreme cultural and religious diversity, a mosaic society and the increase of ageing population, a costly healthcare. Another challenge is the global competition, the needs for flexibility and mobility in the organisation of labour and living in order to be competitive, a prospective of a move from a 9 to 5/5days a week to 24/7 society, of a customised citizenship and of a increasing desire of societal and individual security.

Five domains of application for the AmI were underlined by Burgelman (Burgelman 2004):

- “1.Culture: culture and language specific PtoP media environments rather than uniform broadcasting
- 2.Work: Mobile/adaptive environments for work and living as people don’t want to move in Europe.
- 3.Living: Networked individuals/ virtual communities rather than individualizing networking.
- 4.Health: The empowered patient: using connectivity to “cure” rather than relying on clinical treatment alone
- 5.Administration: customer/citizen-specific governance rather than “one stop shop” approach
- AMI addresses socio-economic realities in an innovative and ``Euro`` way”.

In conclusion of its presentation Burgelman (2004) underlines four core pillars of the EU model of IST development: growth/employment, solidarity, maintenance of equal opportunities and sustainability. This importance of IST and more specifically of AmI was clearly underlined by the ISTAG analysis.

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applications and content provided, the scale and nature of the markets and the players involved (Miles et al. 2002: 4-9) cited by Punie in Punie Yves (EMTL2, p.12).

2.3.2.1 – ISTAG's analysis, vision and scenarios of Ambient Intelligence

a) Presentation and role of ISTAG[29]

In the European context, ISTAG, the European Information Society Advisory Group, a group of experts from both academia and industry advising the IST (Information Society Technology) program of the European Commission had an important role in the development promotion of the AmI vision.

"ISTAG has made consistent efforts for Information and Communication Technologies to get a higher level of focus and a higher pace of development in Europe. In 1999 it published a vision statement for the European Community Framework Programme 5 for Research and Technological Development (FP 5) that laid down a challenge to start creating an ambient intelligence landscape (for seamless delivery of services and applications) in Europe relying also upon test-beds and open source software, develop user-friendliness, and develop and converge the networking infrastructure in Europe to world-class.

Following this vision statement, AmI became broadly embedded in one of the funding instruments of the European Commission, i.e. the IST work programme for 2000 and 2001. To help further develop a better understanding of the implications of an Ambient Intelligence landscape, a scenario exercise was launched as a joint exercise between DG Information Society and the Joint Research Centre's Institute for Prospective Technological Studies in Seville. It reported to an ISTAG working group chaired by Dr Martin Schuurmans (CEO of Philips Industrial Research). The scenarios were developed and tested in two interactive workshops with over 35 experts. This report (ISTAG 2001) has in the meantime become a reference document in the field because it not only developed scenarios on AmI but also identified major key technologies, socio-political issues and a S&T research agenda.8 The IST Advisory Group continued to develop the vision of AmI in preparation of the next RTD Framework Programme (FP6). The report was published at a time when confidence in the ICT sector had been shaken, by the burst of the dot-com bubble, by the September 11 events and by a more general slow-down of the economy. Therefore ISTAG argued for an urgent need of targeted and far-sighted investments in ICTs and for FP6 to be a-cyclical: "Those who will come out strongly during the next 'upturn' will be those who have maintained their investment in innovation during the present phase of the cycle" (ISTAG 2002: 3-4). ISTAG anticipates that during the next ten years a new infrastructure paradigm will emerge: the 'Ambient Intelligence Space'. This is the collection of infrastructures technologies, applications and services that will enable the seamless interoperation of AmI applications and services. ISTAG (2002: 3) sees a real opportunity for Europe to establish a strong position in this new paradigm. In the report it makes ten recommendations to make this possible, ranging from mechanisms and methodologies to identify IST priorities over supporting activities for the realisation of AmI to targeted FP 6 efforts on the AmI Space.

Table 6 - ISTAG implication in the development of the European vision (Punie, EMTEL2, P.14)

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[29] For a detailed analysis of the ISTAG implication in the development promotion of the European AmI vision we refer to the deliverable wrote by Punie: (Punie,EMTEL2).

The vision of "Ambient Intelligence" as developed within the ISTAG reports is far-reaching and assumes a paradigm shift in computing from machine-centred towards human-centred computing. The ISTAG's AmI vision focuses on people, not technologies. Technologies will be designed *for people* rather than making people adapt to technologies. Ambient Intelligence as developed in the ISTAG report provides a vision of the Information Society where the emphasis is on user-friendliness, efficient and distributed services support, user-empowerment, and support for human interactions. It claims to place the user at the centre of future development.

Technologies should be designed for people rather than making people adapt to technologies. AmI should also be unobtrusive, often invisible: everywhere and yet in our consciousness nowhere unless we need it. Interaction should be relaxing and enjoyable for the citizen, and not involve a steep learning curve. [30]

b) The four ISTAG-Scenarios of Ambient Intelligence [31]

Those visions have been described in the ISTAG-Scenarios of *Ambient Intelligence in 2010*. The aim of the report was to describe what living with 'Ambient Intelligence' might be like for ordinary people in 2010. To reach this objective, ISTAG launched a scenario planning exercise in 2000. The scenarios were developed by the IPTS (part of the European Commission's Joint Research Centre) in collaboration with DG Information Society and with the active involvement of 35 experts from across Europe. This work results in the 2001 ISTAG report which developed four scenarios[32].

Maria is the business executive scenario where all communications and actions (private and public) necessary on a business trip are being taken care of and handled by a P-com (personalised ambient communicator) she wears on her wrist. The emphasis is on individual efficiency. No major changes in user behaviour are assumed.

Dimitrios wears a digital-me (D-me) that knows perfectly well his social and personal data and communication preferences and handles accordingly. The emphasis is on play and social interaction rather than 'efficiency'. The changes in behaviour relate mainly to the willingness to reveal (or disguise) personality on-line. Price could be a barrier to a break through to a mass market.

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[30] ISTAG (2001, p.11).

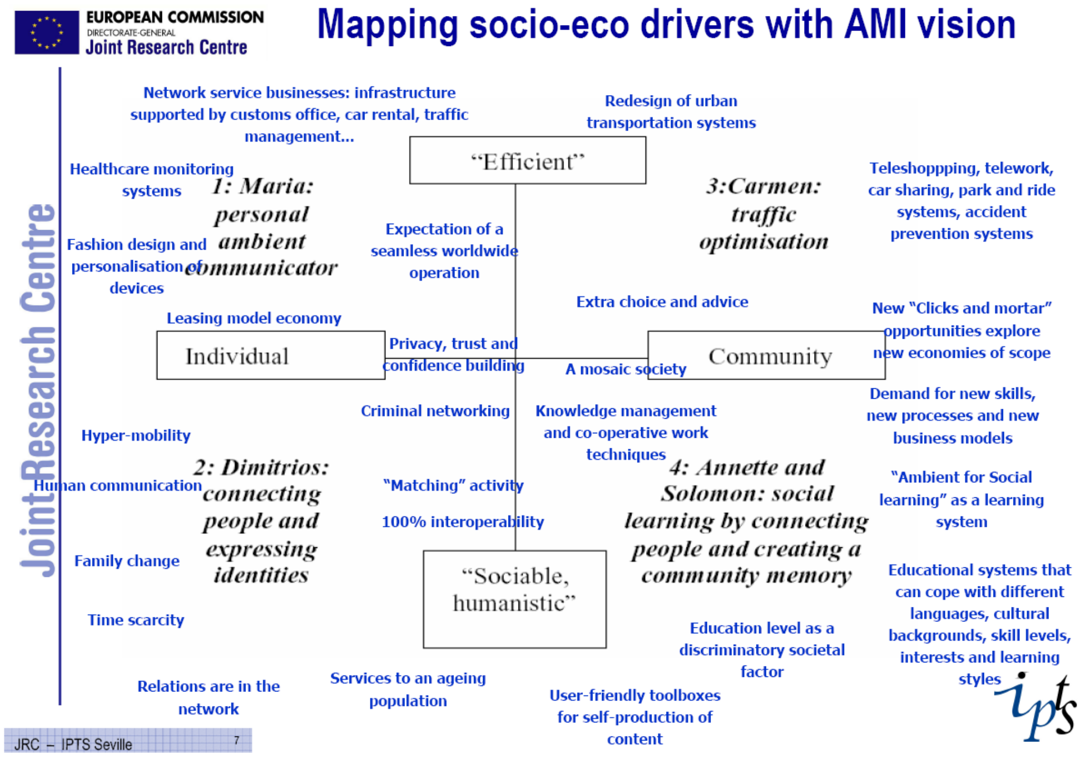
[31] See Friedewald and Da Costa (2003 a) and ISTAG 2001.

[32] It must be noted that constructing scenario will be a characteristic of the AmI policy development strategy. As noted by Michael Friedewald, Elena Vildjiounaite, David Wright by "Building scenarios is a useful tool for the development and application of new technology. Scenarios could be seen as akin to storytelling, as a way of projecting new situations showing the application and/or consequences of new technologies. Scenarios anchor the design process and, at the same time, are intended to provoke reflection on situations of use, both as they occur in the real world and in the future." (Friedewald et al., 2005, P.23) More generally The European Commission and research organizations, such as the WWRF, encourage scenario-based approaches for pushing the research in the right way (or more exactly in the direction that is normatively considered as the right way) Experts have to analyze the scenarios drawing consequences and future research topics. The main output of these modelling efforts will consist in the "pieces of technology" needed to provide the functionalities envisaged within the reference scenarios. The advantage of this strategy is also to delimit a priori a field of interest which can have as a possible result a cognitive closure… and a difficulty to consider alternative field of interest (we will put in evidence that the MIAUCE project is a paradigmatic case of that strategy)

Carmen is the scenario where AmI is used to optimise traffic and goods delivery by creating smart traffic and smart delivery in order to minimise ecological impact and maximise urban efficiency. Carmen is further out on the time horizon because it implies major infrastructure developments. It also makes significant assumptions about changes in public behaviour such as accepting ride shares and traffic management systems. Annette and Solomon use AmI to enhance the learning experience on a spontaneous basis and to establish a 'collective learning memory'. This scenario is probably the furthest out in terms of time because it implies significant technical developments such as high 'emotional bandwidth' for shared presence and visualisation technologies, or breakthroughs in computer supported pedagogic techniques. In addition, the scenario presents a challenging social vision of AmI in the service of fostering community life through shared interests	

Table 7- The four ISTAG-Scenarios of Ambient Intelligence

"They contrasted applications that served to optimize efficiency (whether in business or in society) against those that emphasised human relationships, sociability or just having 'fun'. They also underlined the place of AmI in serving society and supporting the community, as well as individuals. The scenarios sketched out different design emphases and pathways towards AmI, but their common ground was situation at the human interface. This emphasised a key feature of AmI, namely that technologies should be fully adapted to human needs and cognitions" (Punie, 2005, p. 147).



EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

Mapping socio-eco drivers with AMI vision

Joint Research Centre

Network service businesses: infrastructure supported by customs office, car rental, traffic management...

Redesign of urban transportation systems

"Efficient"

Healthcare monitoring systems

1: Maria: personal ambient communicator

3:Carmen: traffic optimisation

Teleshoppping, telework, car sharing, park and ride systems, accident prevention systems

Fashion design and personalisation of devices

Expectation of a seamless worldwide operation

Extra choice and advice

Leasing model economy

New "Clicks and mortar" opportunities explore new economies of scope

Individual

Privacy, trust and confidence building

A mosaic society

Community

Criminal networking

Knowledge management and co-operative work techniques

Demand for new skills, new processes and new business models

Hyper-mobility

2: Dimitrios: connecting people and expressing identities

Human communication

"Matching" activity

4: Annette and Solomon: social learning by connecting people and creating a community memory

"Ambient for Social learning" as a learning system

100% interoperability

Family change

"Sociable, humanistic"

Educational systems that can cope with different languages, cultural backgrounds, skill levels, interests and learning styles

Time scarcity

Education level as a discriminatory societal factor

Relations are in the network

Services to an ageing population

User-friendly toolboxes for self-production of content

ipts

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Fig. 4 - Socio-economic drivers of the four ISTAG scenarios (Burgelman JC, 2004)

ISTAG sees "significant opportunities" for AmI in relation to: modernising the European social model particularly in terms of: improving civil security; providing new leisure, learning and work opportunities within the networked home; facilitating community building and new social groupings; providing new forms of healthcare and social support; tackling environmental threats; supporting the democratic process and the delivery of public services.

The 2003 revision and updating of the AmI vision confirm the general believes that AmI development has focus on human that is to say to be to the service of a 'User Friendly Information Society', AmI still being conceived as serving society and supporting the community, as well as individuals and underlined the economic potentiality of AmI:

> In particular, significant opportunities" for AmI in relation to "Improving Europe's economy in terms of: supporting new business processes; increasing the opportunities for tele-working in the networked home; enhancing mobility and improving all forms of transport; supporting new approaches to sustainable development (ISTAG, 2003, p. 9)."

While ISTAG has a generally sunny outlook with regard to AmI, it does see at least one dark patch. It says the anticipated benefits of ambient intelligence may be numerous but the enabling technologies can also facilitate monitoring, surveillance, data searches and mining, as a result of which AmI deployment is likely to be of great concern to citizens, civil liberties groups, governments and industry. Addressing the balance between privacy and security will, it says, be a core challenge for the future (ISTAG, 2003, p. 11).

c) Requirements for the societal acceptance of AmI underlined by ISTAG

According the ISTAG 2001 and 2003 reports about the scenarios, they required social and political aspects of AmI that will be very important. A series of necessary characteristics that will permit the eventual societal acceptance of AmI were identified as a result.

> AmI should facilitate human contact, be orientated towards community and cultural enhancement, and help to build knowledge and skills for work, better quality of work, citizenship and consumer choice. AmI should inspire trust and confidence. AmI should be consistent with long-term sustainability –personal, societal and environmental and with life-long learning. In essence, the challenge is to create an AmI landscape made up of 'convivial technologies' that are easy to live with. AmI should be controllable by ordinary people. Otherwise, the social aspects of AmI raise major issues that require precautionary research particularly in the areas of privacy, control and social cohesion. In addition, encouragement may be needed to develop forms of Ambient Intelligence that are sensitive and adaptive to societal development and the diversity of European social, political and cultural life.
>
> The business-case for AmI is not yet self-evident, but aspects of business models are indicated by the scenarios, in the form of the following entry points to AmI business landscape:
>
> - Initial premium value niche markets in industrial, commercial or public applications where enhanced interfaces are needed to support human performance in fast moving or delicate situations (such for example as Maria's).
>
> - Start-up and spin-off opportunities from identifying potential service requirements and putting the services together that meet these new needs.

- High access-low entry cost based on a loss leadership model in order to create economies of scale (mass customisation).

- Audience or customer's attention economy as a basis for 'free' end-user services paid for by advertising or complementary services or goods.

- Self-provision – based upon the network economies of very large user communities providing information as a gift or at near zero cost. Overall most of these developments will come through in the form of partnerships and complex combinations of different business models to deliver a packaged set of services. Investment for development of the necessary communications systems requires expectations of substantial returns in generation after generation of new infrastructures.

Table 8- Characteristics that will permit the eventual societal acceptance of AmI

Necessary characteristics that will permit the eventual societal acceptance of AmI

The technology timelines for each of the scenarios were explored. On this basis the following five technology requirements for AmI could be identified:

- Requirement 1: Very unobtrusive hardware
- Requirement 2: A seamless mobile/fixed communications infrastructure
- Requirement 3: Dynamic and massively distributed device networks
- Requirement 4: Natural feeling human interfaces
- Requirement 5: Dependability and security`

In synthesis, the ISTAG recognises the need for AmI to be driven by human and societal centred considerations not technologically determined ones and believes that AmI being human focused in its development will allow the development of the so called information society for the benefice of human. ambient Intelligence[33] The AmI discourse refers to a vision of the future information society where intelligent interfaces enable people and devices to interact with each other and with the environment Technology is conceived as operating in the background while computing capabilities are everywhere, connected and always available. This intelligent environment is aware of the specific characteristics of human presence and preferences, takes care of needs and is capable of responding intelligently to spoken or gestured indications of desire. It even can engage in intelligent dialogue The focus is on the human needs, not on the technology. (ISTAG, 2001).

The IST Advisory Group continued to develop the vision of AmI in preparation of the RTD Framework Programme (FP6). The context of 9/11 events and a more general slow-down of the economy makes ISTAG arguing for an urgent need of targeted and far-sighted investments in ICTs and for FP6. ISTAG anticipates that during the next ten years a new infrastructure paradigm will emerge: the 'Ambient

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[33] possible benefices that are most often quoted in the literature: More Efficient Access to Information and Knowledge/Economy of Attention Begins to Dominate Culture, Emergence of Virtual Communities, Better Protection from Criminal Actions, Reduction of the Digital Divide, better and more democratic access to knowledge, new ways to fight crimes and more generally security benefices, new form of shopping, benefices for disabled person…

Intelligence Space'[34].

This *Ami Space* should not be construed as a physical layer of infrastructures, hardware platforms, services, or applications, but as collection of these things in combination, characterized through various environments. Therefore, and characteristically, ISTAG adopted a '3-layer'model, with the *societal and economic challenges as the top layer*, technologies as the bottom layer, and AmI Space as the 'middle layer'.

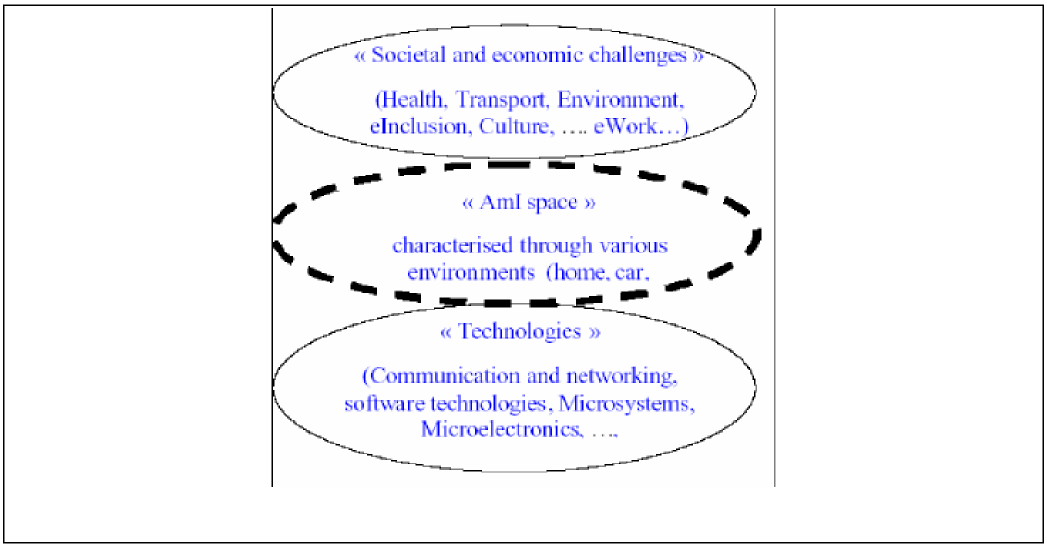
« Societal and economic challenges »
(Health, Transport, Environment, eInclusion, Culture, ... eWork...)
« AmI space »
characterised through various environments (home, car,
« Technologies »
(Communication and networking, software technologies, Microsystems, Microelectronics, ...

Fig. 5 - The middle layer: Ambient Intelligence Space.(ISTAG, 2002, p. 15)

Pursuing the work of ISTAG and of other consultative procedures organised by the European Commission, AmI became a key concept in the FP6 IST program for the period 2002-2006. The overall vision is that the IST thematic priority will contribute directly to realising European policies for the knowledge society as agreed at the Lisbon Council of 2000, the Stockholm Council of 2001, the Seville Council of 2002, and as reflected in the e-Europe Action Plan. The objectives of IST in FP6 were therefore to ensure European leadership in the generic and applied technologies at the heart of the knowledge economy. To make this possible, AmI is seen as a key concept.

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[34] . ISTAG has proposed Ambient Intelligence Space as a layer connecting different AmI environments (e.g. home, car, public spaces) in a seamless and unobtrusive way. Obviously interoperability and standards are crucial in this respect. Context awareness is another issue that needs to be looked into more closely, especially when trying to integrate forms of context that are more sophisticated and user oriented than current definitions of context This space needs to be engineered so it has predictable behaviours, so that services can be offered through it, and so it can manage complicated many-to-many relationships.• The AmI Space could be seen as the integration of functions at the local level across the various environments, enabling the direct natural and intuitive dialogue of the user with applications and services spanning collections of environments, as well as at the cyberspace level, enabling knowledge and content organization and processing.(from ISTAG presentation).

2.3.2.2 – The necessity of an integrated research approach

But to make the ISTAG vision and more generally the AmI vision[35] a reality a massive and integrated research effort that addresses major societal and economic challenges and that ensures the co-evolution of technologies and their applications is required according to the IST program (EC 2002: 5). And in fact, considerable efforts were made in the year which followed the publication of the ISTAG reports to mobilize in the EU research and companies towards realizing the building blocks for an AmI landscape. The budget of the IST FP 6 program for instance amounts to €3.6 billion for 4 years (against €16 billion for FP6 as a whole).

At the same time, apart from the technical oriented project, and, as underlined by the FP6 WP 2006 - Action N°4124 presentation[36], "in pursuit of the Lisbon strategy to become an inclusive, dynamic, competitive and secure knowledge-based society, the European Union pursued Information Society policies that address social challenges and meet technological expectations in selected areas with the aims to raise awareness as to bottlenecks that may hinder the take-up of Information Society (IS) and to help to resolves the societal problem raised by the new information technologies. This policy resulted in different consortia and projects addressing the various problems connected with the development of AmI techniques and its social deployment, questioning whether and to what conditions AmI systems will fulfil most of the promises made by researchers. *Those consortia and projects will put in evidence that realisation of the AmI vision poses numerous challenges, many of those challenges are of course technical but other involve societal issues*

Synthesis

Ambient Intelligence in European context is presented as and thus offers a vision of a next wave in computing and networking with far-reaching societal implications that is promoted by industry, government S&T agencies, technical research laboratories and universities. It is a vision that mobilises professionals, companies and (technical) R&D resources. The aims are to prop up and stimulate innovation and the S&T knowledge base for growth, competitiveness and welfare in the future information society promoted in Europe. But to make the ISTAG vision and more generally the AmI vision a reality a massive and integrated research effort that addresses major societal and economic challenges and that ensures the co-evolution of technologies and their applications is required.

2.4 - AMI VISION: FROM VISION TO CRITICS

While most stakeholders see the possibilities of AmI in an angelic way, there is a darker side to AmI as well. In a way, this dark side is inherent in the very nature of AmI, i.e. the fact that AmI technologies will deliver personalised services to users means that somewhere a lot of personal information needs to be stored about the user. These risks have been recognized by policy-makers and researchers. ISTAG recognizing the anticipated numerous benefits of ambient intelligence at the same time has acknowledged the fact that the enabling technologies can also facilitate monitoring, surveillance, data searches and mining, as a result of which AmI deployment is likely to be of great concern to citizens, civil liberties groups, governments and industry. Those critical issues and problems were further addressed specifically and developed by diverse projects, network and roadmap such as EMTEL – IPTS, SWAMI project, FIDIS project, AmI@Life. In that section, we will not intend to develop a systematic analysis of the projects financed or supported by the European commission. With this analysis we just modestly seek to put in evidence, giving some outstanding examples that, in Europe, a critical vision started to emerge challenging the idealistic representation of the potential benefices associated to the AmI representation in the initial vision of the integration of the AmI techniques in the societies.

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[35] We must quote also the ITEA consortium (Information Technology for European Advancement) which offered another pan-European funding program. This Eureka project focuses on stimulating and supporting the development of software technology competencies to enhance to competitiveness of the European industry. ITEA brings together industries from (once) very different applications in the same technological area. Its *'Technology Roadmap for Software Intensive Systems'* also makes reference to AmI 'where the environment becomes the interface'. Building a common vision of future developments and needs is seen as an essential part in developing the roadmap and in supporting the competitiveness (ITEA 2001, pp. 16-18, 64-65).

[36] http://projects-2006.jrc.ec.europa.eu/show.gx?Object.object_id=PROJECTS0000000020001B1

2.4.1 - EMTEL - IPTS consortium critique [37]

The European Media Technology and Everyday Life Network (EMTEL) was created by the European Commission under the FP5. It was constituted as a research and training network. Among other researches, it focused its interests on AmI technologies. The Institute for Prospective Technological Studies (IPTS) is one of the seven Research Institutes of the European Commission (EC). These Institutes together, make the EC Directorate General known as the Joint Research Centre (JRC), which is the corporate research laboratory of the European Union with sites in Ispra (Italy), Geel (Belgium), Karlsruhe (Germany), Petten (the Netherlands) and Seville (Spain). The IPTS' mission is to provide techno-economic analyses in support of the European policy-making process. IPTS' prime objectives are to monitor and analyse science and technology developments, their cross-sectoral impact, their inter-relationship with the socio-economic context and their implications for future policy development.

2.4.1.1 -Critiques about the ISTAG scenarios[38]

EMTEL-IPTS deplores the fact that, first, the ISTAG AmI scenarios does recognise the need for AmI to be driven by humanistic concerns, not only technologically determined ones. This position goes against the tendency of mainstream vision building and technology foresight to be technology deterministic.

Second, scenarios describing possible futures in relation to ICTs and AmI are criticised on the basis of their tendency to portray ideal, successful users in a perfect world. Not only do they present stereotyped user groups, but they also seem to ignore the struggles, uncertainties and irregularities that characterise everyday life. The scenario scripts contain few tensions and malfunctions, and breakdowns and user-unfriendliness are hardly considered. User research, in contrast, demonstrates that the process of use and acceptance of technologies is not straightforward, obvious or without struggles.

2.4.1.2 - Critical issues

For the EMTEL-IPTS reviewers, there are some socio-economic and policy-related issues to notice in the AmI vision[39]. Digital divide, privacy, security and surveillance, control, reliability and dependability have been pointed as problematic. Domestication perspective, which include power relations and everyday life at home, physical versus mental disappearance of computing, and adaptive computing and intended use versus effective use. The EMTEL-IPTS analysis and critics underlined that the AmI visions raised some societal, socio-economics and policy related issues. The Safeguards in a World of Ambient Intelligence (SWAMI) project (SSP project European FP6) aimed to identify and analyse systematically the social, legal, organisational and ethical implications related to issues such as privacy, anonymity, manipulation and control, and identity in the context of Ambient Intelligence using current and future information and communications technologies.

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[37] This analysis is a synthesis abstracts from Punie et al. (2003)

[38] We must not that IPTS was involved in the ISTAG analysis of AmI

[39] We do not want to detail each assumption, see : Punie et al. (2003, pp. 23-37).

2.4.2 - SWAMI project and critiques

The first step of the SWAMI project was a review of existing AmI projects, studies, scenarios and roadmaps to ensure that the SWAMI project[40] captures, as far as possible, the major trends and issues.

As a second step to examine the potential threat and issues connected to AmI vision and development, the SWAMI partners created for analysis four dark scenarios on AmI that highlight and detail the key socio-economic, legal, technological and ethical risks related to, in particular, identity, privacy and security.

2.4.2.1 - The SWAMI dark scenarios [41]

Those four dark scenarios have been developed to cover both individual and societal concerns, on the one hand, and private and public concerns, on the other hand. These two scenario axes (individual-societal and private-public) have helped reduce the virtually infinite number of possible futures that could be developed to a manageable number of four. These dark scenarios offer visions of a potential future where safeguards to personal data are inadequate or have not been put in place. The scenarios are called “dark” because they present visions of the future that SWAMI does not want to become realities. Their objective is to expose risks and vulnerabilities as a way to inform policy-makers and planners to be aware of the dangers of these possibilities.

- In scenario 1, a man goes off to work at his office in the security company where he is employed, while his son exploits the technology on this father’s computer at home, with all its sophisticated investigative capabilities. - In scenario 2, senior citizens on a bus tour from Italy into Germany are involved in a collision due to a malfunctioning Aml traffic control system. The accident was caused by a hacker who accessed the control system and turned all the traffic lights to green. - Scenario 3 deals with a data-aggregation company that suffers theft of the personal AmI-generated data which fuels its core business. With a dominant position in the market, the company tries to cover this up, but ends up being taken to court two years later by the individuals affected. The scenario focuses on the boardroom discussions taking place as the management tries to decide what to do. - Scenario 4 presents an AmI society as high risk, as portrayed from the studios of a morning news programme. The scenario shows an action group fighting against personal profiling; the global digital divide and related environmental concerns, and the potential vulnerabilities of crowd management and traffic control systems in an AmI environment.

Table 9- The dark scenarios defined by SWAMI project

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[40] SWAMI web reference: http://swami.jrc.es/pages/index.htm

[41] For the dark scenarios, see Punie, Y. et al. (2005).

According to Wright, the darkest scenario of all is the threat to our personal space. “The most disturbing aspects of this new technology are already around us today, in the steady erosion of personal privacy,” he says. “Because of threats to our society, most people are willing to compromise on their personal privacy in order to gain greater security. Yet – and this must be a serious concern – is our security actually better than before we gave up this privacy?” He believes therefore that further safeguards to personal data are needed. In the legal arena, the partners believe that present legal frameworks will not protect individual liberties in an ambient-intelligence future. Existing personal data laws and safeguards will need strengthening to meet the challenges posed by such all-encompassing technology.

2.4.2.2 - SWAMI list of issues

Swami consortium identified a list of fundamental issues connected with AmI and ubiquitous computing vision and related to privacy, identity, security and trust.

Surveillance of users will be enforced, as the availability of data about virtually every citizen can provoke the desire of governments to access the data for the common welfare as in law enforcement and the fight against terrorism and insecurity. Other institutions responsible for health insurance may justify their actions on similar grounds. Increasing surveillance can have very concrete consequences for the citizen: disclosure of health details, personal preferences, habits and lifestyle to an insurance company or to an employer can easily lead to discrimination, blackmailing and problems in human relations. The possibility of a retailers being able to monitor the shopping behaviour of customers can not only lead to an optimised supply chain, it is also the basis of the transparent customer who can be manipulated and controlled. Even seemingly useful and simple surveillance of the elderly intended to improve care may spoil their dignity

Spamming problem: profiles of individuals built from data collected through use of AmI technologies can be used for spamming those individuals with more or less useful but in most cases unwanted information.

Identity theft is the act of obtaining identity information without the concerned persons consent and for future activities criminal or not (intent). The more widely personal information becomes available, the greater is the risk of its being stolen by malicious persons and being used for fraud and other illegal activities.

Malicious attacks: an attack can be active or passive. An active attack is a deliberate alteration or destruction of data in a message or creation of false data. A passive attack consists of unauthorized monitoring, but not alteration or destruction of data (e.g., wiretapping). The purpose is to acquire the information. A passive attack occurs when someone listens to or eavesdrops on network traffic. Since AmI applications will become pervasive in many spheres of life, citizens and businesses will become increasingly dependent on the availability and dependability of the system. An attack at the right place of the AmI infrastructure may cause a temporal breakdown of activities in business and society.

Digital divide: the pervasiveness of ambient intelligence applications in almost every sphere of life poses the threat of social pressure and digital divide. People may be forced to use AmI technology. This may be direct as in the case of (health) insurance companies that only give insurance protection when their clients are using some kind of health monitoring system. Even if a person accepts to use AmI applications, he will be bound to routines predefined by the system. This will limit personal freedom and self-determination. AmI applications and services will probably not be free of charge with the result that not all citizens will enjoy all of the benefits

that AmI will offer even in fields that have been regarded as public utility. This is especially grave in the field of education where society could be divided more sharply into well-educated and less well-educated people.

Table 10- List of fundamental issues connected with AmI identified by the SWAMI project

The consortium defined and studied various research and policy options, whose the aims were to identify mechanisms, which ensure user control, user acceptance and enforceability of policy in an accessible mode, as well as to ensure that all Europeans have real equal rights and opportunities of accessibility to the 'Ambient Intelligence space'. Finally, the project partners came up with a lengthy list of proposed safeguards to personal data; measures that will be fundamental in a future of ambient intelligence[42]. They believe that legislation will be necessary both at national and at European level if Aml technologies are to be implemented without endangering the fundamental liberties upon which our civilisation is built. These safeguards need to address technical, socio-economic and legal issues. In the technical arena for example, so-called privacy-enhancing technology (PET) can be built into fourth generation mobile devices, to alert the user to any data-privacy risks present within specific surroundings. Socio-economic safeguards will need to focus on increasing user awareness of the risks, both through improved education and by encouraging journalists to comment on such issues.

2.4.3 – FIDIS project [43]

The FIDIS project addressed more specifically the problem of identity. As presented on the FIDIS (*Future of Identity in the Information Society)* web page[44], "the European Information Society (EIS) which is building slowly requires technologies which address trust and security yet also preserve the privacy of individuals. As the EIS develops, the increasingly digital representation of personal characteristics changes our ways of identifying individuals, and supplementary digital identities, so-called virtual identities, embodying concepts such as pseudonymity and anonymity, are being created for security, profit, convenience or even for fun. These new identities are feeding back into the world of social and business affairs, offering a mix of plural identities and challenging traditional notions of identity. At the same time, European states manage identities in very different ways. For example, in Germany holding an ID card is mandatory for every adult, while in the UK state-issued ID cards do not exist. FIDIS objectives are shaping the requirements for the future management of identity in the EIS and contributing to the technologies and infrastructures needed." The FIDIS Deliverable 7.3 concerns the aspect of profiling activity in AmI. The problem of identity connected with AmI is described in the introduction of the deliverable as follow: "To be able to offer such personalised operation, the 'intelligent' environment needs to build a profile of each individual, and be able to subsequently link the profile with the correct individual. In essence, the environment must become the interface to the distributed and invisible AmI. Thus profiling is an essential part of the idealised AmI. In a world where computing is truly ubiquitous, profiles will seamlessly follow the individual to whom it is linked."

The report provides a first analysis of actual and possible profiling techniques in the field of AmI and describes some implications of such profiling techniques within AmI for privacy and security." It put in evidence that security and privacy concerns arise when profiling activity is carried out. Ideally, profiling activity requires continuous monitoring or surveillance of the users. It is an important threat to highlight, as well as the possibility of the conflict between the user control and intelligent environment.

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[42] For the list of safeguards defined by SWAMI project, see: Wright David ed. (2006, pp. 110-121) .

[43] FIDIS Deliverable 7.3 (2005.)

[44] http://www.fidis.net/about/

In its conclusion it describes the main issues to be solved for a successfully networked and adaptive environment have being located in the domains of interoperability, privacy and security.

- Interoperability may seem to warrant technical solutions first, but – as explained in FIDIS deliverable 4.1 – without effective communication and trust these technical solutions will not be conclusive.
- Solutions to issues of privacy and security have been explored from the perspective of enhancing user control. As chapters 6 and 7 of this deliverable clearly indicate, such solutions need integration of technological and legal tools.
- Legislation that is technically, socially and/or economically not feasible will not amount to any substantial protection, while privacy enhancing technologies that promote user control may not catch on if the law does not effectively constrain the production and usage of privacy invading design.

Those identity, privacy problems which were underlined by the SWAMI and Fidis project in particular were also underlines by the Ambient Intelligence in Everyday Life roadmap.

2.4.4 - AmI@Life roadmap (Friedewald and O. Da Costa eds , 2003)

“Ambient Intelligence in Everyday Life ()” is one of the S&T roadmaps developed at IPTS (Institute for Prospective Technological Studies) of the European Commission’s Joint Research Centre in collaboration with the European Science and Technology Observatory (ESTO) network. AmI@Life roadmap focuses on “trusted and universal access to Ambient Intelligence technologies within the context of everyday life”, raising the potential of full IST integration in the everyday life of ordinary European citizens.

Several authors of the roadmaps share the worries over trust and security, dependability, respect of privacy and anonymity. Indeed, for people to feel comfortable with and to trust AmI, it needs to establish an acceptable level of security respecting their privacy and their numerous identities.

The issue of control by the user has also been highlighted as essential, as well as the threats concerning manipulation & control using ambient systems; negative effects of privacy and security concerns, and, finally, the problematic of the delegation of control to the technology. Users should know what is happening behind their backs and AmI should be controllable by ordinary people, i.e. the ‘off-switch’ should be within scope.

Finally, a scope over the social issues, from social inclusion (including social participation, increased autonomy of disabled and elderly people so as to enable them to play a more important role in society) to social exclusion (digital divide) is highlighted as a major challenge for AmI. Indeed, factors correlated with the problematic of universal access / digital divide / techno- inclusion versus techno-exclusion come also high in the reflection of the authors. Then, new forms of socialisation and family life tend to appear; and virtual residence, transfer of knowledge is noted as a new kind of socialisation too.

Those societal challenges raised by the SWAMI and FIDIS projects and by the AmI@Life concerning the AmI techniques were also raised and underlined by other European consortia and research group more technically focused[45].

GENERAL SYNTHESIS

The rapid change and evolution of the Information and Communication Technologies (ICTs) present opportunities for social interaction and management of life activities in new and often unfamiliar ways. The diversity of use and application areas brought about by the convergence of different media offer great potential for enhancing many aspects of living. In this chapter we have seen that the Ami evokes a near future in which humans will be surrounded by 'always-on', unobtrusive, interconnected intelligent objects few of which will bear any resemblance to the computing devices of today. This future in which AmI presents a paradigm shift in the way humans interact with computer, has been portrayed in discourse and text that most of the time described *an idealistic vision,* which was proposed before the technology itself, where technology is totally at the service of human and yield many benefits for citizens and consumers, industry, commerce and the provision of public services Ubiquitous computing proposed by Mark Weiser and Ambient Intelligence as developed in the ISTAG report provides a vision of the Information Society where the emphasis is on user friendliness, efficient and distributed services support, user-empowerment, and support for human interactions. The main characteristic of the AmI vision proposed by scientist and industrial is that it pretends explicitly to be *'human-centered'*. It claims to place the user at the centre of future development. From a more policy-makers perspective it also proposes to embed IST RTD in its socio-economic and user context. Presented like this, it is obvious that the AmI vision is compelling and ambitious since it will affect our existence, our identity, and our relation to the world.

We have underlined that those visions proposed by industrial (for example Philipps company) or scientist nevertheless portrayed more a future than a reality and are, by definition, normative. They imply a desired world (desired according to the industrial, scientist conceptions of what is desirable…) Those vision being promoted by certain people, companies and institutions are not neutral[46] and imply implicitly many values and conceptions concerning what the world and human are…we will come back to that normative issue in the next chapter).

Ambient intelligence is expected to yield many benefits for citizens and consumers, industry, commerce and the provision of public services. ISTAG sees a real opportunity for Europe to establish a strong position in this new paradigm.

Nevertheless, in pursuit of the Lisbon strategy to become an inclusive, dynamic, competitive and secure knowledge-based society, the European Union pursued Information Society policies that address social challenges and meet technological expectations in selected areas with the aims to raise awareness as to bottlenecks that may hinder the take-up of Information Society (IS) and to help to resolves the societal problem raised by the new information technologies. This policy resulted in different consortia and projects addressing the various problems connected with the development of AmI techniques and its social deployment, questioning whether and to what conditions AmI systems will fulfil most of the promises made by researchers. Those consortia and projects underlined that realisation of the AmI vision poses numerous challenges, many of which are connected to societal issues: mainly the challenged raised by those projects concern mainly the privacy and identity issues, the question of security and confidentiality, the problem of trust, the question of accessibility, the problem of the social acceptance the problems of anonymity, manipulation and control, and of digital divide.

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[45] see the annex for a description of some of those projects

[46] The fact that the scenario exercise that was launched as a joint exercise between DG Information Society and the Joint Research Centre's Institute for Prospective Technological Studies in Seville reported to an ISTAG working group was *chaired* by Dr Martin Schuurmans (CEO of Philips Industrial Research) is, for example, characteristic of the importance of the industry in the development of the AmI vision.

In promoting the goodness and godliness of AmI, computer science and industry have sketched an ideal world and, if the word wasn't too philosophically connoted, nearly an utopian world in a sunny color, but one can ask if technology doesn't have, as consequence, to enframe our world and to reduce human being to object of the technical systems that surround them. The AmI raises, as will put in evidence the next chapter, many ethical and societal issues. To addresses specifically those issues, a critical deconstruction has to be undertaken. To do so, as a preliminary and necessary step, we first have, in the next chapter, to address precisely the possibility and the condition allowing a critical stance towards AmI.

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CHAPTER 3:

THE AMBIENT INTELLIGENCE: ETHICAL AND SOCIETAL ISSUES[47]

Abstract:

"If you think technology can solve your security problems, then you don't understand the problems and you don't understand the technology" (Bruce Schneier).

Proactive and AmI techniques, especially if implemented in highly sensitive environments, give rise to specific ethical and societal issues. Proactive systems (such as AmI) may make decisions without direct human supervision, and place the technical system in a position of authority vis-à-vis the "users". Although ethical issues implied by interactive computer systems, and particularly about the way such systems are (or can be) used by human users have already been much discussed in the literature, one needs now to take into account the unprecedented technological possibilities suggested in the MIAUCE project, in particular the possibility that computers increasingly come to influence human decisions. Assessing the ethical stakes of decisions made or influenced by computers becomes crucial.

As foreseen in the technical annex, the third chapter's objective will be, in first instance, to review the ethical and societal issues associated with AmI technology as a first step towards analysing the ethical issues specific to the MIAUCE project. After having established the conditions necessary for a critical perspective and the ethical references grounding our analysis, we will finally address the ethical issues inherent to AmI.

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[47] The reflections and analysis expressed in this chapter are those of the author – Prof. Philippe Goujon - and do not necessarily reflect the position of Namur's other partners.

INFORMATION SOCIETY, TECHNICAL DEVELOPMENT AND ETHICS

The impact of techno-scientific developments on societal evolution and lifestyles no longer needs to be demonstrated. In particular the last half of the twentieth century has witnessed a considerable acceleration of the integration of technological elements into the means of economic production and social life in general. The profound transformations that have taken place in the last few decades equally involve energy, transportation, construction, telecommunications, administration, medicine, pharmacy and agricultural sectors. These transformations are closely linked to techno-scientific developments and particularly to stunning developments in Information and Communication Technologies (ICTs). However the information society emerging in the contemporary period can no longer simply be considered as a simple consequence of technical mutations. Up to now, this on-going global phenomenon that is at the same time a technological, economic, political and cultural phenomenon, is in search of a social and a political project, references and reaffirmed values. We are faced with the task of building networks based on a cultural model incorporating clear collective choices. The knowledge society is the embodiment of a change in civilisation whereby science and technology became omnipresent and are developing at a disconcerting rate.

More and more people, in particular through their work and their responsibilities, are questioning the relationship between knowledge and power, between science, technology and society and the complex notion of governance whereby decision-makers impact on the public. In this fast-changing context, the relationship between government and citizens, between industrial and consumers, between designers and end-users is no longer the same. New governance models need to be established and socio-economic progress must be rethought providing a stronger consideration of the sustainability issue[48]. Consequently different relationships and a positive dialogue between the scientific community, society, society's decision-makers and end-users are required as underlined in the Council Decision of September 30th 2002 (2002/835/EC). This document emphasises the need for ‘structuring the European Research Area’ (2002–2006), adopting a specific programme for research, technological development and demonstration: “Today, and even more in the knowledge-based society of tomorrow, science and technology have a ubiquitous presence throughout the economy and in everyday life. If they are to realise their full potential in securing a continually increasing quality of life — in the broadest sense — for Europe’s citizens, new relations and a more productive dialogue between the scientific community, industry, policy-makers and society at large, as well as scientists’ critical thinking and responsiveness to societal concerns, will be needed.”The evolution of ICT is driving our society towards situations and applications where the humans interact so deeply with the "intelligence" pervasively distributed among them that, at some point, we will reach a divide where a fundamental choice will be presented to us: to develop a "utopian" environment where all humans will have access to an empowering and accessible techno-environment ("Ambient Intelligence environment") or head towards a "dystopian" environment where Bentham's panopticon[49] will become more and more a reality thanks to thousands of sensors, computers and networks that will track every human movement. David Lyon named this new form of 'cooperative surveillance' 'Synopticon' and 'Scopophilia’ (D. Lyon, 2003, 2006). The notion goes beyond Bentham's Panopticon and was interpreted by Zygmunt Bauman as a significant trend of the globalisation process.

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[48] For example: Science and Society: Action Plan, EC, Com 2001, Brussels, 04.12.2001, 714 final

[49] The famous Panopticon was designed by Jeremy Bentham, British jurist and philosopher, towards the end of the eighteenth century. It is a type of prison, also known as the ‘Inspection House’, which enables an observer to watch all the prisoners without their knowledge. This essential principle of construction is reflected in the Greek neologism, pan- meaning ‘everything’ and - opticon concerning ‘vision’, and as such the word is meant to express ‘the all-seeing place’.

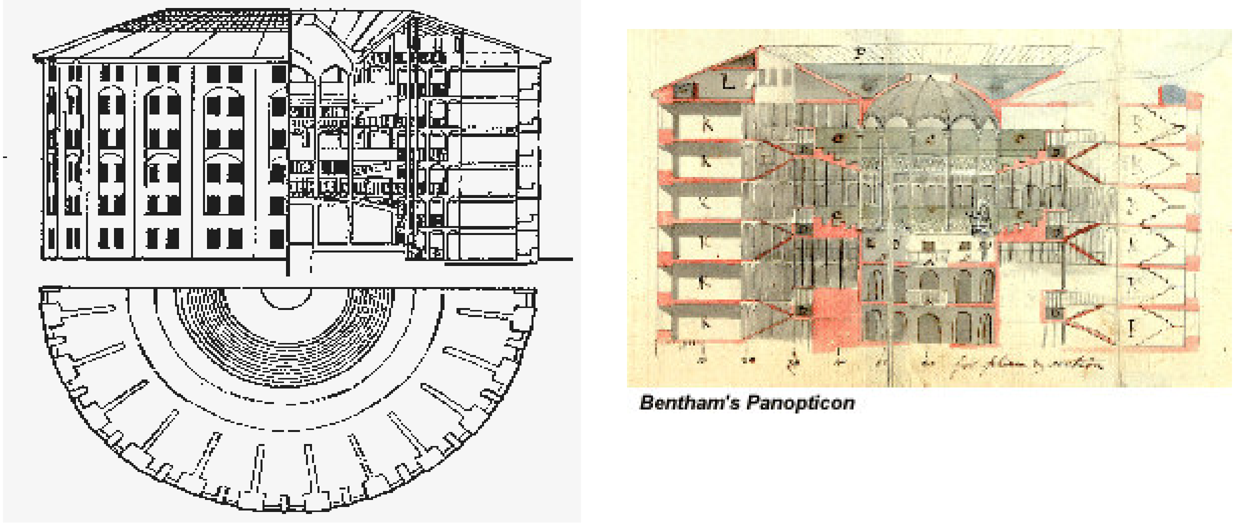
Bentham's Panopticon

Fig. 6. Bentham’s panopticon

In a world that is becoming increasingly homogenised, any capacity for questioning is likely to be stifled by the rational constraints extended to all fields. This brings us back to the question of the possibilities and the place of ethics. The problem of the real action of norms in the context of technical development is crucial, and needs to be scientifically taken into account if ethics is to be effectively integrated in technical development and more generally in the relationship between science and society. The need for serious attention to the problem of allowing the conditions for the development of a responsible information technology is strong. It is based on the conditions for developing what is sometimes referred to as *Value Sensitive Design*, which recognises that any technology and/or artefact (i.e. ICT) embeds moral values into their technological design, research and development. It assumes that human values, norms and moral considerations are imparted to the things we make and use, and it construes information technology (and other technologies for that matter) as a formidable force which can be used to make the world a better place, especially when we take the trouble of reflecting on its ethical aspects in advance. A wider approach in evaluating emerging technologies should include not just the legal dimensions (often referred to in the ICT field as “compliance”) but also the ethical dimensions.

3.1 – CONDITIONS FOR A CRITICAL TRANSFORMATIVE ROOM’ [50]

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[50] Concept of *critical transfomation room* from Crutzen (2003). Critical transformative rooms are characterized as those interaction worlds, where actions of questioning and doubt are present, which have the potential to change habits and routines, where the "change of change" has a differentiated potential

What we propose is to review, as it was foreseen in the technical annex of the MIAUCE project, the ethical analysis of ICT developments, and in particular of AmI applications. Practically, the main problem consists of a deep lacking of background: the strong push for technology development too often obscures the need for any deep ethical consideration before a technical project is funded, developed and deployed. This is natural since the researchers and technical developers of Ami systems focus mostly on the technical and economics challenges before them, and are not usually aware of potential ethical issues when they don't consider ethical considerations and analysis as an obstacle to the technical and economics development. In short, the problem we must first analyse is not so much to determine solution to ethical problems. It is much more to settle the conditions for raising ethical questions and for a new approach authorizing a real reflexivity[51] and allowing a questioning concerning the integration of ethics in complex technical systems. Obligation of the economic constraints, interests concerned the influence of the experts, impression of the ineluctability of the technical projections, social and consumers demands, make that it becomes increasingly difficult to define the conditions of a critical perspective respecting the requirements of morals autonomy.

We do not want to mean that existing criticisms don't allow certain reflexivities. We support nevertheless that these criticisms, generally demonstrate a tendency to restrict ethics to a *categorical* field by sacrificing the existence and its tension in the name of a flattering pragmatism, being satisfied with *ad hoc* answers to artificially isolated specific contexts and being conditioned by the reign of instrumental rationality.

The danger and problem is to limits the debate to the scientific perspective (hence the importance of expertise, and the tendency among politicians to favour traditional, "top down" governance of activities in which risks are involved) and, in shunning an approach based on technology assessment, or debate on the meaning and the ethical, cultural and social stakes. Instead of initiating an inclusive debate on the nature of the different forms of knowledge and vision of world, discussions restrain the debate by adopting a positivist and reductionist approach that leads to cognitive closure. Hence the question of how to elicit the cognitive opening-up required for a genuine reflexivity that would allow us, as Ladrière puts it, to extract the existential and the political meaning from the objective meaning? How to decompartmentalize ethical discourse and make it play a more important role in the joint construction of technologies? How to transcend the neo-classical, technological approach (the cost-benefit approach for Slovic)?

The economists' answer appeals to the industrialists, because it confirms them in their practices and habits. So common has positivism become today that the project of emancipation through reason is, for the most part, either rejected or ignored. In its place appear instructions on how to increase one's power over social processes that have been reduced to the status of objects. Hence again—even if, as Ulrich Beck has stressed, this is a perspective that needs qualifying—the difficulty of controlling the rampant growth of technological innovations.

In this context, expertise, be it philosophical or scientific, becomes the indisputable new source of normativity[52], and the problems revealed are confined to a scientific perspective alone—which means that the problems taken into account are confined to the realm of strict scientific rationality, and as consequence democracy is confiscated. One must be wary of any theory which tries to objectify the world we experience (emotion, attitude as in MIAUCE project) in order to predetermine the form of the world we share. There's a big risk that the possibility of genuine reflexivity, will be stifled by a technological and scientific rationality imposing its value system with, as a result, a dismissal of the prestige of the moral reason.

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[51] Reflexivity may be defined as the capacity of actors and institutions to revise basic normative orientations in response to the evolution of economic, techno-scientific or political systems and to shortcomings in current modes of regulation. This reflexivity is not given, however, as is clearly shown by the growth of science and technology.

[52] Normative is contrasted with its antonym, positive, when describing types of theories, beliefs, or statements. A positive statement is a falsifiable statement that attempts to describe ontology. A normative statement, on the other hand, is a statement regarding how things should or ought to be. Such statements are impossible to prove or disprove, thus forever banishing them from the scientific world but not from the rational world.

This dismissal of the prestige of the moral reason found credit in "progress" of all kinds acquired following the scientific work and of the technological discoveries. One came from there to hope from this progress even the realization of human waiting (control of the natural processes, happiness, social harmony, etc…) This effectiveness tested in many fields little by little maintained the idea (or the myth) of a possible emancipation with regard to the morals. *The modern thought" thus needs by no means morals, since it "is, in itself, an action", founding the man in the knowledge and the technical rationality.*

The stake is of importance; indeed various sectorial ethics tend increasingly to reinforce social differentiation characteristic of modernity by proposing an internal, and specific, framing moral problems, with the risk to exclude other external and alternative framings. As a consequence ethics is disconnected from the design of technological device and the lack of a concrete grid of assessment concerning the embedding of ethics in technological development makes this issue important. Briefly and globaly, this is the European situation: some Ami projects investigate ethical aspects, but ethical considerations are not a 'matter of course' in the development cycle. In some cases, ethics experts are brought in at some stage in the project to assess the ethical implications. As a consequence ethics is often an "add-on". It is perceived and understood as a sort of accessory and instrumentalized guarantee and not properly integrated neither understood in its methods and objectives which are clearly very different from the method and objectives of sciences and techniques. This instrumentalization is allowed because generally the conditions for a real reflexivity are not analysed, with the consequences to deny to the ethical normativity it is importance and to reduce it to the very vague acceptability concept which for convenience reason is reduced implicitly to the acceptance concept.

Consequently, there is a strong need for the inclusion of ethical consideration before, during and at the end of a project technical and scientific, so that the technology 'incorporates' and tackles the ethical side (within its whole concept and implementation). The risk is that, by not analysing the conditions (institutional, rules, cognitive) for the effective integration of those considerations in the context of a technical project, the ethical considerations will be excluded from the technical rationale and treated as a totally separate domain. The consequence of this separation is a loss of impact, and an undermining of the integral role of ethics in the application of technology. This consequence is quite understandable since the techno science can only be limited to the set of its rules (objectivity, technical rationality which frames its vision and conception).

Ethics is never in the answer (always conditioned) but well in this dynamic movement of questioning, before the action and on a border, the border which separates our subjective existence (with its presupposed, its preferences, its convictions, its hidden motivations) from the constraining externality (economic constraint, political, hierarchical, technical, and ideological). In the MIAUCE project, which is fundamentally a technical and scientific project, this problematic is fundamental since the ethical and societal approaches aimed to influence the development and the design of the technical systems. A moral freedom of positioning appears from those analysis fundamental, it remains to question its possibility, and conditions

3.1.1 - The autonomy of the technique in question and legitimacy of ethics

It is undeniable that “the scientific method, as a highly considered and self-checking specification of the rational method, is at the base of the common dynamics which crosses the properly scientific field as well as the technological field. What this dynamics tends to generate, it is an autonomous reality, intermediary between nature and properly human reality, a kind of “third world”, of which the formal structure is given in conceptual architectures of science and the concrete figure in the equipment of all kinds which constitute around us, the extremely dense network of what one calls the technical world. Nevertheless, if there is autonomy of the technical sphere, this autonomy is, however, only an expression of an ideology, that of the engineers or a society which justifies, by subjecting its various components to scientific and technical rationalities, its incapacities to find political and social remedies for its problems. In a world full of doubt and characterized by its complexity, the technique becomes, or tends to become, in spite of the undeniable suspicion which weighs on it, the supreme reference of truth and of the pragmatico-economic effectiveness. The myth of progress, after having been identified with science, coincides with the technique, accompanied with a decline of the question of the truth in the name of a pragmatism which is more than ready to respond to all the economic and industrial requirements of the context.

When the cult of knowledge is replaced by that of the performances, moral, ethical and societal considerations are apparently private of justification. It is a consequence of the fact that, conditioned by the technical framing, we have forgotten that technique is not neutral. It is a manner of thinking, of making, and of transforming the world which is indissociable of the policy and, by the subjacent choices of ethics. From this point of view, the data processing and the techniques of the communication including the AmI are not neutral and *reflect*, in their constitution and their use, expectations of the society and are influenced by their socioeconomic context. For example, technological innovations that focus on satisfying needs of individuals also come to fulfil a function dependant on the cultural features of the society in which they fit. As in any society, these needs can be seen as negative or positive, for instance, perhaps negatively to control, or more positively to align the political, social and institutional goals with the individuals’ desires (Lyon, 1993). On this view, the organisational life has to become increasingly rationalized and controlled and organisational control will be “less and less apparent and increasingly powerful” (H. Isaac and Mr. Kalika, 2001; W.J. Orlikowski, 1991; J.R. Barker, 1993).

The organisational perspective of ICTs stresses that any technological innovation is *not a neutral tool* to increase the production, but “a tactic deliberated to increase the managerial capacity”. These characteristics also apply to the ICT in a broader social sense, with the result that the introduction of ICT also shapes social practice: “information technology has become a constitutive technology and partly constitutes the things to which it is applied. It shapes our discourses, practices, institutions and experiences in important ways” (Van den Hoven, 2007).

3.1.2 – The neutrality of AmI in question

This recognition of the non-neutrality of ICT should not be surprising, after all technology is designed with some purpose in mind guiding the technical direction. However, the implications of the technology in its capacity to affect and change social practices are not so easily seen. The context in which the development takes place – the culture, language, discourse – already provides the framework for the resulting artefact. Consequently, although an expert in another field (e.g. ethics) can advise on possible impact, the advice is reinterpreted within the context and cultural knowledge of the development team, and thus does not extend the understanding to a wider view. That is, "learning" has not taken place. Without this deeper understanding brought about through learning, we are all bound in some way to narrow horizons that need an external mechanism to be opened to wider horizons. In the case of MIAUCE project and more generally AmI, the construction of the social and ethical legitimacy (and not just acceptability) of science and technology requires that the metaprinciples of normative nature subjacent with the action techno-scientist be considered. The technique forms system and is also a form of organization and perpetuation of the social reports, a manifestation of the dominant ways of thinking and behaviours. Each technique is an historical and social project, and this project reflects the intentions which nourish a society, the interests which dominate it and the values which guide it.

As underlined by Punie, in the case of the information and communication technologies, if the increased diffusion and usage of computer, Internet, mobile phone and PDA had not happened, technological progress in these fields would have of course slowed down. The acceptance of these technologies is nevertheless enabled by demographic and social trends such as the emergence of individualism, diversity, mobility, and choice of personal life styles, affecting the structure of groups and community and the ways we live and work."(Punie, 2003, p . 17)

In the case of the vision of Ambient Intelligence, at a first glance, it seems that it is based on technological progress in the fields of microelectronics, communication networks and interfaces. Nevertheless, it is also driven by socio-economic factors that go beyond the technologies alone (economic neoliberal rationality, rationalization of the production, demographic conditions, impact of terrorists' actions, and consumerization of the communication.).

3.1.3 - For a critical perspective

Every technical object represents a construction which rests on some *a priori* and, even if it is partially suggested by preliminary information on the behaviour of the objects, it reinterprets the latter starting from its own categories. The political impact of a technique cannot thus be assigned to this technique alone, but must be allotted to the techno-speeches which diffuse it, give it a specific meaning and envisage for it specific usages. Data processing and the innovations related to the TIC, if they seem to be binding to the individuals, come, actually, to satisfy a need and to fulfil a function largely dependant on the cultural features of the society in which they fit.

D. Lyon, while underlining the limits of research using the theory of the monitoring of Foucault and giving a negative vision of a technology of control, defends the idea according to which technologies can also be used in order to align the political goals, social and institutional with the desires of the individuals. On their side, H. Isaac and Mr. Kalika, W.J. Orlikowskior J.R. Barker notes that the organisational life has to become increasingly rationalized and controlled and that organisational control will be "less and less apparent and increasingly powerful". Many authors retained this sight by embracing an organisational prospect for the TIC which stresses that the technological innovation is not a neutral instrument to increase the production, but well "a tactic deliberated to increase the managerial capacity". Rierder cited by Punie (2003, p. 34) "argues that intelligent agents are in their constitution not neutral and should not only be regarded as software programs, but also as 'social actors' since they inevitably take a position. Agents present a certain view on the world" (Rieder, 2003) and norms and value are included in their functioning by their designers.

In Rierder words (Rierder, 2003, pp. 10-11), “More than in the case of any other technology before, the agent’s functioning disappears thoroughly in the black box. Not knowing the nature of the underlying algorithms, which are too complex for even the expert to adequately evaluate from the outside, we are tempted to put agents in a position of authority. An agent’s view on information might consequently be taken as an exclusive or “better” view on information. But agents provide interpretations which are in a sense very powerful, in another very poor. They are very good with statistic analysis of large amounts of data and rather bad with actual meaning; it is always a perspective, and information allows for the generation of infinite numbers of such interpretations. And every single one is like a map, a dimensional reduction performed to give a picture of a whole; but as in cartography there is no “correct” projection, just different traditions. Günther Anders introduced in 1942, long before computers were parts of our homes, the notion of “promethean shame”, which he defined as the “shame in the face of the ‘humiliating’ high quality of manmade things” providing us with a very powerful concept for analyzing modern technology. Especially with computers, people have the tendency to blame themselves and not the machine when something goes wrong. Because of the immense complexities involved with microchips and their software, we often attribute abilities and a degree of perfection to the machine that it just does not have. The process of interpretation and the creating of meaning in the dealings with agents may become a co-construction between user and software, where it is the agents that leads that the way – highly skilled in conversation as they are. We often overestimate the machine and take it to be neutral and objective; but an agent is far from that. The shift in computing I described on the last couple of pages is in fact an attempt to make the machine more subjective, giving it a situated base in accordance to user, task and environment. And it has been designed by people with values and assumptions. Following Virilio, I would argue that an agent is a highly elaborate “vision machine” – it produces a view on reality. In doing so, it is based on its own perception of reality (ontology) and follows a programmed method of reasoning. ».

It is only to the condition of recognizing the non-neutrality not just of the agent, but more generally of the TIC that one can start to change its cognitive framing and can start to think to ethical and societal issues. Without this *propaedeutics* steps, one can just interpret the world and the technique in the restricted cognitive fields allowed by its framing - in our case the technological framing - with result or to negate any justification to ethical and societal consideration or to instrumentalize them and consider them as a mean to obtain a sort of ethical guarantee. The mechanism which consists in providing the answer waited by a given context (economic, industrial) pose ethically questions since the justified context becomes itself justification of the social function of ethics.

This recognition of the non-neutrality of ICT returns realistic the ambition consisting to put instrumental rationality in perspective and to seek its political and societal control. It is a certain a priori of intelligibility which guides all technical steps. The immediate urgency is to correct the manner of approaching the ICT corresponding at applying approaches which dissociate social approach from the technological one, political approach from economic and ethics, and too often privilege the response to the only economic, political and institutional constraints,. It is undeniable, for example, that the policies are fascinated by the technique. Positivism continues to influence our political leaders, in a state of utter disarray in relation to the complexity of our world. A symptom of this tendency is the call to the technique in all the recesses of public policies - education, health, environment, administration etc… - to solve the problems which affect our societies.

The urgency is also not to limit ethic to the only question of the institution and the application of the standards. Indeed, such an ethic is purely a decisionnist one. It refers immediately and limits itself to the problem of the adequacy of the ethical representation to the context of action but ignores the origin and legitimacy of this representation a practical way to auto justify it and instrumentalized all ethical considerations· This problem is all the more important as from an ethical point of view, the theoretical image of human conveyed by a sphere of activity deserves, as underlined by Marc Maeeschalck (2001, p.27), "to be questioned according to its effective impact on the culture and the traditions. The extrapolation of a model of activity can become totalitarian when it claims to redefine the relation of human with its horizons" [53]. The function of knowledge in modern sciences is in an increasing way conceived in relation to the system of work. These sciences generalize and rationalize the technical capacity of human on the *objectalized* processes of nature and the society and the use of techniques of administration increasingly more effective and generalized.

Once the knowledge is reduced to applied science, this type of science and rationality monopolizes the rational behaviour. The positivist conscience, consequently, combat like dogmatic any theory referring to the practice differently than those improving the possibilities of the practical applications. The practical (moral) issues become as a result the object of a decision and are confined to the irrational field, unless they are not, in their turn, subjected to the only technical criteria of instrumental rationality, as that is generally the case, "blocking any possibility of discussion on common ethical standards while imposing, preliminary a manner of understanding the world in general, a meaning of life determined usually inextricably by traditions, solidarity and personal identifications". The explanation is that the directives required by the action are divided into a rational determination of techniques and strategies and into an irrational choice of systems of values.

The consequence, for the economy governing the choice of the means, is a total freedom characterized by a decisionism in the choice of the highest goals (values associated with the action). However, as Ladrière underlines it, recalled by Maesschalck (2001, p.31)[54] , "the decisionnism is radically insufficient, because one cannot be satisfied to seek and pose principles of action and from that justify the action. It is also a question of permanently assessing the "ethicity" of the lived situations, i.e. of their particular relationship with the ethical requirements, themselves included/understood ideally like realization of the human one. " It is the fundamental explanation why what is ethically at stake is not so much to find an answer but well to make a room for ethical thinking to allow an ethical thinking that is to say an attitude that can localized the issues raised by technique and have the theoretical tool. Without that ethical posture relying on ethical references, all the answers are useless since the cognitive tools to understand and apply them are not presents (the cognitive framing being in that situation still the technical framing.). The ethical step and interrogation cannot be limited to provide the elements to establish the justification of a decision and refers to the construction of a human order and questions the way human are perceived and treated[55].

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[53] Reference translated by the author of this chapter.

[54] Reference translated by the author of this chapter.

[55] Ethics concerns convictions which are not explained in a logic of compromise. A consensus can respect the interests of all the parts in question without being by its object or its purposes (industrial, economic, scientific) in conformity with the ethical requirements. The ethical provision precedes the consensual effort and is its only guaranty. But this provision is not obtained by negotiation, it refers to the intentionality of the actors, their relation to the real world, their conceptions of existence and on which values those conceptions are founded. Without such an image of the human responsibility in relation to a real world, the stake of the ethical reflection disappears. In the field of subjectivity, the ethical interrogation is not satisfied by transformation of the individual forces into social autonomy. It seeks to exceed the responsibility concerning the measurable to open a reflection concerning the responsibility with regard to the non measurable, i.e. with regard to the destiny of humanity and the life and of our world. If we think that it is impossible for us to measure what we are and to measure what is the life, a particular dimension of our responsibility must also concern this irreducible dimension of the subjects, of the life, dimensions which are not calculable. Compared to the life given, ethics is a concrete answer where a figure of humanity with its specific features is at stake. It thus answers partially in the concrete world to the challenges of a future for the human

3.2. ETHICAL REFERENCES

The history of computer technology is not very old when one compares to, say, law, medicine, architecture, or even engineering or education. As we previously underlined, the human and social impact of technology needs to be considered. In these cases, the moral responsibility for the social impact of technology extends beyond just the practitioner, for that reason the deontological perspectives is obviously. To paraphrase a famous sentence informatics is too serious to be left to the informatician's responsibility alone. It concerns the society at large and needs a social debate. As underlined by Rob Meredith and David Arnott (July 2003, p. 4)' "Whilst a large part of the moral responsibility for the use of technology belongs with system owners and users, it often falls to the practitioner, as a professional, to highlight potential ethical issues in proposed systems. Unfortunately, as underline by Conger & Loch many IT professionals lack the communicative skills, and the ethical training to be able to engage in an ethical dialogue (Conger & Loch, 1995)".Talking about ethics, the focus on responsibility is fundamental - ethics implies responsibility (without responsibility for an action residing with a person, then we cannot label the action (and its outcomes) as good, bad.

3.2.1 - Responsibility and moral autonomy

In the case of informatics technological system, it is very often difficult to determine who is responsible for what. The determination of that locus will differ from project to project, system to system, issue by issue It seems apparent, however, that it is beholden on the IT practitioner, as an expert professional, to ensure that such issues are explored prior to, rather than during or after, an ethical dilemma, and that the relevant actors and decision makers are aware of their responsibilities. However, where systems are designed to undertake actions autonomously of their developers, owners and users, or where a system contributes significantly to a decision made by a user, then a large range of potential ethical dilemmas might arise. This is of particular interest to computer scientists interested in the field of artificial intelligence. Lucas (2001) and Dowling (2001) both point out that Asimov was one of the first to codify a set of rules for autonomous systems, albeit fictionally, with his laws of robotics."

Moral Responsibility it is well known implies autonomy, without moral autonomy there is no possibility of responsibility. The action cannot be said ethical if justified and motivated by reasons dictated by the context (efficiency, security, profit, …). The motivation of the action *must, from the start*, *be* moral (not conditioned by interest) So morality implies :

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world. It cannot thus elude the specific fields of activities. Ethic answers the injunction of reality when it questions the rational choices for the management of the limits of our capacity of answer. It refers the human action to a destiny which exceeds it, that of the life which is "carried out" in it. Ethics must assumes a normative authority which wants to be free of any contextual constraints, otherwise ethics would be subject to the reign of instrumental rationality, and would transforms itself in a sort of justification for objectives that are not ethically founded but may be for example economically driven. Refusing to be subject to such constraints we assume, in that chapter, deliberatively the normative authority of ethics.

1) **Moral autonomy**[56]…. One can not reflect on the morality of an action in terms of its contribution to efficiency, security, profit …

2) **Good Will**… to be ethical ? The will to be moral !

The other principle which is fundamental is, according to the famous *Hume principle*, that values can never be infer from fact … for example it is not because there is a consensus (political social, economics) on video-surveillance, that it is morally justified… It is not even because a AmI system is judged to be acceptable and answer to the legal requirements, that it is ethically and morally legitimated… Moral and ethics are fundamentally normative and teleological - teleology here means that there are ends which are posed as objectives: the good life, the improvement of our current social and individual situation, respecting and promoting humanistic values, with the aim of protecting dignity, autonomy, preserving integrity of human being. We will have to keep that in mind when we will consider the societal acceptability of the scenarios proposed by the partners in MIAUCE project to avoid reducing the acceptability problem to the acceptance problem. The acceptability concept implies a fundamental normative dimension, that is to say implies the determination of the conditions that makes something acceptable (including the moral acceptability which can't be reduced to the acceptation according to the contextual constraints, whatever may be those constraints: politic legal economic…).

From those considerations it is obvious that concerning computer systems with a capability to take some decisions and cause action, the question of attributing a responsibility is highly problematic. More generally, as underlined by Dowling, the concepts of autonomy, trust[57] and responsibility become more problematic as the system is more active in the decision making process (Dowling, 2001).

Obviously, AmI can't apprehend ethical issues and so can't be, by themselves, responsible for their decision and action. What about their designers? Of course they are responsible, but there are many problems concerning the designer's responsibility: they can't be considered as the unique responsible since the informatics systems respond also to social economical political etc constraints. Moreover, many IT professionals lack the communicative skills, and the ethical training to be able to engage in an ethical dialogue (Conger & Loch, 1995). . It seems apparent, however, that it is beholden on the IT practitioners, and on the policy makers to ensure that such issues are explored prior to, rather than during or after, an ethical dilemma, and that the relevant actors and decision makers are aware of their responsibilities. But again one of the fundamental prerequisite for such an exploration is that those practitioners accept to free themselves from their conditioning technical framing.

3.2.2 - Ethical principles

All ethical considerations need to have ethical principles reference. In the case of AmI where a decision is either made by the system, or based on the output thereof, *Snapper (1998) suggests that the solution is to adopt a similar view to the situation where a physician relies on advice from non-computerised sources such as human consultants. In these situations, responsibility is shared amongst the various professionals*. Accepting this analysis, we agree with Collste *et al* (1999) who, in their discussion of the ethical aspects of a *decision support*

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[56] This autonomy imperative applies also to the author of the present chapter who, by definition of moral autonomy, has to free himself ***from all constraints*** (including technical economical or political constraint) which are not moral and ethical constraints.

[57] The notion of trust has technical aspects as well as social, cultural and legal aspects.

*systems (*DSS) for diabetes care, highlight autonomy of the decision maker as important, but go further and point to the four principles of bioethics described in Beauchamp and Childress[58] (1989): beneficence, non-maleficence; autonomy, and justice. Rob Meredith and David Arnott in their communication titled « On Ethics and Decision Support Systems Development" (2003) have demonstrated *that this four principles framework is useful for DSS in general[59]. Taking in account that AmI system also is a decision system which take decision according to information resulting from analysis of data coming from the environment we believe that this framework can represent a sort of ethical reference to discuss the ethical issues raised by AmI in general, and by MAIUCE project specifically.*

The principles which Beauchamp and Childress employ in their approach are very distinct from the Utility Principle and the Categorical Imperative.

"- Above all, these principles are not first justified through a specific ethical theory in order that they can then be – in a second step – brought to bear on moral experience.

Instead, they are formed out of experience and in fact reveal a part of that experience.
They are rules of thumb, or *prima facie* duties, which reflect the core stock of moral beliefs held in common in a modern pluralistic world. Principlism endows our ordinary moral experience (perception,

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[58] We acknowledge that those principles raised many problems which concern their interpretation and their application above all in AmI context. Critics have contended that the principles are so general that whatever agreement on them there may be is unlikely to be very meaningful. Thus, to take one example, although the utilitarian and the Kantian may both accept the principle of autonomy, the principle as it is formulated allows them to understand the notion of autonomy in very different ways. Another criticism of the approach is that it does not offer any clear way of prioritizing between the principles in cases where they conflict—as they are often liable to do. The principle of autonomy, for example, might conflict with the principle of beneficence.
According to the hierarchy between those principles, Dawson A, Garrard E. (2006, p. 123) noted that « , these principles are widely regarded as *prima facie,* and the relative importance of each of the four will vary according to each circumstance under examination, without any one being regarded generally as taking priority" According to the original framework of the four principles approach, there is *no intrinsic priority* to any of the principles; they are all of equal weight. In the third edition of the *Principles of Biomedical Ethics,* Beauchamp and Childress provided the following list of conditions that justified "infringing on a prima facie norm," i.e., choosing one principle over the other.
"Justificatory Conditions" for infringing on a prima facie norm
- The moral objective must be realistic. (Be Realistic)
- No morally preferable alternative action is possible that would fulfil both of the conflicting duties. (Seek win-win solutions)
- Choose a solution that minimizes the infringement of duties. (When win-win can't happen, choose the "next best thing")
- Seek to minimize the effects of that infringement. (Clean up after yourself)"

In the fourth edition of *Principles of Biomedical Ethics (p.34),* Beauchamp and Childress add a new condition.
Better Reasons can be offered to act on the overriding norm than on the infringed norm (for example, typically if persons have a right, their interests deserve a special place when balancing those interests against the interests of persons who have no comparable right).
For an analysis of the problems of this framework see for example: Wulff, HR. Against the four principles: A Nordic view. In: Gillon R. , editor.. Chichester , John Wiley & Sons; 1994. pp. 277–286.
Despite of all those insufficiencies and critics, we believe that in a non ethical specialized context the principles remain useful as a framework in which to think about moral and ethical issues at least to allow a discussion concerning the condition of an open ethical discussion which imposes to reject all technological determinism way of thinking.

[59] We refer for a demonstration of the usefulness of the ethical framework to their communication.

intuition) with justificatory force. As Beauchamp and Childress emphasise, moral experience in general is a 'credible and trustworthy' source of ethical knowledge (Beauchamp and Childress 2001, p. 400). In that respect principlism is very different from justification in the framework of a Utilitarian or Kantian ethics, where one always needs to infer what one ought to do in a given situation. Instead we arrive at the Aristotelian idea that getting things right in ethical matters is much more a matter of seeing things right than of intellectualist justification.

The four principles of nonmaleficence, autonomy, beneficence, and justice constitute the least common denominator of morality. " (Döring & Goldie) A brief explanation of these principles in the context of biomedical ethics is provided in the following table:

Beneficence	= providing 'benefit' Beneficence obligates professionals to 'do good' towards their clients. It is their duty to further their clients' welfare and interests. Beneficence seems relatively straightforward, but can be difficult to apply in practice. What exactly is a benefit? How can we tell whether a particular benefit will occur or not?
Non-maleficence	○ = 'not harming' Health professionals also have an obligation not to inflict intentional harm upon their clients, or to minimise a risk if it is necessary to take one at all.
Autonomy	Autonomy means 'self rule' or self-determination. That is, we all have the right to deliberate about our own values and make decisions about how we want our lives to go, free from the interference of others.
Justice	Justice requires that medical care be provided in the fairest possible way, treating 'equals equally'. ○

Table 11- Tom Beauchamp and James Childress (2001) Principles of biomedical ethics, 5th ed. Oxford University Press, New York. ISBN 0195143329.

Although there is a danger in dividing ethical problems into only these four categories, the four principles are a useful tool for determining where the ultimate conflict in a problem might lie. Each of the four regulative principles should be regarded as guiding ideas for debate and decision making. The table 14 represents a sort of checklist for ethical decision making when one seeks to apply those principles or discuss some issues referring to them. These principles are open to competing interpretations and the precise relationship between each of the principles has to be informed by more general theoretical positions taken by the disputants. *Deliberating with these principles means balancing them and specifying them to the particular case*. Moral decisions also need virtues on the part of the moral agent to arrive at just decisions. Compassion, fortitude, and perseverance all affect outcomes.

RESPECT FOR AUTONOMY

Does my action impinge on an individual's personal autonomy?

Do all relevant parties consent to my action?

Do I acknowledge and respect that others may choose differently?

BENEFICENCE

Who benefits from my action and in what way?

NON-MALEFICENCE

Which parties may be harmed by my action?

What steps can I take to minimise this harm?

Have I communicated risks involved in a truthful and open manner?

In the event of a disaster, how can I avert the possible harm caused?

JUSTICE

Have I identified all vulnerable groups that may be affected by my action?

Is my proposed action equitable? How can I make it more equitable?

Source: Beauchamp, T. & Childress, J. (2001) Principles of Biomedical Ethics, 5th Ed, Oxford University Press, Oxford.

A sound ethical decision-making process may incorporate the following abilities;

1. The ability to identify all related issues pertaining to the incident/issue/dilemma.
2. The ability to sort morally relevant issues from morally irrelevant issues in any given situation.
3. The ability to unpack the elements of morally relevant information.
4. The ability and willingness to research issues and reflect upon them.
5. The ability and willingness to seek advice.
6. The ability to form a well-reasoned, unbiased, and morally defensible conclusion in any given situation.
7. The ability to justify this position and act upon it.
8. The ability to challenge one's own moral framework in light of recalcitrant experiences.
9. Being in possession of a *consistent* moral framework.

Table 12- A checklist for ethical decision making

We believe that there are enough parallels with general decision support systems development to argue that these four principles and their complements (dignity, integrity, vulnerability: see table 15 below) defined in the Barcelona declaration should apply there as well in the case of proactive technology and AmI technology, since it is this interpretation which is concerned by the project.

> 1. Four ethical principles ought to be considered in their mutual connection as basic principles: autonomy, dignity, integrity and vulnerability...
>
> 2. All four principles express dimensions of the human being which must be respected and protected, and three of them - dignity, integrity and vulnerability - also concern respect for and protection of animals and living organisms.
>
> 3. Autonomy should not only be interpreted in the liberal sense of “permission” given for treatment and/or experimentation, instead five aspects of autonomy should be put forward: 1) the capacity of creation of ideas and goals for life, 2) the capacity of moral insight, "self-legislation" and privacy, 3) the capacity of rational decision and action without coercion, 4) the capacity of political involvement and personal responsibility, 5) the capacity of informed consent. But autonomy cannot express the full meaning of respect for and protection of the human being. Autonomy remains merely an ideal, because of the structural limitations given to it by human weakness and dependence on biological, material and social conditions, lack of information for reasoning etc. We must recognise the human person as a situated living body. A number of human individuals such as minors, coma patients and mentally ill persons cannot be considered having autonomy.
>
> 4. Dignity should not be reduced to autonomy. It says more. Although originally a virtue of outstanding persons and a virtue of self-control in healthy life - qualities which can be lost, for instance by lack of responsibility or in extreme illness - it has been universalised as a quality of the person as such. It now refers to both the intrinsic value of the individual and the intersubjective value of every human being in its encounter with the other. Thus it expresses the outstanding position of the human individual in the universe as being capable of both autonomy in rational action and involvement in a good life for and with the other in just institutions. Respect for the dignity of human being is respect for its inviolability in common life. Dignity concerns both oneself and the other: I must behave with dignity, and I must consider the dignity of the other; I must not give up civilised and responsible behaviour, and the other should not be commercialised and enslaved. Human rights are built on this principle of dignity.
>
> 5. Integrity accounts for the inviolability of the human being. Although originally a virtue of uncorrupted character, expressing uprightness, honesty and good intentions, it has, like dignity, been universalised as a quality of the person as such. Thus it refers to the coherence of life that should not be touched and destroyed. It is coherence of life which is remembered from experiences and therefore can be told in a narrative. It is the life story of a person, the narrative unity or history of human society and culture, the natural grown coherence in the life of animals and plants and finally the created wholeness of the world which makes the conditions for all life. Therefore respect for integrity is respect for privacy and in particular for the patient's understanding of his or her own life and illness. In bioethics and biolaw the idea of integrity expresses the untouchable core, the inner nucleus of life that must not be subject to external intervention. It is the most important principle for the creation of trust between physician and

patient, because it demands that the physician listens to the patient telling the story about his or her life and illness.

6. Vulnerability concerns integrity as a basic principle for respect for and protection of human and non-human life. It expresses the condition of all life as able to be hurt, wounded and killed. It is not integrity as completeness in any sense, but the integrity of life that must be respected and protected as vulnerable.
Vulnerability concerns animals and all self-organising life in the world, and for the human community it must be considered as a universal expression of the human condition. The idea of the protection of vulnerability can therefore create a bridge between moral strangers in a pluralistic society, and respect for vulnerability should be essential to policy making in the modern welfare state. However, vulnerability has been largely misunderstood in modern society, as if all vulnerability, i.e. suffering, abnormality, and disability, should be eliminated in order to create perfect human beings. Respect for vulnerability is not a demand for perfect and immortal life, but recognition of the finitude of life and in particular the earthly suffering presence of human beings.

Tableau 13 - Understanding of the Principles (Final report to the commission on the project Basic ethical principles in bioethics and bioloaw, 1995-1998, p.5)

In the context of the project, we propose that these principles can be applied as follows:

- Autonomy refers to the right of the user to decide what should happen as result of a given situation.
- Veracity implies that the user knows exactly what information the system collects about the user.
- Beneficence is the expectation that the use of the system will be for doing good;
- “Nonmaleficence” is the expectation that the system will not be used with bad intent.
- Confidentiality ensures that the information collected by the system will not be freely available. Justice is the expectation that the system’s decisions will be fair.

Synthesis

To take an active critical part in the technological design of our daily behaviors means to deconstruct meanings, especially the oppositions that can be found in the discourses of AmI designers and computer.

Technique is not neutral. The AmI reflect, in their constitution and their use, expectations of the society and are influenced by their socioeconomic context. In the case of MIAUCE project and more generally AmI, the construction of the social legitimacy (and not just acceptability) of science and technology requires that the metaprinciples of normative nature subjacent with the action techno-scientist be considered. Iintelligent agents are in their constitution not neutral and should not only be regarded as software programs, but also as 'social actors' since they inevitably take a position.

Ethics is never in the answer but well in this dynamic movement of questioning, before the action and on a border, that which separates our subjective existence (with its presupposed, its preferences, its convictions, its hidden motivations) from the constraining externality. What is ethically at stake is to make a room for ethical thinking to allow an ethical thinking that is to say an attitude that can localized the issues raised by technique and have the theoretical tool. The fundamental prerequisite for such an exploration of the ethical problems raised by a technique is that the practitioners of that technique accept to free themselves from their conditioning technical framing.

Ethics implies responsibility, autonomy and good will and is fundamentally teleological. Ethical ways of thinking need to be encapsulated within the very process of the research itself, probably based on multi-disciplinary or interdisciplinary perspectives. A more informed and balanced analysis of the potential social and ethical implications of technology would, it is hoped, be the result.

We determined as ethical references needed for our ethical exploration of the ethical issues raised by AmI: nonmaleficence, autonomy, beneficence, and justice, dignity, integrity, vulnerability.

3.3. AMI ETHICAL ISSUES

3.3.1 –AmI visions too optimistic?

Having as reference those ethical principles, in order for Ambient Intelligence to go behind the recurring one-sided claim of consumer technology throughout the twentieth century that it will simplify our lives, save time, and liberate us from toil (Langdon Winner, quoted by Bohn et al. 2003), its societal and user implications should be made more explicit.

The problem with the visions that were proposed[60] is that there are for most of them very optimistic. They only look at what is technological feasible and have a simplistic account of how social change occurs by ignoring the social and user dynamics involved in the innovation process (Burgelman 2001: 215-216). The portrayed everyday life in the scenarios that were proposed by scientist or industrials “is primarily a perfect life where users are able to cope, successfully, with their lives. Scenarios have a tendency to ignore the struggles, uncertainties and irregularities that are characteristic for everyday life as well. They are inclined to portray only the bright side of life”. (Punie, 2003, p. 19)

As more and more objects and environments are being equipped with ambient intelligence technology, the degree of our dependence on the deployed devices is increasing accordingly. In a largely computerized future that is proposed, it might not be possible to escape from this sort of technologically assistance with as a result an induced dependence. This possible dependence which leads to a number of fundamental social challenges for future ambient-intelligence systems. Privacy is just one of these challenges, though probably the most prominent one.

More generally, the fact that these technologies will deliver personalised services to individual users means that somewhere a lot of personal information needs to be stored about those individuals. Such personal data can, either accidentally or intentionally, be abused. “Most people would be shocked to find out just how much information they consider private is already in the public domain,” says project information coordinator David Wright of Trilateral Research & Consulting in London. “Thanks to data aggregators that gather and consolidate a wide range of information about groups – and individuals – in society, our government and commercial organisations already know a great deal about what we do and what motivates us." However, without effective privacy protection measures, this brave new world of smart environments and interconnected objects could become an Orwellian nightmare (Mattern, 2003; Bohn *et al.,* 2003; ISTAG, 2001). Addressing the balance between privacy and security will be a core challenge for the future of Ambient Intelligence. For people to feel at home within AmI, it needs to be able to represent their multiple identities, respect their privacy and establish an acceptable level of security (Beslay & Punie, 2002). The questions that need to be tackled are in short: What kind of society is envisaged with Ambient Intelligence? How are the users configured in Ambient Intelligence ?

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[60] For those visions see chapter 2.

After having specified the condition for an ethical analysis and determined the ethical references, through a synthesis of the issues found in the literature, we will identify and try to analyze ethical and social implications of future ambient-intelligence landscapes. Doing so, we will offer the MIAUCE partner a landscape of issues to be discussed in the project to steer its development in a direction that has more in common with Weiser's optimistic vision of the 21st century than with the dystopian representation we can find for example in Spielberg's "Minority Report. To try to understand human values, we need to consider many concepts including: behavior, trust, privacy, security, inclusion, social norms, respect, self-esteem, context, choice and control.

3.3.2 - The ethical issues of Ambient Intelligence

The evolution of ICTs is moving towards what is variously called pervasive computing, ubiquitous computing or simply Ambient Intelligence (AmI). The future scenario is of a computing infrastructure where the familiar "machine" (keyboard, screens, etc.) will disappear and will be distributed "around" us. The environments around us will include sensors and wireless devices able to detect human presence, to collect data on human parameters (physiological parameters, pressure, temperature, etc.), to detect situations that need attention from other parties, and react to human presence. These "future computing" scenarios represent a large-scale transformational change in the history of computing and are encouraged by the European Commission as demonstrated by the large number of AmI projects currently being funded[61]. The significant opportunities of AmI recognised by the EU in the 7th Framework Program mainly refer to:

- Improving living arrangements for people and further supporting society to bring added benefits.
- Modernizing the European social model particularly in terms of: improving civil security; providing new leisure, learning and work opportunities within the networked home; facilitating community building and new social groupings; providing new forms of healthcare and social support; tackling environmental threats; supporting the democratic process and the delivery of public services.
- Improving Europe's economy in terms of: supporting new business processes; increasing the opportunities for tele-working in the networked home; enhancing mobility and improving all forms of transport; supporting new approaches to sustainable development.

At the same time, as evidenced by the numerous reports underlining the potentialities of those new technologies and their dangers, they introduce many concerns related to ethical implications[62]. There is an increasing recognition that technical development in the area of ICTs can have ethical implications concerning privacy, identity, freedom, autonomy, dependability, social acceptability, the question of informed consent, problems of discrimination, risks and complexity, exclusion, profiling.[63] This recognition is emphasised by the attention paid to ethics in the FP7 ICT calls. In this context it is imperative that in the development of new technologies account is taken of any ethical implications.

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[61] for a description of those projects see chapter 2 and Annex)

[62] For more information, please refer to the following:

ITEA (2004). ITEA Technology Roadmap for Software-Intensive Systems, 2nd edition. Eindhoven: Information Technology for European Advancement (ITEA) Office Association. Website: www.itea-office.org.

Since our environment will become aware, active and responsive, many applications will have the immense potential to bring benefit to our lives by improving our communication abilities (e.g. displaying activity levels of a remote relative), automating common tasks (e.g. refilling medicines at appropriate times), assisting those with special needs to participate more actively in society (e.g. to adapt the interface of the information infrastructure to the specific person's sensorial capabilities with a multimodality, design-for-all and eInclusive approach) and helping to keep vulnerable populations safe (e.g. sending an alarm when a patient is missing critical medicines, is falling down, etc.). However these scenarios and envisaged applications have the potential to lead us to an Orwellian society where every person's action could be monitored and recorded. Privacy then is one issue (partially tackled by the SWAMI project (Wright, D., 2005) but it is not the only critical ethical issue arising from such scenarios. When the application of these AmI emerging technologies also include life-critical matters, then availability and technical reliability concerns (typical of very complex computing applications) become critically important. Other ethical issues include (but are not limited to): equality of access (digital divide[64]), increasing social pressure, user-centred design (at what stage, if any, will the end-user be involved in the design process?), and security (who will have access to sensitive information, how, and for how long?).

3.3.3 - From Vision to Users

Ambient systems are often referred to as being IT systems intimately integrated with everyday environments and supporting people in their activities. In the visions of ubiquitous computing the integrative ideal is one of invisibility: "Such a disappearance is a fundamental consequence not of technology, but of human psychology. Whenever people learn something sufficiently well, they cease to be aware of it. When you look at a street sign, for example, you absorb its information without consciously performing the act of reading. Computer scientist, economist, and Nobelist Herb Simon calls this phenomenon 'compiling'; philosopher Michael Polanyi calls it the 'tacit dimension'; psychologist TK

IST Advisory Group (2003). Ambient Intelligence: From Vision to Reality. For participation – in society and business. Luxembourg: Office for Official Publications of the European Communities. Website: http://www.cordis.lu/ist/istag-reports.html.

ePOCH (2003). e-ID and the Information Society in Europe. White Paper. Website: http://www.eepoch.net/documents/public/WhitePapers/eepoch_white_paper.pdf.

IST Advisory Group; Ducatel, K.; Bogdanowicz, M. et al. (2001). Scenarios for Ambient Intelligence in 2010. EUR 19763 EN. Sevilla: EC-JRC, Institute for Prospective Technological Studies (IPTS). Website: http://www.cordis.lu/ist/istag-reports.html.

SWAMI (Safeguards in a World of Ambient Intelligence) which aim to identify and analyse the social, economic, legal, technological and ethical issues related to identity, privacy and security in the forecasted but not yet deployed Ambient Intelligence (AmI) environment http://swami.jrc.es/pages/index.htm.

PRIME Hansen, Marit and Henry Krasemann (eds.), Privacy and Identity Management for Europe – PRIME White Paper, Deliverable D 15.1.d, 18 July 2005, p. 10.

[63] For example: Johnson, D. G., (2001), Computer Ethics, 3rd. ed. Prentice Hall. Hamelink, Cees J. (2000) The Ethics of Cyberspace. Sage Publications. Spinello, R., (2000) Cyberethics: Morality and Law in Cyberspace. Jones and Bartlett. Tavani, H.T. (2004) Ethics and Technology: Ethical Issues in Information and Communication Technology. John Wiley and Sons. SWAMI, "Safeguards in a World of Ambient Intelligence (SWAMI): Pasi Ahonen et alii, final report, Deliverable D4 30 August 2006.

[64] The digital divide y refers to the gap between those that have access to the new ICTs (internet or any emerging new technologies) and those that don't and to the disparities regarding the ability to use them.

Gibson calls it 'visual invariants'; philosophers Georg Gadamer and Martin Heidegger call it 'the horizon' and the 'ready-to-hand'; John Seely Brown at PARC calls it the 'periphery'. All say, in essence, that only when things disappear in this way are we freed to use them without thinking and so to focus beyond them on new goals."» (*Weiser, 1991)* In 1998, Weiser coined the term "Calm Technology" in order to honour the fact that what he wished for the future was to focus on designing technology that would act in the periphery for us. As he stated in a keynote speech » Unlike ubiquitous computing, 'calm technology' does not name a method, but a goal. » (*Weiser, 1998)*

The transition from ubiquitous computing to calm technology is mainly a transition from technology-centred work to human-centred work. Calm technology wishes to honour humans, and the complexity of human life. The goal, though, is still technological development and dependence. The idea of invisible technology is strong within the calm technology perspective, as is the idea of fitting technology to the visible parts and the invisible parts of the iceberg that is used as a model of a human being. In this vision, human needs are positioned centrally and technology is seen as a means to enrich our life.

3.3.4 - AmI visions: an utopia?

The ubicomp and AmI vision is to fully computerize society, with the objective to serve with its orientation towards the public as well as the private, the personal as well as the commercial, people in their everyday lives at home and at work, functioning invisibly and unobtrusively in the background and freeing people to a large extent from tedious routine tasks improving of people's quality of life. The good' design is defined here as making a product which will not create disharmony or doubt in the life of its users.

AmI sees the human user as the main actor, always in control, playing multiple roles in society. We can note with J. P. Allen (Allen, 2004, pp. 7-16) the paradox at the same time attempting to maintain user control of a technology and make that technique invisible to the user.

Regarding the question of the autonomy, it is obvious for a proactive system, as it is foreseen in the MIAUCE project, that, by its very essence, it limits the users' full autonomy (this raises a central ethical problem if we acknowledge that personal autonomy is fundamental for all human beings)[65]. What will remain as cognitive possibility if the environment does not cease being built and in the same time to build a predetermined and finalized meaning? In this context the constructivist idea of a construction of reality must be put in question. Virtuality is a new philosophy, a new relation to the world, to reality, which is more significant, because the virtual concerns metaphysic. As very well underlined by Theodore Roszack (Roszack, 1994, pp. 11-14) "We think with ideas, not data. Ideas must be there to contain data. Ultimately ideas generate data by defining problems, raising issues (…) thinking in the highest sense of the word has little to do with information, and still less to do with expensive information-processing machinery. It has everything to do with knowing how to deal with ideas. And that requires plain old-fashioned literacy—the ability to read, write, listen and speak with critical awareness. In the natural order of things, it is ideas—whether in the form of judgements, evaluations, interpretations, theories, beauties of form and structure—that take precedence over facts and figures".

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[65] It is possible to distinguish three levels of AmI control:

- High: AmI acts on behalf of the person.
- Medium: AmI gives advice and proactive suggestions.
- Low: AmI executes the person's commands.

Without putting in doubt the good will and intention of the scientist and industrial that proposed the vision, it should be noted that as the history of technique puts clearly in evidence, each new technique is accompanied with a positive discourse that gives a positive representation of it and always positives social changes are promised and promoted and finally gives one-sided promises of a better world. . Even if they maintain that they are focused on human rather on technique, the problem with those visions is that they are, for the most part, technologically deterministic, and at the service of the stakeholders promoting them.

As underlined by Punie "It should also be noted that technological vision building is not new and that it typically promises a better world. Looking back to the time when 'old technologies were new' (Marvin, 1988) can be useful to put the rhetoric's about the home of the future in perspective. A century ago 'the electrification of private life' and the 'mechanization of the household' were important issues (Flichy 1995). Forty (1986: 183) describes how electricity was represented as the 'fuel of the future', as a liberating technology promising a clear, clean, healthy and efficient way of life. This discourse served the purposes of the industry looking for ways of using the electricity network outside working hours, i.e. in the home environment. It took place at the end of the 19th century in a period where public and private life became increasingly separated as distinct and gendered spheres for production (work, public_activities) and reproduction (leisure, family life, personal identity, care). The home was ideologically and symbolically represented as a 'haven in a heartless world'. (Punie, 2003, pp. 18-19)

Is it possible to believe blindness those visions which present in a sunny colour the impact of the AmI ? The widespread implementation of the AmI vision would have a tremendous impact on our everyday lives and society. It is probably one occasion where the overused phrase 'paradigm change' is appropriate" because it implies a radical shift in such dimensions as the users of the technology, its incorporation into different spheres of living and working, the skills required, the applications and content provided, the scale and nature of the markets and the players involved" (Miles , 2002, pp. 4-9)[66]. Previous examples have shown that social and ethical regulation mechanisms have always lagged behind technological developments.

The problem is really important since firstly technical development as the computer development and diffusion are generally irreversible and secondly it seems to be clear that with these technical developments – pushed through largely unnoticed by the general public and extending quite rapidly into our everyday lives – unanticipated (if not unacceptable) standards could soon be set for the rest of our lives.

Friedewald (Friedewald *et al*, 2005) questions whether ubicomp systems will fulfill most of the promises made by researchers or whether the vision is just an illusion? Living in a ubiquitous society suggests effortless communication, our needs, wants and desires met. The exchange of information has vast social implications and might not decrease but actually increase the complexity of life.

Ubiquitous systems hold the danger of increasing social pressure and the digital divide. Ubicomp has the potential to create an invisible and comprehensive network. The more options a bundle of devices offers to their users, the greater is the challenge not to get lost in an abundance of possibilities.

Concerning the visions that have been proposed through the mean of scenarios one immediate remark, this better life foreseen for the user is in fact the designers' view and perception of what should be better in their own lives. In general, users have little to say in the process of determining what is good for them. If the visions and systems are focused on the user, the values underlying them are generally industrial's or scientist's values. The ethical principles embodied in AmI systems can, for the most part, be transferred from their designers, whose intents and competences will determine in which way the systems will influence their user's lives. If a programmer does not care about the ethical implications of a system, then the system may very well be unethical in the end. The just and fair decisions of a proactive system would, once again, depend on its purpose and the way it was designed this refers once again to the problem of the responsibility of its designer. In that sense, we will consider computers as simply following their programming, not as intelligent beings with free will and possibly malicious intent. This explains that from ethical perspective, the just and fair decisions of the proactive systems foreseen would depend on its purpose and the way it is designed.

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[66] cited by Punie, 2003, p. 12.

Concerning the scenarios, we must recognize that describing scenarios is not an innocent activity and, implicitly, represents a framing process conditioning the representation of the impact of the technology (positive impact in the case of the scenario build by industrials for example or negative as in the case of SWAMI scenarios).

Scenarios are indicative and normative, they form the foundations of political decisions, which research topics will be financed and which not, which applications are developed and which not. So scenarios for a 'better life' for the prototype individual might become the standard way of living for everyone. The convergence of the designed domestication processes based on the assumption of a 'better life'[16] could become an apocalyptic trip of an automatic 'repression to normality', without the option of creative adventures or explorations. (Crutzen, 2006, p.3)

Table 14- Scenario and values

The vision of the industrial and designers of 'usercentredness' is based on a notion of non-problematic interaction: '... which means technology that can think on its own and react to (or possibly even predict) individual needs so people don't have to work to use it'. This non problematic relation is allowed because of the drastic simplification undertaken by the designer in the representation of the context and human, reducing that complexity to what their calculable framing allow them to represent[67]. In scenarios focused on the individual, human life is idealized and optimized. [68] Social issues are only mentioned from an egocentric point of view.

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[67] Despite all these initiatives, context remains relatively problematic for the design of interactive computer systems because of poor understanding what it is and how it can be used (Dey 2001). Moreover, definitions of context are context dependent. The weather, for instance, may be crucial for out-door activities but irrelevant when doing the same things indoors. A challenge is also that many context-aware services assume that the context they use is completely accurate while in reality, both sensed and interpreted context is often ambiguous (Dey et al. 2002).
Realistic context awareness should also take into account context in its sociological sense, i.e. peoples' socio-economic positions (class, gender, ethnicity), their history (parents, education, etc.) and symbolic positions in society (e.g. social capital). This seems to be even more complicated and as a result, its incorporation in the design of interactive systems will probably even further away in the future compared to using location and identification for context aware services.

[68] Punie, 2003, p.6. In MIAUCE project the way emotion for example is analyzed demonstrate a positivist and reductionist conception of emotion that reduced emotion to what can be perceived on a human face. In general the AmI conception reduced the world and human to what science is able to apprehend that is to say to what is calculable discarding all what refer to interiority, to the subject.

The risk is that taking the objective of a "technology for user", *in fact* the user disappears to leave the place to the value and conception of society promoted by the industrial, the scientist and the policy makers which promote the technique which is perceived without democratic deliberation as a way to resolve societal and economic issues (for example security issues…)[69]. Concerning this "user's representation" issue, we can highlight two key problems in theoretical ethics: "On the one hand, the determination of reality which we should influence with our acting, and on the other hand, the determination of the subject to which these actions should be attributed and should intervene in reality. In certain sense we may say that reality diminishes with respect to its confrontational character, and hence becomes virtual, and there comes into focus the subject that is perceived by intelligent systems, always as a user stereotype, i.e. as a buying, sickly and travelling subject etc. To a certain extent the subject becomes weakened, and, moreover, the formation of its identity is impaired. This is because it has to above all manufacture its personality without the recognition and non-recognition of a present Other, and possibly without the development of those specific skills dependent on this confrontational experience with the world."(*International Review of Information ethics*, Vol. 8 - December 2007)

There is also the risk that intelligent agents' functioning becomes a new 'black box' since it is not obvious to understand the algorithms used to get certain results, algorithms which themselves are not neutral[70].

Current descriptions of both context awareness and intelligent agents tend to present them as neutral, i.e. not needing to adopt a position within social relations. This position will be difficult to sustain when confronted with users and non-users in their everyday life, since the latter are not at all neutral.

3.3.5 - Justifications of AmI

In most of the scenarios and visions that were proposed two justifications for the development of AmI technology are security and care. People in those scenarios and vision are, most of the time, presented in danger, vulnerable.

> *We trust less and we fear more. We will therefore be searching for reassurance and guarantees. Given this we will search for anything that helps us, nurtures us and keeps us safe. In other words we shall search for peace of mind. We will welcome tools that allow us to monitor the health of ourselves or our loved ones, that allow quick links with emergency services, or 'tag' our children so that we know where they are. In short how can our technologies look after us and our environments rather than us looking after our technology.* (Philips Research 2003, p. 35)

As underlined by Crutzen, domestication of AmI will be forced by jumping on the bandwagon of some fundamental fears of the individual and society such as the present loss of security and safety because of terrorism, the necessary but unaffordable amount of care for the elderly (Braun 2004)[71] or economic constraint. We don't deny of course that technology can help to make our life easier but those consumer driver can't, by themselves, be a justification to a systematic deployment of AmI to resolve what are fundamentally social issues and not technical issues.

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[69] This raised also the question about who is in control of the AmI system. How are the user's interests protected and how is it ensured that information is objective?

[70] For an explanation of the non neutrality of algorithm in computer systems see for example Jeroen van den Hoven (2007).

[71] Cited by Crutzen 2006, p. 4.

It is from our ethical and reflexive perspective really insufficient to outline scenarios 'to encompass societal, economic as well as technology developments and form a logical framework in which use cases can be fitted' with as goal to find a justification for the goal which has been determined. Can we counter-balance the risk of dehumanization and depersonalization by progressively disembodying patients, by reducing them to their behavior and reducing them as pure source of data even for their on wellbeing ?

To relay on security, care or economic drivers is to obey to a technological determinism that finally reduced all social problem to a technological one with the danger to impose the technological framing with as a consequence the rejection of other alternative perspectives. There is a very real danger that in many instances positivism will end up presenting itself, in cultural terms, as the only genuine form of knowledge, the only activity endowed with meaning, and will discard as meaningless any reflection on the role it plays in the social context, that of a justification of technocratic domination. Hence the force of technocratic ideology, an unacknowledged domination that arises from the fact that it hides behind technological rationality. Hence again—even if, as Ulrich Beck has stressed, this is a perspective that needs qualifying—the difficulty of controlling the rampant growth of technological innovations politically; often as not, political institutions make do with furnishing them with a regulatory and financial framework within a dynamic system accompanied by positive feedback that leads to overheating. In this context, expertise becomes the indisputable new source of normativity, and the problems revealed are confined to a scientific perspective alone—which means that the problems taken into account are confined to the realm of strict scientific rationality, and democracy is confiscated and the objectivation of the world we experience in order to predetermine the form of the world we share.

It is precisely the danger we can see in the promotion of AmI. All the problems (security, care etc) are conceived as if the only solution was a technical solution without considering alternative solution and without raising the question of the proportionality[72] of this technical solution to the perceived risk[73] and danger[74]. Considering from that perspective, the security justification for AmI can be considered as "a symptom of the fact that we have become so hypnotised by the 'need' to find technical solutions to crime, terrorism, fraud and many other problems that we forget to ask whether these solutions are even appropriate, and whether there might be other, non-technological or less invasive answers" (Murakami Ball, 2006, p. 5). The last CNIL[75] annual report (CNIL, 2006) and to give another example an Australian report concerning video surveillance highlight that risk: "The development of policies governing the application of CCTV surveillance must therefore be grounded in solid empirical research. Authorities considering using CCTV should be careful to avoid falling into the trap of basing their decision on persuasive anecdotal evidence and flawed assumptions about its effectiveness. Authorities need to be clear about what it is they hope to achieve through the use of CCTV surveillance and determine how that will be achieved, before simply assuming there is a need for it. Just how useful traditional CCTV surveillance will be in countering terrorism in the long term is unclear when the effectiveness of CCTV in combating a range of other crimes remains largely inconclusive." (Parliament of Australia, 2005)

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[72] We emphasize the need to make a deliberate decision with regard to appropriate levels of privacy and security, of control and constraints.

[73] Risk is a concept that denotes a potential negative impact to an asset or some characteristic of value that may arise from some present process or future event. In everyday usage, "risk" is often used synonymously with the probability of a known loss. Paradoxically, a probable loss can be uncertain and relative in an individual event while having a certainty in the aggregate of multiple events Frequently in the subject matter literature, risk is defined in pseudo-formal forms where the components of the definition are vague and ill defined, for example, *risk* is considered as an indicator of threat, or depends on threats, vulnerability, impact and uncertainty.

[74] danger is a keyword used to denote that an indicated action will result in serious personal injury or harm.

[75] CNIL, Commission nationale de l'informatique et des libertés.

In the case of the MIAUCE project, the fact that for each scenario *none alternative* to AmI solution was considered is striking of a technological determinist perspective which is encouraged by a political surrounding which insists on the economic perspectives, the international competition… and conceived the development of the so called information society as an absolute necessity.

According to the Lisbon European Council of 2000 and the e-Europe 2005 Action Plan, the European Union is committed to developing, amongst others, 'an information society for all' and to enable all European citizens to benefit from the knowledge society. The Lisbon process clearly stated that the European knowledge based society should also be a socially inclusive one. This places the notion of the digital divide on the policy agenda. It is of concern to policy makers that (new) technologies should not become a (new) source of exclusion in society. All this is perfect but the concept of information society is not defined and can be related to many visions (positive if it is driven by humanistic concerns more problematic if it is driven only by economic considerations which seek justification in societal considerations to assure the acceptation of the techniques developed.).

Jacque Berleur underlines that « *the nature of eEurope action currently remains modelled by the obstinate classicism of a vision generated within inner administrative circles and seeking legitimacy through reliance on chosen expert groups, a vision translated into vague action plans and embellished with some social and democratic concerns.* » « *We cannot avoid thinking that social and societal considerations have been sprinkled on what mainly remains a market-driven plan.* ». *In our opinion, the market-driven option has never been questioned since it was chosen as a central pivot in the Delors' White Paper…. The latest elements of European policy on Information society maintain the same convergence discourse. Europe shares with its predecessors (…) a common cognitive map…* » (Berleur and Galland, 2005).

It is undeniable, that the policy makers are fascinated by the technique. Positivism continues to influence our political leaders, quite at a loss facing the complexity of our world, with the weakness of their means, and facing the global crisis of meaning. The technique seems to them to offer the horizon of certainty that the ideologies do not appear capable any more to provide. It operates in their perception a looping enters, on the one hand, their convictions of backgrounds increasingly conditioned by the impact of the infiltration of the technique in our epistemology and leading to social habitus and, on the other hand, interpretative and doctrinal outgrowths which contribute to solidify, by theorizing them, these forms of life and thus to reinforce them in their apparently inescapable character. A symptom of this tendency is the call to the technique in all the recesses of our public policies - education, health, environment, administration etc… - to solve the problems which affect our societies.

Again to analyse with an open mind the issues raised by AmI requires to changes of cognitive maps, a profound shift which place human above technical, economic and politicians considerations, a good will accepting not to reduce all the problems to the technical and economic ones a good will accepting that the fundamental principle of "autonomy" (with its associated principles of integrity, dignity, and vulnerability) should be placed in the context of care for others - a context that already presupposes an ethic of solidarity, responsibility and justice (fairness). Without that necessary cognitive shift all ethical considerations are just mere justifications, a sort of label and guarantee to what has been decided *a priori* according to other constraints and necessity (mostly economic and technical ones) – this conception which reduces all ethical approaches to a justification is ethically unacceptable. Of course this shift can't be imposed; it must represent a choice depending of a free will[76] - this is why the expertise approach is insufficient and why the ethical approach implies a learning[77] and an effort which aims to allow an appropriation of the ethical process by the stakeholders. It is also an explanation why the ethical problems raised by MIAUCE project can't be resolved only by giving, from a top down perspective, solutions in an table[78] to ethical problems defined by the experts (it should be highlighted that waiting external solutions to ethical issues is a way to deny all ethical responsibility because it is a way to escape to the ethical requirement to take upon oneself the ethical process).

Most of the current day systems and application designs are unfortunately technology driven, the ethical and societal considerations serving more as a justification than really as a mean to develop a real reflexivity, since most of the time the system under development can't be refused. The technical solution is very often from the beginning imposed. What is open to discussion is how to make that solution acceptable and ethics a way to seek an ethical justification. The care and security justifications that are advanced as justifications by the promoters of AmI can't be an insurance to counter-balance the risk of dehumanisation and depersonalisation by progressively reducing people to object and source of data for AmI systems, above all if, as the French CNIL in its last annual report, we take in account the convergence of techniques (biometric video-surveillance, biotechnology) that goes in the direction of a more and more efficient control of human being[79] and societies which represent also a society in

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[76] What I mean by ethical is the application of ethical theory stemming from a free commitment to a metaethical position. In plain English, something is ethical if we can explain how we arrived at it being "good" (by relying on a metaethical framework). morality implies : 1) moral autonomy….One can not reflect on the morality of an action in terms of its contribution to efficiency, security, profit …2) Good Will… Because rationality is a shared characteristic of all human beings, it is possible to reach agreements regarding moral rules. Fundamental consequences: 1) Every human deserves respect and is endowed with fundamental rights 2) The unique « good thing » is the Good Will (only motivated by the duty of respecting moral principles) 3) Consequences import less than motives

[77] This justifies the necessity of those reflexions concerning the condition for reflexive and critical perspectives.

[78] Ethical reflexion implies deliberations, critical discussion and is fundamentally a process which takes time ...

[79] As underline by Wood David Murakami and Ball Kirstie (2006, p.3), we are already living in a surveillance society:

- Video cameras are watching us everywhere – in buildings, shopping streets, roads and residential areas. Automatic systems can now recognise number plates (and increasingly faces).
- Electronic tags make sure those on probation do not break their release conditions, and people arrested by police have samples of their DNA taken and kept whether they are guilty or not. 'Criminal tendencies' are identified earlier and earlier in life.
- We are constantly asked to prove our identity, for benefits, healthcare, and so on. The government now plans to introduce a new system of biometric ID cards, including 'biometrics' (fingerprints and iris scans) linked to a massive database of personal information.
- When we travel abroad, who we are, where we go and what we carry with us is checked and monitored and the details stored. Our passports are changing: computer chips carry information, and like ID cards, there are proposals for biometric passports.
- Many schools use smart cards and even biometrics to monitor where children are, what they eat or the books they borrow from the library.
- Our spending habits are analysed by software, and the data sold to all kinds of businesses. When we call service centres or apply for loans, insurance or mortgages, how quickly we are served and what we are offered depends on what we spend, where we live and who we are.
- Our telephones, e-mails and internet use can be tapped and screened for key words and phrases by British and American intelligence services.
- Our work is more and more closely monitored for performance and productivity, and even our attitudes and lifestyle outside work are increasingly scrutinised by the organisations that employ us.

The surveillance society has come about almost without us realising. It is the sum total of many different construction where human is not really trusted and treated as potential criminals. Surveillance fosters suspicion and can have as an impact victimization process by what could appear a disproportionate reaction based on unfounded suspicions. Honest ccitizens have a moral and democratic right not to be treated as criminals; otherwise, they will be unfairly victimized.

3.3.6 - AmI and human representation: Profiling, privacy issues, and responsibility

We have seen in the second chapter the future of the brave new world spotted by AmI promoters, a world in which ‘‘intelligence’’ is embedded in virtually everything around us This intelligent environment is aware of the specific characteristics of human presence and preferences, takes care of needs and is capable of responding intelligently to spoken or gestured indications of desire. Many promises are advanced to justify the AmI development all of them refer to a future in which machine action and human behaviour converge for the benefice of human which is always represented as the principal focus of the AmI design. « In promoting their vision of the future, AmI promoters “speak like heavenly fathers, creating a technological paradise, sensitive and responsive to people’s vision of heaven on earth. They follow the ideal of creating devices which cause no disturbances and fit perfectly with their assumed expectations. They are convinced that digital environments, by acting on their behalf, can improve of people’s quality of life. » (Crutzen, 2006, p.3)

This humanistic concern is somehow paradoxical because at the same time, in the promoter’s vision of AmI, it is claimed that it is user-centred and seeks the mental and physical invisibility of AmI technique which means an increasing difficulties for the AmI users to be aware, to influenced and to control the systems and the values embodied in them.

“The overvaluation of ‘design’ by designers, industry and research has reduced ‘design within use’ to themes such as ‘the adaptability of the technology’ and ‘the acceptance of these technologies by users’. This permanent adaptatibility raised numerous problems, including "the Knowledge Sustainability problem. In a highly dynamic world, the sustainability of knowledge risks being lost. Such a loss or accelerated devaluation of long-term experiences could, in the long term, contribute to an increased uncertainty and lack of direction for people in society” (Jürgen Bohn, p.18).

The price of the promised adaptability of these intelligent devices is a continuous measurement and interpretation of our body[80] data and movements”(Crutzen, 2006, p.5). Ami represents undeniably a form

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technological changes, many policy decisions, and many social developments. Some of it is essential for providing the services we need: health, benefits, education. Some of it is more questionable. Some of it may be unjustified, intrusive and oppressive. People may have many different opinions. But in fact most people know very little about the surveillance society: it is seen as the stuff of science fiction, not everyday life. So there has been very little public debate about surveillance. The surveillance industry is already massive and (especially since 9/11) is growing much faster than other industries[12]: the global industry is estimated to be worth almost $1 trillion US dollars, covering a massive range of goods and services from military equipment through high street CCTV to smart cards. The surveillance society has come about often slowly, subtly and imperceptibly and by the unforeseen combination of many small paths into one bigger road. Wood David Murakami and Ball Kirstie (2006, p.3).

[80] ‘... for investigating different forms of natural, multimodal human-computer interaction. It involves the research and development of computer vision, speech and gesture recognition systems that connect media and physical spaces to what its inhabitants are, and do and say.*’ (*Cantoni Rejani 2004)

of monitoring. It implies collecting information, creating configurations of information and data interpretations. It seems as if that technology was enframing our world and people were made available as ready-made resources, reduced to cyber bodies producing data for input to the acting of artificial agents in their environment.

3.3.7 - Profiling and social sorting risk

Indeed, the adaptative environment, the realisation of the brave new world promised by the promoters of AmI techniques implies the efficient collect of data concerning human being and as a consequence first the risk of what David Lyon, Professor of Sociology at Queen's University in Canada, calls through profiling a "social sorting" – " the Categorizing persons and groups in ways that appear to be accurate and scientific according to some predefined ontology or values framing, but which in many ways accentuate differences and reinforce existing inequalities" (Lyon D, 2001) [81] and secondly the opening up of the private lives of AmI users. People not matching a certain 'desirable' profile might have to pay much higher prices, as they do not qualify for any of the existing discounts, which might in turn reinforce the non-matching patterns. We must also highlight the risk concerning the freedom.

Indeed, profiles can limit freedom of choice of users by confining them within the limited set of options on offer by the providers. Profiles tend to govern opaque decisions about individuals concerning their access to services, such as obtaining credit or a position. This opacity implies the non negligible risk that this profiling activities induced a sort of cognitive closure due to the positive feedback consisting in the marketing field in giving more offer to the consumer according his preference, which mean that the consumer's cognitive openness is automatically, progressively and in an insidious way conduced to be "restricted" to his preferences. It is necessary to let the consumer free to envisage alternative and diverse possibilities.

Profiling activities are essential in order to achieve the objectives of an adaptive behavior of systems in response to the user's mental or emotional state and action in order to delivery services to users and facilitate his life. Profiling activities implies a continuous measurement and interpretation of our body data and movements. This profiling activity poses a clear threat to personal privacy above all if it is mentally and physically invisible and unobtrusive, a threat that is the price of the promised adaptability of these intelligent devices. This threat concerns obviously the problem of the control by the user that is to say by the people who will be monitored by the system, on the collection of data that were taken from them.

3.3.8 - The danger of invisibility

As the AmI seeks to be invisible it is foreseen that the collect of data will be able to be done without the consent of the users. This invisibility, which is a technological design statement raised many problems the most obvious one is that the power of control will be invisible. The consequence is a danger that the users will have less and less opportunities to adjust AmI devices to protect themselves from unwanted actions transforming human in objects of the systems reducing their responsibility[82] and autonomy[83], including moral autonomy since the value directing the systems interpretation and action will not be chosen by the user but imposed by the designers of the systems. This problem raises the question of who guarantees the objectivity and accuracy of the statements made. In a certain sense, AmI are becoming media representing a particular "ideology" (e.g., that of the product's manufacturer, or the politically motivated opinion of a consumer protection organization).

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[81] Lyon D (2001) cited by Bohn Jürgen et al., 2003, p. 18.

As remarked by C. Crutzen, "our body representations and the changes the individual will make in the environment could be unconsciously the cause of actions and interactions between the AmI devices, without knowing the reason of the reaction of the system.[84] Although 'not seeing this technology' could be counterproductive, it is suspicious that computing is largely at the periphery of our attention and only in critical situations should come to our attention. Who will decide how critical a situation is and who is then given the power to decide to make the computing visible again? Providing selective perceptivity to consumers could be counterproductive for the acceptance of AmI. Making technologies disappear, while assuming that this will reduce the tension for users could, on the contrary, make acceptance insoluble (Punie 2003, pp.40-41)."

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[82] Responsibility can be defined as a social construct that ascribes an object to a subject. Responsibility is a widely accepted term used to convey normative content and link it with considerations of facts, which renders it useful for addressing moral and ethical problems. Moral responsibility must be distinguished from juridical responsibility. In the juridical acceptation the responsibility concept is generally associated with the culpability concept On the contrary for moral responsibility one must a priori seeks to assume the consequence of the action as if he has to justify in front of humanity…. Among the conditions of responsibility one finds a number of philosophically contentious ones such as causality, freedom, knowledge and others. The subject should have a causal relationship with the object, should be free to influence it, have knowledge about it, be concerned etc. Bernd Sthal argues that there are three main characteristics of responsibility: Openness, affinity to action, and teleology. Teleology here means that responsibility aims at the good life, at an improvement of our current social and individual situation. Openness stands for the fact that the ascription process is open in terms of who participates, in terms of arguments admitted, and in terms of eventual outcome. Affinity to action, finally, denotes the fact that responsibility is supposed to make a real difference, to have manifest results. Reflective responsibility takes these three characteristics and applies them to responsibility ascriptions. This means that responsibility is checked for openness, practical outcomes, and adherence to the aim of a good life. According to Sthal, taking this idea of reflective responsibility serious leads to many consequences. One of these consequences is the linked to the concept of accountability. While "accountability" is often used synonymous to "responsibility", it takes a slightly different meaning in the framework of reflective responsibility. Here, it stands for those mechanisms that allow the ascriptions of objects to subjects. The practice of reflective responsibility will typically take the form of a stakeholder discourse. All individuals and groups who are affected by a particular situation are part of a discourse that determines who will be held responsible for what. This includes the definition of subjects and objects as well as the expected sanctions and the mechanisms of enforcement. (Stahl, 2004)

[83] We highlight that the Artefact physical Autonomy will be also reduced. Networked everyday objects embedded in an ambient- intelligence landscape lose part of their autonomy and, with this, exhibit an increased dependence on the infrastructure. For users, this reduces the "object constancy" of the objects that surround them (for example the necessity of a regular connection to internet to a server may make object more error-prone and less autonomous). The fact that AmI system will integrate object in a communicating network will raise also the accountability problem: If "autonomous" objects start taking decisions on their own, legal guidelines need to be drawn up in order to resolve who is ultimately responsible for these business transactions

[84] 'The human actor should know ... why the system has reacted as it reacted' (Schmidt 2004) cited by Crutzen (2006, p. 14). The problem of accountability is here a crucial problem, of course the problem of giving person who is subject of AmI decision all the relevant information is a part of the solution but not all the solution because the problem and risk is to appealing to simply shift the responsibility and liability onto the end user.

In the same line of thought, the system can react against our will, choosing action at our own place without any possible feedback to correct the framing of interpretation[85] and without our participation in the process of domestication the tool being invisible from the beginning and not becoming invisible through learning from the users (people monitored by the system). From that perspective, mental invisibility can't be reduced to physical invisibility since mental invisibility implies an integration process on the part of human actors. According to Punie, mental invisibility could be one of the outcomes of a domestication process, which is not … necessarily harmonious, linear or complete. Rather it is presented as a struggle between the user and technology, where the user tries to tame, gain control, shape or ascribes meaning to the technological artifact. This is not resistance to a specific technology but rather an active acceptance process. (Punie 2003, pp. 40-41).

It is clear that in the case of AmI there is a great danger that we can loose what Crutzen denominates "critical transformative room' (Crutzen 2003) that is to say the possibility of a critical and reflexive perspective between representation and interpretation of the readymade interactions with our environment[86], the possibility to create actions of questioning and doubting in our future relationship with AmI. In a largely computerized future, it might not be possible to escape from a sort of technologically induced dependence. This danger is inherent of the visions of the AmI world promoted by scientist, industrials and policy makers.

According to Weiser and many of his successors, for example we should live in an AmI infrastructure without thinking about it. 'Hundreds of computers in a room could seem intimidating at first, just as hundreds of volts coursing through wires in the walls once did. But like the wires in the walls, these hundreds of computers will come to be invisible to common awareness. People will simply use them unconsciously to accomplish everyday tasks.' (Weiser 1991).

3.3.9 - User's autonomy in question

In those visions, the active *explicit* participation aspect is lost and "the symbolic meaning of use and design is reconstructed as an opposition in which 'design' is active and virtuous and 'use' is passive and not creative."[87] As we can see in this architectural concept of AmI of Piva *et al.*, the user is reduced to an observable object placed in a feedback loop that, in the opinion of the designers, converges to an optimal intelligent environment with an action/communication oriented smart space function in order to influence the user (Piva et al. 2005).

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[85] We have to underline here the problem of the Information asymmetry which positions the consumer or end user in an position of inferiority. This asymmetry of information is particularly obvious in the security and marketing fields. Concerning the sociological impacts of the AmI in the economy see : Jürgen Bohn, Vlad Coroamă, Marc Langheinrich, Friedemann Mattern, Michael Rohs, " Social, Economic, and Ethical implications of Ambient Intelligence and Ubiquitous Computing :
web reference: http://www.vs.inf.ethz.ch/publ/papers/socialambient.pdf

[86] Crutzen, 2006, p.8.

[87] Crutzen, 2006, p. 5.

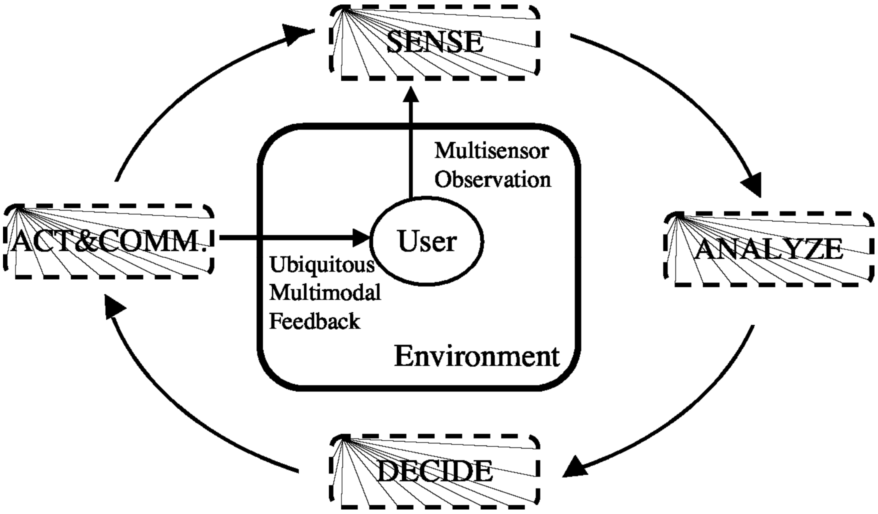

Table 15 - User-centered ambient intelligence closed loop (Piva 2005, pp. 65 -66)[88]

This consequence is really important since morality implies moral autonomy. Without consent and deliberation concerning the values that are embodied in the systems there are clearly ethical difficulties concerning trust to the deployment of such invisible intelligent systems and problem. Trust may be the result from a good knowledge of how the technology works acquired by training or by experience or directly as a result of a positive experience. Without such a knowledge there is a clear risk that trust will not established between the user and the technology.

ISTAG underlines that technologies should be designed for people rather than making people adapt to technologies (ISTAG 2001:11) we could add should including from the start the users in the design process[89] (people who will be monitored by the systems, the different stakeholders) and to avoid intelligent agents becoming new 'black boxs' in society beyond reach of any control by the peoples that will be their subjects.

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[88] cited by Crutzen (2006, p. 6).

[89] It should be noted though that some activities towards user-centred design are already developed, such as the ISO 13407 "Human-centred design for interactive systems" (Cf. infra), which requires human-centred design to actively involve users; to clearly understand and use task requirements, to appropriate the allocation of functions, to use the iteration of design solutions, and to set up a multidisciplinary design team the "Design for all" standards for accessibility of information technology products promoted by the European Commission, the issue of user evaluation in ambient displays (e.g. Mankoff et al. 2003) or user-oriented definitions of context-awareness (Dey 2001). This finds an echo in the Report of the Science and Society Forum (2005) to the European Commission by Ulrike Felt which urges not to consider public influence and criticism with suspicion, rather to see it in its positive side: "First of all it was stressed that critical citizenship should not be regarded as problematic for the techno-scientific development of societies, but rather as playing a central, positive role in building democratic societies. Being aware of the robustness of this idea, it was emphasised that public opposition to techno-scientific developments cannot be understood as simply rooted in ignorance or anti-scientific orientation. The debate on science, technology and society should thus not run along the classical rational vs. irrational divide, but rather acknowledge that multiple forms of public "testing of expertise" are essential to the making of robust science in contemporary societies. Critical citizens do not hinder the transfer of science from the laboratory to society but play an essential role in this process. As a consequence, blind trust and consensus from the side of the public should not be perceived as the central goal to be reached by all means. The second perspective underlines the central function of epistemic citizenship in a knowledge society. If we take the idea of knowledge society seriously it requires the diversification of types of knowledge recognized as being relevant

A challenge for adaptive computing and for AmI in general is to find an acceptable balance between openness and adaptability versus user guidance and rigidity. Perhaps the worst aspect of those AmI could be the impossibility to escape to the *normativity* of the system and, in a dystopia conception, be punished when trying to oppose to the implicit value framing of the systems and behind of its designers. Here we can see clearly that those intelligent agents embodied the social values that are characteristic of the society in which they are developed they are more than non neutral they can be perceived as the perfect vector of the values of a determined society in a determined time. The problem is again the possibility to control those systems and, for the AmI in public space, to decide democratically of their framing of interpretation and action, of the values embodied in them.

Being invisible the domestication of those systems can pose apart from the privacy problem some difficulties, as Punie underlined. "Exactly because they are invisible, they become uncontrollable. Making technologies disappear, while assuming that they will reduce tensions, could, on the contrary, make them insoluble. There is a difference between the physical and mental disappearance of computing, and it is incorrect to assume that physical disappearance will lead automatically to acceptance and use, and thus to mental invisibility…There is a substantial difference between these two perspectives, however. AmI assumes the material or physical disappearance of computing, while domestication refers to the mental invisibility of the technology. The two might exist together, but not per se: physical disappearance will thus not automatically lead to mental disappearance and hence to smooth acceptance and use of AmI. The former may even harm rather than facilitate acceptance, precisely because AmI is invisible and thus difficult to control"[90] Control and accounting mechanisms appears are important tools for determining who is in control of an autonomous system, and who is responsible if something goes wrong.[91]

This danger is also related to another one which is the problem of an ambient intelligence divide and the potential exclusion[92] of a part of the population[93] .Persons who have difficulties to use ICT (minorities,

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(…). It was further seen as crucial to give up the classical fact-value divide in public techno-scientific issues as it hinders more open forms of debates, and it is misleading about the fact that values are also embodied in expert knowledge. Public debates about science and technology in society are to be understood not so much as a battle between different forms of scientific knowledge, but rather as places where different visions and imaginations of the world are being negotiated." Most of these activities are probably mainly based on functional descriptions of how to involve users in the design process. This constitutes a first logical step, but the real challenge may lie in involving users in a sociological sense, i.e. by taking into account the micro-context of their everyday lives.

[90] Punie, 2003, p. 38.

[91] This invisibility poses another problem. Whenever a AmI system causes damage, the complexity of the systems is likely to make it very difficult to find the cause. System behavior is determined by the interplay of numerous software products, hardware products, user interaction, network protocols, and so on. Here the causation principle comes up against limits because of a complexity created by humans that they no longer master (Hilty Lorenz *et al.* 2004, p. 866).

[92] As underlined in the opinion of the Committee on Employment and Social Affairs for the Committee on Industry, External Trade, Research and Energy on the proposal for a Council decision concerning the multiannual framework programme 2002-2006 of the European Community for research, technological development and demonstration activities - ambient intelligence systems offering access to the information society for all *regardless of age or* situation, as well as interactive and intelligence systems for health, mobility, security, leisure, preservation of the cultural heritage and environmental monitoring. *Intelligence systems should be particularly aimed at securing access for and participation by socially excluded and disadvantaged groups in society including disabled people; covering both design for all principles and assistive technologies in this field." (*Mantovani Mario (draftman)):.

[93] Of course we recognized with the promoters of AmI, that the opportunities to carry on new forms of human–computer interaction will make it possible to lower the threshold limiting the use of ICT.

marginal groups, disabled person, the elderly, very young people) or who do not want to use ICT and be the object of AmI for certain activities might be put at such a disadvantage by changes in the structures of the offering. Without talking about the new skills and competencies that are likely to be necessary to use those intelligent systems. Having more information opportunities does not necessarily mean more justice or freedom. To avoid this risk of exclusion it is a minimal prerequisite that accessibility is required in order to support the inclusive participation (user acceptance), awareness and learning of users with as subpoints equal rights and opportunities, usability (vs. complexity), training/education and the question of dependability which can be tackled by an effective implementation of AmI technologies by taking into account both technical constraints and harmonized human-machine interfaces.

In line with that problem of exclusion we must also put in evidence the question of the possibility to choose. Does the user will have the possibility to refuse the systems? To switch it off? To influence it? Again, there is a clear paradox in claming that this technique is 'human-centered computing', user-friendliness, user empowerment and at the same time imposed it to the society, to the users without any possibility to influence it, to refused it.

The problem is even more important since that technique acting and providing services represents also a value and to a certain extent and ethical framing which represent a certain conception (the conception of the designers of the scientist of the society[94] …) of the world and of human, a conception that can't be accepted without deliberation that allow a reflexivity of the second order that is to say a reflexivity concerning the objectives off the system and its framing (ethical, societal etc..). Again without a possibility of changing of framing and of objectives the deliberative process is nothing more that a sort of game aiming at justifying what was already decided.[95]

3.3.10 - The privacy issue[96]

There is the major problem of privacy. Privacy is not a simple concept. Nissenbaum (2004)[97] presents a model of informational privacy in terms of contextual integrity, namely, that determining privacy threats needs to take into account the nature of a situation or context: what is appropriate in one context can be a violation of privacy in another context. Nissenbaum describes the connection between privacy and autonomy: the freedom from scrutiny and relative insularity are necessary conditions for formulating goals, values, conceptions of self, and principles of action because they provide freedom for people to formulate for themselves the reasons behind their choices, preferences and commitments. Thus, the privacy aspect called "utility", the right to be left alone, is much more than just a utility because it is important for personal development. Singer (2001) argues that privacy is not only about disclosure of dangerous information or disturbing a person at a wrong time or with information on a wrong topic. For example, personalisation of advertisements may seem to be beneficial. Instead of a bunch of useless and time robbing advertisements about, e.g., new skis, a client who is not interested in skiing will receive advertisements about what he is truly interested in, for instance, new fishing rods. However, such personalised or targeted advertising may be not so innocent or beneficial in a long term because advertising views people as bundles of desires to buy more and more, and this view is partially true. Precise advertisements are harmful because they proceed to reshape human nature to fit the picture of ”being a bundle of desires”, diminishing people’s capacities of reasoned choice and thoughtful action. Thus, Singers work also links privacy to personal development.

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[94] We have to evoke here the gender question which is crucial: industry claims that they apply female values and translate these into 'ease of use' see Manning Andre 2002.

[95] The fact that in the MIAUCE project the different fields of application (security, marketing and web tv) were from the start chosen without discussion and deliberation with Namur's partner is for the ethical approach quite problematic and reduced the possibility of ethical analysis to those specific fields.

[96] We will define briefly in this section the privacy concept. The chapter four titled *Privacy and data protection in multi-modal behaviour analysis and exploration of users in controlled environments* will develop a more systematic analysisof the privacy concept in the legal context.

[97] Friedewald Michael *et al.* (2005, p.5).

A simple but useful definition of privacy is ‘‘the ability of an individual to control the terms under which their personal information is acquired and used’’ (Culnan MJ, 2000, pp. 20–26) As such, privacy is about individuals’ capabilities in a particular social situation to control what they consider to be personal data. Privacy is the interest that individuals have in sustaining a 'personal space', free from interference by other people and organisations. It is an interest that has several dimensions:

- Privacy of the person. This is concerned with the integrity of the individual's body. Issues include compulsory immunisation, blood transfusion without consent, compulsory provision of samples of body fluids and body tissue, and compulsory sterilisation

- Privacy of personal behaviour. This relates to all aspects of behaviour, but especially to sensitive matters, such as sexual preferences and habits, political activities and religious practices, both in private and in public places
- Privacy of personal communications. Individuals claim an interest in being able to communicate among themselves, using various media, without routine monitoring of their communications by other persons or organisations
- Privacy of personal data. Individuals claim that data about themselves should not be automatically available to other individuals and organisations, and, even where data is possessed by another party, the individual must be able to exercise a substantial degree of control over that data and its use.

Table 16 - The several dimensions of privacy concept (COST 219 ter, p. 19)

“The old sayings that ‘the walls have ears’ and ‘if these walls could talk’ have become the disturbing reality The world is filled with all-knowing, all-reporting things” (Lucky R ,1999) Such comprehensive monitoring (or surveillance) techniques create new opportunities for what Gary T. Marx calls border crossings : “Central to our acceptance or sense of outrage with respect to surveillance ... are the implications for crossing personal borders” (Marx GT 2001) He distinguishes four different border crossing (see table below).

* Physical borders of observability, such as walls and doors, clothing, darkness, and also sealed letters and phone conversations. Even facial expressions can represent a natural border against the true feelings of a person Social Borders[98]. Expectations with regard to confidentiality

in certain social groups, such as family members, doctors, and lawyers. This also includes the expectation that your colleagues do not read personal fax messages addressed to you, or material that you leave lying around the photocopier.

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[98] In the case of emotion recognition, the expression of natural border crossing is really adapted. Indeed the system infers the emotion we feel from our face expression and crosses the physical border to infer from the exterior

* Spatial or Temporal Borders. The expectation by people that parts of their lives can exist in isolation from other parts, both temporally and spatially. For example, a previous wild adolescent phase should not have a lasting influence on the current life of a father of four, nor should an evening with friends in a bar influence his coexistence with work colleagues.

* Borders due to Ephemeral or Transitory Effects. This describes what is best known as a "fleeting moment," a spontaneous utterance or action that we hope will soon be forgotten, or old pictures and letters that we put out in our trash. Seeing audio or video recordings of such events subsequently, or observing someone sifting through our trash, would violate our expectations of being able to have information simply pass away unnoticed or forgotten.

Table 17- Four different border crossings that form the basis for perceived privacy violation Natural Borders

Putting ambient-intelligence systems into place will most certainly allow far greater possibilities for such border crossings in our daily routines (for example the hypermnesie problem in the case of marketing profiling, social crossing when for example have information concerning a relative without his consent and natural border crossing when one will be able to see your actions behind closed doors or determine your emotion from your face expression…) and represent an undeniable threat for our privacy. Privacy is a hard problem because individuals wish to control their personal information in a very detailed and nuanced manner.[99] Goffman (Goffman 1961) noted that people must control their presentation of self, their face... People need to be able to control what others think of them, and find it disconcerting when they cannot. Culnan and Armstrong (1999) make the argument that people have two kinds of privacy concerns.

- First, they are concerned over unauthorized access to personal data from security breaches or the lack of internal controls.
- Second, people are concerned about the risk of secondary use; that is, the reuse of their personal data for unrelated purposes without their consent. This secondary use includes sharing with third parties who were not part of the original transaction.

It also includes the aggregation of transaction data and other personal data to create a profile with all the risk connected to the problem of identity[100] recognition and localization and spamming[101]. Smith et al.[102]

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expression of the face the emotion which represents fundamentally an inner state. This emotion recognition and determination can be perceived as an intrusive determination and a sort of privacy violation. Who has the right to tell what I feel , without my consent and without possibility to correct the interpretation?

[99] Every data collected must be processed fairly for specified purposes and on the basis of the consent of the person concerned or some other legitimate basis laid down by law. Everyone has the right of access to data which has been collected concerning him or her, and the right to have it rectified

[100] this identity issue has been systematically analysed by the FIDIS project.

[101] The risk of spamming encompasses several issues such as profiling, disclosure of personal data and malicious attacks. Different facets of spamming, such as false alarms and blackmail, are referenced in scenarios one, two and three.

[102] Smith HJ, Milberg SJ, Burke SJ (1996) Information privacy. measuring individuals' concerns about organizational practices.MIS Quart 20(2):167–196

raise two additional concerns: people have a generalized anxiety about personal data being collected[103], and people are also concerned over their inability to correct any errors.

> The field of consumer profiles must be put in evidence as a highly problematic field. "Although such profiles are often the subject of public debate, the social and legal attitudes towards them have, until now, been relatively relaxed. Consumer acceptance is also much higher than the frequent negative news coverage might indicate, mostly because their negative consequences are often perceived as being rather minor (such as unsolicited spam) compared to their advantages (e.g., monetary incentives in the form of discounts or rewards). However, there are well-known risks associated with profiles and their adoption as the basis for ambient intelligence would only exacerbate such problems. Besides the obvious risk of accidental leaks of information, profiles also threaten universal equality, a concept central to many constitutions, basic laws, and human rights, where "all men are created equal". Even though an extensively customized ambient-intelligence future where I only get the information that is relevant to my profile holds great promise, the fact that at the same time a large amount of information might be deliberately withheld from me because I am not considered a valued recipient of such information, would constitute a severe violation of privacy for many people. *Natural borders*, then, might be the easiest to respect when designing ambient intelligence systems. Here, the concept of surveillance is well known and usually fairly straightforward to spot, after all: if others are able to watch your actions behind closed doors, they are most certainly intruding on your privacy. Proponents of wearable computing systems often cite the fact that information could both be gathered and stored *locally* (i.e., on the user's belt, or within her shirt) as a turnkey solution for privacy-conscious technologists (Rhodes B, Minar N, Weaver J 1999) . Border crossings, however, are not only about *who* does something, but also *what* is happening. Even though a context-aware wearable system might keep its data to itself, its array of sensors nevertheless probe deep into our personal life, and the things they might find there could easily startle (and trouble) us, once such systems start anticipating our future actions and reactions. The feeling of having someone (or something) constantly looking over our shoulder and second-guessing us would certainly constitute a natural border crossing for most of us. And the temptation of law enforcement subpoenaing such information not only to determine your physical data (were you at the crime scene?) but also to guess your *intentions* (by assessing the data feed from our body sensors) would certainly motivate legislation that would make the deletion of such information a crime (just as recent legislation against cybercrime does for computer log files)." (Bohn Jürgen et al., p. 12)

As we have seen in the previous chapter, the invasive potential of AmI is, nearly by definition of the AmI itself, great. The AmI can fulfill their functions of proactive device indeed only by the mean of data collect from individuals and their action emotion etc…in determined context. "Most people would be shocked to find out just how much information they consider private is already in the public domain," says project information coordinator David Wright of Trilateral Research & Consulting in London. "Thanks to data aggregators that gather and consolidate a wide range of information about groups – and individuals – in society, our government and commercial organisations already know a great deal about what we do and what motivates us." This might poses severe risks to privacy and issues concerning the use that can be made of those data - with so much private information about people, it is easy to – intentionally or by mistake – use it wrongfully, distribute it too widely or used it for other purposes that are not connected with the initial objectives of the system with raised the conditions in such context of faith in the systems[104] It must be underline that the best and the most efficient solution, from a technical perspective, concerning the collect and processing of data to provide a service, a care or to assure security is not always the more morally acceptable (even if it is accepted by users…). According to Wright "The most disturbing aspects of this new technology are already around us today, in the steady erosion of personal privacy," he says. "Because of threats to our society, most people are willing to compromise on their personal privacy in order to gain greater security. Yet – and this must be a serious concern – is our security actually better than before we gave up this privacy. From an ethical perspective there is a great problem here since the threat is more susceptible to be acceptable under security menace or it is exactly the same problem as for example in medical testing the consent can't be obtain when the subject is subject to a constraint (example economic constraint) ethically the consent[105] implies the moral autonomy of the person. It is the same for the question of the moral acceptability (otherwise in an insecure context everything would be acceptable and justified - the USA patriot act is a paradigmatic example of that danger).

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[103] It should be possible for a person to control the information profile that has been monitored within an ambient intelligent system. The moral requirement we therefore follow is, that it must be possible for persons to control and make choices concerning the functioning of ambient intelligence. This is an implication of the moral principle of autonomy. There is some interesting discussion in The Book of Visions about profiling users, especially in the context of personalisation of services, security and privacy. It observes that without access to user-related context data many mobile services would not exist, nevertheless *it recognises that customers should have the means to decide their security policies in a simple way*. At the same time, this industry forum is of the view that ''profile data-exchange and accessibility must not be restricted too much'' in order to enable attractive and personalised mobile services (tailored to the user)

It is easy to foreseen not only an augmentation in the quantity of privacy issue but the occurrence of some qualitative changes:

> "People's notion on privacy is changing. We are already getting used to the idea that while we are using for instance Internet services, someone can be able to observe our doings. While travelling abroad, we need to frequently present our passports and other documents, even though it makes it possible for authorities to follow our paths. In the past, that was not possible, but still most people are not concerned about the change. Either they accept the reduction of their privacy, because they think it is necessary or that they get something valuable instead, or they do not care. Anyway, it seems that most people will not object the gradual impairment of

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[104] It is clear from the simple concept of responsibility that trust in such a concept is possible only at the conditions that there is a clear information concerning the processing of the data (who is responsible, how the data are kept for which purpose, what are those data, is it possible for the source that is to say the source of the data, the human monitored by the system to control them etc…

[105] Informed consent defined by ask-it consortium, is the process by which a participant will be fully informed about the research in which he/she is going to participate. It originates from the legal and ethical right the participant or end-user has to know and to control what happens to his / her body and personal data and from the ethical duty of the owner of the system to inform the end-user consumer…. Seeking the consent of an individual reflects the right of an individual to self-determination and also his/her fundamental right to be free from (bodily) interference, whether physical or psychological, and to protect his / her personal data. These are ethical principles recognised by Law as legal rights. A distinction between three informed consent elements is possible: the information given, the capacity to understand it and the "voluntariness" of any decision taken. Respect for persons requires that participants, be given the opportunity to choose what shall or shall not happen to them. This opportunity is provided, when adequate standards for informed consent are satisfied. Informed consent is a process, not just a form. A related issue to that consent concept that has to be resolved is how to advise people when their actions are being monitored … When should notification be mandatory? How can users be effectively signalled? Given individual differences in sensitivity and awareness, it may be difficult to provide adequate notification to some without annoying others (NRC/NAS 2001 pp. 135f.).

> their privacy. The expectations of privacy are very much related to the surrounding culture and social norms and as they slowly change, people will also have a different notion on privacy." (Pitkänen Olli and Marketta Niemelä, pdf p. 7).

According to Jürgen Bohn et al.(Bohn et al.) "having thus both monitoring and search capabilities at the very core of their architecture, ambient-intelligence systems will very likely provide their developers, owners, and regulators with a significant tool for driving the future development of privacy concepts within society".

Apart the privacy issue, we must not neglect that there are people who simply do not like this vision as it is presented by the AmI promoters, regardless of privacy. This will also be a great challenge for the supporters of Ambient Intelligence.

General synthesis

Condition and principles for an ethical discussion of issues raised by Ami

The strong push for technology development too often obscures the need for any deep ethical consideration before a technical project is funded, developed and deployed. To take an active critical part in the technological design of our daily behaviors means to deconstruct meanings, especially the oppositions that can be found in the discourses of AmI designers and computer.

Technique is not neutral. It is a manner of thinking, of making, and of transforming the world which is indissociable of the policy and, by the subjacent choices of ethics. the data processing and the techniques of the communication including the AmI are not neutral and *reflect*, in their constitution and their use, expectations of the society and are influenced by their socioeconomic context. In the case of MIAUCE project and more generally AmI, the construction of the social legitimacy (and not just acceptability) of science and technology requires that the metaprinciples of normative nature subjacent with the action techno-scientist be considered. Intelligent agents are in their constitution not neutral and should not only be regarded as software programs, but also as 'social actors' since they inevitably take a position. Agents present a certain view on the world. It is only to the condition of recognizing the not-neutrality of the TIC that one can start to change its cognitive framing and can start to think to ethical and societal issues.

The urgency is to limit ethics to the only question of the institution and the application of the standards. Ethics is never in the answer (always conditioned) but well in this dynamic movement of questioning, before the action and on a border, that which separates our subjective existence (with its presupposed, its preferences, its convictions, its hidden motivations) from the constraining externality. What is ethically at stake is not so much to find an answer but well to make a room for ethical thinking to allow an ethical thinking that is to say an attitude that can localized the issues raised by technique and have the theoretical tool. The ethical interrogation refers to the construction of a human order and questions the way human are perceived and treated. The fundamental prerequisite for such an exploration of the ethical problems raised by a technique is that the practitioners of that technique accept to free themselves from their conditioning technical framing.

Ethics implies responsibility, autonomy and good will and is fundamentally teleological. Ethical ways of thinking need to be encapsulated within the very process of the research itself, probably based on multi-disciplinary or interdisciplinary perspectives. A more informed and balanced analysis of the potential social and ethical implications of technology would, it is hoped, be the result.

We determined as ethical references needed for our ethical exploration of the ethical issues raised by AmI: nonmaleficence, autonomy, beneficence, and justice, dignity, integrity, vulnerability.

Issues raised by AmI:

Concerning the issues raised by AmI, the table below synthesizes the principal issues:

PRINCIPAL ISSUES RAISED BY AMI

- **Bystander apathy:** AmI systems may have the consequence to make people lazy, decreasing human cognitive ability and reducing the workforce.
- **Dehumanisation:** the use of agent systems can be perceived as dehumanising
- **Discrimination**: risk resulting from profiling activity
- **Enforced participation: the risk that** little or even no choice would exist in an AmI society
- **Exclusion** (vs. inclusion): exclusion may be voluntary or can also be the result of lack of interoperability, denial of service, inadequate profiling, data mismatches or deficient of the system.
- **Identity theft:** the AmI environment may give malicious persons opportunities to steal identity information
- **Identity:** the different components of identity play important roles in determining the feasibility of the AmI environment
- **Inflexibility:** the pressure to adopt AmI systems could increase
- **Integrity**: information stored on a system has to be reliable and can be trusted
- **Loss of control:** the impression that can be feel to become an object of a system without any possible control on it with the associated issue of trust
- **Malicious attacks:** every new technology is plagued by weaknesses (known and/or unknown), which threaten to serve as the backdoor for malicious attackers. Some possible consequences and impacts are considered in various scenarios
- **Over-reliance and dependently:** relying too much on the system can be very problematic (associated with this issue is the responsibility issue)
- **Privacy**: Who are my data accessible to? How can I know they will not be misused, whether now or any time in the future?
- **Profile abuse :** the probability that stakeholders would collect personal information in an ad hoc manner without informing the person
- **Reduced social interaction and** Social isolation: AmI systems could foster social isolation as less human-human interaction would take place
- **Reliability of the system** : the system must be reliable
- **Responsibility and accountability issues:** who will be responsible and accountable? Whenever a Pervasive Computing system causes damage, the complexity of the systems is likely to make it very difficult to find the cause.
- **Security:** security is a key challenge for successful AmI implementation.

- **Spamming:** spamming encompasses several issues such as profiling, disclosure of personal data and malicious attacks
- **Surveillance :** when using AmI systems surveillance is a major issue
- **ambient intelligence divide**: risk of exclusion of a part of the population
- **Transparency and Consent**: The data subject has the right to be informed when how and for what reasons his personal data are being processed
- **Trust:** the notion of trust has technical aspects as well as social, cultural and legal aspects. trust is raised in different connections: trust and confidence, lack of trust (from loss of control, unwillingness to provide some data, contextual misunderstandings) and honesty
- **Victimisation**: Democratic right not be treated as a criminal

GENERAL GUIDELINES FOR A SOUND ETHICAL DECISION[106]

- Think before doing
- Re-visit classic solutions
- Think ethically that is to say free from the contextual constraints
- Determine precisely your ethical references
- Ensure that new organizational processes are ethically sensitive, and
- Recognize that future and emerging technologies will continue to come onto the horizon and will challenge historical concepts of legitimacy and what may have been considered as ‘right’ or ‘wrong’.

ABILITIES REQUIRED FOR A SOUND ETHICAL DECISION-MAKING PROCESS

- The ability to identify all related issues pertaining to the incident/issue/dilemma.
- The ability to sort morally relevant issues from morally irrelevant issues in any given situation.
- The ability to unpack the elements of morally relevant information.
- The ability and willingness to research issues and reflect upon them.
- The ability and willingness to seek advice.
- The ability to form a well-reasoned, unbiased, and morally defensible conclusion in any given situation.
- The ability to justify this position and act upon it.
- The ability to challenge one's own moral framework in light of recalcitrant experiences.
- Being in possession of a *consistent* moral framework.
- analyzing precisely from the ethical perspective the objectives pursued
- Accepting to envisage different alternatives to the envisaged solution

PRINCIPLES TO FOLLOW (FROM SWAMI PROJECT)

- Privacy considerations should be taken into account and designed in from the start rather than after an AmI technology has been developed or deployed.
- Privacy enhancing technologies should be easy to use and to understand.
- Individuals should be able to specify their privacy preferences.
- Personal data should not be collected unnecessarily (data minimisation).

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[106] from Ambient Agoras: Dynamic Information Clouds in a Hybrid World IST-2000-25134 - D15.4 –European Disappearing Computer Privacy Design Guidelines v1. WP15 – Privacy Issues

- In designing any new technology, potential vulnerabilities should be investigated, not only in the technology, but also in the possible cascading or secondary effects that may result from a failure.
- The dependencies between AmI technologies also should be investigated and their consequences for privacy, identity, security, etc.
- The introduction of new security measures should similarly be assessed to determine whether they create insecurities in some other part of the security chain.
- If biometrics are used for identification and authentication, privacy should be considered together with best practices; Fixing an identity in one context should not lead to function / mission creep.
- Policy, regulation and technology development should work hand-in-hand and concurrently.

GUIDELINES FOR THE DESIGNERS

One set of guidelines can be found in the “Who Goes There” report (Kent and Millett, 2003,p. 78). It recommends that, when designing an authentication system or selecting an authentication system for use, one should:

- authenticate only for necessary, well-defined purposes;
- minimise the scope of the data collected;
- minimise the retention interval for data collected;
- articulate what entities will have access to the collected data;
- articulate what kinds of access to and use of the data will be allowed;
- minimise the intrusiveness of the process;
- overtly involve the individual to be authenticated in the process;
- minimise the intimacy of the data collected;
- ensure that the use of the system is audited and that the audit record is protected against modification and destruction;
- and provide means for individuals to check on and correct the information held about them that is used for authentication

We add:

- analyzing precisely from the ethical perspective the objectives pursued
- Accepting to envisage different alternatives to the envisaged solution
- Third party guarantee: Safety, security, sustainability, equity… are important issues with which trade-offs may have to be considered. These trade-offs should be discussed with stake-holders or their representatives as much as possible

ETHICAL GUIDELINE CONCERNING PRIVACY ISSUES[107]

Privacy considerations should be taken into account and designed in from the start rather than after an AmI technology has been developed or deployed.

- Privacy enhancing technologies should be easy to use and to understand.
- Individuals should be able to specify their privacy preferences.
- Personal data should not be collected unnecessarily (data minimisation).
- In designing any new technology, potential vulnerabilities should be investigated, not only in the technology, but also in the possible cascading or secondary effects that may result from a failure.
- The dependencies between AmI technologies also should be investigated and their consequences for privacy, identity, security, etc.
- The introduction of new security measures should similarly be assessed to determine whether they create insecurities in some other part of the security chain.
- If biometrics are used for identification and authentication, privacy should be considered together with best practices.
- Fixing an identity in one context should not lead to function / mission creep.
- Policy, regulation and technology development should work hand-in-hand and concurrently.
- In consideration of new policies or regulations or alternatives to regulation that may be required as a consequence of the introduction or proliferation of a new technology, impacts should be assessed and stakeholders consulted.
- Policies and regulations should satisfy the interests and concerns of all involved stakeholders as far as possible and to the extent they cannot satisfy some stakeholders, an explanation should be given as to why that is not possible.

THE ETHICAL CROSS

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[107] Safeguards in a World of Ambient Intelligence (SWAMI) Deliverable D1 The brave new world of ambient intelligence: A state-of-the-art review, Michael Friedewald, Elena Vildjiounaite, David Wright, July 2005, p. 175.

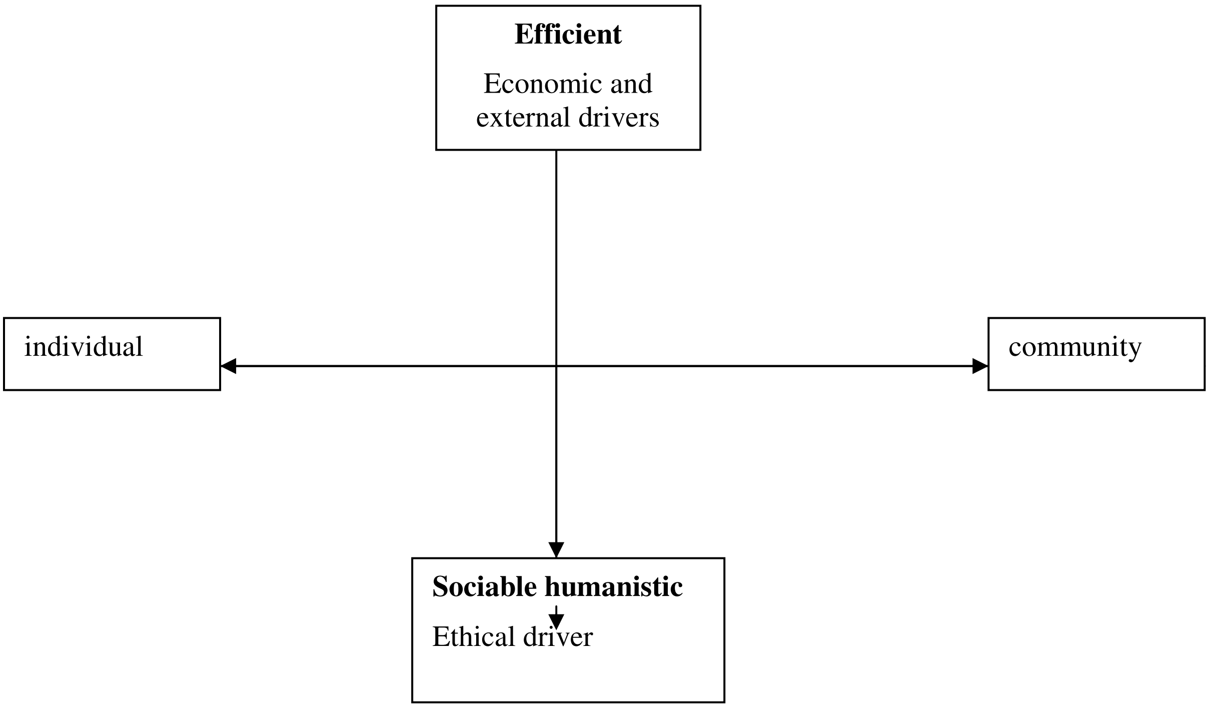
Efficient
Economic and external drivers
individual
community
Sociable humanistic
Ethical driver

Fig. 7 - The Ethical cross: an analytical tool for scenario building

This cross can be used to localized the scenario according their drivers.

In conclusion of this chapter, the ethical issues raised by AmI are numerous. The guidelines proposed may represent great help for the designers of the system and the different stakeholders. They are nevertheless not by themselves sufficient. The laws have to be taken in account. All technical projects, all techniques have to respect the law. The next chapter will analyse the existing regulatory framework, its requirements (in particular concerning the privacy issues) and will put in evidence its limits.

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CHAPTER 4:

PRIVACY AND DATA PROTECTION IN MULTI-MODAL BEHAVIOUR ANALYSIS AND EXPLORATION OF USERS IN CONTROLLED ENVIRONMENTS.

Abstract

The present chapter identifies the unprecedented threats that AmI visions carry from the points of view of "privacy" and "data protection". Privacy and data protection are identified as complementary legal instruments aimed at protecting the individual's possibility to construct his own identity and personality without undergoing unreasonable constrains (privacy as immunity or self-determination) on the one hand, and the individual's ability to control some aspects of his identity that he projects on the world on the other hand. The "performativity" and the distribution of agency that characterize AmI systems are exposed as transversal concerns that threaten the fundamental value grounding both privacy and data protection laws: respect for individual autonomy. The relevance, applicability and adequacy of the European privacy and data protection legal frameworks to deal with those unprecedented challenges is then assessed. That assessment required us to re-think about the scope and the normative grounds of what is meant by the "right to privacy", to critically explore the applicability of the European data protection scheme to the data processing in the Miauce project, and the compatibility of the technical visions involved in the Miauce project with the fundamental data protection principles.

INTRODUCTION

THE MORAL IMPERATIVE OF INDIVIDUAL AUTONOMY IN DELIBERATIVE DEMOCRACY AND ITS LEGAL "PROXIES": PRIVACY AND DATA PROTECTION.

The question of how the law should intervene to guarantee that technological progress does not result in violations of fundamental rights and fundamental freedoms has been with us for a long time, and any possible answer that may be suggested at a given moment is unavoidably rooted in specific and fluctuating political, technological and cultural assumptions. As announced in the previous chapter, the aims of the present chapter is to assess the relevance, applicability and adequacy of existing European privacy and data protection legal frameworks to the unprecedented challenges carried by the technical visions and the potential industrial application scenarios involved in the Miauce project.

Philip Agre grasped much of the relation between data protection and privacy in a simple sentence:

> . . . control over personal information is control over an aspect of the identity one projects to the world, and the right to privacy is the freedom from unreasonable constraints on the construction of one's own identity.[108]

Those two aspects – freedom from unreasonable constraints (from the state or from others) on the construction of one's identity, and control over (some) aspects of the identity one projects to the world – are at the heart of the most crucial concerns arising when considering, from a legal and political point-of-view, the emerging AmI *scenarios*. Concerns for privacy and data protection in the advanced information society and with regards to the nascent "ambient intelligence revolution" have been widely reflected in the literature[109], in opinions of consultative bodies[110] and in various research reports on ethical, legal and social issues raised by current visions of AmI.[111] One obvious reason for this is the fact that the most essential ingredient, so to speak, of envisioned AmI systems, is information about “users”.[112] The unavoidable cost of entering in an AmI world, and the very condition of possibility of such a world, appears to be the loss of control over personal information: the constitutive ideas of AmI, such as pervasiveness, invisibility of information systems, constant and automatic recording of events etc. render highly implausible that the user retain control over what and how information is processed. But the reasons that privacy issues are so vividly debated on threshold of an “AmI era” go well beyond those important concerns for control over personal information (data protection).

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[108] Philip E. Agre, Marc Rotenberg (eds.), *Technology and Privacy. The New Landscape*, MIT Press, 1998, p. 3.

[109] A comprehensive list of references would be interminable. Among the most famous references are Lawrence Lessig, *Code and Other Laws of Cyberspace* Basic Books, 1999; Jeffrey Rosen, *The Naked Crowd: Reclaiming Security and Freedom in an Anxious Age*, Random House Trade Paperback, 2005; Daniel Solove, Marc Rotenberg, and Paul M. Schwartz, *Privacy Information and Technology*, Aspen Publishers, 2006; Daniel Solove, *The Digital Person: Technology and Privacy in the Information* Age, NYU Press, 2006. Papers include, for example, see Paul M. Schwartz, "Beyond Lessig's *Code* for internet Privacy: Cyberspace Filters, Privacy Control, and Fair Information Practices", *Wisconsin Law Review*, 2000, 743-788; Friedewald, M., Vildjiounaite, E., Punie, Y., & Wright, D. (2007). "Privacy, identity and security in ambient intelligence: A scenario analysis." *Telematics and Informatics. 24*(1), 15; Yves Poullet and Jean-Marc Dinant, "The internet and private life in Europe: Risks and aspirations". In *New Dimentions of Privacy Law*, Cambridge University Press, 2006, pp. 60-90; Helen Nissenbaum, "Protecting Privacy in an Information Age: The Problem of Privacy in Public", *Law and Philosophy*, 17, 1998; Lisa Austin, "Privacy and the Question of Technology", *Law and Philosophy*, 22, 2003, pp. 119-199-166.

[110] Of particular relevance, at the European level, are the opinions delivered by the Working Party on the Protection of Individuals with regard to the Processing of Personal Data set up by article 29 of the Directive 95/46/EC of the

The fact is that the visions behind AmI technologies may appear incompatible with the major importance Western societies place in cultivating and preserving both *individual autonomy* (freedom from unreasonable constraints on the construction of one's own identity[113]) and *political autonomy* (a vivid

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European Parliament and of the Council of 24 October 1995. See in particular the *Working document on data protection issues related to RFID technology*, WP 105, of 19th January 2005, ec.europa.eu/justice_home/fsj/privacy/docs/wpdocs/2005/wp105_en.pdf ; the *Opinion on the concept of personal data*, WP 136 of 20th June 2007, ec.europa.eu/justice_home/fsj/privacy/docs/wpdocs/2007/wp136_en.pdf - ; the *Results of the Public Consultation on Article 29 Working Document 105 on Data Protection Issues Related to RFID Technology*, of 28th June 2005, ec.europa.eu/justice_home/fsj/privacy/docs/wpdocs/2005/wp111_en.pdf - ; the *Opinion 5/2004 on unsolicited communications for marketing purposes under Article 13 of Directive 2002/58/EC*, ec.europa.eu/justice_home/fsj/privacy/docs/wpdocs/2004/wp90_en.pdf - ; *Opinion on the Processing of Personal Data by means of Video Surveillance* of 11th February 2004. The European Commission for Democracy Through Law (Venice Commission)’s recent *Opinion on videosurveillance in public places by public authorities and the protection of Human* Rights, of 23 March 2007 (Study No. 404/2006), CDL-AD(2007)014, http://www.venice.coe.int/docs/2007/CDL-AD(2007)014-e.pdf is also marginally interesting for our purpose in MIAUCE, as the study explicitly excludes legal issues arising from the video surveillance of private areas such as banks, casinos, stores, private residential areas.

In the United States, the 2007 *Guidelines for Public Videosurveillance: A guide to Protecting Communities and Preserving Civil Liberties*, a Report by the Constitution Project’s Liberty and Security Committee, www.constitutionproject.org/pdf/Video_surveillance_**guidelines**.pdf, provides information and reflections particularly useful to a project like MIAUCE, which also involves videosurveillance.

[111] Of particular relevance are the TAUCIS (Technology Assessment of Ubiquitous Computing and Informational Self-Determination) project, funded by the German Federal Ministery for Education and Research, http://www.taucis.hu-berlin.de/content/de/ueberblick/english.php, the European Network of Excellence FIDIS (Future of Identity in the Information Society)’s study on “Radio Frequency Identification (RFID), Profiling, and Ambient Intelligence (AmI)”, http://www.fidis.net/fileadmin/fidis/deliverables/fidis-wp7-del7.7.RFID_Profiling_AMI.pdf, the SWAMI (Safeguards in a World of Ambient Intelligence) project, http://swami.jrc.es/pages/index.htm identifying privacy, identity, security, trust and the digital divide as the main (social, ethical and legal) challenges raised by AmI. Also of interest is the commencing PRIAM (privacy issues in ambient intelligence) project funded by the French INRIA. http://priam.citi.insa-lyon.fr/index.php?option=com_content&task=view&id=12&Itemid=26

[112] We will come back later on the highly ambiguous concept of “user”.

[113] The importance of a private sphere where the individual could enjoy ‘insulation’ has been famously acknowledged by John Stuart Mill, in *On Libert,* (Cambridge University Press, 1989 [1859], pp. 8-9), where he suggests that such insulation may be necessary in order to avoid the ‘tyranny of the majority’: “there needs protection also against the tyranny of the prevailing opinion and feeling, against the tendency of a society to impose, by other means than civil penalties, its own ideas and practices as rules of conduct on those who dissent from them; to fetter the development, and, if possible, prevent the formation, of any individuality not in harmony with its ways, and to compel all characters and fashion themselves upon the model of its own. There is a limit to the legitimate

democracy where a condition for rules and norms to appear 'just' is that they result from democratic deliberation among citizens endowed with individual deliberative autonomy). Why not discuss individual autonomy right away then? Our answer is that, as such, individual autonomy is not a right but an individual capability that is always a matter of degree. The conditions for individual autonomy are so diverse, so subjective in a sense, that no law could really ensure the genuine effectuation of a 'right to autonomy'.[114] Individual autonomy is a stage in the development of a person that she should strive to attain. Individual autonomy, not more than musical talent, artistic gifts, of happiness, is not something that the State, through the law, could ever 'provide' to individuals. That is the reason why the "right to be autonomous" does not exist as such in the law.

However, despite the law's inability to 'create' or 'guarantee' individual autonomy, showing *respect* for individual autonomy[115], and, as far as possible, providing some of the conditions necessary for individuals to develop their capacity for individual deliberative autonomy (the individual process of self-governance) and for collective deliberative democracy (the group-oriented process for critical discourse indispensable to a vivid democracy)[116] have become the most fundamental and basic ethical and legal imperative in contemporary western societies, where respecting those imperatives is perceived as a precondition to the legality and legitimacy of the law. Individual autonomy and deliberative democracy presuppose a series of rights and liberties allowing individuals to live a life characterized as (in part at least) self-determined, self-authored or self-created, following plans and ideals - a conception of the good - that they have chosen for themselves.[117] Among those fundamental rights and liberties, the *right to individual privacy*,

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interference of collective opinion with individual independence: and to find that limit, and maintain it against encroachment, is as indispensable to a good condition of human affairs, as protection against political despotism."

[114] Considering the 'right to autonomy' as a fundamental human right would require justification for any restriction on that 'right' imposed by the parents to their child.

[115] Respect for individual autonomy of persons, and thus for the choices they make, is contingent, in law, to the consideration that the subject is *indeed* autonomous in the choices he makes. That condition of autonomy implies the absence of either physical, mental or economic coercion. Legal interference with lawful, fully conscious and uncoerced choices of capable individuals is considered unacceptable, even if interference arises for the sake of the subject's own good, in which case one speaks of unacceptable legal paternalism.

[116] The inspiration for the link between private and public autonomy (the idea that they are 'co-originated' or mutually productive of each-other) is to be found in Jürgen Habermas's discourse theory of law (especially in *Between Facts and Norms*, MIT Press, 1996) according to which "Just those action norms are valid to which all possibly affected persons could agree as participants in rational discourses". One could interpret as an application of this thesis of the co-origination thesis the defense of privacy on the ground of its structural value for society to be read, for example, in P.M. Schwartz, and W.M. Treanor, "The New Privacy", *Michigan Law Review*, 101, 2003, p.216. On deliberative autonomy, see James E. Flemming, "Securing Deliberative Autonomy", *Stanford Law Review*, Vol. 48, N.1, 1995, pp. 1-71, arguing that the bedrock structure of deliberative autonomy secures basic liberties that are significant preconditions for persons' ability to deliberate about and make certain fundamental decisions affecting their destiny, identity, or way of life. On deliberative democracy, see James E. Flemming, "Securing Deliberative Democracy", *Fordham Law Review*, Vol. 72, p. 1435, 2004. Endorsing the concept of a co-originality of private and public autonomy as developed by Jürgen Habermas in *Between Facts and Norms*. On the concept of co-originality, see Rainer Nickel, "Jürgen Habermas' concept of co-originality in times of globaliation and the militant security state", IUE Working Paper Law, 2006/27.

[117] See Onora O'Neill (*Autonomy and Trust in Bioethics (Gifford Lectures, 2001)*, Cambridge University Press, 2002) recalling the wide variety of notions that have been associated to the concept of autonomy by scholars such as Gerald Dworkin (*The Theory and Practice of Autonomy*, Cambridge University Press, 1988), listing liberty (positive or negative), dignity, integrity, individuality, independence, responsibility and self-knowledge, self-assertion, critical reflection, freedom from obligation, absence of external causation, and knowledge of one's own interest as concepts that have been equated to the concept of autonomy, or as Ruth Faiden and Thomas Beauchamps (*A History and*

understood not merely as a right to be left alone but also as a right to self-determination disallowing paternalism from the state, and the *right to data protection* empowering individuals with means to control the collection, use and disclosure of personal information, on the assumption that lacking such control would subject those individuals to the unbalanced power of others (public authorities or private agents), function as the closest legal "proxies" to the moral concept of autonomy. As "proxies" for the legally unattainable moral ideal of autonomy, privacy and data protection are thus often perceived as the most efficient and direct legal instruments to protect individual autonomy on the threshold of a predicted "AmI era".

A BRIEF OUTLINE OF THE EUROPEAN PRIVACY AND DATA PROTECTION LEGAL FRAMEWORK.

Acknowledgements of the right to privacy as "autonomy in the construction of one's identity" are explicit in the European human rights framework (this is not the case in the United States, where the right to privacy has no explicit written constitutional basis).

Article 8 of the European Convention on Human Rights on the right to respect for private and family life acknowledging that:

> 1. Everyone has the right to respect for his private and family life, his home and his correspondence.
>
> 2. There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.

The right to privacy protects individuals against invasions of privacy by public authorities or, through the Convention's *horizontal effect*, by other individuals,[118] and has been interpreted by the European Court

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Theory of Informed Consent, Oxford University Press, 1986) according to whom autonomy may also be defined as privacy, voluntariness, self-mastery, choosing freely, choosing one's own moral position and accepting responsibility for one's choices.

[118] Since the 1981 judgement in *Young, James and Webster v. United Kingdom* (Eur.Ct.H.R., 13 August 1981, Series A No.44) the European Court on Human Rights acknowledges an *horizontal effect* to the Convention, extending the scope of protections to relations between private parties: §49: 'Although the proximate cause of the events giving rise to this case was [an agreement between an employer and trade unions], it was the domestic law in force at the relevant time that made lawful the treatment of which the applicants complained. The responsibility of the respondent State for any resultant breach of the Convention is thus engaged on this basis.' Through this horizontal effect of the Convention, the fundamental rights seem to gain positive effectiveness. The matter is highly controversial, however, just as controversial as the question of the conception of privacy either as a mere *privilege* or as a (subjective) *right*. See also *X and Y v. Netherlands*, 8978/80 (1985) ECHR 4 (26 March 1985), Series A, vol. 91: 'although the object of Article 8 (art. 8) is essentially that of protecting the individual against arbitrary interference by the public authorities, it does not merely compel the State to abstain from such interference: in

of Human Rights as including the individual right to control personal information, including in the workplace[119](the scope of the right to privacy and of the right to data protection may intersect with regards to 'informational privacy'), the right to physical and moral integrity including regarding sexual life,[120] the right to access one's personal records,[121] the right to establish and maintain personal and social life,[122] to establish and develop relationships with other human beings,[123]…

The Charter of Fundamental Right of the European Union[124], reproduces, in its Article 7, §1 of Article 8 of the European Convention on Human Rights to private and family life:

> Respect for private and family life: Everyone has the right to respect for his or her private and family life, home and communications.

Article 8 of the Charter raises the protection of personal data to the status of a fundamental right:

> 1. Everyone has the right to the protection of personal data concerning him or her.
> 2. Such data must be processed fairly for specified purposes and on the basis of the consent of the person concerned or some other legitimate basis laid down by law. Everyone has the right of access to data which has been collected concerning him or her, and the right to have it rectified.
> 3. Compliance with these rules shall be subject to control by an independent authority.

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addition to this primarily negative undertaking, there may be positive obligations inherent in an effective respect for private or family life (see the Airey judgment of 9 October 1979, Series A no. 32, p. 17, para. 32). These obligations may involve the adoption of measures designed to secure respect for private life even in the sphere of the relations of individuals between themselves.'

[119] See the recent decision by the European Court on Human Rights, in *Copland v. United Kingdom*, 62617/00 [2007] ECHR 253 (3 April 2007), in which the Court held that monitoring of an employee's emails, internet usage and telephone calls had breached the employee's right to privacy. The Court held that even monitoring the date and length of telephone conversations and the number dialed could give rise to a breach of privacy. The arguments of the court included the fact that the employee had not been informed that her telephone calls might be subject to monitoring, and that, at the time, no law exited in the UK that allowed employers to monitor their employees communications. Indeed, the Regulation of Investigatory Power Act of 2000 was not yet in force at that time. The Court does not investigate whether that Act might be inconsistent with the Human Rights Act however.

[120] X and Y v. Netherlands, 8978/80 (1985) ECHR 4 (26 March 1985), Series A, vol. 91.

[121] Gaskin v. United Kingdom, 10454/83 (1989 ECHR 13 (7 July 1989) Series A no. 160. See also Odièvre v. France, 42326/98 (2003) ECHR 86 (13 February 2003), where the ECHR acknowledged that the right to privacy (Article 8 of the European Convention on Human Rights) protects, among other interests, the right to personal development, and that matters relevant to personal development included details of a person's identity as a human being and the vital interest in obtaining information necessary to discover the truth concerning important aspects of one's personal identity.

[122] Beldjoudi v. France, 12084/86 (1992) ECHR 42 (29 March 1992)

[123] Niemietz v. Germany, 13710/88 ECHR 80 (18 December 1992) Series 1, vol. 251 B.: 'The Court does not consider it possible or necessary to attempt an exhaustive definition of the notion of "private life". However, it would be too restrictive to limit the notion to an "inner circle" in which the individual may live his own personal life as he chooses and to exclude there from entirely the outside world not encompassed within that circle. Respect for private life must also comprise to a certain degree the right to establish and develop relationships with other human beings.'

[124] 2000/C 364/01

The fundamental principles of data protection (fair processing, performed for specific purpose, on the basis of the subject's consent or of other legitimate basis laid down by law, subjective rights of the data subject to access and rectify collected data) had been formalized in the Convention for the Protection of Individuals with regards to Automatic Processing of Personal Data of the Council of Europe,[125] and reiterated in the fair information principles formalised in the European directive on the protection of individuals with regards to the automatic processing of personal data[126] and in the European directive concerning the processing of personal data and the protection of privacy in the electronic communication sector.[127]

The European legal framework of data protection's major instruments are essentially those two important directives, the Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data[128], and the Directive 2002/58/EC of the European Parliament and of the Council of 17 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communication sector.[129] Data protection principles apply to the processing of "personal data" that the directives define as: "any information relating to an identified or identifiable natural person". Except when the data is anonymous or anonymized, any collection, storage and use of coded or personal data relating to human subjects must comply with the 1995/46/EC Directive on the protection of individuals with regard to the processing of personal data and on the free movement of such data. When, in addition, that information is about the user's communications on the internet, the Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications) must be complied with.

The right to privacy (acknowledged in Article 8 of the European Convention of Human Rights and taken over in Article 7 of the Charter of Fundamental Rights of the European Union) and the right to data protection acknowledged at Article 8 of the Charter of Fundamental Rights of the European Union, and implemented by the two Data protection directives) interact in a variety of ways. The European Court of Human Rights has acknowledges that "informational privacy" is among what Article 8 of the ECHR protects. In this regard, data protection directives are among the *tools* through which the individual exercises his right to privacy. More generally, having the guarantee that personal information (personal data) will not be collected and used in manners that totally escape from the individual's control is indeed a precondition for the individual to feel genuinely free from unreasonable constraints on the construction of his identity. The notion of "informational self-determination" is sometimes used to characterize the rights guaranteed through data protection legislation. The expression is misleading however as it suggests an unduly reductionistic correspondence between a person's "self" and that person's "data". What a person does in exercising the prerogatives she holds according to the European data protection directives is not "determining herself" but merely controlling, to a certain extent, "an aspect of her identity she projects to the world". Data, or information one may say, are not preexistent to their processing, and are certainly not what the person *is*. Data protection is also a tool for protecting other rights than the right to privacy: preventing the processing of information relating to the individual's racial or ethnic origin, political opinions, religious or philosophical beliefs, trade-union membership, and concerning the individual's health or sexual life, the data protection directives prevents potential discriminations on those grounds. On the other side, the right to privacy is irreducible to the right to data protection: it guarantees the inviolability of the home (spatial privacy), has to do with the inviolability of the human body, and protects the individual's emotions and relationships with others. We will come back to those different aspects of privacy later. Suffice for now to acknowledge that what privacy protects is irreducible to personal information. Privacy and data protection intersect but are also different tools for enabling individual deliberative democracy, and, as a consequence, also collective deliberative democracy.

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[125] Convention for the Protection of Individuals with regards to Automatic Processing of Personal Data of the Council of Europe, ETS No. 108, Strasbourg, 28 January 1981.

[126] Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data, *Official Journal* L 281, 23 November 1995.

[127] European Directive 2002/58/EC EC of the European Parliament and of the Council of 17 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communication sector.

[128] *Official Journal* L 281, 23 November 1995.

[129] *Official Journal* L 201, 31 July 2002. See also the Directive 2006/24/EC of the European Parliament and of the Council of 15 March 2006 on the retention of data generated or processed in connection with the provision of publicly available electronic communication services or of public communications networks and amending the Directive 2002/58/EC, *Official Journal*L 105, 14 April 2006 P. 0054-0063.

Assessing the requirements that privacy and data protection instruments impose on the design and applications of a project like Miauce, and identifying the potential inadequacies of the legal framework will be the object of the second section of the present chapter (**Section II**). Some detours are needed indeed as preconditions to these assessments.

As privacy and data protection are grounded on the moral imperatives of individual deliberative autonomy and democratic deliberative autonomy, a precondition to our study of the relevance, applicability and adequacy of legal privacy and data protections in Europe is to identify what, in the Miauce project, threatens those fundamental 'autonomic' and 'democratic' values that privacy and data protection are meant to protect. As 'transversal issues' (**Section I**), we have identified two main matters in this regard, which are respectively the "performative" power of the classifications operated by the information systems (I.1), and the increasingly distributed human-objects agency (I.2). Taking those issues seriously, we will argue, requires the development of value-sensitive design or, more precisely, of privacy-sensitive design and of democracy-sensitive design. Beyond privacy-enhancing technologies, democracy-sensitive design should ensure that socio-technological configurations both *result from democratic deliberation*, and *increase democratic participation and inclusion*. (I.3)

1 TRANSVERSAL ISSUES: ARE AMI SYSTEMS COMPATIBLE WITH PRIVACY AS "FREEDOM FROM UNREASONABLE CONSTRAINS IN THE CONSTRUCTION OF ONE'S IDENTITY"?

The focus of the present section is on how AmI systems, due to their 'performative' power on the one hand, and to the character of distributed agency they exhibit on the other hand, may interfere with the "free development of one's personality", requiring a certain level of immunity from constrains in the construction of one's identity.[130]

1.1 FREEDOM FROM UNREASONABLE CONSTRAINS IN THE CONSTRUCTION OF ONE'S IDENTITY AND THE 'MAKING OF PEOPLE' IN AMI SYSTEMS.

Combined with the ever increasing technological capacities to track, record, analyse, correlate and interpret images, sounds and texts transpiring from human activity and context[131] (the Miauce project involves the tracking, recording and analysis of information voluntarily or involuntarily "released" the "users", such as eye fixation, body movements, facial expressions, internet transactions, etc.), AmI visions rely on systems capable to 'learn' from occurring events and to incrementally self-adjust to respond optimally to human 'needs' whereas those 'needs' are decreasingly defined by the concerned "users" themselves, but increasingly defined according to the system's interpretations of whatever happens in the contexts, and of whatever users do or even, increasingly, of what their facial expressions and body motions are. To that extend, one may say that AmI technologies such as those involved in the Miauce project, not only rely on the automatic and systematic processing of personal information, but that they "construct" and "produce" knowledge about their "users".[132]

The type of knowledge so produced is in no way 'objective' as one has long been able to speak of the 'objectivity' of scientific knowledge. Said otherwise, the information systems involved in AmI visions are not intended to "observe" the unique complexity of each individual human being, but to sort individuals in a variety of heterogeneous categories for the purpose of predicting either their willingness to buy specified commodities, their risk to fill claims with health and disability insurances, the danger they represent for others, or other propensities that marketers, insurers, law enforcement officials and many others will find useful to have. Ian Hacking recently expressed concern with regards to classification of people, which is highly relevant to the assessment of the scenarios envisioned in the Miauce project: when people are taken as objects of scientific or bureaucratic inquiry for a variety of purposes going from controlling to helping them, passing by organizing them or keeping them away from places, such classifications affect the people classified, and that the affects on the people in turn change the classifications.

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[130] Warren and Brandeis explicitly grounded their conception of the "right to privacy" on the peace of mind such a right should allow, and on what they identified as the principle of "inviolate personality", which, according to them, was part of a general right of immunity of the person, "the right to one's personality" (Warren, S., Brandeis, L., "The Right to Privacy", *Harv. L. Rev*. 1890, p. 195 and 215.)

[131] Computing, communication and storage capabilities are said to be doubling every eighteen, six and nine months respectively. (Thomas Skordas and George Metakides, "Major Challenges in Ambient Intelligence", *Studies in Informatics and Control*, 12(2), June 2003.)

[132] The most obvious example of such constructions are the profiles produced through data mining. See Bart Custers, *The Power of Knowledge. Ethical, Legal, and technological Aspects of Data Mining and Group Profiling in Epidemiology*. Wolf Legal Publishers, 2004.

> We think of these kinds of people as definite classes defined by definite properties. As we get to know more about these properties, we will be able to control, help, change, or emulate them better. But it's not quite like that. They are moving targets because our investigations interact with them, and change them. And since they are changed, they are not quite the same kind of people as before. The target has moved. I call this the 'looping effect'. Sometimes, our sciences create kinds of people that in a certain sense did not exist before. I call this 'making up people'.[133]

This 'making up of people' in the Miauce project is contingent on the type of finalities and applications of the system. Those finalities and applications are diverse, and very difficult to predict in advance. Yet, as far as the Miauce project is concerned, the envisioned applications (or *scenarios*) involve either the "automatic" display of information optimized to the user's needs or preferences as interpreted by the system (e.g. in marketing or interactive web-TV scenarios), or the "automatic" initiation of security measures adapted to the system's interpretation of the events occurring in the environment it captures (e.g. in intelligent video surveillance scenario, with cameras equipped with technologies allowing motion detection, automated tracking, …).

The concerns here are not merely about the increased "visibility" of individual existences in their most tiny details (a concern which was the focus of the traditional conceptions of privacy)[134], but also about the possibility that *meaning* be ascribed to even the most trivial and fugitive image, sound or movement captured from individuals. The engines involved in AmI scenario are engines of 'discovery' or of 'observation', but also engines for 'making up' people.[135] The probable impacts of AmI *scenarios* consist less in discovering and characterising *what is pre-existing* than it in *creating* new interactions and behaviours involving subjects, objects, and (public and private) organizations, and, through an elaborated interplay of statistics and correlations, in producing, or, more probably, reinforcing the *norms*, the criteria of normality and desirability against which individual lifestyles, preferences, choices and behaviours will be evaluated, with gratifications for compliant individuals, and sanctions for deviant ones, in the form of increased surveillance and monitoring, or of a reduction of access to specific places, goods, services, activities or other opportunities.[136]

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[133] Ian Hacking, "Making Up People", *London Review of Books*, 26(16), 17 August 2007.

[134] The recent American "Guidelines for Public Video Surveillance" suggested by the Constitution Project's Liberty and Security Committee (2007) acknowledge that "technological advances and social changes have ushered in new and more pervasive forms of public video surveillance with the potential to upset the existing balance between law enforcement needs and constitutional rights and values. Modern public video surveillance systems consist of networks of linked cameras spread over vast portions of public space. These cameras can be equipped with technologies like high resolution and magnification, motion detection, infrared vision, and biometric identification – all linked to a powerful network capable of automated tracking, archiving, and identifying suspect behavior." (http://www.constitutionproject.org/pdf/Video_Surveillance_Guidelines_Report_w_Model_Legislation4.pdf)

[135] See Ian Hacking, "Making Up People", *London Review of Books,*, 17 August 2006, p. 23, where he develops a parallel reflexion, not about AmI technologies, but about humans sciences (many social sciences, psychology, psychiatry and a good deal of clinical medicine).

The central importance of privacy and data protection in the context of MIAUCE, as in other AmI projects, is thus not merely due to the fact that AmI systems record what happens in "real life". What is crucial here is that those systems "construct" the meaning of those events and, on that basis, frame the user's environment in ways that in turn impact on his self-perception, choices, preferences and behaviours, interfering, potentially at the deepest level, with the effective exercise by individuals of their right to self-determination, and with their effective political capacity to participate in the discursive processes of deliberative democracy that should guarantee the justiciability of those classifications[137] (to the extent that those classifications condition access or denial of access to valuable opportunities, they should result from a democratic deliberative process).

At a time where respect for individual autonomy has become the most fundamental and basic ethical and legal imperative, this truly "poïetic" nature of AmI visions is problematic. The "performativity" of the knowledge constructed about users on the basis of correlated data transforms the very users about whom that knowledge is constructed.

A word of caution is needed about the concept of "users", which is very common in the literature about ambient intelligence and ubiquitous computing, but has never received any thorough definition. It is usually employed to designate the *persons about whom information is recorded and processed*. They may be ordinary civilians in security scenarios, they may be customers in marketing scenarios,… from the point-of-view of data protection, they would be called the "data subjects". This ambiguity attests of the ambivalence of technological developments such as those contemplated in the Miauce project, which *assist* people in their daily activities, increasing their performance, enhancing their security in *given* environments and spaces, while also 'producing' truly *new* spaces, called by some 'performative' or 'surveillance spaces', and, arguably, new "users" as well.[138]

What conditions would guarantee the "autonomous" character of expressed choices and consents in a performative surveillance space where citizens systematically adapt their behaviours to what is expected from them, where, on the basis of what they have read, or chosen in the past, one-to-one marketing filters the information and offers communicated to them about goods and services available for purchase, thereby confirming them in their "profile", where, in other words, they are themselves *constituted* as subjects through their active participation to the system they are asked to consent to? When individual desires, preferences, and choices are always already framed by the technology, when, in other words, no *elsewhere* exists from where individuals could contest what is proposed or imposed to them through the AmI technologies, how can individual autonomy be preserved ?

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[136] « Things have changed since Orwell's time, and consumption for the masses has emerged as the new inclusionary reality. Only the minority, the so-called underclass, whose position prevents them from participating freely in consumption, now experience the hard edge of exclusionary and punitive surveillance." (David Lyon*, The Electronic Eye: the Rise of Surveillance Society*, University of Minnesota Press, 1994.)

[137] On the idea that 'profiles' should be made 'justiciable', see M. Hildebrandt, "Profiles and Correlatable Humans", in: Christoff Henning, Nico Stehr and Bernd Weiler (eds.), *Knowledge and the Law. Can Knowledge be Made Just?*, New Jersey: Transaction Books 2007.: "If the knowledge produced by profiling practices entails exclusion, stigmatisation, confrontation, customisation and even de-individualisation, the question is how to constrain these practices in order to make the knowledge they produce just."

[138] John E. McGrath, *Loving Big Brother: Performance, Privacy, and Surveillance Space*, Routledge, 2004. See also Henri Lefebvre, *The Production of Space*, Blackwell, 1991.

1.2 FREEDOM FROM UNREASONABLE CONSTRAINS IN THE CONSTRUCTION OF ONE'S IDENTITY IN A CONTEXT OF DISTRIBUTED AGENCY.

The trope of the "user" may thus be somewhat misgiving also to the extent that it conveys the idea of active agency. Although AmI systems are mostly described – as it is the case in MIAUCE – as "human centred", as "reactive" to human choices, actions and needs, and as oriented towards *empowering "users"* by increasing convenience and entertainment for them, spare them time and costs, increase their safety and security, the vocation of AmI systems is to be seamless and disappear from human consciousness, thereby *bypassing users' intentionality and control*, as to dispense individuals from making decisions and performing certain actions.

To the extent that users are free to use the intelligent interface, they are in part pre-defined in their choices and preferences by the design of technology. "Objects make subjects", Lucy Suchman[139] recently explained, elaborating on the theme developed previously by Madeleine Akrish:

> Designers (…) define actors with specific tastes, competences, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science and economy will evolve in particular ways. A large part of the work of innovators is that of *inscribing* this vision of (or prediction about) the world in the technical content of the new object. I will call the end product of this work a 'script' or a 'scenario.'[140]

And the 'vision of the world' in contemporary Europe carries a wealth of under-challenged assumptions, such as that carried by the 'security imperative' and the 'efficiency imperative' on which we will come back later on. Suffice to say for now that the embodiment of those imperatives in the design of technology tends to immunize them from public debates and possible contestation. This may be seen as an interference with the ideal of deliberative autonomy.

Design may also interfere with the individual deliberative autonomy. Framing the concept of 'technical paternalism', Spiekerman and Pallas[141] suggested that it differs from human paternalism in two important ways: first, machines react automatically and autonomously, which leaves users little room for anticipation or reaction; second, technology paternalism is not a matter of obedience as it is the case with human interfaces, instead it is a matter of total compliance, as, by their 'coded' rules, machines can become 'absolute' forces and therefore may not be overrulable anymore (they provide the example of sensors in a car detecting alcohol in someone's breath, and disallowing the car to start, even in cases of emergency), as, "in a world of Ubicomp, (…) most decisions are performed in the background and are often neither noticed nor can they be reviewed or overruled constantly." Notice of action, which would be necessary for allowing users to overrule decisions made by the machine, indeed appears to contradict the 'calmness' of ubiquitous computing and ambient intelligence.

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[139] Lucy Suchman, *Human-Machine Reconfigurations : Plans and Situated Actions*, Cambridge University Press, 2d.ed., 2006.

[140] M. Akrich, "The De-Scription of Technological Objects", in. W.E. Bijker and J. Law, *Shaping Technology / Building Society*, MIT Press, 1992, p. 208.

[141] See S. Spiekermann and F. Pallas, "Technology paternalism – wider implications of ubiquitous computing", *Poiesis Prax*, 4, 2006, 6-18.

IBM's vision of "autonomic computing"[142] radicalizes the idea of non-human agency or of "cooperating objects" through a systemic view of computing modelled after a self-regulating biological system, and that would "know itself", comprising components that also possess a system identity, be able to configure and reconfigure itself under varying and unpredictable conditions, would always look for ways to optimize its workings, would be able to recover from routine and extraordinary events that might cause some of its parts to malfunction, would be able to protect itself, would know its environment and the context surrounding its activity, and adapt its actions accordingly, would exist with and implement open standards, and would anticipate the optimized resources needed while keeping its complexity hidden.

A fundamental challenge raised by the new cooperation between humans and objects will thus be for the law to deal with this new form of "distributed agency". Indeed a truly revolutionary feature of AmI is that they are systems where the individual sentient human being loses the exclusivity of "agency" he has traditionally enjoyed at least from the point-of-view of law. Sociologists, such as Bruno Latour[143], Michel Callon[144] have acknowledged nonhuman agency in actor-network theory. Media artists have understood their poetic potential - that is, the potential they offer to imagine and create radically different spaces – and, relying on new information, communication and networking technologies, have begun indeed to "create" new spaces, new experimental experiences. [145] But from the legal point-of-view, the spread of agency is resented as a true disruption. One reason for this is that the presumption that only sentient human beings exhibit "agency" is fundamental to the law's capacity to assign individual responsibility and liability.

This raises fundamental and very basic questions with regard to the functioning of law in a world of AmI: how shall legal responsibility be allocated for the potential harms and violations of rights when intentionality is "spread" and not exclusively locatable in individual psychism? How to assign responsibilities in computer-controlled environments where it becomes impossible to locate and isolate the cause of potential damages resulting from combined agencies originating from computer hardware and software, networks, and human beings?[146] How can meaning be ascribed to the "informed consent" provided by individuals to the electronic treatment of personal data when individual preferences are from the outset framed by the norms of the "infosphere"? We will come back to those questions later on. Suffice for now to acknowledge that the 'performative' power of AmI over individual desires, choices, preferences and behaviours, and the distribution of agency in AmI set unprecedented challenges for the law.

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[142] http://www.research.ibm.com/autonomic/manifesto/

[143] Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory*, Oxford University Press, 2005.

[144] Michel Callon, "Les réesaux sociaux à l'aune de la théorie de l'acteur-réseau", *Sociologies Pratiques*, n.13, pp. 37-43, 2006.

[145] See Sha Xin Wei, "Poetics of performative space", *AI & Society*, 21(4), June 2007. See also the Planetary Collegium / Montreal 2007 Summit, "Reviewing the Future: Vision, Innovation, emergence", 19-22 April 2007 (abstracts viewable at http://summit.planetary-collegium.net/abstracts.html). Another example is *Alternet Fabric*, a private company composed of Architects, telecommunication and computer scientists and artists engaged in common architectural, esthetic and technologic projects (http://www.fabric.ch).

[146] See Hilty et al. *The Precautionary Principle in the Information Society – Effects of Pervasive Computing on Health and Environment*, Swiss Center for Technology Assessment (TA-SWISS), Bern (TA46e/2005) and Scientific

An important challenge for the law in advanced AmI environments, but also already in more modest visions such as the Miauce project's, will thus be to deal with the increasing dissociation between the concept of "users" and that of "agency". Empowerment of "users" through the mechanisms described in fair information principles formalized in the European data protection framework may only partially resolve the issue, as will be further explained in the next section. Advanced information and communication technologies are partially outpacing current legal protections of personal data and privacy in several ways, of which the confrontation of the technological visions embedded in the Miauce project to the fundamental principles of data protection and privacy provide many examples. To those challenges, the law does not necessarily have pre-determined, definitive and secure responses. Guarantees of fundamental rights and liberties in a world of ambient intelligence will not be found nor constructed by the law alone: it is now commonsense that the law alone, however well thought through and drafted, is ill equipped to provide exhaustive and sufficient responses to the normative and regulatory challenges of the advanced information society.

In assessing the aspects, scope and value of privacy and data protection that are pertinent to the Miauce project (Section II), we will need to take those transversal concerns into account, as well as to acknowledge that privacy and data protection will have to rely on much more than law for their protection. A new regulatory metabolism, including law, technology and social deliberation will need to be activated.

1.3 A LESSON FROM THOSE TRANSVERSAL CHALLENGES? TOWARDS A DEMOCRACY-SENSITIVE TECHNOLOGICAL DESIGN.

The legal challenges of AmI visions are further complicated by the ubiquitous and "pleiotropic" characters of the emerging technologies, that is, respectively, their potentiality to be embedded in any object of our environment (cf. RFID tags) or even in the human body itself, and their capacity to develop in a multitude of unpredictable applications. That AmI-related technologies may be developed into a wide variety of unpredictable scenarios makes prospective legal inquiry intricate and render it very difficult for the law to usefully regulate *a priori* those developments.[147] It is reasonable to assume that the law may have to

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technology options assessment at the European Parliament (STOA 124 EN). http://www.ta-swill.ch/www-remain/reports_archive/publications/2005/050311_STOA125_PvC_72dpi_e.pdf
p. 17 : « As a rule, it is not possible to isolate the cause of damage due to the combined effects of several components from computer hardware, programmes and data in networks, as no one can cope with the complexity of such distributed systems, neither mathematically nor legally. As society's dependence on systems of this kind will grow with Pervasive Computing, a net increase in the damage derived from unmastered technical complexity has to be expected. As a consequence, a growing part of day-to-day life will, virtually, be removed from liability under the causation principle. »

[147] See also Kevin D. Werbach, "Sensors and Sensibilities", *Cardozo Law Review*, 2007 (forthcoming), arguing that the fact that sensors will be embedded in the most trivial objects used in daily life will make it difficult for the law to

evolve to accommodate the new challenges raised by AmI, but although the path followed by legal change is usually *evolutionist* (following a method of anchoring and adaptation), the unprecedented character of some of the issues awaiting regulation in a world of ubiquitous computing and ambient intelligence might well render former anchors irrelevant.

Besides those methodological difficulties, the uncertainty and variety of potential applications (scenarios) has implications for more than one branch of law. Let us take, for instance, intellectual property law: a very practical problem one will soon be confronted to in this regard relates to the adaptation of intellectual property policies to individual innovations that are at the same times finalized inventions, and components embedded into other technological products or daily use objects. Allocation of patents on, say, RFIDs, allows private constructive pre-emption of the new AmI space. The impact of IPRs as incentives or disincentives to innovate must be assessed anticipating on the wide variety of undefined, unpredictable scenarios involving convergent technologies and the development of an "internet of objects". Patents in this context is not merely about rewarding technological innovation and, thereby, producing positive incentives for the development of useful technological solutions to technical problems: a patent over a basic technological element that may be involved in complex ambient intelligent networks grants power to the patent holder to orient the very construction of the "AmI ecosystem" (the vision of AmI implies that the human-digital interface indeed appear "natural"), a power that is not merely technological but also highly political by nature: a power over the political economy of information environments.

From the transversal issues described above and from the new complexities facing legal regulation of unpredictable technological developments, that policy and technology have become increasingly interdependent is undeniable:[148] legal principles, to be efficient, may need to be "embedded" in the technology itself (the development, encouraged by the European Commission, of privacy-enhancing technologies (PET's), attests of the new distribution of regulating power between law and technology) with the implication that lawyers and engineers must engage in dialogue.[149] The development of **value-**

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regulate AmI technology itself: it would make it difficult or either impossible or enormously costly to either ban them altogether, restrict their use in specific circumstances, restrict specific uses of those devices, or even try to shape how the technology operates, as the devices in which it is embedded may be general-purposes devices.

[148] James X. Dempsey and Ira Rubinstein, "Lawyers and Technologists. Joined at Hips?", *IEEE Security and Privacy*, May/June 2006, pp. 15-19. See also M. Schwartz, "Beyond Lessig's *Code* for internet Privacy: Cyberspace Filters, Privacy Control, and Fair Information Practices", *Wisconsin Law Review*, 2000, p.787: "a central fashion in which regulation takes place in cyberspace is through "code", that is, through technological configurations and system design choices."

[149] See Lawrence Lessig, "The Architecture of Privacy", *Vanderbilt Entertainment Law and Practice*, 1, 1999, and *Code and Other Laws of Cyberspace*, Basic Books, 2000 where Lessig, advocating mixed property-based and technological solutions to the issue of privacy on the Internet, suggests to structure privacy rules along a two-tier mechanism involving, on the one hand, acknowledgement that each individual has property interest in her own information and, on the other hand, the use of software transmission protocols to empower the individual with the possibility to control her access to the web-sites according to her privacy preferences and the extent to which each site's practices meet meets those preferences. For a critique of Lessig's approach, see Paul M. Schwartz, "Beyond Lessig's *Code* for internet Privacy: Cyberspace Filters, Privacy Control, and Fair Information Practices", *Wisconsin Law Review*, 2000, 743-788. Besides the argument that most users will probably never master and/or use the software transmission protocols (such as P3P), Schwartz criticizes Lessig's idea that privacy protects a right of individual control, and rather suggests that privacy is a constitutive value that safeguards participation and association in a free society. Schwartz identifies the normative function of privacy as inhering in its relation to participatory democracy and individual self-determination. While he recognizes that a privacy market may play a

sensitive design in pervasive and context-aware information and communication systems such as those envisioned in the Miauce project require "design guidelines that are both specific enough to provide meaningful direction and sufficiently flexible to be used across systems and deployment conditions".[150] As the Miauce project is among the precursors in a technological revolution expected to crucially affect human experience and performance in both trivial and important behaviours and interactions constitutive of our economic, politic, cultural, social and intimate daily life, those design guidelines should moreover be **democracy-sensitive**. "Inventors" in the Miauce project cannot be characterized simply as problem-solvers: the technology they develop are simply aimed at solving problems that simply exist "out there", they are also, "constructing" bundles of solutions who construct problems suited to their unique skills and ideas", they "invent both artifacts and frames of meanings"[151], and should therefore acknowledge the fundamentally political nature of their work. A "democracy-sensitive" design must comply with the two following requirements: the "framing" or norms implicit in the "intelligent" information and communication systems should themselves *result from democratic deliberation*, and the implementation of those systems should *increase democratic participation and inclusion*.

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role in helping information privacy fulfill its constitutive role, Schwartz considers that shortcomings and structural difficulties in that market make it improbable that those market failures can be spontaneously solved by the market itself. His recommendation is thus to rely on fair information practices, that he conceptualizes as a mixture of property and liability rules, with mandatory and default elements.

[150] Anne Jacobs, "The benefits of The Legal Analytic Perspective For esigners of Context-Aware Technologies", guir.berkeley.edu/pubs/ubicomp2002/privacyworkshop/papers/UbicompPaper2.doc -

[151] W. Bernard Carlson, "Artifacts and Frames of Meaning: Thomas A. Edison, His Managers, and the Cultural Construction of Motion Pictures", in. Wiebe E. Bijker, J. Law, eds., *Shaping Technology/Building Society. Studies in Sociotechnical Change*, pp. 175-176.

2 RELEVANCE, APPLICABILITY AND ADEQUACY OF THE EUROPEAN PRIVACY AND DATA PROTECTION LEGAL FRAMEWORKS TO THE UNPRECEDENTED CHALLENGES IN MIAUCE.

Our orientation in thinking about privacy and data protection in a context such as Miauce is to consider the scope, meaning and value of those rights in a contextualized and pragmatic manner rather than in a purely positivist way. Law is 'not a tangible object of the real world' but a 'concept or process'.[152] That one needs to be able to identify *what it is, in each context* that privacy and data protection protect in order to balance privacy and data protection principles against competing principles and legitimate interests may appear a truism, but a truism that most positivist legal scholarship appears forgetful of, failing to assess, behind positive laws, the extra-legal values they promote. An important task in assessing the relevance, applicability and adequacy of the European privacy and data protection legal frameworks is to distinguish, as separate issues, the scope (aspects of privacy), the values (or normative grounds) of privacy, and the instruments of privacy and data protection. The abundant literature on privacy rarely makes those distinctions explicit, and, as a result, sometimes obscures rather than clarifies what indeed is meant by the legal concept of "privacy" in the advanced information society.[153]

It is only through a consideration of the nature of the threats that the new information and communication technologies raise for a free and democratic society that one may identify the type of privacy protections needed in the current configuration of our society and for the future.[154] What we mean by this is that the legal concept of privacy we need in a world of ambient intelligence will not necessarily be the same concept as the one we needed in a pre-information society. In the pre-information society, local social norms (like norms of decency regulating what people were allowed to disclose or not in public), strong physical and temporal boundaries (like walls and the limitation of human memory), a framing of issues of security and efficiency different from the one experiences nowadays (with security and efficiency largely imposed as absolute logics trumping other considerations), and the fact that personal information was not yet considered, as it is today, as a basic resource of informational capitalism[155] (no "market" for personal information existed), privacy laws protecting only intimate matters and sensitive information were arguably playing their role satisfactorily in view of keeping the free and democratic characters of society.

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[152] L. Friedman, *Law and Society. An Introduction,* Prentice Hall, 1977, p. 3.

[153] Serge Gutwirth and Paul De Hert, usefully make those distinctions. One agrees with their suggestion that privacy is a *tool* that shield individuals against others' interferences, and regret, with them, that, as far as data protection is concerned, transparency seems to have replaced legitimacy as the core *value* of data protection. (Serge Gutwirth, Paul De Hert, "Privacy, data protection and law enforcement. Opacity of the individual and transparency of power", in Erik Claes, Anthony Duff and Serge Gutwirth, *Privacy and the Criminal Law*, Intersentia, 2006. That indeed the 'legitimacy' imperative of data processing is not sufficiently assessed by Courts may in part be explained by the pression that the 'absolute logics' of security and efficiency impose on any proportionality test that one might wish to implement in assessing the legitimacy of data processing.

[154] Article 1 of the "Data protection directive" (95/46/EC) explicitly frame data protection in the larger context of the protection of fundamental rights and freedoms: "In accordance with this Directive, Member States shall protect the fundamental rights and freedoms of natural persons, and in particular their right to privacy with respect to the processing of personal data."

[155] Perri6 (1998) *Private Life and Public Policy* in *The future of Privacy: Public Trust in the Use of Private Information v. 2*, Lasky, K and Fletcher, A (eds), Demos Medical Publishing: "what is distinctive about

As Lisa Austin argued, however, "because technology creates privacy issues that fall outside the bounds of our traditional analysis – known and even accepted surveillance, collection of non-intimate information, collection of information in public – we do need to sharpen and deepen our understanding of traditional concerns regarding privacy in order to respond to these new situations." [156] Sharpening and deepening our understanding of traditional concerns regarding privacy and data protection is what we would like to attempt in the following pages.

2.1 THE RIGHT TO PRIVACY

2.1.1 The scope of privacy

AmI technologies have the potential to increase the 'visibility' of the wide range of daily experiences that compose the fabric of everyday life and that, for a significant part, we never even had to think as 'private' or 'anonymous'[157] so far, as there were no reasons to fear they would ever be 'watched', recorded and interpreted by anyone, either because the technical capabilities to do so were lacking, or because we thought those experiences were so trivial and meaningless that nobody would ever pay attention to them.

A useful question to ask is: what aspects of our life are protected when we 'have' privacy? Spatial, informational, emotional, relational, communicational privacy are various 'aspects' of privacy that the Miauce technologies may interfere with.

Communicational privacy is explicitly acknowledged in Article 8 of the European Court of Human Rights and in Article 7 of the European Charter of Human Rights.

We can feel 'privacy' when we have our 'spatial' territory, such as our home, protected from non consented intrusions by others. Protection of the home is indeed explicitly acknowledged in Article 8 of the European Court of Human Rights and in Article 7 of the European Charter of Human Rights. Ubiquitous and pervasive computing easily cross walls, and have the potential to interfere with our **spatial privacy**.

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informational capitalism is that personal information has become the basic fuel on which modern business and government run and (…) the systematic accumulation, warehousing, processing, analysis, targeting, matching, manipulation and use of personal information is producing new forms of government and business (…)."

[156] Lisa Austin, "Privacy and the Question of Technology", *Law and Philosohpy*, 22, 2003, p. 164.

[157] Anonymity has been described famously by Alan F. Westin as a form of privacy "that occurs when the individual is in public places or performing public acts but still seeks, and finds, freedom from identification and surveillance" (*Privacy and Freedom*, Athenaeum, 1967.) Anonymity is certainly something most people expect to have even in public places, although, as it will be argued, because expectations of privacy and anonymity are indeed inversely proportional to the intensity of surveillance, those expectations are probably prone to decrease in the coming years, if the 'security state' further develops.

We also share the notion that our own body should be protected from intrusive gaze. The reason why we wear clothes is not exclusively the need to protect ourselves from the cold or from the sun. There is something more: **physical privacy** (in the American Constitution, protection against unwarranted searches and seizures protect, to a certain extent, the physical privacy of the citizens). In this regard, protection of the legitimate interests of individuals may require reconsidering the "boundaries" of the subject. The European Group on Ethics of Science and Technologies suggested, in its 2005 report on ethical aspects of ITC implants in the human body, a broader conception of the individual endowed with the right to claim the total respect of a body which is at the same time physical and virtual. The idea has been suggested, for a few years already, (and especially in feminist and post-structuralist scholarship), that the person, the subject deserving legal protection, is irreducible to the spatially situated and physically circumscribed subject.158 Disembodied informational samples gathered in databanks, in that view, constitute 'informational identities'159 parallel to – but interacting with - the physically embedded identities, and independent from the personal biographies through which individuals construct and maintain their self-perception. How 'physical privacy' interacts with the potential legitimate interests that a person has in the protection of his or her 'digital' or 'virtual' identity would be an interesting field of research.

Informational privacy is a notion that appears quite obvious to most people, although they are not necessarily conscious that images, sounds, movements 'emanating' from their body are indeed at stake when one think of informational privacy. The usual way to protect informational privacy is by empowering the subject with (legal and/or technical) means to control the collection and use of personal information.

Privacy may also be conceived as protecting one's "thoughts, emotions, and sensations"[160] and thereby one's "right to inviolate personality". The tracking and analysis of facial expressions in order to derive information about "users"'emotions obviously interfere with the enjoyment of **emotional privacy**.

As has already been mentioned, the European Court of Human Rights acknowledged that the right to privacy is not something that must necessarily be lived in isolation: the right to enter in relationships with others, or the right to **relational privacy** is part of the right to privacy. This is not surprising if indeed one understands the right to privacy as the right to construct one's personality free from unreasonable constrains. Relations with others are essential to the construction of an individual's personality. Respect for relational privacy may require abstentions from others to interfere with the relationship.

That legitimate interests of privacy may be acknowledged in those, and many other, diverse dimensions of human existence does not necessarily imply that those interests always trump competing interests of others

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158 See Haraway, D J (1997) Modest_Witness@Second_Millenium. FemaleMan_Meets_OncoMouse: Feminism and Technoscience, Routledge, p. 247) : 'Most fundamentally,(…) the human genome projects produce entities of a different ontological kind than flesh-and-blood organisms (…) or any other sort of "normal" organic being (...) the human genome projects produce ontologically specific things called databases as objects of knowledge and practice. The human to be represented, then, has a particular kind of totality, or species being, as well as a specific kind of individuality. At whatever level of individuality or collectivity, from a single gene region extracted from one sample through the whole species genome, this human is itself an informational structure.'

159 See Katja Franko Aas, 'The body does not lie' : Identity, risk and trust in technoculture, Crime, Media, Culture, 2 :143-158.

[160] Samuel Warren and Louis Brandeis, "The Right to Privacy", *Harv. L. Rev.* 1890, p. 193.

(the government, enterprises, other individuals,…). It is the law's business to balance those legitimate interests of the subject against the competing interests of others to interfere with his 'privacy'. Several methods exist to this end.

In the United States, the Supreme Court has repeatedly conditioned her acknowledgement of the existence of a right of privacy in specific area of human life to the existence of 'reasonable expectations of privacy' in those areas.

The major weakness of such a method is that the generalization of surveillance devices, especially in the public space, decreases the public's expectations of privacy anyway. It is not useless to recall that although 'expectations of privacy' do not play such an important role for the definition of the right to privacy in Europe, the decrease of expectations of privacy will necessarily negatively impact on the probability that people will indeed claim respect of their right to privacy in those new areas where they are 'observed', or refuse their consent to being 'observed'. Preserving awareness about issues of privacy might happen to be both of paramount importance and enormously challenging the more we progress in the surveillance society. A theory of privacy relying on 'expectations of privacy' can not more be justified by saying that what privacy is about is the right individuals have not to be 'surprised' by surveillance devices they ignored to be there. Even where people know they are observed, and thus have no expectation of privacy because they have been informed that surveillance devices are in use, surveillance, even overt, and not hidden, may cause people harms that they would probably term as invasion of their privacy. The most unsophisticated example of this would be an instance where video cameras would have been placed in public toilets. More subtle instances would be, for example, instances where employees would know they are being monitored by their employer and their productivity evaluated in real time. Although they do not have expectations of privacy in that case, they still have loss something that resembles very much 'their privacy'.

Another method, more usual in Europe, for balancing competing interests and establishing whether or not, in each situation, there is a right to privacy or not, and whether or not legitimate and sufficiently compelling reasons exist for allowing interferences with that right, is normative inquiry.

2.1.2 The normative grounds of the right to privacy

The normative grounds of privacy are logically contingent on the type or aspect of privacy that is being considered. For the purpose of the present chapter, although we acknowledge that other aspects of privacy are obviously involved in the *scenarios* potentially ensuing from the Miauce project, we will restrict our inquiry to informational privacy.

2.1.2.1 Powerful political, economic and cultural forces militate against informational privacy.

Some of the fundamental assumptions shaping both the technological and legal developments of the day are inextricably bound within the fabric of our current political economy. They form and are formed by the political, economic, and social context that commands the development of the information society.

The current support for, and massive investment in, the development and intensification of the information society (where the term 'information' refers essentially to 'personal information', as the new technological devices developed are essentially constructed as to channel personal information about individual citizens, patients, suspects, consumers from those individuals to public authorities, government officials, commercial enterprises, managers), is (in part) derived from, and in turn (in part) reinforces, two simultaneous evolutions: the advent of the "security imperative" on the one hand, and the "individualization of risks" in the neo-liberal societies on the other hand.

2.1.2.1.1 THE SECURITY IMPERATIVE.

A first evolution relates to the "security imperative" that has become an absolute logic, especially in the two sectors of law enforcement on the one hand, and of socio-economic relations on the other hand. The "security imperative", trumping all other considerations, absolves, to a large extent, the procedures implemented in its name, from both legitimacy and proportionality assessments.[161] The logic justifies submitting the entirety of human behaviours and interactions to control and scrutiny, and does not tolerate the competing claims of privacy. 162

In the context of law enforcement, Rainer Nickel notes

> the shift from enabling 'freedom' to upholding 'security' as the central description of the function of the nation-state. This shift has severe implications for the discourse on human or constitutional rights and their a priori status as a constraint on the popular sovereign: from infinite detention, through (bio) data collections on an unprecedented scale, to the use of torture, and from pre-emptive shootings of suspects and kidnapped or suspicious passenger planes to pre-emptive wars, the security paradigm seems to trump the traditional notion of inalienable individual rights and replace them with the rule that the end justifies the means.[163]

In that « security paradigm », claiming respect for one's privacy is less perceived as the exercise of a fundamental right than as a way for the claimants to try hiding a wrong. To a certain extent, the anti-privacy rhetoric used to sustain the "security paradigm" is the same as the anti-privacy rhetoric used by law and economic scholars such as Posner and Epstein, seeing personal privacy not as a final value, but merely as an instrument used by dishonest people to deceive others,164 under the assumption that honest people do not have reasons to value their privacy.

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[161] Daniel Solove recently argued, among other things, that assessing the balance between security interests pursued by governments on the one hand citizens' liberty interests on the other hand requires ineffective security measures to be curtailed. Although the governments may be currently seduced by data mining, it is not clear that data mining is an effective security measure, though it is clear that its lack of transparency serves as a major impediment to any balancing of its security benefits and liberty costs. (Daniel J. Solove, "Data Mining and the Security-Liberty Debate", *University of Chicago Law Review*, Vol. 74, 2007-2008.)

162 See Institute for Prospective Technological Studies – Joint Research centre, *Security and Privacy for the Citizen in the Post-September 11 Digital Age. A prospective overview. Report to the European Parliament Committee on Citizens' Freedoms and Rights, Justice and Home Affairs (LIBE)*, July 2003, IPTS Technical Reports Series, EUR 20823 EN, 97. See also Hardt, M. et Negri, A., (2004) *Multitude. Guerre et démocratie à l'âge de l'empire.* La Découverte, pp. 240-246.

[163] Rainer Nickel, "Private and Public Autonomy Revisited: Jürgen Habermas' Concept of Co-Originality in Times of Globalisation and the Militant Security State", EUI Working Paper, Law No. 2006/27.

In the context of socio-economic relationships, the most radical law and economics theories, prolonging utilitarian theories, ground their arguments against any form of regulation restricting access to personal information by market agents, on the idea that protecting an individual right to privacy, and allowing individuals to 'lie' in the socio-economic exchanges, undermines the common good, understood as the aggregate welfare in society. 'People should not - on economic grounds, in any event - have a right to conceal material facts about themselves' Posner (1978: 399) argues. Allowing people to conceal personal information relating to things such as 'arrest records, health, credit-worthiness, marital status, sexual proclivities' would likely result in people concealing discreditable facts about themselves with the aim of selling their services or involvement at an improperly high price.165 Those who

> profess high standards of behaviour in order to induce others to engage in social or business dealings with them from which they derive an advantage but at the same time they conceal some of the facts that these acquaintances would find useful in forming an accurate picture of their character.166

In the views of 'law and economics' scholars like Posner and Epstein, *privacy* is essentially anti-social, instrumental, whereas *personal information* is a form of 'input into the production of income or some other broad measure of utility or welfare', a commodity that should be allocated according to market rules:

> The employer can ask any question of the prospective employee that she wants. The applicant may refuse to answer. In the end, the two can decide whether the information is more valuable when kept private or when shared. In many cases, the personal life of an employee will be regarded as information to which the employer has no right. If so, it will not be because of some high principle, but because of the joint recognition that the information is worth less to the employer than its concealment is worth for the employee. Let the employee receive comprehensive benefits from the employer, such as health care, and the calculus may well shift radically: now it does matter whether the employee drinks, smokes, or exercises on a regular

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164 See Epstein, R (2002a) 'How Much Privacy Do We Really Want?', Hoover Digest, 2. and Gavison, R (1984) Privacy and the Limits of Law in Philosophical Dimensions of Privacy: an Antology, Schoeman, F D (ed.), Cambridge University Press.

165 Posner, R A (1978) 'The Right of Privacy', Georgia Law Review, 12: 393-422; Posner, R A (1984) An Economic theory of Privacy in Philosophical Dimensions of Privacy:An Anthology, Schoeman, F D (ed.), Cambridge University Press. Privacy allows individuals to manipulate access to personal information and therefore the world around them, thereby increasing transaction costs between bargaining parties and creating harmful information asymmetries. Individuals, in that view, are essentially bad persons, whose main aims in life are oriented by their desire to gain unwarranted advantages over others rather than to cooperate with others. For a critique of Posner's views on privacy see Baker, C E (1978) 'Posner's Privacy Mystery and the Failure of Economic Analysis of Law', Georgia Law Review, 12(3): 475-496.

166 As stated by Ferdinand Schoeman, there are numerous grounds for puzzling over the significance and value of privacy. 'The right to privacy is seen as creating the context in which both deceit and hypocrisy may flourish: It provides the cover under which most human wrongdoing takes place, and then it protects the guilty from taking responsibility for their transgressions once committed'. (Schoeman, F (1984) Philosophical Dimensions of Privacy:An Anthology, Cambridge University Press.)

> basis. If that information is relevant to an insurer in setting risk, then it is relevant to the employer who has to foot the bill for the long-term health plan. 167

Contrary to those authors' assertions, we hold that economic relevance of private information does not suspend the normative value of privacy.[168] Privacy, as a fundamental right, is irreducible to a mere commodity that people willing to have should be ready to pay for, even if, according to 'hard law and economics' supporters, the transaction costs arising from uncertainties caused by the unavailability of all personal information, and from information asymmetries existing between the contracting parties, should be paid by those who, for the sake of protecting their own privacy, create or refuse to abolish a removable uncertainty.169 The inconditionality of human rights is incompatible with assertions that those who want privacy for themselves, refusing thereby to be submitted to the transparency imperative of the market, should pay the "cost" of privacy. Moreover, in order to be competitive, market traders should take privacy seriously. Respect for consumers' preferences for privacy might become a commercial argument: provision of privacy, on a competitive market, should be beneficial to those agents who provide it when other agents don't (at least if one considers that consumers would usually prefer to be protected in their privacy).

2.1.2.1.2 THE INDIVIDUALIZATION OF RISKS.

Besides this 'security imperative' at play in both the field of law enforcement and socio-economic relations, there is the institutional shifts accompanying neoliberalism and the ensuing social need to ground identification of individuals and predictions of their risks and behaviours on private information, such as health, lifestyle, consumption habits, etc. The compulsive interest for private information, in a perspective that locates the main source of risks in personal characteristics and behaviours indeed reflects the move western societies are currently experiencing from the model of the universal insurance society or welfare state to the actuarial post-Keynesian society, the two significant attributes of which are the decrease of individual privacy and the rise of discourses of personal responsibility and personal accountability for bad luck.

A first assumption is that personal information about individuals is the most precious input for the planning and management of governmental and business activities, as it is believed that private information necessarily allows accurate predictions of risks and behaviours and a significant reduction of the costs associated with uncertainty.

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167 R. Epstein, "Deconstructing Privacy and Putting it Back together Again", *Social Philosophy and Policy*, 2000, 17(2): 22. See also Tom Miller, Director of health Policy Studies, Cato Institute, Testimony on Genetic privacy, before the House Judiciary Subcommittee on the Constitution on genetic privacy, September 12, 2002.: 'Rather than rely on greater regulation of information flows simply because they are labelled genetic, we should restore and renew our commitment to competitive markets, private property rights, and private contracts.' (http://www.house.gov/judiciary/miller091202.htm#_edn11>)

[168] Restrictions of the type of information insurers or employer scan ask about prospective policy-holders and job applicants are based on that consideration, and may sometimes be viewed as indirect ways to implement redistributive policy. In the same sense, legal interference with contractual freedom may be a legitimate instrument of redistributive policies. See A.T. Kronman, "Paternalism and the Law of Contracts", *Yale Law Journal*, 1983, 92: 770.

169 What the law and economics movement teaches us, at least, is that the protection of privacy on the marketplace raises a cost that should be paid by someone.

As a matter of fact, despite the explicit acknowledgement of human rights as "constitutional instruments of the European public order"170 and the reaffirmation, by Article 6 (ex Article F) of the Amsterdam Treaty, that respect for human rights and fundamental freedoms is part of the grounds of the European Union171*,* privacy interests are increasingly trumped by the needs of governments and businesses to use a wide range of personal information about individuals in order to increase security, minimise transaction costs and other inefficiencies born by informational asymmetries.

As selectivity replaces universality as a principle for the distribution of welfare benefits, discourses of personal empowerment, activation and responsibility induce individuals to assume personal responsibility for most adverse circumstances resulting from 'brute bad luck' for which they would have expected some compensation from the community in a traditional welfare-state. In this way, the concept of 'risk' becomes a privileged disciplinary tool of post-Keynesian governance: it functions as a 'technology of the self', urging individuals to get the most information they can about their personal risk status, to act 'rationally and responsively' after having been so informed, and to take the responsibility to minimize their risks. [172]

Whereas the insurance society typical of the welfare state had shifted the focus from the subjective notion of behaviour and individual responsibility to the objective notion of risk as probabilities, and had replaced moral assessment of individual behaviours by amoral statistics, in the rising post-Keynesian society, the notion of risk loses its moral neutrality and, paradoxically, its statistical validity, when 'The acceptance of solidarity is (…) accompanied by a demand for control over personal behaviour.'173 The current support for 'active social policy' epitomizes this 'moralizing' tendency, as it explicitly 'stresses the importance of shifting the focus of social programmes from insuring individuals against a few, well-defined contingencies towards investing in their capabilities and making use of them to the best of their potential at every stage of the life course.'174 Governance through the concept of risk dissuades individuals from making claims on collective public or private pools and rather focuses on what they might change in their lifestyle, diet, professional activity and leisure so as to minimise their risks. Governing through risks absolves economic, social and political institutions from their responsibility in engendering diseases and disabilities, but requires pervasive systems of surveillance to be implemented.

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170 *Loizidou v. Turquie (preliminary exceptions)* ECHR (1995), series A vol. 310, 27 § 75.

171 Even before the enactment of the Charter of Fundamental Rights of the European Union, the Court of Justice of the European Community protected fundamental rights in its jurisdiction as they are part of the unwritten general principles of community law. See Spielmann D, "Jurisprudence des jurisdictions de Strasbourg et de Luxembourg dans le domaine des droits de l'homme: conflits, incohérences et complémentarités", *in.* Alston P. (ed.), *L'Union Européenne et des Droits de l'Homme*, Bruxelles, Bruylant, 2001.

[172] In this regard, see my developments in A. Rouvroy, *Human Genes and Neoliberal Governance: A Foucauldian Critique*, Routledge-Cavendish (GlassHouse books), 2007 (in press).

173 Rosanvallon, P (1995) La nouvelle question sociale. Repenser l'État providence, Seuil.

174 Organisation for Economic Cooperation and Development (2005) Extending Opportunities: How Active Social Policy Can Benefit Us All, OECD.

Why do we fear (public and private) surveillance? In *Transparent Society: Will Technology Force Us to Choose Between Privacy and Freedom?*175, David Bryn argued that the generalization of observation and surveillance, instead of constituting a threat for our fundamental rights and freedoms, may bring even greater freedom, total transparency of every-one to every-one being the only way to guarantee *provided that the power of observation and surveillance be shared by us* all rather than only by the police, the wealthiest or the most powerful. Provoking as he may be, Bryn nevertheless pointed to a fundamental reason why surveillance as it is now developing in public and private spaces is frightening: information about others provides, to the person who controls that information, much power over those others. Privacy, in this view, is thus not so much about protecting a subjective sense of intimacy or of decency as it is about preventing situations where those who know things about others that not everybody knows be allowed, due to their privileged position in the information economy, to take advantage of the power this situation provides them to constrain others. We will come back to that later. Either increased privacy or total transparency can guarantee against that threat, as total transparency of everyone to everyone would suppress the differential op power assigned by access to restricted knowledge. Gillom provided a very useful analysis of the effects of surveillance. According to him, the effects of surveillance include:

> degradation, the loss of control, the implied suspicion, the feelings of being just a number, the anxiety over errors or subterfuges being caught, the fear of malevolence or incompetence on the part of surveillance practitioners, the fear of breaking rules or departing from norms that are unknown, and, especially, the need or desire to break the rules.[176]

But that the information society takes the orientation of a surveillance society is not a spontaneous phenomenon, nor the unpredictable result of scientific progress, but epitomizes the phenomenon of co-production between technology and society notably popularized by Sheila Jasanoff.177 Acknowledging that science, business, and politics are not separated spheres of human activity, but are rather interacting indistinctively in our collective 'social metabolism', increases the necessity that the material, cultural, social and political conditions of the democratic process be present from the beginning in the design of techno-scientific development.

2.1.2.2 Reassessing the normative grounds for privacy.

Those strong privacy-adverse logics in contemporary society, make the need to ground privacy on strong normative grounds more crucial than ever. We would like to reassess those grounds on the basis of what we have already suggested about the intimate link between privacy and individual and political autonomy. In such a view, privacy appears as a precondition to the meaningful exercise of most other fundamental individual attributes and capabilities, such as human dignity, individual autonomy, social justice, democracy and the other values which our Western democracies are supposed to praise so much.

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175 In *Transparent Society: Will Technology Force Us to Choose Between Privacy and Freedom?*, Perseus Books Group (1999).

[176] John Gilliom, *Overseers the Poor*, Chicago University Press, 2001, p. 125.

177 Sheila Jasanoff, *States of Knowledge: The Co-Production of Science and the Social Order*, Routledge, 2004.

John Dewey argued that rights need not be justified as the immutable possession of the individual, but as instrumental in light of 'the contribution they make to the welfare of the community'.178 Rather than merely a tool for the realisation of individual liberties (agent-relative values), privacy (thoroughly conceived to take into account the complex and heterogeneous meanings of private information) may be an essential structural tool, for the preservation of autonomous individuals empowered with the contestation (and reconstitution) abilities (typically agent-neutral values) needed in order to negotiate a new social contract on the threshold of an information era characterized by the possibility of refining, in an exponential manner, the classification of people in categories of risks, merits, abilities, etc.[179]

As already suggested, privacy (as 'insulation') guarantees the possibility for the subject to think differently from the majority and to revise his first order preferences. Privacy is a condition for the existence of 'subjects' capable of participating in a deliberative democracy. As a consequence, privacy also protects lawful, but unpopular, lifestyles against social pressures to conform to dominant social norms. Privacy as freedom from unreasonable constraints in the construction of one' identity, prevention of the "tyranny of the majority".

The right to privacy and the right not to be discriminated against have in common that they protect the opportunities, for individuals, to experiment a diversity of non-conventional ways of life.180 Privacy is itself a tool for preventing invidious discriminations and prejudices.

Strahilevitz recently argued against this position[181], arguing that there is often an essential conflict between information privacy and antidiscrimination principles, as non-disclosure of pertinent information about a job applicant such as their criminal history induce employers to rely more heavily on distasteful statistical discrimination strategies:

> In the information age, we should consider approaching the statistical discrimination problem (…) using the government to help provide decision makers with something that approximates complete information about each applicant, so that readily discernable facts like race or gender will not be overemphasized and more obscure but relevant facts, like past job performance and social capital, will loom larger.

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178 Dewey, J (1991) Leberalism and Civil Liberties in *John Dewey: The Later Works*, 1925-1953 : 1938/Logic: The Theory of Inquiry, Vol. 12, Boydston, J A (ed.), Southern Illinois University Press: 374.

[179] In the same sense, see Paul De Hert and Serge Gutwirth, « Privacy Law, Data Protection and Law Enforcement. Opacity of the individual and Transparency of Power", in. Eric Claes and Serge Gutwirth, eds., *Privacy and the Criminal Law*, Intersentia, 2006, pp.61-101.

[180] See particularly Charles Fried (1968), "Privacy: a moral analysis." Yale Law Journal 77:475-93, arguing that informational privacy rights serve to free us "to do or say things not forbidden by the restraints of morality, but which are nonetheless unpopular or unconventional." In that sense, the right to privacy as guaranteed in Article 8 of the European Convention on Human Rights has been interpreted as implying the right, for people belonging to the Tzigan community, to live in caravans, such way of life being constitutive of the Tzigan way of life, that has to be respected as part of their right to private and family life. See Coster v. United Kingdom (n°24876/94) and Chapman v. United Kingdom (n°27238/95) of January 18, 2001. The European Court on Human Rights has also acknowledged that failure to legally acknowledge the new sexual identity of a trans-sexual person constituted a violation of her right to privacy. See I v. United Kingdom (requête n° 25680/94) of July 11, 2002.

[181] Lior Jacob Strahilevitz, "Privacy versus Antidiscrimination", *Chicago Law & Economics Working Paper*, No. 349 (2D Series), July 2007

Yet, the argument is easily dismissed: nothing indeed guarantees that information about, say, past diseases, records of past convictions are in any way relevant to assess the job applicant's suitability for the job. More information may even increase the reach of the employer's prejudices rather than increase job applicants' opportunities.

The rationale grounded on prevention of discrimination for constraints imposed on the free trade of personal information between concerned persons and their employers, insurers and other interested third parties is much challenged, however, especially in the United States. In neo-rule-utilitarian reasoning182, economic efficiency may be considered as the final value, the prevention of discrimination then being instrumental and contingent to realizing efficiency.183 Those debates attest of a fundamental ambiguity inherent to human rights discourses, an ambivalence between two conceptions of individual liberty, the roots of which have been located in the Anglo-American and the European traditions respectively.

Privacy may moreover be necessary to guarantee a certain level of distributive justice, by maintaining of a certain degree of information asymmetry. Information asymmetries may be necessary to prevent "rational" discrimination that would deprive some individuals from access to basic goods such as subsistence food, health care and insurance. The perspective of 'dynamic pricing' for essential goods is incompatible with common views about justice and fairness. This substantiates our claim that, unlike it is most often asserted, the 'opacity' of individual subjects may be, as much or even, in some circumstances, more favourable to the common good.

That leads us to the consideration that will introduce the next section: private information is power, and the normative ground of data protection is the balancing of power between data controllers and data subjects.

2.2 THE RIGHT TO DATA PROTECTION.

2.2.1 Are potential application scenarios of MIAUCE in the scope of application of the data protection directives?

The questions one needs to reflect on regarding "personal data" include the following. Can we value "personal information" as we value 'other' commodities (as 'law and economics' scholars would have it)? Should "personal information" rather be analyzed in terms of the power it confers to those in control of it (as the European data protection directives suggest)? Are some "personal information" so closely related to the individual's personality that some measures of inalienability should be enforced? Or are there other reasons, related to the public's interest, that would require the implementation of strong legal restrictions on the possibility for information to cross the former social and physical borders that guaranteed the

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182 Rule utilitarianism requires not that individuals maximize welfare as they act, but rather that they conform their acts to rules that maximize welfare.

183 R.W. Wright, "The Principles of Justice", *Notre Dame Law Review*, 2000, 75: 1859.

'impermeability' of social microcosms? More importantly, for our immediate purpose, we should assess whether the European Data Protection directives are indeed applicable in a context like the one suggested in the Miauce project. Do the data protection directives apply to the collection of data through the technology involved in the diverse security, marketing and interactive web-TV scenarios contemplated in the MIAUCE project?

The Directive 95/46/EC only applies to processing of **personal data**, which it defines, as "any information relating to an identified or identifiable natural person ('data subject'); an identifiable person is one who can be identified, directly or indirectly, in particular by reference to an identification number or to one or more factors specific to his physical, physiological, mental, economic, cultural or social identity" (Article 2). The concept of personal data has recently been elucidated by the Article 29 Working Party on the protection of personal data, according to which the concept of personal data refers to:

- "*any information*", either objective (such as the substances in one's blood) or subjective (such as opinions or assessments), either correct or incorrect, about individuals, regardless of their position of capacity (as consumer, patient, employee, customer, etc.), and regardless of the format or medium on which that information is contained (numerical, graphical, photographical, acoustic,…).

- that *relates*, even indirectly, *to individuals* (information on the functioning of a machine where human information is required and allowing to ascertain the productivity of the person working on that machine, or information about the length and pace of a queue, allowing to ascertain the productivity of the employee in an office or a shop)[184] either because it contains information about a particular person and/or because that information is processed for the purpose of evaluating, treating in a certain way or influencing the status or behaviour of an individual, and/or because the processing of that information is likely to have an impact on a certain person's rights and interests (be that impact major or simply the fact that the individual may be treated differently from others as the result of the processing of the data), taking into account all the circumstances surrounding the precise case.

This broad understanding of the concept of « personal data » is not unanimously held in all the countries of the European Community. Just to provide one example, although the French law of August 2004 had defined personal data as: "toute information relative à une personne physique qui peut être identifiée, directement ou indirectement, par reference à un numéro d'identitification, ou à un ou plusieurs elements qui lui sont propres" (article 2 al. 2 Law of 6 January 1978 modified in august 2004), in the UK, the concept of personal data has been interpreted more restrictively since the Court of Appeal's 2003 decision in *Duran v. FSA*[185](a case about disclosure of information in the financial service sector). How the interpretation by the Group 29 will impact of future interpretation of the applicability of the directive in a world of ambient intelligence remains to be seen.

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[184] The WP29 had previously noted, in the context of its discussion on the data protection issues raised by RFID tags, that "data relates to an individual if it refers to the identity, characteristics or behaviour of an individual or if such information is used to determine or influence the way in which that person is treated or evaluated." (Working Party document No WP 105: "Working document on data protection issues related to RFID technology", adopted on 19.1.2005, p. 8.)

[185] Duran v. FSA, [2003] EWCA Civ 1746 restricting the meaning of "personal data" to information that is "biographical in a significant sense, that is, going beyond the recording of the putative data subject's involvement in a matter or event that has no personal connotations" (§28). See L. Edwards, "Taking the "Personal" Out of Personal Data: Duran v. FSA and its Impact on Legal Regulation of CCTV", *SCRIPT-ed*, 1(2), 2004 http://www.law.ed.ac.uk/ahrc/script-ed/issue2/durant.asp

Another issue relates to the category of “sensitive data”. Although, by default, the European Data Protection framework organizes de “transparency” of personal information, designing rules for the processing of personal data, some types of personal data are excluded from the framework and may never be processed: **sensitive data.** Article 8 of the Directive 95/46/EC makes it in principle illegal to process personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, trade-union membership, and data concerning health or sex life.[186] This raises particular questions with regards to some of the potential applications envisioned in the Miauce project as the intervention of AmI technologies may alter the “nature” of the data involved. Images of persons unavoidably provide information about their racial or ethnic origin; profiling of persons on the basis of their preferred entertainment programs in a context of interactive web TV may carry indications about those persons’ political opinions, religious or philosophical beliefs; tracking of consumers’ choices in a supermarket may reveal sensible aspects of their private life: a specific diet may indicate religious beliefs, buying drugs (supermarkets increasingly sell health products and medicines) may indicate one’s health status, etc.

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[186] Article 8 The processing of special categories of data:

1. Member States shall prohibit the processing of personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, trade-union membership, and the processing of data concerning health or sex life.

2. Paragraph 1 shall not apply where:

(a) the data subject has given his explicit consent to the processing of those data, except where the laws of the Member State provide that the prohibition referred to in paragraph 1 may not be lifted by the data subject's giving his consent; or

(b) processing is necessary for the purposes of carrying out the obligations and specific rights of the controller in the field of employment law in so far as it is authorized by national law providing for adequate safeguards; or

(c) processing is necessary to protect the vital interests of the data subject or of another person where the data subject is physically or legally incapable of giving his consent; or

(d) processing is carried out in the course of its legitimate activities with appropriate guarantees by a foundation, association or any other non-profit-seeking body with a political, philosophical, religious or trade-union aim and on condition that the processing relates solely to the members of the body or to persons who have regular contact with it in connection with its purposes and that' the data are not disclosed to a third party without the consent of the data subjects; or

(e) the processing relates to data which are manifestly made public by the data subject or is necessary for the establishment, exercise or defence of legal claims.

3. Paragraph 1 shall not apply where processing of the data is required for the purposes of preventive medicine, medical diagnosis, the provision of care or treatment or the management of health-care services, and where those data are processed by a health professional subject under national law or rules established by national competent bodies to the obligation of professional secrecy or by another person also subject to an equivalent obligation of secrecy.

4. Subject to the provision of suitable safeguards, Member States may, for reasons of substantial public interest, lay down exemptions in addition to those laid down in paragraph 2 either by national law or by decision of the supervisory authority.

5. Processing of data relating to offences, criminal convictions or security measures may be carried out only under the control of official authority, or if suitable specific safeguards are provided under national law, subject to derogations which may be granted by the Member State under national provisions providing suitable specific safeguards. However, a complete register of criminal convictions may be kept only under the control of official authority.

Member States may provide that data relating to administrative sanctions or judgements in civil cases shall also be processed under the control of official authority.

6. Derogations from paragraph I provided for in paragraphs 4 and 5 shall be notified to the Commission

7. Member States shall determine the conditions under which a national identification number or any other identifier of general application may be processed.

2.2.2 Are the technical visions of MIAUCE compatible with the fundamental principles of data protection?

The prospects that ubiquitous proactive computing systems will “spontaneously” respond to individual “needs” in adapting the environment, and the system itself without the individual having to decide anything anymore about that, and that those systems will become so embedded in our daily lives that they will literally “disappear” from users’ consciousness187, that individuals will not even necessarily be conscious of their presence promise important disturbances in our conceptualizations of individual informational rights and data controllers’ responsibility.

Article 6 of the Directive 95/46/EC specifies the requirements relating to the “data quality”:

> 1. Member States shall provide that personal data must be:
> (a) processed fairly and lawfully;
> (b) collected for specified, explicit and legitimate purposes and not further processed in a way incompatible with those purposes. Further processing of data for historical, statistical or scientific purposes shall not be considered as incompatible provided that Member States provide appropriate safeguards;
> (c) adequate, relevant and not excessive in relation to the purposes for which they are collected and/or further processed;
> (d) accurate and, where necessary, kept up to date; every reasonable step must be taken to ensure that data which are inaccurate or incomplete, having regard to the purposes for which they were collected or for which they are further processed, are erased or rectified;
> (e) kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the data were collected or for which they are further processed. Member States shall lay down appropriate safeguards for personal data stored for longer periods for historical, statistical or scientific use.
>
> 2. It shall be for the controller to ensure that paragraph 1 is complied with.

Personal data must be collected for specified, explicit and legitimate purposes and not further processed in a way incompatible with those purposes. How can the legitimacy of the under-described finality of the data processing, and the compatibility of further uses of the data with those initial finalities be assessed although the technology may give birth to indeterminate and imprevisible applications and although service providers may assume different functions?

Personal data must be adequate, relevant and not excessive in relation to the purposes for which they are collected and/or further processed. The directive also requires that processed personal data be accurate and, where necessary, kept up to date; and that every reasonable step must be taken to ensure that data which are inaccurate or incomplete, having regard to the purposes for which they were collected or for which they are further processed, are erased or rectified. Those principles are arguably difficult to

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187 Weiser, M (1993), “Computer Science Problems in Ubiquitous Computing”, *Commun.*, *ACM 36*, ACM Press, 7: 75-84.

comply with when the purpose for which the data are collected, and for which they may be further processed are so difficult to define a priori as they are in AmI systems. What about that principle of data minimization in information systems where, by default, everything is recorded?

Article 7, relating to the criteria for assessing the legitimacy of personal data processing reads as follows:

> Member States shall provide that personal data may be processed only if:
>
> (a) the data subject has unambiguously given his consent; or
>
> (b) processing is necessary for the performance of a contract to which the data subject is party or in order to take steps at the request of the data subject prior to entering into a contract; or
>
> (c) processing is necessary for compliance with a legal obligation to which the controller is subject; or
>
> (d) processing is necessary in order to protect the vital interests of the data subject; or
>
> (e) processing is necessary for the performance of a task carried out in the public interest or in the exercise of official authority vested in the controller or in a third party to whom the data are disclosed; or
>
> (f) processing is necessary for the purposes of the legitimate interests pursued by the controller or by the third party or parties to whom the data are disclosed, except where such interests are overridden by the interests for fundamental rights and freedoms of the data subject which require protection under Article 1 (1).

What happens to the traditional, and legal, requirement that individuals give their "informed consent" to any processing of their personal data, whenever the technologies involved fade out of the user's consciousness? Would *implicit* consent be enough to protect the fundamental rights, freedoms and interests of individuals? What is the impact of the "performativity" of technologies on the validity of individual consent?

The requirements of the directive regarding transparency of the processing of personal data (Article 10 and 11) will not be easy to fulfil either in the context of AmI.

Article 10 requires that the controller or his representative must provide a data subject from whom data relating to himself are collected with at least the following information, except where he already has it:

(a) the identity of the controller and of his representative, if any;

(b) the purposes of the processing for which the data are intended;

(c) any further information such as

- the recipients or categories of recipients of the data,

- whether replies to the questions are obligatory or voluntary, as well as the possible consequences of failure to reply,
- the existence of the right of access to and the right to rectify the data concerning him

in so far as such further information is necessary, having regard to the specific circumstances in which the data are collected, to guarantee fair processing in respect of the data subject.

Article 11 provides that where the data have not been obtained from the data subject, Member States shall provide that the controller or his representative must at the time of undertaking the recording of personal data or if a disclosure to a third party is envisaged, no later than the time when the data are first disclosed provide the data subject with at least the following information, except where he already has it:

> (a) the identity of the controller and of his representative, if any;
>
> (b) the purposes of the processing;
>
> (c) any further information such as
>
> the categories of data concerned,
>
> the recipients or categories of recipients,
>
> the existence of the right of access to and the right to rectify the data concerning him
>
> in so far as such further information is necessary, having regard to the specific circumstances in which the data are processed, to guarantee fair processing in respect of the data subject.
>
> 2. Paragraph 1 shall not apply where, in particular for processing for statistical purposes or for the purposes of historical or scientific research, the provision of such information proves impossible or would involve a disproportionate effort or if recording or disclosure is expressly laid down by law. In these cases Member States shall provide appropriate safeguards.

The invisibility of the terminal in AmI systems, the decentralization and multilateral service models,…are incompatible with the principle of transparency.

How can responsibility be assigned in a system of (human-computer) distributed agency?

Finally, to the extent that data protection is meant, as it is at least in part, to protect people's privacy, it is necessary, for it to be an effective means to indeed protect individual privacy, that users implement the rights provided by the EU Data protection scheme, including the rights provided by **Article 12** of the Directive 95/46/EC. Unfortunately, as a matter of fact, very few users take the opportunity to genuinely control and intervene in the processing of their personal data as the European data protection framework allows them to do. One may think of several reasons for this.

Most peoples' perceptions of what their right to privacy is about correspond to the traditional theories of privacy as protecting intimate and/or sensitive information. Information that they do not subjectively perceive as intimate and/or sensitive is not, in most persons' mind anything the disclosure and processing of which they should worry about. That traditional conception does not necessarily fit the new configuration of socio-technical constellations involved in an AmI world, where what we are worried about is collection, use and disclosure of information that is not sensitive nor intimate *per se* and that is increasingly collected in public, as Nissenbaum relevantly argued[188]: the challenge that information technology raises for our traditional conceptions of privacy results from both the fact that information technologies allow the use of information gathered in one specific context to move outside that context more easily than ever, and from the ever increasing capacity to aggregate (even trivial and non intimate nor sensitive) information about a person to an extent that very precise knowledge is gained about that person.

Another reason why people do not exercise their data protection rights is that, on the short term, when disclosing personal data is rewarded with immediate utilities, advantage or privileges in their interaction with other agents such as a supermarket, a trader or a service supplier on the internet, keeping control on their own personal data may appear immaterial to them comparing to the immediate and tangible advantages of waiving such control.

That brings us back to an important, yet under discussed issue: the normative value of personal information. Can personal information be conceived as pure commodity? Or should one acknowledge that personal information is among those new "hybrid" objects[189] that modernity has produced, half the way between the category of "subjects" and the category of "objects", and therefore deserving an *ad hoc* legal status, which does not go as far as borrowing the inviolability and inalienability that attach to the rights which protect the dignity of human beings, yet cannot be considered either as fully alienable commoditized consumption goods. Personal information emanates from, and contributes to the formation of individual personality, and has therefore to do with human dignity, yet, a person is obviously irreducible to 'his' personal information, which is 'an aspect of the identity' she 'projects to the world', in the inspiring words of Philip Agre that opened our reflections.

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[188] Helen Nissenbaum, "Protecting Privacy in an Information Age: The Problem of Privacy in Public", *Law and Philosophy*, 17, 1998, p. 559.

[189] About the modern « hybrids », see Bruno Latour, *Nous n'avons jamais été modernes. Essai d'anthropologie symétrique*, La Découverte/Poche, 1991. On the idea of 'incomplete commodification', see Margaret Jane Radin, *Contested Commodities,* Harvard University Press, 1996.

CONCLUSIONS

In this chapter, we have assessed the normative grounds of privacy and data protection, and established that the value of those rights is not only individual but has also a fundamentally collective, democratic dimension, or a "social-structural" value.

The right to privacy protects the legal subject's legitimate interests in controlling aspects of his identity he projects on the world, and in being free from unreasonable constraints on the construction of his identity. But the right to privacy also preserves the possibility for the legal subject to develop as autonomous citizen endowed with the reflexive capability needed in order to usefully participate in the processes of deliberative democracy, whereas data protection and rules of non disclosure of personal data avoid the creation or perpetuation of situations of domination and oppression. The collective, social-structural dimension of privacy and data-protection is intimately linked with the 'justiciability' of knowledge that AmI systems construct over and about individuals 'justiciable'.

The role of the law, despite its weakness in front of the unprecedented challenges that the technical visions in the Miauce project, as in other AmI projects, announce, is to allow and protect the possibility of democratic debates, involving all stakeholders, about the issues involved. It is exactly there that the morality of the law resides.[190] This may require legal intervention to prevent power imbalances among the stakeholders. This may also require legal intervention to protect, up to a certain extent, individual choices and preferences from the tyranny of the majority. The European privacy data protection framework also assigns a crucial mandate to the law: the mandate of balancing the competing interest at play. In order to fulfil its task, the law therefore needs first to have those interests identified and their legitimacy assessed.[191] This may only be done through careful evaluation of the social acceptability of each application scenario contemplated in the project. In this regard, the methodology developed in the next chapter will be immensely useful for giving a voice to the variety of stakeholders, to identify their respective visions and interests, and to organize a discussion process ensuring that the information systems remain compatible with the democratic character of our society and with the fundamental values attested in our attachment to citizens' fundamental rights and liberties.

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[190] In that sense, see Jacques Derrida, *The Force of Law* in *Deconstruction and the Possibility of Justice*, Cornell, D, Rosenfield, M and Gray, D (eds), Routledge, 1992. Derrida, like Foucault, consider that the law is never imparial but always results from and carries strategies of power. Yet, where Foucault situates the possibility of resistance within the productive power of normativity and governmentality, Derrida argues that the law must be transposed from that sphere of normativity and governmentality, where it functions as droit, and rethought in relation to an impossible justice. See Margrit Shildrick, "Transgressing the law with Foucault and Derrida: some reflections on anomalous embodiment", *Critical* Quarterly, Vol. 47, n. 3, Autumn 2005, pp. 30-46. See also Colin Perrin, "The Silent Responsibility of Law", *International Journal for the Semiotics of Law / Revue Internationale de Sémiotique Juridique* Vol. XI no.31, 1998, 39-47.

[191] Proecedural safeguards, such as the requirements of transparency and accountability are obviously insufficient to establish the legitimacy of certain surveillance practices in society, especially in the field of law enforcement. (De Hert, P., Gutwirth, S., « Privacy Law, Data Protection and Law Enforcement. Opacity of the individual and Transparency of Power", in. Eric Claes and Serge Gutwirth, eds., *Privacy and the Criminal Law*, Intersentia, 2006, pp.61-101.)

It is the law's communicative function (which is highly complex, and that we have, in the present chapter, modestly tried to fulfil in part) to create a normative framework, a vocabulary to structure normative discussions, as well as institutions and procedures that promote further discussion. The law also has a related expressive function as it also expresses which fundamental standards, which values are regarded as important. Finally, a fundamental role of the law is to evolve as to ensure that, confronted to unprecedented social and political challenges, we remain in a free and democratic society. The changes needed may be important this time: acknowledging its inability to guarantee alone what really matters about privacy and data protection in the context of AmI requires the law to "delegate" some of its power to the designers of the technologies, and to the public at large, and therefore, to begin at last a long awaited interdisciplinary discussion.

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CHAPTER 5:

FROM SOCIAL ACCEPTABILITY TO SCENARIOS BUILDING – GUIDELINES FOR THE PROJECT'S GOVERNANCE'S METHODOLOGY

Abstract

This chapter aims at setting up the methodological bases for MIAUCE project's governance. One of the challenges of the MIAUCE project is to design MIAUCE proposals socially acceptable. This challenge requires to define a methodology which considers ethical, social and legal values as central design criteria along with more traditional design criteria of usability, reliability and economy. In a first section, the chapter will introduce to the concept of the 'social acceptability', setting it in the broader framework of its theoretical backgrounds and its philosophy for IT design and project governance. In the second section, the concept of scenario will be analyzed. The scenario building is at the very centre of the MIAUCE approach and very in line with the 'social acceptability' issue. This section will draw the landscape of different concepts of scenario in order to identify the way that will be endorsed for the MIAUCE project. Based on this clarification, the next section will present some methodological guidelines that could support the building process of MIAUCE scenarios and the deliberation about their social acceptability.

1 FROM SOCIAL ACCEPTABILITY TO VALUE SENSITIVE DESIGN

The social acceptability is a very fuzzy concept. A large state of the art shows that this concept is very rarely defined though very largely used by sociological or political analyses made on technologies.

Let us open this chapter with a very general definition of social acceptability set up by B.A. SHINDLER, M. BRUNSON and G. STANKEY[192]their report dedicated to ecological issues.

> *The concept of social acceptability (…) can be traced to the work of rural sociologist Firey (1960), who was interested in understanding why certain resource practices and prescriptions in different societies persisted, whereas others did not. He concluded that the adoption and retention of any particular resource program or action depends on the extent to which that activity satisfies three key requisites:*
>
> - *Physically possible : practices are consistent with ecological processes*
> - *Economically feasible : practices generate revenue in excess of costs*
> - *Culturally adoptable : practices are consistent with prevailing social customs and norms*

According to this definition, one can define the social acceptability of a technological project as the focal point of three main concerns: the technical feasibility, the economic viability and the cultural appropriateness. Regarding this third dimension, it should be noticed that this cultural dimension is twofold with a soft dimension related to the social customs and habits and a more normative or hard one related to the norms being either legal, cultural or ethical.

This first comment on definition is important to be pointed out since it underlines that the social acceptability is to some extent framed by prescriptive conditions or nonnegotiable conditions that border the whole exercise about the social acceptability of a technological application or deployment.

1.1 - SOCIAL ACCEPTABILITY AS A WILLINGNESS TO NEGOTIATE

In their 2002 paper, A.K. WOLFE, D.J. BJORNSTAD, M. RUSSEL and N. KERCHNER[193] define the concept of social acceptability as a process, or a willingness to negotiate :

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[192] B.A. SHINDLER, M. BRUNSON and G. STANKEY, **Social Acceptability of Forest Conditions and Management Practices : A Problem Analysis**, US Department of Agriculture, General Technical Report, PNW-GTR? 637, May 2002

[193] A.K. WOLFE, D.J. BJORNSTAD, M. RUSSEL and N. KERCHNER (2002), *A framework for Analyzing Dialogues over the Acceptability of Controversial Technologies*, In Science, Technology & Human Values, vol 27, N° 1, Winter 2002

> *In a decision-making context, acceptability gauges whether the technology or technological method at issue conforms with societal values and norms sufficiently well to be placed on the table of a viable alternative to other technologies.* (P. 134)

According to those authors, the public acceptability is a very central issue for a technology deployment. A technology can be technologically feasible, that means efficient as promised in a reliable and predictable manner yet fail the test of social acceptability. For them, the social acceptability is not a fixed point between socially acceptable and not acceptable technologies, but it is rather a process and a willingness to negotiate, a sort of public deliberation that should support a learning process amongst the participants and by which the controversies become more clear and social agreements are concluded regarding a viable and an acceptable deployment of the technology.

To underline this social process, BRUNSON[194] makes a clear distinction between acceptability or acceptance and social acceptability. According to BRUNSON, acceptability can be defined as :

> *a condition that results from a judgmental process by which individuals 1) compare the perceived reality with its known alternatives; and 2) decide whether the real condition is superior, or sufficiently similar, to the most favourable alternative condition*

The acceptance is thus judgments about acceptability made at the individual level, which progress, facing to a mass of external influences. According to BRUNSON, the term ‘social acceptability’ refers to aggregate forms of public consent whereby judgments are shared and articulated by an identifiable and politically relevant segment of the citizenry.

Related to this concept of social acceptability, it is argued that values are organized beliefs held by a community about what is right to do, and preferences are simply the desires of individual members and which, as such, may not serve the larger society very well.

One of the noticeable arguments related to those definitions does concern the importance of the procedure (citizenry) that should govern the social acceptability process. This procedure has to be clearly defined and transparent for all the stake-holders in order to insure the accountability of its result. This is not only a democratic requirement but also a pragmatic one very in line with many researches that have demonstrated during the last decade that the public’s idea of fairness and legitimacy involves the quality of the decision-making procedures.

1.2 - SOCIAL ACCEPTABILITY AND THE SOCIAL SHAPING OF THE TECHNOLOGY

At a more theoretical level, social acceptability concept can be related to the wider theoretical approach developed by R. WILLIAMS and D. EDGE[195], and called the ‘social shaping of technology’, or SST approach.

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[194] M.W. BRUNSON (1996). *A definition of “social acceptability” in ecosystem management*. In M. Brunson, L. Kruger, C. Tyler, and S. Schroeder (Eds.), **Defining social acceptability in ecosystem management: a workshop proceedings** General Technical Report PNW-369. Portland, OR: U.S. Forest Service.

The central argument of this approach is that:

> *Technology does not develop according to an inner technical logic but is instead a social product, patterned by the conditions of its creation and use. Every stage in the generation and implementation of new technologies involves a set of choices between different technical options. Alongside narrowly `technical' considerations, a range of `social' factors affect which options are selected - thus influencing the content of technologies, and their social implications.*

According to these authors, this approach forces to go beyond the two traditional determinisms that mark the whole concern regarding interaction between Technology and Society.

The first one is the technological determinism that sustains a vision of an autonomous technology, with its inner logic that affects in a predetermined and thus in a non-negotiable way the future of our Society. For the authors, this technological determinism is related to post-enlightenment traditions which did not problematize technological change, but limited the scope of enquiry to monitoring the social adjustments required by the technological progress.

The second one is the social determinism which sees technology as reflecting a single and dominant rationality as an economic imperative or the political hand of a dominant elite.

At the very root of Social Shaping of Technology approach, is this epistemological vision of technology introduced by W. RAMMER[196] (quoted by WILLIAMS and EDGE) stating that a technology is both a 'socialized nature' and a 'naturalized society' to illustrate the dual character of any technology as material and symbolic objects. In this definition, what is well underlined by RAMMER is that any technology is always supported by a vision or social project.

This definition of technology opens the path to one of the central concept of the SST approach which is the concept of *choices*. For R. WILLIAMS and D. EDGE,

> *Central to SST is the concept that there are `choices' (though not necessarily conscious choices) inherent in both the design of individual artefacts and systems, and in the direction or trajectory of innovation programmes. If technology does not emerge from the unfolding of a predetermined logic or a single determinant, then innovation is a 'garden of forking paths'. Different routes are available, potentially leading to different technological outcomes. Significantly, these choices could have differing implications for society and for particular social groups. The character of technologies, as well as their social implications, are problematised and opened up for enquiry.*

This concept of choices opens to the negotiability of technology and therefore of its social impact.

SST is not a purely theoretical or academic approach, it has also strong implications on the way the technological policies, programs and projects should be governed. This new governance pattern is very close to what A. RIP, J. THOMAS and M&S SCHOT[197] name the 'Constructive Technology Assessment'.

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[195] R. WILLIAMS and D. EDGE (1996), *The Social Shaping of Technology,* In Research Policy Vol 25.

[196] W. RAMMER (1995) *Technology within Society: Research Fields and Theoretical Differences in Germany in the 1990s* , In **Similar Concerns, Different Styles Technology Studies in Western Europe** Proceedings of the COST A4 workshop, Ruvaslahti, Finland 13-14 January 1994

[197] A. RIP, J.THOMAS, M. and J. SCHOT (eds.) (1995) Managing Technology in Society: The approach of Constructive Technology Assessment, Pinter, London/New York.

This assessment is an iterative and deliberative method of technological governance that allows exploration of the possible implications of different choices within and during a technological development.

This political aim of SST is well expressed by R. WILLIAMS and J. EDGE when underlining that:

> *The outset SST was influenced by a desire to democratise technological decision-making (or, at least, to subject it to forms of social accountability and control)*

1.3 - SOCIAL ACCEPTABILITY AND THE VALUE SENSITIVE DESIGN

The concept of social acceptability is also directly related to a new approach for information system design which is called the "value sensitive design". This new approach states that till now the classical information system design methodologies have worked with three major edges to assess the design of their artefacts : the technical feasibility, the economic opportunity and the functional usability . According to this approach all those three dimensions are too limited to explain the difficulties of some artefacts to move from technical project to new social realms duly appropriate by the actors and by the society.

Let us examine more in deep this new approach of information systems design.

According to B. FRIEDMAN, P. KAHN, A. BARNING[198], the value sensitive approach is :

> *A theoretically grounded approach to the design of technologies that accounts for human values in a principal and comprehensive manner throughout the design process.*

This new approach for technological design stems from the weakness of other social approaches to capture some hard elements related to norms and values that intervene in the meaning and in the understanding people can have about a technological artefact.

For those authors, human values with ethical import are considered as central design criterion along with more classical or traditional criteria of usability, economy, reliability and correctness.

According to those authors, value sensitive design is an approach that brings forward a "unique constellation of features". Amongst them, it particularly worth to underline two of them for the MIAUCE framework :

- *Value sensitive design draws on moral epistemology to offer a principled approach to design that maintains that certain values (such that those pertain to human welfare, rights and*

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[198] B. FRIEDMAN, P. KAHN, A. BARNING, **Value Sensitive Design**, University of Washington CSE Technical Report 02-12-01

justice) have moral standing independent of whether a particular person or group upholds such values

- *Value sensitive design maintains that certain values are universally held, although how such values play out in a particular culture, at a particular point in time can vary considerably*

One can observe that this approach shares the same vision that the one that supports our concept of social acceptability as a process bordered by values universally held or by nonnegotiable conditions.

According to these authors, the value sensitive design is an iterative methodology that integrates three main layers:

- **the conceptual investigation** is devoted to the identification of the main values to be considered in the design process. They should be defined as the principles that frame the design process. In this report, those values have been approached and defined through the chapters 2 to 4 in a general concern on ethical and legal issues.

- **the technical investigation** focuses on how existing technologies and underlying methods support or hinder these values. This epistemological exercise has been made into the chapter 1 of this report.

- **the empirical investigation** is concerned with the contextualization of those values by questioning the designers and the stakeholders on their representation of these values, on the way they prioritize them…

Regarding this third layer, the value sensitive design remains currently a bit silent and should be considered much more as a new design principle or framework than as a new design methodology with guideline and tools for action.

The major problem at this stage in MIAUCE is how to convince or constraint any industrials or technicians to prioritise ethical or/and legal concern over marketing concerns ?

A first option, as suggested by the authors, would be to make industrial and technician partners aware that there is in fact a "demand for privacy" and a "taste for fairness", and that those demand and taste play a major role in the consumers choices.

Taking those concerns for privacy, fairness, autonomy, and other "ethical" principles on board in the design and marketing of technology may constitute commercial assets. Yet, this would hold only to the extent that users and consumers indeed care for their privacy, fairness, autonomy and other (ethical, legal and democratic) principles more than they value the commodities and conveniences offered by MIAUCE scenarios careless about such societal concerns.

This pleads for enforced standards or what we called before "bordered scenarios" (see also in the next section : the predetermined elements).

Enforced would mean, in a context where individual preferences regarding technology are vulnerable to manipulations by technology itself, making certain "rights" or "attributes" of individuals not merely inviolable (inviolability meaning that nothing can be done without prior informed consent be given by the individual) but also inalienable (inalienability meaning that the right, prerogative, or attribute of the individual cannot be waived, even with full informed consent by the individual).

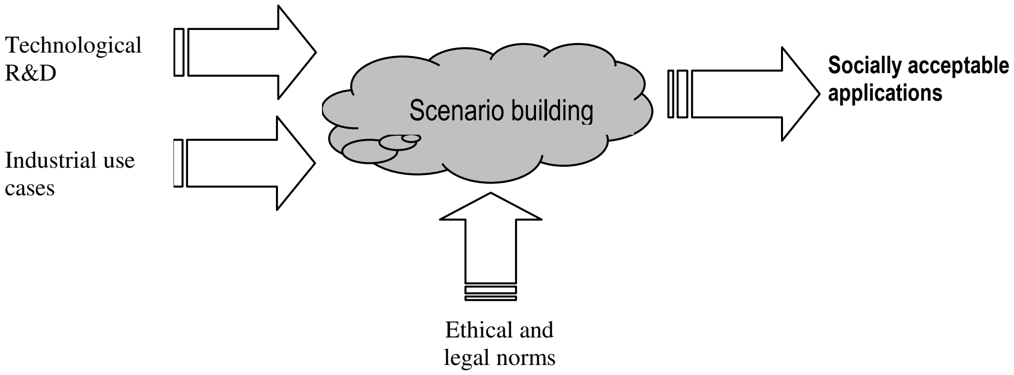
How could that be enforced? At a time where the value of individual autonomy and self-determination has taken precedence over almost all other ethical principles, how could one justify the enforcement of "protective" standards even against the wish of individuals without being accused of undue paternalism?

A suggestion is to consider what the "noyeau dur" of human rights consists of: mostly the protection of the integrity of the human body. Let's imagine now that, given the new threats arising from invasive information technology, one would enlarge our concept of the "person", the "legal subject", and consider that the person consists not merely in a human body, but includes all the "virtual identities" that are being created, collected, used, and through which she/he "exists" in this emerging technological environment. Why not protecting the informational integrity of the person in the same way one protects the integrity of her body? People indeed "exist" as avatars as well as in embodied form. Their bodies are increasingly used as "passwords" (given the development of biometrics, the prospects of implanted RFIDs in human beings etc.), under the assumption that bodies, unlike narratives, do not "lie": unlike narratives, they correspond to the "virtual identity" that has been created in databases. Virtual identities are not unimportant: they even come to count more than narratives as they condition peoples' access to a series of services, benefits, places…(see the chapter devoted to the legal issues)

This framework is critical to keep in mind when considering, in the next section, the scenario building methods that could support the democratic deliberation to set up for the design of MIAUCE applications.

2- SCENARIO CONCEPT

If we consider the MIAUCE project in a schematic view, one could consider that we have technological blocks based on bodies and faces recognition that have to be designed in socially acceptable applications. The "go between" or the mediator between the technological blocks and the applications is the scenario building methodology. Before explaining this methodology, it is worth focusing in this section on the scenario concept since it is a central master piece of the governance methodology that supports the MIAUCE project.



2.1 - SCENARIO AS A "SENSE MAKING" EXERCISE

In its more general definition, a scenario is, according to M. GODET[199],

> *a description (usually of possible futures) which assumes the intervention of several key elements or conditions which will have taken place between the time of the original situation and the time in which scenario is set*

But this anticipation of the future is not a pure technical exercise of prospective. It is also a social exercise of sense-making according to the meaning given by K. WEICK[200] to this concept.

So to underline this social or epistemological dimension of the scenario concept, we will adopt the L.B. RASMUSSEN[201] definition as the focal point of our methodology. According to L.B. RASMUSSEN,

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[199] M. GODET (2006), **Stategic Foresight, La Prospective : Problems and Methods,** LIPSOR Working Paper, Issue 20, Paris, November 2006

[200] K.WEICK (2001), **Making Sense of the Organization**, Blackwell Business, Blackwell Publishing UK

[201] L.B. RASMUSSEN (2005), *The Narrative Aspect of Scenario Building. How Story Telling May Give People a Memory of the Future* Online publication 12-8-2005, Springer Verlag, London Limited 2005

> *Scenarios are flexible means to integrate disparate ideas, thoughts and feelings into holistic images providing context and meaning of possible futures.*

This sense-making character of the scenario building process is also pointed out by M. GODET when stating that the utility of this exercise which is:

> *To stimulate the imagination, to reduce incoherence, to create a common language, to structure collective thought and to permit appropriation.*

This definition shows many elements that are important to be underlined.

2.1.1 - Scenario as a desirable future

First of all, a scenario does not pretend to predict the future but to build several stories of possible version of it. Those stories are conducted or animated by people social representations of what they consider as an acceptable or desirable future. In that sense, for L.B. RASMUSSEN, a scenario or a story should make clear the following question:

> *What are the needs which the stories are supposed to fulfil in the scenarios?*

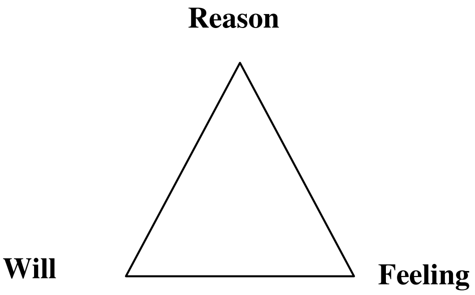
Speaking about needs means also working with the various interests that are put on the table by the stakeholders during the scenario building exercise. We will come back later on on this element but it is important to underline that a scenario building is also a negotiation exercise related to the general *theory of games*.

2.1.2 - Scenario as a construction of a non deterministic future

Secondly in its philosophical or epistemological basis, a scenario does consider the future in a non deterministic way. That is a very critical point of this approach since the scenario concept gives to people a real ability of action and transformation on their future. This is very well underlined by M. GODET when explaining that:

> *The future is, at least in part, the fruit of human desires.*

In that sense, M. GODET sees the future and the scenario building as the result of the marriage of the three edges of what he call the Greek Triangle : the *reason* or the calculated anticipation of prospective trends, the *will* or the strategic actions deployed by the stakeholders to influence the future and the *feeling* or the ideas and values that give or not an acceptable or appropriate sense to this future.



This triangle is important to consider since it shows that there is no technological determinism even if, as we have seen in Chapter 1, some technologies have structural characteristics that can have structural influence on the reality they approach. According to this triangle, this structural influence is mediated and negotiated by the design of these technologies into acceptable or desirable applications. The design of those applications and their conditions of use remain human activities supported by the will, the feeling and the reason. That means that the social impacts of a technology is open to negotiation and it is worth negotiating if we want to create an acceptable future.

2.1.3 - Scenario as a deliberative democratic process

Regarding this third edge of the triangle, *the feeling*, L.B. RASMUSSEN points out the central importance of ideas and values in the scenario approach. According to him, a scenario approach is also an *open exercise* that gives the possibilities to get rid off with some stereotypes or preconceived or non debated ideas. To explain this L.B. RASMUSSEN assumes the J. DERRIDA concept of “centres” and does consider the scenario approach as an exercise of “deconstruction”:

> *All Western thought, according to DERRIDA, is based on the idea of a centre…'an Origin, a Truth, and Ideal Form, a fixed point, an immovable Mover, an Essence, a God, a Presence, which is usually capitalized and guarantees all meanings' (POWELL, 1997:21- quoted by L.B. RASMUSSEN). Deconstruction is not only about unmasking stories that posit an authoritarian centre, but to show several centres are in constant state of change.*

This explanation makes also clear that scenario approach does participate to what we could call a deliberative democratic process letting the less dominant or visible positions or visions come into view along with the most dominant ones or, to quote DERRIDA, the central vision. This democratic exercise supposes that the procedures of the scenarios building exercises are acceptable, legitimate and transparent for all the stakeholders. We will come back on this in the next section devoted to the methodological approach of scenario building.

2.2 - FROM EXPLORATORY SCENARIO TO NORMATIVE SCENARIO

In his methodological report, M. GODET points out a well established distinction between two major types of scenario : the *exploratory* scenario and the *normative* one. Let us define those two types in order to identify the appropriate frame for the MIAUCE project.

2.2.1 - The exploratory scenario or the outward-bound scenario

This first type of scenario belongs to the prospective methodology or to the foresight exercise. According to M. GODET, an exploratory scenario aims at:

> *Extrapolating past and present trends which lead to likely futures.*

This type of scenario is also called narrative scenario or descriptive scenario. As pointed out by M. GODET, these scenarios are objective, insofar as any story can be objective and value-neutral.

This first type of scenario is related to prospective exercise and supported by rational analyses of past and present trends to anticipate a possible future or several possible futures according to hypotheses made on some uncertainties marking some of the key variables taken into account in the foresight exercise. It is very used in some large area as economy, ecology or social policy.

One important element of this type of scenario is its objective character (even if the objectivity is always conditioned by the human activities making hypotheses on uncertainty) and the fact that it is "value neutral". In other words, this type of scenario does not attempt to define visions of desirable or acceptable futures but to anticipate objectively the consequences of past and present trends. To some extent, those scenarios based on rational methods, aims at to define possible futures in order to prepare the relevant strategies and actions to cooperate with.

I. MILES[202] defines those scenarios as "outward-bound" scenario to underline the fact that the first leverages that lead those scenarios are not related to the human aspirations and actions but to external factors related to large trends of economy, ecology, etc. According to him, those scenarios are fostered by a "what if" exercise very in line with classical decision making exercise. For I. MILES, they can not be qualified as objective scenario since there is subjectivity in the way the "what if" are raised and answered. But in their formulation, those scenarios do not give a visible place or a leading position to human feelings, ideas and values.

To some extent, those scenarios can be viewed as more deterministic than the normative ones (see point 2.3), since they give a wide and leading position to external factors or to structural trends in the exploration of the futures in comparison with the human capabilities and actions.

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[202] I. MILES (2003), **Scenario Planning,** Report of the PREST department (Policy Research, Science and Technology), University of Manchester, United-Kingdom

2.3 - THE NORMATIVE SCENARIO OR THE "INNER-DIRECTED" SCENARIO

This second type of scenario is called normative by M. GODET and "inner-directed" by I. MILES.

According to M. GODET, this type of scenario aims at building:

> *Alternative images of the future that are either desirable or feared and are conceive retrospectively. These scenarios are subjective and value-laden.*

This type of scenario belongs also to the prospective exercise but let a central or dominant positions to the values, norms and ideas contrasted or shared by the different stakeholders involved in the scenario building process. The term "retrospective" can sound a bit strange in a prospective exercise. We can interpret it as the fact that this normative scenario starts with the identification or the projection of the preferred views or visions of the future and based on those visions, explores the conditions and actions that have to be endorsed to achieve those visions.

The reason why I. MILES prefer to talk about "inner-directed" scenarios is to underline the fact that they are designed through the various interests and aspirations of the involved stakeholders.

According to G.H. MAY (2006)[203], the idea of the normative scenario or the "inner-directed" scenario

> *is based on the belief that if we, as human beings, can influence the future by our decisions and actions, what eventually happens is conditional on those decisions and actions. If, therefore, we make different decisions and take different actions the future will be different. Multiple scenarios explore these alternative futures by using different assumptions in their development.*

To some extent, those normative scenario belong to what is traditionally defined as a constructive or a non deterministic approach of the future since it states that the future is a social construction that depends, at least in part, on our social representations of this future, our values and the actions we endorse to shape this future in an appropriate or desired manner.

2.3.1 - What type of scenario for MIAUCE ?

Even if as underlined by many authors, the borderline between exploratory and normative scenario is sometimes a bit fuzzy when considering the various methodologies that support them, in the MIAUCE project, the type of scenario that will serve as mediator between technological blocks and socially acceptable or desirable proposals belongs somewhat to the *normative approach*.

Different reasons can justify this choice :

- The first one is paradigmatic or epistemological and does concern our vision of the human being and his capacity of action on the society. It is also related to the "value sensitive design" and the social shaping of technology (SST) approaches presented before which state that human values and principles are as hard to coop with in the design of a future application than the more factual factors related to the technological devices or to the economic constraints.

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[203] G.H. MAY (2006), **Scenario Planning,** Future Skills, ILKLEY –UK, UNIDO Technology Foresight for Corporations, Presentation made in Bratislava, Slovakia, March 2006

- The second one is related to the epistemological basis that supports the concept of technology. This epistemology addresses the dual character of the technology, as statetd by W. RAMMER not only as 'socialized nature' but also as 'naturalized society', considering that technologies are at the same time both material and symbolic objects. This epistemological vision of technology demands that both the socialization project and the naturalization’s one could be deliberated in a democratic way.
- The third one is related to the context of this project. In this project, we can not explore the past and the present trends to design the visions of the future since we work with technologies that are radically new in their concept and in the human-machines interactions paradigm they introduce.
- The fourth one is more political and depends on the irreversibility of the AmI paradigm, once introduced into the society. More than a technologies, we have seen previously that AmI environment brings a new relationship to the reality and to the others. Because of this irreversibility, this emerging technological environment and its applications must be sustained by a deep reflexive exercise based on a democratic deliberation concerning the desirable or preferred future to be created.

2.4 - TOWARDS A THIRD WAY: THE LEARNING SCENARIO

Even if we can qualify the scenario approach that will be endorsed in the MIAUCE project as a somewhat normative one, we would like to introduce a last consideration to explain the learning status of the MIAUCE scenario exercise.

As well stated by L.B. RASMUSSEN,

> *Scenarios are flexible means to integrate disparate ideas, thoughts and feelings into holistic images, providing the context and the meaning of possible futures.*

In the frame of the MIAUCE project, this RASMUSSEN approach of scenario is very significant due to the various scientific backgrounds and vested interests of the different researchers and industrials involved in this project. Due to this fragmented backgrounds, the dialogue between the teams is made difficult and can be seen as a blocking factor for the project progress. Those difficulties are not only due to tangible elements related to particularity of the scientific or of the economic environment endorsed by each team, but are also due to the highly sensitive value character of the technology and of the project we are working on questioning our vision of privacy, autonomy and responsibility.

So, to some extent, the MIAUCE scenario building process could be considered as a collective learning process through which each team learns to know the others by making clear its background, its framing, its vision of the world, its ideas of privacy, of autonomy, of responsibility, its central values regarding fairness and the future of our Society…

This learning process should improve the dialogue between the teams and sustain the negotiation to design scenarios of applications that are socially acceptable and respectful to norms, principles and constraints defined by the group.

To be legitimate by all the participants, this exercise has to be democratic, based on a methodology acceptable and transparent for all of them and giving a balanced political voice to each of them.

3 - SCENARIO BUILDING METHODOLOGY

In this last section we will set up the bases for the scenario building methodology which will be deployed into the MIAUCE process. The first part of this section will be devoted to this methodological construct. In the second section, we will address the question of the actors playing on this scene, their status and their roles.

3.1 - METHODOLOGICAL CONSTRUCT

The methodologies devoted to support a scenario building exercise are numerous. I. MILES has made a very complete state of the art regarding those methodologies. According to him:

> *Scenario may be developed by an extremely wide-ranging set of methods. They may emerge from workshops or be prepared by small expert groups, derived from DELPHI or other survey results or constructed on the basis of different worldviews.*

3.1.1 - A methodology based on the workshop method

In his state of the art, I. MILES identifies six families of methodology that can support the scenario building:

- Individuals presenting their informed speculations about the future ('genius forecasters') can use scenarios as a template for illustrating and enlivening their accounts.
- Expert panels can establish a framework of scenarios on the basis, for example, of literature review or conceptual analysis.
- Survey results can be analysed t determine if there are different clusters of views about the future that can be considered representative of different scenarios
- Cross-impact and similar methods can be used to identify the most probable of all the scenarios logically possible from a combination of variables
- Workshops may be used to construct or elaborate on scenario in process of intra-group dialogue
- Online methods are being explored, as are techniques using computers to support face-to-face (F2F) workshops

These families remain rather large and non-precise regarding the methodological sets that support their deployment. However, this multiplicity of methods requires to make a choice regarding the methodological family that will be deployed into the MIAUCE project.

According to M. GODET, the choice of the method must be made

> *According to the problems confronted, the allocated time and the accessibility of the method.*

With these pragmatic considerations in mind along with what we stated before regarding the collective learning status of the scenario building exercise in the MIAUCE framework, the workshops' method appears to be the most relevant methodology to support the scenario process in the project.

For I. MILES, this method is particularly relevant to:

- identify points of agreement, disagreement and uncertainty
- create new shared understanding
- develop action plans and other instruments so as to help mobilise future activity.

Those different points fit perfectly well with the needs identified in the frame of the MIAUCE Project.

3.1.2 - Methodological guidelines for MIAUCE

As already underlined before, those families remain relatively non precise regarding the methodological tools that support them and the choice of the workshop method does not say anything regarding the methodological paths and procedures that can support this methodology. Though, the clear definition of those procedures is an absolute requisite regarding the democratic requirement of transparency and legitimacy that supports the whole MIAUCE project.

To instrument this methodology, we make the choice to rely on the P. SCHWARTZ[204] method, proposed by GBN for Global Business Network and to adapt it to MIAUCE purpose.

3.1.2.1 - the choice of the Schwartz approach

Before presenting the SCHWARTZ methodological tool, let us explain first the choice of this method.

- First of all, this methodology has the benefit of a very large popularity in the Anglo-Saxon world. Though the popularity is not a criterion of choice, this popularity makes this method one of the well documented and experienced methods for scenario building.

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[204] P. SCHWARTZ (1993), *La planification stratégique par scénarios*, In Futuribles, n°176, mai 1993 – P. SCHWARTZ (1991), **The Art of the Long View**, Doubleday/Currency, New York

- The second criterion is related to the general philosophy that supports this GBN approach. This method gives a central place or a dominant leading role to people and human agencies to design desired future. In that sense, this method is well in line with the Social Shaping of Technology approach we presented previously.

- The third consideration regards the pragmatism of the method in its ability to support the scenario building dialogue into the MIAUCE group. The method is quite simple and so is relevant to give a common support for the interactions between scientists and industrials with highly scattered backgrounds.

However, the fact that P. SCHWARTZ designed this method, at first, for companies or business scenarios can introduce a sort of hesitation regarding the relevance of this choice which can be rejected when examining the current exercises made by GBN[205] with this method which concern climate, urbanization, migration, worldsecurity,…

At this stage of the WP5 progress, we present the SCHWARTZ method as a methodological proposal. But we have to consider this method as a starting point to design an adapted method to support the MIAUCE scenario building exercise. That means that this method will certainly evolve and be modified in order to take into consideration the specific requirements of the MIAUCE team, but also regarding the 'collective learning role we intend to give to this building process. The critical point here is that those adaptations have to be openly deliberated with all the teams associated to MIAUCE and well documented in order to ensure the accountability and the transparency of the process.

3.1.2.2 - the central idea of the Schwartz approach

The approach of P. SCHWARTZ begins always with a specific issue, decision or problem that require to be innovative and prospective in the way to deal with and to build an appropriate and acceptable response.

What is central to this approach and makes a clear difference with all the other candidate methodological tools is the position or the role given to social representations and perceptions in the process of scenario building. For SCHWARTZ, the future is at least in part the fruit of our aspirations and perceptions of what is fair or good regarding the issue at consideration.

To some extent, this approach is deeply in line with the *bounded rationality* concept developed by H. SIMON[206] . This concept suggests that deciders are bounded in the choice and problem-solving process by cognitive limitations related to the incapacity to manage the whole complexity and uncertainty of the world. So in this decision process, people tend to reduce this uncertainty and complexity by relying on their perception or on a sort of *framed world* circumscribed by value assumptions, past experiences, rules and routines. As well underlined by J. CHONG[207], bounded rationality differs from rational choice theory in two key ways :

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[205] See for more information : http://www.gbn.com/
[206] H. SIMON (1997). **Administrative Behavior,** 4th ed., The Free Press, New York
[207] J. CHONG (2006) **Tutorial on The Decision-Making Tradition**, Carnegie School, Stanford University www.stanford.edu/~jchong/articles/quals/CarnegieSchool.doc

> *First, whereas rational choice theory posits that an actor maximizes – selects the best alternative from among all those available to him – bounded rationality posits that an actor satisfies – looks for a course of action that is simply satisfactory.*
>
> *Second, whereas rational choice theory posits that an actor approaches the "real world" in its full complexity, bounded rationality posits that the perceived world is a drastically simplified model of the complex world.*

According to P. SCHWARTZ (1991), scenarios deal with two worlds : the worlds of facts and the world of perceptions.

> *(The scenarios) explore the facts, but they aim at perceptions inside the head of decision makers. Their purpose is to gather and transform information of strategic significance in fresh perceptions*

As pointed out by M. GODET, P. SCHWARTZ gives a large importance to myths, beliefs and perceptions that are consciously or unconsciously used by the scenario players in their definition of the desired future.

> *According to SCHWARTZ, it is important to understand the "myths" that an organization uses to describe itself. Scenarios … must take these cultural myths into consideration. For SCHWARTZ, a good scenario is one that requires the reader to suspend his/her disbelief and allows the reader to see beyond previously held taboo beliefs.*

This cultural aspect of the scenarios method proposed by P. SCHWARTZ is particularly relevant for the MIAUCE project since it deals with radical technological innovations that, per se, are the ideal fields for birthing myths and utopia regarding the socialization project of the technology.

This cultural aspect is also important when considering the insights of the French conventionalist school and particularly the thesis developed by L. BOLTANSKI and L. THEVENOT[208]. For those two political philosophers, what is at stage when analyzing difficulties encountered to take a collective decision is the contrasted visions stakeholders have about societal values as fairness, justice or common Good. According to them, those values have a leading role in the way people analyze a situation and take a decision, though those values never come into view as a visible constituent of the decision-making process.

3.1.2.3 - MIAUCE and the Schwartz approach : the ATM example

MIAUCE project aims at developing applications in three main sectors : the security, the marketing and the interactive WEB TV.

For the purpose of this methodological presentation, we will grasp the security sector.

This security sector is taken in charge by the Visual Tools team. Amongst the proposals of potential applications of MIAUCE technologies, Visual Tools has developed the ATM proposal. The ATM proposal aims at deploying MIAUCE technologies in the ATM rooms in order to monitor the movements and to prevent against unexpected visitors. The full proposal has been developed by Visual Tools according a defined template (see deliverable D6.1 Application Requirements)

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[208] L. BOLTANSKI et L. THEVENOT (1991), **De la justification. Les économies de la grandeur.** Gallimard édition, Paris

This ATM proposal will be used as an illustrative platform to present the methodological steps of the scenario building process.

3.1.2.4 - The steps of the Schwartz approach

In his approach, P. SCHWARTZ (1991) defines the different methodological steps that support the scenario building process. In this section, we will synopsize those steps and illustrate them with the ATM proposal developed in the frame of the MIAUCE project. This synopsis is based on the Vision 2010 project[209].

STEP 1: DECIDING ON THE CENTRAL ISSUE

The first step in the process is the identification of a central issue or decision.

In the case of the ATM, the central issue or decision is the deployment of a surveillance system based on AMI in order to monitor the movements and to prevent against unexpected visitors.

This issue has been fully described by the Visual Tools in the template presented in (see deliverable D6.1 Application Requirements).

The scenario building will help to create contrasted visions of the future in order to test the social acceptability, the technical feasibility and the economic sustainability of this project.

It is important to point out that the scenarios to be built do not concern strictly the ATM surveillance deployment but rather different potential visions of the future world/the surrounding context that can give sense or not to this project. The process for exploring those visions is maybe more important than the scenarios themselves since it gives the opportunity to each participants to address his/her requirements, to analyze the uncertainties that surround the proposal and finally to negotiate a proposal that represents an accepted compromise for all the participants at stage.

In this process, P.SCHWARTZ underlines the absolute necessity to begin it by articulating all the mind-sets around this focal issue. Mind-sets do concern attitudes regarding the future and more specifically to pessimistic or optimistic visions of this future. They can be defined as pre-conceived ideas that make the dialogue between stakeholders difficult and the definition of a common issue problematic.

As explained by P. SCHWARTZ:

> *Mind-sets tend to keep us from seeing the appropriate questions to ask about a decision.*

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[209] **VISION 2010 Project**, Commission on Preservation and Access – University of Michigan's Scholol of Information. Project fundede by the Carnegie Foundation

STEP 2: IDENTIFYING THE KEY FORCES IN THE "LOCAL" ENVIRONMENT

The second step aims at drawing a complete list of all the key factors in the micro-environment that may directly influence or affect the answers to the central issue.

In the frame of the MIAUCE project and the ATM proposal, how to define this micro-environment? One response is to consider the project consortium as a specific organization and to examine all the factors on which the consortium has a mastership or should have a mastership to answer to the issue.

Without being at this stage exhaustive, we can raise some questions to illustrate those key factors in the frame of MIAUCE project.

- Technological key factors : What do we master regarding the technological constituencies ? Where are the technological uncertainties?
- Economic key factors : What is the comparative advantage of the technology we deploy in the frame of MIAUCE? What will be the cost of the ATM proposal? Are the industrials (the banking sector) prepared to invest in this type of technology?
- Social key factors : What are the legal norms to take into consideration regarding this proposal? What do we know about the 'social acceptance' of this range of 'surveillance' technology?
- Managerial key factors : What are the time's constraints of the project? Do we have the full range of the needed skills to achieve this proposal?

In the frame of the MIAUCE project, most of the insights needed to analyze those key factors (except the managerial ones) should be at disposal in the state of the arts made by each implicated team. These factors should be weighted by the participants (see below) for their effect on the central issue.

STEP 3: IDENTIFYING THE LARGER DRIVING FORCES

The third step is devoted to the analysis of the external driving forces that means related to the macro-environment that can have an impact on the potential answers to the central issue. Some of those trends can have a direct impact on the evolution of the key factors as identified in step 2, though others may affect the general context of the proposal.

According to P. SCHWARTZ, the rigorous survey on those external driving forces by the group is important since some of them are obvious to one person and absolutely obscure for another one. This is an important point for the learning process at stage in a scenario building exercise.

In this survey, P. SCHWARTZ suggests to make a clear distinction between what he calls the *pre-determined forces and the critical uncertainties*. Let us analyze them and introduce some adaptations to fulfill our social acceptability agenda.

Pre-determined forces are what the French scholars define as “tendances lourdes” (heavy trends). Speaking about heavy trends means that those trends are characterized by a high degree of inertia and for this reason, are not likely to change their trajectory. To explain, those pre-determined forces, M. GODET points out some demographic trends as an aging population. Those trends are the “hard part” of the scenario since participants have few margin of handling on them. They are also the most foreseeable or predictable trends.

Critical uncertainties are more volatile in their realm. These are those elements or factors which are marked by a high degree of dynamism and may indeed change their trajectory very quickly. To illustrate this second type of the driving forces, M. GODET gives the example of the public opinion which is very volatile and subject to frequent changes related to particular and unforeseeable events.

T. CHEMACK and J. WALTON[210] underline that very often in of a scenario building processes:

> *The vast majority of forces at play contain considerable uncertainties.*

This observation is related to the growing complexity and uncertainty of the whole environment to be faced during a scenario building exercise.

However, one striking point of the T. CHEMACK and J. WALTON paper does concern the way they define or approach those pre-determined elements. According to them:

> *The pre-determined elements provide the boundaries within which scenarios are constructed.*

This approach of predetermined forces as boundaries that frame the scenarios setting is particularly relevant in the MIAUCE project. Indeed, we have explained in the section devoted to the social acceptability, that all is not negotiable. Particularly, some legal norms and ethical values have to be considered as the borderlines that any scenario has to respect since they are at the basis of the social contract that regulates our Society.

This step of the scenario building process is the most consuming one. In MIAUCE project, it has to be supported by the state of the art made by each team in its specific domain. But it has also to be refined and consolidated by structured brainstorming between participants.

Let us review, non-exhaustively, what could be the predetermined-forces and the critical uncertainties for the ATM issue.

- Predetermined forces :
    - *ethical values regarding autonomy, privacy, dignity and responsibility (see for instance the principles set up in the Declaration of Barcelona (2004) for the bio-medical domain) These values consist in the “enforced standards” developed in the 1st section (Value sensitive design)*

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[210] T. CHEMACK and J. WALTON (2006), *Scenario Planning as a Development and a Change Intervention*, In International Journal Agile Systems and Management, vol1, n°1, 2006

  - *legal norms and principles regarding privacy, responsibility and proof of evidence*
  - *demographic trends with the aging population that can affect the usability of the ATM systems*
  - *social trends related to the individualization and the aging of the Society and the growing need for surveillance systems*
  - *economic/financial trends related to the business willingness to reduce the fixed costs by externalization and automatization*
  - *development in sciences and technologies that could affect the trajectory of the AMI*
  - …

- Critical uncertainties :
  - *Public reactions and opinions regarding those surveillance devices*
  - *Banking strategies concerning the ATM platforms*
  - *Insurance sector assessment of this new surveillance equipments*
  - *Physical uncertainties related to the various architectural configurations of the ATM rooms*
  - …

As well underlined by P. SCHWARTZ, critical uncertainties are intimately related to pre-determined forces:

> *You will find them by questioning your assumptions about the predetermined elements*

STEP 4: RANKING FACTORS BY IMPORTANCE AND BY UNCERTAINTY

Step four is devoted to the ranking of the factors and forces listed in step two and three. These factors are weighted for their effect on the central question.

The ranking is based on two main criteria: the importance of each factor in influencing the issue and its level of uncertainty. At this step, the plurality of the candidate scenarios will emerge. Indeed significant or important factors that have a high degree of certainty will probably be present in all possible scenarios. But significant factors that are highly uncertain may help to differentiate among the scenarios hat should be created. In the frame of MIAUCE, the plurality of scenarios is less important than the maturing of one of them based on a deep deliberated exploration of all the factors that have to be taken in account to design a socially acceptable application. This consideration is very in line with the 'collective learning process' related to the scenario building exercise in the MIAUCE project. This could lead to some adaptations of the SCHWARTZ method that will be fully experienced and documented in the next deliverable.

STEP 5 : DESIGNING THE SCENARIO LOGICS

Scenario logics can be considered as the main logical axes that will differentiate the scenarios made on the possible futures. Those axes aim at creating contrasted visions of a possible future. They can be considered as major contrasted societal orientations that shape different visions of the future.

As recommended by P. SCHWARTZ quoted by M. GODET, at this stage of the process, two criteria must guide this research of logics: the simplicity and the contrast.

Simplicity is directed related to the number of axes that may be elaborated. Usually, scenario building exercises relay on main axes which, subsequently, give raise to the elaboration of four scenarios. This simplicity requirement is in line with or conditioned by the bounded rationality of the associated stakeholders.

Contrast is directly related to the differentiation of the scenarios to be elaborated. The axes should really contrast opposite or incompatible logics. Therefore, the axes are often built on factors (or clusters of them) that have a high degree of importance and of uncertainty.

The axes and their related factors are those which are considered by the participants as deciding the directions of the future around the central issue. By taking the two or three most significant axes, a matrix is created with different quadrants and in each quadrant takes place a particular scenario that gives a different framing for the issue at stake.

STEP 6: WRITING THE SCENARIOS (THE QUADRANTS)

Each quadrant of the elaborated matrix represents different futures that could shape the critical issue stated in stage 1. To create the scenario related to each of those quadrants, the different factors identified in step two and three must be considered in order to analyze how each of them will play in the scenario. In fleshing each of the contrasted scenarios, it is important to keep it coherent regarding the logics under consideration. Write scenarios means making coherent but contrasted narrations of the future that give contrasted answer to the issue stated in step 1.

STEP 7: IMPLICATIONS AND PROJECT ADAPTATIONS

When the scenarios are written, it is time to confront them to the issue or decision identified in step 1. This exercise aims at testing the robustness of the identified proposal according to the features of each scenario. What are the strengths and the vulnerabilities of the current proposal revealed by the scenarios? How to adapt it to make it more robust regarding those scenarios?

It is obvious that the proposal or the ATM decision can not fit to all the futures designed into the scenarios. But those scenarios are opportunities to learn and to argue about the initial project in order to better specify it according to the various directions the future could take but also according to a clearer and shared vision of what we defined, in step 3, as the non negotiable borderlines of the projects.

As we explained at step 1, in the case of MIAUCE, the process for exploring those visions is the most important part of the work concerning the ATM proposal and more generally the MIAUCE scenarios design, maybe more important than drawing the scenarios themselves since it gives the opportunity to each participants to address his/her requirements for the proposal, to analyze the uncertainties that surround it and finally to negotiate a proposal that represents an accepted compromise for all the participants at stage.

3.2 - THE DYNAMIC OF THE METHODOLOGY: THE ACTORS

Two main criteria must lead the suggested methodology. This is on one hand the credibility of the process and on the other one its legitimacy.

According to I. MILES, the *credibility* is related to the fact that

> *The scenario is developed with the assistance of, and validated by a sample of experts in the area, chosen to reflect a broad range of interests (and usually including both practitioners and researchers).*

The *legitimacy* is, as we pointed out in the first section of this chapter, directly linked with the democratic character of the whole process that has to be transparent and agreed by all the participants. This transparency vouches also for the accountability of the decisions taken by the MIAUCE consortium for the AMI proposals at stage.

Those two criteria lead us to examine carefully the role and the responsibilities of the various participants in this process.

Two main roles must be defined to support this process: the role of *experts* and the role of the *procedure keeper*. Let us examine each of them.

3.2.1 - The role of experts

The main role of the experts is to open the rationality that bounds the whole process of scenario building. That means that the responsibility of those experts is:

- to supply the process with their knowledge,
- to raise the potential uncertainties related to their area of expertise and

- to negotiate an accepted proposal regarding the various requirements, interests and values at stage.

If we draw the map of the actors involved in the MIAUCE project, three main types of expertise are at stage:

- The technical expertise is represented by the team of Lille (Body motion capture), the team of Amsterdam (Face recognition) and the team of Glascow (Context framing and interpretation)

- The industrial expertise is represented by three businesses associated into the project with visual tools (for camera surveillance sector), with Sylis (for the marketing sector) and with Tilde (for the WEB interactive TV sector). Even if each of those business teams is dedicated to one of the specific industrial domain covered by MIAUCE, each of them may participate in the whole process of scenarios building since they may express economic interests and constraints usually put on the table when investing in new technological devices.

- The societal expertise is represented by teams deeply involved in researches regarding the interaction between technology and society. There is on one hand the CITA (Namur team) that is in charge of the sociological and ethical issues and the CRID (Namur team) which represents the legal domain in the process.

The status of the expert has been mainly criticised. Indeed, this status implies that a division has been made between the experts and the public, which is supposed ignoring and not understanding the contents, the issues of the scientific debates.

As the report [211] from the EC forum "Science and society" points it out, a main critique is expressed concerning the classical stakeholder model of democracy. This model is based on the idea of only self-interested actors, whose positions and values need to be incorporated in order to produce stable societal solutions. It was argued that such a model of public representation was often perceived as inadequate by the public and thus could not work out.

However, also the difficulty to handle the concept of "the public" in an adequate way was referred to. The issue is more questioning and acknowledging the diversity of collections in which different forms of publics are constituted or constitute themselves and have to be encountered, than offering dogmatic definitions of what publics are/should be. Then, that mode of expertise is understood as a "matter of facts", in which experts are the main efficient actors of a debate regarding the assessment of the technologies. In order to guarantee the credibility of the scenarios that will emerge from the methodology and to open them to discussion with the so-called "civil society", two additional mechanisms have been suggested: the focus group and the survey.

- The focus group is a technique supported by a wider panel of industrial participants in order to open the rationality of the MIAUCE consortium and to collect additional requirements, constraints and issues that could have been hidden in the inner process. In our case, each industrial team is responsible for the setting up and the animation of one focus group in the sector the team represents and at consideration in the proposal. For instance, regarding the ATM and more generally the security sector, it is up to Visual Tools to set up this focus group gathering other industrials involved in the security sector in order to test the credibility of the MIAUCE proposal with them.

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[211] U. FELT (SCIENCE IN SOCIETY – FORUM 2005), Session 2: Science, **Technology and Democracy**. Report to the European Commission Ulrike Felt, Brussels March 9-11, 2005.

- The survey aims at collecting the wider opinion of the so-called civil society regarding the proposals in progress into the MIAUCE project. This survey is both more general and quantitative based. It will be set up by the Namur team when all the proposals for the three sectors at consideration are defined. This survey aims at validating the application trajectories defined in the scenarios building process, at consolidating the hypotheses that support them.

One important point to be underlined is the iterative character of this whole process. Each of the defined mechanisms has to be considered as having the power to modify at any time the proposals trajectory drawn by the MIAUCE consortium. This means also another regard on the technology which is in the MIAUCE process considered as a flexible part of the work that has to be designed according to the various interests and values suggested by all the associated constituents of this approach.

Another important point to be raised is that even with a methodology properly designed and fully transparent for all the participants, it does not guarantee the democratic and legitimate exercise of it. It is the reason why it is important to call for a diplomatic position or role in this process, a role that has the responsibility to give to each (declared or more hidden) position at discussion a balanced power and to foster the consensus around an acceptable proposal for all the participants. This role can be defined as the procedures keeper.

3.3 - THE PROCEDURE KEEPER OR THE DIPLOMAT[212]

As well underlined by T. RASMUSSEN, scenario building is a political process with stakeholders that confront highly dominant or legitimate positions to more hidden or dominated ones. To create an acceptable future for all the stakeholders, one needs accepted and transparent rules for the scenario game (see the previous sections devoted to the methodology) but also a regulator or a diplomat that guarantee the full respect of the defined rules and procedures. This is what one means by procedure keeper or what M. GODET names the “process expert”.

This role is important if one wants to guarantee the balance of the interests in the whole exercise, even if as underlined by the two authors quoted before, his or her role should stick on the procedure keeping and remain as limited as possible regarding the content of the process.

Let us explain the roles of this procedure keeper or diplomat.

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[212] I. STENGERS (1996), *La guerre des sciences*, La Découverte, Paris.

3.3.1 - The four roles of the procedure keeper

The first main role of this procedure keeper or diplomat is a pedagogical one. The procedure keeper has to explain the methodological rules to each of the participants, to make them accepted by them and to guarantee the respect of the whole procedure during the scenario exercise.

In adapting the concept of diplomatic representation developed by J. LADRIERE[213] in its theory of knowledge, one may consider two additional role for this diplomat or procedure keeper : the translator and the negotiator.

First of all, a diplomat has a role of translator. He/she has to make significant for all the associated parties the arguments, practices and issues raised by one of them. In that sense, the diplomat is always accused to be a betrayer, because he/she is situated between two spaces of evidences and expertises. He/she represents one camp of the experts, and therefore is obliged to think like the experts and their practises, then to translate those preoccupations in terms to be understood by the other 'camp'.

Another role of the diplomat is the negotiator one. The procedure keeper has to help the participants to negotiate social agreements which are acceptable for all the participants. He/she stands in a paradox place, and tries to create some encounters between some opposite camps (scientific camp vs industrial camp vs sociological, ethical and legal camp). While using the principles of precaution and information, the diplomat can exist in discussions and contribute to build an acceptable social contract between the implicated parties.

However, all those roles present the major default to not ensure that ethical values are respected in the design of the scenarios. Because of the difficulty of a consensus among values, raised by the diversity of ethics and morality (traditions, religions, theories, etc...), the diplomat is confronted to the problems of relativism or the supremacy of the universalism. How to elect some ethical values in a democratic way, in order to design them in the technologies? How to agree among all participants? How can we react properly to the election or non-election of ethical values?

This leads us to the fourth role of the procedure keeper or of the diplomat. We may name this role as the caring[214] role. How to define this caring role of the procedure keeper?

A first suggestion is to consider the 'care' as a concept embedded in 'everyday-life' practices, questioning 'what do you care about in your practice?' In every step of designing the technology. It implies a view of *jurisprudence* in the activities of the diplomat. As opposed to the ethical theories that focused on the individual's rights (autonomy, self-determination, privacy,..), an ethic of care emphasizes a person as a part of an interdependent relationship that affects how decisions are made. In this theory the specific situation and context in which the person is embedded becomes a part of the decision-making process. It is important that we always keep in mind that our decisions may affect more than just one person. In MIAUCE project, this caring role is about the respect of the ethical constrains identified not by the participants but by the society as large as non negotiable principles that have to border the design of the scenarios. It is what we named before as the "noyeau dur" of the negotiation or as the ethical pre-determined elements.

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[213] J. LADRIERE. (1968), *Représentation et connaissance*, Paris, Encyclopedia Universalis

[214] Cf. Maria PUIG and Nathalie TRUSSART unpublished thoughts and discussions

All of those four roles must be played all along the process if we want to guarantee the democratic and legitimate character of the solutions designed in the MIAUCE project.

3.3.2 - The procedure keeper in MIAUCE

The question is who is going to play this diplomat or procedure keeper role in the MIAUCE project? In the technical annex, it is underlined that the Namur team is in charge of all the aspects regarding the governance of the project.

To this point of view, it can be sensible to commit the Namur team with this responsibility. But, since the Namur team acts also as the societal experts group in the scenario process, the decision should be sharpened by the consensual election of one member of this team as the diplomat or the procedure keeper for the MIAUCE scenarios exercise process. Once elected, this researcher should comply with the prescripts of the procedure keeper roles as defined just below.

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Annex to chapter 2

Some other projects underlining some societal difficulties raised by AmI techniques

Tiresias COST 219 ter (Cost 219 ter)

According to the presentation found on the cost[215] 219 ter Accessibility for All to services and terminals for next generation mobile networks, "The next generations of mobile systems will have the capability to transmit data, text, voice and pictures and will also be able in due course to transmit videos between fixed or moving terminals with a varying bandwidth that responds to instant demand with the customer being charged accordingly. These systems will provide Internet access as well as point-to-point communication, and will merge with other wireless technologies - such as broadcasting, as well as with fixed systems to a very significant extent. They will also embrace short-range communication links like Bluetooth and IEEE 802.11b, so that mobile equipment can automatically identify and communicate with appliances at home or in the street that have these capacities. Because the new mobile systems will be general conduits for information carriage, and will not be function-specific, they have the potential to form the ideal foundation for an inclusive telecommunications arena.

The "Design for All" approach is a prerequisite in order to ensure that as many persons as possible can use and benefit from the new mobile systems and services. This approach will decrease the need for special adaptations and separate solutions, although this requirement can never be fully removed but has to be taken up separately.

It is therefore essential that further research be carried out on the "Design for All" approach for next generation networks, building on the work carried out by the two previous actions COST 219 and COST 219bis on accessibility to telecommunication in general. As already mentioned, various organisations/programmes are active in this field but they will often be focusing on a single aspect (standardisation, legal aspects, research or education. In this sense the COST mechanism is an ideal framework for implementing a comprehensive approach to "Design for All" and bringing together all the players across Europe (scientists, service providers, users and user organisations) and should continue to prove an efficient means of networking and building on the links established in the two previous Actions. It is also an excellent platform for co-operation with standardisation bodies that are currently working on Human Factor aspects of standardisation and COST has acted as stimulation for national activities and research in the area mainly through he National Reference Groups.

Objectives and benefits of the COST 219 ter

The main objective of the Action is to increase the accessibility of next generation telecommunication network services and equipment to elderly people and people with disabilities by design or, alternatively, by adaptation when required. In cases where this cannot be achieved, the Action will aim at promoting the establishment of appropriate supplementary assistive services and equipment.

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[215] Concerning the TIRESIAS COST 219 TER we must not that the COST action are supported by the EU RTD Framework Programme and that The Council of the European Union provides the COST Secretariat (see cost presentation website: http://www.cost.esf.org/index.php?id=26)

Taking always into account the "Design for All" concept in telecommunications and teleinformatics, especially in the mobile field, the objectives of the Action can be specified in operational terms as follows:

- Extend the existing COST 219 database and the knowledge required for designers on consumers and their requirements, so that many more disabled and elderly people can be catered for in mainstream design,

- Support the exchange of Inclusion and Accessibility issues so that these can be freely explored with developers, researchers and representatives of the telecommunications industries and service providers,"

The Action devoted a chapter to the identification of new opportunities and challenges for the socio economic integration of older people and people with disabilities in an AmI environment. It is first part, starting from European development scenarios (in particular ISTAG scenarios) described possible activities to be carried out in future ambient intelligence environments, and aimed at anticipating to what degree and how people with different disabilities will be able to cope with the foreseen activities. People are considered as "immersed" in the described environments and a preliminary analysis is carried out about the potential integration of individuals who cannot see, hear, speak, manipulate objects, move around or have difficulties with memory, concentration or problem solving. Its second part considers the ethical and legislative issues related to AmI and some of the technology necessary for its implementation. The discussed problems include privacy and transparency, product safety, and trust can be cited.

* The first challenge is related to the intelligence that is considered as an integral part of the emerging environment. Considering the current state of the art in Artificial Intelligence, it is clear that significant improvements are needed in order to realize the environment foreseen in the ISTAG scenarios. For example, even if speech recognition and speech synthesis are improving, the introduction of intonation in synthetic speech, the recognition of speech outside specialist domains, and the translation between different languages require fundamental improvements in the semantic interpretation of messages. The same is true for those aspects of the intelligent environment that are related to people's emotions or difficulties in executing tasks. Obviously, without fundamental improvements with respect to present possibilities, the environment could interfere in the life of citizens in unacceptable and negative ways.

* Second, it must be considered that the analysis presented above is related only to problems of access to information and communication and to other activities that can be supported by improving the possibility of being integrated into the information and communication community. This will obviously not solve all the problems of people, and in any case needs a proactive Design for All approach in order to take full advantage of new possibilities. For example, having speech synthesis or transitory Braille displays as a standard feature of the environment does not automatically mean that all information will be available to people who cannot see, because this will depend on how the information is stored and structured. Since it is clearly impossible to adapt all the databases connected to the network, it will be necessary to use a Design for All approach (for example, the WAI guidelines) to represent information in a form that is amenable to a "transduction" using text (speech or Braille). But this is not sufficient. For example, if information about accessibility is not available in a hotel database, no guideline regarding the representation of information and no adaptation will help.

Many other aspects of the development of an intelligent environment must be discussed as to their impact on the population at large and on people with disabilities in particular. First of all, it is necessary to investigate how human functions will be engaged in the emerging forms of interaction and how this interaction will affect individual perceptive and cognitive spaces. The emerging environment will be very complex and stimulating, from both a sensorial and cognitive perspective. It is not clear whether people will be able to cope with the hyper-stimulation and the corresponding cognitive load. This is particularly true for people with reduced abilities, and principally for people with cognitive limitations. The environment must be developed in such a way that the capabilities of people are taken into account, for example, in order to balance the distribution of tasks between the user and the intelligent environment itself.

This introduces another very important aspect. The acceptance of the new environment by the citizens will also depend on their trust in it and, therefore, on their level of acceptance of delegation. This may be a particularly sensitive point for people with disabilities, who might need to delegate more than other users and have additional problems in conceptualising the situation. Therefore, the environment must both incorporate all the adaptation and personalisation facilities needed by all the groups of potential users, as well as provide to users the possibility to really understand the facilities available and the implications of delegating certain tasks to the intelligent environment.

Impact on emotion, vigilance, information processing and memory must be considered with particular attention when people with disabilities are involved. On a lower level, it is necessary to avoid forms of interaction that may lead to negative consequences such as confusion, cognitive overload, and frustration.

Another challenge involves privacy and security. The possibility of adapting the environment to different types of users requires the availability of information about them. In the case of people with disabilities, this information may be very sensitive. It is therefore of paramount importance that users can trust the privacy guaranteed by the system. Privacy has always been a very important problem in any control system. The problem is made more sensitive now by the fact that the control will not be effected by a dedicated system, but by an omnipresent intelligent environment.

Lastly, security is another very import aspect. The intelligent environment, including also the support infrastructure, is a very complex system. It has recently been demonstrated that complex systems are prone to collapse (electrical blackouts due to the collapse of the distribution system are a well-known example). This could be very dangerous if human society is organised around complex information and communication system such as the one envisaged in the AmI scenarios. This has particularly importance for people with disabilities, who will rely more heavily on the available facilities. Therefore, backup strategies, redundancy and error checking facilities will have to be available in the system and must be understandable by end users

Emerging challenges related to Ami according to cost 219 ter (Cost 219 ter)

ASK-IT (Ambient Intelligence System of Agents for Knowledge-based and Integrated Services for E&D users) http://www.ask-it.org/ (in particular their Ethics- Manual)

ASK-IT is an integrated project, partly funded by the European Commission under the 6th Framework Programme, e-Inclusion. The driving vision behind the ASK-IT project is to develop services based on Information Communication Technologies (ICT) that will allow Mobility Impaired people to live more independently. Through a device (mobile phone, PDA) users will have access to relevant and real-time information primarily for travelling but also whilst home, for work and leisure services. The emphasis is on a seamless service provision and a device that is intelligent enough to address the personal needs and preferences of the user. For example, information for a visually impaired person will be given orally, while for an illiterate person mostly in graphics. The project involves a demonstration phase during which the ASK-IT system will be tested and evaluated in 8 cites across Europe. ASK-IT involves 57 partners from a range of organisation, including industry, research institutes and European user associations and is coordinated by SIEMENS and CERTH/HIT (Hellenic Institute of Transport, Greece).

GUIDE (C**reating a European Identity Management Architecture for eGovernment)** (http://istrg.som.surrey.ac.uk/projects/guide/, The domain of eGovernment has been identified as a strategic concern for the EU. The European Council's Conclusions on eGovernment (20 November 2003, 14671/03) have called for strategic research and technological development in e-Government. The Council has recognised the "contribution of the public sector in achieving the Lisbon goals through the modernisation of public administrations". It calls for projects that will "evaluate necessities, obstacles and solutions…[and] explore…possible interoperable European solutions for citizens' and companies' authentication for eGovernment…in order to facilitate mobility in Europe and provide cross-border services on line". GUIDE applies an inter-disciplinary perspective to this problem, bringing together internationally recognised expertise in technology, institutional, policy, socio-economic, legal and ethical research. GUIDE recognises the specific needs of the EU based upon the social, ethical and legislative differences regarding privacy and data protection. The approach of the project is 'integrative' in that it seeks to overcome the fragmentation of existing IdM initiatives, which inhibits the efficient operation of eGovernment services they are designed to facilitate.
The vision of GUIDE is to:

* Develop a technological, institutional, policy and socio-economic architecture for eGovernment services in the EU Establish Europe as world leader in the provision of eGovernment solutions

* By establishing an open identity management architecture for eGovernment solutions, GUIDE seeks to enable governments to offer high quality services to businesses and citizens by increasing efficiencies and reducing administrative costs.

PRIAM: Privacy Issues and AMbient intelligence (http://priam.citi.insa-lyon.fr/index.php?option=com_content&task=vi), The techniques under development in the field of ambient intelligence may soon lead to a society where people are surrounded by intelligent objects capable of interacting in an unobtrusive and often invisible way. While many applications of ambient intelligence benefit to the users, these new techniques also present enormous technical challenges for privacy and security because of the huge amount of behavioural, personal and even biological data being recorded and disseminated.But privacy policies are difficult to characterize, to specify and to implement. In addition, enforcing privacy cannot be tackled exclusively by technical means: this is clearly one of the areas where strong interactions are required between experts from various disciplines (technology, law, social sciences, etc.).

The PRIAM project (http://priam.citi.insa-lyon.fr/) has been set up to address these issues in a transversal and multidisciplinary way. PRIAM puts strong emphasis on the collaboration between lawyers and experts from the information and communication technology. The focus of the project is as follows:

- On the methodological side: put forward or characterize techniques which can meet both legal and technical requirements.

- On the technological side: emphasize the design of privacy policies that are amenable to realistic implementations in the ambient world. This objective requires strong interactions between experts in formal methods, in operating systems and communication technologies.

PRIME. (Privacy and Identity Management for Europe) - http://www.prime-project.eu.org/), in particular the PRIME white paper

PRIME aims to develop a working prototype of a privacy-enhancing Identity Management System. To foster market adoption, novel solutions for managing identities will be demonstrated in challenging real-world scenarios, e.g., from Internet Communication, Airline and Airport Passenger Processes, Location-Based Services and Collaborative e-Learning.

PISA The Privacy Incorporated Software Agents (PISA; www.pet-pisa.nl)

The Privacy Incorporated Software Agents (PISA; www.pet-pisa.nl) project was a European Fifth Framework project whose goal was to develop and demonstrate Privacy-Enhancing Technologies (PET) that will protect the privacy of individuals when they use services that are implemented through intelligent software agents. An integral part of the project was to examine the human-computer interaction (HCI) implications and develop interface specifications. The goal of these HCI activities was to build an agentbased service that people will trust with sensitive, personal information and one that will operate according to privacy-protection requirements coming from legislation and best practices.

To meet these goals, three different research activities have been conducted. The first was to carefully examine the concept of "trust" and review what is known about building trustworthy systems. It was found that intelligent, autonomous agents have the potential to facilitate complex, distributed tasks and protect users' privacy. However, building agents users will trust with personal and sensitive information is a difficult design challenge. Agent designers must pay attention to human factors issues that are known to facilitate feelings of trust. These include providing transparency of function, details of operation, feedback, and predictability. They must also consider factors that lead to feelings of risk taking. This means reducing uncertainty, collecting the minimal amount of information, and carefully considering the amount of autonomy an agent will have.

The second research activity was to examine the privacy legislation and principles to determine the human factors implications and consequences. The goal of this work was to document a process that begins with privacy legislation, works through derived privacy principles, examines the HCI requirements, and ends with specific interface design solutions. This research involved a phrase-by-phrase analysis of the European Privacy Directive (95/46/EC) to determine the human behaviour requirements that were implied by the legal constructs. Interface design techniques were then outlined for each of the requirements, and specific design solutions were developed for the PISA Demonstrator. The result was a set of recommendations for implementing "usable compliance" with privacy legislation and principles.

The third research activity was to conduct a preliminary usability test of portions of a PISA interface design prototype. The research results indicated that users could use the major features of the interface, such as creating a job-searching agent. However, some of the specific features, such as controlling specific privacy preference parameters, were in need of more attention. Concerning understanding, the results clearly indicated that users had difficulty understanding the privacy preference terms used in the interface, and this was the most important characteristic to improve. Finally, users found the service to be trustable, although it is clear that, with the problems in understanding the interface, the maximum possible trust was not created.

European project that addressed issues (ethical and societal) raised by AmI Those projects addressed those issues also from a technical perspective

Miauce Kickoff Meeting in Greece, September 5th and 6th 2006

Research Agenda

MIAUCE

WP 5 – Social, Ethical, and Legal issues

Prof. Philippe Goujon – Prof. Claire Lobet-Maris
Prof. Yves Poullet – Mr. Denis Darquennes

CRID - University of Namur, Belgium

CITA - University of Namur, Belgium

University of Namur (FUNDP)

- **Middle-size university (4.500 students)**
- **Located in the capital of the Walloon Region**
- **Excellence in Computer Science and in human aspects of ICT (legal – CRID, ethical and social – CITA)**

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CITA-FUNDP (Namur-Belgium)

- **Interdisciplinary Centre for Technology Assessment**
  - Ethical issues raised by ICT
  - Sociological approach of ICT use
  - Social and organizational aspects of ICT systems design
  - ICT governance and politics
- **Interdisciplinary team**
  - 2 academics (sociology and philosophy)
  - 10 researchers (sociology, cultural studies, communication, philosophy, historical science, applied economics)
- **Working and networking**
  - Contracts funded by Region – Federal State – EU
  - Annual academic seminars : "Trust and Governance"
  - COST 298 Network – CEFRIO (Canadian network…)

CRID-FUNDP (Namur-Belgium)

❑ **Interdisciplinary team focusing on the ICT legal aspects**
- 6 academics (Economists, Lawyers)
- 30 researchers

❑ **Working and networking**
- Contracts funded by Region – Federal State – EU – International organisations (UNESCO, Council of EUROPE)
- Annual seminars (JURITIC) and support for the postgraduate programmes (DGTIC)
- ECLIP Network

❑ **Themas**
- IPR
- PRIVACY and LIBERTIES in the I.S.
- ELECTRONIC COMMERCE
- TELECOMMUNICATION REGULATION
- SECURITY ISSUES

Summary

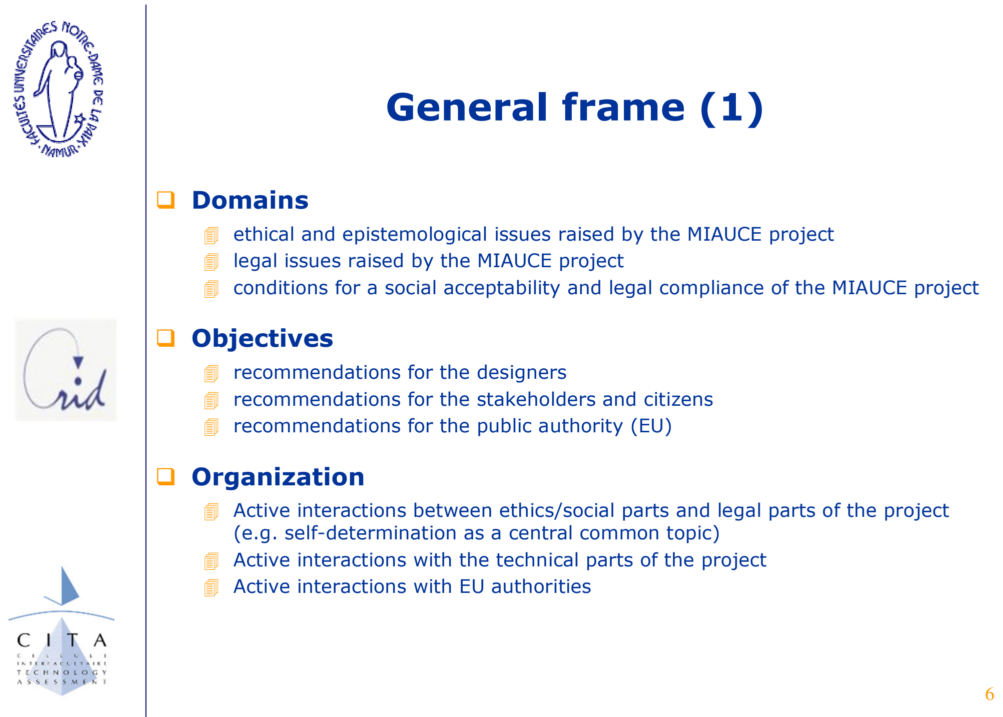
❑ General frame :
- The Process Diagram in three steps

❑ First step :
- task 1 : General landscape of the technology
- task 2 : The representation : the MIAUCE concept

❑ Second step :
- Tasks 3 to 5 : the ethical, sociological and legal entries

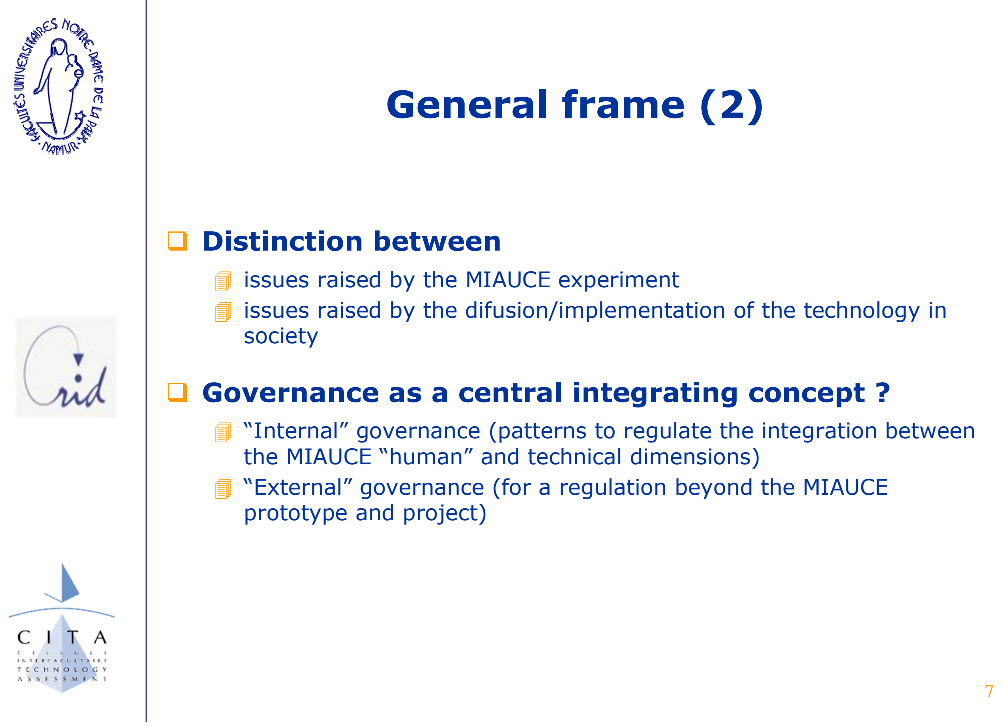
❑ Third step :
- Tasks 6 to 7 : Empirical approach and recommendations

❑ Questions



General frame (1)

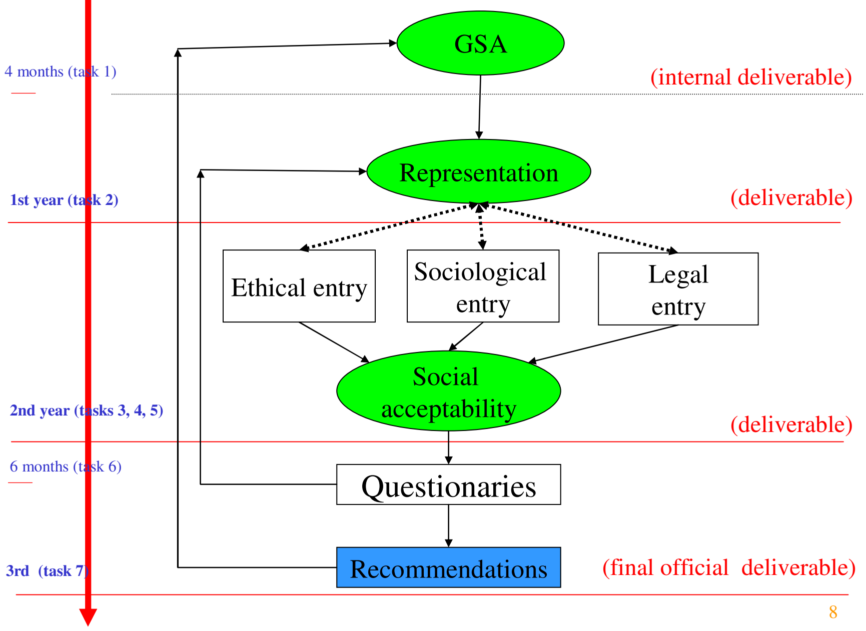
- **Domains**
  - ethical and epistemological issues raised by the MIAUCE project
  - legal issues raised by the MIAUCE project
  - conditions for a social acceptability and legal compliance of the MIAUCE project
- **Objectives**
  - recommendations for the designers
  - recommendations for the stakeholders and citizens
  - recommendations for the public authority (EU)
- **Organization**
  - Active interactions between ethics/social parts and legal parts of the project (e.g. self-determination as a central common topic)
  - Active interactions with the technical parts of the project
  - Active interactions with EU authorities



General frame (2)

- **Distinction between**
  - issues raised by the MIAUCE experiment
  - issues raised by the difusion/implementation of the technology in society
- **Governance as a central integrating concept ?**
  - “Internal” governance (patterns to regulate the integration between the MIAUCE “human” and technical dimensions)
  - “External” governance (for a regulation beyond the MIAUCE prototype and project)

The Process Diagram


GSA
4 months (task 1)
(internal deliverable)
Representation
1st year (task 2)
(deliverable)
Ethical entry
Sociological entry
Legal entry
Social acceptability
2nd year (tasks 3, 4, 5)
(deliverable)
6 months (task 6)
Questionaries
3rd (task 7)
Recommendations
(final official deliverable)
8

First step :

task 1 : General landscape of the technology

task 2 : The representation : the MIAUCE concept

Task 1. General State of the Art of the technology (4 months)

- Objectives
  - Technical, historical and cultural fondations of this type of technology
  - Identification and classification of the major social, ethical, and legal issues
  - Models of governance
- Process
  - Bibliographical research
  - Visit to the laboratories
  - Analysis of the ethical framework
  - Feedback to the partners (Seminars ?)
- Outcome : Internal delivrable
  - Bibliography
  - Ethical, sociological and legal issues identification and classification
  - Goals : to alert the partners about the social, ethical and legal issues and to create a certain awareness

Task 2 : The MIAUCE concept (8 months)

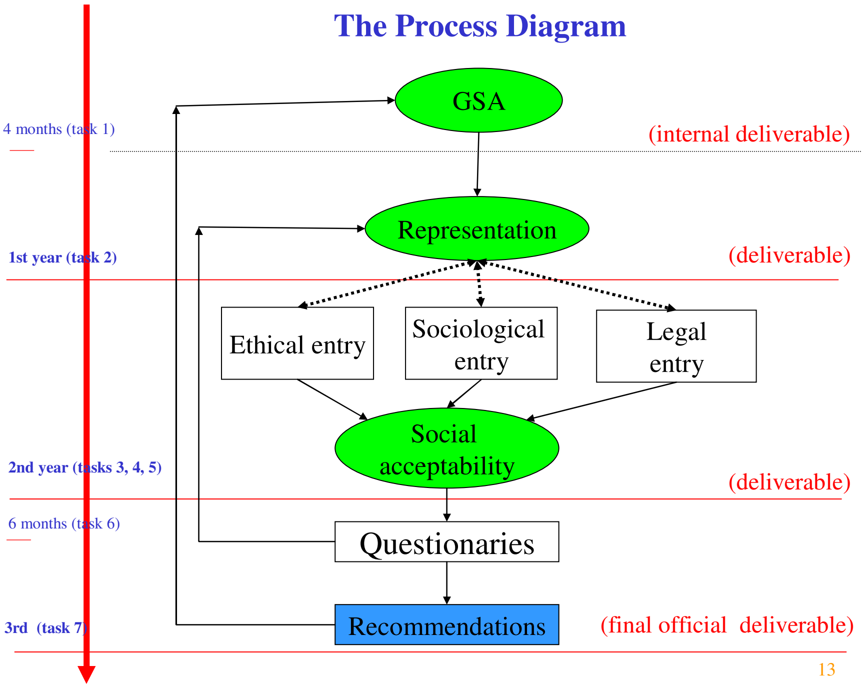
- Objective
  - Knowledge consolidation regarding MIAUCE (History, technical and specification basis, aims and social meaning, legal bases,… of the project)
- Process
  - Visits to the Lille Laboratory and interviews of the researchers associated to the MIAUCE project
  - Documentation analysis

First official deliverable (12 months)

Second step :

Tasks 3 to 5 : the ethical, sociological and legal entries

The Process Diagram



4 months (task 1)

GSA

(internal deliverable)

1st year (task 2)

Representation

(deliverable)

Ethical entry

Sociological entry

Legal entry

Social acceptability

2nd year (tasks 3, 4, 5)

(deliverable)

6 months (task 6)

Questionaries

3rd (task 7)

Recommendations

(final official deliverable)

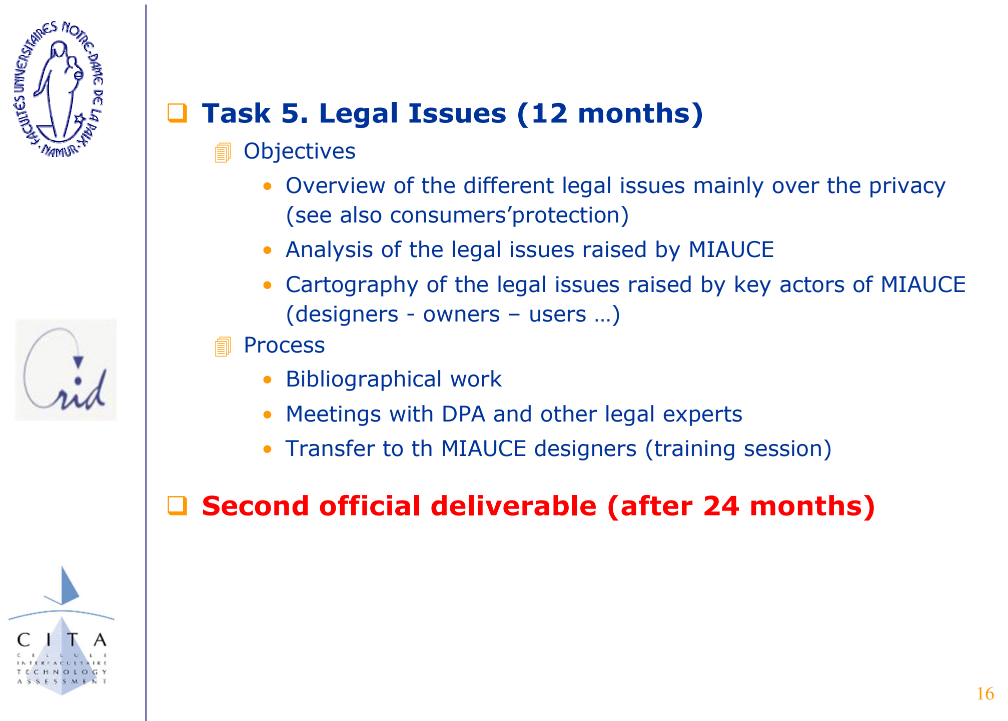
13

❑ Task 3. Ethical approach of MIAUCE (12 months)

- Objectives
  - Theoretical approach of Ethics
  - Analysis of the ethical issues raised by MIAUCE
  - Cartography of the ethical issues raised by key actors of MIAUCE (designers - owners – users …)
    - Non exhaustive: identity, responsibility, determinism, limits to be integrated into the design, relation between machine, culture and society,…
- Process
  - Bibliographical work
  - Interviews of a sample of key actors (of MIAUCE and also other concerned people (searchers, politics, associations,…)
  - Transfer to the MIAUCE designers (training sessions ?)

❑ Task 4. Sociological approach of MIAUCE (12 months)

- Objectives
  - Theoretical approach of social acceptability (S.A.) concepts
  - Analysis of the sociological issues raised by MIAUCE
  - Cartography of the sociological issues raised by key actors of MIAUCE (designers - owners – users …)
    - Non exhaustive : social use and fields of application, reflexivity, autonomy vs control, informational powers' balance,…
- Process
  - Bibliographical work
  - Interviews of a sample of key actors
  - Transfer to the MIAUCE designers (training session ?)



❑ **Task 5. Legal Issues (12 months)**

- Objectives
  - Overview of the different legal issues mainly over the privacy (see also consumers'protection)
  - Analysis of the legal issues raised by MIAUCE
  - Cartography of the legal issues raised by key actors of MIAUCE (designers - owners – users …)
- Process
  - Bibliographical work
  - Meetings with DPA and other legal experts
  - Transfer to th MIAUCE designers (training session)

❑ **Second official deliverable (after 24 months)**

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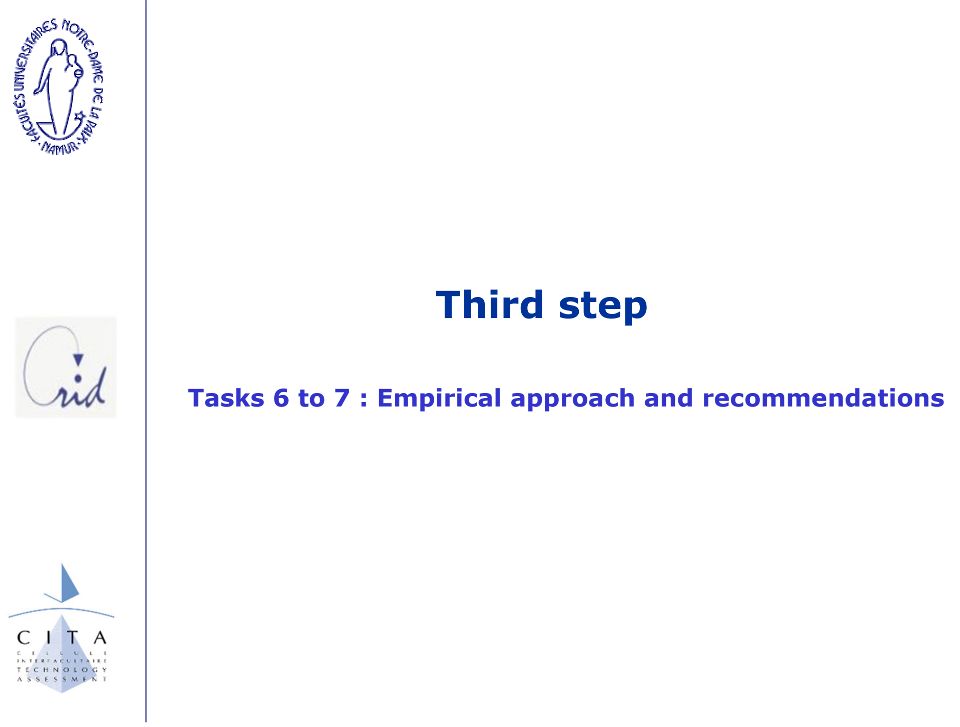
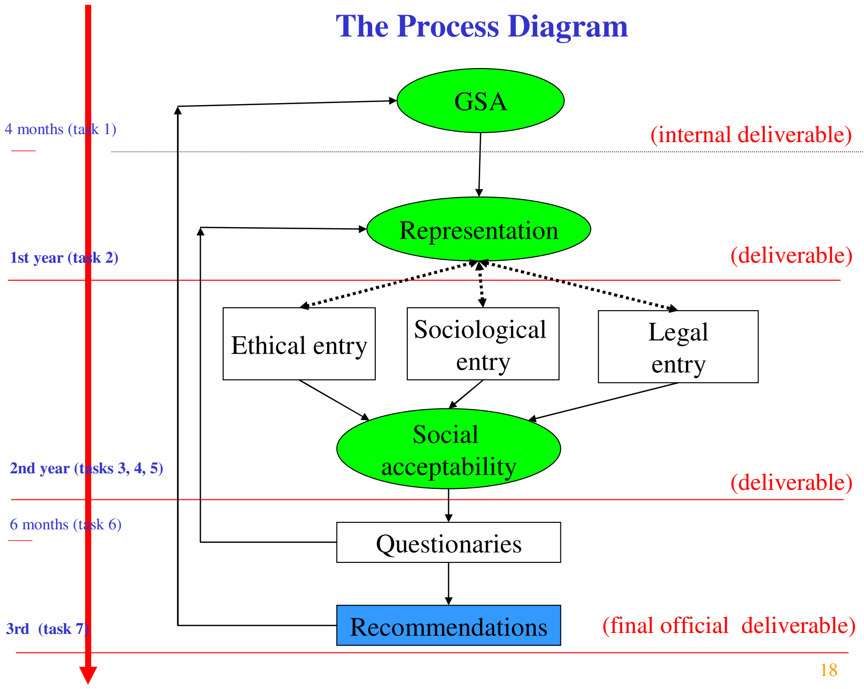


Third step

Tasks 6 to 7 : Empirical approach and recommendations

The Process Diagram



4 months (task 1)

GSA

(internal deliverable)

1st year (task 2)

Representation

(deliverable)

Ethical entry

Sociological entry

Legal entry

2nd year (tasks 3, 4, 5)

Social acceptability

(deliverable)

6 months (task 6)

Questionaries

3rd (task 7)

Recommendations

(final official deliverable)

❑ Task 6. Empirical approach of ethical, legal and S.A. conditions regarding MIAUCE and AI systems (6 months)

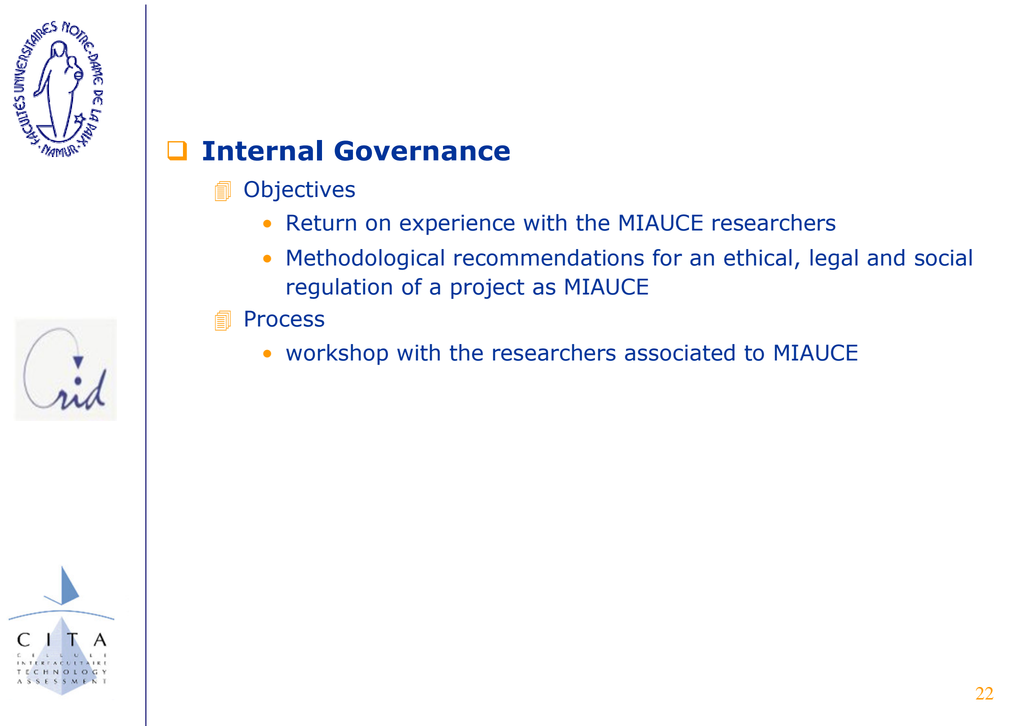
- Objectives
  - Validate the ethical norms and principles that should govern MIAUCE and AI sytems, including legal aspects
  - Validate the sociological conditions
  - Validate the legal frame that should govern those systems
- Process
  - Methodology of sampling and selection of two samples : potential end-users (N = 250) - potential users (industries, services, administrations) (N=100)
  - Elaboration of the questionnaires and administration via WEB survey or other methods (to define regarding the budget constraints)
  - Analysis of the results
  - Transfer to the MIAUCE designers (training session ?)

Task 7. Recommendations (6 months)

- Internal governance : limits / constraints, principles
  - For the designers of the system
  - For the Commission (EU)
  - For the Society
- External governance : socio-technical system
  - For the designers of the system
  - For the Commission (EU)
  - For the Society

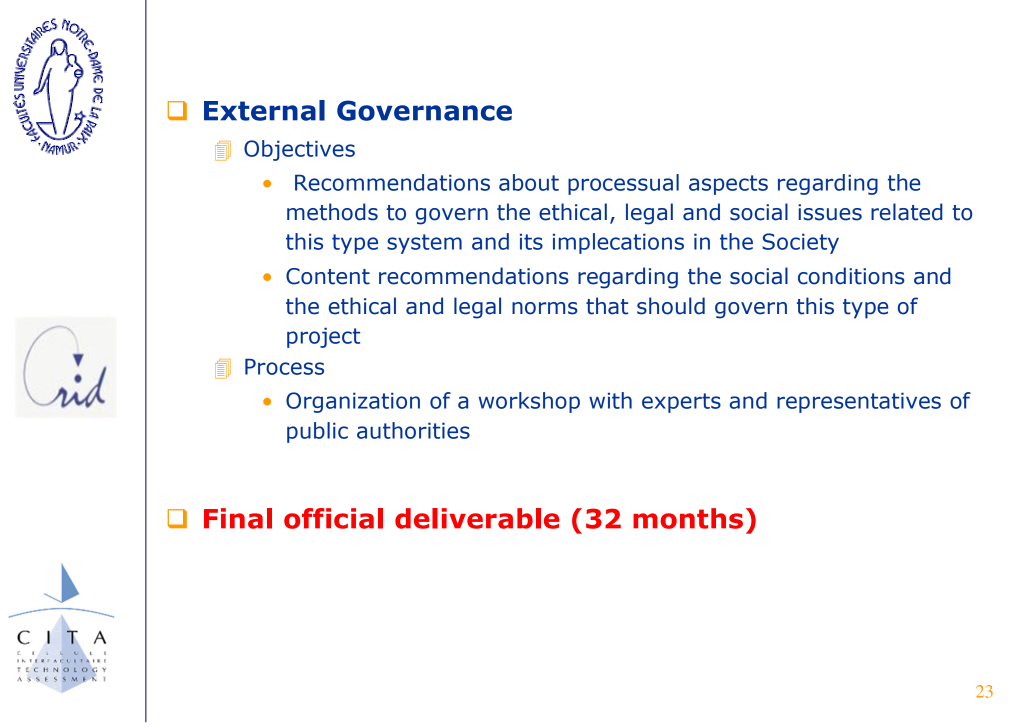
Feed-back over the Governance Approach

- Objectives
  - Analysis of different frames of governance to regulate the ethical norms, the legal principles and the social conditions that should shape a project as MIAUCE considered both as an experiment and, in a foreseen future, as a disseminated technology
  - Identification of an appropriate frame
- Process
  - Theoretical analysis of governance frames
  - Feed-back with the GSA theoretical model of governance



❑ Internal Governance

- Objectives
    - Return on experience with the MIAUCE researchers
    - Methodological recommendations for an ethical, legal and social regulation of a project as MIAUCE
- Process
    - workshop with the researchers associated to MIAUCE



❑ External Governance

- Objectives
    - Recommendations about processual aspects regarding the methods to govern the ethical, legal and social issues related to this type system and its implecations in the Society
    - Content recommendations regarding the social conditions and the ethical and legal norms that should govern this type of project
- Process
    - Organization of a workshop with experts and representatives of public authorities

❑ Final official deliverable (32 months)

Questions

- **Questions regarding the integration to the technical project (regular meetings ?)**
- **Questions concerning the communication between the partners**
- **Questions regarding organisation & planning (final meeting ? Travel budget ?)**
- **Evaluation criteria and process**

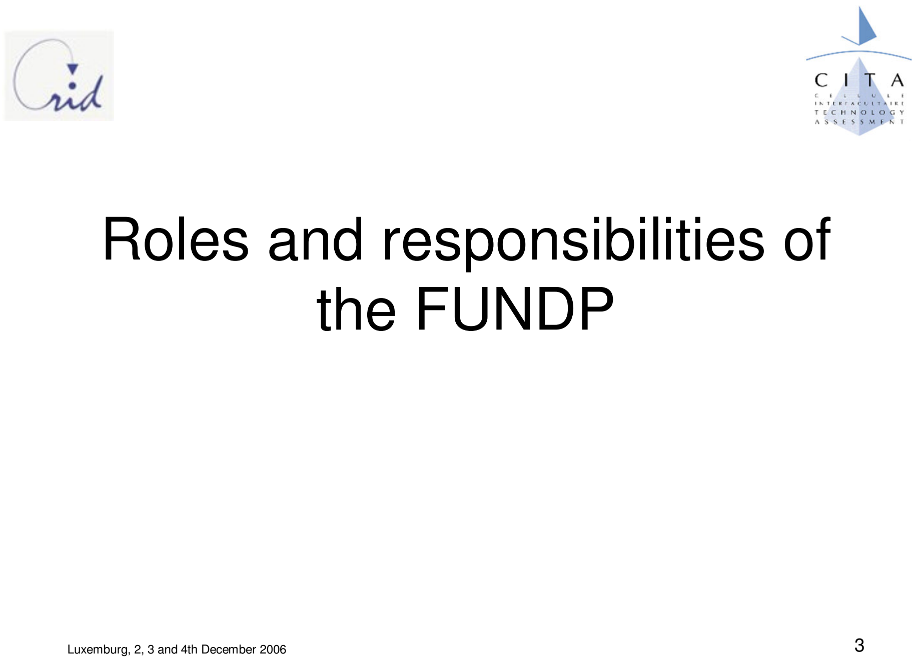
Miauce Meeting in Luxemburg, December 2nd and 3rd 2006

MIAUCE Meeting
WP 5 - FUNDP (CITA / CRID)

Luxemburg, December 2nd, 3rd and 4th 2006
Denis Darquennes (CRID) – Philippe Goujon,
Nathalie Grandjean & Claire Lobet-Maris
(CITA)

Outline

- Role and responsibilities of FUNDP
- Three stages of innovation
- Meanings of technology
- Legal approach
- Ethical approach
- Sociological approach
- Governance
- Next steps for WP5
- Conclusion



Roles and responsibilities of the FUNDP

Luxemburg, 2, 3 and 4th December 2006

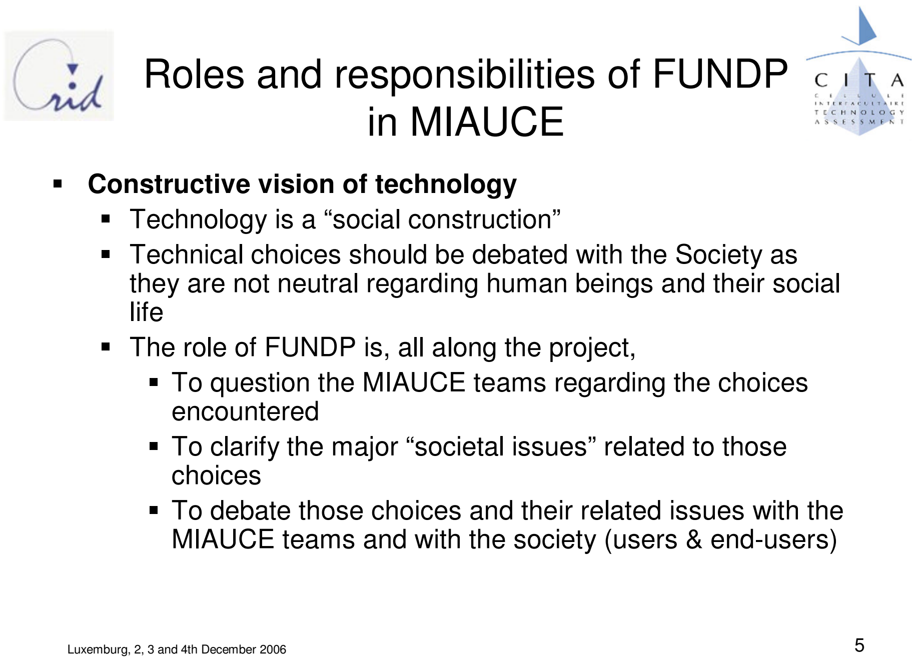
3

Responsibilities

- Two main responsibilities
  - Content responsibility : help the project design regarding its legal, ethical and social requirements
  - Process responsibility : design governance's patterns to insure a true « socio-technic » dynamics

Luxemburg, 2, 3 and 4th December 2006

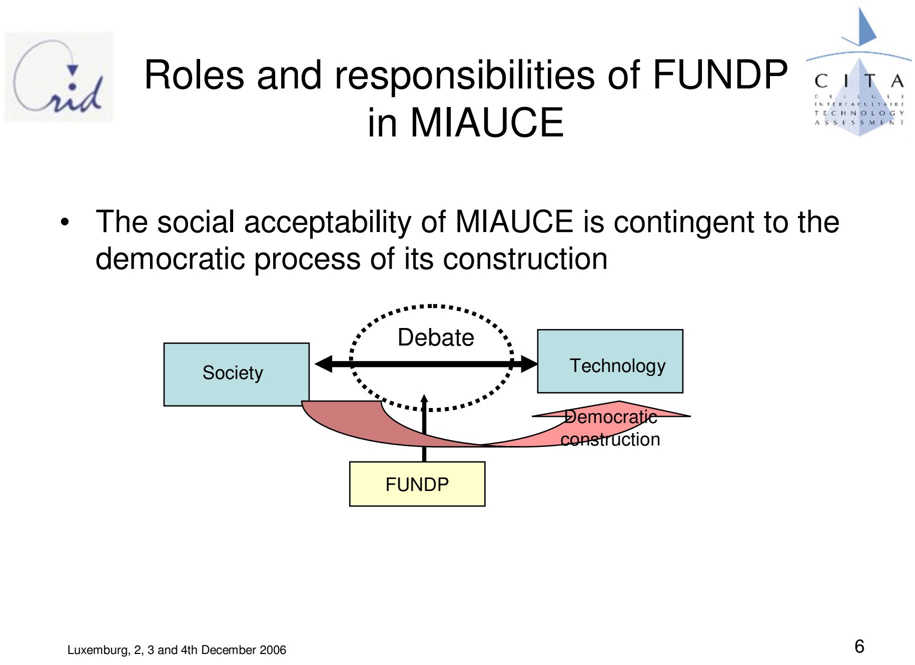
4



Roles and responsibilities of FUNDP in MIAUCE

- **Constructive vision of technology**
  - Technology is a “social construction”
  - Technical choices should be debated with the Society as they are not neutral regarding human beings and their social life
  - The role of FUNDP is, all along the project,
    - To question the MIAUCE teams regarding the choices encountered
    - To clarify the major “societal issues” related to those choices
    - To debate those choices and their related issues with the MIAUCE teams and with the society (users & end-users)

Luxemburg, 2, 3 and 4th December 2006

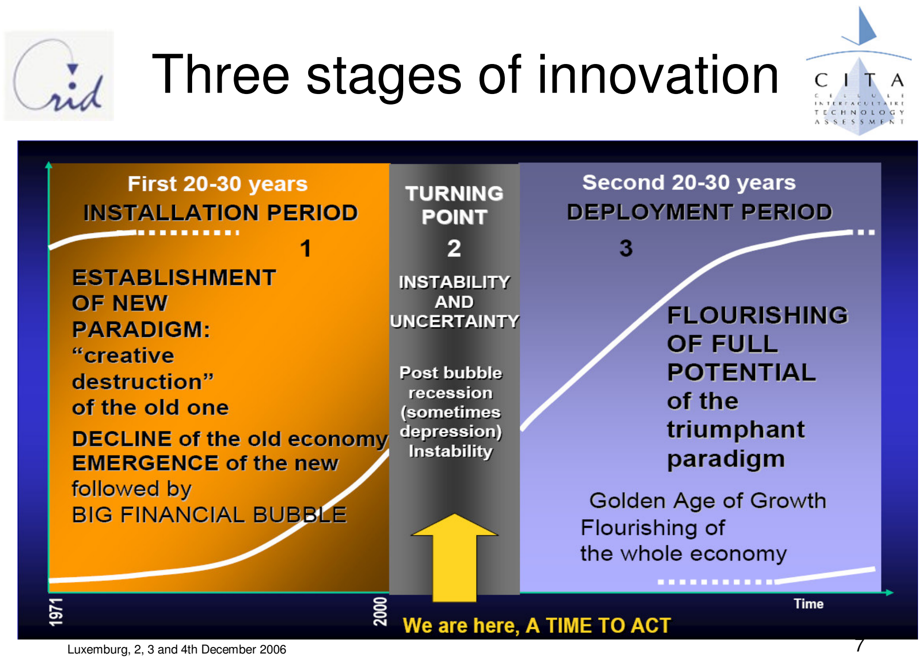


Roles and responsibilities of FUNDP in MIAUCE

- The social acceptability of MIAUCE is contingent to the democratic process of its construction

Debate
Society
Technology
Democratic construction
FUNDP

Luxemburg, 2, 3 and 4th December 2006



Three stages of innovation

First 20-30 years
INSTALLATION PERIOD
1

ESTABLISHMENT OF NEW PARADIGM: “creative destruction” of the old one

DECLINE of the old economy
EMERGENCE of the new
followed by
BIG FINANCIAL BUBBLE

TURNING POINT
2

INSTABILITY AND UNCERTAINTY

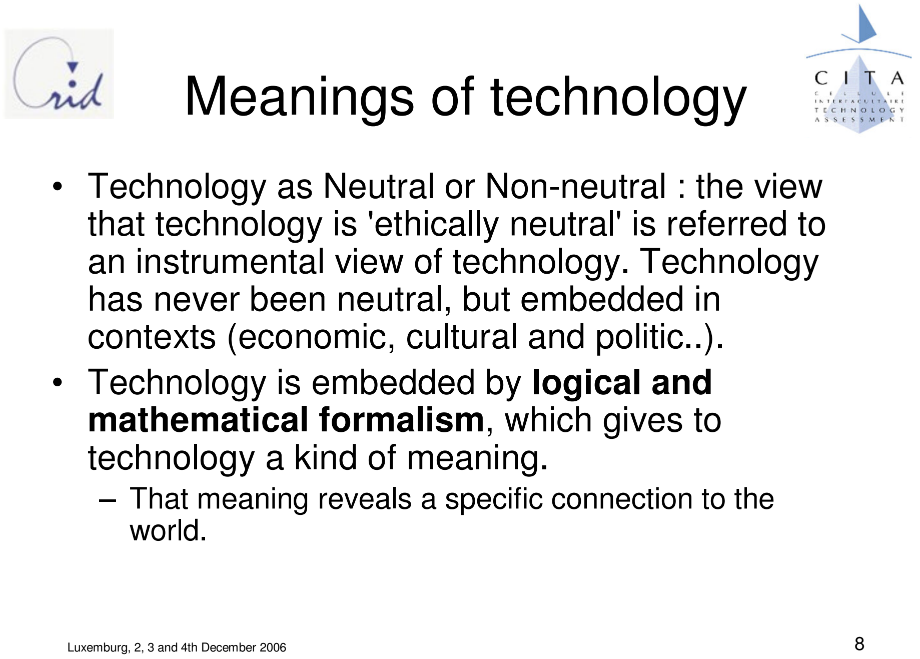
Post bubble recession (sometimes depression) Instability

Second 20-30 years
DEPLOYMENT PERIOD
3

FLOURISHING OF FULL POTENTIAL of the triumphant paradigm

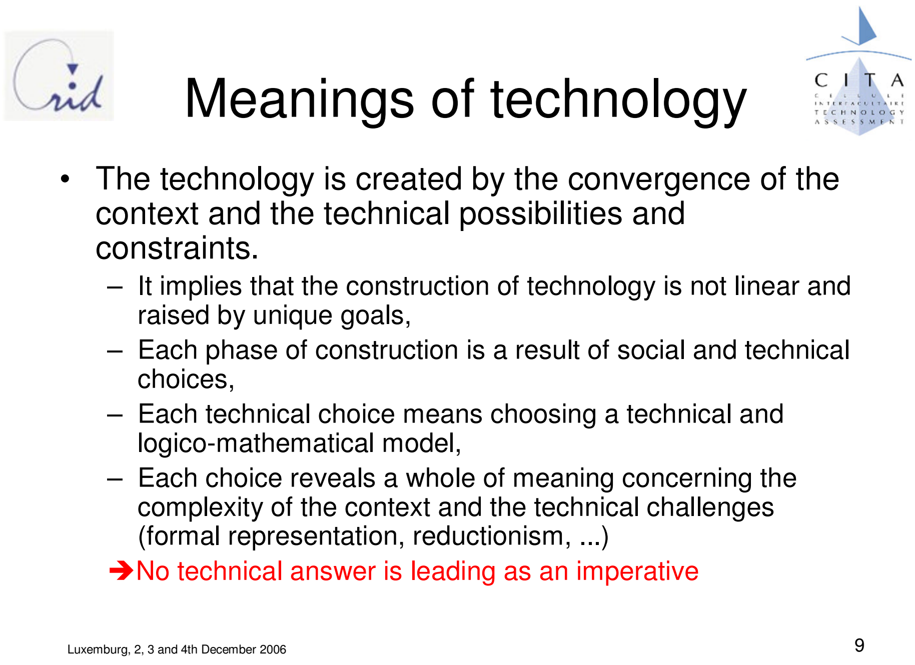
Golden Age of Growth
Flourishing of the whole economy

We are here, A TIME TO ACT



Meanings of technology

- Technology as Neutral or Non-neutral : the view that technology is 'ethically neutral' is referred to an instrumental view of technology. Technology has never been neutral, but embedded in contexts (economic, cultural and politic..).
- Technology is embedded by **logical and mathematical formalism**, which gives to technology a kind of meaning.
  - That meaning reveals a specific connection to the world.



Meanings of technology

- The technology is created by the convergence of the context and the technical possibilities and constraints.
  - It implies that the construction of technology is not linear and raised by unique goals,
  - Each phase of construction is a result of social and technical choices,
  - Each technical choice means choosing a technical and logico-mathematical model,
  - Each choice reveals a whole of meaning concerning the complexity of the context and the technical challenges (formal representation, reductionism, ...)

➔No technical answer is leading as an imperative

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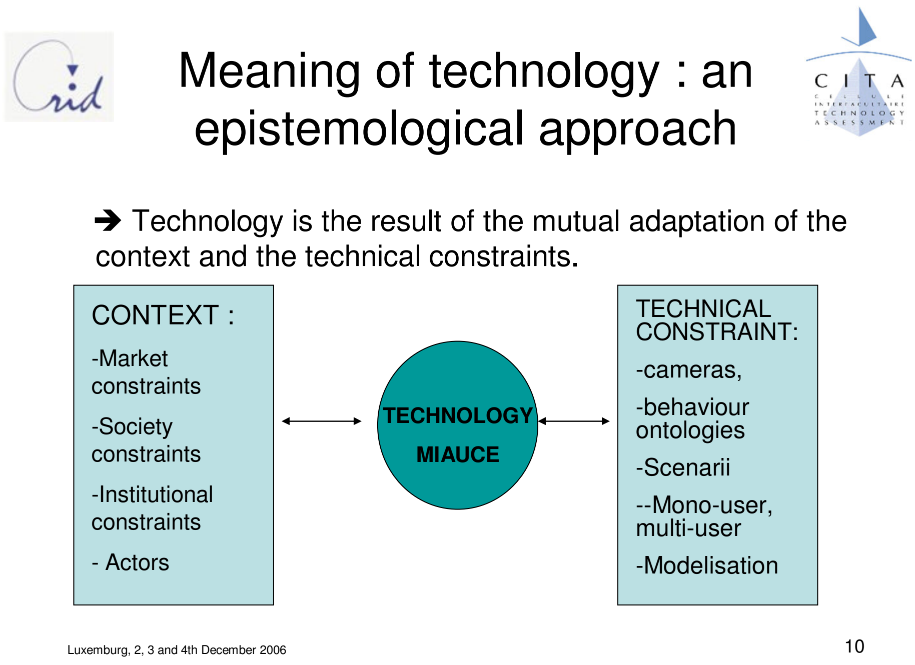

Meaning of technology : an epistemological approach

➔ Technology is the result of the mutual adaptation of the context and the technical constraints.

CONTEXT :

-Market constraints

-Society constraints

-Institutional constraints

- Actors

TECHNOLOGY MIAUCE

TECHNICAL CONSTRAINT:

-cameras,

-behaviour ontologies

-Scenarii

--Mono-user, multi-user

-Modelisation

Luxemburg, 2, 3 and 4th December 2006

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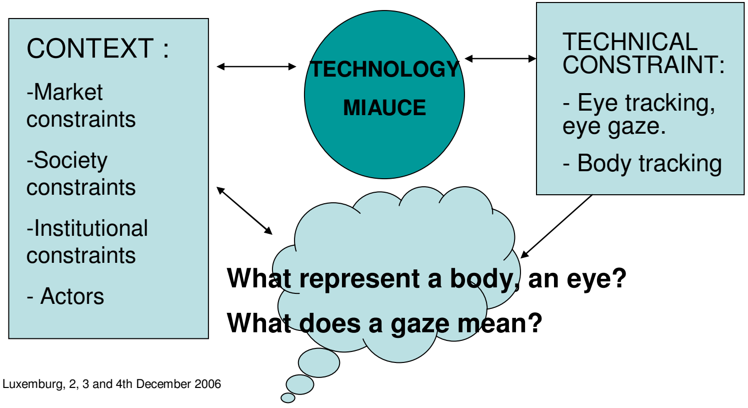
Meaning of technology : an epistemological approach

➔ Technology is the result of the mutual adaptation of the context and the technical constraints.



CONTEXT :

-Market constraints

-Society constraints

-Institutional constraints

- Actors

TECHNOLOGY

MIAUCE

TECHNICAL CONSTRAINT:

- Eye tracking, eye gaze.

- Body tracking

What represent a body, an eye?

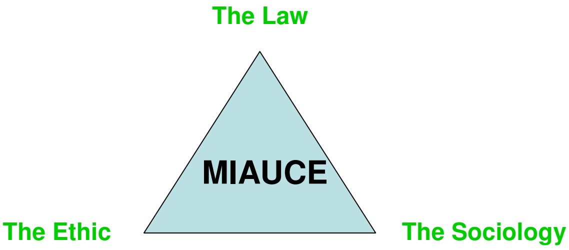
What does a gaze mean?

Meanings of technology

- It implies that technological choices made during the construction of the technology are never neutral. We need to debate about.
- If the technological choices are made without reflexivity (debates about its framing and its meaning), the legitimacy and the social acceptability is in question.
- Therefore,

➔ What is technically feasible is not necessarily socially, legally and ethically acceptable.

Societal frame



The Law

MIAUCE

The Ethic

The Sociology

Legal approach

What is « the Legal framework » ?

- ✓Every technology acts in a legal frame …
- ✓Is this enough to respect the rules ? What is de common perception of the Law ?
- ✓ Convention 108 of the Council of Europe for the protection of person regarding the automated processing of personal data…

1. Everyone has the right to respect for his private and family life, his home and his correspondence.
2. There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the **law** and is **necessary** in a **democratic society** in the interests of **national security**, **public safety** or the **economic well-being** of the country, for the **prevention of disorder or crime**, for the **protection of health or morals**, or for the **protection of the rights and freedoms** of others.

- ✓ Directive 95/46/EC on the protection of individuals with regard to the processing of personal data and on the free movement of such data…
- ✓ Charter of the Fundamental Rights of the European Union (2000)…

Luxemburg, 2, 3 and 4th December 2006

15

What is « privacy » ?

- ✓ Our back shop where we can establish our liberty, our main refuge and solitude
- ✓ « The right to be let alone » (1890)
- ✓ « The solitude with many » ie the right to establish relations with somebody without to be exposed to illegal interference (1984)

Intimate sphere protected from interference and where individual may choose to reveal or not some infomations about him.

- ✓ The right for privacy to be respected means the right to lead his life as we please, with a minimum of interference (Recom. Ass Council of Europe 23.01.1970)

Right for physical and mental peak; freedom of being yourself
Freedom to make existential choices

- ✓ German Constitutional Court (1983)

The “right to self-determination”, i.e. the right of the “control over the informational environment”, wherein the “informational picture” moves or is used.

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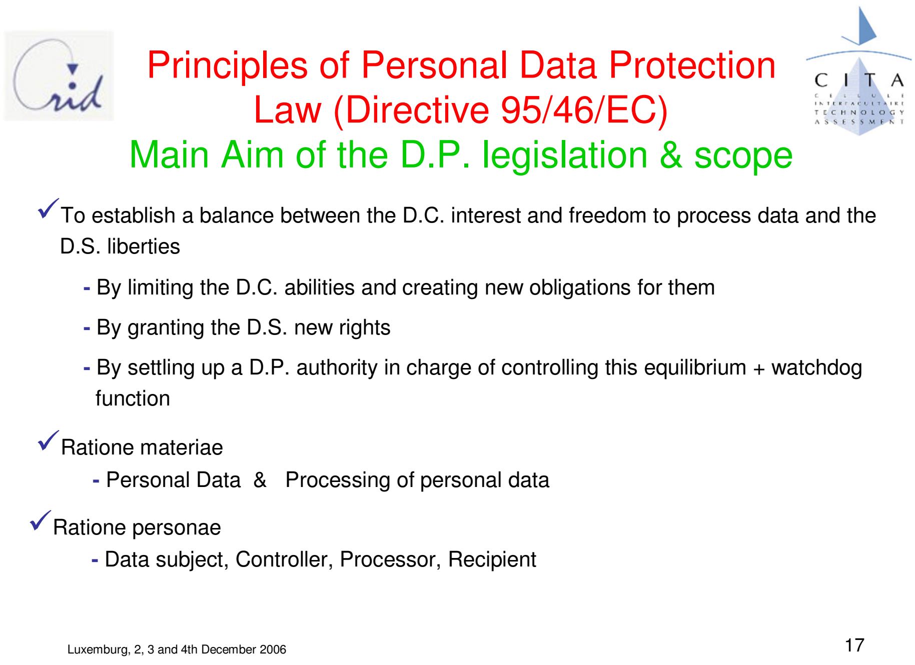

Principles of Personal Data Protection Law (Directive 95/46/EC)
Main Aim of the D.P. legislation & scope

- ✓ To establish a balance between the D.C. interest and freedom to process data and the D.S. liberties
  - By limiting the D.C. abilities and creating new obligations for them
  - By granting the D.S. new rights
  - By settling up a D.P. authority in charge of controlling this equilibrium + watchdog function
- ✓ Ratione materiae
  - Personal Data & Processing of personal data
- ✓ Ratione personae
  - Data subject, Controller, Processor, Recipient

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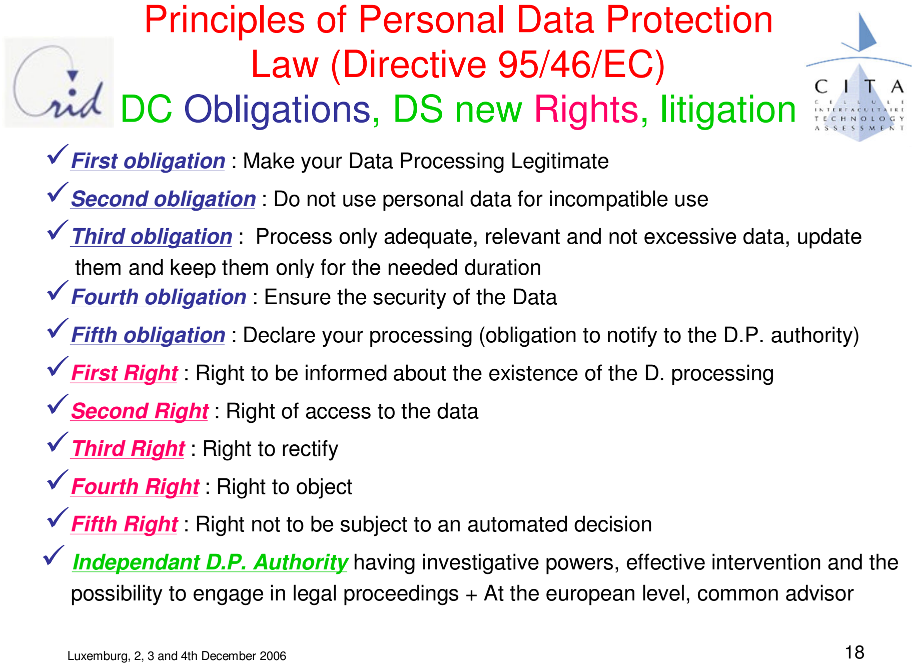

Principles of Personal Data Protection Law (Directive 95/46/EC)
DC Obligations, DS new Rights, litigation

- ✓ ***First obligation*** : Make your Data Processing Legitimate
- ✓ ***Second obligation*** : Do not use personal data for incompatible use
- ✓ ***Third obligation*** : Process only adequate, relevant and not excessive data, update them and keep them only for the needed duration
- ✓ ***Fourth obligation*** : Ensure the security of the Data
- ✓ ***Fifth obligation*** : Declare your processing (obligation to notify to the D.P. authority)
- ✓ ***First Right*** : Right to be informed about the existence of the D. processing
- ✓ ***Second Right*** : Right of access to the data
- ✓ ***Third Right*** : Right to rectify
- ✓ ***Fourth Right*** : Right to object
- ✓ ***Fifth Right*** : Right not to be subject to an automated decision
- ✓ ***Independant D.P. Authority*** having investigative powers, effective intervention and the possibility to engage in legal proceedings + At the european level, common advisor

Luxemburg, 2, 3 and 4th December 2006

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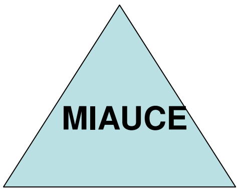
The Law

Refers to legal normative frame, and questions the norms thanks to the definition of some open concepts



Synthesis

- ✓ Concepts : freedom, finality, privacy, proportionality, responsibility,…
- ✓ Definitions and concepts are NOT closed …. New actors may appear … Visions may be different…
- ✓ The law is NOT only an application of the rules …
- ✓ This implies necessity of deliberation at all levels (ethical and social acceptability)

➔➔Therefore, the legal, ethical and sociological dimension should be tackled.

Necessity to handle the ethical approach...

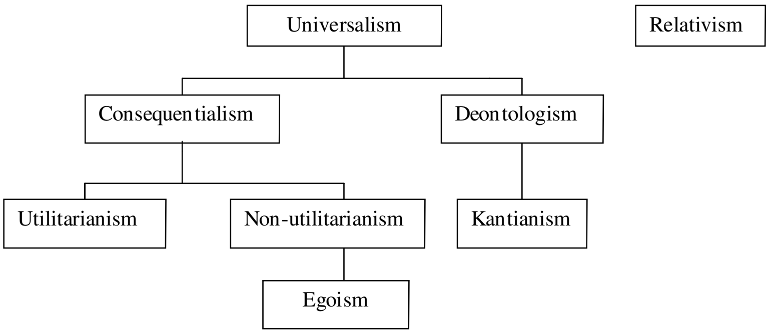
What is ethics?

- At first glance, it seems to be an answer to ‘what is the good? What is the bad?’.
- Technique is an historical and social project which reflects the intentions of the society, the interests that dominate it and the values that guide it. Technique appears in a context of norms.
    - So, ethics seems to apply the norms to the possibilities of the technique.

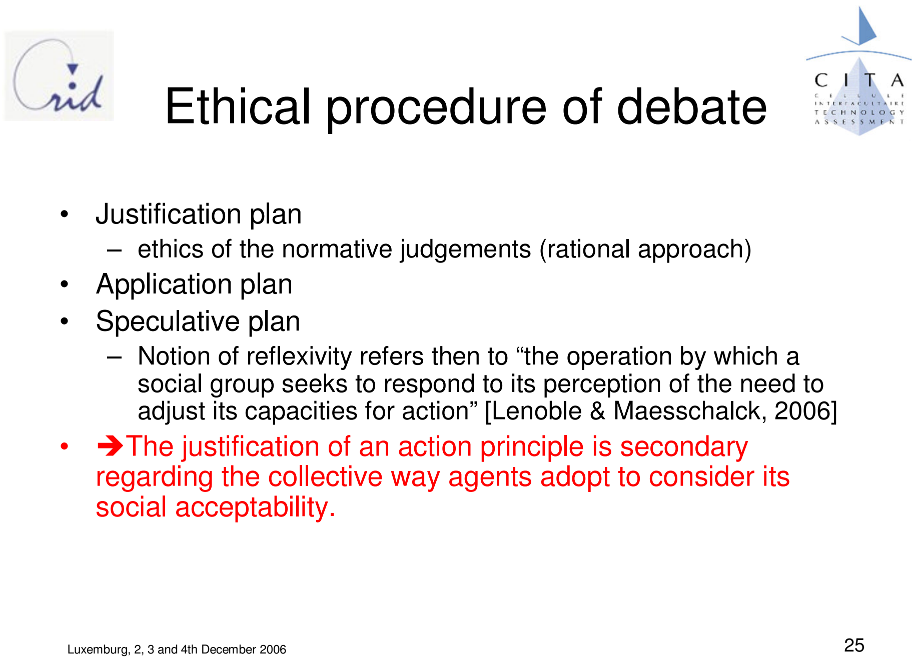
Ethical process

- The first problem is every person has its own definition of what is good or bad.
- The second problem is that implies a plurality of sources of norms :
  - So, anyone can not agree to some norms ‘a priori’.
  - And the question of trust is not guaranteed.
- The third problem is the number of ethical theories : which one is the best?
    - No one can determine which one is the best.
    - It implies a risk of relativism
- Therefore, ethics is never in the answer but it is in this process of questioning before the effective action, and on a border which separates our subjective existence from the constraining externality.

There’s is lot of ethical theories



- Universalism
  - Consequentialism
    - Utilitarianism
    - Non-utilitarianism
      - Egoism
  - Deontologism
    - Kantianism
- Relativism



Ethical procedure of debate

- Justification plan
  - ethics of the normative judgements (rational approach)
- Application plan
- Speculative plan
  - Notion of reflexivity refers then to “the operation by which a social group seeks to respond to its perception of the need to adjust its capacities for action” [Lenoble & Maesschalck, 2006]
- ➔The justification of an action principle is secondary regarding the collective way agents adopt to consider its social acceptability.

Luxemburg, 2, 3 and 4th December 2006

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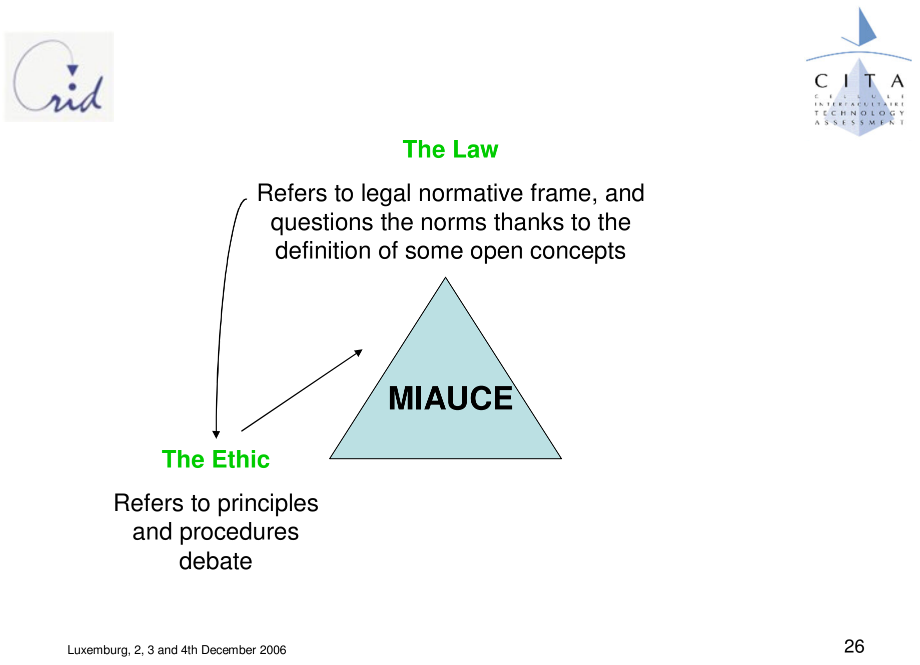

The Law

Refers to legal normative frame, and questions the norms thanks to the definition of some open concepts

MIAUCE

The Ethic

Refers to principles and procedures debate

Luxemburg, 2, 3 and 4th December 2006

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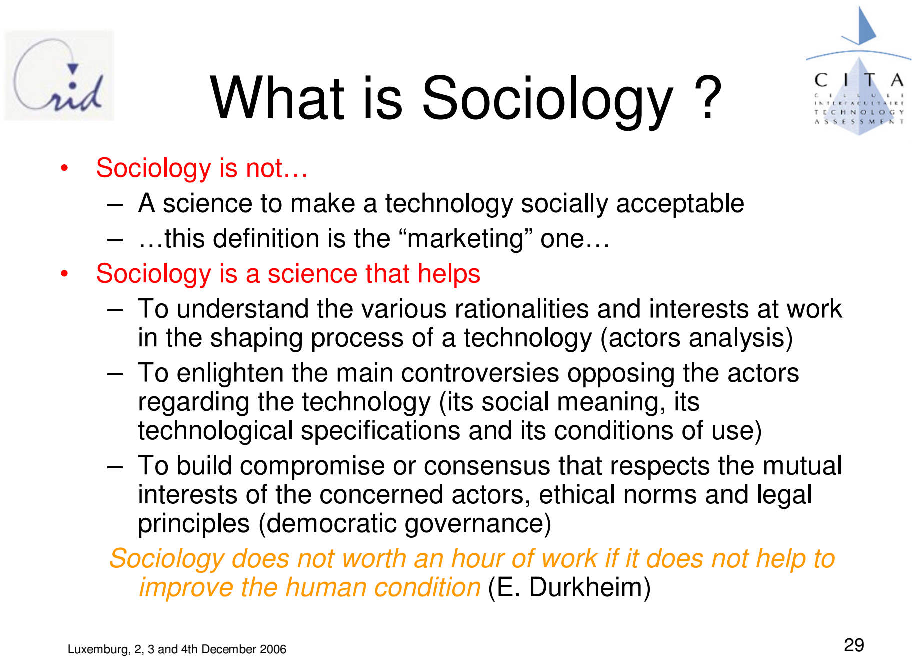
Synthesis

- The most important : the way of deliberation.
- So, ethics is not the restriction of the actions regarding the ‘a priori’ norms.
- It is necessary to question the conditions of the debate between the actors.

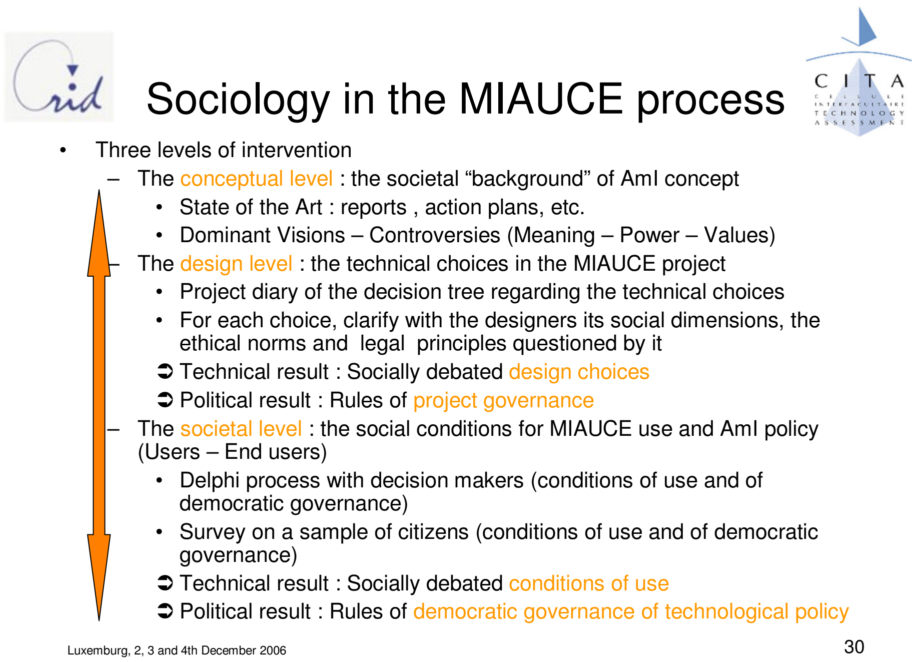
Necessity to handle the sociological approach...



What is Sociology ?

- Sociology is not…
  - A science to make a technology socially acceptable
  - …this definition is the “marketing” one…
- Sociology is a science that helps
  - To understand the various rationalities and interests at work in the shaping process of a technology (actors analysis)
  - To enlighten the main controversies opposing the actors regarding the technology (its social meaning, its technological specifications and its conditions of use)
  - To build compromise or consensus that respects the mutual interests of the concerned actors, ethical norms and legal principles (democratic governance)

Sociology does not worth an hour of work if it does not help to improve the human condition (E. Durkheim)

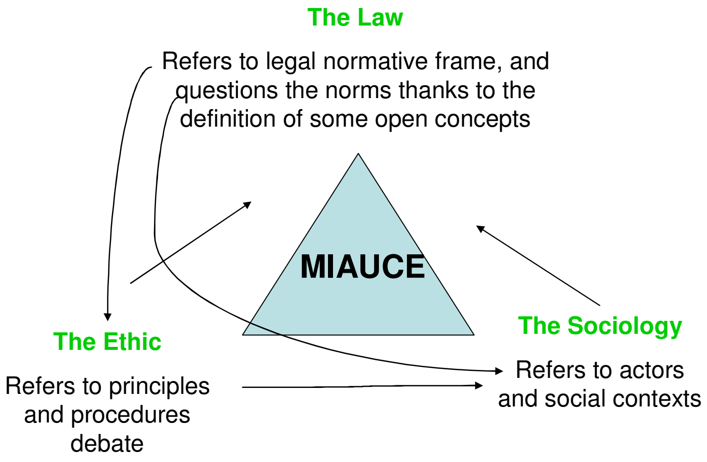


Sociology in the MIAUCE process

- Three levels of intervention
  - The conceptual level : the societal “background” of AmI concept
    - State of the Art : reports , action plans, etc.
    - Dominant Visions – Controversies (Meaning – Power – Values)
  - The design level : the technical choices in the MIAUCE project
    - Project diary of the decision tree regarding the technical choices
    - For each choice, clarify with the designers its social dimensions, the ethical norms and legal principles questioned by it
    - ➲ Technical result : Socially debated design choices
    - ➲ Political result : Rules of project governance
  - The societal level : the social conditions for MIAUCE use and AmI policy (Users – End users)
    - Delphi process with decision makers (conditions of use and of democratic governance)
    - Survey on a sample of citizens (conditions of use and of democratic governance)
    - ➲ Technical result : Socially debated conditions of use
    - ➲ Political result : Rules of democratic governance of technological policy

Sociology : two expectations

- Socio-technical expectation : design and conditions of MIAUCE use
  - Question the design choices of MIAUCE according to their social, legal and ethical stakes : the social robustness of the MIAUCE specifications
  - Question the social, legal and ethical conditions for MIAUCE use and appropriation : the social robustness of the MIAUCE context of use
  - ➲ Operational process
- Political expectation : democratic governance of technology
  - As project : how to organize a social debate around technical choices? How to organize the cooperation between the technical and the “social” in a single socio-technical dynamics ? (project governance)
  - As policy : how to organize the “voice of the Society” in the definition of technological policies? What are the institutional conditions that guarantee a democratic and ethical governance of technology? (democratic governance)
  - ➲ Learning process



The Law

Refers to legal normative frame, and questions the norms thanks to the definition of some open concepts

MIAUCE

The Ethic

Refers to principles and procedures debate

The Sociology

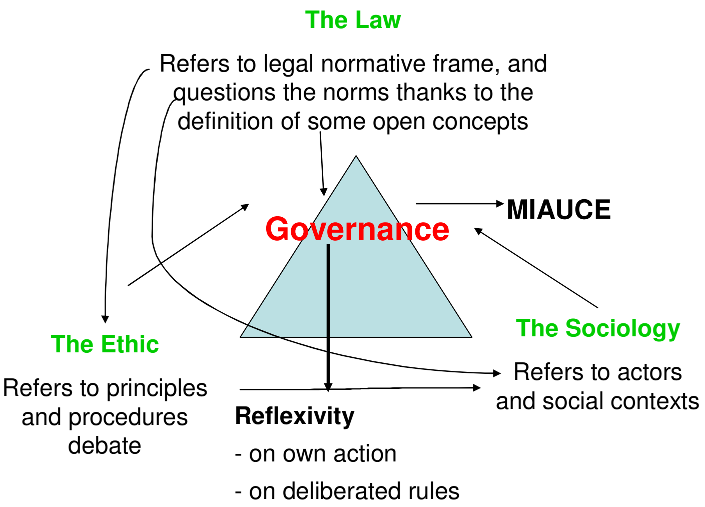
Refers to actors and social contexts

Governance

Governance refers to the formation and stewardship of the rules formal and informal that regulate the public realm, the arena in which state as well as economic and societal actors interact to make decisions (Hyden et alii)

Governance?

- Definition :
- The question of governance is the question of the rules and procedures to define the common good.
- A reflexive governance must be able to think the normativity inside the practical contexts.
- Governance implies reflexivity.
- The link between the ethical aspects and the governance of the general interest is the reflexivity.
- The justification of an action principle is secondary regarding the collective way agents adopt to consider its social acceptability.
- It implies the necessity to inscribe the possibilities of reflexivity in the institutional structures.
  - There is no real contents of politics, and it is not detained by any experts.
  - The politics is in construct thanks to the actors and their reflexivity.



The Law

Refers to legal normative frame, and questions the norms thanks to the definition of some open concepts

Governance

MIAUCE

The Ethic

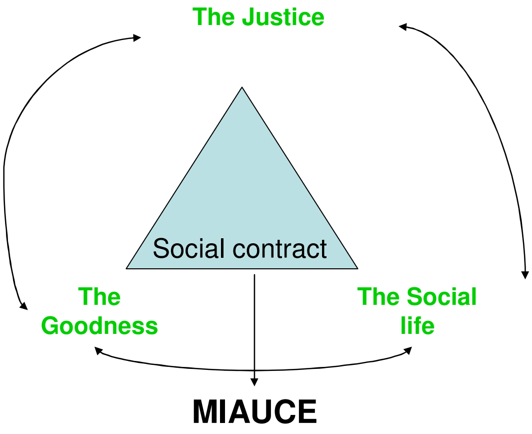
Refers to principles and procedures debate

The Sociology

Refers to actors and social contexts

Reflexivity

- on own action
- on deliberated rules



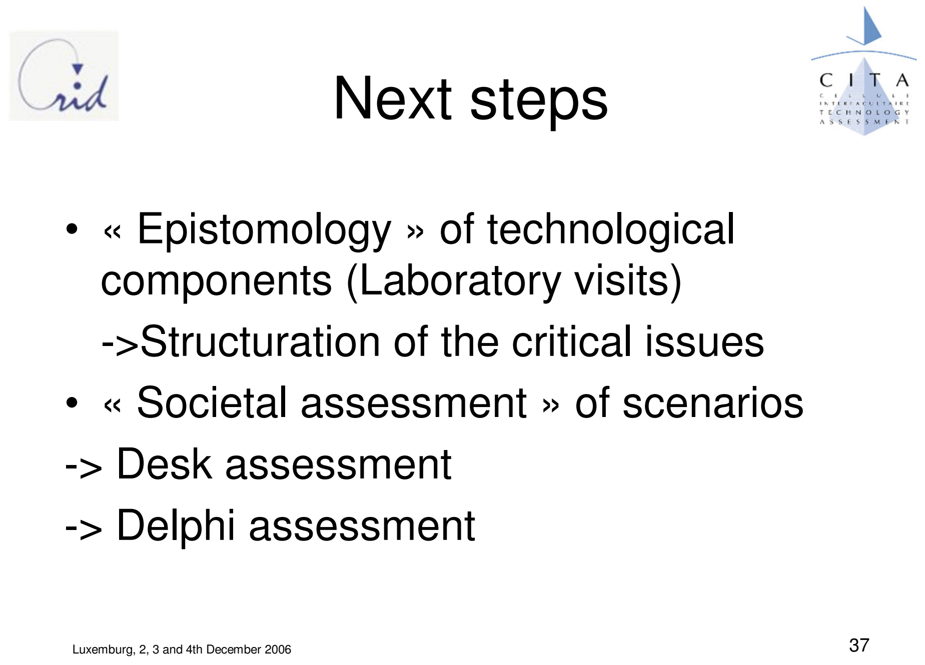
The Justice

Social contract

The Goodness

The Social life

MIAUCE

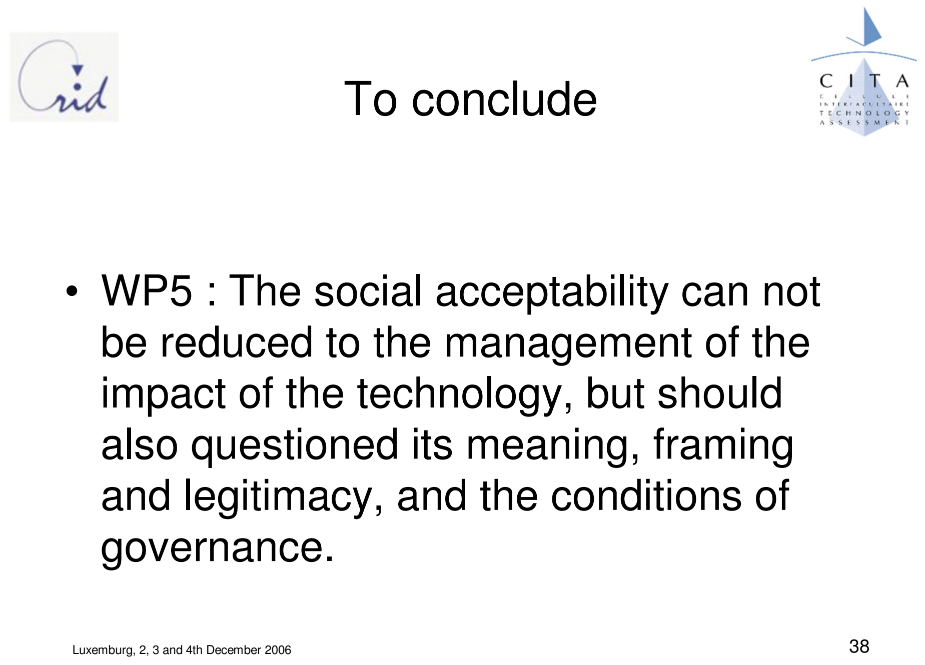


Next steps

- « Epistomology » of technological components (Laboratory visits)
  ->Structuration of the critical issues
- « Societal assessment » of scenarios

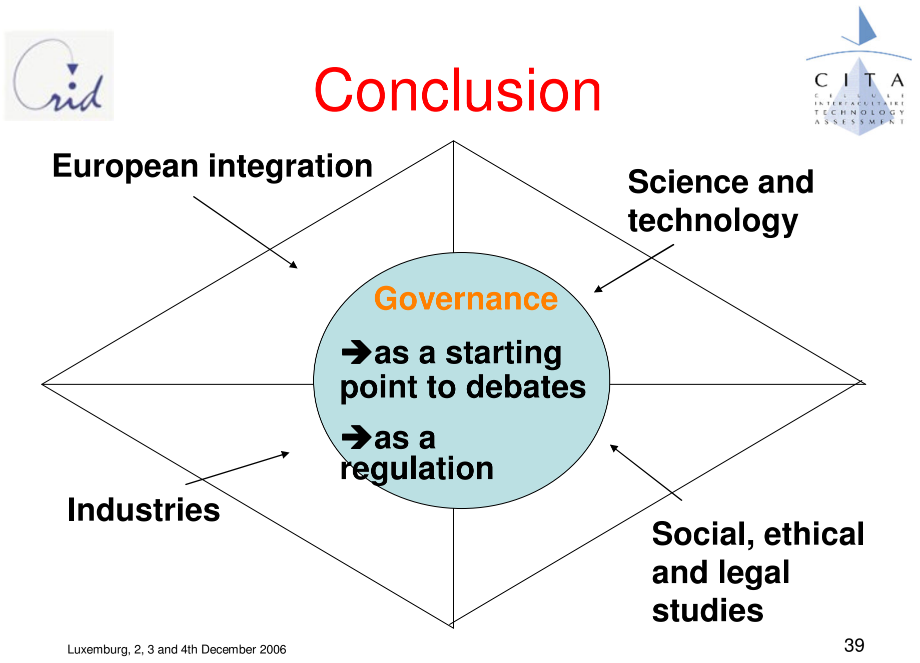
-> Desk assessment

-> Delphi assessment



To conclude

- WP5 : The social acceptability can not be reduced to the management of the impact of the technology, but should also questioned its meaning, framing and legitimacy, and the conditions of governance.



Conclusion

European integration

Science and technology

Governance

➔as a starting point to debates

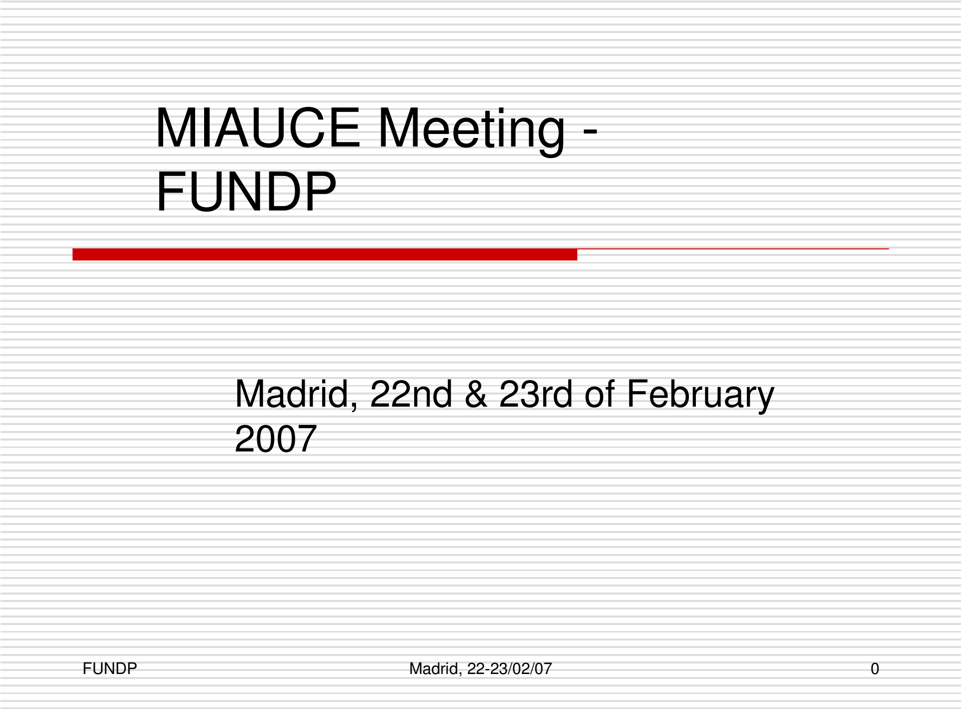
➔as a regulation

Industries

Social, ethical and legal studies

Luxemburg, 2, 3 and 4th December 2006

Miauce Meeting in Madrid, February 22nd and 23rd 2007



MIAUCE Meeting - FUNDP

Madrid, 22nd & 23rd of February 2007

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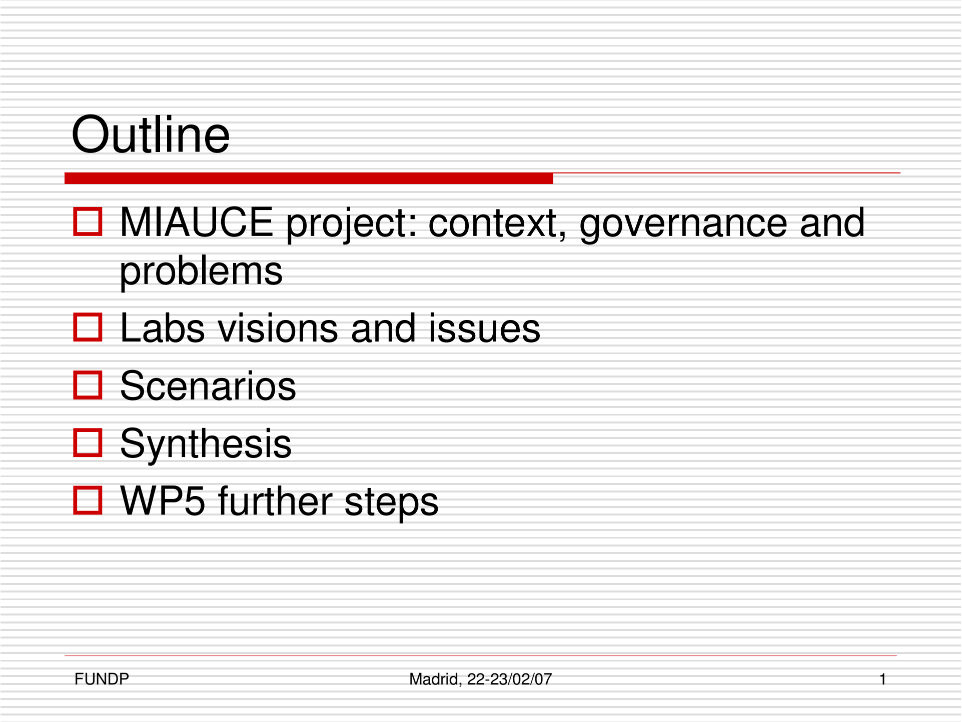

Outline

- ☐ MIAUCE project: context, governance and problems
- ☐ Labs visions and issues
- ☐ Scenarios
- ☐ Synthesis
- ☐ WP5 further steps

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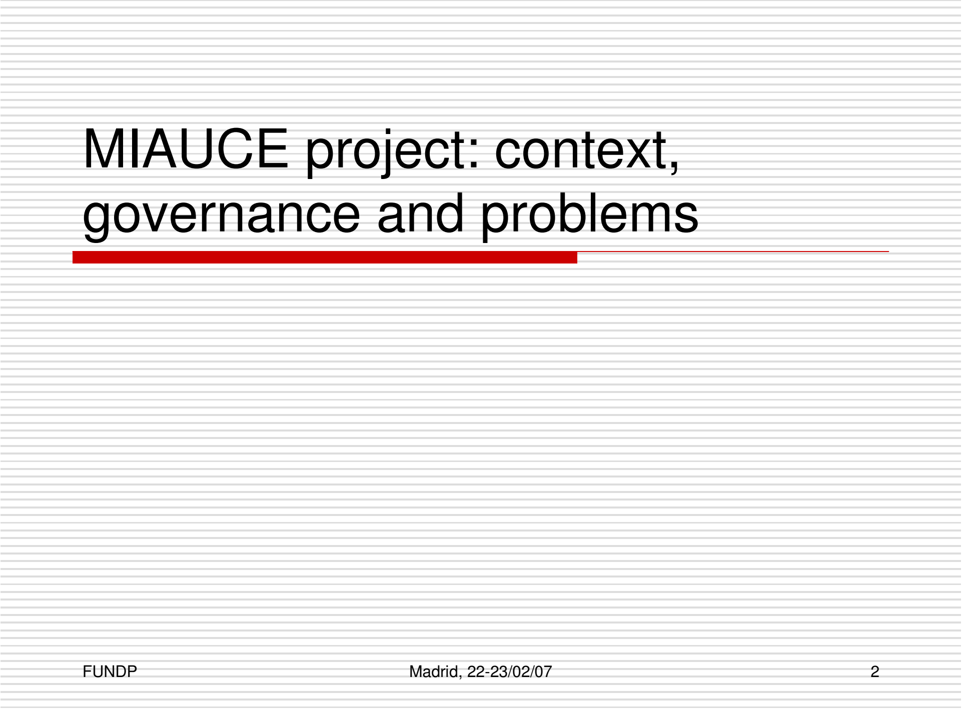
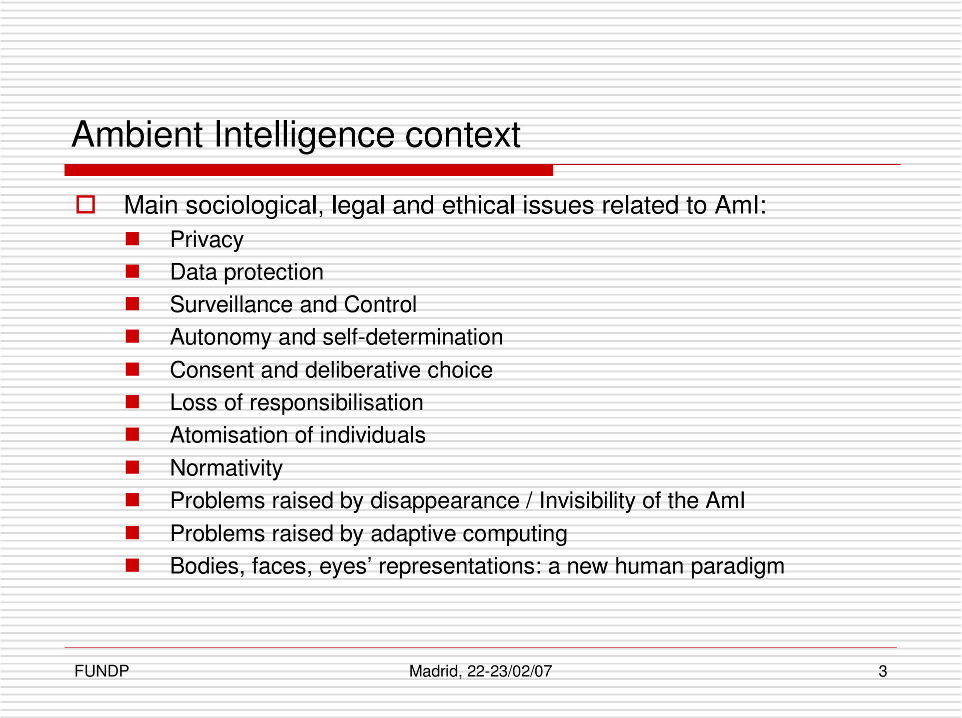
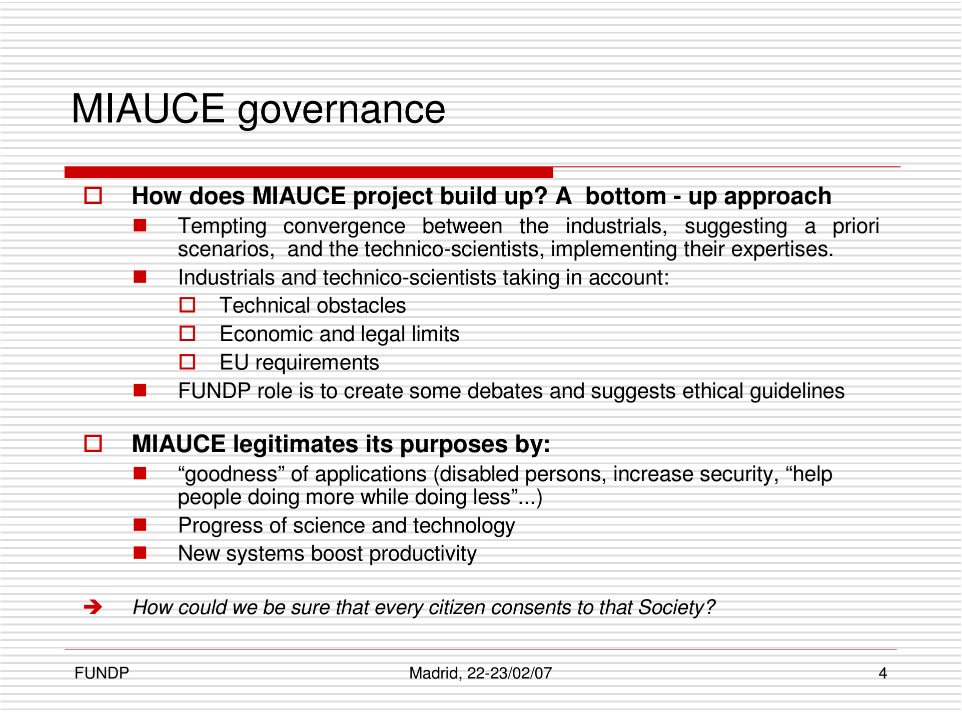


MIAUCE project: context, governance and problems



Ambient Intelligence context

- Main sociological, legal and ethical issues related to AmI:
  - Privacy
  - Data protection
  - Surveillance and Control
  - Autonomy and self-determination
  - Consent and deliberative choice
  - Loss of responsibilisation
  - Atomisation of individuals
  - Normativity
  - Problems raised by disappearance / Invisibility of the AmI
  - Problems raised by adaptive computing
  - Bodies, faces, eyes' representations: a new human paradigm



MIAUCE governance

- ☐ **How does MIAUCE project build up? A bottom - up approach**
  - Tempting convergence between the industrials, suggesting a priori scenarios, and the technico-scientists, implementing their expertises.
  - Industrials and technico-scientists taking in account:
    - ☐ Technical obstacles
    - ☐ Economic and legal limits
    - ☐ EU requirements
  - FUNDP role is to create some debates and suggests ethical guidelines
- ☐ **MIAUCE legitimates its purposes by:**
  - “goodness” of applications (disabled persons, increase security, “help people doing more while doing less”...)
  - Progress of science and technology
  - New systems boost productivity

➔ *How could we be sure that every citizen consents to that Society?*

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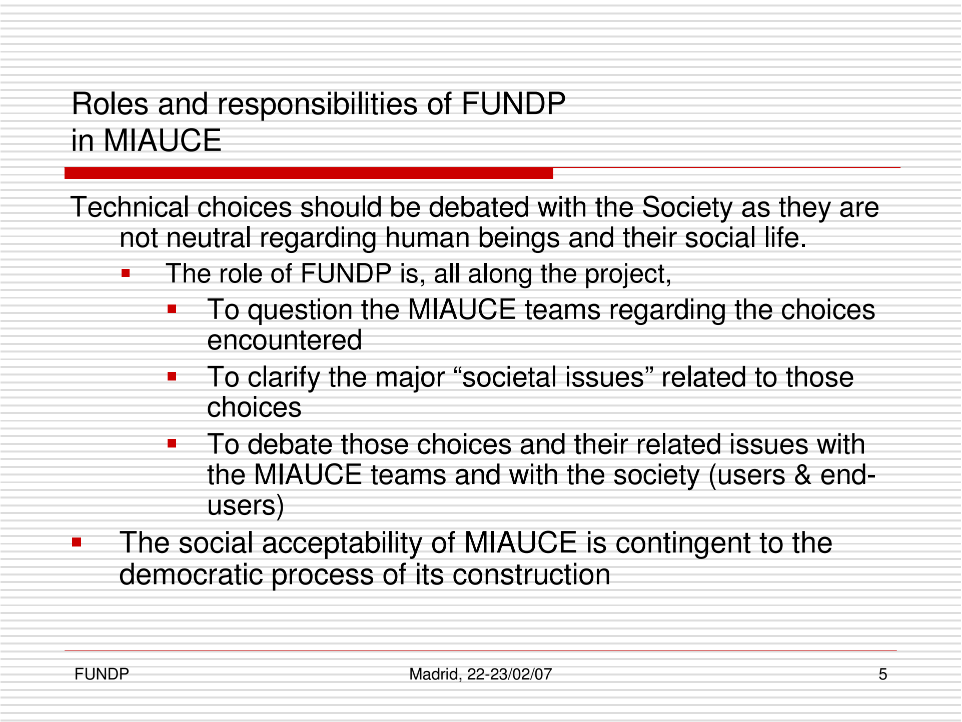

Roles and responsibilities of FUNDP in MIAUCE

Technical choices should be debated with the Society as they are not neutral regarding human beings and their social life.

- The role of FUNDP is, all along the project,
  - To question the MIAUCE teams regarding the choices encountered
  - To clarify the major “societal issues” related to those choices
  - To debate those choices and their related issues with the MIAUCE teams and with the society (users & end-users)
- The social acceptability of MIAUCE is contingent to the democratic process of its construction

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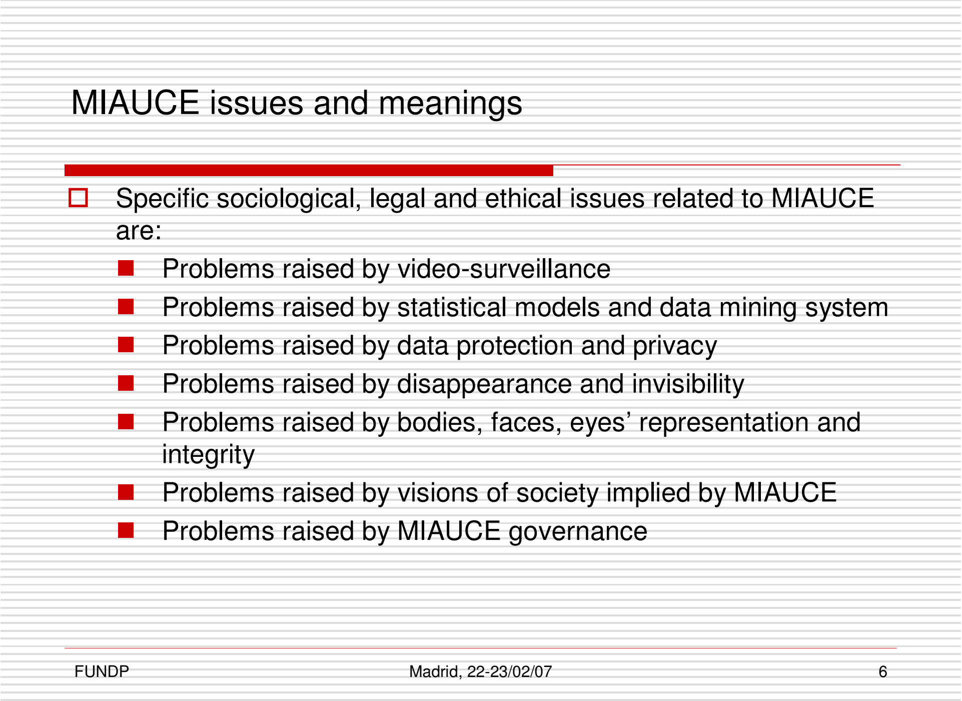

MIAUCE issues and meanings

- ☐ Specific sociological, legal and ethical issues related to MIAUCE are:
  - Problems raised by video-surveillance
  - Problems raised by statistical models and data mining system
  - Problems raised by data protection and privacy
  - Problems raised by disappearance and invisibility
  - Problems raised by bodies, faces, eyes' representation and integrity
  - Problems raised by visions of society implied by MIAUCE
  - Problems raised by MIAUCE governance

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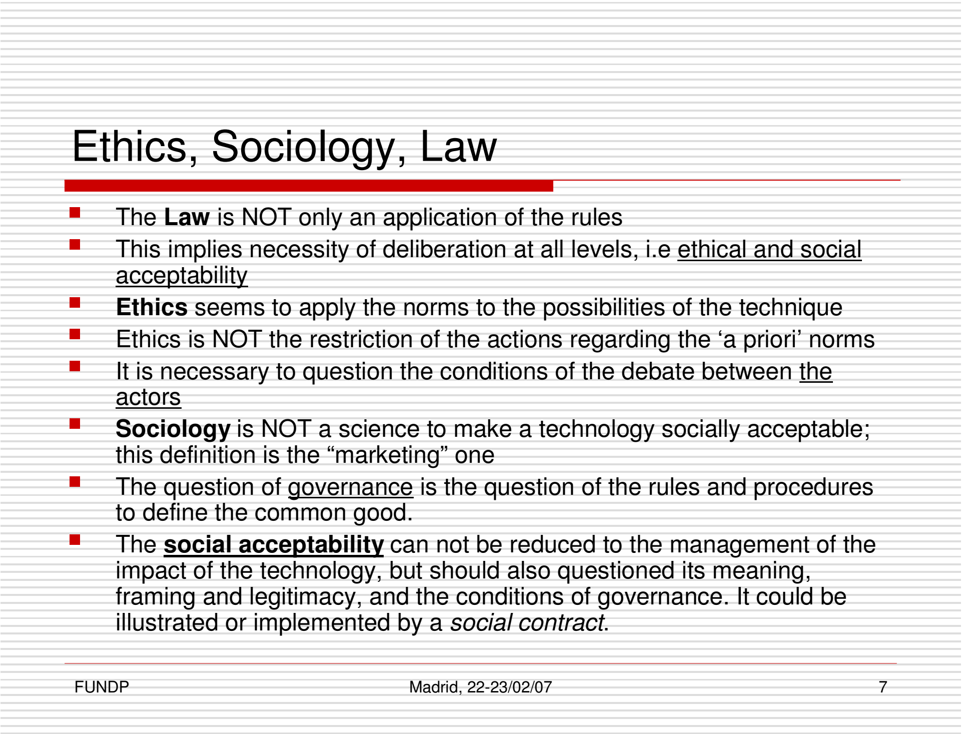

Ethics, Sociology, Law

- The **Law** is NOT only an application of the rules
- This implies necessity of deliberation at all levels, i.e ethical and social acceptability
- **Ethics** seems to apply the norms to the possibilities of the technique
- Ethics is NOT the restriction of the actions regarding the 'a priori' norms
- It is necessary to question the conditions of the debate between the actors
- **Sociology** is NOT a science to make a technology socially acceptable; this definition is the "marketing" one
- The question of governance is the question of the rules and procedures to define the common good.
- The **social acceptability** can not be reduced to the management of the impact of the technology, but should also questioned its meaning, framing and legitimacy, and the conditions of governance. It could be illustrated or implemented by a *social contract.*

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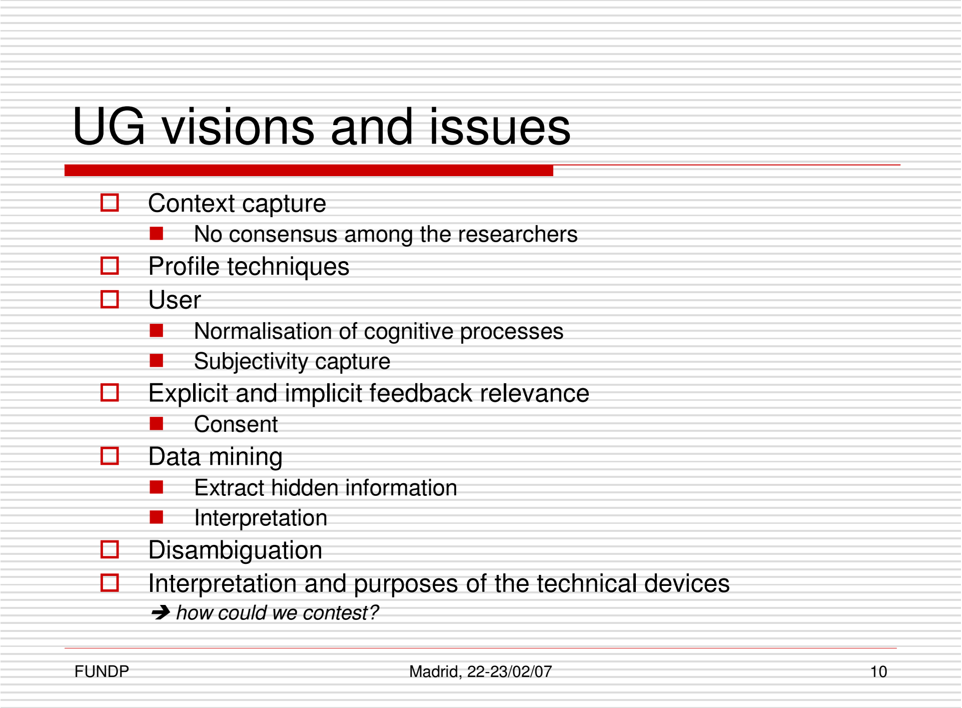
Labs contexts, visions and issues

University of Amsterdam
University of Glasgow
Lifl / CNRS (Lille)

UvA visions and issues

- ☐ Facial recognition of emotions
  - ■ Psychological background (Eckman)
  - ■ Facial modelling
    - ☐ Statistical weight
    - ☐ Implicit consequences raised by modelling
  - ■ Emotions (Picard, Pantic)
    - ☐ Reductionism
    - ☐ Behaviourism
    - ☐ Attack to human subjectivity (by reduction to object) ➔ identity
- ☐ Human-Computer Interaction is similar to Human-Human Interaction: another psychological background.
- ☐ Common sense and naturalness
- ☐ Long-term responsibility, science as a black box and as neutral
- ☐ Interpretation and purposes of the technical devices

  ➔ *how could we contest?*



UG visions and issues

- Context capture
  - No consensus among the researchers
- Profile techniques
- User
  - Normalisation of cognitive processes
  - Subjectivity capture
- Explicit and implicit feedback relevance
  - Consent
- Data mining
  - Extract hidden information
  - Interpretation
- Disambiguation
- Interpretation and purposes of the technical devices

  ➔ *how could we contest?*

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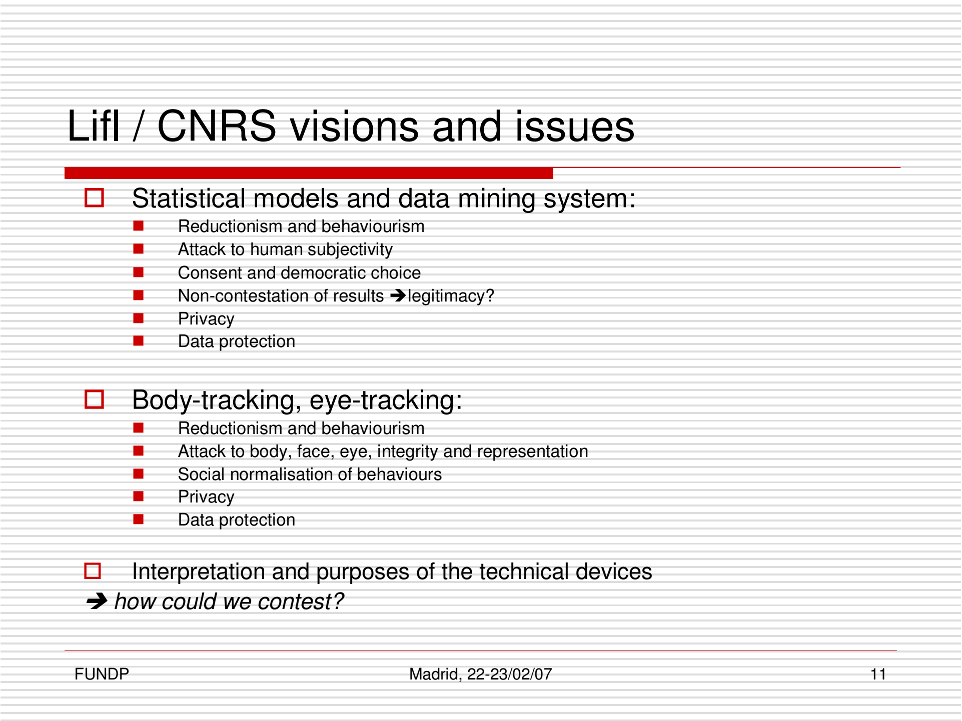

Lifl / CNRS visions and issues

- Statistical models and data mining system:
  - Reductionism and behaviourism
  - Attack to human subjectivity
  - Consent and democratic choice
  - Non-contestation of results ➔legitimacy?
  - Privacy
  - Data protection
- Body-tracking, eye-tracking:
  - Reductionism and behaviourism
  - Attack to body, face, eye, integrity and representation
  - Social normalisation of behaviours
  - Privacy
  - Data protection
- Interpretation and purposes of the technical devices

➔ *how could we contest?*

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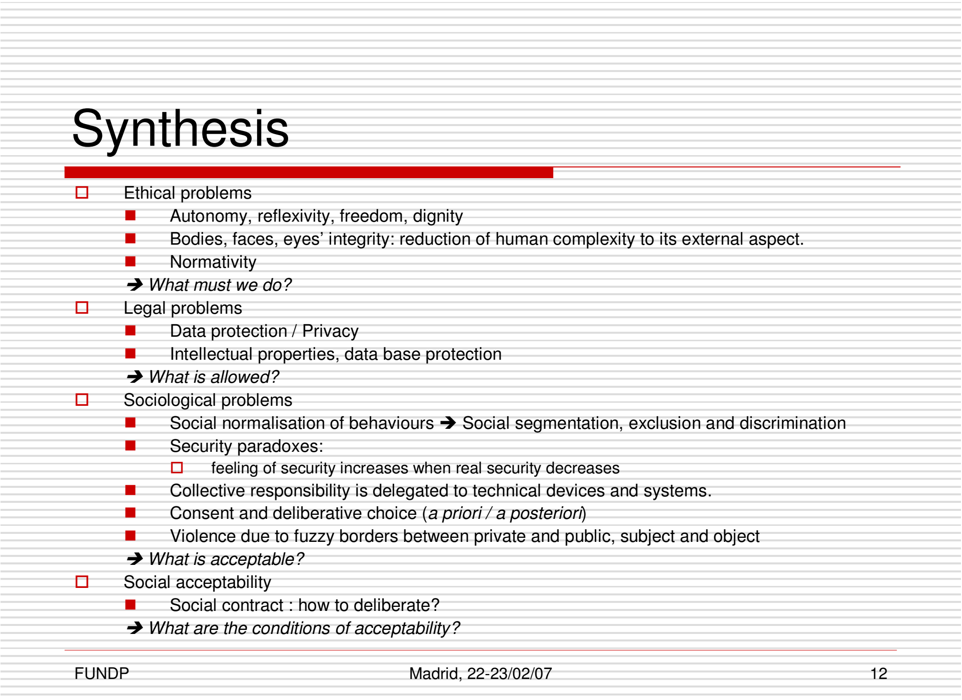

Synthesis

- ☐ Ethical problems
  - ■ Autonomy, reflexivity, freedom, dignity
  - ■ Bodies, faces, eyes' integrity: reduction of human complexity to its external aspect.
  - ■ Normativity
  - ➔ *What must we do?*
- ☐ Legal problems
  - ■ Data protection / Privacy
  - ■ Intellectual properties, data base protection
  - ➔ *What is allowed?*
- ☐ Sociological problems
  - ■ Social normalisation of behaviours ➔ Social segmentation, exclusion and discrimination
  - ■ Security paradoxes:
    - ☐ feeling of security increases when real security decreases
  - ■ Collective responsibility is delegated to technical devices and systems.
  - ■ Consent and deliberative choice (*a priori / a posteriori*)
  - ■ Violence due to fuzzy borders between private and public, subject and object
  - ➔ *What is acceptable?*
- ☐ Social acceptability
  - ■ Social contract : how to deliberate?
  - ➔ *What are the conditions of acceptability?*

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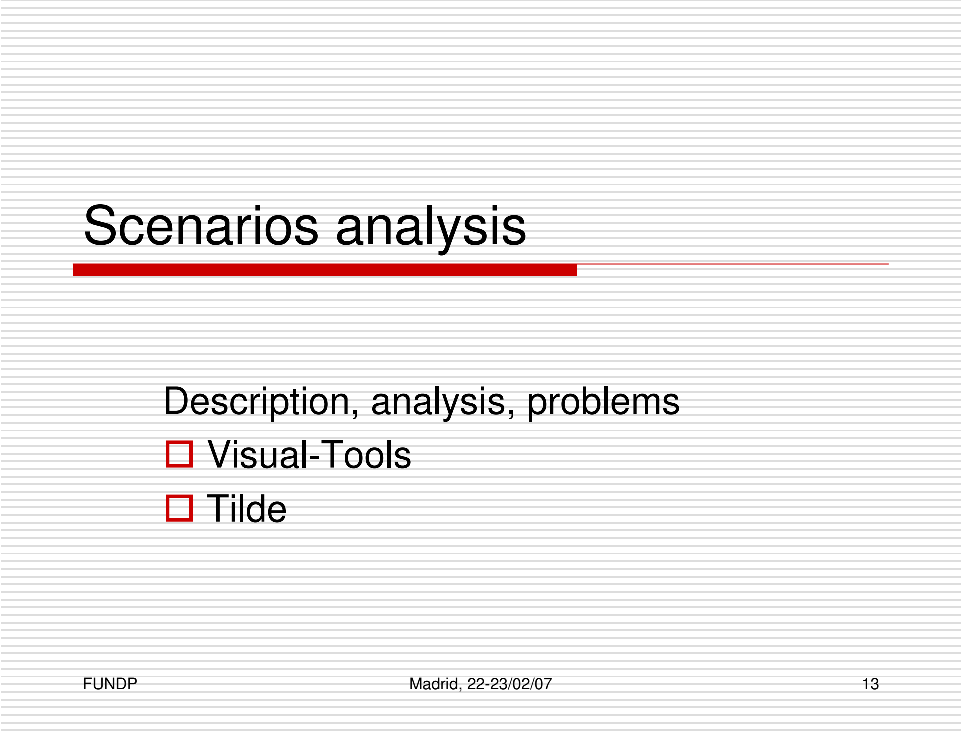

Scenarios analysis

Description, analysis, problems

- ☐ Visual-Tools
- ☐ Tilde

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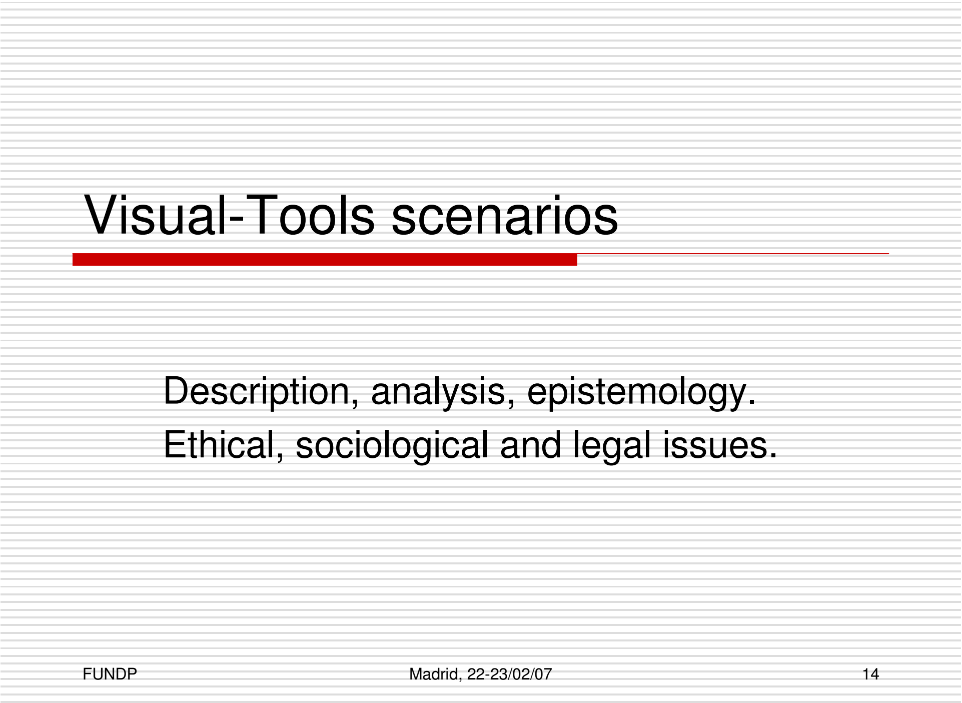

Visual-Tools scenarios

Description, analysis, epistemology.
Ethical, sociological and legal issues.

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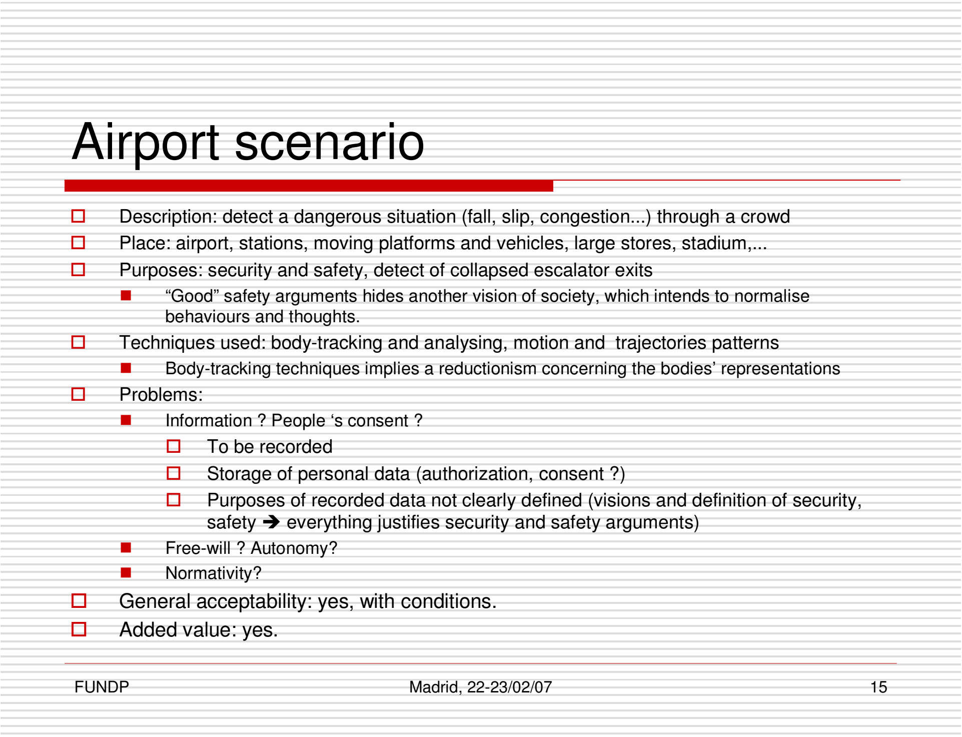

Airport scenario

- ☐ Description: detect a dangerous situation (fall, slip, congestion...) through a crowd
- ☐ Place: airport, stations, moving platforms and vehicles, large stores, stadium,...
- ☐ Purposes: security and safety, detect of collapsed escalator exits
  - ■ “Good” safety arguments hides another vision of society, which intends to normalise behaviours and thoughts.
- ☐ Techniques used: body-tracking and analysing, motion and trajectories patterns
  - ■ Body-tracking techniques implies a reductionism concerning the bodies’ representations
- ☐ Problems:
  - ■ Information ? People ‘s consent ?
    - ☐ To be recorded
    - ☐ Storage of personal data (authorization, consent ?)
    - ☐ Purposes of recorded data not clearly defined (visions and definition of security, safety ➔ everything justifies security and safety arguments)
  - ■ Free-will ? Autonomy?
  - ■ Normativity?
- ☐ General acceptability: yes, with conditions.
- ☐ Added value: yes.

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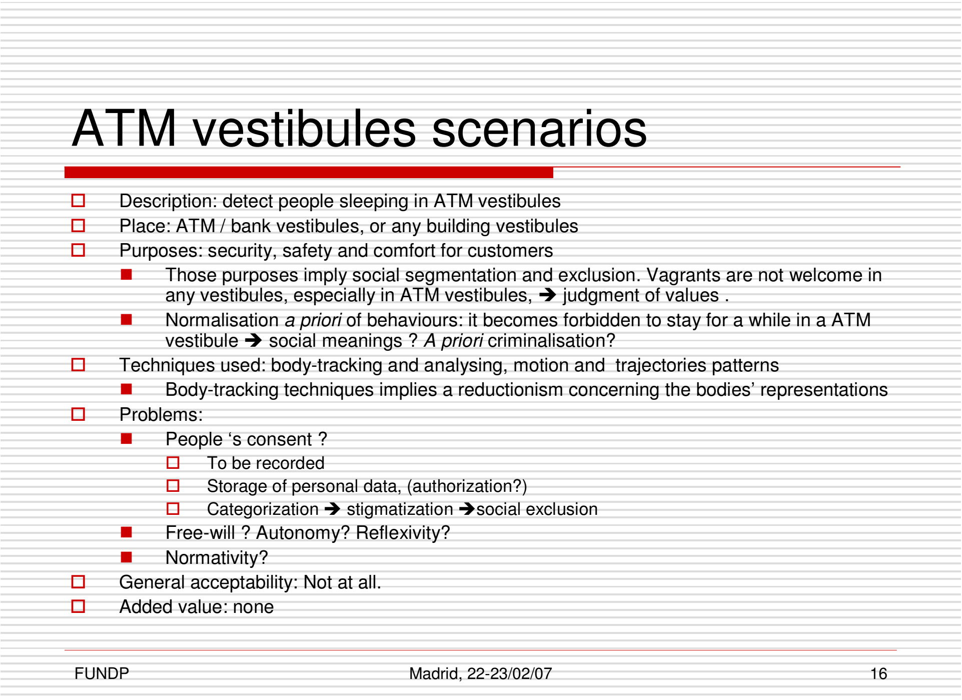

ATM vestibules scenarios

- Description: detect people sleeping in ATM vestibules
- Place: ATM / bank vestibules, or any building vestibules
- Purposes: security, safety and comfort for customers
  - Those purposes imply social segmentation and exclusion. Vagrants are not welcome in any vestibules, especially in ATM vestibules, ➔ judgment of values .
  - Normalisation *a priori* of behaviours: it becomes forbidden to stay for a while in a ATM vestibule ➔ social meanings ? *A priori* criminalisation?
- Techniques used: body-tracking and analysing, motion and trajectories patterns
  - Body-tracking techniques implies a reductionism concerning the bodies' representations
- Problems:
  - People 's consent ?
    - To be recorded
    - Storage of personal data, (authorization?)
    - Categorization ➔ stigmatization ➔social exclusion
  - Free-will ? Autonomy? Reflexivity?
  - Normativity?
- General acceptability: Not at all.
- Added value: none

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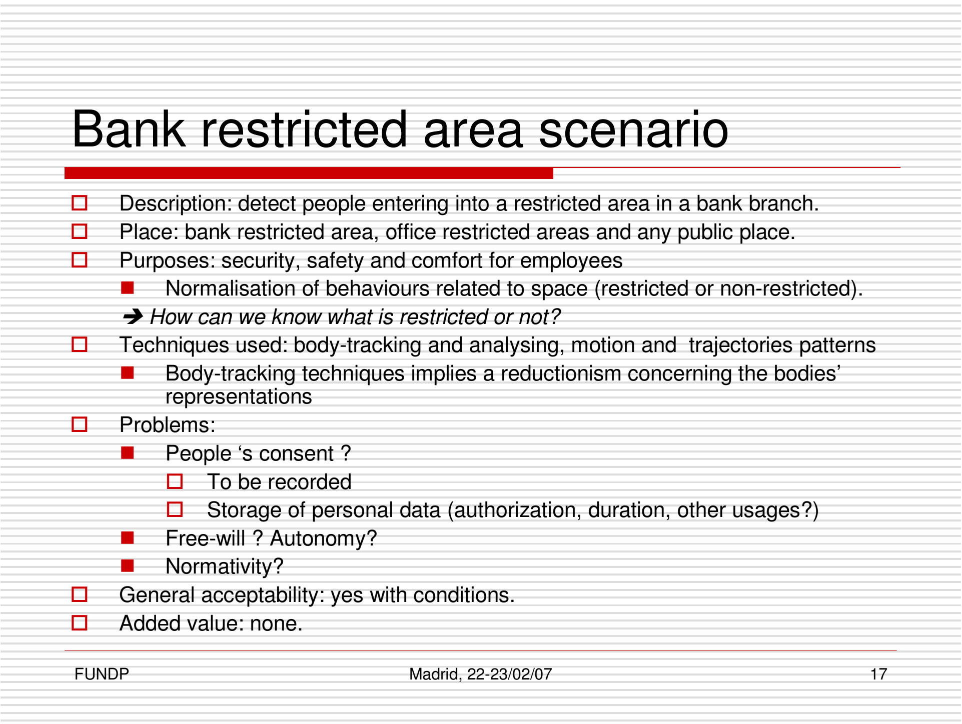

Bank restricted area scenario

- Description: detect people entering into a restricted area in a bank branch.
- Place: bank restricted area, office restricted areas and any public place.
- Purposes: security, safety and comfort for employees
  - Normalisation of behaviours related to space (restricted or non-restricted).

  ➔ *How can we know what is restricted or not?*
- Techniques used: body-tracking and analysing, motion and trajectories patterns
  - Body-tracking techniques implies a reductionism concerning the bodies' representations
- Problems:
  - People 's consent ?
    - To be recorded
    - Storage of personal data (authorization, duration, other usages?)
  - Free-will ? Autonomy?
  - Normativity?
- General acceptability: yes with conditions.
- Added value: none.

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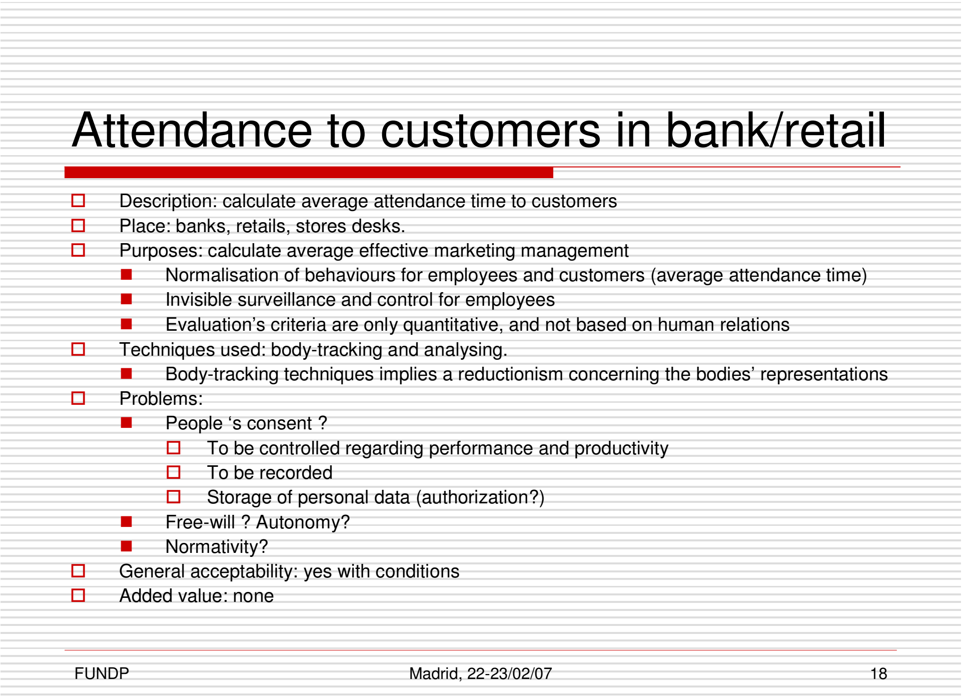
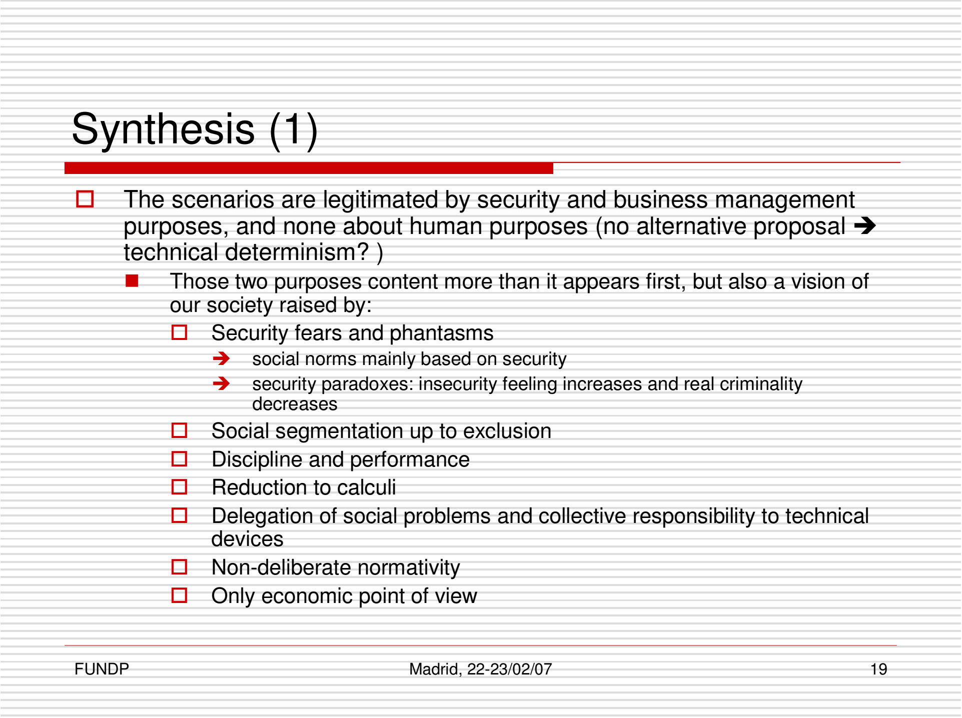


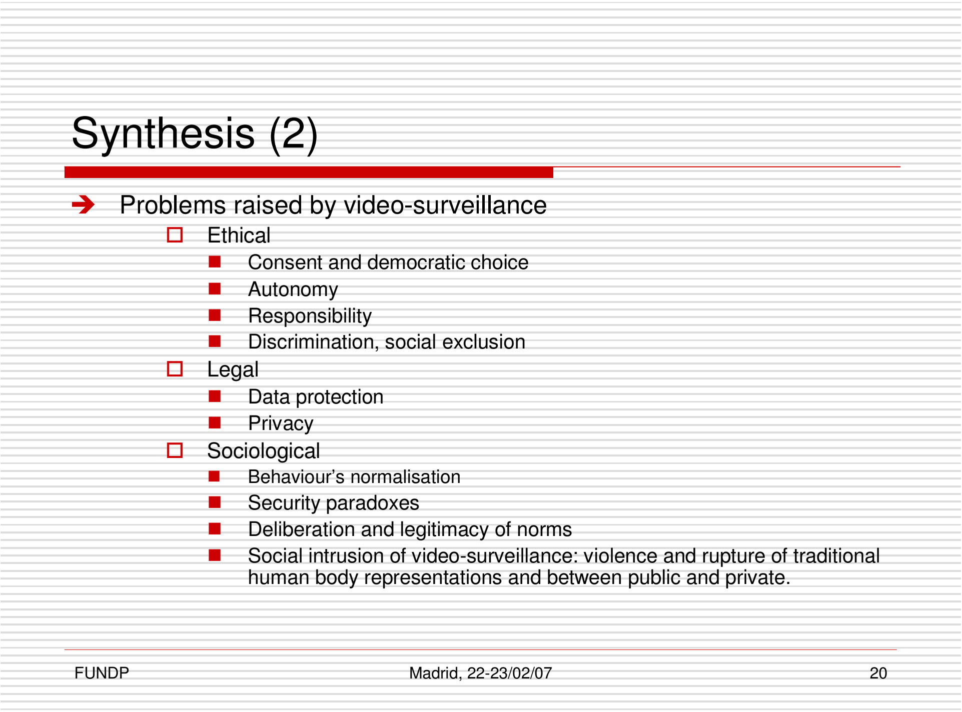
Attendance to customers in bank/retail

- Description: calculate average attendance time to customers
- Place: banks, retails, stores desks.
- Purposes: calculate average effective marketing management
  - Normalisation of behaviours for employees and customers (average attendance time)
  - Invisible surveillance and control for employees
  - Evaluation's criteria are only quantitative, and not based on human relations
- Techniques used: body-tracking and analysing.
  - Body-tracking techniques implies a reductionism concerning the bodies' representations
- Problems:
  - People 's consent ?
    - To be controlled regarding performance and productivity
    - To be recorded
    - Storage of personal data (authorization?)
  - Free-will ? Autonomy?
  - Normativity?
- General acceptability: yes with conditions
- Added value: none



Synthesis (1)

- The scenarios are legitimated by security and business management purposes, and none about human purposes (no alternative proposal ➔ technical determinism?)
  - Those two purposes content more than it appears first, but also a vision of our society raised by:
    - Security fears and phantasms
      - ➔ social norms mainly based on security
      - ➔ security paradoxes: insecurity feeling increases and real criminality decreases
    - Social segmentation up to exclusion
    - Discipline and performance
    - Reduction to calculi
    - Delegation of social problems and collective responsibility to technical devices
    - Non-deliberate normativity
    - Only economic point of view



Synthesis (2)

- ➔ Problems raised by video-surveillance
  - ☐ Ethical
    - Consent and democratic choice
    - Autonomy
    - Responsibility
    - Discrimination, social exclusion
  - ☐ Legal
    - Data protection
    - Privacy
  - ☐ Sociological
    - Behaviour's normalisation
    - Security paradoxes
    - Deliberation and legitimacy of norms
    - Social intrusion of video-surveillance: violence and rupture of traditional human body representations and between public and private.

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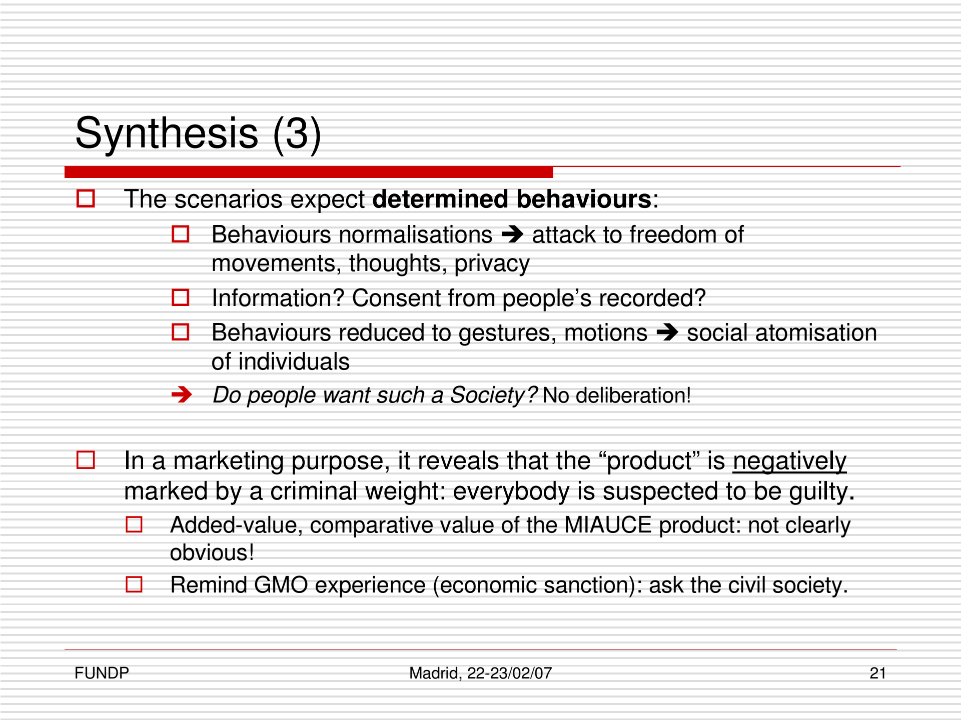

Synthesis (3)

- ☐ The scenarios expect **determined behaviours**:
  - ☐ Behaviours normalisations ➔ attack to freedom of movements, thoughts, privacy
  - ☐ Information? Consent from people's recorded?
  - ☐ Behaviours reduced to gestures, motions ➔ social atomisation of individuals
  - ➔ *Do people want such a Society?* No deliberation!
- ☐ In a marketing purpose, it reveals that the "product" is negatively marked by a criminal weight: everybody is suspected to be guilty.
  - ☐ Added-value, comparative value of the MIAUCE product: not clearly obvious!
  - ☐ Remind GMO experience (economic sanction): ask the civil society.

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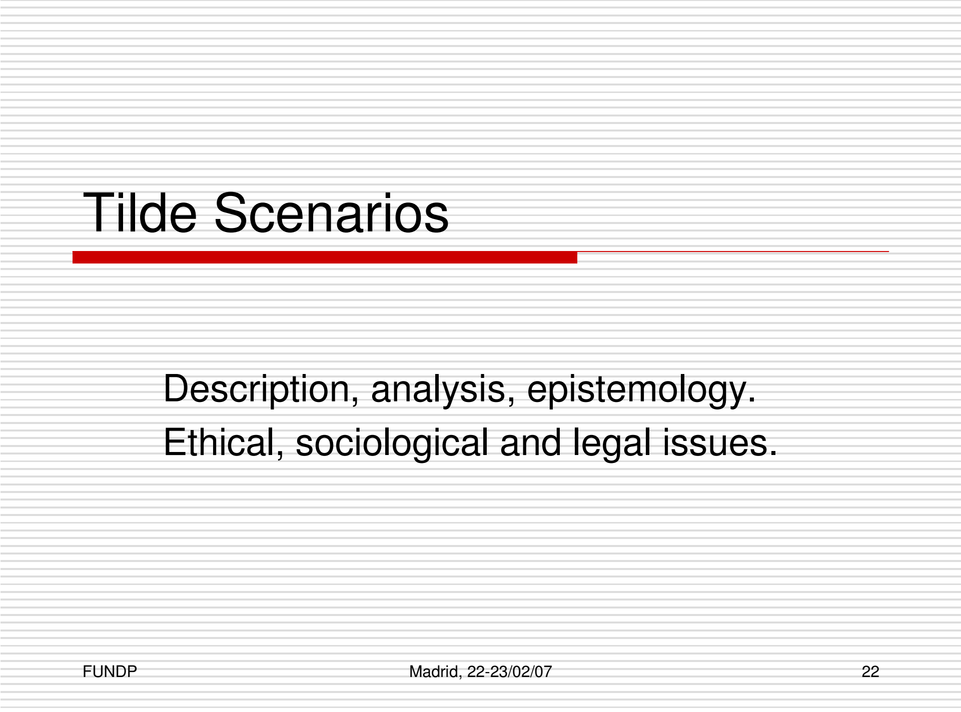
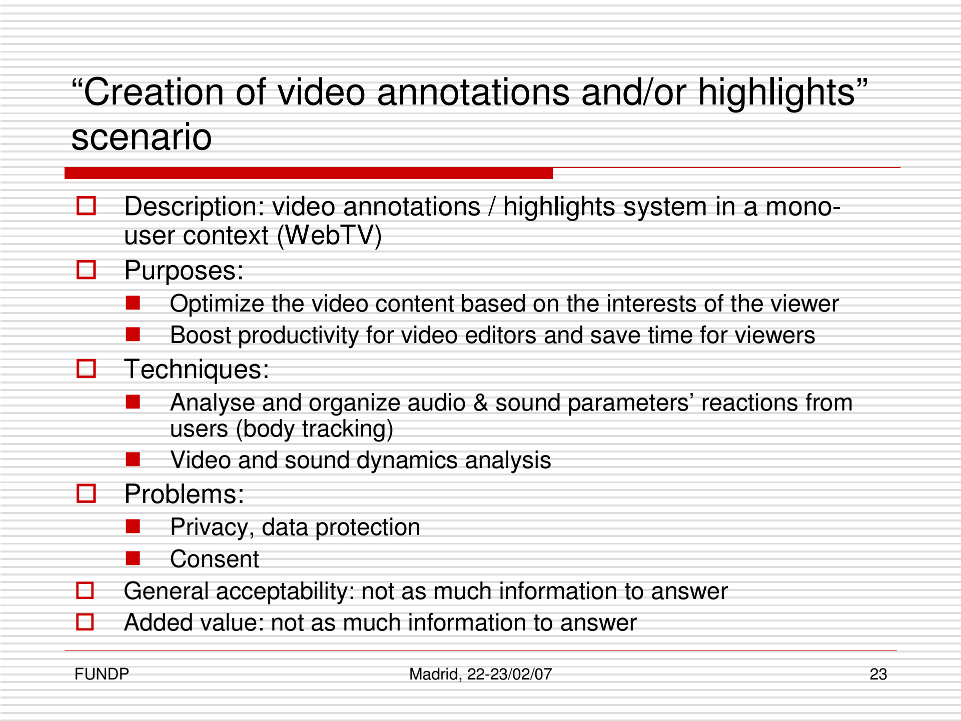


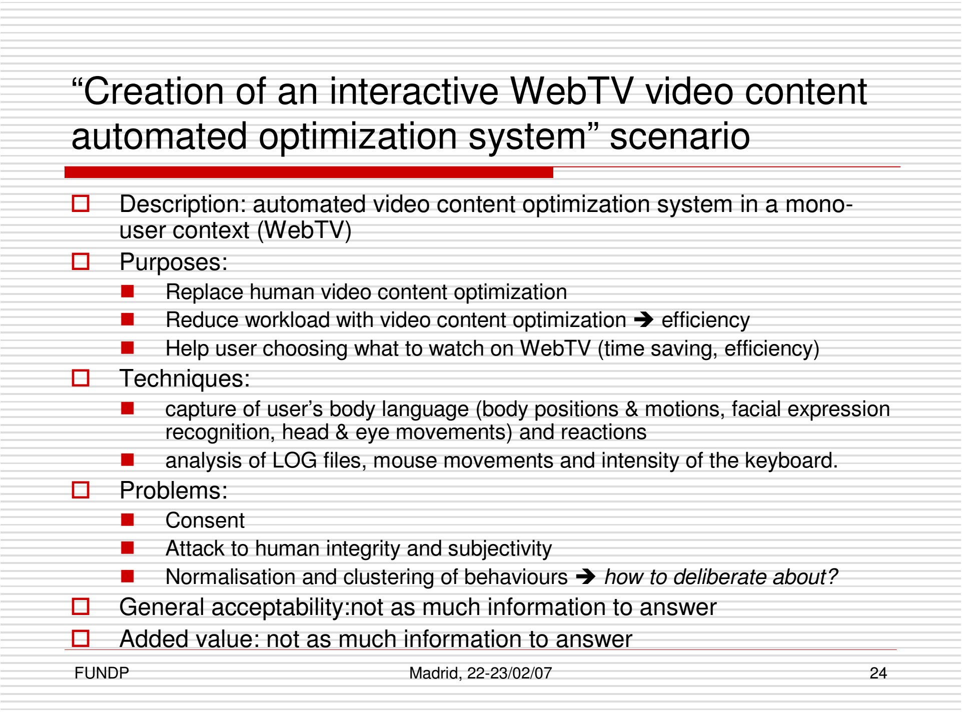
Tilde Scenarios

Description, analysis, epistemology.
Ethical, sociological and legal issues.



“Creation of video annotations and/or highlights” scenario

- Description: video annotations / highlights system in a mono-user context (WebTV)
- Purposes:
  - Optimize the video content based on the interests of the viewer
  - Boost productivity for video editors and save time for viewers
- Techniques:
  - Analyse and organize audio & sound parameters’ reactions from users (body tracking)
  - Video and sound dynamics analysis
- Problems:
  - Privacy, data protection
  - Consent
- General acceptability: not as much information to answer
- Added value: not as much information to answer



"Creation of an interactive WebTV video content automated optimization system" scenario

- Description: automated video content optimization system in a mono-user context (WebTV)
- Purposes:
  - Replace human video content optimization
  - Reduce workload with video content optimization ➔ efficiency
  - Help user choosing what to watch on WebTV (time saving, efficiency)
- Techniques:
  - capture of user's body language (body positions & motions, facial expression recognition, head & eye movements) and reactions
  - analysis of LOG files, mouse movements and intensity of the keyboard.
- Problems:
  - Consent
  - Attack to human integrity and subjectivity
  - Normalisation and clustering of behaviours ➔ *how to deliberate about?*
- General acceptability:not as much information to answer
- Added value: not as much information to answer

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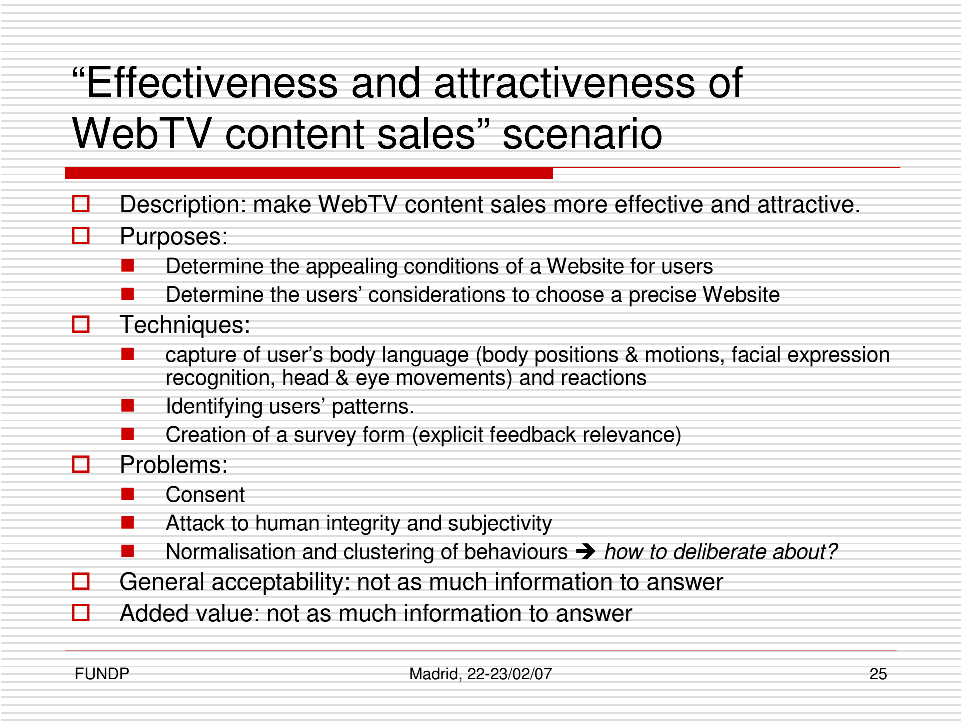

"Effectiveness and attractiveness of WebTV content sales" scenario

- Description: make WebTV content sales more effective and attractive.
- Purposes:
  - Determine the appealing conditions of a Website for users
  - Determine the users' considerations to choose a precise Website
- Techniques:
  - capture of user's body language (body positions & motions, facial expression recognition, head & eye movements) and reactions
  - Identifying users' patterns.
  - Creation of a survey form (explicit feedback relevance)
- Problems:
  - Consent
  - Attack to human integrity and subjectivity
  - Normalisation and clustering of behaviours ➔ *how to deliberate about?*
- General acceptability: not as much information to answer
- Added value: not as much information to answer

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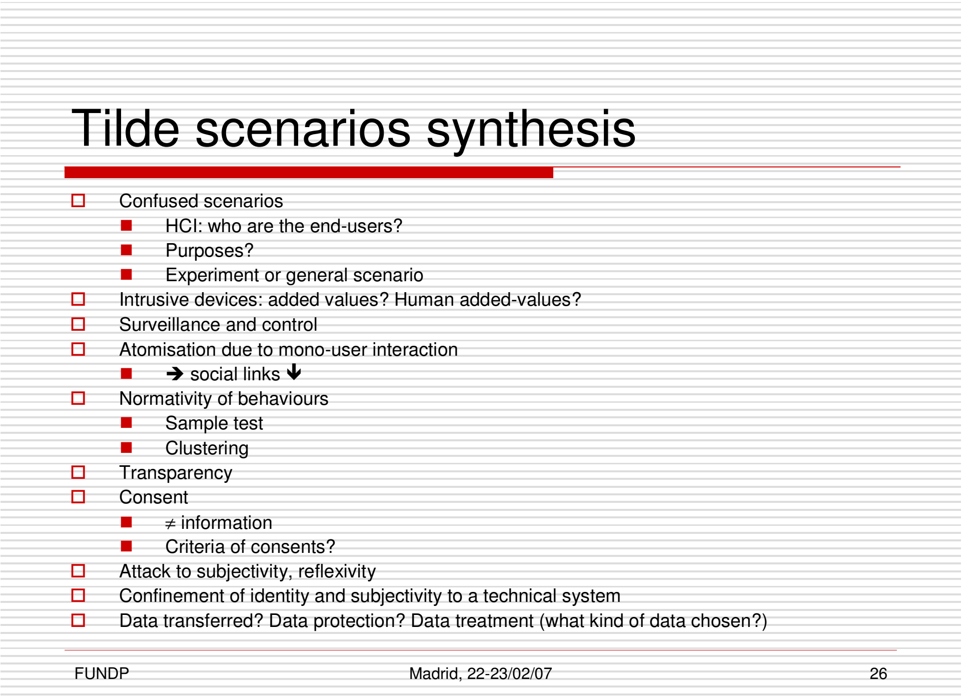

Tilde scenarios synthesis

- Confused scenarios
    - HCI: who are the end-users?
    - Purposes?
    - Experiment or general scenario
- Intrusive devices: added values? Human added-values?
- Surveillance and control
- Atomisation due to mono-user interaction
    - ➔ social links 🡻
- Normativity of behaviours
    - Sample test
    - Clustering
- Transparency
- Consent
    - ≠ information
    - Criteria of consents?
- Attack to subjectivity, reflexivity
- Confinement of identity and subjectivity to a technical system
- Data transferred? Data protection? Data treatment (what kind of data chosen?)

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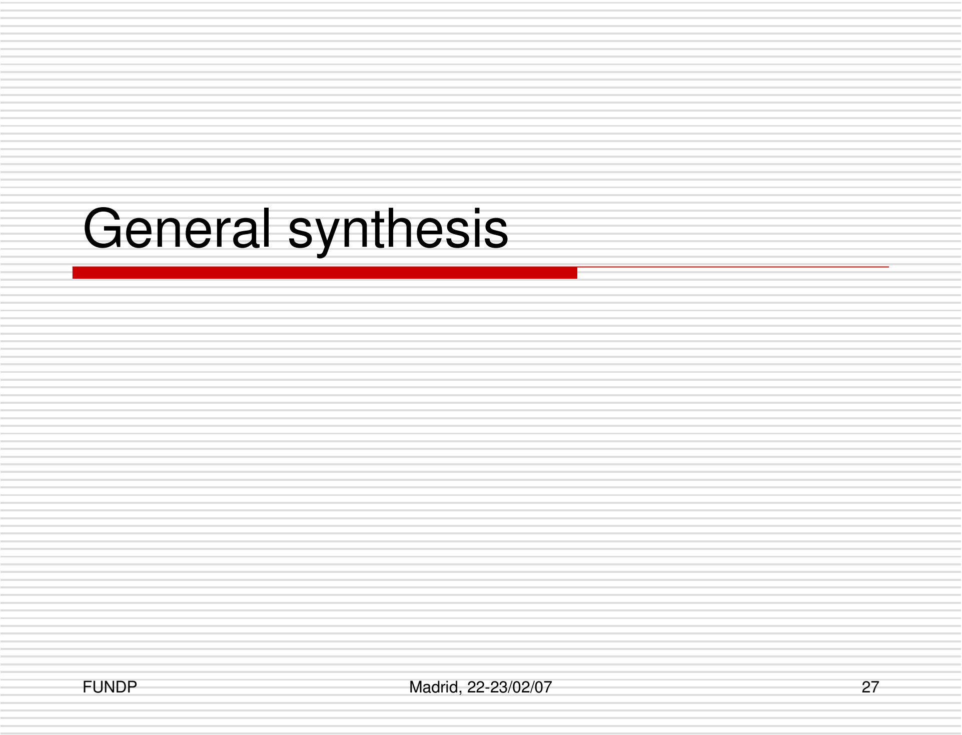

General synthesis

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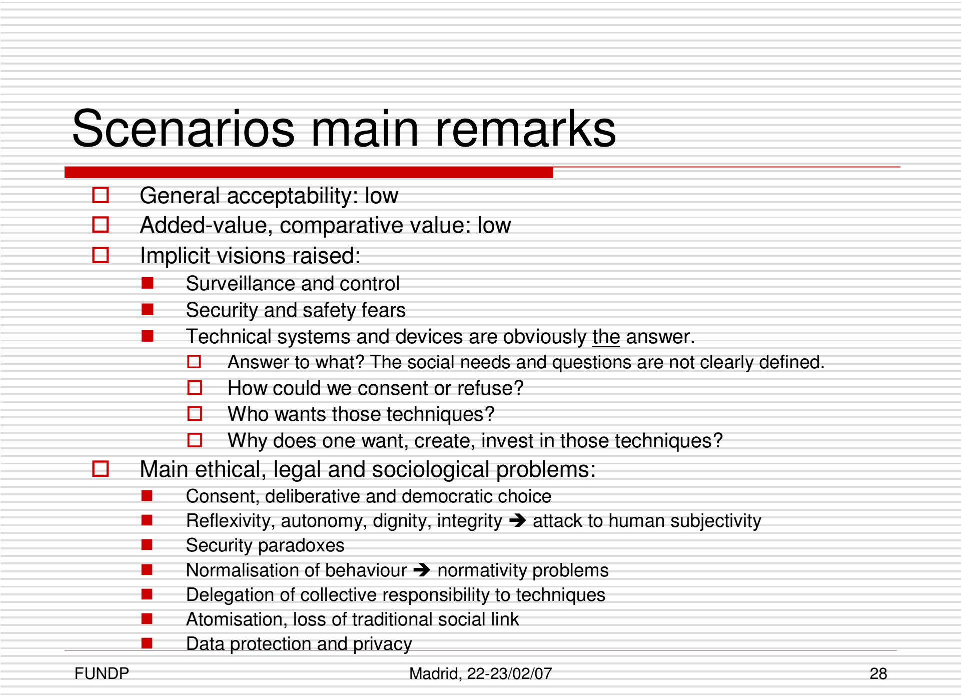

Scenarios main remarks

- ☐ General acceptability: low
- ☐ Added-value, comparative value: low
- ☐ Implicit visions raised:
  - Surveillance and control
  - Security and safety fears
  - Technical systems and devices are obviously the answer.
    - ☐ Answer to what? The social needs and questions are not clearly defined.
    - ☐ How could we consent or refuse?
    - ☐ Who wants those techniques?
    - ☐ Why does one want, create, invest in those techniques?
- ☐ Main ethical, legal and sociological problems:
  - Consent, deliberative and democratic choice
  - Reflexivity, autonomy, dignity, integrity ➔ attack to human subjectivity
  - Security paradoxes
  - Normalisation of behaviour ➔ normativity problems
  - Delegation of collective responsibility to techniques
  - Atomisation, loss of traditional social link
  - Data protection and privacy

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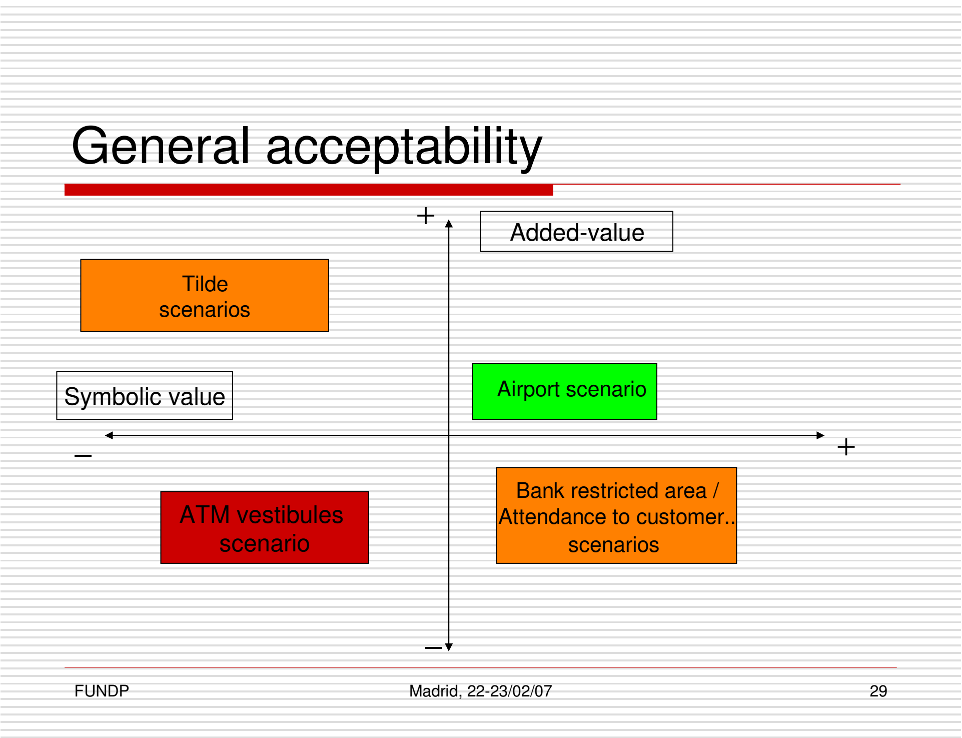

General acceptability

+
Added-value
Tilde scenarios
Symbolic value
Airport scenario
–
+
ATM vestibules scenario
Bank restricted area / Attendance to customer.. scenarios
–

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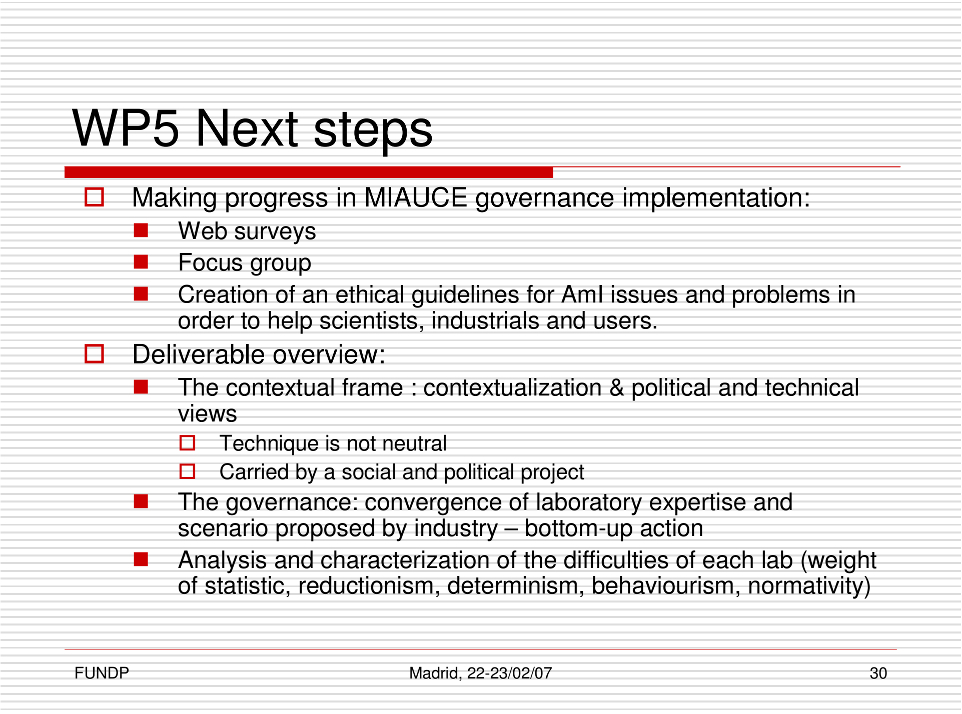
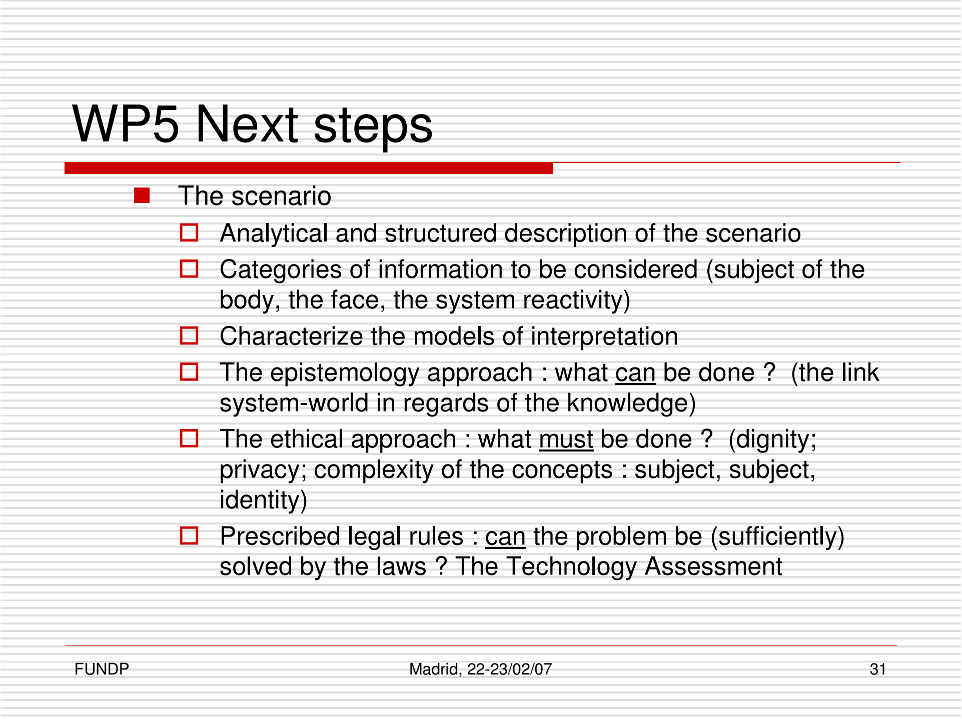


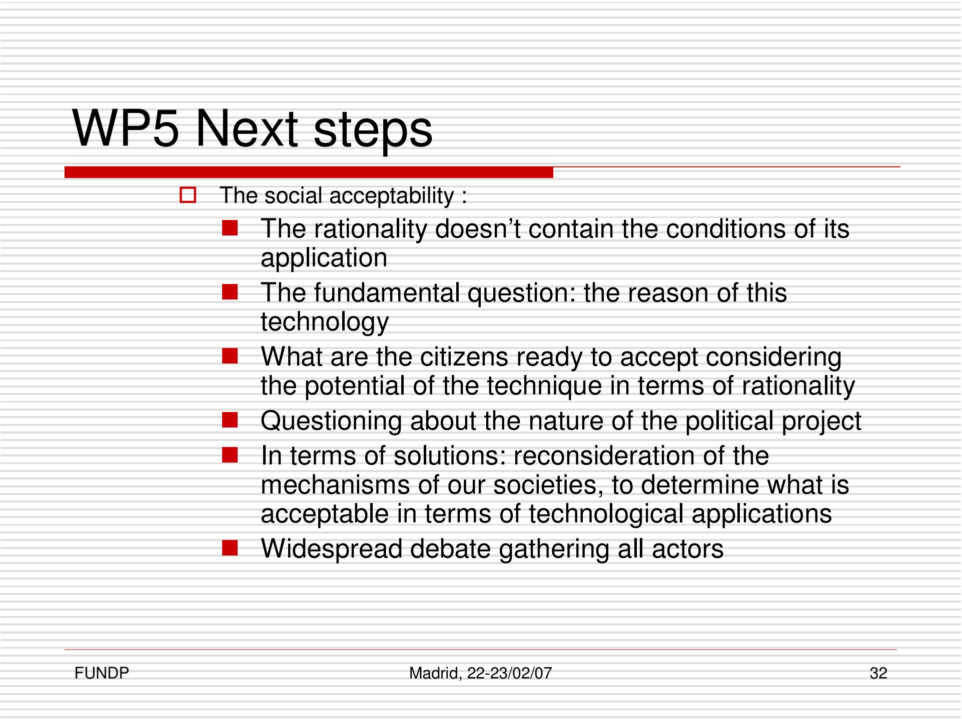
WP5 Next steps

- Making progress in MIAUCE governance implementation:
  - Web surveys
  - Focus group
  - Creation of an ethical guidelines for AmI issues and problems in order to help scientists, industrials and users.
- Deliverable overview:
  - The contextual frame : contextualization & political and technical views
    - Technique is not neutral
    - Carried by a social and political project
  - The governance: convergence of laboratory expertise and scenario proposed by industry – bottom-up action
  - Analysis and characterization of the difficulties of each lab (weight of statistic, reductionism, determinism, behaviourism, normativity)



WP5 Next steps

- The scenario
  - Analytical and structured description of the scenario
  - Categories of information to be considered (subject of the body, the face, the system reactivity)
  - Characterize the models of interpretation
  - The epistemology approach : what can be done ? (the link system-world in regards of the knowledge)
  - The ethical approach : what must be done ? (dignity; privacy; complexity of the concepts : subject, subject, identity)
  - Prescribed legal rules : can the problem be (sufficiently) solved by the laws ? The Technology Assessment



WP5 Next steps

- ☐ The social acceptability :
  - The rationality doesn't contain the conditions of its application
  - The fundamental question: the reason of this technology
  - What are the citizens ready to accept considering the potential of the technique in terms of rationality
  - Questioning about the nature of the political project
  - In terms of solutions: reconsideration of the mechanisms of our societies, to determine what is acceptable in terms of technological applications
  - Widespread debate gathering all actors

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Miauce Meeting in Riga, May 24th and 25th 2007

Social acceptability in Miauce: ethical, legal & social perspective

Prof Dr Yves Poullet, Prof Dr Philippe Goujon,
Dr Antoinette Rouvroy, Mr Denis Darquennes,
Prof Dr Claire Lobet, Ms Nathalie Grandjean

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http://www.crid.be

Miauce project, meeting in Riga
24th and 25th of may 2007

Map presentation

Introduction: Legal, ethical and social uncertainties raised by the “AmI revolution”.

(I) Social acceptabilty: a process

(II) Social acceptabilty: the ethical construction

(III) Social acceptabilty: a legal perspective on privacy

(IV) Social acceptabilty: moral values as horizon

(V) Social acceptabilty: from process to result

Preliminary comments

- Observations resulting from Namur's consultation process
  - ➢ Consulted partners: CNRS, Amsterdam, Glasgow, Tilde
  - ➢ Points to consider:
    - ✓ The function of the meetings: they still serve for the partners to present their respective works but not to integrate them in Miauce;
    - ✓ There is a clear problem of communication;
      - Recommendations:
    - ✓ To reconsider the discrepancies existing between the current modes of interaction in the project and the requirements set in this regard by the reviewers
    - ✓ There are misunderstandings concerning the respective roles and tasks assigned to the different partners;
    - ✓ This is particularly the case regarding the role of Namur

Roles and responsibilities of FUNDP in MIAUCE

- **Constructive vision of technology**
  - Technology is a "social construction"
  - Technical choices should be debated with the Society as they are not neutral regarding human beings and their social life
  - The role of FUNDP is, all along the project,
    - To question the MIAUCE teams regarding the choices encountered
    - To clarify the major "societal issues" related to those choices
    - To debate those choices and their related issues with the MIAUCE teams and with the society (users & end-users)
    - To help those partners to construct their answers and their objectives, and their ethically, legally and socially acceptable objectives

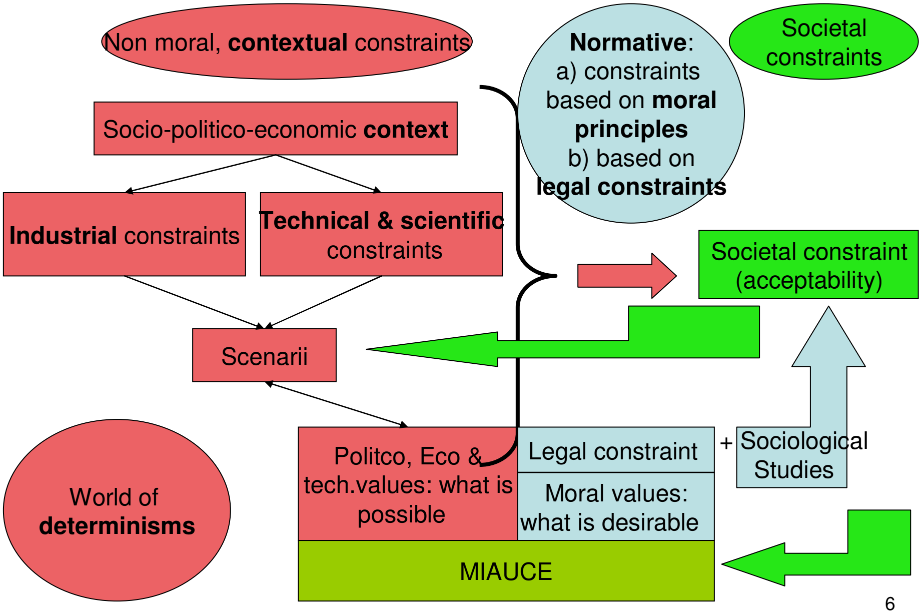
Introduction: Legal, ethical and social uncertainties raised by the "AmI revolution".

- MIAUCE: technological, ethical, sociological and legal *projections* (scenarii)
  - ubiquitous computing
  - converging technologies
  - decreased forgetfullness / increased memory
  - obfuscation of the public/private divide
  - Tacit, invisible revolution
  - …

➡ Ambiant intelligence raises unprecedented questions for the society.

- ➡ Many questions are currently not absolutely clearly answered even by positive law: because we are in a projection process, legal uncertainties remain.
- ➡ Legal evolutions are only partly predictable but a more secure way is to conform with stable fundamental principles found in human rights law, and implemented through fair information practices formalised in EC Law, etc.
- ➡ Adressing those problems requires ethical deliberation involving all stakeholders concerning what the determination of what is morally desirable.

Miauce: technique, ethics & law ?



Non moral, **contextual** constraints

Normative: a) constraints based on **moral principles** b) based on **legal constraints**

Societal constraints

Socio-politico-economic **context**

Industrial constraints

Technical & scientific constraints

Societal constraint (acceptability)

Scenarii

World of **determinisms**

Politco, Eco & tech.values: what is possible

Legal constraint

Moral values: what is desirable

+ Sociological Studies

MIAUCE

(I) Social acceptabilty: a process

Social acceptabilty: a process (A)

- The current situation of MIAUCE : Use cases
    - Description of a « front » situation of images capture
    - No description of the wider potential contexts of use
        - The actors operating the system are not sufficiently identified.
        - The backoffice and its data management are not sufficiently described.
        - The infomation provided regarding the identity of the subjects and the type of information retrieved from them is insufficient.
        - ….
- Working on social acceptability requires moving :
    - From use cases …… to scenarii
- Scenario?
    - *« A **scenario** is an internally consistent view of what the future might turn out to be - not a forecast, but one possible future ».* (Michael Porter)
    - *« A **scenario** is a coherent, internally consistent and plausible description of a possible future state of the world. It is not a forecast; rather, each scenario is one alternative image of how the future can unfold ».* (Intergovernmental panel on Climate Change)

☑ Recom 1. To assess the social acceptability of AMI, we need to build scenarios

Social acceptabilty:
a process (B)

- Social acceptability ? No standard definition
  - ***I) The conditions for the construction of social acceptability: a debate !***
    - ➢ (A) Taking on board moral principles (ethical borders)
      - » Human Values
      - ➔ Moral prescriptions
    - ➢ (B) Respectful of legal principles
      - » Human Rights and Laws (legal prescriptions – balance of individual rights and interests v. other types of social utilities, etc…)
      - ➔ Legal prescriptions
    - ➢ (C) Acceptable and substainable by (directly and indirectly) concerned actors
      - » Actors and their various interests
      - ➔ Deliberative agreement

II) The building of scenarii

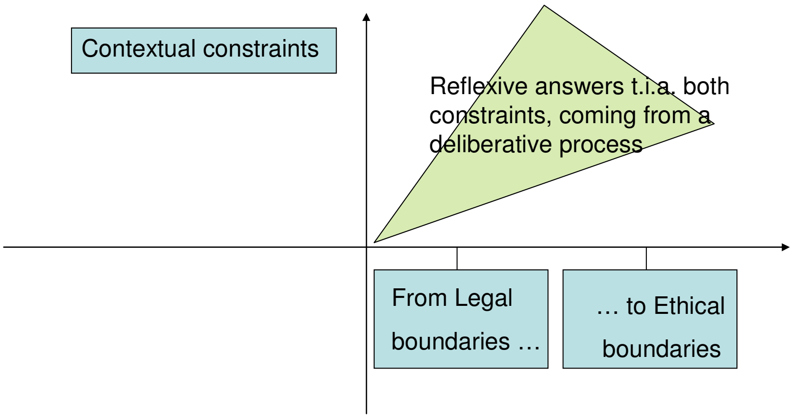
☑ Recom 2. Building scenarii is a result coming from a negocation process

III) Socially acceptable scenarii

☑ Recom 3. A scenario will be socially acceptable only on the conditions that it results from a democratic social delibaration complying with moral and legal prescriptions

Social acceptabilty:
a process (C)

Recom 3. A scenario will be socially acceptable only on the conditions that it results from a democratic social delibaration complying with moral and legal prescriptions

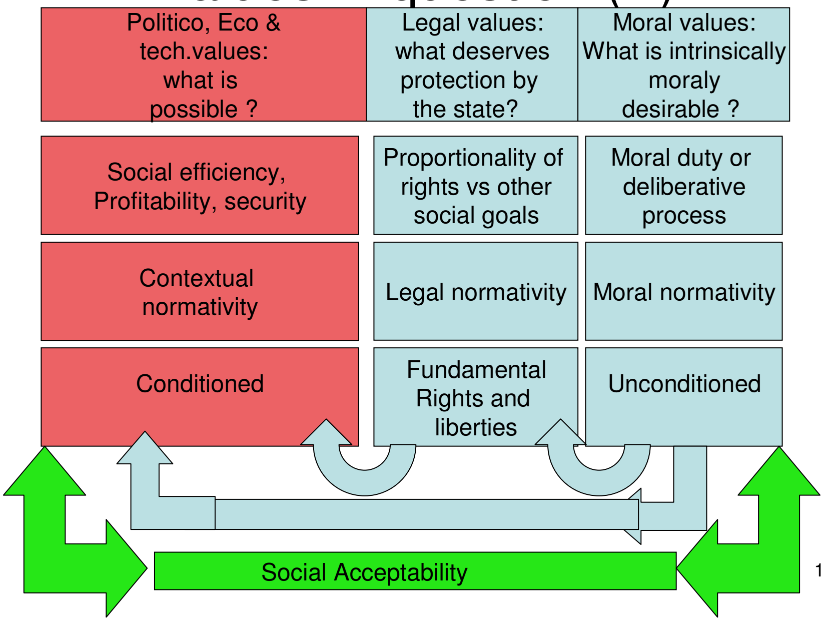

Contextual constraints
Reflexive answers t.i.a. both constraints, coming from a deliberative process
From Legal boundaries …
… to Ethical boundaries

(II) Social acceptabilty: the ethical construction

Social acceptabilty: the ethical construction (A)

- Social acceptability?
  - Taking on board moral principles (ethical borders)
    - Question: How to determine those ethical principles and borders ?
    - Question: How do we draw the ethial roadmap ?
      - ➢ Preliminary answer: No expert can provide you with clear answers
    - Why ? Because ethics is not just a justification, but a way and a method of reflecting about values in both design and action !
      - ➢ This requires to understand and comply with externally imposed moral rules and to adopt a certain ethical posture in daily practice !
      - ➢ That explains why **no definitive answer** can be expected a priori from experts in societal issues ! (endless and recuring process)
    - The role of Namur is to help in the constrution of that necessary ethical delibaration !

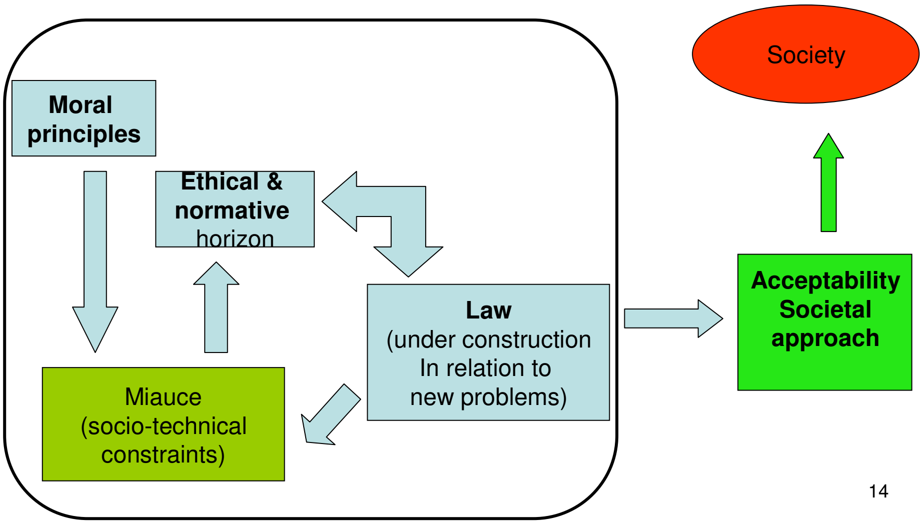
Societal acceptability: values in question (B)



Politico, Eco & tech.values: what is possible ?	Legal values: what deserves protection by the state?	Moral values: What is intrinsically moraly desirable ?
Social efficiency, Profitability, security	Proportionality of rights vs other social goals	Moral duty or deliberative process
Contextual normativity	Legal normativity	Moral normativity
Conditioned	Fundamental Rights and liberties	Unconditioned

Social Acceptability

Social acceptability: a projective process (C)



Moral principles

Ethical & normative horizon

Law
(under construction
In relation to
new problems)

Miauce
(socio-technical
constraints)

Acceptability Societal approach

Society

(III) Social acceptabilty: a legal perspective on privacy

Defining "privacy"… … or "privacies" (A)?

- Privacy of (trivial or sensitive) personal information: "**informational** **privacy**"
- Privacy of the physical body: "**physical** **privacy**"
- Privacy of the home: "**spacial** **privacy**"
- Privacy of thoughts and beliefs: "**intellectual** **privacy and property**"
- Privacy of behaviours in social and intimate life: "**decisional and social** **privacy**"
- Privacy of conversations, telephone calls, letters,..."**communicational** **privacy**"

➡ Based on those aspects, where does it come from that Privacy has to be protected ?

The "values" of privacy: Why protecting privacy (B)?

Consensus values of privacy

- Individual **control** and **empowerment**
- protection against interference in personal matters
  - **protection** of lawful **lifestyles** against social pressures to conform to dominant **social norms**.
  - **protection** against invidious **discriminations** and **prejudices.**
- correlation with political freedom
  - **protection** of the individual's possibility to **think differently** from the majority and to revise his first order preferences.

➡ Protection of individual freedom (*deliberative autonomy*)

➡ Precondition to democratic political life (*deliberative democracy*)

The "architecture" of privacy (C)

- **Law**: European Convention on Human Rights (1950); Council of Europe Convention for the Protection of Individuals with Regard to Automatic Processing of Personal Data (1981); Directive 95/46/EC (1995); OECD Guidelines on the Protection of Privacy and Transborder Flows of Personal data (1981); ..
- **Technology**: Privacy Enhancing Technologies (PETs)
  - Encryption, filtering of web cookies as to prevent profiling,...in practice, no strong incentives exist for companies, governments and designers to deploy those PETs in their systems. Some would also like to make individuals pay or exerts special efforts to have them.
- **Self-regulation**: guidelines; good informational practices.
  - In practice: companies are continually lowering the lowest common denominator. Although arguments about consumers' choice seem reasonable on their face, they don't work in reality. e.g. If a company wants to compete with Amazon, it has to engage in privacy practices as bad or more invasive than Amazon. Problems of accountability, supervision and transparency.
- **Social norms and expectations** of the population

European Convention on Human Rights (D)

Article 8:

1. Everyone has the right to respect for his private and family life, his home and his correspondence.
2. There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.

Horizontal effect:

States are not only obliged to respect the fundamental rights of their citizens, they are also obliged to enforce the respect of the rights guaranteed by the Convention **against infringements by private agents.**
If new technologies allow infringements of privacy by private agents, it may be the international responsibility of national states to take the appropriate measures as to prevent such infringements.

The “Politics” of Privacy (E)

- **Security v. Privacy?** (security scenarios)
  - “If you aren’t doing anything wrong, what do you have to hide?”
  - “If I am not doing anything wrong, then you don’t have a cause to watch me!”
  - ➡ Privacy is not about hiding a wrong, it is a fundamental, yet not absolute, human right. The protection of privacy must be ballanced against other societal objectives.
- **Efficiency v. Privacy?** (marketing scenarios)
  - “Efficiency gains of information sharing exceeds the privacy fears.”
  - “Who benefits from efficiency gains? How is the balance set between benefits and risks? Do consumers who don’t want to consent to ‘give away’ part of their privacy undergo disadvantages?”
  - ➡ Privacy is not a mere individual “commodity”, the effective possibility for individuals to impose the respect of their privacy is incompatible with too systematic waivers of privacy by individuals.

- **Conclusion**: the Laws are always the result of evolving political choices and societal assumptions, inseparable from reflexive political debates, with the ethical debates as horizon.

(IV) Social acceptabilty: Moral values as horizon

Social acceptability: Moral values as horizon (A)

Political, Economical & technical values: what is possible	Legal values: what deserves protection by the state?	Moral values: What is intrinsically moraly desirable ?
Conditioned	Fundamental Rights and liberties	Unconditioned

Question: Is it because it is possible (technically), justified (politically & economically) that it is morally desirable ?

Problems: 1) What about human **values** (societal v. economic) ?

2) Is individual consent **enough** to guarantee moral acceptability ?

3) Are consequences (even good ones) enough to found the morality of action ?

Principle: (Hume) **Values can never be infered from facts (otherwise human values would be contingent to the context)**

Social acceptability: values in question (B)

Principle: **Values can never be infered from facts (context)**

Consequences:Every external contextual **DETERMINATION** of an action can't be ethical

Conclusion: Ethics is connected with the moral **AUTONOMY** of the subject

Justification: If everything was contingent to the context, it would be impossible to evaluate the morality of any action because the agent would not be morally responsible.
Ex: a mentally irresponsible person can't be judged

From Moral to Ethics (C)

Moral: Ex: « you will not kill »
Imperative principle : a priori, prescriptive, universal (does not depend on context).

Ethics: …. ? **WHY** should one not kill ? (Ethic is **NEVER** an answer, even an expert one; ethic's message: « think ethically by yourself »)

Ethics (D)

Rationality: a) The action cannot be said ethical if justified and motivated by reasons dictated by the context (efficiency, security, profit, …)

b) The motivation of the action **must be, from the start,** moral (not by interest)

c) So morality implies : 1) **moral autonomy**….
One can not reflect on the morality of an action in terms of its contribution to efficiency, security, profit …
2) **Good Will**… to be ethical ? The will to be moral !

Because rationality is a shared characteristic of all human beings, it is possible to reach agreements regarding moral rules.
Fondamental consequences:

1) Every human deserves respect and is endowed with fundamental rights

2) The unique « good thing » is the Good Will (only motivated by the duty of respect,i.e,by moral principles)

3) Consequences import less than motives

How to determine Moral Principles ?

The fundamental test : the principle of universalisation

Keystone of ethical thinking (E)

THE principle :

The categorical imperative principle : « Act only on that maxim whereby you can at the same time wish that it becomes a universal law. »

Or… « Man as rational being exists as an end in himself, not merely as a means to be arbitrarily used by this or that will, and in all his actions, whether they concern himself or other rational beings, he must always be regarded at the same time as end.”

Conclusions: 1) to be moral, an action must be in conformity with the moral obligation, whatever the consequences may be (external to the moral consequences)

2) From a moral point of view: we **may be obliged to refuse** some actions in order to respect others, even if those actions are **economically or technically justified.**

From Ethics to Social Acceptability: a process (F)

1st level : Rationality — the level of justification

- Principles : Barcelona declaration: (1) autonomy, (2) dignity, (3) integrity, (4) vulnerability

2nd level : Politics — the context of application

- What are the pre-suppositions and pre-conditions of the project ?
- The context of the application of the norms (the context where the norme is applied)

3rd level : Good Will — the motivation to act ethically (respect of humanity in every human)

- The freedom to act following a law that a human being gives by himself to himself, without any other constraint (either economic, politic, technique, scientific, …) than the good will !

4th level : Conditions — the conditions of ethical reflexion

- The need to create a cognitive openess
- The building-up of a pedagogical context

The Goal : achieving a co-building of the normativity within the project itself.

Social acceptabilty: a process (G)

- Social acceptability?
    - ➢ No standard definition
    - *I) Social acceptability conditions*
        - ➢ (A) Respectful to moral principles (ethical borders)
            - » Human Values
            - ➔Moral prescriptions
        - ➢ (B) Respectful to legal principles
            - » Human Rights and Laws
            - ➔Legal prescriptions
        - ➢ (C) Acceptable and substainable by the concerned actors (direct and indirect)
            - » Actors and their various interests
            - ➔Deliberative agreement
    - *II) The building of the scenarios*

☑ Recom 2. Building scenarios is a process of negocation

III) For a social acceptable scenario

☑ Recom 3. A socially acceptable scenario must achieve a compromise and fit moral and legal prescriptions

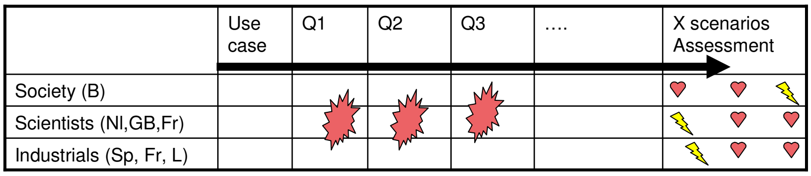
(V) Social acceptabilty: from process to result

Social acceptability: a process (A)

- How to build scenarios?
  - 1st step : the internal process (MIAUCE)
  - 2d step : the external validation - the survey
- 1st step : What method?
  - A participative method with large implication of the MIAUCE teams
  - Based on a micro « DELPHI like »* consultation and tools of LIPSOR**
  - Organized as a decisions tree

* http://www.design.philips.com/about/design/section-13478/index.html

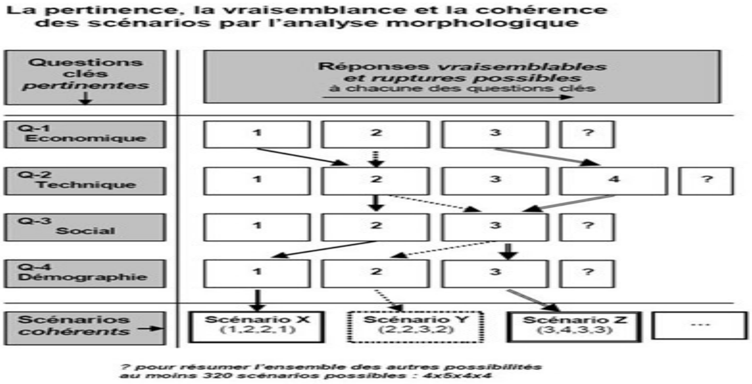
** http://www.3ie.fr/lipsor/



	Use case	Q1	Q2	Q3	….	X scenarios Assessment
Society (B)						♥ ♥ ⚡
Scientists (Nl,GB,Fr)		✸	✸	✸		⚡ ♥ ♥
Industrials (Sp, Fr, L)						⚡ ♥ ♥

Social acceptabilty: a process (B)

Dynamic vision of the scenario building Process : MORPHOL method


La pertinence, la vraisemblance et la cohérence des scénarios par l'analyse morphologique
Questions clés *pertinentes*
Réponses *vraisemblables et ruptures possibles* à chacune des questions clés
Q-1 Economique
Q-2 Technique
Q-3 Social
Q-4 Démographie
Scénarios cohérents
1
2
3
?
4
Scénario X (1,2,2,1)
Scénario Y (2,2,3,2)
Scénario Z (3,4,3,3)
...
? pour résumer l'ensemble des autres possibilités au moins 320 scénarios possibles : 4x5x4x4

http://www.3ie.fr/lipsor/morphol.htm

Conclusion: social acceptabilty

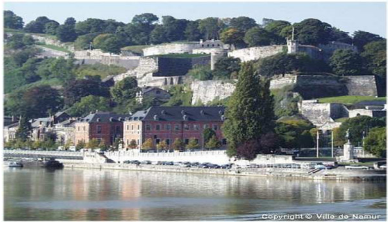
- Building scenarios in practice
  - Decision about the 3 use cases (one by domain)
  - Preparation of the micro DELPHI process and questionnaire
  - Definition of an agenda of interactions with the MIAUCE teams
  - Launching the process on a first use case and assessment of the method
- Agenda
  - Decision about the 3 use cases : Tilde meeting
  - Preparation and agenda : september
  - First process of scenarii building : october

☑ Recom 4. The success of the process depends on the participation of all the MIAUCE teams

Next:

- I) The contextual frame related to the AI technology
  - Objective: to put in evidence how historically the meaning of AI was constructed
- II) The Miauce project, regarding the way of its construction and governance (bottom-up approach and not top-down)
  - Caracterisation of the project, of its governance and of the role of its actors
- III) The analysis for each labs of the difficulties of the scientific and technical approaches.
  - Epsitemological analysis
  - Then how those blocs contribute to scenarii building
- IV) The problem of the scenario
  - Analysis of those scenarii and the construction of the social acceptability

Miauce Meeting in Amsterdam, September 3rd and 4th 2007



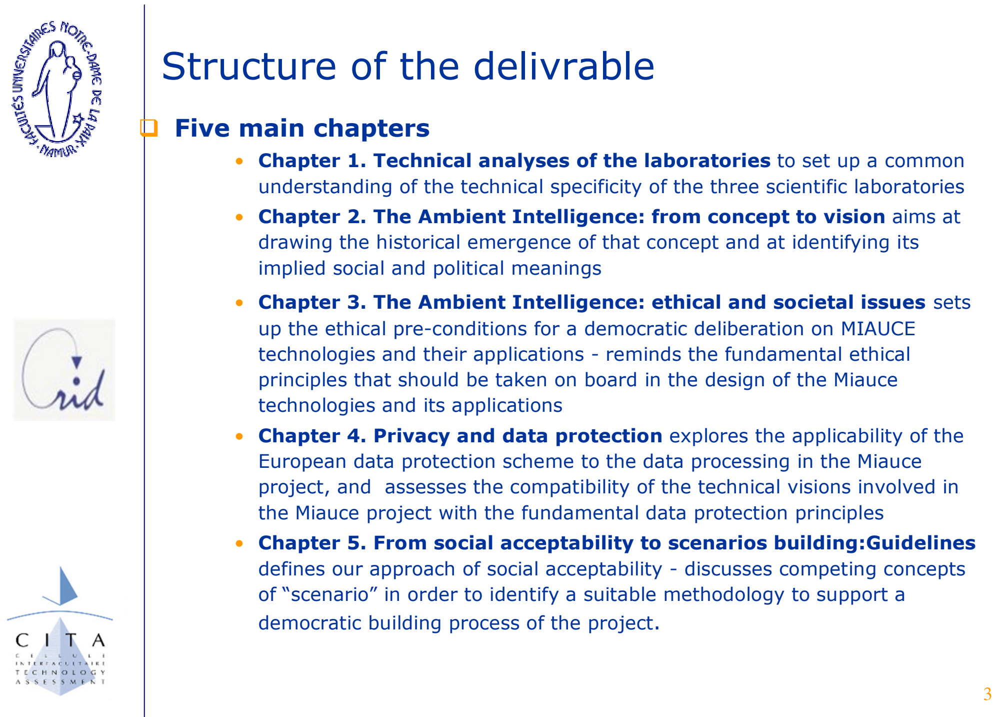
Presentation of the delivrable

WP 5 – Social, Ethical, and Legal issues

CRID - University of Namur, Belgium
CITA - University of Namur, Belgium

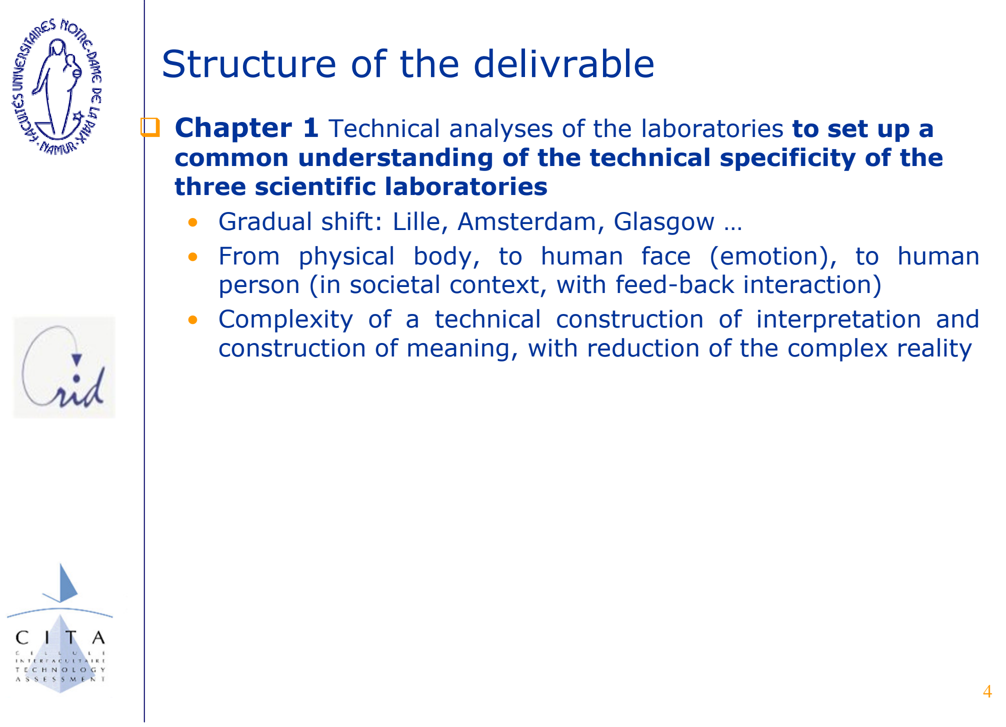
Status of the deliverable

- **Work in progress addressing critical issues emerging from the state of the art**
- **Think tank that can help partners to better understand the 'societal' issues related to the MIAUCE technologies and their potential applications**
- **First essay regarding the methodology that could support the 'democratic deliberation' to design socially acceptable MIAUCE applications (to be presented Tuesday 4/9)**



Structure of the delivrable

- **Five main chapters**
  - **Chapter 1. Technical analyses of the laboratories** to set up a common understanding of the technical specificity of the three scientific laboratories
  - **Chapter 2. The Ambient Intelligence: from concept to vision** aims at drawing the historical emergence of that concept and at identifying its implied social and political meanings
  - **Chapter 3. The Ambient Intelligence: ethical and societal issues** sets up the ethical pre-conditions for a democratic deliberation on MIAUCE technologies and their applications - reminds the fundamental ethical principles that should be taken on board in the design of the Miauce technologies and its applications
  - **Chapter 4. Privacy and data protection** explores the applicability of the European data protection scheme to the data processing in the Miauce project, and assesses the compatibility of the technical visions involved in the Miauce project with the fundamental data protection principles
  - **Chapter 5. From social acceptability to scenarios building:Guidelines** defines our approach of social acceptability - discusses competing concepts of "scenario" in order to identify a suitable methodology to support a democratic building process of the project.



Structure of the delivrable

- **Chapter 1** Technical analyses of the laboratories **to set up a common understanding of the technical specificity of the three scientific laboratories**
  - Gradual shift: Lille, Amsterdam, Glasgow …
  - From physical body, to human face (emotion), to human person (in societal context, with feed-back interaction)
  - Complexity of a technical construction of interpretation and construction of meaning, with reduction of the complex reality

Structure of the delivrable

- ☐ **Chapter 2** The Ambient Intelligence: from concept to vision **aims at drawing the historical emergence of that concept and at identifying its implied social and political meanings**
  - AmI vision – human centred – is ambitious since it will affect our existence, identity and relation to the world.
  - Visions are not neutral – imply many values concerning the world, the human.
  - AmI imply many benefits for citizens, industry, commerce, public services.
  - The Lisbon strategy – a knowledge based society … meeting societal chalenges (privacy, identity, security, confidentiality, trust, accessibility, social acceptance, anonymity, manipualtion, control, digital divide).
  - Will the technological world reduce human being to an object of the technical system ?

Structure of the delivrable

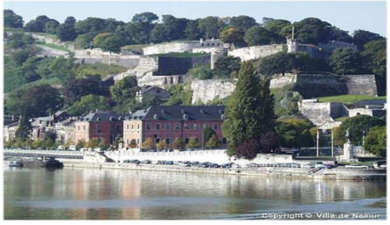
- ☐ **Chapter 3** The Ambient Intelligence: ethical and societal issues **sets up the ethical pre-conditions for a democratic deliberation on MIAUCE technologies and their applications - reminds the fundamental ethical principles that should be taken on board in the design of the Miauce technologies and its applications**
  - To take an active critical part in the technology design means to deconstruct meanings.
  - As answers are conditioned, ethic is more in questioning, before the action and on a border, that which separates our subjective existence from the constraining externality.
  - The ethical interrogation refers to the construction of a human order and questions the way human are perceived and treated.
  - This implies to be free from conditioning technical framing; responsibility, autonomy and good will.

Structure of the delivrable

- **Chapter 4** Privacy and data protection **explores the applicability of the European data protection scheme to the data processing in the Miauce project, and assesses the compatibility of the technical visions involved in the Miauce project with the fundamental data protection principles**
  - Privacy… to build the personality without excessive constraints
  - Data protections allows protection of the projected identities
  - The respect of privacy is necessary for the user's legitimate interests and for the collective interests of a free and democratic society
  - To take on board imperatively in technological's design:
    - Respect for autonomous decision & self-determination
    - The process of ascribing meaning should be made « justiciable »
    - Priority to scenarios increasing individuals'participation in social cooperation & deliberative democratic process
    - Security & accountability of the infrastructure

Structure of the delivrable

- **Chapter 5**
  - defines our approach of social acceptability - discusses competing concepts of "scenario" in order to identify a suitable methodology to support a democratic building process of the project.
- **Legal and ethical constraints**
  - Democratic co-construction of the solution; learning process
  - Taking into account the boundaries
  - Necessary attitude:
    - Ask questions
    - Bring solutions



Scenario building

Methodological proposals

WP 5 – Social, Ethical, and Legal issues

CRID - University of Namur, Belgium
CITA - University of Namur, Belgium

The aims of the presentation

- To define the methodological framework to build socially acceptable scenarios for MIAUCE applications
- To get an agreement and an involvement of the MIAUCE teams for the scenarios building process
- To open the discussion to practical consideration for a better cooperation regarding this process

The two challenges of the MIAUCE project

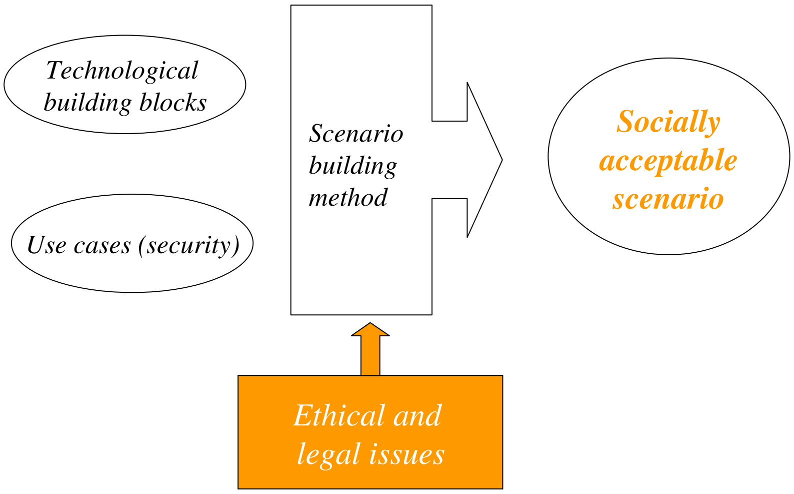
A PRODUCT challenge

The first major challenge of this project is to integrate human values (legal social and ethical aspects) as central design criteria along with more classical or traditional criteria of usability, economy, reliability and correctness

A PROCESS challenge

The second critical challenge is to set up a democratic process to support an open deliberation regarding the design of Miauce application, taking into account all the constraints respectful of human values (ethical and legal constraints)

The current situation of the MIAUCE project



Technological building blocks

Use cases (security)

Scenario building method

Socially acceptable scenario

Ethical and legal issues

Social acceptability?

- **Social acceptability of a technological project is the focal point of three main concerns:**
  - the technical feasibility and reliability
  - the economic viability and
  - the human appropriateness
- **Human appropriateness**
  - a soft dimension related to the social customs/habits
  - a normative or hard one related to values and norms being either legal, ethical.

    In a decision-making context, acceptability gauges whether the technology or technological method at issue conforms with societal values and norms sufficiently well to be placed on the table of a viable alternative to other technologies

    A.K. WOLFE, D.J. BJORNSTAD, M. RUSSEL and N. KERCHNER(2002)

Scenario's definition and roles

- Scenario as a product

  Alternative images of the future that are either desirable or feared.(M. GODET – 2006)

- Scenario as a process

  Scenario is based on the belief that if we, as human beings, can influence the future by our decisions and actions(…) If, therefore, we make different decisions and take different actions the future will be different. Multiple scenarios explore these alternative futures by using different assumptions in their development (G.H MAY – 2006)

- Scenario as a "sense making" exercise

  Scenarios are flexible means to integrate disparate ideas, thoughts and feelings into holistic images providing context and meaning of possible futures (L.B. RASMUSSEN – 2005)

MIAUCE scenario as a LEARNING process

- ❑ Difficult dialogue between MIAUCE teams due to
    - The fragmented backgrounds
    - The highly sensitive value character of the technology and the contrasted visions of the "good"
- ❑ In MIAUCE, the role of the scenario building process is threefold :
    - Deliberative : Scenario building should improve the dialogue between the teams
    - Pedagogical : Scenario building aims at supporting a collective learning regarding the major values, norms and constraints that should frame MIAUCE future applications (open understanding of other's background and constraints)
    - Operational : Scenario building aims at designing socially acceptable applications
- ❑ To be legitimated by all the participants, this exercise has to be democratic

Need for a methodology

Methodological choice

- ❑ **Several competing methods (see I. Miles- 2006)**
- ❑ **Choice of the method depends on**
    - *the problems confronted : design socially acceptable applications – improve the dialogue between teams - support a collective learning process*
    - *the allocated time : …quite short for the ambitious agenda*
    - *the accessibility of the method : pragmatic and simple due to our various backgrounds*

Adaptation of the Schwartz method (1991 – 1993)

Simplified version of the Schwartz method

❑ **Why a simplification?**

- The full Schwartz's method leads to the building of contrasted scenarios for one issue (problem solving or decision making)
- In the case of MIAUCE, the learning process is as important than the product (scenario)

❑ **A 5 steps' process of scenario building**

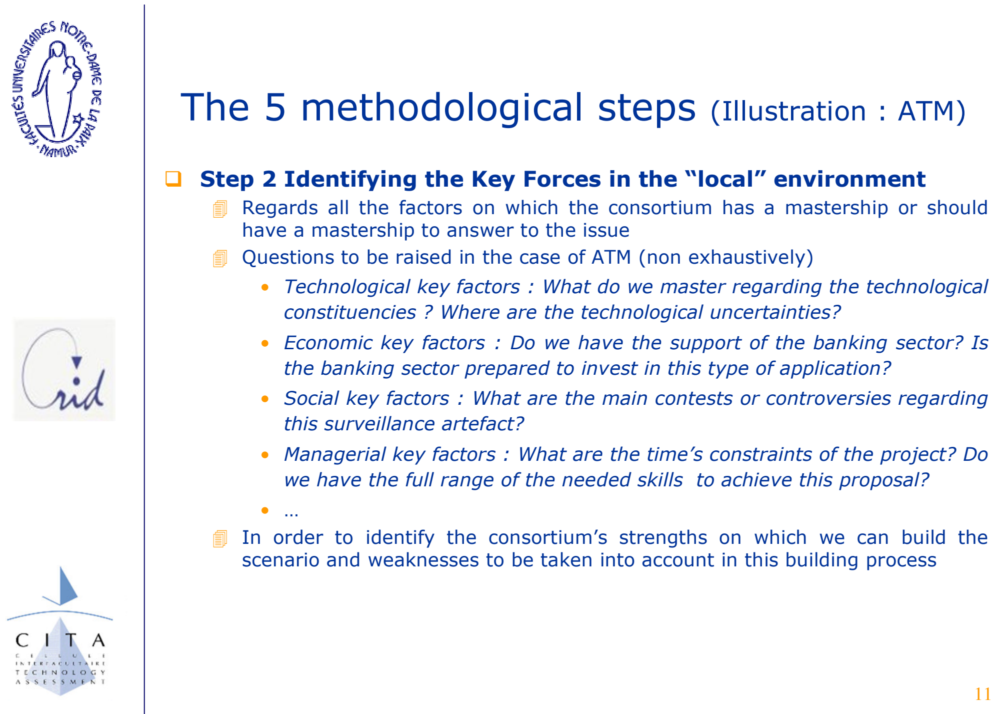
- Each step is supported by a « virtual workshop » between teams
- Each step is a learning process : do we know enough to go further? What are the remaining uncertainties and contreversies? What are the major points of consensus? Etc.
- The process is iterative : each step can retroact on the previous ones till we reach a sharing vision of a desirable scenario

The 5 methodological steps (Illustration : ATM)

❑ **Step 1. Define the central issue**

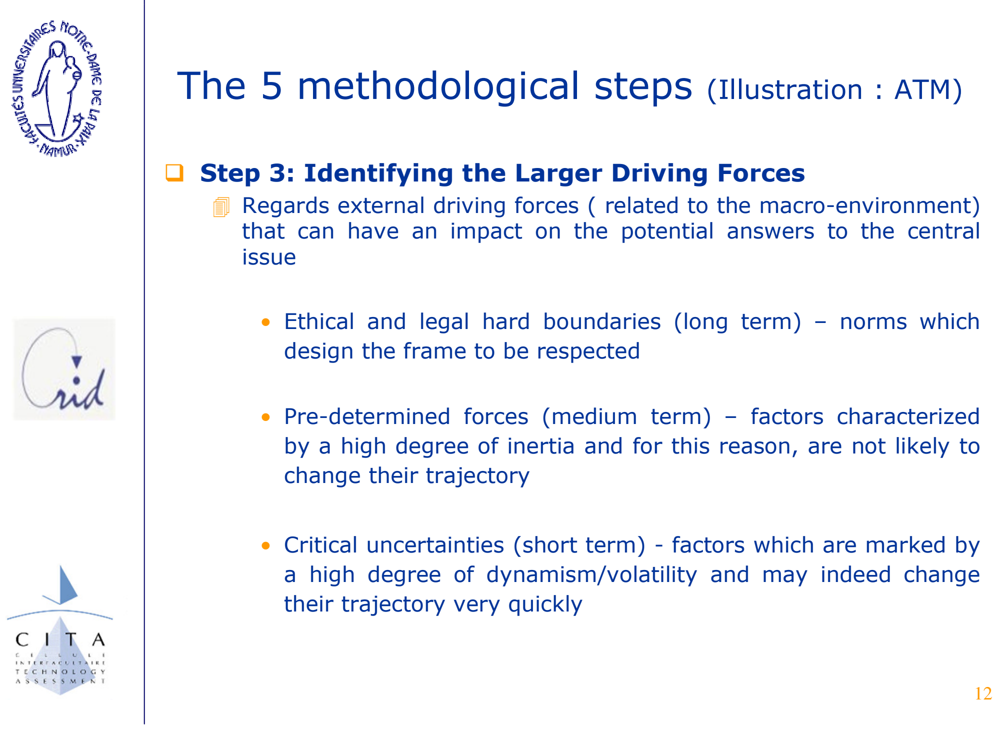
- ATM use case : the deployment of a surveillance system based on MIAUCE technologies in order to monitor the movements and to prevent against unexpected visitors

- The suggested central issue could be how (conditions) to design this project in order to make it
  - » *Technically feasible*
  - » *Economically substainable*
  - » *Socially acceptable ….*
  - » *…. and respectful of ethical and legal boundaries*



The 5 methodological steps (Illustration : ATM)

- **Step 2 Identifying the Key Forces in the "local" environment**
  - Regards all the factors on which the consortium has a mastership or should have a mastership to answer to the issue
  - Questions to be raised in the case of ATM (non exhaustively)
    - *Technological key factors : What do we master regarding the technological constituencies ? Where are the technological uncertainties?*
    - *Economic key factors : Do we have the support of the banking sector? Is the banking sector prepared to invest in this type of application?*
    - *Social key factors : What are the main contests or controversies regarding this surveillance artefact?*
    - *Managerial key factors : What are the time's constraints of the project? Do we have the full range of the needed skills to achieve this proposal?*
    - …
  - In order to identify the consortium's strengths on which we can build the scenario and weaknesses to be taken into account in this building process



The 5 methodological steps (Illustration : ATM)

- **Step 3: Identifying the Larger Driving Forces**
  - Regards external driving forces (related to the macro-environment) that can have an impact on the potential answers to the central issue
    - Ethical and legal hard boundaries (long term) – norms which design the frame to be respected
    - Pre-determined forces (medium term) – factors characterized by a high degree of inertia and for this reason, are not likely to change their trajectory
    - Critical uncertainties (short term) - factors which are marked by a high degree of dynamism/volatility and may indeed change their trajectory very quickly

The 5 methodological steps (Illustration : ATM)

❑ Step 3: application to ATM

- Hard boundaries (non exhaustively)
  - ethical values regarding human autonomy and dignity
  - legal norms and principles regarding privacy and responsibility
- Pre-determined forces (non exhaustively)
  - demographic trends-aging population that can affect the usability of the ATM systems
  - social trends - individualization and the aging of the Society and the growing need for surveillance systems
  - economic/financial trends as business willingness to reduce the fixed costs by automatization
  - technological trends that could affect the trajectory of the project
- Critical uncertainties (non exhaustively)
  - Public reactions and opinions regarding those surveillance devices
  - Banking strategies concerning the ATM platforms
  - Insurance sector assessment of this new surveillance equipments
  - Physical uncertainties related to the various architectural configurations of the ATM rooms

The 5 methodological steps (Illustration : ATM)

❑ Step 4 Writing of a « desirable » scenario

- The scenario should be based and framed by the results of steps 2 and 3
- The writing of a scenario aims at drawing a complete picture of the future application and its conditions of use :
  - Identification of the project's finality : purposes of the application
  - Narration of typical use cases aiming at understanding the whole process from capturing images to decision making
  - Definition of the norms that have to regulate the application
    - Information and consent of the public
    - Data recording and use (data protection)
    - Roles and responsibilities of the various involved actors
    - …

The 5 methodological steps (Illustration : ATM)

❑ **Step 5 Assessing the robustness of the scenario and the « learning » of the MIAUCE teams**

- Last validation of the scenario by the MIAUCE teams
- Statement about the shared learnings related to this process

In the case of MIAUCE, the process for exploring those visions (step 2 and 3) is the most important part of the work concerning the MIAUCE scenarios building, maybe more important than drawing the scenarios themselves since it gives the opportunity to each participants to address his/her requirements for the project, to analyze the uncertainties that surround it and finally to negotiate a project that represents an accepted compromise for all the participants at stage.

How to 'play' the Scenario Building (SB) ?

❑ **Do we need one scenario by application ?**

Suggested response

- Since scenario building is a learning process
- One scenario by domain could be enough in order to explore all the issues related to the design of MIAUCE technologies and applications

❑ **How to play together this methodology ?**

Suggested response (for security domain)

- October : survey by questionnaire (all teams associated)
- November : 2 days workshop with all teams
  - Survey's results presentation
  - Focus group supported by the 5 steps SB method
  - First draft of scenario + list of pending questions
- November – december :
  - Survey's second round
- December (Miauce meeting):
  - Final version of the scenario
  - Assessment of the methodology

Two major roles to 'play' the methodology

- ❑ **The « learning » experts**
  - Roles
    - » To be pro-active : raising question AND giving solution
    - » to supply the process with their knowledge, and to be open to the others knowledge
    - » to raise the potential uncertainties related to their area of expertise and
    - » to negotiate an accepted proposal regarding the various requirements, interests and values at stage
  - The MIAUCE experts : the associated 'learning' teams
    - » technical expertise Lille (Body motion capture), Amsterdam (Face recognition) and Glascow (Context framing and interpretation)
    - » industrial expertise is represented by three businesses associated into the project with visual tools (for camera surveillance sector), with Sylis (for the marketing sector) and with Tilde (for the WEB interactive TV sector) +Focus groups
    - » societal expertise is represented by the Namur teams in charge of the ethical, legal and social issues of the project

Two major roles to 'play' the methodology

- ❑ **The 'procedure' keeper**
  - Roles
    - Methodological 'conductor' : to explain and to lead the methodological process
    - Negociator to help the participants to reach social agreements which are acceptable for all the participants
    - Carer to protect some ethical and legal values identified not by the participants but by the society as large as non negotiable
    - Writer to draw the result of each steps and the 'desirable' scenario
  - Suggested role keeper
    - One member of the Namur team
- ❑ **How is going to participate to the ATM SB ?**
  - List of representatives