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Towards a framework to provide citizen-centred guidelines in the design of e-participation platforms

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Towards a framework to provide citizen-centred guidelines in the design of e-participation platforms

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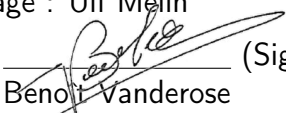
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Résumé

Les technologies de communication et d'information (TIC) sont désormais présentes partout et sont devenues des outils dont l'homme peut difficilement se passer. Leur introduction a eu un impact sur tous les secteurs d'activité, de l'hôtellerie et la restauration avec les services de livraison, au secteur des transports avec la présence d'entreprises comme Uber ou encore le secteur financier où la gestion d'un compte bancaire peut se faire sur un smartphone. Le secteur public ne fait pas exception et utilise de plus en plus les TIC pour offrir des services standards par le biais des TIC [1]. C'est ce qu'on appelle l'e-gouvernement. De nombreuses villes et municipalités surfent sur la vague du concept de ville intelligente (smart city) et s'efforcent de présenter des solutions utiles aux citoyens par le biais des TIC. L'exemple le plus concret est l'apparition de parkings connectés, ceux-ci retournent en direct le nombre et l'emplacement des places de stationnement disponibles dans les villes aux conducteurs. Avec l'e-gouvernement, le concept d'e-participation a été introduit et est défini comme "l'utilisation des TIC pour permettre et améliorer l'efficacité de la participation des citoyens aux processus de délibération et de prise de décision" [34]. Pour renforcer la démocratie, les organisations gouvernementales introduisent des activités d'e-participation et les mènent par le biais des TIC et, plus spécifiquement, par l'introduction de plates-formes d'e-participation. Ce mémoire vise à fournir un framework centré sur les besoins du citoyen pour la conception de plates-formes de participation électroniques afin de faciliter l'introduction de ces plates-formes en satisfaisant les préférences des citoyens et en évitant les problèmes génériques qu'ils peuvent rencontrer. Ce framework est la combinaison d'heuristiques théoriques issues d'une revue de la littérature concernant les normes d'évaluation des plates-formes numériques et l'évaluation de la participation des utilisateurs dans le domaine informatique confrontée à deux études empiriques. Ces deux études visent à identifier les préférences des citoyens concernant l'utilisation des plates-formes de participation en ligne par le biais d'une enquête et à identifier les problèmes génériques rencontrés dans l'utilisation des plates-formes de participation en ligne par le biais d'évaluations think-aloud. L'enquête résulte en 137 sets de préférences et les évaluations think-aloud ont été menées sur deux plates-formes de participation belges existantes avec 6 participants répartis en 3 tranches d'âge (moins de 25 ans, entre 25 et 50 ans, plus de 50 ans) pour chaque plate-forme évaluée. Les résultats de ces études ont été rassemblés en deux sets de lignes directrices qui sont croisées et affinées entre elles avec la liste heuristique précédemment citée pour créer le framework final. Ce framework est composé de lignes directrices concernant les domaines de la participation citoyenne, de la qualité logicielle, de l'interaction homme-machine, de l'accessibilité et du web 2.0.

Abstract

Information and Communications Technologies (ICT) are now present everywhere and have become a tool that humans can hardly do without. Their introduction has impacted all sectors of activity, from the hotel and catering industry with delivery services, to the transport sector with the presence of companies such as Uber or the financial sector where the management of a bank account can be done on a smartphone. The government sector is no exception and is increasingly using ICT to offer standard services through ICT [1]. This is called e-government. Many cities and municipalities are riding the wave of the smart city concept and are striving to present useful solutions to citizens through the use of ICT. The simplest example is the appearance of connected parking which returns the number and location of available parking spaces in cities on time. With e-government, the concept of e-participation was introduced and is defined as "the use of ICTs to enable and improved the effectiveness of citizen involvement in deliberation and decision-making processes" [34]. To enhance democracy, government organisations are introducing e-participation activities and conduct them through ICT and more specifically, e-participation platforms. This master thesis aims at providing a citizen-centred design framework for e-participation platforms to ease the introduction of them by satisfying citizen preferences and avoiding generic issues that they may encounter. This framework is the combination of theoretical heuristics emerged from a literature review concerning the evaluation standards of digital platforms and the evaluation of user participation in the IT domain confronted to two empirical studies. Those two studies aim at identifying the citizen preferences concerning the use of e-participation platform through a survey and identifying the generic issues encountered in the use of e-participation platform through think-aloud evaluations. The survey results in 137 sets of preferences and the think-aloud evaluations were conducted on two existing Belgian participation platform with 6 participants divided into 3 age distributions (minus than 25 years old, between 25 and 50 years old, over 50 years old) for each platform evaluated. The results of these studies were gathered into two sets of guidelines that are crossed and refined with the heuristics list previously cited to create the final framework. This framework is composed of guidelines concerning citizen participation, quality, human-computer interaction, accessibility and web 2.0 domains.

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1 Introduction

ICTs are now present everywhere and have become a tool that humans can hardly do without. Their introduction has impacted all sectors of activity, from the hotel and catering industry with delivery services, to the transport sector with the presence of companies such as Uber or the financial sector where the management of a bank account can be done on a smartphone. The government sector is no exception and is increasingly using ICT to offer standard services through ICT [1]. This is called e-government. Many cities and municipalities are riding the wave of the smart city concept and are striving to present useful solutions to citizens through the use of ICT. The simplest example is the appearance of connected parking which return in time the number and location of available parking spaces in cities. With e-government, the concept of e-participation was introduced and is defined as "the use of ICTs to enable and improved the effectiveness of citizen involvement in deliberation and decision-making processes" [34].

In this master thesis, the field of e-participation is studied as well as its application via ICTs. Through a literature review, no studies have been noticed on the lack of design of ICTs that enable e-participation activities: e-participation platforms.

This master thesis aims to address the lack of e-participation platform design and more precisely the citizen preferences concerning this kind of digital platform. To solve this problem we conducted a literature review concerning the evaluation standard of digital platforms and user participation to come out with a list of theoretical heuristics. To complete and clarify this list we conducted two empirical studies, an online survey concerning the citizen preferences in terms of usability and features of e-participation platform and think-aloud evaluations on two existing Belgian participation platform to highlight the issues that citizens encountered during their use. The combination of the results of these three approaches led to the final framework proposed in the result section.

This document is structured as follows.

In the "Background" section we detailed every concept and aspect that need to be understood to approach the issue raised in the next section "Research Relevance". This section details the literature review conducted on e-participation platforms and highlights the research gap "Lack of citizen-centred design for e-participation platforms". The section "Research Design" describes the methodology applied to resolve the previous issue by the conducting of a literature review and two empirical studies. The results of these 3 approaches are detailed in the "Results" section and are translated into 3 proposals of design that crossed and refined together form a framework that answers the research gap highlighted in the first literature review. This document is closed with the "Discussion" section where we comment on the applied methodology, the limitations and future works. Finally, the "Conclusion" section summarizes the overall research and its contributions.

2 Background

In this section, we describe the theoretical concepts that guide us throughout this thesis. We define the concept of the smart city broadly and then focus more precisely on the e-government aspect and the importance of citizen participation via online participation platforms. The smart city concept is the point of entry of this section as it is the most familiar concept followed by the e-government concept that is considered as an important feature of smart city and that a city government should study and apply in order to proclaim oneself "smart city". One of the four objectives of the e-government is to enhance democracy through the use of ICT. That is the main purpose of the e-participation concept defined as the use of ICTs to improve citizen involvement in the decision-making process and detailed right after the e-government concept.

2.1 Smart city

The concept of "smart city" is emerging all over the world and for many western countries is a synonym of urban development. A race to be labelled "smart city" has started in today's modern urban context. Defining this concept is not easy because of the wide range of different qualities and functionalities that smart cities want to offer. Those often link together technological informational transformations with economic, political and socio-cultural changes[134]. Kominos in his work about intelligent cities (a concept closely related to the smart city) defines the term "intelligent city" in 4 different ways: "a territory with developed knowledge-intensive and innovation-based activities, a territory with embedded routines of social co-operation allowing knowledge and know-how to be acquired and adapted, a territory with a developed information and communication infrastructure, digital spaces, and knowledge management tools and a territory with a proven performance to innovate, manage and resolve problems that appear for the first time, since the capacity to innovate and manage uncertainty are the critical factors for characterizing intelligence." [51] In 2006, Kominos highlights that the difficulty to understand what are intelligent cities (smart cities) is due "to the multiple scientific and technology disciples and social movements that take part in their creation, namely the movements towards 'cybercities', 'smart growth', 'intelligent communities' and 'intelligent innovation environments' ". He then defined intelligent cities as "territories with high capacity for learning and innovation, which is built in the creativity of their population, their institutions of knowledge creation, and their digital infrastructure for communication and knowledge management". In 2016, Meijer and Bolívar in their study about smart city, review the literature on smart urban governance. They highlight three different types of definitions for smart cities: "smart cities as cities using smart technologies (technological focus), smart cities as cities with smart people (human resource focus) and smart cities as cities with smart collaboration (governance focus)" [10] Smart cities with a technological focus aim to strengthen the urban system with new technologies (e.g.: parking connected, wi-fi in the whole city, e-platform for the citizens, use of IoT...). Smart cities with a human resource focus, focus on the level of education of the population. This concept of a smart city is built on having highly educated people with a college degree. Smart cities with a governance focus, are seen from a user-centred perspective. The main goal is to collaborate with citizens. Meijer and Bolivar specify that studies on smart cities are usually more focus on the technological focus and governance focus than the human resource focus. These days, smart cities are a mix of the use of technology in the

public cities' infrastructures and the presence of e-government. The aim of setting up e-government is to collaborate with citizens to identify their needs and to develop a city that will provide them with the best urban environment possible. To achieve this goal e-participation platforms are introduced as the main ICT tool of e-participation. Concepts of e-government and e-participation are processed in the next sections. Berntzen and Johannessen studied the role of citizen participation in smart city projects, they bring to the fore that citizen participation may be an important factor in implementing smart cities projects. Indeed some citizens may have better experience and competences in a certain domain that the city doesn't possess and can thus provide a better early-stage evaluation of the project to avoid problems and reduce risks of failure. Citizens can also via their smartphone collect environmental and other data needed by the city in their project, for example, "FixMyStreet.com" is a web application where citizens can report problems city's road. Finally, active participation from citizens enhances democracy, participation help to build sustainable communities where citizens care for each others[53]. Portney and Berry in their research about the sustainability of cities highlight that cities that favour citizen participation and respect different ways of participating (petitions, local reform groups, neighbourhood associations,...) tend to be more sustainable[54]. Coe, Paquet and Roy have found that ICT plays an essential role in the development of smart cities and citizen participation. Networks have transformed the way people live and communicate and ICT became the first tool of communication. Governments thus need to apply ICT in their governance to provide better connectivity with citizens and better-suited services[55]. With all this information, e-participation platforms are then the ICT tools to provide a level of participation in smart city and to help it to develop.

2.2 E-government

Since the appearance of the context of e-government, several definitions of it have been made. E-government may be defined in a one-sentence definition as: "the use of ICT tools and the internet to provide services electronically"[1].

Grönlund and Horan in their research about the history of e-government, report that the term of e-Government emerged in the late 1990s with the Internet boom.[57] In the United State, it was Al-Gore in 1993 who highlighted the role of e-government in federal services [56] His vision was to link citizens to various governmental agencies to facilitate the provision of all types of governmental services automatically, improve governmental performance by using the information and communication network and reduce cost and increase the speed of effective implementations[24]. But Grönlund and Horan found that there is literature about the use of IT in government since the 1970s as Kraemer in 1978[58]. In those times, the literature focused on IT in government, while the literature on e-government since the 1990s has focused on the external use of IT as a service to citizens.[57].

E-government can be defined in a more complicated definition that is divided into four objectives [1] :

- gain free dissemination of information to overcome the shortcomings of a traditional physical process
- improve the access and delivery of government services

- improve government performance
- improve the democratic process in the country

The purpose of e-government is then to deliver services and information via ICT tools. By using e-government, 3 possible relationships can be named: government to citizen (G2C), government to business (G2B), and government to government (G2G). So the e-government is useful to the citizens but also companies and other governments[41].

Each relationship is differentiated by the services it provides. CG Reddick in his research (2004) has highlighted in + 4.000 U.S. local governments the most popular services for each relationship. Here is a non-exhaustive list with the first 4 services in percent [41]:

- G2C services :
 - Online communication with individual elected and appointed officials (72.3%)
 - Forms that can be downloaded for manual completion (56.30%)
 - Online requests for services, such as pothole repair (32.3%)
 - Online requests for local government records (28.0%)
- G2B services :
 - Review product offerings online for equipment (68.9%)
 - Review product offerings online for office supplies (67.9%)
 - Make purchase online for office supplies (53.7%)
 - Make purchase online for equipment (45.6%)
- G2G services - intranet service :
 - Provides news and information (75.9%)
 - Publish documents and manuals online to reduce printing costs (61.9%)
 - Post job openings for internal recruitments (53.4%)
 - Expand telecommuting staff access to information and data (42.2%)

Yildiz highlighted that two more relationships can be added: Government to Civil Societal Organizations (G2CS) and Citizen to Citizen (C2C) that are part of the concept of e-Governance [43]. If e-Government refers to the delivery of information and services via IT for the citizen, business or other government, e-governance refers to the way of managing and utilize IT to executes functions of supervising, planning, organizing, coordinating, and staffing effectively. Keohane and Nye propose the following definitions[33]: "*Governance implies the processes and institutions, both formal and informal, that guide and restrains the collective activities of a group. Government is the subset that acts with authority and creates formal obligations. Governance need not necessarily to be conducted exclusively by governments. Private firms, associations of firms, nongovernmental organizations (NGOs), and associations of NGOs all engage in it, often in association with governmental bodies, to create governance; sometimes without governmental authority.*".

Yildiz provides a table with the categories and their characteristics, definitions and some examples.

Subcategories of e-government				
Parties of communication	Content	Dominant characteristics	Definition	Example
Government-to-Government (G2G)	Government information and services	Communication, coordination, standardization of information and services	E-administration	Establishing and using a common data warehouse
Government-to-Citizen (G2C)		Communication, transparency, accountability, effectiveness, efficiency, standardization of information and services, productivity	E-government	Government organization Web Sites, e-mail communication between the citizens and government officials
Government-to-Business (G2B)		Communication, collaboration, commerce	E-government, e-commerce, e-collaboration	Posting government bids on the Web, e-procurement, e-partnerships
Government-to-Civil Society Organizations (G2SC)		Communication, coordination, transparency, accountability	E-governance	Electronic communication and coordination efforts after a disaster
Citizen-to-Citizen (C2C)		Communication, coordination, transparency, accountability, grassroots organization	E-governance	Electronic discussion groups on civic issues

Figure 1: Yildiz Subcategories of e-government

Never mind which relationship is focused by the government, e-government is a growing concept, Layne and Lee have developed a stage of growth model for fully functional e-government. They suggest that e-government is an evolutionary phenomenon and therefore e-government initiatives should be accordingly derived and implemented. The stage model is composed of four stages: cataloguing, transaction, vertical integration and horizontal integration[44].

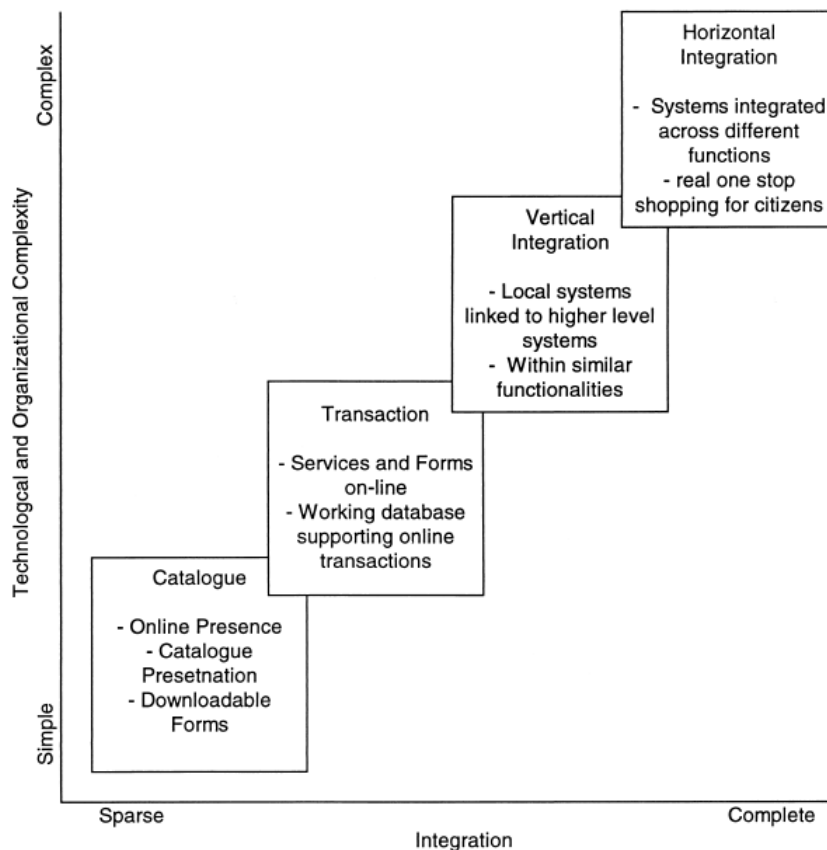


Figure 2: Layne and Lee e-government growth model

Layne and Lee explain the four-stage as follows [44] : The first stage is called "cataloguing" because efforts of governments are focused on having an online presence by cataloguing government information. Governments typically set up an informing website with the presentation of the government and scattered electronic documents like detailed related information or downloadable forms.

The second stage is called "transaction-based" because e-government initiatives are focused on connecting the internal government system to online interfaces that allow the citizen to transact with the government electronically. For example, interfaces provide the renewing of the citizens' licences or paying taxes online. Each government services can have their own online adapted services. The quantity of e-transactions is phenomenal and the governments will be pressed to integrate the states' systems with the web interfaces. With the increasing citizen demand, Governments will be pushed to go further as the critical benefits of implementing e-government are derived from the integration of underlying processes not only across different levels of government but also different functions of government. The next step is to have a "one-stop shopping" concept where

the citizen can contact one point of government and complete any level of governmental transactions.

Two ways to integrate e-government: vertical integration (third stage) and horizontal integration (fourth stage). The vertical integration refers to local, state and federal governments connected for different functions or services of government an example would be the business licensing process. In an ideal situation where systems are vertically integrated, once a citizen filed for a business license at the city government, this information would be propagated to the state's business licensing system and to the federal government to obtain an employer identification number (FEIN). Horizontal integration is defined as integration across different functions and services. An example would be a business being able to pay its unemployment insurance to one state agency and its state business taxes to another state agency at the same time because systems in both agencies talk to each other or work from the same database.

In 2004, Reddick has highlighted that the G2C is primarily in stage 1 by cataloguing information and providing an online presence for cities. The G2G relationship is more developed with the use of Intranets for government employees. But it's the G2B relationship that is the most in the second stage with the interfaces of online procurement of office supplies and equipment. [41]

In 2011, Reddick and Norris have researched local e-governments in the U.S. to compare with the predictions of their previous research (including Reddick's from 2004). They concluded that by 2011, U.S. local governments offered greater arrays of information, services, transactions and interactions online via their website. However, information and services are the main focus on local government websites (the e-government stay at stage 1). The reason for this is that information and services are easier and cheaper to automate on websites than transactions and interactions. They also confirmed that most e-services are one way but it appears to be a trend toward becoming more transactional and interactive[45].

The establishment of e-government benefits to many sectors as the private, government and academic sectors. Evans and Yen highlighted the impacts on these three sectors. E-government provide simplicity between private sectors and government, there is one government point access instead of an array of contacts it is easier for businesses to find and amend taxes and submit information about their employees and it helps stop erroneous or fraudulent manners of assistance. The impact for governmental organizations is better coordination between them and better management of resources, staff and finances. With e-government, academics institutions are forced to reveal their actual progress, it benefits the students that get better information and funding. College students can also apply online for government grants and loans. Some classes change their focus to e-government applications and issues and it is easier to conduct research projects in collaboration with web-based associates working in positions of interest in government. The citizen benefits of online services that daily help them but Evans and Yen emphasize that traditional channels of delivery of services can't be eliminated completely. Automation addresses many questions but there will always be a need for "human" customer services. E-government will be successful only if this process is handled correctly and if the government treat citizens as consumers and ask their expectations to better serve them[46].

Like every concept, e-government is limited by some barriers, Stepehn, Norris and Fletcher in a research in 2003 highlighted some of these barriers that slow the growth of e-government. The main barriers to e-government are the lack of technology staff mem-

bers, the lack of financial resources, the lack of technical expertise and issues regarding security[47].

In 2014 Savoldelli, Cadagnone and Misuraca studied about all the barriers in e-government adoption by literature reviewing 248 publications about e-government and divided into three periods the barriers highlighted in these publications.

e-Government adoption barriers frequency of citation in the selected papers.

Typology of barriers		P1 – reinventing government (1994-2004)	P2 – i2020 strategy implementation in European Union (2005-2009)	P3 – Digital Agenda for Europe implementation (2010-2013)
Technological and economical	Lack of bandwidth capacity	2.4%	11.9%	
	Lack of interoperability		14.3%	9.5%
	Too high investment and maintenance costs	2.4%	7.1%	4.8%
	Lack of privacy and security	2.4%	31%	9.5%
	Lack of open sources software and standards			4.8%
Managerial and organisational	Lack of project management capabilities	2.4%	11.9%	
	Resistance to change	2.4%	11.9%	9.5%
	Lack of skills	2.4%	26.2%	33.3%
Institutional and political	Digital divide		1.5%	6.2%
	Lack of legal bases		1.5%	7.2%
	Lack of political commitment	1.5%	1.5%	
	Lack of political coordination	1.5%	4.6%	
	Lack of policy cycle management	4.6%	3.1%	12.3%
	Lack of measurement and evaluation	1.5%	7.7%	9.2%
	Lack of citizens participation		3.2%	13.8%
	Lack of trust and transparency	1.5%	6.2%	10.8%

Figure 3: Savoldelli et al. e-government barriers

In this table, we can see that the lack of policy cycle management is the main barrier during the period of 1994-2004. Between 2005 and 2009, the lack of policy cycle management dropped and the lack of privacy and security and the lack of skills become the two main barriers to the adoption of e-government. Finally, during the last period of 2010-2013, the lack of privacy and security, that has been made a priority since the events of September 11th, drastically dropped while the lack of skills raised. The lack of citizens participation that has been nonexistent in the first period becomes the second barrier to the growth of e-government in the third period[61].

Citizen participation in e-government that is referred as "e-participation", is often restricted to the participation of citizens in decision-making (e-democracy) but Simonofski et al. in their research highlighted that e-participation can take another form with the participation of citizens in e-government service delivery[59]. Indeed, as expressed in the smart city section, citizens can be useful in implement of city projects as e-government services, they are thus no more considered as customers of these services but as participants. Axelsson et al. (2010) found that citizen engagement must be seen as an integrated part in the thinking and the realisation of e-government projects to provide services but citizens still remain passive receivers (end users) of the outcome that the services provide. This collaboration between citizens and government is a challenge that is not explored enough in 2010 according to Axelsson et al.[60]. Simonofski et al. in systematic literature review about the citizen participation in e-government service delivery in 2017 identified that citizens can have positive impacts in the service design and the service execution by providing new ideas, requirement, evaluation of services (co-design of services) and assist the government in their core tasks (co-execution)[59]. Lack of citizen participation that is identified as a barrier in e-government is then important to reduce to enhance e-government services and help develop smart cities.

2.3 E-participation

All over the world, a growing public indifference and inertia from citizens towards governments and formal political process are related. There is a decline of trust by the citizens toward government in the modern western democracies. To overcome this problem, governments seek to encourage citizen participation to rebuild the trust between citizens and governments and to improve the legitimacy of political processes[48]. This is where the concept of e-participation appears. E-participation as e-government can be defined in many ways. Macintosh defines it as "the use of ICTs to enable and improved the effectiveness of citizen involvement in deliberation and decision-making processes"[34] while Quan-Haase and Wellmand define it as "Electronic participation is one dimension of e-government that focuses on the use of ICTs to interact with citizens and other external stakeholders with the expectation that greater engagement will better inform government decision making and enhance democratic processes"[35]. With these two definitions we can say that the concept of e-participation is right in the centre of the relationship between government and citizen (G2C) with the main focus to provide better decisions that benefit the lives of citizens and is a strong actor in the enhancing of the democracy that is one of the four objectives of e-governement[1].

Al-Dalou and Abu-Shanab in their study highlighted five levels of e-participation[14]: e-information, e-consultation, e-involving, e-collaboration and e-empowering. E-informing is only about providing policies and information on citizenship to citizens. E-consulting is a two-way communication channel where stakeholders and citizens can discuss their opinions and contribute to the study of issues. E-involving ensures that the opinions of citizens concerned by certain issues are assessed. E-collaborating is a two-way channel where stakeholders and citizens are partners in generating solutions. E-empowering empowers citizens to make decisions and monitor policies. Each level possesses performance indicators that are specified in the appendix section.

Medaglia in his literature review with 122 research articles about e-participation (2012) revisits the shape of the e-participation field proposed by Sæbø et al. (2008) by re-defining e-participation actors, activities, effects, evaluation and contextual factors. E-participation actors are users of e-participation platforms, they initiate the e-participation processes and benefits them. Every class of citizen or organizations is is an actor that conduct e-participation activities. Those activities are numerous, a lot of studies focus on e-voting that is closely related to e-democracy defined as "the use of ICT to support the democratic decision-making processes"[49] by Macintosh. However, with the emergence of e-participation platform activities like e-activism, e-consultation, e-campaigning or e-petitioning that promote the participation with the interest and the point of view of citizens in decision making, not only the voting power as e-voting. E-participation activities are influenced by contextual factors, those factors can be infrastructures, policy, technologies,... As a result of these activities, some impacts are revealed like civic engagement, deliberative or democratic effects that include positive or negative outcomes. The results are determined through an evaluation of these effects that help improve the conducting of e-participation activities to create beneficial effects[37].

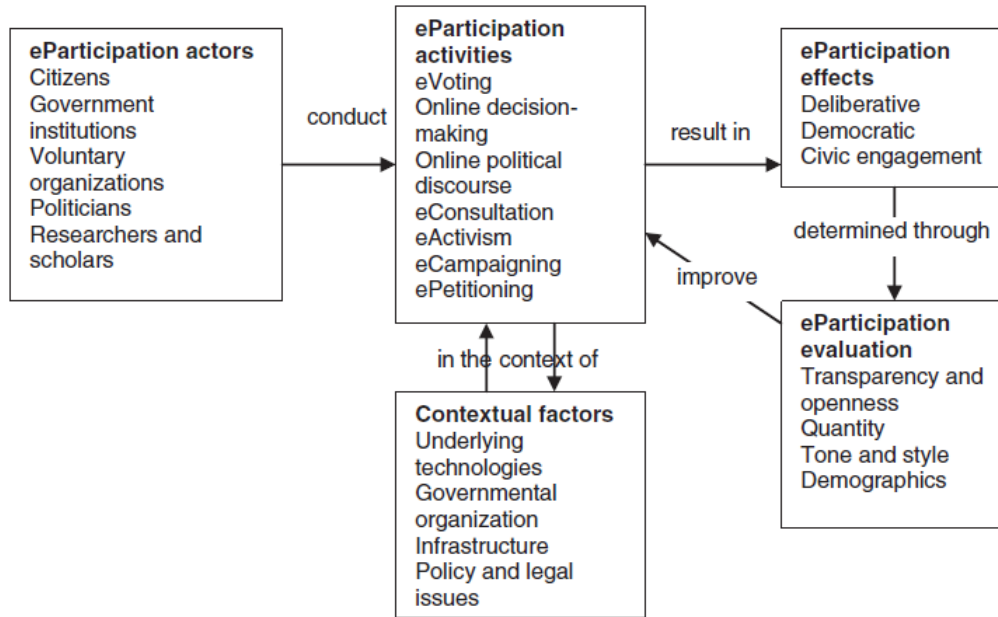


Figure 4: Medaglia shape of the e-participation field

All these e-participation activities can be conducted via ICT tools, Panopoulou, Tambouris, and Tarabanis in their research about e-participation initiatives in Europe concluded that the main use of communication channel is the Internet and that web portals (e-platform) are the main ICT tool used in e-participation initiatives[50]. It seems important to define those activities because each activity influences the way the e-participation platform related to is build and its main functionalities.

E-voting include all ICT tools to permit citizens to formally vote online, this e-participation activity aims to increase security, citizen trust and their usability and acceptance [37]. Research shows that e-voting can positively affect democratic deliberation and citizen engagement in politics [38, 39].

The online political discourse can be debated with the help of ICT environments. The introduction of ICT results in changes of political discourses, existing challenges can be identified as the stakeholder's engagement, management, design, evaluation and reshaping of political processes. All these challenges lead to new propositions of different models of e-democracy[37].

Online decision making is promoted via specific platforms with the purpose to enable, enhance and guide decision-making with the collaboration of citizens. Decision making as parliamentary debates, participatory budgeting, collaborative drafting of policy documents or urban planning can be addressed in these platforms[37].

E-activism refers to all activities carried out by voluntary organizations, interest groups, and individuals to promote viewpoints and interests using ICT tools[37]. Depending on their nature, organizations use web tools to foster civic engagement to different degrees. For example, organizations can be rights groups, environmental organizations, government-sponsored movements,... [40]

E-consultation refers to providing feedback from citizens to governments and public agencies. E-consultation initiatives can be initiated at supra-national (EU), national or local level[37].

E-campaigning is not studied a lot and there is a need of more research about it, it refers to the use of ICT by politicians to bring to the fore their campaign and their political objectives if they are elected by citizens[37].

E-Petitioning refers to initiatives of citizens to influence decision making by proposing challenge and decisions to be discussed[37].

Those activities are then mostly conducted on online participation platforms whose applications are the main subject of the research relevance of this thesis.

3 Research Relevance

In 2012, Medaglia had conducted a literature search covering the period from 2006 to 2011 to provide an analysis of the development of the e-participation and the directions that the research field was taking at this time. He gathered data from 122 research articles that he divided into 6 different fields: e-participation actors, e-participation activities, contextual factors, e-participation effects, e-participation evaluation and e-participation research method. His work is valuable for this thesis as we take his analysis of e-participation activities as a point of entry for the conduct of the literature review about e-participation platform. Medaglia highlighted 6 e-participation activities, that are defined in the background section, and highlighted for each which direction their related research was taking. The following state of the art is then the continuation of the work of Medaglia concerning e-participation activities from 2012 to 2020 (April).

3.1 Literature Review - Methodology

In this section we present our methodology for planning, conducting and reporting the literature review.

3.1.1 Planning the review

Aim of the review: This literature review aims at identifying the outcome of the research made over e-participation platform by exploring the e-participation activities: e-voting, online decision making, online political discourse, e-consultation, e-activism, e-campaigning and e-petitioning; and the way they are introduced through ICT over the period of 2012 to 2019. The review aims to respond to the questions: What are the applications of each e-participation activities? What kind of frameworks are proposed for each e-participation activities? What are the online platforms used to perform these e-participation activities?

Search terms : The following search terms were selected following a reflection on the synonyms of the different participation activities as well as the different keywords that could imply the study of a related digital platform and were used to perform the literature review : ("e-participation" OR "online participation" OR "citizen participation" OR "e-voting" OR "e voting" OR "evoting" OR "online voting" OR "digital vote" OR "online decision-making" OR "digital decision-making" OR "online political discourse" OR "digital political discourse" OR "e-consultation" OR "e consultation" OR "econsultation" OR "online-consultation" OR "digital consultation" OR "e-Activism" OR "e activism" OR "eactivism" OR "Digital activism" OR "Online activism" OR "e-compaigning" OR "e compaigning" OR "ecompainging" or "digital compaigning" OR "online-compaigning" OR "e-petitioning" OR "e petitioning" OR "epetitioning" OR "digital petition" OR "online petition") AND ("application" OR "framework" OR "ICT" OR "solution" OR "digital tools" OR "platform").

Search for primary studies: To find relevant papers, we used different libraries and applied the keyword search to the titles and abstracts of papers. We searched the Google Scholar and Scopus library and applied a snowball method analysis with the citation of the selected articles. Those two libraries returned over 800 articles and 60 of them were selected to conduct the review.

Study selection criteria: We selected only articles published in English that contain relevant discussions about the e-participation activity in the context of citizen participation. As a result, we exclude papers that treat decision making in the artificial intelligence domain and papers treating about e-consultation in the medical domain.

Study quality assessment checklist and procedures: To include or exclude the articles we based ourselves on reading the abstract. In case of doubt, we reviewed the entire paper.

3.1.2 Overview of e-participation activity research articles

e-participation activities	Articles
E-participation	Balahadia, F. et al. 2015, Nascimento, D. M. 2016, Cegarra-Navarra, J.G. et al. 2012, Alharbi, A., & Kang, K. 2014, Scherer, S., & Wimmer, M. A. 2014, Kim, S., & Lee, J. 2012, Zolotov, M. N. et al. 2018, Bianchini, D. et al. 2016, Prowol, L. et al. 2018, Khan, Z. et al. 2017, Meijer, A., & Potjer, S. 2018, Lafrance, F. et al. 2019, Wirtz, B. 2018, Andrews, P., & da Silva, F. S. C. 2013, Zheng, Y. 2016, He, G. 2017, Wakasa, K., & Konomi, S. I. 2015, Liu, L. 2019
E-voting	Anggriane et al. 2016, Ayed 2017, Wibowo 2018, John et al. 2018, Ajiboye Adeleke et al. 2013, Mendez & Serdult 2014, Vassil et al. 2016, Abdulhamid et al. 2013, Backes et al. 2016, Cortier et al. 2014, Cortier & Smyth 2013
Online decision making	Pantano, E. et al. 2017, Chang, M. L., & Wu, W. Y. 2012, Slivkins, A., & Vaughan, J. W. 2014, Punj, G. 2012, Kushin, M. J., & Yamamoto, M. 2013, Sadovykh, V. et al. 2015, Catania, V., & Ventura, D. 2014, Boudoin, D. et al. 2014, Falco, E., & Kleinhans, R. 2019, Gordon, V. 2017, Nietzsche, P. et al. 2012, Fain, B. 2016, Valilai, O. F., & Houshmand, M. 2013, Vrandečić, D. 2012,
E-consultation	Røed, M., & Wøien Hansen, V. 2018, Beyers, J., & Arras, S. 2019, Fraussen, B. et al. 2020
Online political discourse / e-activism / e-campaigning	Olorunnisola et al. 20013, Masullo et al. 2017, Garimella et al. 2016, Al-Mohammad, S. M. 2017, Baban, E. & Güzel, E. 2015, Gong, X. 2015, Ceron, A., & d'Adda, G. 2016, Hermans, L., & Vergeer, M. 2013
E-petitioning	Singh, G. et al. 2012, Moss, G., & Coleman, S. 2014, Åström, J., & Karlsson, M. 2016, Riehm, U. et al. 2014, Hough, R. 2012, Böhle, K., & Riehm, U. 2013, Singh, G. 2012

3.1.3 Reporting the review

Report of Medaglia literature review [37]

E-voting

In his literature review about e-participation, Medaglia report that the contributions in e-voting activity mainly consist of hardware and software architecture propositions intending to overcome the limitations of the traditional voting system. The literature is also focused on security, citizen trust, usability and citizen acceptance. There is a small amount of researches more specific as analyzing the proportion of gender group using e-voting or the risks of e-voting systems. Researches about the impacts of e-voting systems introduced in the voting process show that e-voting affect positively the democratic deliberation and the citizen engagement in politics.

Online political discourse

Research on online political discourse highlights the changes that the introduction of ICT had to the political discourse. They identify new challenges, new types of political parties, the introduction of online political discussion on blogs and the emergence of the proposition of new models of e-Democracy.

Online decision-making

Contributions in online decision-making are mainly frameworks of digital platforms to enhance decision making with the ICT. In 2012 Megaglia highlighted that studies focus on platforms with a dedicated decision making purpose as parliamentary debate, participatory budgeting, collaborative drafting of policy documents and urban planning.

E-activism

The few e-activism studies mainly treat the interplay between the on-line and off-line dimension and the relationship between activist initiatives and representative democracy. Studies show that activist organizations as rights groups, environmental organizations or government-sponsored movements are employing ICT tools to carry their speech.

E-consultation

E-consultation research focuses on specific government cases that introduced e-consultation initiatives. The government level can be supra-national, national or local. Medaglia highlighted that e-consultation is a temporary objective towards active participation enable by ICT.

E-campaigning

E-campaigning studies are almost nonexistent. Politicians seem to use social networks in 2012 to the campaign but Medaglia reports that there is a need for more research on it. He also highlighted that the use of social network reflects a one-way communication and fail to build a discussion between politician and citizen.

E-petitioning

In 2012, only one study about e-petitioning was reported by Medaglia that reflect the uncertainty of this e-participation activity from a policy maker's point of view.

Report of Literature review from 2012 to 2019

E-participation

On a wide approach, e-participation researches treat about citizen participation study cases, frameworks and approaches of introducing e-participation, impacts and limitations management of e-participation. Papers about study cases analyze factors that create benefits and limitations of introducing citizen participation platforms. Benefits are mainly related to democracy improvement through transparency, communication and civic engagement between government and citizens and the ability to gather data ignored by the government but known by the citizens. The main limitation highlighted by study cases is the lack of implication of citizens that is strongly related to the mediating regarding the introduction of e-participation platforms and the comprehension of ICT by citizens. Another limitation is the lack of citizen trust toward the usefulness of e-participation platforms, citizens estimate quickly that their participation won't affect the democracy. [166, 167, 168, 169] Papers that propose framework or approaches to introduce e-participation activities bring a contribution by solving factors that lead to e-participation limitations. As the main factor, trust is highly treated [170, 171, 172, 178]. Other papers propose participation platforms approach with a specific feature as gamification [173], Social Software Infrastructure (SSI) [174], use of Open Data [175, 176, 179] or Web Mapping [177]. Some researches treat about impacts that e-participation activities imply as the decrease of corruption in countries with better e-participation level [180] or environmental sustainability as a subject taking seriously by a lot of citizens around the world [181, 182, 183].

E-voting

With more than 500 returned articles from the keywords search, the e-voting activity possess the biggest number of contributions among all the e-participation activities. Studies mainly focus on the security within the e-voting system by introducing the use of different types of encryption algorithms as homomorphic encryption [136] or the blockchain encryption [137]. The security of e-voting systems is also studied on the e-ID part with search about RFID technology [138, 139]. Other studies treat about implementation and evaluation of e-voting systems that aim to overcome technical (security), social and cultural challenges that slow the widespread use of e-voting systems [140, 141]. To introduce e-voting systems, study cases about countries that have implemented e-voting systems are reviewed as Estonia, Nigeria and Swiss. These reviews analyze the implementing approach, the sustainability and security of each system to report challenges and problems that need to be solved in the future [142, 143, 144]. The main platform used and discussed is the "Helios voting system" that is an open-source web-based end-to-end verifiable e-voting system. Articles about it are mainly treating aspects like usability, verifiability and security of the platform with analysis and proposals of improvement [145, 146, 147].

Online decision making

Since 2012, the literature about online decision-making is mainly focused on online decision making in the e-commerce (online shopping) with studies about impacts, challenge and proposal of framework [93, 94, 96, 97] where the citizens are seen as consumers. The literature on e-decision-making in e-government is thus stifled by that on e-commerce, this literature in majority continue growing on studies about dedicated e-platforms as urban planning platform [101, 103, 104], participatory budget platform [105, 106, 107] and collaborative platforms [111, 112, 113]. All these researches mainly highlight impacts

and evaluation of existing platforms. Some more specific studies treat about impacts of online decision making process [98] or link with social networks [99].

E-consultation

Contributions concerning e-consultation focus on the lack of citizen participation challenge [156] and on analyzing approaches and diversity of stakeholder on e-consultation cases [157, 158]. To perform e-consultation activities, governments resort to regulatory agencies. As an example, European Union resorts to European authority agencies like the European Food Safety Authority (ESFA) and European Banking Authority (EBA) among others. Each agency possess their own platform to conduct e-consultation activities [157]

Online political discourse - E-activism - E-campaigning

Online political discourse, e-activism and e-campaigning studies are all three closely related. Indeed, with the rise of social networks, every politicians or activists can freely give their opinions or lead a campaign without being constrained by any censorship or by their low notoriety. The researches about the three concepts mainly focus on impacts, influences and strategies of the use of social media in a political way [148, 149, 150, 153, 154, 155]. The "Arab Spring" started in 2010 is the perfect example where the young generation of politicians/activists used Facebook and youtube to spread their views and to bring citizens together and lead manifestations and revolutions [151, 152].

E-petitioning

E-petitioning researches mainly discuss the effectiveness of e-petitions, how parliament and government take into account e-petitions if it impacts democracy [159, 161, 165, 160, 163]. Some studies review its development and challenges [162, 164].

3.2 Research gap

Performing this literature review permits us to identify a research gap that this thesis will attempt to solve.

Research Gap : Lack of citizen-centred platform design for e-participation platforms

Studies about e-participation activities essentially treat about impacts and application of the activity reviewed but don't treat about designing or implementing ICT tools to conduct the activity. This statement is logical for e-Campaigning, e-Activism, Online political activities as they are conducted on social networks. E-consultation activities are conducted on platforms directed by government regulatory agencies. E-voting, e-petitioning and Online decision-making activities are usually conducted on dedicated platforms. E-petitions platforms and e-voting platforms have both respectively one main purpose: marshalling voices for a public purpose and vote in elections online. Because of this, e-participation platforms are usually related to online decision platforms also called citizen participation platforms. The main three purposes of these digital platforms are urban planning, participatory project and collaborative project. To conduct these online activities, governments and independent organisations use different existing platforms. In any case, the purpose is to make citizens participate and enhance the e-democracy around a public interest subject. Papers treating e-participation platforms focus on the introduction of the participation activity through ICT with the will to overcome known limitations as the lack of trust or lack of mediating. All these researches are based on

analysis of study cases but it seems there are no proposals frameworks of designing a generic citizen participation platform that meets the needs and preferences of citizens.

3.3 Research questions

In order to overcome the research gap identified in the previous section, we have divided the gap into 3 research questions. By dividing the research gap into those research questions we pointed out the 3 different problems that must be solved one by one to provide the solution at our research gap.

Research question 1: How to design an e-participation platform?

It is significant to understand how an e-participation platform should be designed and to know which evaluation standards should be consulted during its design period.

Research question 2: How to define the preferences of citizens?

The preferences of citizens are a good addition to help designing an e-participation platform but need to be gathered. What type of studies are appropriate to collect this type of data?

Research question 3: How to apply citizen preferences in the design of e-participation platforms?

By solving the RQ1 and the RQ2, different sets of data are gathered around the domain of e-participation platform and need to be combined together to solve the research gap.

4 Research Design

4.1 Overall methodology

The overall methodology adopted in this thesis is represented by the following figure.

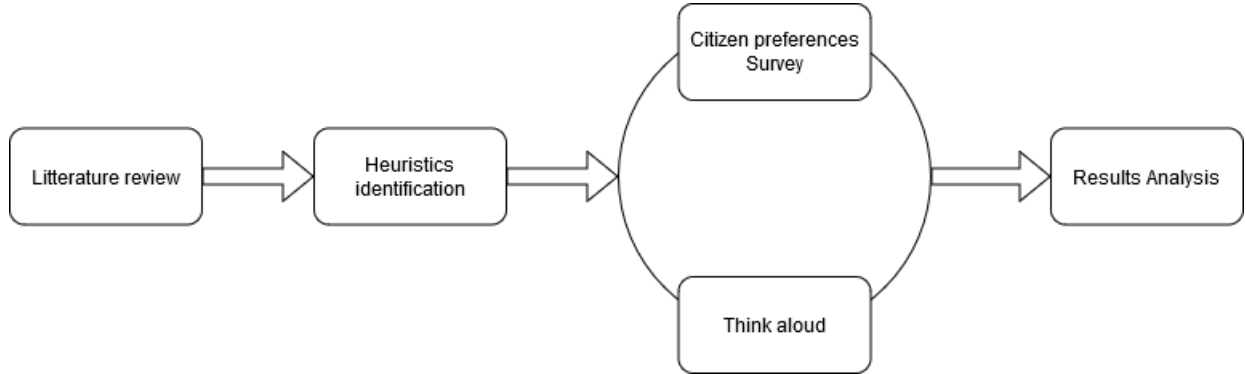


Figure 5: Overall methodology

Thanks to this methodology we look forward to answering the research questions identified in section 3.3. Regarding RQ1 ("How to design an e-participation platform?"), a literature review, detailed in section 4.2, about digital platforms is conducted to highlight heuristics that a citizen participation platform must meet in term of software and user participation evaluation standards. Regarding RQ2 (How to define the preferences of citizens?), a citizen preferences survey is led on Belgian citizens through social networks to gather data about their preferences concerning the use of e-participation platforms. In addition to the survey, a HCI think-aloud study is led on the two Belgian online participation platforms "youth4climate.be" that is an independent platform and "Fluicity - Etterbeek" that is a governmental platform. The study concerned 3 slices of ages: minus than 25 years old, between 25 and 50 years old and more than 50 years old. Both platforms are described in section 4.3.3. From those studies we emerged two design propositions that respectively provide guidelines centred on citizens' preferences concerning e-participation platforms and on citizens' issues towards existing platforms. Regarding RQ3(" How to apply citizen preferences in the design of e-participation platforms?"), the two approaches providing citizen-centred guidelines are crossed and refined with the theoretical heuristics list to provide guidelines that aim at respecting the IT literature evaluation standards and the citizens' needs concerning e-participation platforms.

4.2 E-platform Literature Review - Methodology

4.2.1 Planning the review

Aim of the review: This literature review aims at identifying the characteristics that a citizen participation platform must meet in term of features, quality, HCI, citizen perspective and user participation. By conducting it we can respond to the questions: "What features a participation platform must have?", "What quality standards an online platform must meet?", "What HCI standards an online platform must meet?", "What citizen perspective standards an online platform must meet?", "What kind of user participation must be respected to build a citizen participation platform?".

Search terms: The following search terms were selected following a reflection concerning the different synonyms of a digital platform as well as the different keywords that can imply a domain proposing software evaluations and were used to perform the literature review : ("online platform" OR " digital platform" OR "e-platform" OR "participation platform" OR "e-participation platform") AND ("evaluation" OR "quality" OR "design" OR "features"), ("user participation" OR "citizen participation" OR "citizen perspective") AND ("evaluation").

Search for primary study: To find relevant papers, we used different libraries and applied the keyword search to the titles and abstracts of papers. We searched the Google Scholar and Scopus library and applied a snowball method analysis with the citation of the selected articles. The two libraries returned over 580 articles and 18 were selected to perform the literature review.

Study selection criteria: We selected only articles published in English that contain relevant discussion about online platform feature, quality and design evaluations and citizen perspective in an e-government context. As a result, we exclude papers that focus on the impacts of the use of a platform and papers that don't discuss the citizens view in the e-government domain.

Study quality assessment checklist and procedures: To include or exclude the articles we based ourselves on reading the abstract. In case of doubt, we review the entire paper.

4.2.2 Overview of e-platform evaluation research articles

Domain	Articles
Citizen perspective	K Axelsson, U Melin 2008, Masters, Z. et al. 2004, Anthopoulos, L.G. et al. 2007, Cavaye, A. 1995
Quality	Nevalainen R. 2017
Human-Computer Interaction	Tambouris, E., & Gorilas, S. 2003, Dumas B. 2018, Hartson, R., & Pyla, P. S. 2018, Nogier, J. F. 2008, Cooper, A. et al. 2014, Shneiderman, B. 1992, Davis, F. D. 1989, Orgeron, C. et al. 2013
Accessibility	Serra, L. C. 2015, Reid, L. G., & Snow-Weaver, A. 2008, Caldwell, B. et al. 2008
Web 2.0	Nitzsche, P. et al (2012)

The reporting of the literature review is detailed in the results section.

4.3 Empirical studies

The heuristics reported from the literature review help us to have a proposal of theoretical guidelines for the design of an e-participation platform regarding software evaluation and user participation standards. To entirely fill the research gap (Lack of citizen-centred platform design for e-participation platforms) highlighted in this thesis, citizens' needs in terms of citizen participation platform must be defined. To identify those needs, two empirical studies were conducted on Belgian citizens concerning e-participation platforms : a user preferences survey and a HCI think-aloud method testing. The questions proposed in these studies are directly based on the reporting of the previous literature review and aim to clarify how the theoretical heuristics should be followed according to the users. The results of these two tools combined with the list of theoretical heuristics described in the result section are the guidelines proposed in this thesis to build a citizen-centred e-participation platform.

4.3.1 User preferences survey

The user preferences survey aims at identifying preferences concerning mediating, notifications, the usefulness of features, accessibility, interest and ease of use.

The survey takes as an example the Belgian citizen participation platform "youth4climate.be" to introduce and explain its objective. This platform has been selected as an example because its purpose is to solve climate problems (which is a cause that has a strong interest nowadays for people) with a goal to submit their results to political authorities. This choice has been made to make understand surveyed people that using an e-participation platform provides benefits that aim at enhancing democracy and that responding to the survey deserve their interest. Even though the survey used "youth4climate.be" as an example to introduce some preferences questions, it is designed to be completed by everybody even if they have never heard about participation platforms and include only 4 out of 23 questions about "youth4climate.be" functionality and usability.

To permit every possible Belgian citizen to fill in the survey, it is written in English, Dutch and French. The English version of it is in the appendix.

The results of the survey are divided into 3 slices of age, minus than 25 years old, between 25 and 55 years old and more than 55 years old. Each response is presented as a percentage. The purpose of this presentation is to highlight the difference and occurrence between each slice in order to emerge preferences guidelines that suit the biggest number of e-participation platform users.

4.3.2 HCI think-aloud method evaluations

The Think-Aloud method is a method where users verbally express their tensions about their interaction experience. The objective is to enter the world of user thinking and perspective [22]. The description of this kind of evaluation is detailed in the section 5.1.

To define user's design preferences concerning e-participation platforms, this evaluation method is conducted on two different existing citizen participation platforms: "youth4climate.be" and "Fluicity - Etterbeek". Those two platforms were chosen because of their differences,

"youth4climate.be" is a citizen participation platform sponsored by the independent volunteer group "Youth For Climate" and is powered by CitizenLab while "Fluicity - Etterbeek" is a citizen participation platform sponsored by the municipality of Etterbeek (municipality located in the Brussels region) and is powered by Fluicity. CitizenLab and Fluicity are both digital participation platform suppliers that have a strong presence in the digital participation platform market. The functioning and purpose of each platform are detailed in the next section.

The think-aloud method evaluations are conducted for each participation platform on 6 Belgian citizens divided into 3 slices of age, minus than 25 years old, between 25 and 50 years old and more than 50 years old. Each slice is composed of one man and one woman with a view to gender equity.

Each evaluation follows a list of scenarios to highlight the ease of use, responsiveness tolerance, features usefulness, limitations and will of re-use of each design according to each slice of age. The result of these evaluations helps to emerge HCI guidelines that suit the biggest number of e-participation platform users.

Youth4Climate.be evaluation scenarios

The scenarios followed during the evaluations of the e-participation platform "youth4climate.be" are :

- Discovery of the platform and registration.
- Consultation of the project "15 priorities to save our climate" and vote for an idea proposed in the voting section.
- Sharing on social networks an idea about mobility.
- Unchecking a notification preference and deleting the account.

Fluicity - Etterbeek evaluations scénarios

- Discovery of the platform and registration.
- Create an idea concerning mobility.
- Voting and commenting an idea concerning security.
- Sharing on social networks an actuality about Etterbeek.
- Changing the language and disconnect.

The time spend to conduct these evaluations is an average of 30 minutes without taking into account the presentation of the purpose and the mode of operation of the evaluations. Each evaluation was finished with the following overall questions :

- Do you find the platform reliable? Do you think its use enhances democracy?
- Do you think the platform performs well enough? Is there a point at which you would give up if the use of the platform wasn't in a context of evaluation?

- If a new participatory project were to emerge, would you want to participate and re-use this platform?
- Which part of the design do you think useful and are there some features that don't suit you?

4.3.3 Belgian participation platforms - analysis

This section describes the two Belgian e-participation platforms chosen to perform empirical studies: "youth4climate.be" and "Fluicity - Etterbeek". Each e-participation platform is described with its goals, its operations and all user interactions. Those two platforms are a good example of e-participation platforms that exist in Belgium as both are powered by two generic e-participation platform toolbox that powered numerous of the existing citizen participation platforms in Belgium. To have a graphical representation of each platform, related screenshots are available in the appendix.

Youth4climate participation platform

The platform "youth4climate.be" is a citizen participation platform that is an initiative of the independent group of volunteers behind the movement "youth for climate" from Belgium. This Belgian action movement is inspired by Greta Thunberg who started striking every Friday in August 2018 to demand climate actions. This led to student strikes all over the world to claim better climate policies. In Belgium, every citizen can join the Youth For Climate movement that is independent of any level of Belgian governments. This citizen participation platform has the goal to gather citizens' ideas to fight the climate crisis and to recommend actions to politicians.

Powered by CitizenLab

The citizen participation platform "youth4climate.be" is powered by CitizenLab that is a Belgian startup that provides a toolbox to create citizen participation platform with the help of developers and citizen participation experts. According to its website, CitizenLab has helped more than 100 cities to introduce a citizen participation platform depending on their citizen participation goals[117]. CitizenLab is heavily implanted in Belgium but is also present at Vancouver and Paris among other countries.

How the platform works

With the use of the citizen participation platform, citizens can suggest ideas concerning the climate problematic before a fixed deadline. Every suggestion can be debated by all users and are gathered by categories. The aim is to share ideas approved by a great number of citizens to politicians. In practice, the first deadline of this movement was the Belgian federal elections of May 2019. The project is divided into five phases. Step one, administrators launch a collection of ideas that started on January 29 and ended on February 21, 2019, where every citizen logged to the platform could propose ideas to improve the climate policies, vote and comment others suggestions. Step two, from February 21 to April 25 administrators clustered all the ideas with the CitizenLab team to propose a reduced number of climate recommendations based on all ideas proposed that politicians should meet. Step three, users must vote for the recommendations that matter the most for them between April 25 and May 7. Step 4, administrators take 3 days to count the votes and will share the most important recommendations with politicians in step 5.

Some numbers, for the first gathering of climate ideas between 29 January and 21 February 2019 there were :

- more than 2.600 users registered on the citizen participation platform
- 1744 ideas published
- 15 recommendations proposed
- 2716 comments about the recommendations
- 32751 votes about the recommendations
- More than 480 users for each 10-year age group from 10 to 60 years old and around 460 users from 60 to 89 years old that participated at the project

User's interaction

Without being logged, users of the citizen participation platform can browse through the "home", "projects", "ideas" and "about" sections. They can log in, sign up and change the language of the platform between English, French and Dutch. The whole content of the platform is accessible without having to be logged in but if a user wants to participate in a project he needs to have an account that can be made for free.

Fluicity - Etterbeek participation platform

Fluicity is an e-participation platform that gathers several "sub-e-participation platforms". Where CitizenLab proposes a toolbox to build customized citizen participation platform, Fluicity provides hosting of public or private participation platforms on dedicated spaces. Sponsors of Fluicity e-participation platforms can thus be private or public stakeholders as an enterprise or a government. This e-participation platform provides two versions, a web and a mobile application. Fluicity - Etterbeek is then a citizen participation platform that gathers citizens from the Belgian municipality "Etterbeek" intending to allow citizens to speak up about projects, surveys and suggests ideas to develop the municipality. The citizen participation platform also provides an informing section concerning the news in the municipality.

How the platform works

The main project of Fluicity - Etterbeek is to encourage the co-construction of local projects with the inhabitants of the municipality. The main purpose of this platform for the municipality is to provide a place where citizens can propose ideas, debate them and follow their evolution in all transparency, consult the local news, consult the events available in the municipality and add them directly to their agenda. At the launching in 2018, 2 planning and construction participatory project and a small number of polls concerning the municipality were conducted. Nowadays (July 2020) the platform is regularly updated with the municipality news and is used as a citizen ideas hub regarding the improvement of Etterbeek.

Some numbers: at the date of 01/08/2020 the Flucity-Etterbeek participation platform results in

- 1508 engaged citizen
- 1342 ideas suggested
- 9 ideas concretized
- 319 response to citizen from the municipality
- 6 ideas in treatment

User's interactions

Flucity permits every user logged in Etterbeek section to propose public ideas concerning any subject concerning the municipality and to ask a public question that can benefit all other users. Users can upvote, downvote, comment and share on social media (Facebook and Twitter) every idea. They can privately report a problem and send a message directly to the city administrator. Users can modify their preferences and personal information.

5 Results

This section describes the data reported from the literature review detailed in the research design section and the data gathered through the two empirical studies conducted in this thesis. The literature review permits us to propose theoretical heuristics that an e-participation platform must complete during its designing phase and the two sets of empirical studies results permit us to emerge two proposals of design. These three sets of guidelines are refined at the end of this section into one set of design guidelines that aim at satisfying citizens' preferences concerning e-participation platform and forms the final framework.

5.1 Reporting the e-platform literature review

This literature review helps us to identify the evaluation criteria that a citizen participation platform must meet in order to be as qualitative and user-oriented as possible according to the IT literature. Each point that follows explains the importance of the evaluation standard and how it can be validated in the design of a platform. The validation of these criteria will be defined in section 5.5.1 under a list of theoretical heuristics. The reporting directly feed the content of the questions asked in the two next empirical studies that aim to clarify the theoretical heuristics with the user point of view.

Citizen perspective :

As defined in the background section, e-participation is "the use of ICTs to enable and improve the effectiveness of citizen involvement in deliberation and decision-making processes"[34]. In their work on e-government services, Anthopoulos et al. describe that an e-government solution should be considered a success if citizens are served and satisfied. If citizens are not satisfied they will return back to traditional solutions to fulfil their interactions with government and the supposed benefits of the e-solution won't be met [184]. An e-participation platform as an e-government solution tool for an e-participation activity should then be focused on citizen needs. Thus, the citizen view of the platform is important to be considered and to be established correctly connected to the e-participation activity carried by the e-platform [3]. Lynch and Gregor in their study about user participation in the information systems in 2004 added a seventh attribute on the existing Cavaye framework published in 1995 [20]. The seven user participation attributes are the following: the type of participation (all users or representatives), the degree of participation (level of responsibility, for participants), the content of participation (involvement in different aspects of the design), the extent of participation (variation in scope in different phases of the development process), the formality of participation (formal or informal organization of participation activities), the influence of participation (the effect of participation on the development effort) and the level of participation (the weight of user participation, the frequency of interactions with them and the step-by-step process in which they are engaged). In their research about citizen participation and involvement in e-Government (2008), Axelsson and Melin proposed a framework to evaluate the citizen participation in e-government based on the seven attributes defined previously[3] that is a result of action research on a focus group with citizens that aimed to take their requirement about e-services development. They also added an attribute about the result of participation to make up of the lack of practical results of user participation in the

Cavaye's framework. A focus group is defined in the Oxford dictionary as "A demographically diverse group of people assembled to participate in a guided discussion about a particular product before it is launched, or to provide ongoing feedback on a political campaign, television series, etc"[135]. The aim of a focus group is thus to prevent the reaction of a larger population by taking into account requirements of representants of diverse backgrounds. An e-participation platform is the ICT tool that permits to conduct a bigger focus group with a greater amount of the population. As The Axelsson and Melin framework aims to facilitate the citizen perspective in e-government development projects, the introduction of a participation platform is part of this kind of project and is then suitable to be analysed with the framework proposed. To adapt this framework into heuristics, each heuristic must be the highest response in term of participation expected for each citizen perspective question asked in this analysis framework.

User participation attributes	Citizen perspective questions	Experiences from the eGovernment development project
Type of participation	Which citizens do participate in development activities? How is citizen involvement reached?	Citizens who belong to the main target group of the e-service under development were chosen as participants. Full citizen participation can never be reach in the case of public e-services. Thus, the collective of citizens was represented by smaller groups of citizens. The type of participation can, in Mumford's [21] terms, be characterized as <i>consultative participation</i> .
Degree of participation	What are the citizens' responsibilities?	Focus groups have been used as advisory capacity. The citizens' responsibility has been to participate in discussion and share their opinions regarding discussed issues.
Content of participation	What activities are citizens participating in?	Citizens were asked to discuss different user scenarios, prioritize the importance of different e-services, discuss complex concepts within the field and evaluate a low-fidelity prototype of a web portal.
Extent of participation	In what stages of development do citizens participate? To what extent are citizens involved before, during and after the development process?	Citizens participated in the focus groups during the development project. The focus group results were used as input in the latter phases of the development project. A first prototype was developed prior to the focus groups. Further focus groups were also performed in the evaluation of the first launched version of the web portal.
Formality of participation	How is the citizen participation organized?	Citizen participation was organized in focus groups with an explicit purpose. The group meetings were planned and organized following a certain process; it started with an introduction, was guided by questions and scenarios, and ended with an evaluation.
Influence of participation	What influence do the participating citizens have on the outcome?	The focus group meetings were seen as a way to better understand the future users' needs and requirements. The focus group discussions were documented in a report which served as an important basis for later phases of the development project.
Depth of participation	How active are citizens when participating? How deeply involved are citizens in the development project?	Focus groups were performed both early in the project and during the evaluation phase. The frequency of interaction was low since each focus group only lasted for 2-3 hours and each citizen only participated in one focus group. The voices of the citizens were listened to, though, since the focus groups results were regarded as important input to the development project.
Result of participation	What did the citizen participation result in?	Complex concepts were explained at the web portal as a direct result from the focus group discussions.

Figure 6: Axelsson and Melin framework for citizen participation and involvement in e-government

Quality

An e-participation platform is first and foremost an e-platform and must meet certain software quality requirements. ISO/IEC 25010 is the standard for measuring product quality according to the IT literature. This ISO 25010 framework will serve as a reference for the evaluation of the quality of the e-participation platform analyzed in this thesis. There are two models of quality: a model of quality in use and a model of product quality.

The quality in use model is composed of five characteristics that relate to the outcome expected during runtime.[21]

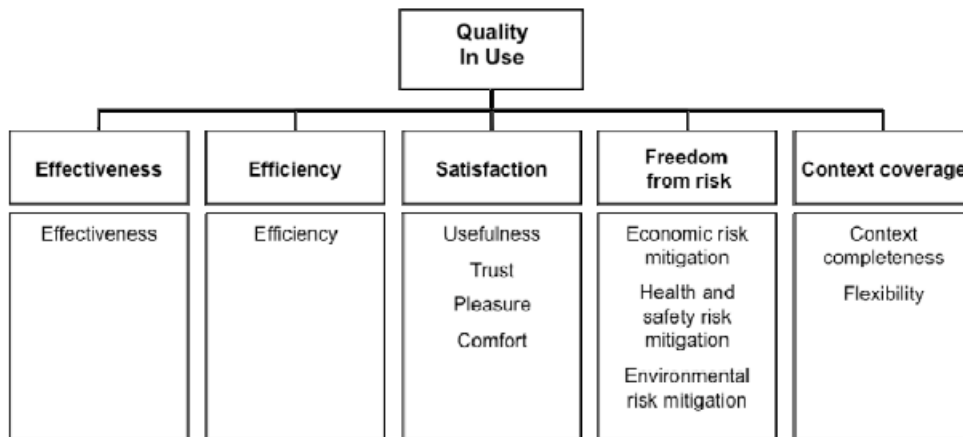


Figure 7: ISO 25010 Quality in use model

1. Effectiveness: accuracy and completeness with which users achieve specified goals
2. Efficiency: resources expended concerning the accuracy and completeness with which users achieve goals
3. Satisfaction: the degree of users' satisfaction with the use of the product.
4. Freedom from risk: the degree to which a product or system mitigates the potential risk to economic status, human life, health, or the environment
5. Context coverage: the degree to which a product or system can be used with effectiveness, efficiency, freedom from risk and satisfaction in contexts beyond those initially specified in the requirements

The product quality model is composed of eight characteristics that relate to static properties of software and dynamic properties of the computer system[21]

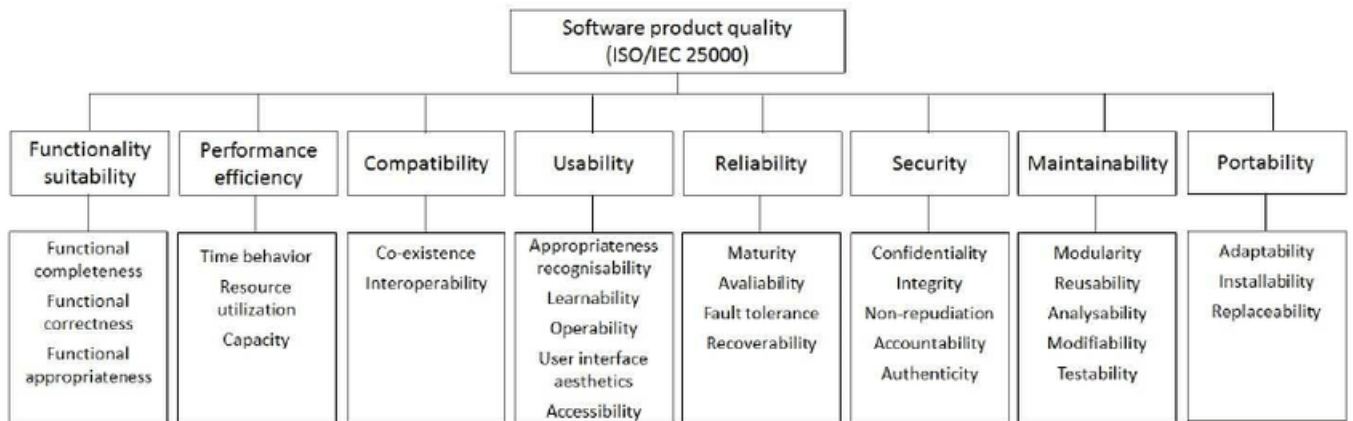


Figure 8: ISO 25010 product quality model

1. **Functional suitability:** the degree to which a product or system provides functions that meet stated and implied needs when used under specified conditions
2. **Performance efficiency:** performance relative to the number of resources used under stated conditions
3. **Compatibility:** the degree to which a product, system or component can exchange information with other products, systems or components, and/or perform its required functions while sharing the same hardware or software environment
4. **Usability:** the degree to which a product or system can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.
5. **Reliability:** the degree to which a system, product or component performs specified functions under specified conditions for a specified period.
6. **Security:** the degree to which a product or system protects information and data so that persons or other products or systems have the degree of data access appropriate to their types and levels of authorisation
7. **Maintainability:** the degree of effectiveness and efficiency with which a product or system can be modified by the intended maintainers
8. **Portability:** the degree of effectiveness and efficiency with which a system, product or component can be transferred from one hardware, software or other operational or usage environment to another

Human Computer Interaction

An e-participation platform, like any electronic platform, must be "user-friendly". Thus, Human-Computer Interaction (HCI) is a heavy criterion to fulfil. Studies have shown that ease of use is linked to the participation rate. If the users can't understand how to use a platform they will be more likely to lose their motivation and won't use the platform again. The platform must be very easy to use, the citizens are not IT skilled and must use the platform without effort or they will give up using it [31]. Tambouris and Gorilas have conducted an evaluation of an E-Democracy Platform for European cities. Their study in Barcelona highlighted that a high effort is needed to achieve citizen participation. Out of 30,000 people exposed to their study, only 200 expressed their interest and join the study (less than 1%). Out of these 200 people, only 34 participated actively (0,113%). The lack of participation may be due to the absence of "participation culture" among the people and the need for a stable platform easy to use.[31]

This review of the HCI evaluation is based on the HCI lecture taught by B. Dumas at the Computer Sciences Faculty of the University of Namur[22]. The references of this lecture are Hartson and Pyla [185], Nogier [186], Cooper et al [187] and Shneiderman [188] in their work about Human-Computer Interaction.

To evaluate the HCI of software, we measure indicators of usability and quality of user experience, productivity, ease of use and user satisfaction. To assess all these indicators, there are two evaluations: the formative evaluation and the summative evaluation.

The formative evaluation is used to shape design by diagnosing a system, collecting qualitative data and identifying and correcting user experience problems and their causes.

The summative evaluation is used to summarize the design by collecting quantitative data, evaluating a level of quality and evaluating improvements to the user experience. There are two types of summative evaluations: formal evaluations that compare the factors of design assumptions and informal evaluations that assess user experience levels.

The formative and the summative informal will be the two main evaluations used. Both form the "user experience evaluation".

Dimensions of user experience evaluation methods :

	Rigorous	Rapid
Analytic	Cognitive walkthrough GOMS	Heuristic evaluation Design walkthrough Other inspection techniques
Empirical	Lab-based evaluation field evaluation study	RITE quasi empirical evaluations

Figure 9: Dimensions of user experience evaluation methods

- Rigorous methods: maximize effectiveness and minimize the risk of errors, regardless of speed or cost
- Rapid methods: speed and cost savings, but will certainly be less effective
- Empirical methods: employ data observed in the performance of real users
- Analytical methods: look at inherent attributes of the design rather than seeing the design in use

There are 4 types of evaluation Data: Objective or Subjective and Quantitative or Qualitative.

- Objective data: observed directly either by evaluator or participant
- Subjective data: opinions, judgements, feedback...
- Quantitative data: numeric data, e.g. data obtained by using performance metrics or opinion ratings
- Qualitative data: non-numeric and descriptive data

In this thesis, the evaluation of HCI of existing e-participation platform is focused on Rapid Analytic methods with the use of Think-Aloud method and heuristics method via questionnaire. Those two methods will provide quantitative data and qualitative data in a rapid way to analyze platforms and are defined in the following.

Think-Aloud method and questionnaires are data collection techniques. The Think-Aloud method is a method where users verbally express their tensions about their interaction experience. The objective is to enter the world of user thinking and perspective. This method is a good technique for collecting qualitative data. Questionnaires are the main instrument for collecting subjective data.

Rapid methods focus almost exclusively on finding qualitative data (those that are costly to rectify). These methods depend on the method such as Think-Aloud. Through informal rapid assessment methods, we can evaluate conceptual designs, scenarios, storyboards, screenshots and wireframes. With rapid evaluation techniques, we can evaluate low-fidelity paper prototypes and medium- or high-fidelity prototypes.

With the Rapid Analytic evaluation, we evaluate the ease of use and the emotional aspect of the design. This type of evaluation should be carried out at the early stages of design construction to help identify major problems at an early stage. In practice, there are 3 to 5 evaluators (different evaluators mean different problems found) who do not participate in the construction of the design.

The Heuristic evaluation is easy to use so that everyone can become an evaluator, it presents a set of good practices in the construction of the design. The evaluator must use the system and state the following heuristics (heuristics can be adapted according to the system being evaluated).

The Heuristics :

1. The system status must always be visible: The user must always be aware and within a reasonable time
2. We must speak the user's language and not a system-specific language
3. The user must always with control and freedom to stop the process. Support undo and redo
4. Name standards must be maintained throughout the system
5. Instead of a good error message, it is better to have a system that prevents errors
6. Recognition rather than recall; minimize the user's memory load by making objects, actions, and options visible.
7. Use accelerators: allow knowledgeable users to take actions quickly.
8. Aesthetic and minimalist design: Dialogues should not contain information that is irrelevant or rarely needed.
9. Help users recognise, diagnose and recover from errors
10. Help and documentation

The heuristics evaluation has some limitations :

- Heuristic evaluation is well suited for novice evaluators, less so for experts
- Heuristics may not encourage analysts to take a rich or a comprehensive view on interaction
- Novice practitioners may get too comfortable with it and think heuristics are enough
- Potentially multiple false negatives

- Sequencing and workflow problems hard to spot with this method

The use of Think-aloud method enables to reduce these limitations and to provide a fuller evaluation method.

Existing e-platform evaluation tools

Some evaluations of e-platforms already have been made, they will be helpful to adapt the list of heuristics.

Accessibility

Every online service of e-government should be accessible to everyone, all disabilities must be taken into account: hearing, visual, physical, cognitive disabilities or specific learning disabilities (*e.g.: dyslexia*).[26]. The Web Content Accessibility Guidelines (WCAG) 2.0 provide success criteria to ensure that an application is accessible to everyone and are considered as standards by the World Wide Web Consortium (W3C) [114, 115]. These criteria are divided into levels A, AA and AAA (whole WCAG in the appendix) and they will be adapted in heuristics to evaluate the minimum need of accessibility of e-participation platform.

Web 2.0

The web 2.0 also known as Participative and Social Web is a concept of Internet use that aims to value the user and his relationships with others. The web 2.0 characteristics are "interaction orientation", "personalization", "social networking", and "user-added value"[29]. These characteristics serve as evaluation criteria. Nitzsche, Pistola and Elsäber have developed an evaluation tool for participative E-government Services by evaluating participatory budgeting project in Germany[29]. Parts of this evaluation tool based on web 2.0 will be useful as a list of features that an e-participation platform must provide.

		Bad Honnef	Bergheim	Berlin Lichtenberg	Berlin Marzahn-Hellersdorf	Berlin Friedrichshagen-Kreuzberg	Essen	Freiburg	Hamburg	Cologne	Potsdam	Solingen	Trier	
Integration of external applications	Other								✓		✓		✓	
	Twitter										✓	✓		○
	Facebook											✓		
	Google Maps			✓		✓						✓		
User added value	Interactive design of the whole electronic participatory budgeting projects							✓	✓	✓				
	Rating of citizens' suggestions		✓	✓		✓	✓			✓	✓	✓	✓	●
	Commentation of citizens' suggestions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Open formulation of suggestions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Social networking	News are displayed within the network													
	Mail invitation of friends/page recommendation			✓	✓				✓		✓			○
	Friends list												✓	
	Sending each other messages								✓	✓	✓			
Personalization	Page customization for individual needs and preferences													
	Citizens can share personal information and make it visible (e.g. interests, pictures etc.)			✓		✓			✓	✓	✓			○
	Register/ Creating an own account	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Interaction orientation	Administration processes suggestion directly Intern	✓		✓		✓					✓			
	Administration comments on suggestions			✓		✓	✓		✓	✓	✓	✓	✓	●
	Administration checks on suggestions	✓		✓		✓	✓		✓	✓	✓		✓	

Figure 10: Nitzsche et al. evaluation tool for participative e-government services

Empirical HCI evaluation of an e-platform

Assar and Boughzala have conducted an empirical evaluation of public e-procurement platforms in France (e-government G2B relationship) [30]. The study has been conducted with criteria which can be classified to three perspectives: functional, user-centred and technical. The criteria of "user-centred" of study will be useful to create criteria for the evaluation of HCI.

As mentioned in the HCI review, the ease of use of the platform is important, the easier the platform is to use, the greater the user's intention to reuse it. We need to measure the satisfaction of the user[31]. Orgeron and Goodman have conducted a research to consider

	<i>www.ixarm.com</i>	<i>www.achats.defense.gouv.fr</i>	<i>www.achatpublic.com</i>	<i>www.e-bourgogne.com</i>	<i>www.adestium.com</i>	<i>www.kletoon.com</i>	<i>www.legademat.fr</i>	<i>www.marches-securises.fr</i>
User centred								
Ergonomics and simplicity of graphical interface	++	+	+	++	++	++	++	++
Editorial content availability	++	++	+++	++	-	++	+	+
Online help availability	++	++	++	++	+++	++	+++	+
Usage-oriented hotline availability	-	-	-	-	+	-	+	-
Collaborative tools availability	-	-	+	+	-	-	-	-

Figure 11: Assar & Boughzala empirical and comparative evaluation of e-platforms

theoretical foundations from the Technology Acceptance Model (TAM), the Web Trust Model (WTM) and SERVQUAL to form a model of citizen adoption and satisfaction for e-government services[189]. According to Orgeron and Goodman, a high level of Trust, SERVQUAL and Technology Acceptance leads to a high intent to reuse a service. TAM is developed by Davis and is derived from the theory of reasoned action. It proposes that the perceived ease of use and the perceived usefulness are underlying causes for an individual's attitude towards a specific technology or information system. Davis defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" and perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort"[32]. In the e-government context, trust is stunted due to privacy and security issues, both revolving around the sharing and potential misuse of personal information. Quality service is a personal appraisal by an individual customer that the service received is the service that was expected. SERVQUAL is one of the most widely used services quality measurement scales. It is comprised of five service quality dimensions: Tangibles (facilities, equipment), Reliability (ability to perform a service accurately), Responsiveness (willingness to help and respond to customer need), Assurance (the ability of staff to inspire confidence and trust) and Empathy (the extent to which caring individualized service is given). According to Orgeron and Goodman, every increase in the criteria in the schema below lead to the increase of the intent to reuse. These criteria will be useful to know the satisfaction of the user in the e-participation platforms think-aloud method testing.

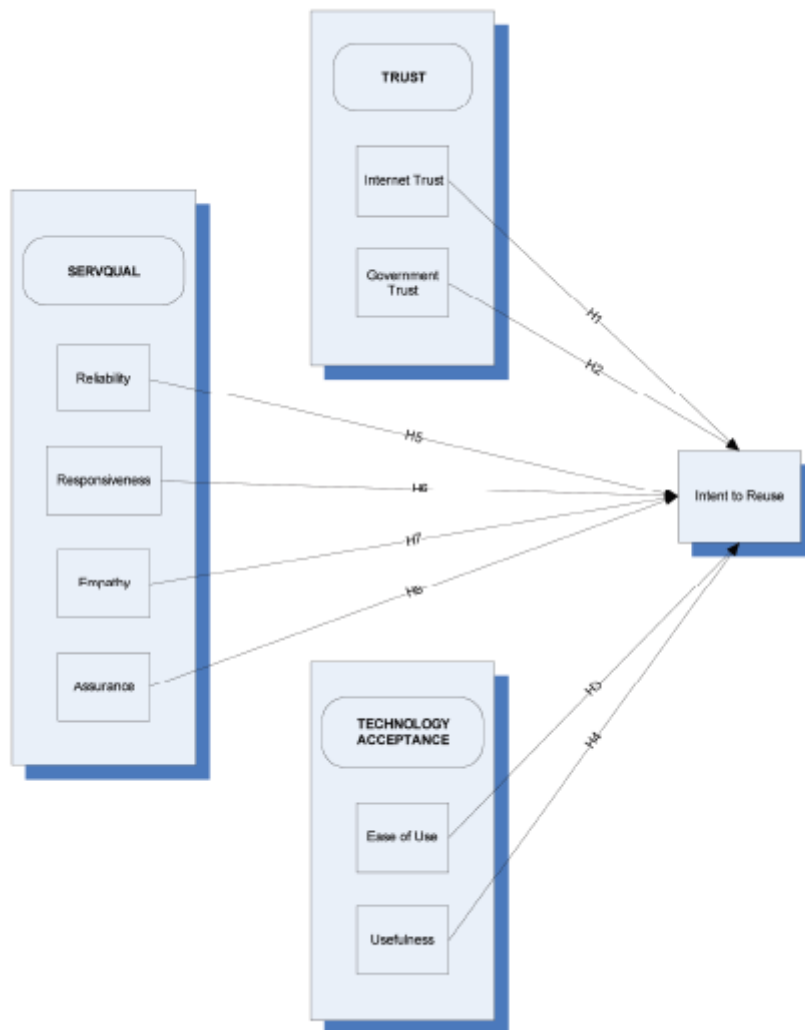


Figure 12: Orgeron and Goodman model of the essential components that inform citizen adoption of e-government services

5.2 Citizen participation platform preferences survey - results

The results presented in this section are based on the data gathered through the user preferences survey detailed in the 4.3.1 section that has been conducted throughout 7 July 2020 to 3 August 2020. Each result is interpreted in order to emerge solution propositions to solve the preferences issues treated in the survey, a solution proposal including every preference is detailed in section 5.5.2.

5.2.1 Preferences overview

This tab summarizes the citizen preferences and priorities in term of communication, participation and accessibility. Every preference cited is based on the results detailed in the followings sections.

Communication domain preferences	
Advertising channels	Social networks, Web ads, TV ads
Notification channels	Social networks, Mail
Notification frequency	Participation required and end of the project
Utilisability domain preferences	
Must-have features	Project feedbacks, Voting system, Idea proposal system, Usability help tab/tutorial
Important features	Comment system, sharing system
Neutral features	Custom Notification system, Custom visible personal data system
Unimportant features	Like system, Private messaging system
Accessibility domain preferences	
Must-have features	hearing/visual impairment assistance, Language selection system
Must-Have Format	Web format (first priority), Mobile (second priority)

5.2.2 Overall results

The survey permits to gather 137 data concerning citizen preferences towards e-participation platform. Out of these data, 73% (100) were collected in French, 19,7% (27) in Dutch and 7,3% (10) in English. In term of age distribution, 43% (59) of the surveyed are under 25 years old, 44,5% (61) are aged between 25 and 55 years old and 12,5% (17) are over 55 years old. 56% (77) are men, 42% (57) are women and 2% (3) didn't want to specify their gender. Out of the 137 surveyed, only 19,7% (27) already used the "youth4climate.be" platform used as an introduction to the survey. 87,5% (120) of the surveyed people would use a participation platform introduced by their municipality while 12,5% (17) are not interested or do not feel concerned by the development of their municipality mainly because of their weak presence in it.

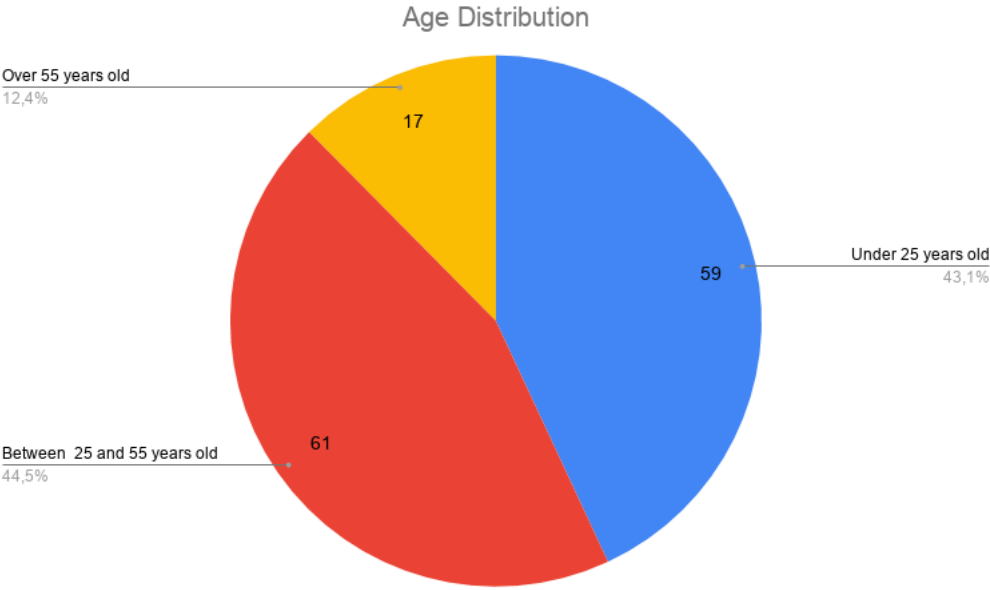


Figure 13: Preference survey age distribution

5.2.3 Communication domain results

This section lists results concerning the citizen preferences in term of communication as advertising channels, notification channels and notification frequency. Each result is presented globally and then divided into three slices of ages, minus than 25 years old, between 25 and 55 years old and over 55 years old to highlight each age difference.

Advertising preferences

Different communication channels can be used to advert about an e-participation platform, surveyed people had to rank each of the 6 proposed channels (Newsletter, Social networks, Advertising posters, Radio Ads, TV Ads and Web Ads) on a 5 Likert scale from Useless to very useful.

Overall results

On the following figure, we can notice the more useful ranked advertising channels is the social networks with a maximum of 68 very "useful vote" that represents 49,6% of the 137 votes. The newsletter is the least useful according to the results with a maximum of 30 useless votes that represent 21,9% of the 137 votes.

In order to more easily represent the usefulness of each channel the two indexes "At least provide a moderate effect" and "At least useful effect" respectively based on the percentage of votes from "moderate effects to very useful" and "useful to very useful" out of the total are calculated. The use of these percentages is useful to understand which channels and how often notifications should be used to advert a maximum of citizen about an e-participation platform.

Percentage index of channels that provide at least a "moderate" effect to advert citizen about e-participation :

- Newsletters : 47,44%
- Social networks : 96,35%
- Advertising posters : 72,99%
- Radio ads : 74,45%
- TV ads : 78,10%
- Web ads : 81,75%

Percentage index of channels that provide at least a "useful" effect to advert citizen about e-participation :

- Newsletters : 18,98%
- Social networks : 87,59%
- Advertising posters : 32,11%
- Radio ads : 35,76%
- TV ads : 47,28%
- Web ads : 52,55%

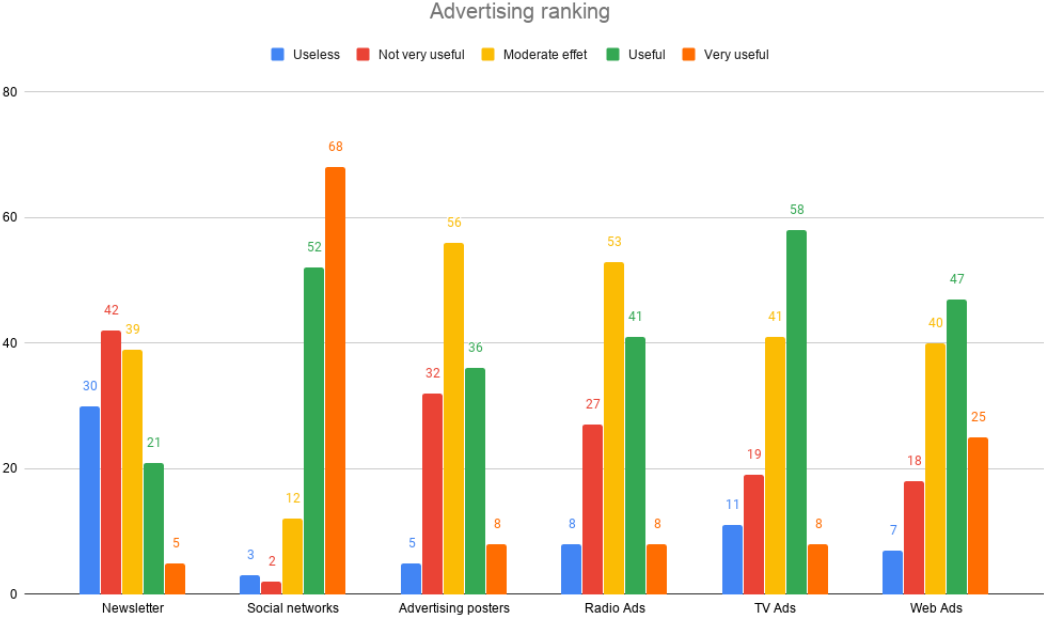


Figure 14: Preferences survey advertising ranking

Minus than 25 years old distribution results

On the following figure, we can notice the more useful ranked advertising channels for the minus 25 years old distribution is the social networks with a maximum of 31 "very useful" votes that represent 52,5% of the 59 votes. The newsletter is the least useful according to the results with a maximum of 13 "useless" votes that represent 22% of the 59 votes. The result of this distribution is close to the overall results however we can highlight that as social networks, the advertising posters channel references 0 "useless" votes.

Minus than 25 years old distribution percentage index of channels that provide at least a "moderate" effect to advert citizen about e-participation :

- Newsletters : 39,98%
- Social networks : 96,61%

- Advertising posters : 79,66%
- Radio ads : 66,10%
- TV ads : 71,18%
- Web ads : 77,96%

Minus than 25 years old distribution percentage index of channels that provide at least a "useful" effect to advert citizen about e-participation :

- Newsletters : 11,86%
- Social networks : 88,13%
- Advertising posters : 30,50%
- Radio ads : 27,11%
- TV ads : 45,76%
- Web ads : 49,15%

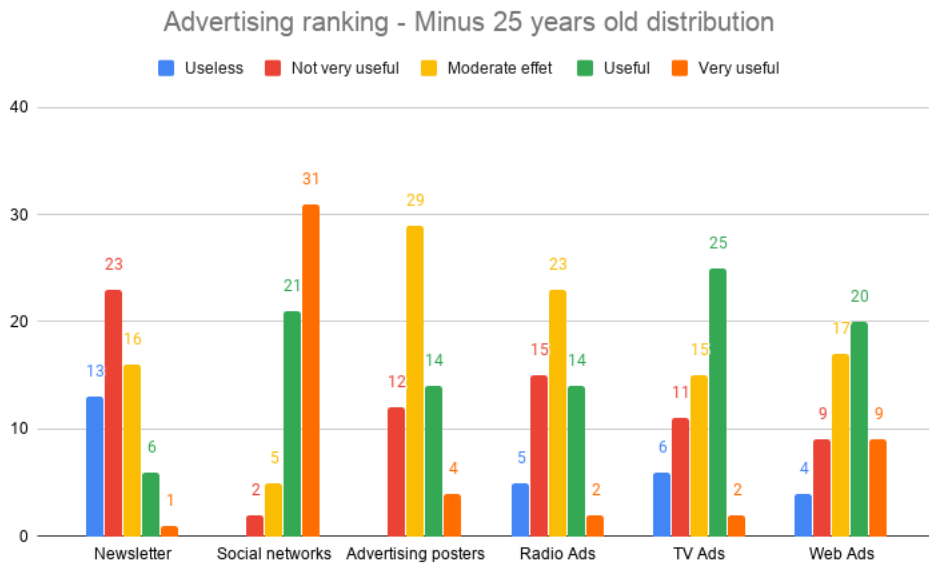


Figure 15: Preferences survey minus 25 years old distribution advertising ranking

25 to 55 years old distribution results

On the following figure, we can notice the more useful ranked advertising channels for the 25 to 55 years old distribution is the social networks with a maximum of 30 "very useful" votes that represent 49,11% of the 61 votes. The newsletter is the least useful according to the results with a maximum of 14 "useless" votes that represent 23% of the 61 votes. The results of this distribution don't highlight a big difference with the overall results.

25 to 55 years old distribution percentage index of channels that provide at least a "moderate" effect to advert citizen about e-participation :

- Newsletters : 49,18%
- Social networks : 95,08%
- Advertising posters : 70,49%
- Radio ads : 78,68%
- TV ads : 80,32%
- Web ads : 88,52%

25 to 55 years old distribution percentage index of channels that provide at least a "useful" effect to advert citizen about e-participation :

- Newsletters : 16,39%
- Social networks : 86,88%
- Advertising posters : 34,42%
- Radio ads : 36,06%
- TV ads : 45,90%
- Web ads : 55,73%

Over 55 years old distributions results

On the following figure, we can notice the more useful ranked advertising channels for the over 55 years old distributions is the social networks with a maximum of 7 "very useful" votes that represent 41,17% of the 17 votes. The newsletter is the least useful according to the results with a maximum of 3 "useless" votes that represent 17,64% of the 17 votes. The results of this distribution are close to the overall results however we can highlight that the social networks reference 0 "useless" and "not very useful" vote, this channel possesses then a 100% percentage index of moderate effect. The radio and the TV channels also reference 0 "useless" vote, this indicates the importance of the radio and TV advertising channels for the over 55 years old distribution. Unlike the two other age distributions, the newsletter channel reflects a strong interest for the over 55 years old distribution.

Over 55 years old distributions percentage index of channels that provide at least a "moderate" effect to advert citizen about e-participation :

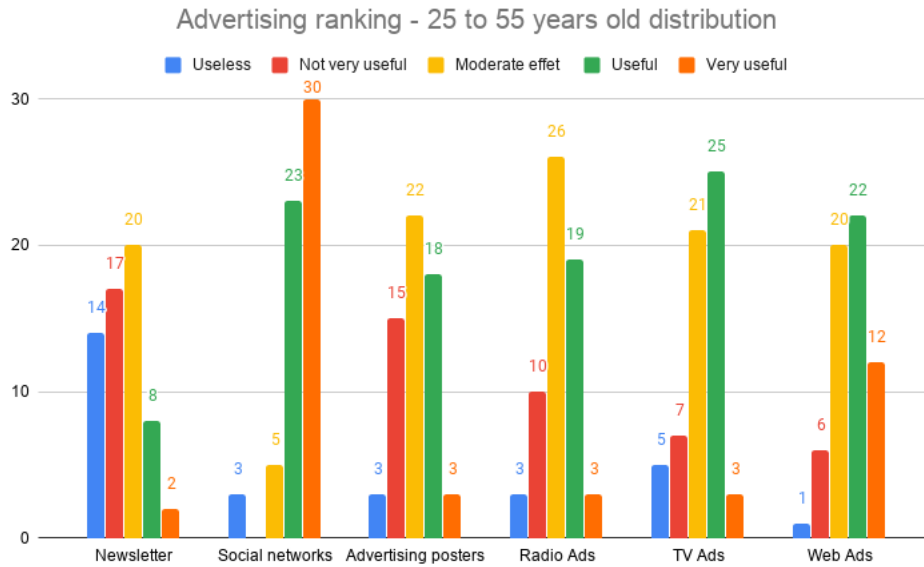


Figure 16: Preferences survey 25 to 55 years old distribution advertising ranking

- Newsletters : 70,58%
- Social networks : 100%
- Advertising posters : 58,82%
- Radio ads : 88,23%
- TV ads : 94,11%
- Web ads : 70,58%

Over 55 years old distributions percentage index of channels that provide at least a "useful" effect to advert citizen about e-participation :

- Newsletters : 52,94%
- Social networks : 88,23%
- Advertising posters : 29,41%
- Radio ads : 64,70%
- TV ads : 64,70%
- Web ads : 52,94%

Advertising results interpretation

Thanks to these data and the two percentage index detailed in this section, we can identify the importance of the social networks as the most useful advertising channel to encourage citizens to use an e-participation platform. The newsletters channel is the less useful

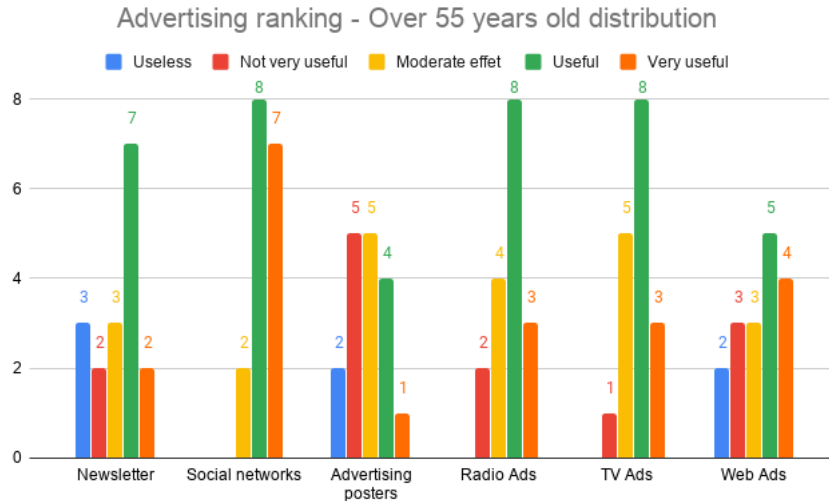


Figure 17: Preferences survey over 55 years old distribution advertising ranking

channel referenced. Even though the over 55 years old seems to have a stronger interest in the newsletters it seems that citizens under 55 years old don't see it as a good point. An assumption can be made that newsletter advert can be taken as spam for citizens. In the overall results, web ads are second in term of usefulness just beside social networks. This reflects the importance of the use of the internet nowadays. It is valuable to highlight the identical strong interest in TV and Radio ads for the over 55 years old distribution where the two other distribution show a stronger interest in TV ads than radio ads. Finally, the advertising posters channels although it shows the strongest moderate effect rank itself on the 4th most useful advertising channels.

To sum up, social networks and web ads have the strongest impacts in term of advertising. TV ads, in general, have a stronger impact than radio ads. Posters advertising and newsletters possess a lower impact. It seems then more interesting to focus on social networks, web ads and TV ads to encourage citizens to use an e-participation platform.

Notification preferences

Citizen preferences notification channel and frequencies data were gathered through the survey. Surveyed people had to select which notification(s) channel(s) (mail, social network, SMS) they preferred to be invited to use an e-participation platform they had already registered. With the possibility to select more than one notification channel in the answer possibilities, 153 responses were collected.

Out of these 153 responses, the main notification preference is through social networks with 54,2% (83) followed by the mail channel with 32% (49) and SMS with 13,7% (21) of the votes.

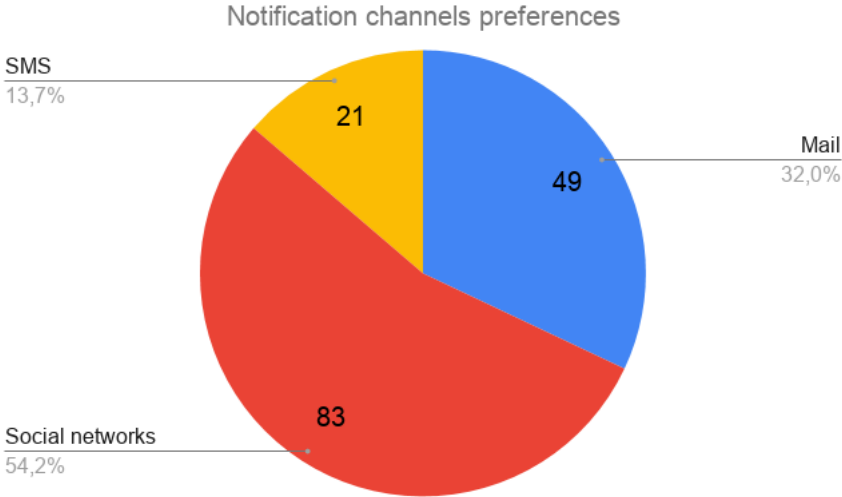


Figure 18: Preferences survey notification channels

On the following figure, we can analyse that the SMS channel is the least favourite and that the two minuses 55 years old distribution prefer the social network over the mail channel where the over 55 years old distribution have a stronger interest in it.

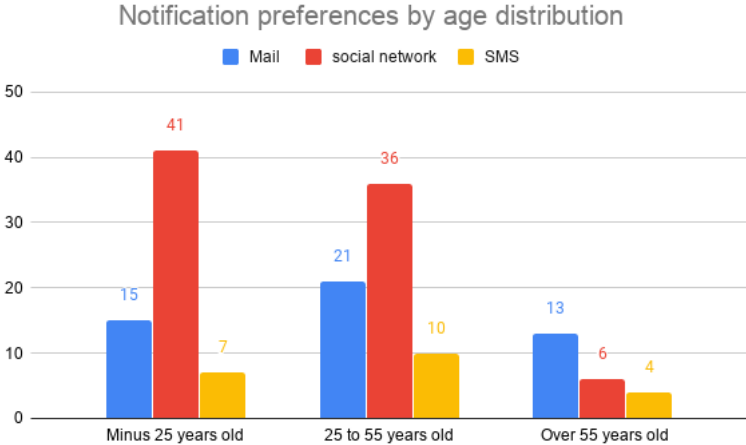


Figure 19: Preferences survey age distribution notification channels ranking

Three notifications frequencies in the case of participation in a project were proposed in the survey: notifications only at the stages where participation is required AND at the end of the project, notifications at all stages of the project, notifications only where participation is required. Surveyed people also had to the opportunity to propose an alternative at these propositions. Out of the 137 responses, 4 "selecting the notifications preferences in parameters" alternative proposed. The 133 other responses are distributed as followed :

- Notifications only at the stages where participation is required AND at the end of the project: 51,1%
- Notifications at all stages of the project: 41,4%
- Notifications only where participation is required: 7,5%

Notification frequency preferences

● Notification only at the stages where a participation is required AND at the end of the project
● Notification at all stages of the project ● Notification only where a participation is required

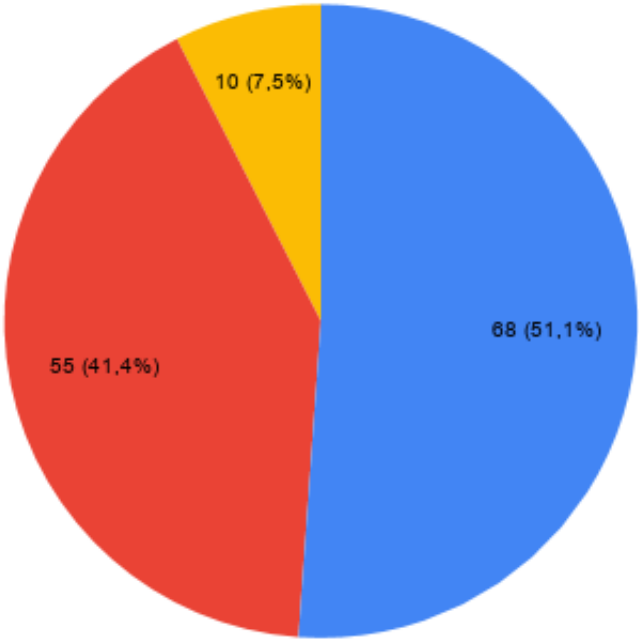


Figure 20: Preferences survey notification frequency ranking

Notifications results interpretation

The two main notification channels citizen preferences are the social networks and mail channels with a strong preference for the social network over the mail channel for the two minuses than 55 years old age distributions. In contrast, the over 55 years old age distribution shows a stronger interest in the mail channel. A possible solution to suit every age distribution would be to use the mail channel by default to propose notification, as not all users use a social network but are more likely to possess an e-mail address, with

the possibility through the platform options to select a notification preference. This thinking is also a possible solution for the notification frequency issue. The notification frequency "Notifications only at the stages where participation is required AND at the end of the project" should be set by default as it includes part of the two other notifications frequencies with a possibility to select a preference in the platform settings.

5.2.4 Utilisability domain results

This section lists results concerning the citizen preferences in term of feature related to e-participation platform. The features studied are user assistance and participation oriented functionalities.

User assistance features results

E-participation platform is a tool to perform an e-participation activity. As defined in the 2.3 section, e-participation activities can be very different from each other. The importance of providing an "about" functionality is then discussed in e-participation platform, surveyed people were asked to position on a 7 Likert scale their opinion about the "about" tab usefulness with 1 defined as "useless" and 7 as very "useful".

Out of the 137 votes, only 5,1% (7) of the votes are a negative review of the "about" feature towards 8,8% (12) neutral votes, 8,8% (12) mildly useful votes, 29,2% (40) useful votes and 51,8% (71) very useful votes. We can then state that an about tab is a must-have in the designing of an e-participation platform. The survey, however, shows that out of the 102 people that respond to the optional question "have you consulted the about section while consulting the youth4climate.be participation platform", only 38,2% (39) of them consulted the about tab. A hypothesis can be proposed that users consult it only if they don't automatically understand the purpose of the e-participation platform or because they want to know more about the activity.

As for the about feature, surveyed people were asked to rank a platform assistance feature that may be in the form of a short tutorial or a help tab in a 7 Likert scale with 1 defined as "useless" and 7 as very "useful".

Out of the 137 votes, 16,1% (22) of the votes is a bad review of the support feature towards 16,8% (23) neutral votes, 23,4% (32) mildly useful votes, 19,7% (27) useful vote and 24,1% (33) very useful votes. The support feature is then must-have feature event though the survey highlight that out of the 98 responses on the optional question "The youth4climate platform doesn't have a support tab, do you think it should have one?", 52% (51) esteemed the platform is intuitive enough and doesn't need one. We can thus propose that an e-participation platform must be design and test to build the more intuitive possible but also need to provide a help tab for people with comprehension difficulties. This proposition is set both in the feature and accessibility domains related to e-participation platforms.

Participation features results

An e-participation platform must provide different participation interactions to users to perform an e-participation activity. 9 participation functionalities were proposed to be ranked on a 5 Likert scale from derisory to must-have by surveyed people. These functionalities were proposed based on the heuristics and the user interactions detailed in the 5.1 section.

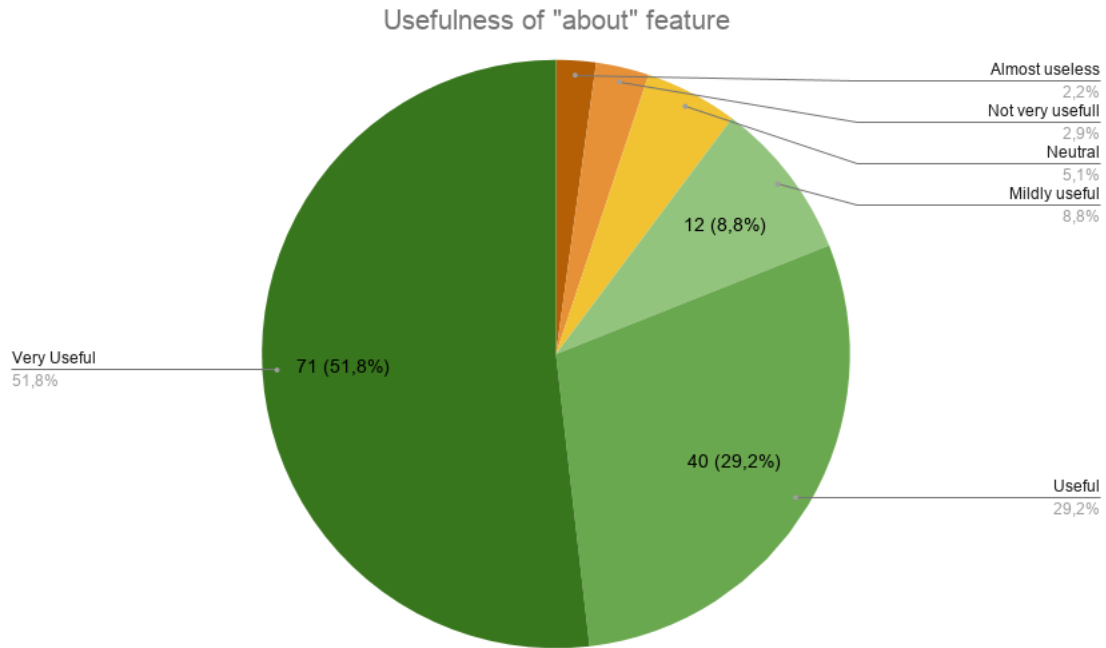


Figure 21: Preferences survey "About" feature utility

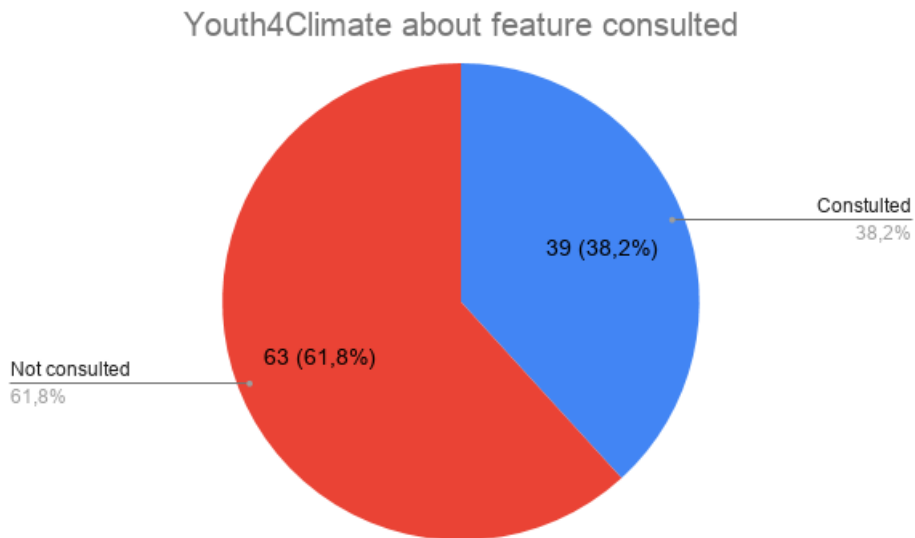


Figure 22: Preferences survey "About" feature consultation ratio

On the following figure, we can notice the features with 55 votes the highest must-have ranked feature is the idea proposal system close followed by the voting system feature with 52 of must-have votes. The feedback feature displays the highest number of votes that is the important ranking. The private messaging system for its part displays the highest number of derisory and unimportant votes with 29 votes for each.

In order to represent easily the priority and importance of each participation feature the index "at least important" rank based on the percentage of "important" and "must-have" rank out of the total is calculated. The use of this index is useful to provide a scale of

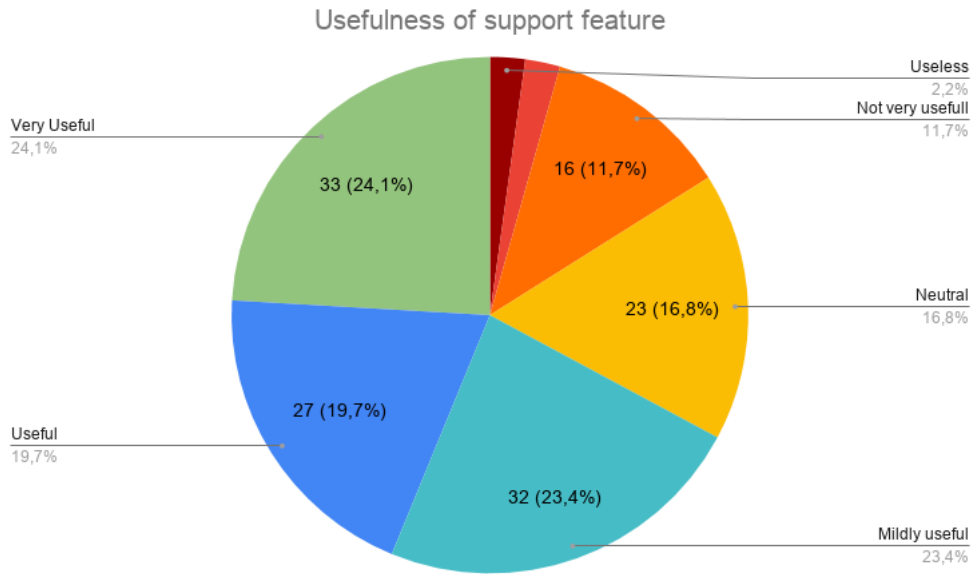


Figure 23: Preferences survey support feature utility

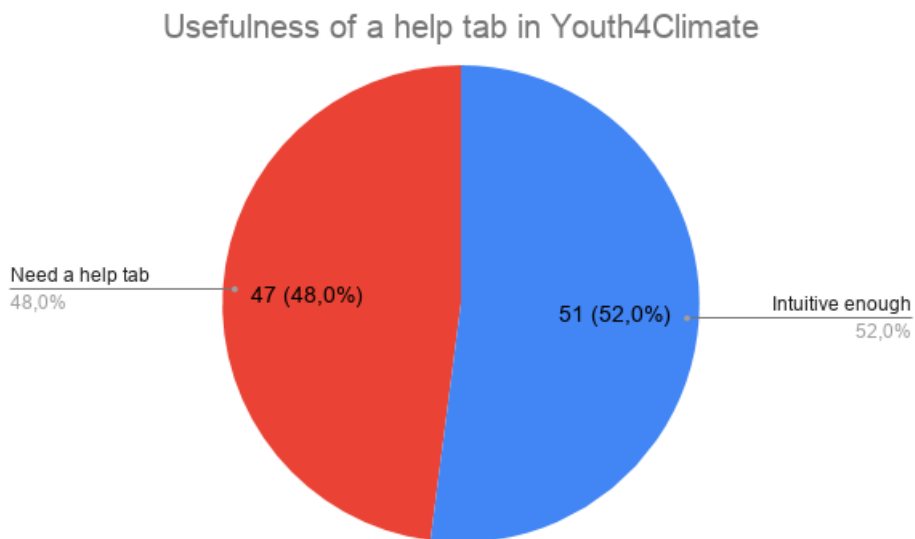


Figure 24: Preferences survey "help" tab utility

priority in term of participation features that an e-participation platform must provide. Percentage index of "at least important" rank of each participation feature present in the preferences survey :

- Idea proposal system : 84,67%
- Comment system : 75,91%
- Voting system : 86,13%
- Feedback on each project : 86,13%

- "Like" system : 37,95%
- Private messaging system : 26,27%
- Customizing the notifications system : 50,36%
- Personalization of visible personal data : 56,20%
- Project sharing via social networks or email : 70,80%

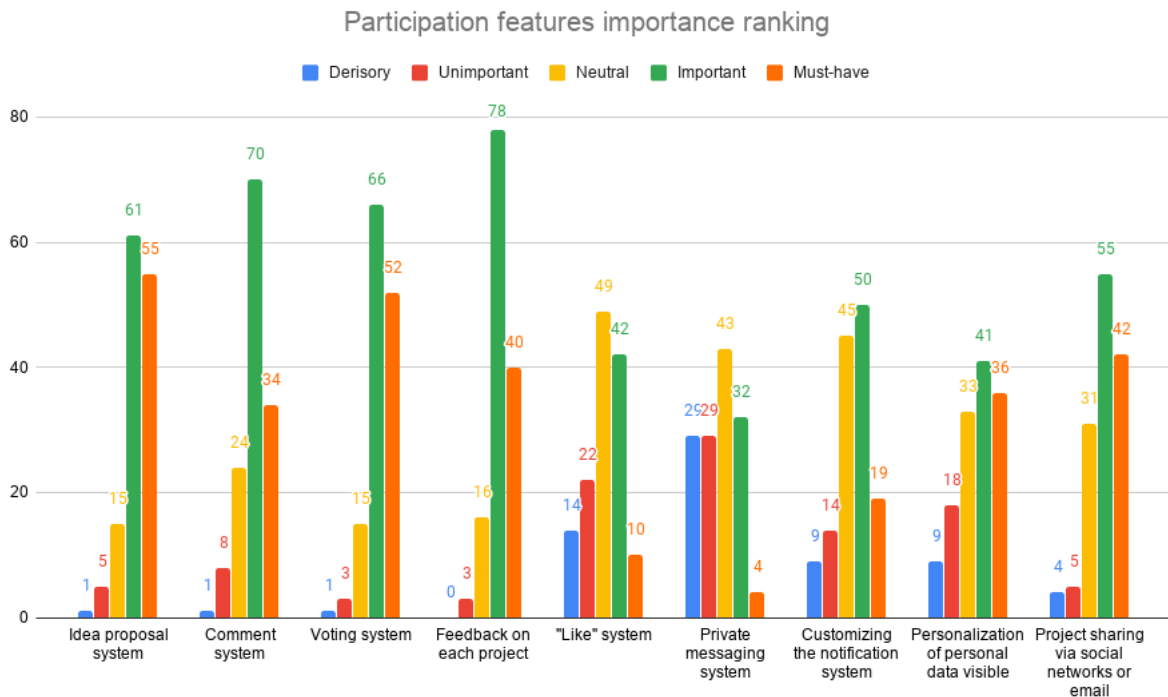


Figure 25: Preferences survey participation features priority

Surveyed people had the possibility to propose a feature that they seem useful to include in e-participation platforms. By grouping similar ideas and discard out of scope content, 7 features emerged that deserve an interest during the designing of an e-participation platform.

- Display of sources with background information on current scientific consensus, legal framework, etc for each project
- A forum linked to the e-participation platform
- Political feedback and motivations for responses
- Possibility to report inappropriate, out of scope and unverifiable content
- Ideas submitting system with different support such as images, mindmaps, diagrams, explanatory videos, etc...
- Treating comments structure

- An algorithm that would generate a forecast of the necessary budget based on open data for each idea and project proposed

The proposed idea of a report feature is closely related to the second question asked in the survey: "The basic principle of a participatory platform is that everyone can express an opinion on a subject. Do you think that opinions should be dismissed directly by the administrators? If so, what kind of ideas?" The results of this question are useful to propose a guideline for a reporting system. Out of the 137 results, 63,5% (87) of them emit a positive response towards a check content/report system by specifying that discard rules must be explicit in the e-participation platform and should follow the declaration of human rights to discard inappropriate content. 11,5% (16) of surveyed people didn't provide an opinion by leaving the response field empty and 25% (34) of them speak out against censorship. A feature of "fact-checking" also has been proposed through this question results, the system should be able to provide a tag to label nonsense content (example provide through the survey: "5G brings the coronavirus"). In the same way, inappropriate content could be blurred with an "inappropriate" tag, leaving the user the choice to read it or not. This proposing can be a solution to adapt in e-participation platform to handle non expected content.

Participation feature results interpretation:

From the index detailed previously, we can rank the participation features feedback, Voting and idea proposal systems with more than 80% for each as the 3 minimal must-have features to design an e-participation platform. The comment and sharing system are both very high ranking with more than 70% each. The customizing notification and personalization systems seem useful but not a strong priority. A link can be made with the previous notifications preferences results. It is highlighted in this section that at least by default notifications should be pushed through the mail with a frequency of each project participation stage and result. This statement can be a heuristic for e-participation platform that doesn't provide a notification customization system. Finally, the like and private messaging system are ranked as the lowest priority in the designing of an e-participation platform. The proposed report system feature seems an important addition to the idea and commenting system to boost clarity and keep every content appropriate. The fact-checking system detail previously can also be a great addition to handle every miscellaneous content.

Depending on the resources allocated to the introduction of an e-participation platform, the following proposed features should be discussed during the design of it :

- Ideas submitting system with different support such as images, mindmaps, diagrams, explanatory videos, etc...
- Treading comments structure.
- Display of sources with background information on current scientific consensus, legal framework, etc for each project.
- A forum linked to the e-participation platform.
- Political feedback and motivations for responses.

The proposed feature of an algorithm based on open data to budget ideas and project seems a strong addition to an e-participation platform but also seems to require a lot of resources. It may thus be pushed too far for the current e-participation platform considered version but deserve to be studied in the future.

5.2.5 Accessibility domain results

This section lists results concerning the citizen accessibility preferences related to e-participation platform as platform format, assistance for users with disabilities and language selection.

Platform format results

Surveyed people were asked on which format they would be more likely to use an e-participation platform, they could choose one or more among these three formats proposed: mobile application, web application and physical terminals. On the following figure, we can notice that that 51,8% (71) of the responses were the combination of the mobile format and web mobile, 29,2% (40) prefer to use only the web format and 19% (26) prefer to use only the mobile format. It must be noticed that the physical format was selected (8% (11) of the votes) only in addition to the web or mobile format but never alone. We can then emit the hypothesis that the introduction of a physical terminal can be a good marketing move to encourage citizens to use an e-participation platform. Thanks to these results, we can notice that an e-participation platform must be at least implemented on the web format with 81% of surveyed people wanting to use this format but it can be noticed that adaptability to mobile format can be a significant addition to the number of e-participation platform uses.

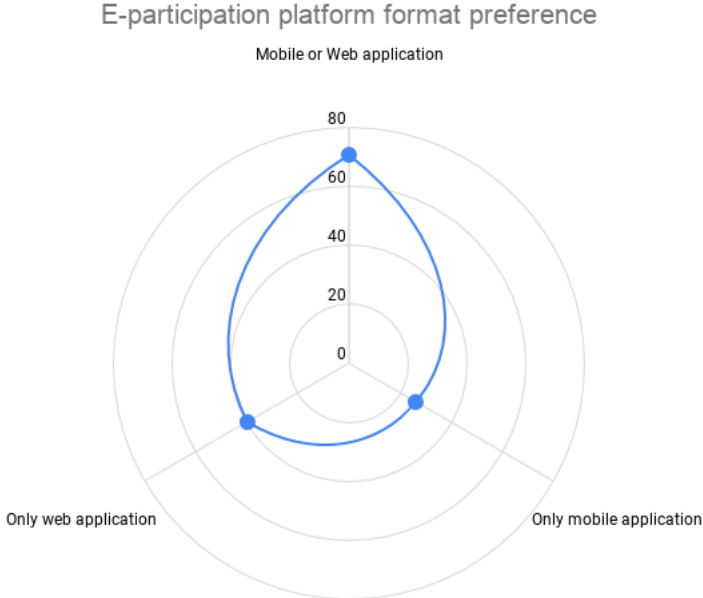


Figure 26: preferences survey format ranking

Disable user assistance

E-participation platforms can be sponsored by the government to imply citizens deeper into the democracy, citizens that suffer hearing or visual impairments must be taken into account when designing an e-participation platform. Surveyed people were asked to rank the priority on a 7 Likert scale to provide an assistance feature and if they think that it can have an impact on the number of e-participation platform users.

On the following figure, we can notice that this feature is considered as a high priority for surveyed people. With 46% (63) of the must-have vote, 22,6% (31) important votes and 16% (22) of mildly important votes that rank the feature at "at least important" priority with an index of 84,6%. Furthermore, 91 of 137 that represent 66,4% of surveyed people esteem that proposing this feature has an impact on the number of users. We can thus state that a disable user assistance feature to counter hearing or visual impairment is highly recommended in the designing of an e-participation platform.

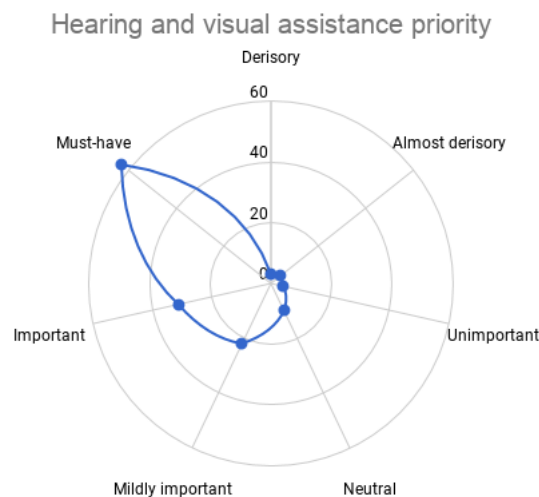


Figure 27: Preferences survey hearing and visual assistance priority

Language selection

The youth4climate participation platform is available in the three languages French, Dutch and English and is intended to gather Belgian citizens around the climate issue. Surveyed people were asked if in the context of a Belgian e-participation platform those three languages were enough. 51,8 % (71) of the responses state that the third official Belgian language: German was missing in the youth4climate platform. 11,7% (16) esteemed that those three languages were enough to conduct an e-participation platform in Belgium and 36,5% (50) empty responses was recorded. From these results, we can state that it is important for an e-participation platform to be available at least in every official language of the country or the specific language of the region the platform is intended. As an example, a Dutch-speaking municipality e-participation platform doesn't need to be available in French or German if the municipality citizens speak only Dutch. It must be noticed that English is a good addition to open the language availability of an e-participation platform.

5.2.6 HCI and responsiveness results

This section lists results concerning the design of the youth4climate participation platform taken as an example in the survey and the user responsiveness tolerance. The use of the survey doesn't provide an accurate evaluation of the HCI but permit to have a global view of the ease of use of the Youth4climate participation platform. The think-aloud evaluation detailed in the next section permit to evaluate more precisely the platform with its benefits and weakness.

Youth4Climate evaluation

Surveyed people were asked to rate the ease of use of the youth4climate participation platform on a 7 Likert scale and to report a potential problem in the design.

Out of the 83 ranking responses, 68,7% (57) of the votes rank the usability of the platform as "at least mildly simple". The following figure details the three age distributions. We can highlight that the 3 over 55 years rated the design as neutral and mildly simple. The results of the think-aloud evaluations performed in the next section will help to highlight which part of the design should be improved to enhance usability.

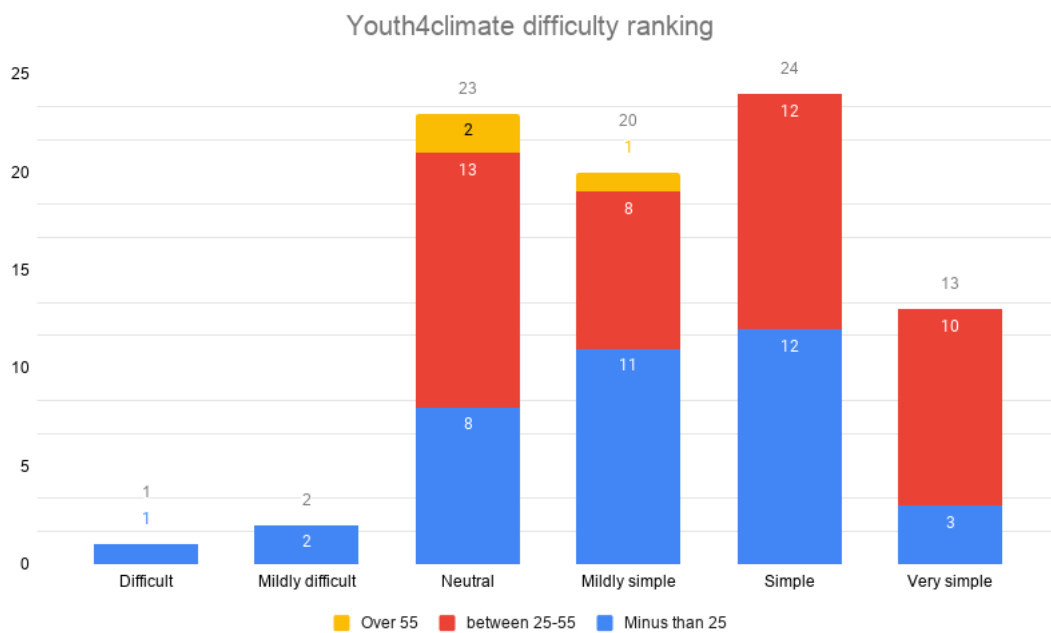


Figure 28: Preferences survey youth4climate.be difficulty ranking

Two improvements were proposed through the survey :

- It would be nice if the tabs climate panel, citizen lab... open in a new tab and not on the one where youth4climate is open.
- Drop-down menu on the project tab without having to click on it would improve the usability.

Responsiveness tolerance

Surveyed people were asked their tolerance threshold in terms of expectations for a platform feature. 4 options were proposed, up to 1,3,5 seconds of loading time and more than 5 seconds of loading time.

On the following figure, we can notice that out of the 137 responses, if the e-participation platform doesn't respond in minus than 3 seconds there is a chance of losing 50% (69) of the users. However, if the platform responds in less than 3 seconds 91,24% (125) of the users will keep using the platform. We can highlight that the 25 to 55 age distribution have a smaller responsiveness tolerance than the minus 25 and over 55 age distributions.

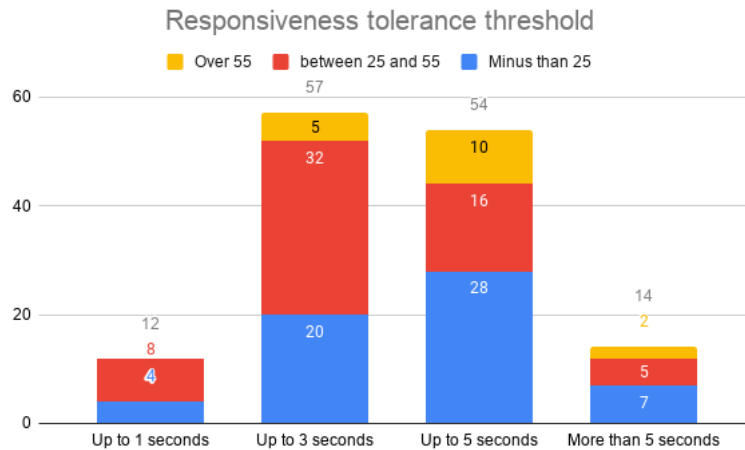


Figure 29: Preferences survey responsiveness tolerance threshold

5.3 Youth4climate.be think-aloud evaluation - results

The results presented in this section are based on the data gathered during the think-aloud evaluations conducted on the Belgian digital participation platform "youth4climate.be". 3 age groups composed of two persons have been focused: minus than 25 years old, between 25 and 35 years old and over 50 years old. Each result is focused on the design, the usability and features that need improvement according to each person interviewed. This section with the next "Fluicity - Etterbeek" section permit to emerge a proposition of a generic design and features in the section 5.5.3 that would enhance the usability of the youth4climate participation platform by resolving each age group faced issues.

Each participant was asked to complete and to answer the following scenarios and overall questions.

Scenarios:

- Discovery of the platform and registration.
- Consultation of the project "15 priorities to save our climate" and vote for an idea proposed in the voting section.
- Sharing on social networks an idea about mobility.
- Unchecking a notification preference and deleting the account.

Overall questions:

- Do you find the platform reliable? Do you think its use enhances democracy?
- Do you think the platform performs well enough? Is there a point at which you would give up if the use of the platform wasn't in a context of evaluation?
- If a new participatory project were to emerge, would you want to participate and re-use this platform?
- Which part of the design do you think useful and are there some features that don't suit you?

5.3.1 Issues occurrence overview

This tab summarizes the issues encountered by each evaluation participant during their review of the youth4climate.be participation platform. Each problem faced the number of occurrences that it was pointed out with a maximum of 6 occurrences. This structure permits us to highlight the main generic problems that need to be avoided with the help of the final framework. Each evaluation results is detailed in section 5.3.2

Issue	Occurrence
Platform not fully translated in the selected language	6
Difficulties to understand how to use the platform	5
Lack of a quick access to participate in a project	4
Lack of labels	3
Lack of tab purpose explanation	3
Vote icon not explicit enough	2
Lack of feedback	2
Themes bar not visible enough	1
Lack of a "contact us" tab	1
Design ambiguous	1
Lack of seriousness in the design	1
Design structure too flat	1
Item misplaced in the design	1
"E-mail address not supported" error not displayed	1

5.3.2 Evaluation results

Emily - 21 - public relations student - 10/08/2020:

On an overall view, Emily rates the platform 7/10. She found its use generally intuitive but highlighted that the design should be more explicit by displaying more labels and precision about its usability. According to her, the idea vote button (thumb up icon) should be labelled with "vote for this idea" to provide more clarity. The ideas tab should display explanations with the meaning of each idea tag and the themes bar should be given more prominence as she didn't see it at first. Emily pointed out that a "contact us" tab with every organization's references was missing as she usually looks after it when browsing websites. The platform not being fully translated in a selected language was a strong brake for her as she was browsing the platform in French and ideas proposed in the project "15 citizen priorities to save our climate" were displayed in Dutch. She later highlighted that ideas are displayed in the language that they were redacted. She would also have preferred to have a feature that permits her to participate in project

faster by the introduction of a "Participate" button that would redirect her to the stage of voting directly. This problem would have made her give up the use of the platform in a personal context. In summary, Emily found the platform intuitive and responsive, but a little difficult to use the first time. She finds it reliable and will likely use it again if a new project appears now that she understood how it works.

Guillaume - 21 - Computer Sciences Student - 07/08/2020

On an overall view, Guillaume rates the platform 7/10. He likes the simple and standard design that allows him to use the platform intuitively. However, he would have preferred more explanations on how to participate in a project and would like to have a button "vote" that redirect him directly towards all the ideas that need a vote. He pointed out that the design of the "projects" tab wasn't optimal as a significant difference in the design divides the explanation and the ideas proposed in the third phase "vote on the 15 citizen priorities" of the 15 priorities projects. He thought at first that the ideas put to the vote were ads or other related content. Since the subscribe process, he faced a problem with the language that switched to Dutch even though he selected French at first. The ideas displayed in another language that the French selected was also a major issue that would have made him give up the platform in a personal context. He found the aim of the participation platform important and would be likely to use it if a new project emerged but he doesn't see the platform as reliable. He finds its design a bit too childish which impacts the seriousness of the platform as for example the vote button represented by a simple thumb up icon. To sum up, Guillaume found the platform intuitive with a correct design but highlighted difficulties to understand the processing of the project participation.

Sandra - 39 - freelance in marketing domain - 11/08/2020

On an overall view, Sandra rates the platform 6/10. She finds the platform intuitive enough for classical interactions but finds it difficult to understand how she can participate in a project. She would like the platform displays more information concerning the aim of the platform right from the homepage, the benefits of subscribing and how to use the platform in general. During her subscription, she browses the terms and conditions of use and was redirected to a new web browser tab, she would have preferred a pop up that would have made the interactions easier. Being bilingual Dutch/French the language problem didn't bother her but was disturbing. According to her, the platform design is too flat and need more hierarchy with an intermediary tab to present the projects, she pointed out that this tab exists in the mobile version but not in the web version. To provide more clarity she would like to see dedicated tags on each idea/project that would define its status and thematic. She found the google translate feature useful but not enough as it doesn't translate the title of ideas written in another language that the language selected. Sandra found not useful to put forth the terms and conditions, privacy and cookies policy in the "About" tab, she would have preferred to have project or ideas linked access instead. In terms of the idea design, she found that the content structure was monotonous for ideas with a lot of content. She proposed the possibility to put bullet points or image to make it easier to read. She also points out that the thumb up icon is intuitive for a lot of people but can be difficult to understand for older people and needs a label. During the browsing of the 15 priorities project, she had difficulties to understand how to interact with the platform and would have given up the platform after trying to understand. To counter this problem she proposed to put to the front the list of ideas that need a vote interaction in regard to the explanations concerning the phase

of the vote. Sandra also wanted to see more feedback concerning the conducted projects, because of this she doesn't find the platform highly reliable but find it more useful than gathering ideas through a Facebook group. She highlights that the "unsubscribe" button in the setting should be the last interaction possible to make and shouldn't be located in the middle of the settings menu. In summary, Sandra found the design intuitive but with several faults concerning the projects tab and had to browse some time before fully understanding how to participate in a project.

Salvatore - 30 - insurance employee - 10/08/2020

On an overall view, Salvatore rates the platform 9/10. He found the platform very intuitive with a great simple design. The only problem that he highlighted was the language problem since the subscribing where the French selected changed to Dutch and some title of ideas are displayed in Dutch, this need to be corrected but it is bearable. He found the platform reliable, easy to use, responsive and would likely re-use it if a new participation project emerged. To sum up, Salvatore considered the platform very well built but need to correct the language problem.

Serap - 54 - Bank employee - 10//08/2020

On an overall view, Serap rates the platform 7/10. She finds it intuitive and easy to use but misses more feedback, these should be represented through charts for an easy understanding. She pointed out a language problem as she selected French and some idea title was in Dutch. Even though there is a google translate feature it is a hindrance for her as she needs to click on an idea written in Dutch without understanding its meaning to perform the google translate feature. While she was subscribing, her mail address wasn't accepted by the platform because it is a family reserved domain but the platform didn't highlight the problem with the mail address while reporting an error in the subscription. While browsing the 15 priority projects, she had trouble to find the ideas put to the vote and proposed a research bar that covers the whole site and more information on the participation process displayed. Even though these problems, she finds that the platform is reliable and permit constructive discussions and would gladly re-use it to participate in a new project. In summary, Serap liked the platform and want to re-use it but is disturbed by the language problem limiting its comprehension of proposed ideas.

Giovanni - 59 - Factory brigadier - 12/08/2020

On an overall view, Giovanni rates the platform 7/10. He finds the design clean and simple but had a lot of difficulties to participate in the 15 priority project and needed explanations from my part to understand how to use this part of the platform. In a personal context, he would have given up the platform. To understand quickly what he had to do, he would clarify the design by displaying labels on ideas and title on each section. He took some time to understand that he could consult his account by clicking the account icon, a label "my account" would counter this problem. He finds the platform reliable and now that he understood how to interact with it he would re-use it if a new project emerged. To sum up, Giovanni had difficulties to interact with the project part of the design but didn't seem bothered by the language problematic highlighted in other evaluations. Once he understood how to use it he found the platform intuitive to interact with and would re-use it.

5.4 Fluicity - Etterbeek think-aloud evaluation - results

The results presented in this section are based on the data gathered during the think-aloud evaluations conducted on the Belgian digital participation platform "Fluicity - Etterbeek". 3 age groups composed of two persons have been focused: minus than 25 years old, between 25 and 35 years old and over 50 years old. Each result is focused on the design, the usability and features that need improvement according to each person interviewed. This section with the previous "youth4climate" section permit to emerge a proposition of a generic design and features in the section 5.5.3 that would enhance the usability of the Fluicity - Etterbeek participation platform by resolving each age group faced issues.

Each participant was asked to complete and to answer the following scenarios and overall questions.

Scenarios:

- Discovery of the platform and registration.
- Create an idea concerning mobility.
- Voting and Commenting on an idea concerning security.
- Sharing on social networks an actuality about Etterbeek.
- Changing the language and disconnect.

Overall questions:

- Do you find the platform reliable? Do you think its use enhances democracy?
- Do you think the platform performs well enough? Is there a point at which you would give up if the use of the platform wasn't in a context of evaluation?
- If a new participatory project were to emerge, would you want to participate and re-use this platform?
- Which part of the design do you think useful and are there some features that don't suit you?

5.4.1 Issues occurrence overview

This tab summarizes the problems encountered by each evaluation participant during their review of the Fluicity - Etterbeek participation platform. Each problem faced the number of occurrences that it was pointed out with a maximum of 6 occurrences. This structure permits us to highlight the main generic problems that need to be avoided with the help of the final framework. Each evaluation results is detailed in section 5.4.2

Issue	Occurrence
Lack of labels	5
Vote icon not explicit enough	4
Disconnect feature hard to find	4
Language selection feature hard to find	4
Design features not eye-catching enough	4
Main structure of the design displayed in English by default	2
Bug in the idea proposal form	2
Item misplaced in the design	2
Lack of possibilities for the sharing feature	2
Difficulties to understand how to use the platform	1
Monotonous design	1
Lack of integrity in the label	1
Lack of feedback	1
Delete idea feature not working	1
Delete account feature not available in the design	1
Home button is ambiguous	1
Scrolling feature is not explicit enough	1

5.4.2 Evaluation results

Anne-Louise - 22 - Law student - 10/08/2020

On an overall view, Anne-Louise rates the platform 7/10. She found the design intuitive but monotonous and would prefer having more colours and bigger labels. She struggled to find how to return to the home page but found it after a few try. According to her the design for the idea proposal should display the button "publish" at the end of the form. She pointed out that the delete idea feature wasn't working and that the icons proposed to vote were not understandable at first sight. Labelling them can be a solution. She

didn't find the feature to change the language of the platform that was in the settings and propose that this feature was directly available on the header. She also highlighted that to consult the actualities, the button was labelled "participate" but it is only a consulting interaction. In summary, Anne-Louise found the platform reliable and would re-use it if she was a citizen from Etterbeek but would change the design to less monotonous colours and bigger labels.

Lionel - 21 - Computer Sciences student - 08/08/2020

On an overall view, Lionel rates the platform 7/10. He found the design simple, easy to use and very intuitive. He pointed out a bug during the process of creating an idea, the categories scroll-down menu didn't display data and blocked the process of publishing the idea. However, he found the process easy to understand and propose a document upload feature to permit users to provide more content to their ideas. He also highlights that the share feature focuses only on Facebook and Twitter and it would be great to propose more social networks like Instagram and that once he was subscribed he couldn't delete his account. To sum up, He finds the platform reliable and would re-use it likely.

Aurélie - 30 - PhD candidate in psychology - 12/08/2020

On an overall view, Aurélie rates the platform 9/10. She finds the platform intuitive well structured and easy to use. If she could operate some changes, she would like to change the search bar position in the main box on the left of the button "subscribe" because she didn't see it at first as she related it to the button "create". She would also display the changing language feature on the home page and would display the button "disconnect" in such a way that it is visible as soon as the parameters are consulted. In summary, Aurélie finds the platform reliable and would likely re-use it if she was a citizen of Etterbeek.

Yann - 29 - responsible in a fruit and vegetable company - 16/08/2020

On an overall view, Yann rates the platform 8/10. He finds the design intuitive and functional. He pointed out that the structure of the platform is in English even though the content of the tags and idea are in French during his first browse. It didn't bother him but it can be an issue for some people. According to him, the search bar should have a hint "I am looking for..." to understand that it is not related to the button "create", the search tag should be bigger and should display an associated icon to eye-catch the user. Yann found the translate feature display on ideas that are written in another language than the selected one but think that the changing language and disconnect feature should be proposed directly while browsing the platform and should be accessible in the home page. For example, a scroll-down menu could propose the language setting and the disconnects feature. The share feature is only focused on social networks and should include the mail possibility. The upvote and downvote icons are not understandable at first sight and are not located well, he proposes to display them with related labels at the end of the idea content with the share feature. He also highlighted that the "home" button is ambiguous as it redirects to the main page of Fluicity, the clickable icon "Fluicity" is enough and the home button should only redirect to the subscribed participation platform. To sum up, Yann finds this platform reliable and would re-use it if he is insured that the platform will provide feedback from the municipality but would operate some change in the design if it was possible.

Marie-Carmen - 65 - Retired - 11/08/2020

On an overall view, Marie-Carmen rates the platform 0/10. She couldn't use it properly alone and need my help to understand its usability. The first problem she faced was the structure of the website display in English that troubled her and make her feel uncomfortable with the platform as she clicked on buttons without knowing their meaning. She was stuck at the subscription process, the pop up was not big enough and she didn't understand that she had to scroll down to complete the process. She would prefer having everything on one page or having explicit information that she needs to scroll down. I had to explain to her how to return to the home page, she would prefer an explicitly labelled button to understand where she needs to click. During the idea proposal process she pointed out that the categories form didn't take into account the input if it doesn't match the existing categories and just go blank. An explanation would counter or changing the format of the form would counter this problem. On the home page, she didn't see the search bar and different tabs displayed, she scrolls down the "all" data to find what she was looking for. She found the voting icons not explicit enough and clicked on them inadvertently. She would prefer that the icon were more explicit with a label. In summary, she thinks the platform is reliable but is not convinced that it will provide a change in the democracy and would re-use it but only as an informative tool now that she was taught how to use it.

Thierry - 56 - legal counsellor - 13/08/2020

On an overall view, Thierry rates the platform 8/10. He found the platform fluid and easy to use but would like to see more feedback concerning ideas supported by the municipality. The numbers presented should be clickable and should redirect the user to the ideas wrapped up. He found the voting icons not explicit enough and would like that labels are displayed to explicit them and think that the changing language and disconnect feature should be more simple to access. To sum up, Thierry finds the platform reliable and would gladly re-use it if he was a citizen from Etterbeek but would like to see more feedback from the municipality.

5.5 Proposals for design guidelines

This section gathers the e-participation platform heuristics emerged from the e-platform literature review and the two proposals of design emerged from the preferences survey and the existing platforms think-aloud evaluations. These three sets of guidelines represent what an e-participation platform must follow during its designing to suite citizens' preferences.

5.5.1 Theoretical heuristics for the design of e-participation platforms

By performing the literature review detailed in section 5.1, we can emerge theoretical heuristics that a website should meet to be the best e-participation platform according to citizen perspective, quality, human-computer interaction, accessibility and Web 2.0 researches.

Citizen participation heuristics for e-participation platform:

By following these heuristics, the e-participation platform analysed by the Axelsson and Melin citizen participation framework[3] should match the highest response expected for each citizen perspective question.

- Type of participation: All users that are concerned about the project should be invited to use the e-platform.
- Degree of participation: Opinion of all users must be taken as advice to progress in the project and must be taken into account.
- Content of participation: Users must be invited to participate in all the decision-making activities.
- Extent of participation: Users must be invited to participate at all stages of the project where a major decision should be made.
- Formality of participation: Each participation of users must be for an explicit purpose introduced by organizers.
- Influence of participation: The outcome of users' participation and the use of it must be explicit and must have a real impact on each project.
- Depth of participation: Users must be invited to be involved in all parts of the decision-making stage.
- Result of participation: All the user's outcomes and their applications in the progress of the project must be explicit.

Quality heuristics for e-participation platform :

In this thesis the evaluation of the quality is not focused on the technical quality, thus the heuristics following are a mix of some requirements of the product quality model and the quality in use model, presented in the ISO25010, that match with e-participation platform.

- **Effectiveness:** The goals and their completeness of the e-participation platform must be explicit for users.
- **Efficiency:** The e-participation platform must be built to fulfil its goals without latency and with the minimum resources required for its use.
- **Satisfaction:** The use of the e-participation platform must be user friendly and easy to handle with a tutorial or and help page.
- **Functionality:** The e-participation platform must be built with functions that respond to its purpose.
- **Compatibility:** The e-participation platform must be compatible with the smart-phone format.
- **Usability/Accessibility:** The e-participation platform must provide a usability alternative for disabled users.

HCI heuristics for e-participation platform :

Heuristics following are part of the ten heuristics presented in the literature review.

1. The system status must always be visible: The user must always be aware of the system state and within a reasonable time.
2. The e-participation platform must be in the language of the target users with a possibility to change the language.
3. The user must always with control and freedom be able to stop the process: System must support undo and redo.
4. Name standards must be maintained throughout the system.
5. Instead of a good error message, it is better to have a system that prevents errors.
6. Recognition rather than recall; minimize the user's memory load by making objects, actions, and options visible.
7. Use accelerators: allow knowledgeable users to take actions quickly.
8. Aesthetic and minimalist design: Dialogues should not contain information that is irrelevant or rarely needed.
9. Help users recognise, diagnose and recover from errors.
10. Help and documentation.

Accessibility heuristics for e-participation platform :

The accessibility heuristics are based on the WCAG 2.0 guidelines to ensure that e-participation platforms are usable for a maximum of users for a minimum of resources. The WCAG 2.0 presented in the annexes section details each level (A, AA, AAA) of features that meet the guidelines.

- Perceivable - Information and user interface components must be presentable to users in ways they can perceive.
 - Text Alternatives: e-participation platform must provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols or simpler language.
 - Time-based Media: e-participation platform must provide alternatives for time-based media.
 - Adaptable: Create content that can be presented in different ways (for example simpler layout) without losing information or structure.
 - Distinguishable: Make it easier for users to see and hear content including separating foreground from background.
- Operable - User interface components and navigation must be operable.
 - Keyboard Accessible: Make all functionality available from a keyboard.
 - Enough Time: Provide users enough time to read and use the content.
 - Seizures: Do not design content in a way that is known to cause seizures
 - Navigable: Provide ways to help users navigate, find content, and determine where they are.
- Understandable - Information and the operation of user interface must be understandable.
 - Readable: Make text content readable and understandable.
 - Predictable: Make Web pages appear and operate in predictable ways.
 - Input Assistance: Help users avoid and correct mistakes.
- Robust - Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.
 - Compatible: Maximize compatibility with current and future user agents, including assistive technologies.

Web 2.0 heuristics for e-participation platforms:

The points evaluated in the tool developed by Nitzsche and Co.[29] are transformed to heuristics that e-participation platforms must fulfil to be a decent web 2.0 platform.

- Personalization
 - E-participation platforms must provide an account system.
 - E-participation platforms must permit users to custom their account to match their preferences.
 - E-participation platforms must permit users to share and hide personal information.
- Social networking
 - E-participation platforms must permit users to send invitations/page recommendations to promote the platform.
 - E-participation platforms must permit users to interact between each other.
- User added value
 - Users must be able to formulate suggestions concerning the goals of the e-participation platform.
 - Users must be able to comment other users suggestions.
 - Users must be able to rate a suggestion.
- Interaction orientation
 - E-participation platforms must be explicit about the way the administration interact with suggestions.

5.5.2 Proposal for the design of an e-participation platform based on citizens' preferences

This generic proposal gathers all interpretations that responds to the different preferences presented in section 5.2 and aims to satisfy all citizens surveyed as a sample of all users likely to use an e-participation platform. The proposal is divided into 3 main guidelines :

Communication guidelines:

Advertising :

To raise citizens' awareness of the existence of an e-participation platform, related advertisements must be focused on social networks, the web in general and TV.

Notification :

Notifications must be pushed by default through the mail channel with the possibility in the platform settings to select a notification channel preference with the choice between at least mail and social networks.

The frequency of the notifications must be set by default to every stage requiring participation and at the end of a project with a possibility to select a frequency preference in the platform settings.

Utilisability guidelines:

An e-participation platform must, with the highest priority, permit the user to receive feedbacks from each participation project, provide a voting system, an idea proposal system, an "About" tab and a usability help tab or tutorial.

A commenting and sharing system are the second priority in the design of an e-participation platform.

A report content feature is highly recommended as an addition to the idea and commenting system to boost clarity and keep every content appropriate.

A customizing notification system is recommended but in case it is not implemented the default notifications guidelines must be respected.

Depending on the resources allocated to the introduction of the e-participation platform, the following features deserved to be discussed :

- Like system.
- Private messaging system.
- Ideas submitting system with different supports such as images, mind-maps, diagrams, explanatory videos, etc...
- Treading comments structure.
- Display of sources with background information on current scientific consensus, legal framework, etc... for each project.
- A forum linked to the e-participation platform.
- Political feedback and motivations for responses.

Accessibility guidelines:

The e-participation platform must be designed to be used on a web format by default and must be mobile responsive.

The e-participation platform must provide a user assistance feature to counter hearing and visual impairments.

The e-participation platform must be available at least in every official language of the country it is introduced. The English language is also a good addition to open language availability.

The responsiveness of interaction in the e-participation platform must be under 3 seconds.

5.5.3 Proposal for the design of an e-participation platform based on citizens' issues towards existing platforms

The following proposition is a gathering of guidelines that aims to counter every issue that interviewed user faced during their think-aloud evaluation of an existing e-participation platform.

Design guidelines :

- An e-participation platform must display an explicit label for each button that it displays.
- An e-participation platform must display explicitly what each tab represents with a catchphrase. An example concerning the idea tab of youth4climate: "Here you can consult all the ideas proposed during the different participatory projects".
- An e-participation platform must display an explicit set of tag, intended to facilitate research in the platform, with the use of colours and with an eye-catch positioning.
- An e-participation platform must display explicitly the voting section of a project and must permit the user to access it easily by the use of a button "Go to vote".
- An e-participation platform must display a "contact" tab to permit the user to contact the administrators of the platform.
- An e-participation platform must display a standardised design with a header that displays at least the features home, account, about, help links and the language selection.
- An e-participation platform must display design with a choice of icons and colours that represents the seriousness of the platform.
- An e-participation platform must display its purpose and feedbacks right in the front page.
- An e-participation platform must display a correct hierarchical design with intermediary tabs to ease its use.
- An e-participation platform must display summarized idea cards with thematic tags that specify their content.

- An e-participation platform must display its related terms and conditions, privacy and cookies policy in the footer design.
- An e-participation platform must have a typo that catches the user eye at first use.
- An e-participation platform must linearly display its interaction features, the user must never regress in its use to complete a process.
- An e-participation platform must display explicit labels that keep the integrity of the interactions.
- An e-participation platform must explicitly display the disconnect and unsubscribe features.
- An e-participation platform must display an explicit feature to inform the user when a scroll interaction is possible.

Usability guidelines

- An e-participation platform must be fully available in every language proposed : every content of the platform must be translated to the selected language.
- An e-participation platform must provide a help feature that responds to more frequently asked questions concerning the usability of the platform or a small tutorial.
- An e-participation platform must not create a new tab in the browser to display information.
- An e-participation platform must provide a word process and file import feature to provide more clarity in the redaction of content.
- An e-participation platform must provide a prevent error feature for every form that it displays.
- An e-participation platform must provide an error report feature.
- An e-participation platform must provide a sharing feature that includes mail and popular social networks.
- An e-participation platform must provide a search bar with a hint that explicit its purpose.
- An e-participation platform must permit the user to consult quickly every content that is displayed.

5.6 Framework for the design of citizen-centred e-participation platforms

The three previous sets of guidelines presented in the 5.5 section are crossed and refined together to provide the following framework that aims at satisfying citizen needs in term of e-participation platform.

Citizen participation guidelines	
Type of participation	All users concerned by the aim of the platform must be invited to use it through social networks, web and TV advertising
Degree of participation	Every appropriate and constructive opinion must be taken into account in the progress of the project
Content of participation	Users must be invited to participate in each activity that requires an interaction
Extent of participation	Users must be notified at each activity that requires interaction and at the end of the project
Formality of participation	The user's participation required must be explicit
Influence of participation	The outcome of users' participation and the use of it must be explicit and must have a real impact on each project
Depth of participation	Users must be invited to be involved in all parts of the decision-making stage of a project
Result of participation	The outcome of users' participation must be reported through project feedback
Quality guidelines	
Effectiveness	The platform must provide an "about" tab that detailed its aim
Efficiency	The platform must perform every interaction in less than 3 seconds
Satisfaction	The platform must be intuitive, user friendly and must provide a help feature that describes its different possible interactions
Functionality	The platform must at least provide in priority order: idea proposal system, voting system, feedback feature, commenting system, sharing system, reporting system, customizing notification system
Compatibility	The platform must be designed for web format and must be mobile responsive
Usability	The platform must provide a language selection setting and a counter hearing and visual impairments feature

HCI guidelines	
Design	<ul style="list-style-type: none"> • The platform must be intuitive, standard (header, body and footer) and heavily labelled • The platform must have a choice of design that inspires reliability • The platform must have a hierarchical design • The platform must permit the user to consult quickly every content displayed • The platform must display its summarized purpose at the home page
Usability	<ul style="list-style-type: none"> • The platform must display the explicit purpose of each feature • The platform must display each feature whose purpose is to ease its use the way they are visible at first use • The platform must provide different category tags that specify the content of projects and ideas • The platform must display basics settings (language, disconnect,..) in the header and terms of use and platform policy in the footer
Accessibility guidelines	
Accessibility	The platform must meet the AA level of WCAG2.0
Web 2.0 guidelines	
Personnalization	The platform must provide a personalizable account system
User added value	The platform must provide a report issue / design suggestion feature
Interaction orientation	The platform must provide a feature to contact its administration

6 Discussion

6.1 Contributions

In this master thesis, first, we presented a literature review treating about the quality, accessibility, Human-Computer Interaction, Web2.0 and citizen participation evaluation standards that the design of an e-participation platform should complete that lead to a theoretical heuristics list. In a second time, we presented an evaluation of the citizens preferences in term of communication, quality features and accessibility towards the use of e-participation platforms through a survey that emerged into a proposal design with citizen-centred guidelines. Finally, We presented an evaluation of existing platforms through think-aloud evaluation interviews that lead to a proposed design that aims at countering every generic issue encountered by the users. By crossing and refining those three sets of guidelines, we managed to provide a framework to design citizen-centred e-participation platforms. By providing this framework we aim at appropriate deeper the domain of e-participation and more precisely its application through ICT. The use of this framework aims at delivering an e-participation platform that avoids citizen generic usability issues and intends to propose a platform that inspires reliability and make it want to be reused by users.

6.2 Limitations

In this section, we discuss the limitations of this master thesis concerning the empirical studies and the final framework.

The citizen preference survey has been conducted only through social networks (Facebook, Whatsapp and Reddit (Belgium thread)) for a period of one month (10/07/20 to 03/08/20) with the Google Forms tool due to the COVID-19 pandemic resulting in lockdown in Belgium from March to May 2020 and social distancing restraints that strongly affect the way of gathering data. During this period, 137 sets of results were reported with a strong majority (73%) of French-speaking participants. Belgium is a multi-languages and multi-cultural country with 3 regions (Wallonia, Flanders and Brussels) with an almost 50/50 proportion between Flanders (Dutch-speaking citizens) and Wallonia and Brussels (French-speaking citizens). As each region have a different way to run their local government, it would have been better to survey more Dutch-speaking Belgian citizens, that may have resulted in more specific preferences. Due to a wrong structure of age referencing in the survey, the age distributions detailed in the results of the survey is slightly different than in the think-aloud method. Indeed the oldest age distribution in the survey is "over 55 years old" and in the think-aloud evaluations it is "over 50 years old". The fact that the survey was conducting through social media had a strong impact on the small amount of over 55 years old participants (12,4%). In a COVID-19 free world, this age distribution could be surveyed more easily through organized focus groups or quick interviews in the streets.

The youth4climate.be participation platform didn't conduct an active project during the period of the survey and the think-aloud evaluations. In result, interviewed people that took part in the think-aloud evaluations had to simulate that they were participating in an opened project. Because of this, a hypothesis can be made that the interaction design for the participation project may have changed since its closing. The problems

encountered by evaluation participants may therefore be distorted if this assumption is true but in any case, it allowed us to highlight issues that absolutely need to be avoided and was a significant addition to the framework proposed.

Finally, the framework proposed is based on a literature review and empirical studies and is not validated through the use of an e-participation platform designed following the framework. This validation can be a start for future researches.

6.3 Future works

This master thesis is a start for research that aims at implementing a functional e-participation platform by following the proposed framework and focusing on the technical aspect of e-participation platforms and introducing it to users to validate the framework. To validate the framework, think-aloud and focus group evaluations can be conducted to ensure that the guidelines provide the best ease of use possible and that they match citizens preferences concerning e-participation platform features. To fully validating the HCI guidelines framework, an over 50 years old age distribution should be tested as a matter of priority and in large numbers as it is the distribution that is the less familiar with the use of IT. This validation can lead to research focusing on the issues encountered by older people using the internet and how the design of websites should be adapted to ease their use.

7 Conclusion

In this master thesis, an e-participation literature review highlighted a gap concerning the proposal of a citizen-centred design framework for e-participation platform. By conducting a literature review concerning quality, accessibility, citizen participation, Human-Computer Interaction and Web2.0 evaluation standards, we dressed a list of theoretical heuristics to evaluate e-participation platforms. From the reporting of this literature review, we manage to create preferences questions and specific scenarios that aim to clarify this list through the conducting of two empirical studies. Those studies consisted on an online survey that aimed at gathering the preferences of citizens and the conducting of think-aloud evaluations of the two Belgian e-participation platforms, youth4climate.be and Fluicity - Etterbeek, that aimed at identifying generic issues encountered during their use. Thanks to these studies, we completed the theoretical heuristic list with two proposals of design respectively based on the citizens' preference concerning e-participation platform and the citizens' issues encountered. Finally, the three sets of guidelines, the theoretical heuristics list and the two design proposals were crossed and refined into one framework based on the heuristic list and clarified with the results of each empirical studies conducted through this master thesis.

8 References

References

- [1] Lana Bataineh Emad Abu-Shanab , (2016), "How perceptions of E-participation levels influence the intention to use E-government websites", *Transforming Government: People, Process and Policy*, Vol. 10 Iss 2 pp. 315 - 334
- [2] Exploring the importance of citizen participation and involvement in e-government projects: practice, incentives, and organization K Axelsson, U Melin, I Lindgren - *Transforming Government: People, Process and Policy*, 2010
- [3] Citizen participation and involvement in eGovernment projects: An emergent framework K Axelsson, U Melin - *International Conference on Electronic Government*, 2008
- [4] Tilson, D., Lyytinen, K., & Sørensen, C. (2010). Research commentary—Digital infrastructures: The missing IS research agenda. *Information systems research*, 21(4), 748-759.
- [5] Yoo, Y., Boland Jr, R. J., Lyytinen, K., & Majchrzak, A. (2012). Organizing for innovation in the digitized world. *Organization science*, 23(5), 1398-1408.
- [6] Fedotova, O., Teixeira, L., & Alvelos, H. (2012). E-participation in Portugal: evaluation of government electronic platforms. *Procedia Technology*, 5, 152-161.
- [7] Kim, S., & Lee, J. (2012). E-participation, transparency, and trust in local government. *Public Administration Review*, 72(6), 819-828.
- [8] Charalabidis, Y., & Loukis, E. (2012). Participative public policy making through multiple social media platforms utilization. *International Journal of Electronic Government Research (IJEGR)*, 8(3), 78-97.
- [9] Linders, D. (2012). From e-government to we-government: Defining a typology for citizen coproduction in the age of social media. *Government Information Quarterly*, 29(4), 446-454.
- [10] Meijer, A., & Bolívar, M. P. R. (2016). Governing the smart city: a review of the literature on smart urban governance. *international review of administrative sciences*, 82(2), 392-408.
- [11] Bonsón, E., Royo, S., & Ratkai, M. (2015). Citizens' engagement on local governments' Facebook sites. An empirical analysis: The impact of different media and content types in Western Europe. *Government Information Quarterly*, 32(1), 52-62.
- [12] Lee, J., & Lee, H. (2014). Developing and validating a citizen-centric typology for smart city services. *Government Information Quarterly*, 31, S93-S105.
- [13] Abu-Shanab, E. A. (2015). Reengineering the open government concept: An empirical support for a proposed model. *Government Information Quarterly*, 32(4), 453-463.

- [14] Al-Dalou, R., & Abu-Shanab, E. (2013, May). E-participation levels and technologies. In *The 6th International Conference on Information Technology (ICIT 2013)* (pp. 8-10).
- [15] Bershadskaya, L., Chugunov, A., & Trutnev, D. (2013, October). e-participation development: a comparative study of the Russian, USA and UK e-petition initiatives. In *Proceedings of the 7th International Conference on Theory and Practice of Electronic Governance* (pp. 73-76). ACM.
- [16] Bataineh, L., & Abu-Shanab, E. (2016). How perceptions of E-participation levels influence the intention to use E-government websites. *Transforming Government: People, Process and Policy*, 10(2), 315-334.
- [17] Wagner, S. A., Vogt, S., & Kabst, R. (2016). How IT and social change facilitates public participation: a stakeholder-oriented approach. *Government Information Quarterly*, 33(3), 435-443.
- [18] Manda, M. I., & Backhouse, J. (2016, September). Towards a “Smart Society” through a connected and smart citizenry in south africa: a review of the national broadband strategy and policy. In *International Conference on Electronic Government* (pp. 228-240). Springer, Cham.
- [19] Al-Jamal, M., & Abu-Shanab, E. (2016). The influence of open government on e-government website: the case of Jordan. *International Journal of Electronic Governance*, 8(2), 159-179.
- [20] Cavaye, A. “User Participation in System Development Revisited,” *Information and Management*, 28(5), 1995, pp. 311-323.
- [21] Nevalainen R. , "ISO/IEC 25000 (SQUARE): Measurement of Product Quality (software, system, service, data)", 18.10.2017
- [22] Dumas B. , [INFOB319] "Human Machine Interaction", UNamur, 2018
- [23] Nam T and Pardo TA (2011) Smart city as urban innovation: Focusing on management, policy, and context. In: *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance*. pp. 185–194.
- [24] Almarabeh, T. and AbuAli, A. (2010), “A general framework for e-government: definition maturity challenges, opportunities, and success”, *European Journal of Scientific Research*, Vol. 39 No. 1, pp. 29-42.
- [25] Silcock 2001, What is E-government
- [26] Serra, L. C., Carvalho, L. P., Ferreira, L. P., Vaz, J. B. S., & Freire, A. P. (2015). Accessibility evaluation of e-government mobile applications in Brazil. *Procedia Computer Science*, 67, 348-357.
- [27] Fedotova, O., Teixeira, L., & Alvelos, H. (2012). E-participation in Portugal: evaluation of government electronic platforms. *Procedia Technology*, 5, 152-161.
- [28] Liu, Y., Chen, X., & Wang, X. (2010). Evaluating Government Portal Websites in China. In *PACIS* (p. 88).

- [29] Nitzsche, P., Pistoia, A., & Elsässer, M. (2012). Development of an Evaluation Tool for Participative E-Government Services: A Case Study of Electronic Participatory Budgeting Projects in Germany. *Administration & Public Management Review*, 18.
- [30] Assar, S., & Boughzala, I. (2008). Empirical evaluation of public e-procurement platforms in France. *International Journal of Value Chain Management*, 2(1), 90-108.
- [31] Tambouris, E., & Gorilas, S. (2003, September). Evaluation of an e-democracy platform for European cities. In *International Conference on Electronic Government* (pp. 43-48). Springer, Berlin, Heidelberg.
- [32] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.
- [33] Keohane, R. O. and Nye, J. S. Introduction, In Nye, J. S. and Donahue, J.D. (editors), *Governance in a Globalization World*. Washington, D.C.: Brookings Institution Press. 2000.
- [34] Masters, Z., Macintosh, A. and Smith, E. (2004) *Young People and E-democracy: Creating a Culture of Participation*. Lecture Notes in Computer Science, 3183 pp15–22.
- [35] Wellman, B. A., Quan-Haase, A., Witte, J. and Hampton, K. (2001) Does the Internet Increase, Decrease, or Supplement Social Capital?: Social Networks, Participation, and Community Commitment. *American Behavioral Scientist*, 45:3 437–56.
- [36] <https://www.smartcity.press/smartest-cities-around-world/>
- [37] Medaglia, R. (2012). eParticipation research: Moving characterization forward (2006–2011). *Government Information Quarterly*, 29(3), 346-360.
- [38] Choi, J. W. (2006). Deliberative democracy, rational participation and e-voting in South Korea. *Asian Journal of Political Science*, 14(1), 64–81.
- [39] Ladner, A., & Pianzola, J. (2010). Do voting advice applications have an effect on electoral participation and voter turnout? Evidence from the 2007 Swiss Federal Elections. *Lecture Notes In Computer Science*, 6229, 211–224.
- [40] Suárez, D. F. (2009). Nonprofit advocacy and civic engagement on the internet. *Administration & Society*, 41(3), 267–289.
- [41] Lynch, T., and Gregor, S. “User participation in decision support systems development: Influencing system outcomes”, *European Journal of Information Systems*, 13, 2004, pp. 286-301.
- [42] Reddick, C. G. (2004). A two-stage model of e-government growth: Theories and empirical evidence for US cities. *Government information quarterly*, 21(1), 51-64.
- [43] Yildiz, M. (2007). E-government research: Reviewing the literature, limitations, and ways forward. *Government information quarterly*, 24(3), 646-665.
- [44] Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government information quarterly*, 18(2), 122-136.

- [45] Norris, D. F., & Reddick, C. G. (2013). Local e-government in the United States: Transformation or incremental change?. *Public Administration Review*, 73(1), 165-175.
- [46] Evans, D., & Yen, D. C. (2005). E-government: An analysis for implementation: Framework for understanding cultural and social impact. *Government Information Quarterly*, 22(3), 354-373.
- [47] Holden Stephen H., Donald F. Norris & Patricia D. Fletcher (2003) Electronic Government at the Local Level, *Public Performance & Management Review*, 26:4, 325-344
- [48] Kalampokis, E., Tambouris, E., & Tarabanis, K. (2008, June). A domain model for eParticipation. In 2008 Third International Conference on Internet and Web Applications and Services (pp. 25-30). IEEE.
- [49] Macintosh, A. (2004, January). Characterizing e-participation in policy-making. In 37th Annual Hawaii International Conference on System Sciences, 2004. Proceedings of the (pp. 10-pp). IEEE.
- [50] Panopoulou, E., Tambouris, E., & Tarabanis, K. (2010, August). eParticipation initiatives in Europe: learning from practitioners. In International conference on electronic participation (pp. 54-65). Springer, Berlin, Heidelberg.
- [51] Komninos, N., 2002, *Intelligent Cities: Innovation, knowledge systems and digital spaces*, London and New York, Spon Press
- [52] Komninos, N. (2006). The architecture of intelligent cities. *Intelligent Environments*, 6, 53-61.
- [53] Berntzen, L., & Johannessen, M. R. (2016). The role of citizen participation in municipal smart city projects: Lessons learned from Norway. In *Smarter as the new urban agenda* (pp. 299-314). Springer, Cham.
- [54] Portney, K. E., & Berry, J. M. (2010). Participation and the pursuit of sustainability in US cities. *Urban Affairs Review*, 46(1), 119-139.
- [55] Coe, A., Paquet, G., & Roy, J. (2001). E-governance and smart communities: a social learning challenge. *Social science computer review*, 19(1), 80-93.
- [56] Gore, A. (1993). *Reengineering through information technology: accompanying report of the National Performance Review*. Office of the Vice President.
- [57] Grönlund, Å., & Horan, T. A. (2005). Introducing e-gov: history, definitions, and issues. *Communications of the association for information systems*, 15(1), 39.
- [58] Kraemer, K. L., et al. (1978). *Local Government and Information Technology in the United States*. Paris: OECD Informatics Studies 12.
- [59] Simonofski, A., Snoeck, M., Vanderose, B., Cromptvoets, J., & Habra, N. (2017). Reexamining e-participation: Systematic literature review on citizen participation in e-government service delivery.

- [60] Axelsson, K., Melin, U., & Lindgren, I. (2010). Exploring the importance of citizen participation and involvement in e-government projects. *Transforming Government: People, Process and Policy*.
- [61] Savoldelli, A., Codagnone, C., & Misuraca, G. (2014). Understanding the e-government paradox: Learning from literature and practice on barriers to adoption. *Government Information Quarterly*, 31, S63-S71.
- [62] Antoniou, A., Korakas, C., Manolopoulos, C., Panagiotaki, A., Sofotassios, D., Spirakis, P., & Stamatiou, Y. C. (2007, September). A trust-centered approach for building e-voting systems. In *International Conference on Electronic Government* (pp. 366-377). Springer, Berlin, Heidelberg.
- [63] Kshetri, N., & Voas, J. (2018). Blockchain-enabled e-voting. *IEEE Software*, 35(4), 95-99.
- [64] Hanifatunnisa, R., & Rahardjo, B. (2017, October). Blockchain based e-voting recording system design. In *2017 11th International Conference on Telecommunication Systems Services and Applications (TSSA)* (pp. 1-6). IEEE.
- [65] Hjálmarsson, F. P., Hreiðarsson, G. K., Hamdaqa, M., & Hjalmtýsson, G. (2018, July). Blockchain-based e-voting system. In *2018 IEEE 11th International Conference on Cloud Computing (CLOUD)* (pp. 983-986). IEEE.
- [66] Ayed, A. B. (2017). A conceptual secure blockchain-based electronic voting system. *International Journal of Network Security & Its Applications*, 9(3), 01-09.
- [67] Kusters, R., Truderung, T., & Vogt, A. (2012, May). Clash attacks on the verifiability of e-voting systems. In *2012 IEEE Symposium on Security and Privacy* (pp. 395-409). IEEE.
- [68] Ahmad, S., Abdullah, S. A. J., Arshad, R. B. (2015). Issues and challenges of transition to e-voting technology in Nigeria. *Public Policy and Administration Research*, 5(4), 95-102.
- [69] Esteve, J. B., Goldsmith, B., Turner, J. (2012). *International Experience with E-Voting*. International Foundation for Electoral Systems.
- [70] Achieng, M., Ruhode, E. (2013). The adoption and challenges of electronic voting technologies within the South African context. *arXiv preprint arXiv:1312.2406*.
- [71] Alomari, M. K. (2016). E-voting adoption in a developing country. *Transforming Government: People, Process and Policy*.
- [72] Ceron, A., d'Adda, G. (2016). E-campaigning on Twitter: The effectiveness of distributive promises and negative campaign in the 2013 Italian election. *New media society*, 18(9), 1935-1955.
- [73] Ceron, A., d'Adda, G. (2016). E-campaigning on Twitter: The effectiveness of distributive promises and negative campaign in the 2013 Italian election. *New media society*, 18(9), 1935-1955.

- [74] Andersen, K. N., Medaglia, R. (2009, September). The use of Facebook in national election campaigns: politics as usual?. In *International Conference on Electronic Participation* (pp. 101-111). Springer, Berlin, Heidelberg.
- [75] Schweitzer, E. J. (2012). The mediatization of e-campaigning: Evidence from german party websites in state, national, and European parliamentary elections 2002–2009. *Journal of computer-mediated communication*, 17(3), 283-302.
- [76] Suárez, D. F. (2009). Nonprofit advocacy and civic engagement on the Internet. *Administration Society*, 41(3), 267-289.
- [77] Baban, E., Güzel, E. (2015). Digital Activism and Social Movements: How the World perceives the Gezi Movement. *Amity Journal of Media Communications Studies (AJMCS)*, 5. 16-26
- [78] <https://www.theguardian.com/environment/2019/feb/15/the-beginning-of-great-change-greta-thunberg-hails-school-climate-strikes>
- [79] Sæbø, Ø., Rose, J., Molka-Danielsen, J. (2010). eParticipation: Designing and managing political discussion forums. *Social Science Computer Review*, 28(4), 403-426.
- [80] Ferber, P., Foltz, F., Pugliese, R. (2007). Cyberdemocracy and online politics: A new model of interactivity. *Bulletin of Science Technology Society*, 27(5), 391–400.
- [81] Hilton, S. (2006, September). Developing local e-democracy in Bristol: From information to consultation to participation and beyond. In *Aslib proceedings: New information perspectives* (Vol. 58, No. 5, pp. 416-428). Emerald Group Publishing Limited.
- [82] Adams, N. J., Macintosh, A., Johnston, J. (2005). E-petitioning: Enabling ground-up participation. In *Challenges of expanding Internet: e-Commerce, e-business, and e-government* (pp. 265-279). Springer, Boston, MA.
- [83] Macintosh A., Malina A., Farrell S. (2002) Digital Democracy through Electronic Petitioning. In: McIver W.J., Elmagarmid A.K. (eds) *Advances in Digital Government. Advances in Database Systems*, vol 26. Springer, Boston, MA
- [84] Hagen, L., Kropczynski, J., Dumas, C., Lee, J., Vasquez, F. E., Rorissa, A. (2015). Emerging trends in the use and adoption of E-participation around the world. *Proceedings of the Association for Information Science and Technology*, 52(1), 1-4.
- [85] Macintosh, A. (2004, January). Characterizing e-participation in policy-making. In *37th Annual Hawaii International Conference on System Sciences*, 2004. Proceedings of the (pp. 10-pp). IEEE.
- [86] Cotton, R. D. (2011). Political participation and e-petitioning an analysis of the policy-making impact of the Scottish Parliament’s e-petition system.
- [87] Asher, M., Bandeira, C. L., Spaiser, V. (2017). Assessing the effectiveness of e-petitioning through Twitter conversations. In *Political Studies Association Annual Meeting 2017*.

- [88] Cruickshank, P., Smith, C. F. (2009). Self-efficacy as a factor in the evaluation of e-petitions. *Proceedings of EDEM*, 223-232.
- [89] Miller, L. (2009). e-Petitions at Westminster: The way forward for democracy? *Parliamentary Affairs*, 62(1), 162-177.
- [90] Phang, C. W., Kankanhalli, A. (2008). A framework of ICT exploitation for e-participation initiatives. *Communications of the ACM*, 51(12), 128-132.
- [91] Williams, S. N. (2010). A twenty-first century Citizens' POLIS: introducing a democratic experiment in electronic citizen participation in science and technology decision-making. *Public understanding of science*, 19(5), 528-544.
- [92] Comegys, C., Hannula, M., Väisänen, J. (2009). Effects of consumer trust and risk on online purchase decision-making: A comparison of Finnish and United States students. *International Journal of Management*, 26(2), 295.
- [93] Pantano, E., Rese, A., Baier, D. (2017). Enhancing the online decision-making process by using augmented reality: A two country comparison of youth markets. *Journal of Retailing and Consumer Services*, 38, 81-95.
- [94] Chang, M. L., Wu, W. Y. (2012). Revisiting perceived risk in the context of online shopping: An alternative perspective of decision-making styles. *Psychology Marketing*, 29(5), 378-400.
- [95] Smith, D., Menon, S., Sivakumar, K. (2005). Online peer and editorial recommendations, trust, and choice in virtual markets. *Journal of interactive marketing*, 19(3), 15-37.
- [96] Slivkins, A., Vaughan, J. W. (2014). Online decision making in crowdsourcing markets: Theoretical challenges. *ACM SIGecom Exchanges*, 12(2), 4-23.
- [97] Punj, G. (2012). Consumer decision making on the web: A theoretical analysis and research guidelines. *Psychology Marketing*, 29(10), 791-803.
- [98] Kushin, M. J., Yamamoto, M. (2013). Did social media really matter? College students' use of online media and political decision making in the 2008 election. In *New Media, Campaigning and the 2008 Facebook Election* (pp. 63-86). Routledge.
- [99] Sadovykh, V., Sundaram, D., Piramuthu, S. (2015). Do online social networks support decision-making?. *Decision support systems*, 70, 15-30.
- [100] Zappatore, M., Longo, A., Bochicchio, M. A. (2017). Crowd-sensing our smart cities: A platform for noise monitoring and acoustic urban planning.
- [101] Catania, V., Ventura, D. (2014, April). An approach for monitoring and smart planning of urban solid waste management using smart-M3 platform. In *Proceedings of 15th conference of open innovations association FRUCT* (pp. 24-31). IEEE.
- [102] Poorazizi, M. E., Steiniger, S., Hunter, A. J. (2015). A service-oriented architecture to enable participatory planning: an e-planning platform. *International Journal of Geographical Information Science*, 29(7), 1081-1110.

- [103] Boudoin, D., Morel, C., Gardat, M. (2014). Supply chains and urban logistics platforms. In *Sustainable urban logistics: Concepts, methods and information systems* (pp. 1-20). Springer, Berlin, Heidelberg.
- [104] Falco, E., Kleinhans, R. (2019). Digital participatory platforms for co-production in urban development: A systematic review. In *Crowdsourcing: Concepts, Methodologies, Tools, and Applications* (pp. 663-690). IGI Global.
- [105] Gordon, V., Osgood Jr, J. L., Boden, D. (2017). The role of citizen participation and the use of social media platforms in the participatory budgeting process. *International Journal of Public Administration*, 40(1), 65-76.
- [106] Nitzsche, P., Pistoia, A., Elsässer, M. (2012). Development of an Evaluation Tool for Participative E-Government Services: A Case Study of Electronic Participatory Budgeting Projects in Germany. *Administration Public Management Review*, 18.
- [107] Fain, B., Goel, A., Munagala, K. (2016, December). The core of the participatory budgeting problem. In *International Conference on Web and Internet Economics* (pp. 384-399). Springer, Berlin, Heidelberg.
- [108] Scherer, S., Wimmer, M. A. (2012, September). Reference process model for participatory budgeting in Germany. In *International Conference on Electronic Participation* (pp. 97-111). Springer, Berlin, Heidelberg.
- [109] Stephenson, M., Di Lorenzo, G., Mac Aonghusa, P. (2012, March). Open Innovation Portal: A collaborative platform for open city data sharing. In *2012 IEEE International Conference on Pervasive Computing and Communications Workshops* (pp. 522-524). IEEE.
- [110] Moreno-Jiménez, J. M., Aguarón, J., Cardeñosa, J., Escobar, M. T., Salazar, J. L., Toncovich, A., Turón, A. (2012). A collaborative platform for cognitive decision making in the Knowledge Society. *Computers in Human Behavior*, 28(5), 1921-1928.
- [111] Valilai, O. F., Houshmand, M. (2013). A collaborative and integrated platform to support distributed manufacturing system using a service-oriented approach based on cloud computing paradigm. *Robotics and computer-integrated manufacturing*, 29(1), 110-127.
- [112] Vrandečić, D. (2012, April). Wikidata: A new platform for collaborative data collection. In *Proceedings of the 21st international conference on world wide web* (pp. 1063-1064).
- [113] Dbouk, M., Mcheick, H., Sbeity, I. (2017). CityPro: city-surveillance collaborative platform. *International journal of Big Data Intelligence*, 4(3), 161-170.
- [114] Reid, L. G., Snow-Weaver, A. (2008, April). WCAG 2.0: a web accessibility standard for the evolving web. In *Proceedings of the 2008 international cross-disciplinary conference on Web accessibility (W4A)* (pp. 109-115).
- [115] Caldwell, B., Cooper, M., Reid, L. G., Vanderheiden, G. (2008). Web content accessibility guidelines (WCAG) 2.0. WWW Consortium (W3C).
- [116] <https://youthforclimate.be/>

- [117] <https://www.citizenlab.co/>
- [118] <https://www.flui.city/home>
- [119] <https://get.flui.city/>
- [120] Qadah, G. Z., Taha, R. (2007). Electronic voting systems: Requirements, design, and implementation. *Computer Standards Interfaces*, 29(3), 376–386.
- [121] Salazar, J. L., Piles, J. J., Ruíz, J., Moreno-Jiménez, J. M. (2008). E-cognocracy and its voting process. *Computer Standards Interfaces*, 30(3), 124–131.
- [122] Geldermann, J., Ludwig, J. (2007). Some thoughts on weighting in participatory decision making and e-democracy. *International Journal of Technology, Policy and Management*, 7(2), 178–189.
- [123] Ramilli, M., Prandini, M. (2010). An integrated application of security testing methodologies to e-voting systems. *Lecture Notes In Computer Science*, 6229, 225–236.
- [124] Antoniou, A., Korakas, C., Manolopoulos, C., Panagiotaki, A., Sofotassios, D., Spirakis, P., et al. (2007). A trust-centered approach for building e-voting systems. *Lecture Notes In Computer Science*, 4656, 366–377.
- [125] Conrad, F. G., Bederson, B. B., Lewis, B., Peytcheva, E., Traugott, M.W., Hammer, M. J., et al. (2009). Electronic voting eliminates hanging chads but introduces new usability challenges. *International Journal of Human Computer Studies*, 67(1), 111–124.
- [126] Prosser, A., Schiessl, K., Fleischhacker, M. (2007). E-voting: Usability and acceptance of two-stage voting procedures. *Lecture Notes In Computer Science*, 4656, 378–387.
- [127] Trechsel, A. H. (2007). Inclusiveness of old and new forms of citizens' electoral participation, representation. *Representation*, 43(2), 111–121.
- [128] Bannister, F., Connolly, R. (2007). A risk assessment framework for electronic voting. *International Journal of Technology, Policy and Management*, 7(2), 190–208.
- [129] Choi, J. W. (2006). Deliberative democracy, rational participation and e-voting in South Korea. *Asian Journal of Political Science*, 14(1), 64–81.
- [130] Ladner, A., Pianzola, J. (2010). Do voting advice applications have an effect on electoral participation and voter turnout? Evidence from the 2007 Swiss Federal Elections. *Lecture Notes In Computer Science*, 6229, 211–224.
- [131] <https://scholar.google.be/>
- [132] <https://www.scopus.com/>
- [133] <https://www.academia.edu/>
- [134] Robert G. Hollands (2008) Will the real smart city please stand up?, *City*, 12:3, 303-320, DOI: 10.1080/13604810802479126

- [135] https://www.lexico.com/en/definition/focus_group
- [136] Anggriane, S. M., Nasution, S. M., Azmi, F. (2016, October). Advanced e-voting system using Paillier homomorphic encryption algorithm. In 2016 International Conference on Informatics and Computing (ICIC) (pp. 338-342). IEEE.
- [137] Ayed, A. B. (2017). A conceptual secure blockchain-based electronic voting system. *International Journal of Network Security Its Applications*, 9(3), 01-09.
- [138] Wibowo, F. W. (2018). Implementation of strategic alignment framework for developing information technology of RFID in XYZ private university. *Advanced Science Letters*, 24(7), 5090-5093.
- [139] John, S. N., Ayo, C. K., Ndujuiba, C., Okereke, C. E. (2013). Design and Implementation of a Unified e-ID Card for Secure e-Voting System (MUSES). *International Journal of Computer and Information Technology*, 2(06), 1131-1135.
- [140] Alonso, L. P., Gasco, M., del Blanco, D. Y. M., Alonso, J. A. H., Barrat, J., Moreton, H. A. (2018). E-voting system evaluation based on the Council of Europe recommendations: Helios Voting. *IEEE Transactions on Emerging Topics in Computing*.
- [141] Ajiboye Adeleke, R., Adewole Kayode, S., Jimoh Rasheed, G., Oladipo Idowu, D. (2013). Modeling and Evaluation of E-Voting System for a Sustainable Credible Election. *International Journal of Applied Information Systems (IJAIS)*–ISSN, 2249-0868.
- [142] Mendez, F., Serdült, U. (2014). From initial idea to piecemeal implementation: Switzerland’s first decade of Internet voting reviewed. In *Design, Development, and Use of Secure Electronic Voting Systems* (pp. 115-127). IGI Global.
- [143] Vassil, K., Solvak, M., Vinkel, P., Trechsel, A. H., Alvarez, R. M. (2016). The diffusion of internet voting. Usage patterns of internet voting in Estonia between 2005 and 2015. *Government Information Quarterly*, 33(3), 453-459.
- [144] Abdulhamid, S. Í. M., Adebayo, O. S., Ugiomoh, D. O., AbdulMalik, M. D. (2013). The Design and Development of Real-Time E-Voting System in Nigeria with Emphasis on Security and Result Veracity. *International Journal of Computer Network Information Security*, 5(5).
- [145] Backes, M., Hammer, C., Pfaff, D., Skoruppa, M. (2016, April). Implementation-level analysis of the JavaScript helios voting client. In *Proceedings of the 31st Annual ACM Symposium on Applied Computing* (pp. 2071-2078).
- [146] Cortier, V., Galindo, D., Glondu, S., Izabachene, M. (2014, September). Election verifiability for helios under weaker trust assumptions. In *European Symposium on Research in Computer Security* (pp. 327-344). Springer, Cham.
- [147] Cortier, V., Smyth, B. (2013). Attacking and fixing Helios: An analysis of ballot secrecy. *Journal of Computer Security*, 21(1), 89-148.

- [148] Olorunnisola, A. A., Martin, B. L. (2013). Influences of media on social movements: Problematizing hyperbolic inferences about impacts. *Telematics and Informatics*, 30(3), 275-288.
- [149] Masullo Chen, G., Lu, S. (2017). Online political discourse: Exploring differences in effects of civil and uncivil disagreement in news website comments. *Journal of Broadcasting Electronic Media*, 61(1), 108-125.
- [150] Garimella, K., Weber, I., De Choudhury, M. (2016, May). Quote RTs on Twitter: usage of the new feature for political discourse. In *Proceedings of the 8th ACM Conference on Web Science* (pp. 200-204).
- [151] Al-Mohammad, S. M. (2017). The Impact of Social Websites over Jordanian Students' Intentions of Active political Participation: An Application of Theory of Planned Behavior. *International Review of Management and Marketing*, 7(3).
- [152] Baban, E., Güzel, E. (2015). Digital Activism and Social Movements: How the World perceives the Gezi Movement. *Amity Journal of Media Communications Studies (AJMCS)*, 5.
- [153] Gong, X. (2015). E-campaigning: An Empirical Study of the Utilisation of ICTs for Election Campaigning in the 2008 New Zealand General Election.
- [154] Ceron, A., d'Adda, G. (2016). E-campaigning on Twitter: The effectiveness of distributive promises and negative campaign in the 2013 Italian election. *New media society*, 18(9), 1935-1955.
- [155] Hermans, L., Vergeer, M. (2013). Personalization in e-campaigning: A cross-national comparison of personalization strategies used on candidate websites of 17 countries in EP elections 2009. *New media society*, 15(1), 72-92.
- [156] Røed, M., Wøien Hansen, V. (2018). Explaining Participation Bias in the European Commission's Online Consultations: The Struggle for Policy Gain without too Much Pain. *JCMS: Journal of Common Market Studies*, 56(6), 1446-1461.
- [157] Beyers, J., Arras, S. (2019). Who feeds information to regulators? Stakeholder diversity in European Union regulatory agency consultations. *Journal of Public Policy*, 1-26. doi:10.1017/S0143814X19000126
- [158] Fraussen, B., Albareda, A., Braun, C. (2020). Conceptualizing consultation approaches: identifying combinations of consultation tools and analyzing their implications for stakeholder diversity. *Policy Sciences*, 1-21.
- [159] Singh, G., Walsh, C. S., Alathur, S., Ilavarasan, P. V., Gupta, M. P. (2012). Citizen participation and effectiveness of e-petition: Sutharyakeralam-India. *Transforming Government: People, Process and Policy*.
- [160] Moss, G., Coleman, S. (2014). Deliberative manoeuvres in the digital darkness: e-democracy policy in the UK. *The British Journal of Politics and International Relations*, 16(3), 410-427.

- [161] Åström, J., Karlsson, M. (2016, September). Will e-participation bring critical citizens back in?. In *International Conference on Electronic Participation* (pp. 83-93). Springer, Cham.
- [162] Riehm, U., Böhle, K., Lindner, R. (2014). Electronic petitioning and modernization of petitioning systems in Europe. *Technology Assessment Studies Series–6*, TAB Office of Technology Assessment at the German Bundestag.
- [163] Hough, R. (2012). Do legislative petitions systems enhance the relationship between parliament and citizen?. *The Journal of Legislative Studies*, 18(3-4), 479-495.
- [164] Böhle, K., Riehm, U. (2013). E-petition systems and political participation: About institutional challenges and democratic opportunities. *First Monday*.
- [165] Singh, G., Walsh, C. S., Alathur, S., Ilavarasan, P. V., Gupta, M. P. (2012). Citizen participation and effectiveness of e-petition: Sutharyakeralam–India. *Transforming Government: People, Process and Policy*.
- [166] Balahadia, F. F., Fabito, B. S., Fernando, M. C. G. (2015, December). E-Participation: Incident mapping portal for local government units. In *2015 International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)* (pp. 1-6). IEEE.
- [167] Nascimento, D. M. (2016, October). Information flows in e-participation applications implications in government service-delivery in Brazil. In *2016 International Conference on Information Society (i-Society)* (pp. 51-52). IEEE.
- [168] Cegarra-Navarro, J. G., Pachón, J. R. C., Cegarra, J. L. M. (2012). E-government and citizen’s engagement with local affairs through e-websites: The case of Spanish municipalities. *International Journal of Information Management*, 32(5), 469-478.
- [169] Alharbi, A., Kang, K. (2014, June). E-participation service in Saudi Arabian e-government websites: The influencing factors from citizens’ perspective. In *European Conference on Digital Government* (p. 265). Academic Conferences International Limited.
- [170] Scherer, S., Wimmer, M. A. (2014, September). Conceptualising trust in E-participation contexts. In *International Conference on Electronic Participation* (pp. 64-77). Springer, Berlin, Heidelberg.
- [171] Kim, S., Lee, J. (2012). E-participation, transparency, and trust in local government. *Public Administration Review*, 72(6), 819-828.
- [172] Zolotov, M. N., Oliveira, T., Casteleyn, S. (2018). E-participation adoption models research in the last 17 years: A weight and meta-analytical review. *Computers in Human Behavior*, 81, 350-365.
- [173] Bianchini, D., Fogli, D., Ragazzi, D. (2016, June). TAB sharing: A gamified tool for e-participation. In *Proceedings of the International Working Conference on Advanced Visual Interfaces* (pp. 294-295).
- [174] Porwol, L., Ojo, A., Breslin, J. G. (2018). Social software infrastructure for e-participation. *Government Information Quarterly*, 35(4), S88-S98.

- [175] Khan, Z., Dambruch, J., Peters-Anders, J., Sackl, A., Strasser, A., Fröhlich, P., ... Soomro, K. (2017). Developing knowledge-based citizen participation platform to support Smart City decision making: The Smarticipate case study. *Information*, 8(2), 47.
- [176] Meijer, A., Potjer, S. (2018). Citizen-generated open data: An explorative analysis of 25 cases. *Government Information Quarterly*, 35(4), 613-621.
- [177] Lafrance, F., Daniel, S., Dragičević, S. (2019). Multidimensional web GIS approach for citizen participation on urban evolution. *ISPRS International Journal of Geo-Information*, 8(6), 253.
- [178] Wirtz, B. W., Daiser, P., Binkowska, B. (2018). E-participation: A strategic framework. *International Journal of Public Administration*, 41(1), 1-12.
- [179] Andrews, P., da Silva, F. S. C. (2013, October). Using parliamentary open data to improve participation. In *Proceedings of the 7th International Conference on Theory and Practice of Electronic Governance* (pp. 242-249).
- [180] Zheng, Y. (2016). The impact of E-participation on corruption: a cross-country analysis. *International Review of Public Administration*, 21(2), 91-103.
- [181] He, G., Boas, I., Mol, A. P., Lu, Y. (2017). E-participation for environmental sustainability in transitional urban China. *Sustainability Science*, 12(2), 187-202.
- [182] Wakasa, K., Konomi, S. I. (2015, September). Green weaver: participatory green mapping and networking for fostering sustainable communities. In *Adjunct Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2015 ACM International Symposium on Wearable Computers* (pp. 157-160).
- [183] Liu, L., Bouman, T., Perlaviciute, G., Steg, L. (2019). Effects of trust and public participation on acceptability of renewable energy projects in the Netherlands and China. *Energy Research Social Science*, 53, 137-144.
- [184] Anthopoulos, L.G., Siozos, P., and Tsoukalas, I.A. "Applying participatory design and collaboration in digital public services for discovering and re-designing e-Government services," *Government Information Quarterly*, 24, 2007, pp. 353-376.
- [185] Hartson, R., Pyla, P. S. (2018). *The UX book: Agile UX design for a quality user experience*. Morgan Kaufmann.
- [186] Nogier, J. F. (2008). *Ergonomie du logiciel et design web-4ème édition-Le manuel des interfaces utilisateur: Le manuel des interfaces utilisateur*. Dunod.
- [187] Cooper, A., Reimann, R., Cronin, D., Noessel, C. (2014). *About face: the essentials of interaction design*. John Wiley Sons.
- [188] Shneiderman, B. (1992). *Designing the user interface: strategies for effective human-computer interaction (Vol. 3)*. Reading, MA: Addison-Wesley.
- [189] Orgeron, C. P., Goodman, D. (2013). Evaluating citizen adoption and satisfaction of e-government. In *E-Government Services Design, Adoption, and Evaluation* (pp. 259-280). IGI Global.

9 Appendix

9.1 Framework from Dalou and Sanab

[14]

Appendix A: The proposed Framework

Stage	Technical Tools	Performance Indicators
E-informing	E-mail (mailing list), e-meetings, virtual communities/online community networks (social networks), e-participation chat rooms, mobile phones/devices (text messages), Webcasts, GIS-tools, RSS Feeds, Online newsletters, FAQs, web portals, weblogs (blogs), video conferencing, Alerts, Wikis, Podcasting.	<ul style="list-style-type: none"> - Number of e-mail alerts sent (according to e-mail list) - Messages sent to cellular phones and PDAs. - Number of visitors who access the published information by the government (visitors of e-government national website). - Number of news feeds and RSS to continuously update citizens with information from the media and blogs. - Number of search requests about published information through the search engine. - Number of access times to newsletters. - Number of subscriptions in the national feeds. - Number of e-meetings to be held - Information about employment opportunities
E-consulting	E-survey, feedback forms, e-mail, e-polls, , newsgroups, weblogs (blogs), mobile phones/ devices, virtual communities/online community networks, consultation platforms, text-to-speech technology (natural language processing), e-panels, Podcasting, Wikis, e-participation chat rooms, , video conferencing, e-referenda, instant messaging	<ul style="list-style-type: none"> - Does the site has a feedback feature on the national home page soliciting user input on the development of a future public issue? (Number of feedback messages on government policies). - The interaction of citizens in video conferencing and e-participation chat rooms. - Number of created e-mail accounts. - Number of responses to e-mails/mobile messages and online submissions. - The percentage of participators in the online polls. - Number of responses to surveys. - The ratio of participations in web forums for policy issues. - Number of comments on government's laws and policies. - Number of downloaded forms.
E-involving	E-mail, virtual e-meetings, chat-rooms, discussion forums/boards, online virtual communities (social networks), video conferencing, , mobile phones/ devices (text messages), consultation platforms, online citizen juries.	<ul style="list-style-type: none"> - Number of downloadable forms. - Providing e-signatures. - Number of bids which is done through the Internet. - Number of payments by cards. - Access to the government sites through its mobile versions. - Number of published results of citizens' opinions on the website. - Acknowledgement of received e-opinions explicitly. - Number of "send receipt" from government to citizens. - E-participation calendar available online. - Number of decisions under consideration - Number of decisions citizens interact in
E-collaborating	E-debates, Web virtual meetings (chat-rooms,	<ul style="list-style-type: none"> - E-decision making commitment publicized online - E-participation policy available online

	discussion forums/boards), decision-making games, virtual communities/online communities networks (social networks, data analysis tools.	<ul style="list-style-type: none"> - Government officials respond to citizen input - Number of uploaded videos and photos. - Government commitment to considering the results of e-participation in decision making.
E-empowering	E-petition, e-voting tools, e- bulletin boards, e-polls, virtual e-meetings, chat-rooms, discussion forums/boards, e-Panel, Virtual communities/online communities networks (social networks), Argument Visualization Tools. Natural Language Interfaces.	<ul style="list-style-type: none"> - Government provides confirmation receipt on citizen sent communication. - Government provide outcome on feedback received from citizens concerning the improvement of their services. - Number of voting in last local elections. - Number of entitled to vote in local elections - Score of involvement in community decision making process. - Score of influence in community decision making process - Archive for past discussion forums - Showing the results of polls online. - Showing the number of petition signatures.

9.2 WCAG guidelines

[\[contents\]](#)



Web Content Accessibility Guidelines (WCAG) 2.0

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Please refer to the [errata](#) for this document, which may include normative corrections.

See also [translations](#).

This document is also available in non-normative formats, available from [Alternate Versions of Web Content Accessibility Guidelines 2.0](#).

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Abstract

Web Content Accessibility Guidelines (WCAG) 2.0 covers a wide range of recommendations for making Web content more accessible. Following these guidelines will make content accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these. Following these guidelines will also often make your Web content more usable to users in general.

WCAG 2.0 success criteria are written as testable statements that are not technology-specific. Guidance about satisfying the success criteria in specific technologies, as well as general information about interpreting the success criteria, is provided in separate documents. See [Web Content Accessibility Guidelines \(WCAG\) Overview](#) for an introduction and links to WCAG technical and educational material.

WCAG 2.0 succeeds [Web Content Accessibility Guidelines 1.0 \[WCAG10\]](#), which was published as a

W3C Recommendation May 1999. Although it is possible to conform either to WCAG 1.0 or to WCAG 2.0 (or both), the W3C recommends that new and updated content use WCAG 2.0. The W3C also recommends that Web accessibility policies reference WCAG 2.0.

Status of this Document

This section describes the status of this document at the time of its publication. Other documents may supersede this document. A list of current W3C publications and the latest revision of this technical report can be found in the [W3C technical reports index](#) at <http://www.w3.org/TR/>.

This is the Web Content Accessibility Guidelines (WCAG) 2.0 [W3C Recommendation](#) from the [Web Content Accessibility Guidelines Working Group](#).

This document has been reviewed by W3C Members, by software developers, and by other W3C groups and interested parties, and is endorsed by the Director as a W3C Recommendation. It is a stable document and may be used as reference material or cited from another document. W3C's role in making the Recommendation is to draw attention to the specification and to promote its widespread deployment. This enhances the functionality and interoperability of the Web.

WCAG 2.0 is supported by the associated non-normative documents, [Understanding WCAG 2.0](#) and [Techniques for WCAG 2.0](#). Although those documents do not have the formal status that WCAG 2.0 itself has, they provide information important to understanding and implementing WCAG.

The Working Group requests that any comments be made using the provided [online comment form](#). If this is not possible, comments can also be sent to public-comments-wcag20@w3.org. The [archives for the public comments list](#) are publicly available. Comments received on the WCAG 2.0 Recommendation cannot result in changes to this version of the guidelines, but may be addressed in errata or future versions of WCAG. The Working Group does not plan to make formal responses to comments. Archives of the [WCAG WG mailing list discussions](#) are publicly available, and future work undertaken by the Working Group may address comments received on this document.

This document has been produced as part of the W3C [Web Accessibility Initiative](#) (WAI). The goals of the WCAG Working Group are discussed in the [WCAG Working Group charter](#). The WCAG Working Group is part of the [WAI Technical Activity](#).

This document was produced by a group operating under the [5 February 2004 W3C Patent Policy](#). W3C maintains a [public list of any patent disclosures](#) made in connection with the deliverables of the group; that page also includes instructions for disclosing a patent. An individual who has actual knowledge of a patent which the individual believes contains [Essential Claim\(s\)](#) must disclose the information in accordance with [section 6 of the W3C Patent Policy](#).

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Introduction

This section is informative.

Web Content Accessibility Guidelines (WCAG) 2.0 defines how to make Web content more accessible to people with disabilities. Accessibility involves a wide range of disabilities, including visual, auditory, physical, speech, cognitive, language, learning, and neurological disabilities. Although these guidelines cover a wide range of issues, they are not able to address the needs of people with all types, degrees, and combinations of disability. These guidelines also make Web content more usable by older individuals with changing abilities due to aging and often improve usability for users in general.

WCAG 2.0 is developed through the [W3C process](#) in cooperation with individuals and organizations around the world, with a goal of providing a shared standard for Web content accessibility that meets the needs of individuals, organizations, and governments internationally. WCAG 2.0 builds on WCAG 1.0 [\[WCAG 10\]](#) and is designed to apply broadly to different Web technologies now and in the future, and to be testable with a combination of automated testing and human evaluation. For an introduction to WCAG, see the [Web Content Accessibility Guidelines \(WCAG\) Overview](#).

Web accessibility depends not only on accessible content but also on accessible Web browsers and other user agents. Authoring tools also have an important role in Web accessibility. For an overview of how these components of Web development and interaction work together, see:

- [Essential Components of Web Accessibility](#)
- [User Agent Accessibility Guidelines \(UAAG\) Overview](#)
- [Authoring Tool Accessibility Guidelines \(ATAG\) Overview](#)

WCAG 2.0 Layers of Guidance

The individuals and organizations that use WCAG vary widely and include Web designers and developers, policy makers, purchasing agents, teachers, and students. In order to meet the varying needs of this audience, several layers of guidance are provided including overall *principles*, general *guidelines*, testable *success criteria* and a rich collection of *sufficient techniques*, *advisory techniques*, and *documented common failures* with examples, resource links and code.

- **Principles** - At the top are four principles that provide the foundation for Web accessibility: *perceivable*, *operable*, *understandable*, and *robust*. See also [Understanding the Four Principles of Accessibility](#).
- **Guidelines** - Under the principles are guidelines. The 12 guidelines provide the basic goals that authors should work toward in order to make content more accessible to users with different disabilities. The guidelines are not testable, but provide the framework and overall objectives to help authors understand the success criteria and better implement the techniques.
- **Success Criteria** - For each guideline, testable success criteria are provided to allow WCAG 2.0 to be used where requirements and conformance testing are necessary such as in design specification, purchasing, regulation, and contractual agreements. In order to meet the needs of different groups and different situations, three levels of conformance are defined: A (lowest), AA, and AAA (highest). Additional information on WCAG levels can be found in [Understanding Levels of Conformance](#).
- **Sufficient and Advisory Techniques** - For each of the *guidelines* and *success criteria* in the WCAG 2.0 document itself, the working group has also documented a wide variety of *techniques*. The techniques are informative and fall into two categories: those that are *sufficient* for meeting the success criteria and those that are *advisory*. The advisory techniques go beyond what is required by the individual success criteria and allow authors to better address the guidelines. Some advisory techniques address accessibility barriers that are not covered by the testable success criteria. Where common failures are known, these are also documented. See also [Sufficient and Advisory Techniques in Understanding WCAG 2.0](#).

All of these layers of guidance (principles, guidelines, success criteria, and sufficient and advisory techniques) work together to provide guidance on how to make content more accessible. Authors are encouraged to view and apply all layers that they are able to, including the advisory techniques, in order to best address the needs of the widest possible range of users.

Note that even content that conforms at the highest level (AAA) will not be accessible to individuals with all types, degrees, or combinations of disability, particularly in the cognitive language and learning areas. Authors are encouraged to consider the full range of techniques, including the advisory techniques, as well as to seek relevant advice about current best practice to ensure that Web content is accessible, as far as possible, to this community. [Metadata](#) may assist users in finding content most suitable for their needs.

WCAG 2.0 Supporting Documents

The WCAG 2.0 document is designed to meet the needs of those who need a stable, referenceable technical standard. Other documents, called supporting documents, are based on the WCAG 2.0 document and address other important purposes, including the ability to be updated to describe how WCAG would be applied with new technologies. Supporting documents include:

1. [How to Meet WCAG 2.0](#) - A customizable quick reference to WCAG 2.0 that includes all of the guidelines, success criteria, and techniques for authors to use as they are developing and evaluating Web content.
2. [Understanding WCAG 2.0](#) - A guide to understanding and implementing WCAG 2.0. There is a short "Understanding" document for each guideline and success criterion in WCAG 2.0 as well as

key topics.

3. [Techniques for WCAG 2.0](#) - A collection of techniques and common failures, each in a separate document that includes a description, examples, code and tests.
4. [The WCAG 2.0 Documents](#) - A diagram and description of how the technical documents are related and linked.

See [Web Content Accessibility Guidelines \(WCAG\) Overview](#) for a description of the WCAG 2.0 supporting material, including education resources related to WCAG 2.0. Additional resources covering topics such as the business case for Web accessibility, planning implementation to improve the accessibility of Web sites, and accessibility policies are listed in [WAI Resources](#).

Important Terms in WCAG 2.0

WCAG 2.0 includes three important terms that are different from WCAG 1.0. Each of these is introduced briefly below and defined more fully in the glossary.

Web Page

It is important to note that, in this standard, the term "[Web page](#)" includes much more than static HTML pages. It also includes the increasingly dynamic Web pages that are emerging on the Web, including "pages" that can present entire virtual interactive communities. For example, the term "Web page" includes an immersive, interactive movie-like experience found at a single URI. For more information, see [Understanding "Web Page"](#).

Programmatically Determined

Several success criteria require that content (or certain aspects of content) can be "[programmatically determined](#)." This means that the content is delivered in such a way that [user agents, including assistive technologies](#), can extract and present this information to users in different modalities. For more information, see [Understanding Programmatically Determined](#).

Accessibility Supported

Using a technology in a way that is accessibility supported means that it works with assistive technologies (AT) and the accessibility features of operating systems, browsers, and other user agents. Technology features can only be [relied upon to conform to WCAG 2.0 success criteria](#) if they are used in a way that is "[accessibility supported](#)". Technology features can be used in ways that are not accessibility supported (do not work with assistive technologies, etc.) as long as they are not relied upon to conform to any success criterion (i.e., the same information or functionality is also available another way that is supported).

The definition of "accessibility supported" is provided in the [Appendix A: Glossary](#) section of these guidelines. For more information, see [Understanding Accessibility Support](#).

WCAG 2.0 Guidelines

This section is [normative](#).

Principle 1: Perceivable - Information and user interface components must be presentable to users in ways they can perceive.

Guideline 1.1 Text Alternatives: Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols or simpler language.

[Understanding Guideline 1.1](#)

1.1.1 Non-text Content: All non-text content that is presented to the user has a text alternative that serves the equivalent purpose, except for the situations listed below. (Level A)

[How to Meet 1.1.1](#)
[Understanding 1.1.1](#)

- **Controls, Input:** If non-text content is a control or accepts user input, then it has a name that describes its purpose. (Refer to [Guideline 4.1](#) for additional requirements for controls and content that accepts user input.)
- **Time-Based Media:** If non-text content is time-based media, then text alternatives at least provide descriptive identification of the non-text content. (Refer to [Guideline 1.2](#) for additional requirements for media.)
- **Test:** If non-text content is a test or exercise that would be invalid if presented in text, then text alternatives at least provide descriptive identification of the non-text content.
- **Sensory:** If non-text content is primarily intended to create a specific sensory experience, then text alternatives at least provide descriptive identification of the non-text content.
- **CAPTCHA:** If the purpose of non-text content is to confirm that content is being accessed by a person rather than a computer, then text alternatives that identify and describe the purpose of the non-text content are provided, and alternative forms of CAPTCHA using output modes for different types of sensory perception are provided to accommodate different disabilities.
- **Decoration, Formatting, Invisible:** If non-text content is pure decoration, is used only for visual formatting, or is not presented to users, then it is implemented in a way that it can be ignored by assistive technology.

Guideline 1.2 Time-based Media: Provide alternatives for time-based media. [Understanding Guideline 1.2](#)

1.2.1 Audio-only and Video-only (Prerecorded): For prerecorded audio-only and prerecorded video-only media, the following are true, except when the audio or video is a media alternative for text and is clearly labeled as such: (Level A)

[How to Meet 1.2.1](#)
[Understanding 1.2.1](#)

- **Prerecorded Audio-only:** An alternative for time-based media is provided that presents equivalent information for prerecorded audio-only content.
- **Prerecorded Video-only:** Either an alternative for time-based media or an audio track is provided that presents equivalent information for prerecorded video-only content.

1.2.2 Captions (Prerecorded): Captions are provided for all prerecorded audio content in synchronized media, except when the media is a media alternative for text and is clearly labeled as such. (Level A)

[How to Meet 1.2.2](#)
[Understanding 1.2.2](#)

1.2.3 Audio Description or Media Alternative (Prerecorded): An alternative for time-based media or audio description of the prerecorded

[How to Meet 1.2.3](#)
[Understanding 1.2.3](#)

video content is provided for synchronized media, except when the media is a media alternative for text and is clearly labeled as such. (Level A)

1.2.4 Captions (Live): Captions are provided for all live audio content in synchronized media. (Level AA)

[How to Meet 1.2.4](#)
[Understanding 1.2.4](#)

1.2.5 Audio Description (Prerecorded): Audio description is provided for all prerecorded video content in synchronized media. (Level AA)

[How to Meet 1.2.5](#)
[Understanding 1.2.5](#)

1.2.6 Sign Language (Prerecorded): Sign language interpretation is provided for all prerecorded audio content in synchronized media. (Level AAA)

[How to Meet 1.2.6](#)
[Understanding 1.2.6](#)

1.2.7 Extended Audio Description (Prerecorded): Where pauses in foreground audio are insufficient to allow audio descriptions to convey the sense of the video, extended audio description is provided for all prerecorded video content in synchronized media. (Level AAA)

[How to Meet 1.2.7](#)
[Understanding 1.2.7](#)

1.2.8 Media Alternative (Prerecorded): An alternative for time-based media is provided for all prerecorded synchronized media and for all prerecorded video-only media. (Level AAA)

[How to Meet 1.2.8](#)
[Understanding 1.2.8](#)

1.2.9 Audio-only (Live): An alternative for time-based media that presents equivalent information for live audio-only content is provided. (Level AAA)

[How to Meet 1.2.9](#)
[Understanding 1.2.9](#)

<p>Guideline 1.3 Adaptable: Create content that can be presented in different ways (for example simpler layout) without losing information or structure.</p>	<p>Understanding Guideline 1.3</p>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------

1.3.1 Info and Relationships: Information, structure, and relationships conveyed through presentation can be programmatically determined or are available in text. (Level A)

[How to Meet 1.3.1](#)
[Understanding 1.3.1](#)

1.3.2 Meaningful Sequence: When the sequence in which content is presented affects its meaning, a correct reading sequence can be programmatically determined. (Level A)

[How to Meet 1.3.2](#)
[Understanding 1.3.2](#)

1.3.3 Sensory Characteristics: Instructions provided for understanding and operating content do not rely solely on sensory characteristics of components such as shape, size, visual location, orientation, or sound. (Level A)

[How to Meet 1.3.3](#)
[Understanding 1.3.3](#)

Note: For requirements related to color, refer to [Guideline 1.4](#).

Guideline 1.4 Distinguishable: Make it easier for users to see and hear content including separating foreground from background.

[Understanding Guideline 1.4](#)

1.4.1 Use of Color: Color is not used as the only visual means of conveying information, indicating an action, prompting a response, or distinguishing a visual element. (Level A)

[How to Meet 1.4.1](#)
[Understanding 1.4.1](#)

Note: This success criterion addresses color perception specifically. Other forms of perception are covered in [Guideline 1.3](#) including programmatic access to color and other visual presentation coding.

1.4.2 Audio Control: If any audio on a Web page plays automatically for more than 3 seconds, either a mechanism is available to pause or stop the audio, or a mechanism is available to control audio volume independently from the overall system volume level. (Level A)

[How to Meet 1.4.2](#)
[Understanding 1.4.2](#)

Note: Since any content that does not meet this success criterion can interfere with a user's ability to use the whole page, all content on the Web page (whether or not it is used to meet other success criteria) must meet this success criterion. See [Conformance Requirement 5: Non-Interference](#).

1.4.3 Contrast (Minimum): The visual presentation of text and images of text has a contrast ratio of at least 4.5:1, except for the following: (Level AA)

[How to Meet 1.4.3](#)
[Understanding 1.4.3](#)

- **Large Text:** Large-scale text and images of large-scale text have a contrast ratio of at least 3:1;
- **Incidental:** Text or images of text that are part of an inactive user interface component, that are pure decoration, that are not visible to anyone, or that are part of a picture that contains significant other visual content, have no contrast requirement.
- **Logotypes:** Text that is part of a logo or brand name has no minimum contrast requirement.

1.4.4 Resize text: Except for captions and images of text, text can be resized without assistive technology up to 200 percent without loss of content or functionality. (Level AA)

[How to Meet 1.4.4](#)
[Understanding 1.4.4](#)

1.4.5 Images of Text: If the technologies being used can achieve the visual presentation, text is used to convey information rather than images of text except for the following: (Level AA)

[How to Meet 1.4.5](#)
[Understanding 1.4.5](#)

- **Customizable:** The image of text can be visually customized to the user's requirements;
- **Essential:** A particular presentation of text is essential to the information being conveyed.

Note: Logotypes (text that is part of a logo or brand name) are considered essential.

1.4.6 Contrast (Enhanced): The visual presentation of text and images of text has a contrast ratio of at least 7:1, except for the following: (Level AAA)

[How to Meet 1.4.6](#)
[Understanding 1.4.6](#)

- **Large Text:** Large-scale text and images of large-scale text have a contrast ratio of at least 4.5:1;
- **Incidental:** Text or images of text that are part of an inactive user interface component, that are pure decoration, that are not visible to anyone, or that are part of a picture that contains significant other visual content, have no contrast requirement.
- **Logotypes:** Text that is part of a logo or brand name has no minimum contrast requirement.

1.4.7 Low or No Background Audio: For prerecorded audio-only content that (1) contains primarily speech in the foreground, (2) is not an audio CAPTCHA or audio logo, and (3) is not vocalization intended to be primarily musical expression such as singing or rapping, at least one of the following is true: (Level AAA)

[How to Meet 1.4.7](#)
[Understanding 1.4.7](#)

- **No Background:** The audio does not contain background sounds.
- **Turn Off:** The background sounds can be turned off.
- **20 dB:** The background sounds are at least 20 decibels lower than the foreground speech content, with the exception of occasional sounds that last for only one or two seconds.
Note: Per the definition of "decibel," background sound that meets this requirement will be approximately four times quieter than the foreground speech content.

1.4.8 Visual Presentation: For the visual presentation of blocks of text, a mechanism is available to achieve the following: (Level AAA)

[How to Meet 1.4.8](#)
[Understanding 1.4.8](#)

1. Foreground and background colors can be selected by the user.
2. Width is no more than 80 characters or glyphs (40 if CJK).
3. Text is not justified (aligned to both the left and the right margins).
4. Line spacing (leading) is at least space-and-a-half within paragraphs, and paragraph spacing is at least 1.5 times larger than the line spacing.
5. Text can be resized without assistive technology up to 200 percent in a way that does not require the user to scroll horizontally to read a line of text on a full-screen window.

1.4.9 Images of Text (No Exception): Images of text are only used for pure decoration or where a particular presentation of text is essential to the information being conveyed. (Level AAA)

[How to Meet 1.4.9](#)
[Understanding 1.4.9](#)

Note: Logotypes (text that is part of a logo or brand name) are considered essential.

Principle 2: Operable - User interface components and navigation must be operable.

Guideline 2.1 Keyboard Accessible: Make all

[Understanding Guideline 2.1](#)

functionality available from a keyboard.

2.1.1 Keyboard: All functionality of the content is operable through a keyboard interface without requiring specific timings for individual keystrokes, except where the underlying function requires input that depends on the path of the user's movement and not just the endpoints. (Level A)

[How to Meet 2.1.1](#)
[Understanding 2.1.1](#)

Note 1: This exception relates to the underlying function, not the input technique. For example, if using handwriting to enter text, the input technique (handwriting) requires path-dependent input but the underlying function (text input) does not.

Note 2: This does not forbid and should not discourage providing mouse input or other input methods in addition to keyboard operation.

2.1.2 No Keyboard Trap: If keyboard focus can be moved to a component of the page using a keyboard interface, then focus can be moved away from that component using only a keyboard interface, and, if it requires more than unmodified arrow or tab keys or other standard exit methods, the user is advised of the method for moving focus away. (Level A)

[How to Meet 2.1.2](#)
[Understanding 2.1.2](#)

Note: Since any content that does not meet this success criterion can interfere with a user's ability to use the whole page, all content on the Web page (whether it is used to meet other success criteria or not) must meet this success criterion. See [Conformance Requirement 5: Non-Interference](#).

2.1.3 Keyboard (No Exception): All functionality of the content is operable through a keyboard interface without requiring specific timings for individual keystrokes. (Level AAA)

[How to Meet 2.1.3](#)
[Understanding 2.1.3](#)

Guideline 2.2 Enough Time: Provide users enough time to read and use content.

[Understanding Guideline 2.2](#)

2.2.1 Timing Adjustable: For each time limit that is set by the content, at least one of the following is true: (Level A)

[How to Meet 2.2.1](#)
[Understanding 2.2.1](#)

- **Turn off:** The user is allowed to turn off the time limit before encountering it; or
- **Adjust:** The user is allowed to adjust the time limit before encountering it over a wide range that is at least ten times the length of the default setting; or
- **Extend:** The user is warned before time expires and given at least 20 seconds to extend the time limit with a simple action (for example, "press the space bar"), and the user is allowed to extend the time limit at least ten times; or
- **Real-time Exception:** The time limit is a required part of a real-time event (for example, an auction), and no alternative to the time limit is possible; or

- **Essential Exception:** The time limit is essential and extending it would invalidate the activity; or
- **20 Hour Exception:** The time limit is longer than 20 hours.

Note: This success criterion helps ensure that users can complete tasks without unexpected changes in content or context that are a result of a time limit. This success criterion should be considered in conjunction with [Success Criterion 3.2.1](#), which puts limits on changes of content or context as a result of user action.

2.2.2 Pause, Stop, Hide: For moving, blinking, scrolling, or auto-updating information, all of the following are true: (Level A)

[How to Meet 2.2.2](#)
[Understanding 2.2.2](#)

- **Moving, blinking, scrolling:** For any moving, blinking or scrolling information that (1) starts automatically, (2) lasts more than five seconds, and (3) is presented in parallel with other content, there is a mechanism for the user to pause, stop, or hide it unless the movement, blinking, or scrolling is part of an activity where it is essential; and
- **Auto-updating:** For any auto-updating information that (1) starts automatically and (2) is presented in parallel with other content, there is a mechanism for the user to pause, stop, or hide it or to control the frequency of the update unless the auto-updating is part of an activity where it is essential.

Note 1: For requirements related to flickering or flashing content, refer to [Guideline 2.3](#).

Note 2: Since any content that does not meet this success criterion can interfere with a user's ability to use the whole page, all content on the Web page (whether it is used to meet other success criteria or not) must meet this success criterion. See [Conformance Requirement 5: Non-Interference](#).

Note 3: Content that is updated periodically by software or that is streamed to the user agent is not required to preserve or present information that is generated or received between the initiation of the pause and resuming presentation, as this may not be technically possible, and in many situations could be misleading to do so.

Note 4: An animation that occurs as part of a preload phase or similar situation can be considered essential if interaction cannot occur during that phase for all users and if not indicating progress could confuse users or cause them to think that content was frozen or broken.

2.2.3 No Timing: Timing is not an essential part of the event or activity presented by the content, except for non-interactive synchronized media and real-time events. (Level AAA)

[How to Meet 2.2.3](#)
[Understanding 2.2.3](#)

2.2.4 Interruptions: Interruptions can be postponed or suppressed by the user, except interruptions involving an emergency. (Level AAA)

[How to Meet 2.2.4](#)
[Understanding 2.2.4](#)

2.2.5 Re-authenticating: When an authenticated session expires, the user can continue the activity without loss of data after re-authenticating. (Level AAA)

[How to Meet 2.2.5](#)
[Understanding 2.2.5](#)

Guideline 2.3 Seizures: Do not design content in a way that is known to cause seizures.

[Understanding Guideline 2.3](#)

2.3.1 Three Flashes or Below Threshold: Web pages do not contain anything that flashes more than three times in any one second period, or the flash is below the general flash and red flash thresholds. (Level A)

[How to Meet 2.3.1](#)
[Understanding 2.3.1](#)

Note: Since any content that does not meet this success criterion can interfere with a user's ability to use the whole page, all content on the Web page (whether it is used to meet other success criteria or not) must meet this success criterion. See [Conformance Requirement 5: Non-Interference](#).

2.3.2 Three Flashes: Web pages do not contain anything that flashes more than three times in any one second period. (Level AAA)

[How to Meet 2.3.2](#)
[Understanding 2.3.2](#)

Guideline 2.4 Navigable: Provide ways to help users navigate, find content, and determine where they are.

[Understanding Guideline 2.4](#)

2.4.1 Bypass Blocks: A mechanism is available to bypass blocks of content that are repeated on multiple Web pages. (Level A) [How to Meet 2.4.1](#)
[Understanding 2.4.1](#)

2.4.2 Page Titled: Web pages have titles that describe topic or purpose. (Level A) [How to Meet 2.4.2](#)
[Understanding 2.4.2](#)

2.4.3 Focus Order: If a Web page can be navigated sequentially and the navigation sequences affect meaning or operation, focusable components receive focus in an order that preserves meaning and operability. (Level A) [How to Meet 2.4.3](#)
[Understanding 2.4.3](#)

2.4.4 Link Purpose (In Context): The purpose of each link can be determined from the link text alone or from the link text together with its programmatically determined link context, except where the purpose of the link would be ambiguous to users in general. (Level A) [How to Meet 2.4.4](#)
[Understanding 2.4.4](#)

2.4.5 Multiple Ways: More than one way is available to locate a Web page within a set of Web pages except where the Web Page is the result of, or a step in, a process. (Level AA) [How to Meet 2.4.5](#)
[Understanding 2.4.5](#)

2.4.6 Headings and Labels: Headings and labels describe topic or purpose. (Level AA) [How to Meet 2.4.6](#)
[Understanding 2.4.6](#)

2.4.7 Focus Visible: Any keyboard operable user interface has a mode of operation where the keyboard focus indicator is visible. (Level AA) [How to Meet 2.4.7](#)
[Understanding 2.4.7](#)

2.4.8 Location: Information about the user's location within a set of Web pages is available. (Level AAA) [How to Meet 2.4.8](#)
[Understanding 2.4.8](#)

2.4.9 Link Purpose (Link Only): A mechanism is available to allow the purpose of each link to be identified from link text alone, except where the purpose of the link would be ambiguous to users in general. (Level AAA) [How to Meet 2.4.9](#)
[Understanding 2.4.9](#)

2.4.10 Section Headings: Section headings are used to organize the content. (Level AAA) [How to Meet 2.4.10](#)
[Understanding 2.4.10](#)

Note 1: "Heading" is used in its general sense and includes titles and other ways to add a heading to different types of content.

Note 2: This success criterion covers sections within writing, not user interface components. User Interface components are covered under [Success Criterion 4.1.2](#).

Principle 3: Understandable - Information and the operation of user interface must be understandable.

Guideline 3.1 Readable: Make text content readable and understandable. [Understanding Guideline 3.1](#)

3.1.1 Language of Page: The default human language of each Web page can be programmatically determined. (Level A)

[How to Meet 3.1.1](#)
[Understanding 3.1.1](#)

3.1.2 Language of Parts: The human language of each passage or phrase in the content can be programmatically determined except for proper names, technical terms, words of indeterminate language, and words or phrases that have become part of the vernacular of the immediately surrounding text. (Level AA)

[How to Meet 3.1.2](#)
[Understanding 3.1.2](#)

3.1.3 Unusual Words: A mechanism is available for identifying specific definitions of words or phrases used in an unusual or restricted way, including idioms and jargon. (Level AAA)

[How to Meet 3.1.3](#)
[Understanding 3.1.3](#)

3.1.4 Abbreviations: A mechanism for identifying the expanded form or meaning of abbreviations is available. (Level AAA)

[How to Meet 3.1.4](#)
[Understanding 3.1.4](#)

3.1.5 Reading Level: When text requires reading ability more advanced than the lower secondary education level after removal of proper names and titles, supplemental content, or a version that does not require reading ability more advanced than the lower secondary education level, is available. (Level AAA)

[How to Meet 3.1.5](#)
[Understanding 3.1.5](#)

3.1.6 Pronunciation: A mechanism is available for identifying specific pronunciation of words where meaning of the words, in context, is ambiguous without knowing the pronunciation. (Level AAA)

[How to Meet 3.1.6](#)
[Understanding 3.1.6](#)

Guideline 3.2 Predictable: Make Web pages appear and operate in predictable ways. [Understanding Guideline 3.2](#)

3.2.1 On Focus: When any component receives focus, it does not initiate a change of context. (Level A)

[How to Meet 3.2.1](#)
[Understanding 3.2.1](#)

3.2.2 On Input: Changing the setting of any user interface component does not automatically cause a change of context unless the user has been advised of the behavior before using the component. (Level A)

[How to Meet 3.2.2](#)
[Understanding 3.2.2](#)

3.2.3 Consistent Navigation: Navigational mechanisms that are repeated on multiple Web pages within a set of Web pages occur in the same relative order each time they are repeated, unless a change is initiated by the user.

[How to Meet 3.2.3](#)
[Understanding 3.2.3](#)

(Level AA)

3.2.4 Consistent Identification: Components that have the same functionality within a set of Web pages are identified consistently. (Level AA)

[How to Meet 3.2.4](#)
[Understanding 3.2.4](#)

3.2.5 Change on Request: Changes of context are initiated only by user request or a mechanism is available to turn off such changes. (Level AAA)

[How to Meet 3.2.5](#)
[Understanding 3.2.5](#)

Guideline 3.3 Input Assistance: Help users avoid and correct mistakes. [Understanding Guideline 3.3](#)

3.3.1 Error Identification: If an input error is automatically detected, the item that is in error is identified and the error is described to the user in text. (Level A)

[How to Meet 3.3.1](#)
[Understanding 3.3.1](#)

3.3.2 Labels or Instructions: Labels or instructions are provided when content requires user input. (Level A)

[How to Meet 3.3.2](#)
[Understanding 3.3.2](#)

3.3.3 Error Suggestion: If an input error is automatically detected and suggestions for correction are known, then the suggestions are provided to the user, unless it would jeopardize the security or purpose of the content. (Level AA)

[How to Meet 3.3.3](#)
[Understanding 3.3.3](#)

3.3.4 Error Prevention (Legal, Financial, Data): For Web pages that cause legal commitments or financial transactions for the user to occur, that modify or delete user-controllable data in data storage systems, or that submit user test responses, at least one of the following is true: (Level AA)

[How to Meet 3.3.4](#)
[Understanding 3.3.4](#)

1. **Reversible:** Submissions are reversible.
2. **Checked:** Data entered by the user is checked for input errors and the user is provided an opportunity to correct them.
3. **Confirmed:** A mechanism is available for reviewing, confirming, and correcting information before finalizing the submission.

3.3.5 Help: Context-sensitive help is available. (Level AAA)

[How to Meet 3.3.5](#)
[Understanding 3.3.5](#)

3.3.6 Error Prevention (All): For Web pages that require the user to submit information, at least one of the following is true: (Level AAA)

[How to Meet 3.3.6](#)
[Understanding 3.3.6](#)

1. **Reversible:** Submissions are reversible.
2. **Checked:** Data entered by the user is checked for input errors and the user is provided an opportunity to correct them.
3. **Confirmed:** A mechanism is available for reviewing, confirming, and correcting information before finalizing the submission.

Principle 4: Robust - Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.

Guideline 4.1 Compatible: Maximize compatibility with current and future user agents, including assistive technologies.

[Understanding Guideline 4.1](#)

4.1.1 Parsing: In content implemented using markup languages, elements have complete start and end tags, elements are nested according to their specifications, elements do not contain duplicate attributes, and any IDs are unique, except where the specifications allow these features. (Level A)

Note: Start and end tags that are missing a critical character in their formation, such as a closing angle bracket or a mismatched attribute value quotation mark are not complete.

[How to Meet 4.1.1](#)
[Understanding 4.1.1](#)

4.1.2 Name, Role, Value: For all user interface components (including but not limited to: form elements, links and components generated by scripts), the name and role can be programmatically determined; states, properties, and values that can be set by the user can be programmatically set; and notification of changes to these items is available to user agents, including assistive technologies. (Level A)

Note: This success criterion is primarily for Web authors who develop or script their own user interface components. For example, standard HTML controls already meet this success criterion when used according to specification.

[How to Meet 4.1.2](#)
[Understanding 4.1.2](#)

Conformance

This section is normative.

This section lists requirements for conformance to WCAG 2.0. It also gives information about how to make conformance claims, which are optional. Finally, it describes what it means to be accessibility supported, since only accessibility-supported ways of using technologies can be relied upon for conformance. [Understanding Conformance](#) includes further explanation of the accessibility-supported concept.

Conformance Requirements

In order for a Web page to conform to WCAG 2.0, all of the following conformance requirements must be satisfied:

1. Conformance Level: One of the following levels of conformance is met in full.

- **Level A:** For Level A conformance (the minimum level of conformance), the Web page satisfies all the Level A Success Criteria, or a conforming alternate version is provided.
- **Level AA:** For Level AA conformance, the Web page satisfies all the Level A and Level AA Success Criteria, or a Level AA conforming alternate version is provided.
- **Level AAA:** For Level AAA conformance, the Web page satisfies all the Level A, Level AA and

Level AAA Success Criteria, or a Level AAA conforming alternate version is provided.

Note 1: Although conformance can only be achieved at the stated levels, authors are encouraged to report (in their claim) any progress toward meeting success criteria from all levels beyond the achieved level of conformance.

Note 2: It is not recommended that Level AAA conformance be required as a general policy for entire sites because it is not possible to satisfy all Level AAA Success Criteria for some content.

2. Full pages: Conformance (and conformance level) is for full Web page(s) only, and cannot be achieved if part of a Web page is excluded.

Note 1: For the purpose of determining conformance, alternatives to part of a page's content are considered part of the page when the alternatives can be obtained directly from the page, e.g., a long description or an alternative presentation of a video.

Note 2: Authors of Web pages that cannot conform due to content outside of the author's control may consider a [Statement of Partial Conformance](#).

3. Complete processes: When a Web page is one of a series of Web pages presenting a process (i.e., a sequence of steps that need to be completed in order to accomplish an activity), all Web pages in the process conform at the specified level or better. (Conformance is not possible at a particular level if any page in the process does not conform at that level or better.)

Example: An online store has a series of pages that are used to select and purchase products. All pages in the series from start to finish (checkout) conform in order for any page that is part of the process to conform.

4. Only Accessibility-Supported Ways of Using Technologies: Only accessibility-supported ways of using technologies are relied upon to satisfy the success criteria. Any information or functionality that is provided in a way that is not accessibility supported is also available in a way that is accessibility supported. (See [Understanding accessibility support](#).)

5. Non-Interference: If technologies are used in a way that is not accessibility supported, or if they are used in a non-conforming way, then they do not block the ability of users to access the rest of the page. In addition, the Web page as a whole continues to meet the conformance requirements under each of the following conditions:

1. when any technology that is not relied upon is turned on in a user agent,
2. when any technology that is not relied upon is turned off in a user agent, and
3. when any technology that is not relied upon is not supported by a user agent

In addition, the following success criteria apply to all content on the page, including content that is not otherwise relied upon to meet conformance, because failure to meet them could interfere with any use of the page:

- **1.4.2 - Audio Control**,
- **2.1.2 - No Keyboard Trap**,
- **2.3.1 - Three Flashes or Below Threshold**, and
- **2.2.2 - Pause, Stop, Hide**.

Note: If a page cannot conform (for example, a conformance test page or an example page), it cannot be included in the scope of conformance or in a conformance claim.

For more information, including examples, see [Understanding Conformance Requirements](#).

Conformance Claims (Optional)

Conformance is defined only for Web pages. However, a conformance claim may be made to cover one page, a series of pages, or multiple related Web pages.

Required Components of a Conformance Claim

Conformance claims are **not required**. Authors can conform to WCAG 2.0 without making a claim. However, if a conformance claim is made, then the conformance claim **must** include the following information:

1. **Date** of the claim
2. **Guidelines title, version and URI** "Web Content Accessibility Guidelines 2.0 at <http://www.w3.org/TR/2008/REC-WCAG20-20081211/>"
3. **Conformance level** satisfied: (Level A, AA or AAA)
4. **A concise description of the Web pages**, such as a list of URIs for which the claim is made, including whether subdomains are included in the claim.

Note 1: The Web pages may be described by list or by an expression that describes all of the URIs included in the claim.

Note 2: Web-based products that do not have a URI prior to installation on the customer's Web site may have a statement that the product would conform when installed.

5. A list of the **Web content technologies relied upon**.

Note: If a conformance logo is used, it would constitute a claim and must be accompanied by the required components of a conformance claim listed above.

Optional Components of a Conformance Claim

In addition to the required components of a conformance claim above, consider providing additional information to assist users. Recommended additional information includes:

- A list of success criteria beyond the level of conformance claimed that have been met. This information should be provided in a form that users can use, preferably machine-readable metadata.
- A list of the specific technologies that are "*used but not relied upon*."
- A list of user agents, including assistive technologies that were used to test the content.
- Information about any additional steps taken that go beyond the success criteria to enhance accessibility.
- A machine-readable metadata version of the list of specific technologies that are relied upon.
- A machine-readable metadata version of the conformance claim.

Note 1: Refer to [Understanding Conformance Claims](#) for more information and example conformance claims.

Note 2: Refer to [Understanding Metadata](#) for more information about the use of metadata in conformance claims.

Statement of Partial Conformance - Third Party Content

Sometimes, Web pages are created that will later have additional content added to them. For example, an email program, a blog, an article that allows users to add comments, or applications supporting user-contributed content. Another example would be a page, such as a portal or news site, composed of content aggregated from multiple contributors, or sites that automatically insert content from other sources over time, such as when advertisements are inserted dynamically.

In these cases, it is not possible to know at the time of original posting what the uncontrolled content of the pages will be. It is important to note that the uncontrolled content can affect the accessibility of the controlled content as well. Two options are available:

1. A determination of conformance can be made based on best knowledge. If a page of this type is

monitored and repaired (non-conforming content is removed or brought into conformance) within two business days, then a determination or claim of conformance can be made since, except for errors in externally contributed content which are corrected or removed when encountered, the page conforms. No conformance claim can be made if it is not possible to monitor or correct non-conforming content;

OR

2. A "statement of partial conformance" may be made that the page does not conform, but could conform if certain parts were removed. The form of that statement would be, "This page does not conform, but would conform to WCAG 2.0 at level X if the following parts from uncontrolled sources were removed." In addition, the following would also be true of uncontrolled content that is described in the statement of partial conformance:
 - a. It is not content that is under the author's control.
 - b. It is described in a way that users can identify (e.g., they cannot be described as "all parts that we do not control" unless they are clearly marked as such.)

Statement of Partial Conformance - Language

A "statement of partial conformance due to language" may be made when the page does not conform, but would conform if accessibility support existed for (all of) the language(s) used on the page. The form of that statement would be, "This page does not conform, but would conform to WCAG 2.0 at level X if accessibility support existed for the following language(s):"

Appendix A: Glossary

This section is normative.

abbreviation

shortened form of a word, phrase, or name where the abbreviation has not become part of the language

Note 1: This includes initialisms and acronyms where:

1. **initialisms** are shortened forms of a name or phrase made from the initial letters of words or syllables contained in that name or phrase

Note 1: Not defined in all languages.

Example 1: SNCF is a French initialism that contains the initial letters of the Société Nationale des Chemins de Fer, the French national railroad.

Example 2: ESP is an initialism for extrasensory perception.

2. **acronyms** are abbreviated forms made from the initial letters or parts of other words (in a name or phrase) which may be pronounced as a word

Example: NOAA is an acronym made from the initial letters of the National Oceanic and Atmospheric Administration in the United States.

Note 2: Some companies have adopted what used to be an initialism as their company name. In these cases, the new name of the company is the letters (for example, Ecma) and the word is no longer considered an abbreviation.

accessibility supported

supported by users' assistive technologies as well as the accessibility features in browsers and other user agents

To qualify as an accessibility-supported use of a Web content technology (or feature of a technology), both 1 and 2 must be satisfied for a Web content technology (or feature):

1. **The way that the Web content technology is used must be supported by users'**

assistive technology (AT). This means that the way that the technology is used has been tested for interoperability with users' assistive technology in the human language(s) of the content,

AND

2. The Web content technology must have accessibility-supported user agents that are available to users. This means that at least one of the following four statements is true:

a. The technology is supported natively in widely-distributed user agents that are also accessibility supported (such as HTML and CSS);

OR

b. The technology is supported in a widely-distributed plug-in that is also accessibility supported;

OR

c. The content is available in a closed environment, such as a university or corporate network, where the user agent required by the technology and used by the organization is also accessibility supported;

OR

d. The user agent(s) that support the technology are accessibility supported and are available for download or purchase in a way that:

- does not cost a person with a disability any more than a person without a disability **and**
- is as easy to find and obtain for a person with a disability as it is for a person without disabilities.

Note 1: The WCAG Working group and the W3C do not specify which or how much support by assistive technologies there must be for a particular use of a Web technology in order for it to be classified as accessibility supported. (See [Level of Assistive Technology Support Needed for "Accessibility Support"](#).)

Note 2: Web technologies can be used in ways that are not accessibility supported as long as they are not relied upon and the page as a whole meets the conformance requirements, including [Conformance Requirement 4: Only Accessibility-Supported Ways of Using Technologies](#) and [Conformance Requirement 5: Non-Interference](#), are met.

Note 3: When a Web Technology is used in a way that is "accessibility supported," it does not imply that the entire technology or all uses of the technology are supported. Most technologies, including HTML, lack support for at least one feature or use. Pages conform to WCAG only if the uses of the technology that are accessibility supported can be relied upon to meet WCAG requirements.

Note 4: When citing Web content technologies that have multiple versions, the version(s) supported should be specified.

Note 5: One way for authors to locate uses of a technology that are accessibility supported would be to consult compilations of uses that are documented to be accessibility supported. (See [Understanding Accessibility-Supported Web Technology Uses](#).) Authors, companies, technology vendors, or others may document accessibility-supported ways of using Web content technologies. However, all ways of using technologies in the documentation would need to meet the definition of accessibility-supported Web content technologies above.

alternative for time-based media

document including correctly sequenced text descriptions of time-based visual and auditory information and providing a means for achieving the outcomes of any time-based interaction

Note: A screenplay used to create the synchronized media content would meet this definition only if it was corrected to accurately represent the final synchronized media after editing.

ambiguous to users in general

the purpose cannot be determined from the link and all information of the Web page presented to the user simultaneously with the link (i.e., readers without disabilities would not know what a link would do until they activated it)

Example: The word guava in the following sentence "One of the notable exports is guava" is a link. The link could lead to a definition of guava, a chart listing the quantity of guava exported or a photograph of people harvesting guava. Until the link is activated, all readers are unsure and the person with a disability is not at any disadvantage.

ASCII art

picture created by a spatial arrangement of characters or glyphs (typically from the 95 printable characters defined by ASCII).

assistive technology (as used in this document)

hardware and/or software that acts as a user agent, or along with a mainstream user agent, to provide functionality to meet the requirements of users with disabilities that go beyond those offered by mainstream user agents

Note 1: functionality provided by assistive technology includes alternative presentations (e.g., as synthesized speech or magnified content), alternative input methods (e.g., voice), additional navigation or orientation mechanisms, and content transformations (e.g., to make tables more accessible).

Note 2: Assistive technologies often communicate data and messages with mainstream user agents by using and monitoring APIs.

Note 3: The distinction between mainstream user agents and assistive technologies is not absolute. Many mainstream user agents provide some features to assist individuals with disabilities. The basic difference is that mainstream user agents target broad and diverse audiences that usually include people with and without disabilities. Assistive technologies target narrowly defined populations of users with specific disabilities. The assistance provided by an assistive technology is more specific and appropriate to the needs of its target users. The mainstream user agent may provide important functionality to assistive technologies like retrieving Web content from program objects or parsing markup into identifiable bundles.

Example: Assistive technologies that are important in the context of this document include the following:

- screen magnifiers, and other visual reading assistants, which are used by people with visual, perceptual and physical print disabilities to change text font, size, spacing, color, synchronization with speech, etc. in order to improve the visual readability of rendered text and images;
- screen readers, which are used by people who are blind to read textual information through synthesized speech or braille;
- text-to-speech software, which is used by some people with cognitive, language, and learning disabilities to convert text into synthetic speech;
- speech recognition software, which may be used by people who have some physical disabilities;
- alternative keyboards, which are used by people with certain physical disabilities to simulate the keyboard (including alternate keyboards that use head pointers, single switches, sip/puff and other special input devices.);
- alternative pointing devices, which are used by people with certain physical disabilities to simulate mouse pointing and button activations.

audio

the technology of sound reproduction

Note: Audio can be created synthetically (including speech synthesis), recorded from real world sounds, or both.

audio description

narration added to the soundtrack to describe important visual details that cannot be understood from the main soundtrack alone

Note 1: Audio description of video provides information about actions, characters, scene changes, on-screen text, and other visual content.

Note 2: In standard audio description, narration is added during existing pauses in dialogue. (See also extended audio description.)

Note 3: Where all of the video information is already provided in existing audio, no additional audio description is necessary.

Note 4: Also called "video description" and "descriptive narration."

audio-only

a time-based presentation that contains only audio (no video and no interaction)

blinking

switch back and forth between two visual states in a way that is meant to draw attention

Note: See also flash. It is possible for something to be large enough and blink brightly enough at the right frequency to be also classified as a flash.

blocks of text

more than one sentence of text

CAPTCHA

initialism for "Completely Automated Public Turing test to tell Computers and Humans Apart"

Note 1: CAPTCHA tests often involve asking the user to type in text that is displayed in an obscured image or audio file.

Note 2: A Turing test is any system of tests designed to differentiate a human from a computer. It is named after famed computer scientist Alan Turing. The term was coined by researchers at Carnegie Mellon University. [\[CAPTCHA\]](#)

captions

synchronized visual and/or text alternative for both speech and non-speech audio information needed to understand the media content

Note 1: Captions are similar to dialogue-only subtitles except captions convey not only the content of spoken dialogue, but also equivalents for non-dialogue audio information needed to understand the program content, including sound effects, music, laughter, speaker identification and location.

Note 2: Closed Captions are equivalents that can be turned on and off with some players.

Note 3: Open Captions are any captions that cannot be turned off. For example, if the captions are visual equivalent images of text embedded in video.

Note 4: Captions should not obscure or obstruct relevant information in the video.

Note 5: In some countries, captions are called subtitles.

Note 6: Audio descriptions can be, but do not need to be, captioned since they are descriptions of information that is already presented visually.

changes of context

major changes in the content of the Web page that, if made without user awareness, can disorient users who are not able to view the entire page simultaneously

Changes in context include changes of:

1. user agent;
2. viewport;

3. focus;
4. content that changes the meaning of the Web page.

Note: A change of content is not always a change of context. Changes in content, such as an expanding outline, dynamic menu, or a tab control do not necessarily change the context, unless they also change one of the above (e.g., focus).

Example: Opening a new window, moving focus to a different component, going to a new page (including anything that would look to a user as if they had moved to a new page) or significantly re-arranging the content of a page are examples of changes of context.

conformance

satisfying all the requirements of a given standard, guideline or specification

conforming alternate version

version that

1. conforms at the designated level, and
2. provides all of the same information and functionality in the same human language, and
3. is as up to date as the non-conforming content, and
4. for which at least one of the following is true:
 - a. the conforming version can be reached from the non-conforming page via an accessibility-supported mechanism, or
 - b. the non-conforming version can only be reached from the conforming version, or
 - c. the non-conforming version can only be reached from a conforming page that also provides a mechanism to reach the conforming version

Note 1: In this definition, "can only be reached" means that there is some mechanism, such as a conditional redirect, that prevents a user from "reaching" (loading) the non-conforming page unless the user had just come from the conforming version.

Note 2: The alternate version does not need to be matched page for page with the original (e.g., the conforming alternate version may consist of multiple pages).

Note 3: If multiple language versions are available, then conforming alternate versions are required for each language offered.

Note 4: Alternate versions may be provided to accommodate different technology environments or user groups. Each version should be as conformant as possible. One version would need to be fully conformant in order to meet [conformance requirement 1](#).

Note 5: The conforming alternative version does not need to reside within the scope of conformance, or even on the same Web site, as long as it is as freely available as the non-conforming version.

Note 6: Alternate versions should not be confused with supplementary content, which support the original page and enhance comprehension.

Note 7: Setting user preferences within the content to produce a conforming version is an acceptable mechanism for reaching another version as long as the method used to set the preferences is accessibility supported.

See [Understanding Conforming Alternate Versions](#)

content (Web content)

information and sensory experience to be communicated to the user by means of a user agent, including code or markup that defines the content's structure, presentation, and interactions

context-sensitive help

help text that provides information related to the function currently being performed

Note: Clear labels can act as context-sensitive help.

contrast ratio

$(L1 + 0.05) / (L2 + 0.05)$, where

- L1 is the relative luminance of the lighter of the colors, and
- L2 is the relative luminance of the darker of the colors.

Note 1: Contrast ratios can range from 1 to 21 (commonly written 1:1 to 21:1).

Note 2: Because authors do not have control over user settings as to how text is rendered (for example font smoothing or anti-aliasing), the contrast ratio for text can be evaluated with anti-aliasing turned off.

Note 3: For the purpose of Success Criteria 1.4.3 and 1.4.6, contrast is measured with respect to the specified background over which the text is rendered in normal usage. If no background color is specified, then white is assumed.

Note 4: Background color is the specified color of content over which the text is to be rendered in normal usage. It is a failure if no background color is specified when the text color is specified, because the user's default background color is unknown and cannot be evaluated for sufficient contrast. For the same reason, it is a failure if no text color is specified when a background color is specified.

Note 5: When there is a border around the letter, the border can add contrast and would be used in calculating the contrast between the letter and its background. A narrow border around the letter would be used as the letter. A wide border around the letter that fills in the inner details of the letters acts as a halo and would be considered background.

Note 6: WCAG conformance should be evaluated for color pairs specified in the content that an author would expect to appear adjacent in typical presentation. Authors need not consider unusual presentations, such as color changes made by the user agent, except where caused by authors' code.

correct reading sequence

any sequence where words and paragraphs are presented in an order that does not change the meaning of the content

emergency

a sudden, unexpected situation or occurrence that requires immediate action to preserve health, safety, or property

essential

if removed, would fundamentally change the information or functionality of the content, **and** information and functionality cannot be achieved in another way that would conform

extended audio description

audio description that is added to an audiovisual presentation by pausing the video so that there is time to add additional description

Note: This technique is only used when the sense of the video would be lost without the additional audio description and the pauses between dialogue/narration are too short.

flash

a pair of opposing changes in relative luminance that can cause seizures in some people if it is large enough and in the right frequency range

Note 1: See general flash and red flash thresholds for information about types of flash that are not allowed.

Note 2: See also blinking.

functionality

processes and outcomes achievable through user action

general flash and red flash thresholds

a flash or rapidly changing image sequence is below the threshold (i.e., content **passes**) if any of the following are true:

1. there are no more than three **general flashes** and / or no more than three **red flashes** within any one-second period; or
2. the combined area of flashes occurring concurrently occupies no more than a total of .006 steradians within any 10 degree visual field on the screen (25% of any 10 degree visual field on the screen) at typical viewing distance

where:

- A **general flash** is defined as a pair of opposing changes in relative luminance of 10% or more of the maximum relative luminance where the relative luminance of the darker image is below 0.80; and where "a pair of opposing changes" is an increase followed by a decrease, or a decrease followed by an increase, and
- A **red flash** is defined as any pair of opposing transitions involving a saturated red.

Exception: Flashing that is a fine, balanced, pattern such as white noise or an alternating checkerboard pattern with "squares" smaller than 0.1 degree (of visual field at typical viewing distance) on a side does not violate the thresholds.

Note 1: For general software or Web content, using a 341 x 256 pixel rectangle anywhere on the displayed screen area when the content is viewed at 1024 x 768 pixels will provide a good estimate of a 10 degree visual field for standard screen sizes and viewing distances (e.g., 15-17 inch screen at 22-26 inches). (Higher resolutions displays showing the same rendering of the content yield smaller and safer images so it is lower resolutions that are used to define the thresholds.)

Note 2: A transition is the change in relative luminance (or relative luminance/color for red flashing) between adjacent peaks and valleys in a plot of relative luminance (or relative luminance/color for red flashing) measurement against time. A flash consists of two opposing transitions.

Note 3: The current working definition in the field for "**pair of opposing transitions involving a saturated red**" is where, for either or both states involved in each transition, $R/(R+G+B) \geq 0.8$, and the change in the value of $(R-G-B) \times 320$ is > 20 (negative values of $(R-G-B) \times 320$ are set to zero) for both transitions. R, G, B values range from 0-1 as specified in "relative luminance" definition. [\[HARDING-BINNIE\]](#)

Note 4: Tools are available that will carry out analysis from video screen capture. However, no tool is necessary to evaluate for this condition if flashing is less than or equal to 3 flashes in any one second. Content automatically passes (see #1 and #2 above).

human language

language that is spoken, written or signed (through visual or tactile means) to communicate with humans

Note: See also [sign language](#).

idiom

phrase whose meaning cannot be deduced from the meaning of the individual words and the specific words cannot be changed without losing the meaning

Note: idioms cannot be translated directly, word for word, without losing their (cultural or language-dependent) meaning.

Example 1: In English, "spilling the beans" means "revealing a secret." However, "knocking over the beans" or "spilling the vegetables" does not mean the same thing.

Example 2: In Japanese, the phrase "さじを投げる" literally translates into "he throws a spoon," but it means that there is nothing he can do and finally he gives up.

Example 3: In Dutch, "Hij ging met de kippen op stok" literally translates into "He went to roost with the chickens," but it means that he went to bed early.

image of text

text that has been rendered in a non-text form (e.g., an image) in order to achieve a particular visual effect

Note: This does not include text that is part of a picture that contains significant other visual content.

Example: A person's name on a nametag in a photograph.

informative

for information purposes and not required for conformance

Note: Content required for conformance is referred to as "normative."

input error

information provided by the user that is not accepted

Note: This includes:

1. Information that is required by the Web page but omitted by the user
2. Information that is provided by the user but that falls outside the required data format or values

jargon

words used in a particular way by people in a particular field

Example: The word StickyKeys is jargon from the field of assistive technology/accessibility.

keyboard interface

interface used by software to obtain keystroke input

Note 1: A keyboard interface allows users to provide keystroke input to programs even if the native technology does not contain a keyboard.

Example: A touchscreen PDA has a keyboard interface built into its operating system as well as a connector for external keyboards. Applications on the PDA can use the interface to obtain keyboard input either from an external keyboard or from other applications that provide simulated keyboard output, such as handwriting interpreters or speech-to-text applications with "keyboard emulation" functionality.

Note 2: Operation of the application (or parts of the application) through a keyboard-operated mouse emulator, such as MouseKeys, does not qualify as operation through a keyboard interface because operation of the program is through its pointing device interface, not through its keyboard interface.

label

text or other component with a text alternative that is presented to a user to identify a component within Web content

Note 1: A label is presented to all users whereas the name may be hidden and only exposed by assistive technology. In many (but not all) cases the name and the label are the same.

Note 2: The term label is not limited to the label element in HTML.

large scale (text)

with at least 18 point or 14 point bold or font size that would yield equivalent size for Chinese, Japanese and Korean (CJK) fonts

Note 1: Fonts with extraordinarily thin strokes or unusual features and characteristics that reduce the familiarity of their letter forms are harder to read, especially at lower contrast levels.

Note 2: Font size is the size when the content is delivered. It does not include resizing that may be done by a user.

Note 3: The actual size of the character that a user sees is dependent both on the author-defined

size and the user's display or user-agent settings. For many mainstream body text fonts, 14 and 18 point is roughly equivalent to 1.2 and 1.5 em or to 120% or 150% of the default size for body text (assuming that the body font is 100%), but authors would need to check this for the particular fonts in use. When fonts are defined in relative units, the actual point size is calculated by the user agent for display. The point size should be obtained from the user agent, or calculated based on font metrics as the user agent does, when evaluating this success criterion. Users who have low vision would be responsible for choosing appropriate settings.

Note 4: When using text without specifying the font size, the smallest font size used on major browsers for unspecified text would be a reasonable size to assume for the font. If a level 1 heading is rendered in 14pt bold or higher on major browsers, then it would be reasonable to assume it is large text. Relative scaling can be calculated from the default sizes in a similar fashion.

Note 5: The 18 and 14 point sizes for roman texts are taken from the minimum size for large print (14pt) and the larger standard font size (18pt). For other fonts such as CJK languages, the "equivalent" sizes would be the minimum large print size used for those languages and the next larger standard large print size.

legal commitments

transactions where the person incurs a legally binding obligation or benefit

Example: A marriage license, a stock trade (financial and legal), a will, a loan, adoption, signing up for the army, a contract of any type, etc.

link purpose

nature of the result obtained by activating a hyperlink

live

information captured from a real-world event and transmitted to the receiver with no more than a broadcast delay

Note 1: A broadcast delay is a short (usually automated) delay, for example used in order to give the broadcaster time to queue or censor the audio (or video) feed, but not sufficient to allow significant editing.

Note 2: If information is completely computer generated, it is not live.

lower secondary education level

the two or three year period of education that begins after completion of six years of school and ends nine years after the beginning of primary education

Note: This definition is based on the International Standard Classification of Education [\[UNESCO\]](#).

mechanism

process or technique for achieving a result

Note 1: The mechanism may be explicitly provided in the content, or may be relied upon to be provided by either the platform or by user agents, including assistive technologies.

Note 2: The mechanism needs to meet all success criteria for the conformance level claimed.

media alternative for text

media that presents no more information than is already presented in text (directly or via text alternatives)

Note: A media alternative for text is provided for those who benefit from alternate representations of text. Media alternatives for text may be audio-only, video-only (including sign-language video), or audio-video.

name

text by which software can identify a component within Web content to the user

Note 1: The name may be hidden and only exposed by assistive technology, whereas a label is presented to all users. In many (but not all) cases, the label and the name are the same.

Note 2: This is unrelated to the name attribute in HTML.

navigated sequentially

navigated in the order defined for advancing focus (from one element to the next) using a keyboard interface

non-text content

any content that is not a sequence of characters that can be programmatically determined or where the sequence is not expressing something in human language

Note: This includes ASCII Art (which is a pattern of characters), emoticons, leetspeak (which uses character substitution), and images representing text

normative

required for conformance

Note 1: One may conform in a variety of well-defined ways to this document.

Note 2: Content identified as "informative" or "non-normative" is never required for conformance.

on a full-screen window

on the most common sized desktop/laptop display with the viewport maximized

Note: Since people generally keep their computers for several years, it is best not to rely on the latest desktop/laptop display resolutions but to consider the common desktop/laptop display resolutions over the course of several years when making this evaluation.

paused

stopped by user request and not resumed until requested by user

prerecorded

information that is not live

presentation

rendering of the content in a form to be perceived by users

primary education level

six year time period that begins between the ages of five and seven, possibly without any previous education

Note: This definition is based on the International Standard Classification of Education [\[UNESCO\]](#).

process

series of user actions where each action is required in order to complete an activity

Example 1: Successful use of a series of Web pages on a shopping site requires users to view alternative products, prices and offers, select products, submit an order, provide shipping information and provide payment information.

Example 2: An account registration page requires successful completion of a Turing test before the registration form can be accessed.

programmatically determined (programmatically determinable)

determined by software from author-supplied data provided in a way that different user agents, including assistive technologies, can extract and present this information to users in different modalities

Example 1: Determined in a markup language from elements and attributes that are accessed directly by commonly available assistive technology.

Example 2: Determined from technology-specific data structures in a non-markup language and exposed to assistive technology via an accessibility API that is supported by commonly available assistive technology.

programmatically determined link context

additional information that can be programmatically determined from relationships with a link, combined with the link text, and presented to users in different modalities

Example: In HTML, information that is programmatically determinable from a link in English includes text that is in the same paragraph, list, or table cell as the link or in a table header cell that is associated with the table cell that contains the link.

Note: Since screen readers interpret punctuation, they can also provide the context from the current sentence, when the focus is on a link in that sentence.

programmatically set

set by software using methods that are supported by user agents, including assistive technologies

pure decoration

-serving only an aesthetic purpose, providing no information, and having no functionality

Note: Text is only purely decorative if the words can be rearranged or substituted without changing their purpose.

Example: The cover page of a dictionary has random words in very light text in the background.

real-time event

event that a) occurs at the same time as the viewing and b) is not completely generated by the content

Example 1: A Webcast of a live performance (occurs at the same time as the viewing and is not prerecorded).

Example 2: An on-line auction with people bidding (occurs at the same time as the viewing).

Example 3: Live humans interacting in a virtual world using avatars (is not completely generated by the content and occurs at the same time as the viewing).

relationships

meaningful associations between distinct pieces of content

relative luminance

the relative brightness of any point in a colorspace, normalized to 0 for darkest black and 1 for lightest white

Note 1: For the sRGB colorspace, the relative luminance of a color is defined as $L = 0.2126 * R + 0.7152 * G + 0.0722 * B$ where **R**, **G** and **B** are defined as:

- if $R_{sRGB} \leq 0.03928$ then $R = R_{sRGB}/12.92$ else $R = ((R_{sRGB}+0.055)/1.055) ^ 2.4$
- if $G_{sRGB} \leq 0.03928$ then $G = G_{sRGB}/12.92$ else $G = ((G_{sRGB}+0.055)/1.055) ^ 2.4$
- if $B_{sRGB} \leq 0.03928$ then $B = B_{sRGB}/12.92$ else $B = ((B_{sRGB}+0.055)/1.055) ^ 2.4$

and R_{sRGB} , G_{sRGB} , and B_{sRGB} are defined as:

- $R_{sRGB} = R_{8bit}/255$
- $G_{sRGB} = G_{8bit}/255$
- $B_{sRGB} = B_{8bit}/255$

The "^" character is the exponentiation operator. (Formula taken from [\[sRGB\]](#) and [\[IEC-4WD\]](#)).

Note 2: Almost all systems used today to view Web content assume sRGB encoding. Unless it is known that another color space will be used to process and display the content, authors should evaluate using sRGB colorspace. If using other color spaces, see [Understanding Success Criterion 1.4.3](#).

Note 3: If dithering occurs after delivery, then the source color value is used. For colors that are dithered at the source, the average values of the colors that are dithered should be used (average R, average G, and average B).

Note 4: Tools are available that automatically do the calculations when testing contrast and flash.

Note 5: A [MathML version of the relative luminance definition](#) is available.

relied upon (technologies that are)

the content would not conform if that technology is turned off or is not supported

role

text or number by which software can identify the function of a component within Web content

Example: A number that indicates whether an image functions as a hyperlink, command button, or check box.

same functionality

same result when used

Example: A submit "search" button on one Web page and a "find" button on another Web page may both have a field to enter a term and list topics in the Web site related to the term submitted. In this case, they would have the same functionality but would not be labeled consistently.

same relative order

same position relative to other items

Note: Items are considered to be in the same relative order even if other items are inserted or removed from the original order. For example, expanding navigation menus may insert an additional level of detail or a secondary navigation section may be inserted into the reading order.

satisfies a success criterion

the success criterion does not evaluate to 'false' when applied to the page

section

A self-contained portion of written content that deals with one or more related topics or thoughts

Note: A section may consist of one or more paragraphs and include graphics, tables, lists and sub-sections.

set of Web pages

collection of Web pages that share a common purpose and that are created by the same author, group or organization

Note: Different language versions would be considered different sets of Web pages.

sign language

a language using combinations of movements of the hands and arms, facial expressions, or body positions to convey meaning

sign language interpretation

translation of one language, generally a spoken language, into a sign language

Note: True sign languages are independent languages that are unrelated to the spoken language(s) of the same country or region.

specific sensory experience

a sensory experience that is not purely decorative and does not primarily convey important information or perform a function

Example: Examples include a performance of a flute solo, works of visual art etc.

structure

1. The way the parts of a Web page are organized in relation to each other; and
2. The way a collection of Web pages is organized

supplemental content

additional content that illustrates or clarifies the primary content

Example 1: An audio version of a Web page.

Example 2: An illustration of a complex process.

Example 3: A paragraph summarizing the major outcomes and recommendations made in a research study.

synchronized media

audio or video synchronized with another format for presenting information and/or with time-based interactive components, unless the media is a media alternative for text that is clearly labeled as such

technology (Web content)

mechanism for encoding instructions to be rendered, played or executed by user agents

Note 1: As used in these guidelines "Web Technology" and the word "technology" (when used alone) both refer to Web Content Technologies.

Note 2: Web content technologies may include markup languages, data formats, or programming languages that authors may use alone or in combination to create end-user experiences that range from static Web pages to synchronized media presentations to dynamic Web applications.

Example: Some common examples of Web content technologies include HTML, CSS, SVG, PNG, PDF, Flash, and JavaScript.

text

sequence of characters that can be programmatically determined, where the sequence is expressing something in human language

text alternative

Text that is programmatically associated with non-text content or referred to from text that is programmatically associated with non-text content. Programmatically associated text is text whose location can be programmatically determined from the non-text content.

Example: An image of a chart is described in text in the paragraph after the chart. The short text alternative for the chart indicates that a description follows.

Note: Refer to [Understanding Text Alternatives](#) for more information.

used in an unusual or restricted way

words used in such a way that requires users to know exactly which definition to apply in order to understand the content correctly

Example: The term "gig" means something different if it occurs in a discussion of music concerts than it does in article about computer hard drive space, but the appropriate definition can be determined from context. By contrast, the word "text" is used in a very specific way in WCAG 2.0, so a definition is supplied in the glossary.

user agent

any software that retrieves and presents Web content for users

Example: Web browsers, media players, plug-ins, and other programs — including assistive technologies — that help in retrieving, rendering, and interacting with Web content.

user-controllable

data that is intended to be accessed by users

Note: This does not refer to such things as Internet logs and search engine monitoring data.

Example: Name and address fields for a user's account.

user interface component

a part of the content that is perceived by users as a single control for a distinct function

Note 1: Multiple user interface components may be implemented as a single programmatic

element. Components here is not tied to programming techniques, but rather to what the user perceives as separate controls.

Note 2: User interface components include form elements and links as well as components generated by scripts.

Example: An applet has a "control" that can be used to move through content by line or page or random access. Since each of these would need to have a name and be settable independently, they would each be a "user interface component."

video

the technology of moving or sequenced pictures or images

Note: Video can be made up of animated or photographic images, or both.

video-only

a time-based presentation that contains only video (no audio and no interaction)

viewport

object in which the user agent presents content

Note 1: The user agent presents content through one or more viewports. Viewports include windows, frames, loudspeakers, and virtual magnifying glasses. A viewport may contain another viewport (e.g., nested frames). Interface components created by the user agent such as prompts, menus, and alerts are not viewports.

Note 2: This definition is based on [User Agent Accessibility Guidelines 1.0 Glossary](#).

visually customized

the font, size, color, and background can be set

Web page

a non-embedded resource obtained from a single URI using HTTP plus any other resources that are used in the rendering or intended to be rendered together with it by a user agent

Note 1: Although any "other resources" would be rendered together with the primary resource, they would not necessarily be rendered simultaneously with each other.

Note 2: For the purposes of conformance with these guidelines, a resource must be "non-embedded" within the scope of conformance to be considered a Web page.

Example 1: A Web resource including all embedded images and media.

Example 2: A Web mail program built using Asynchronous JavaScript and XML (AJAX). The program lives entirely at <http://example.com/mail>, but includes an inbox, a contacts area and a calendar. Links or buttons are provided that cause the inbox, contacts, or calendar to display, but do not change the URI of the page as a whole.

Example 3: A customizable portal site, where users can choose content to display from a set of different content modules.

Example 4: When you enter "<http://shopping.example.com/>" in your browser, you enter a movie-like interactive shopping environment where you visually move around in a store dragging products off of the shelves around you and into a visual shopping cart in front of you. Clicking on a product causes it to be demonstrated with a specification sheet floating alongside. This might be a single-page Web site or just one page within a Web site.

Appendix B: Acknowledgments

This section is informative.

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Additional information about participation in the Web Content Accessibility Guidelines Working Group (WCAG WG) can be found on the [Working Group home page](#).

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Appendix C: References

This section is informative.

CAPTCHA

The CAPTCHA Project, Carnegie Mellon University. The project is online at <http://www.captcha.net>.

HARDING-BINNIE

Harding G. F. A. and Binnie, C.D., Independent Analysis of the ITC Photosensitive Epilepsy Calibration Test Tape. 2002.

IEC-4WD

IEC/4WD 61966-2-1: Colour Measurement and Management in Multimedia Systems and Equipment - Part 2.1: Default Colour Space - sRGB. May 5, 1998.

sRGB

"A Standard Default Color Space for the Internet - sRGB," M. Stokes, M. Anderson, S. Chandrasekar, R. Motta, eds., Version 1.10, November 5, 1996. A copy of this paper is available at <http://www.w3.org/Graphics/Color/sRGB.html>.

UNESCO

International Standard Classification of Education, 1997. A copy of the standard is available at http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm.

WCAG10

Web Content Accessibility Guidelines 1.0, G. Vanderheiden, W. Chisholm, I. Jacobs, Editors, W3C Recommendation, 5 May 1999, <http://www.w3.org/TR/1999/WAI-WEBCONTENT-19990505/>. The latest version of WCAG 1.0 is available at <http://www.w3.org/TR/WAI-WEBCONTENT/>.

9.3 Citizen Participation Platform Preferences Survey

Survey on citizen participatory platforms

As part of my thesis in computer science studies, I would like to propose guidelines for the creation of citizen participatory platforms.

A citizen participatory platform is a website set up by a state body or an independent organization and whose purpose is to gather the ideas and opinions of citizens on a given topic.

Example: "How to reduce traffic problems in Brussels". Each citizen can thus react and propose ideas that will be submitted to the platform's administrator body. In this example, the organization would be the city of Brussels. In short, by using a participatory platform, the citizen becomes a collaborator in the reflection of a project linked to the common good.

For example, the Youth4Climate.be platform asked Belgian citizens for their opinion on the fight against global warming in 2019 and provided the result of 1744 citizen ideas to political representatives on the occasion of the federal elections of 26 May 2019.

Link to the platform: <https://youth4climate.be/fr-BE/>

This questionnaire is intended for all those who have already used the Youth4Climate.be platform or who wish to learn more about this kind of action and to advance citizen participation. It is not essential to have used Youth4Climate.be to answer this questionnaire.

The aim is to identify the essential functionalities that a participatory platform must have in order to create new ones that correspond to the needs of citizens.

Thank you for your participation!

1. A participatory platform must be shared with the widest possible audience. For you, what is the best way of advertising to encourage people to use this kind of platform? *

	Useless	Not very useful	Moderate effect	Useful	Very useful
Newsletter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social networks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advertising posters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Radio Ads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TV Ads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advertising on the web	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. The basic principle of a participatory platform is that everyone can express an opinion on a subject. Do you think that opinions should be dismissed directly by the administrators? If so, what kind of ideas?

Votre réponse

6. Did you read the "about" tab when using the youth4climate.be platform?

- Yes
- No

7. What is your tolerance threshold in terms of expectations for a platform feature? *

- Up to 1 second loading time
- Up to 3 seconds loading time
- Up to 5 seconds loading time
- More than 5 seconds loading time

8. At what level do you target the usefulness that a participatory platform offers a tutorial or a "help" tab to facilitate its use? *

- | | | | | | | | | |
|---------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| Useless | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Very useful |

9. The youth4climate platform doesn't have one, do you think it should have one?

- No, the platform is intuitive enough
- Yes, help would be useful in using the platform.

10. In your opinion, how important are the functionalities below for a participatory platform? *

	Derisory	Unimportant	Neutral	Important	Must-have
Idea proposal system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comment system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Voting system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feedback on each project	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"Like" system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Private messaging system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customizing the notification system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personalization of personal data visible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project sharing via social networks or email	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. In your opinion, are there other functionalities that a participatory platform should have? If so, which ones?

Votre réponse

12. On which format(s) would you be more inclined to use a participatory platform? *

- Mobile Application
- Web application (website)
- Public terminals (town halls, train stations, squares,...)

13. At what level of priority do you target the importance of a participatory platform offering assistance to people with hearing or visual impairments. *

	1	2	3	4	5	6	7	
Derisory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Must-have

14. The youth4climate.be platform does not have this feature, do you think it has an impact on the number of users? *

- Yes
- No

15. Youth4climate offers 3 languages: French, Dutch and English. Do you think we should add one or more languages other than these 3 languages for a Belgian participatory platform? If yes, which ones?

Votre réponse

16. How difficult is it to use the youth4climate platform?

	1	2	3	4	5	6	7	
Very complicated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very simple

17. Have you noticed any problems with the youth4climate platform? If yes, which one?

Votre réponse _____

18. Have you already used the youth4Climate.be platform? *

- Yes
- No

19. If a citizen participatory platform were to be created in your municipality, would you use it? *

- Yes
- No

20. If so, why?

Votre réponse _____

21. If not, why not?

Votre réponse _____

22. How old are you? *

- Under 18 years old
- Between 18 and 25 years old
- Between the ages of 25 and 35
- between 35 and 55 years old
- between 55 and 65 years of age
- Over 65 years old

23. Are you *

- A woman
- A man
- I do not wish to specify it

9.4 Youth4climate participation platform - illustrations

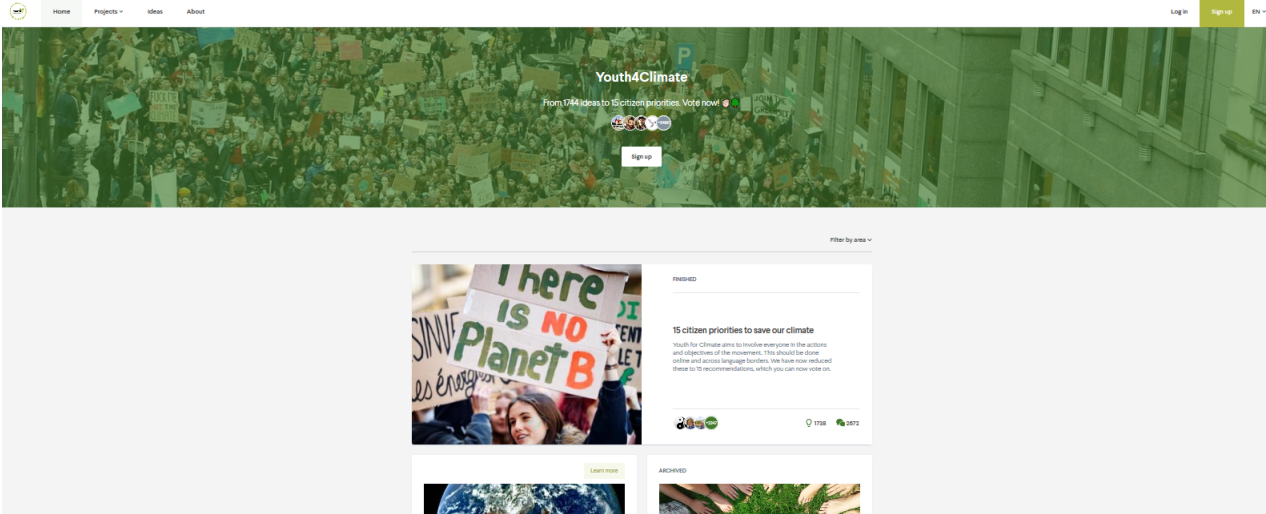


Figure 30: Home tab

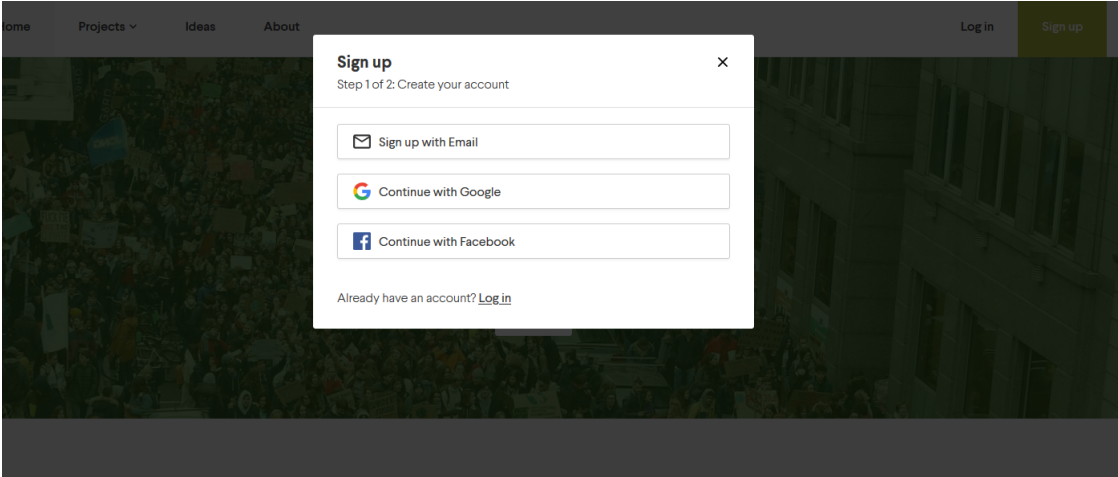


Figure 31: Subscribe feature

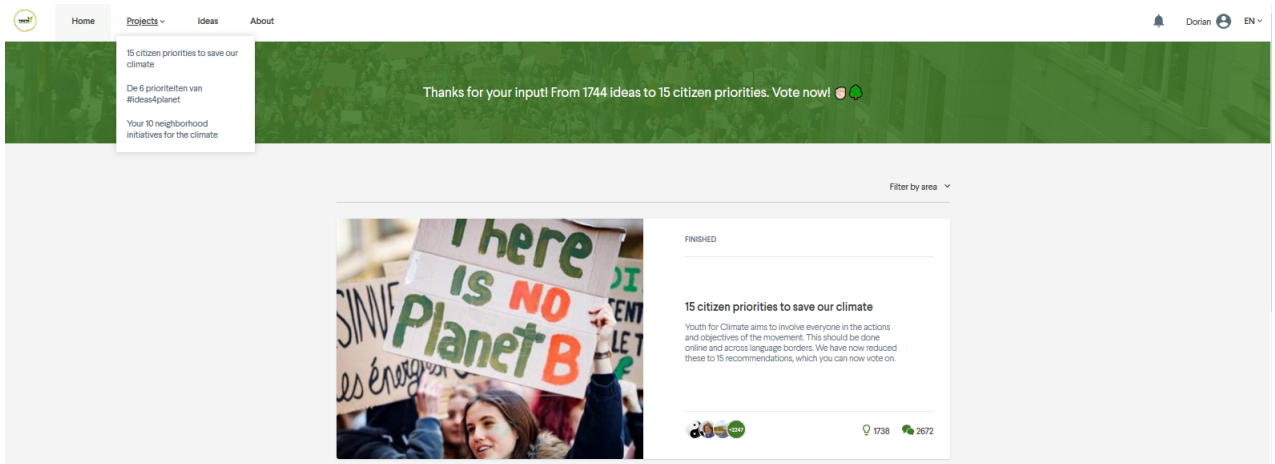
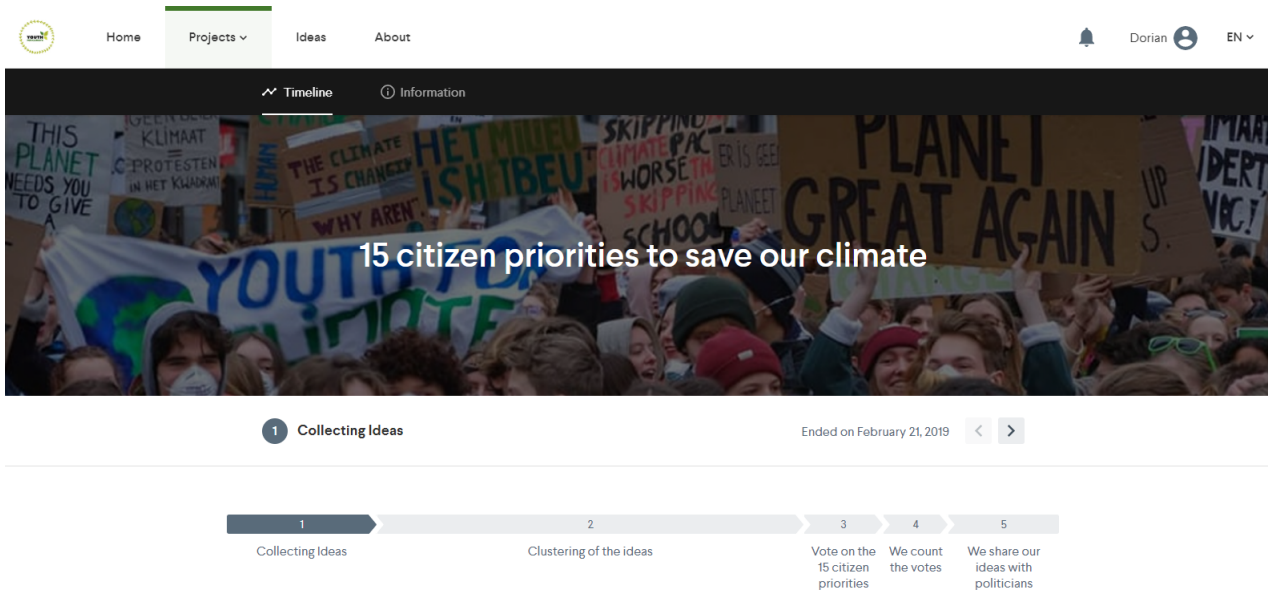



Figure 32: Project tab





Your turn! What are your #ideas4climate?

On this online platform, you can join a movement that reflects on climate topics. Here you can share all the proposals, ideas or measures you'd like to present to the government.

Why?

- We can show that there's even more of us than the thousands in the streets
- Our ideas won't get lost in various Facebook groups
- We keep everything in one centralised place
- We can strengthen each other's ideas.

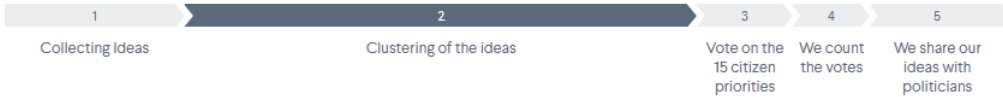

What happens with my ideas?

On 21 February, we will conclude the first phase of ideas. All input is collected and bundled for the first time, because of course there are many similar ideas. From 7 March we will continue with a compilation of the first ideas, until the end of March. It will then again be possible to react and vote further.

Together with a group of voluntary experts, the ideas will be analysed. Also with a 'smart' analysis (artificial intelligence, if you like) this platform automatically draws the broad outlines of all our ideas.

The platform is now open! In this phase, you can share ideas, vote and comment.

Figure 33: First step of participation project

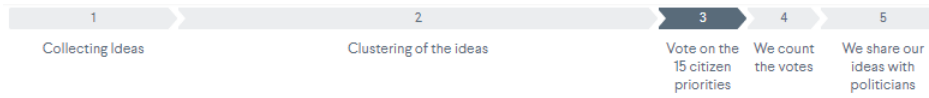
Thanks everyone for your contributions! Between 29 January and 21 February, more than **2.600 users** registered on this citizen participation platform. Together, we have:

- published **1.744 ideas**
- posted **2.748 comments**
- submitted **33.081 votes**

We're now going to get working on these ideas with the *CitizenLab team*.

Idea submission has been put on hold. In order to work more efficiently, we're also pausing votes and comments during the analysis period. If you want to see what's been done so far, you can of course still wander around the platform and have a look at previous contributions from fellow citizens.

Figure 34: Second step of participation project



What is this phase about?

This phase is about collecting your vote on the topics that matter most to you. Based on all input from all participants, 15 policy recommendations have been formulated.

You'll find a short summary, the ideas with the most votes, some key numbers and an attachment with all underlying data below each of those recommendations.

Based on the number of votes that each priority receives, we go back to our (future) politicians with a list of 15 priorities that we want them to work on. What priority will your vote have? Voting is possible until the 7th of May.

How did we get here?

We used all ideas, all comments and all votes to get to these 15 recommendations. The steps we followed, can be found below:

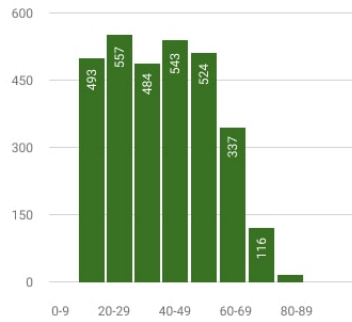
1. All input that couldn't be considered 'an idea' was not withheld for the analysis (78 ideas)
2. We manually added topics to all ideas without topics who clearly belonged to 1 or 2
3. We manually analysed all ideas with more than 20 net votes (upvotes - downvotes) (255 ideas)
4. These 255 ideas could be translated into 15 key policy recommendations (the ones you'll find here)
5. Through NLP (natural language processing), all remaining ideas (1391) were added to one of these 15 recommendations (or to a 'rest' group).
6. For each policy recommendations, key numbers were distilled, a summary was made and the 5 ideas with most net votes were identified.

Figure 35: Third step of participation project

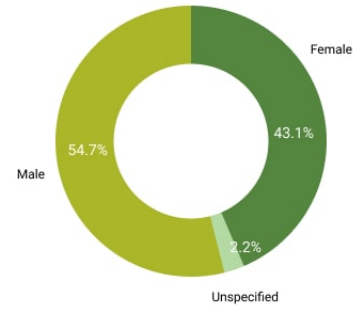
Who participated?



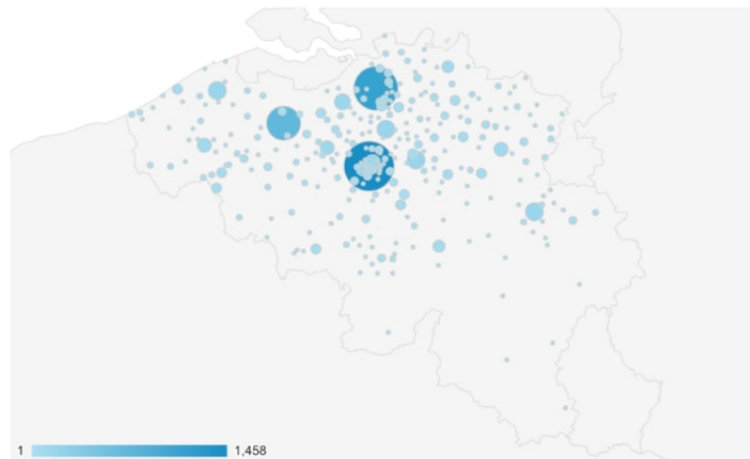
Users by Age



Users by Gender



Where was the platform used?



Key figures

Comments

2716



Ideas

1699



Votes

32751



Figure 36: Feedback display in the third step

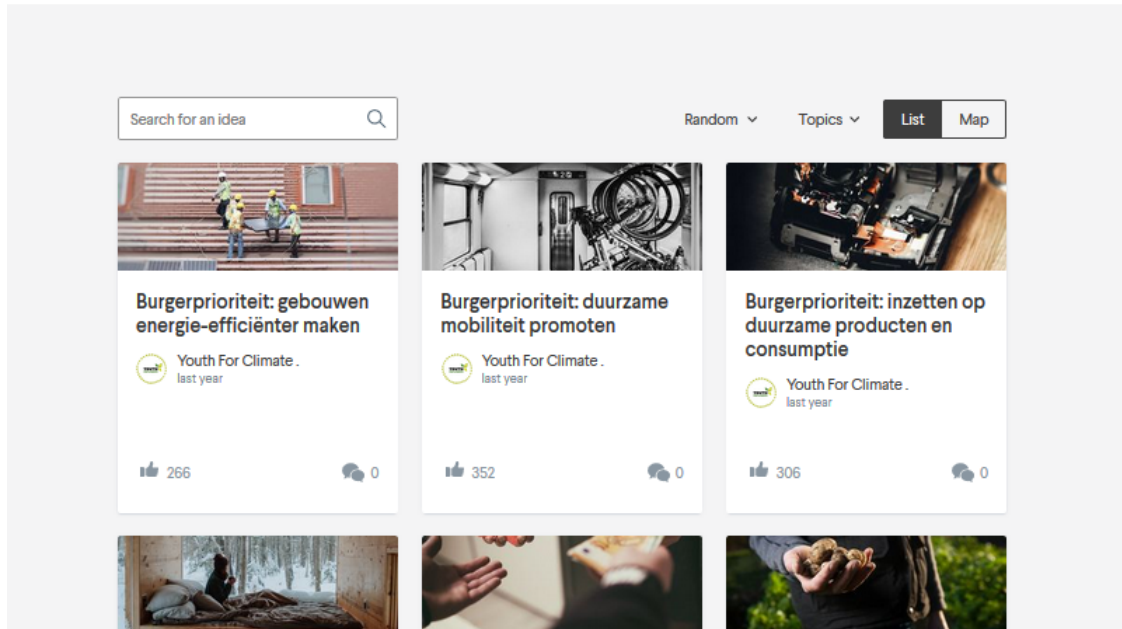
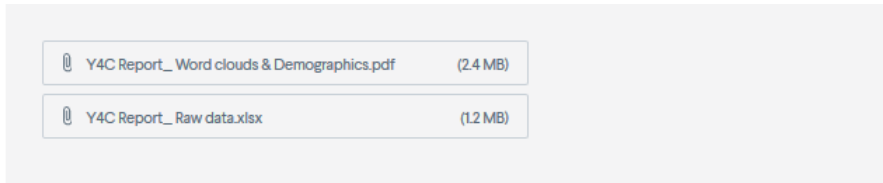


Figure 37: Voting section in the third step

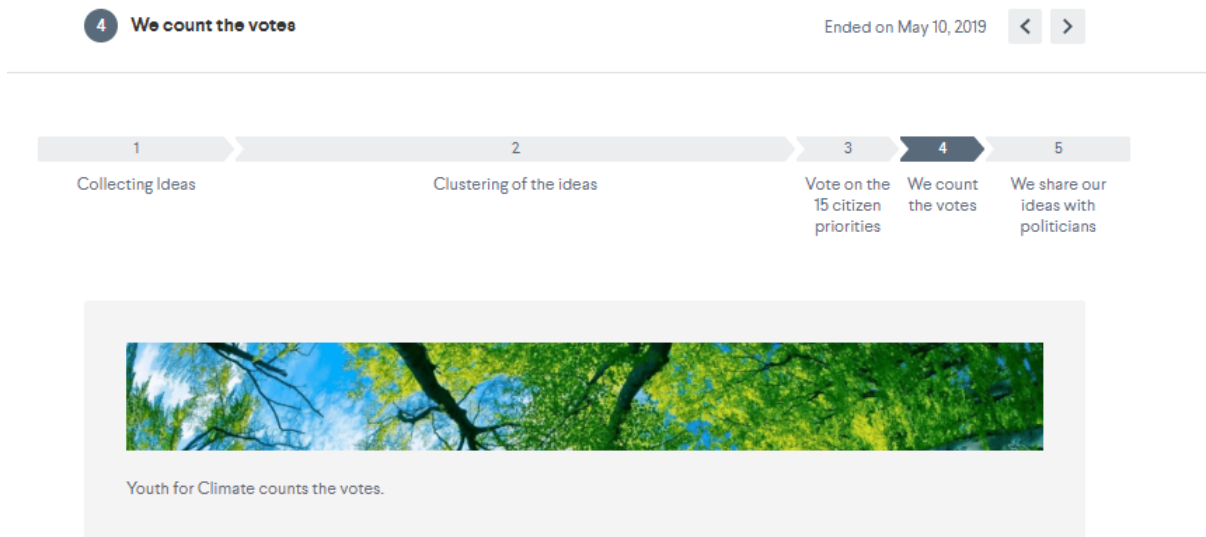


Figure 38: Fourth step of participation project

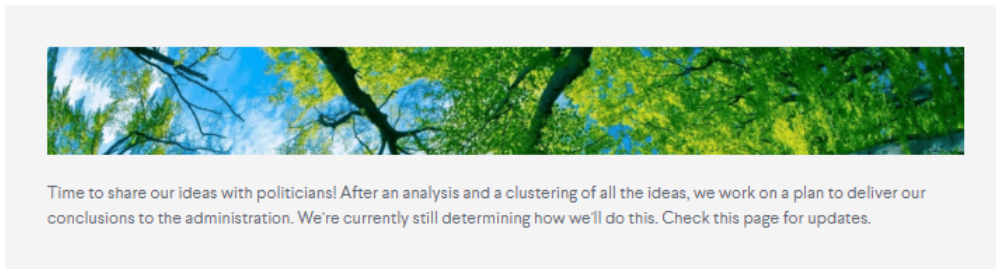
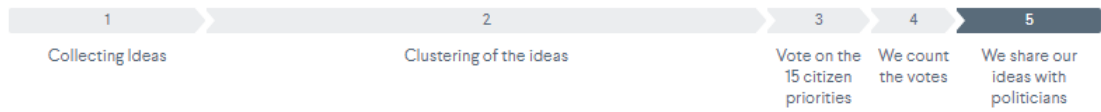


Figure 39: Fifth step of participation project

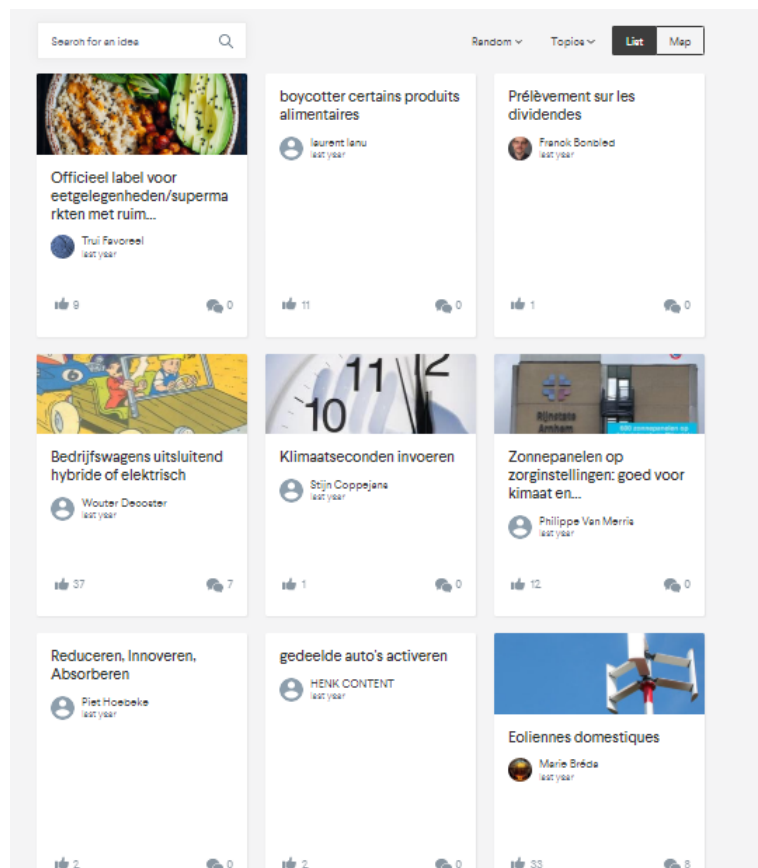


Figure 40: Ideas proposed by citizens

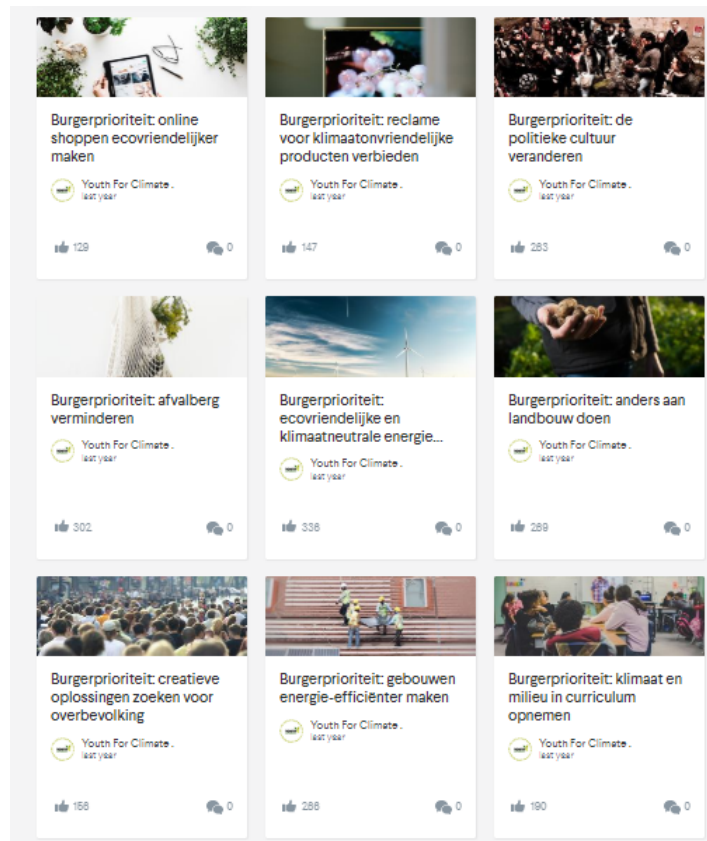


Figure 41: Recommendations made by administrators

9.5 Flucity - Etterbeek - Illustrations

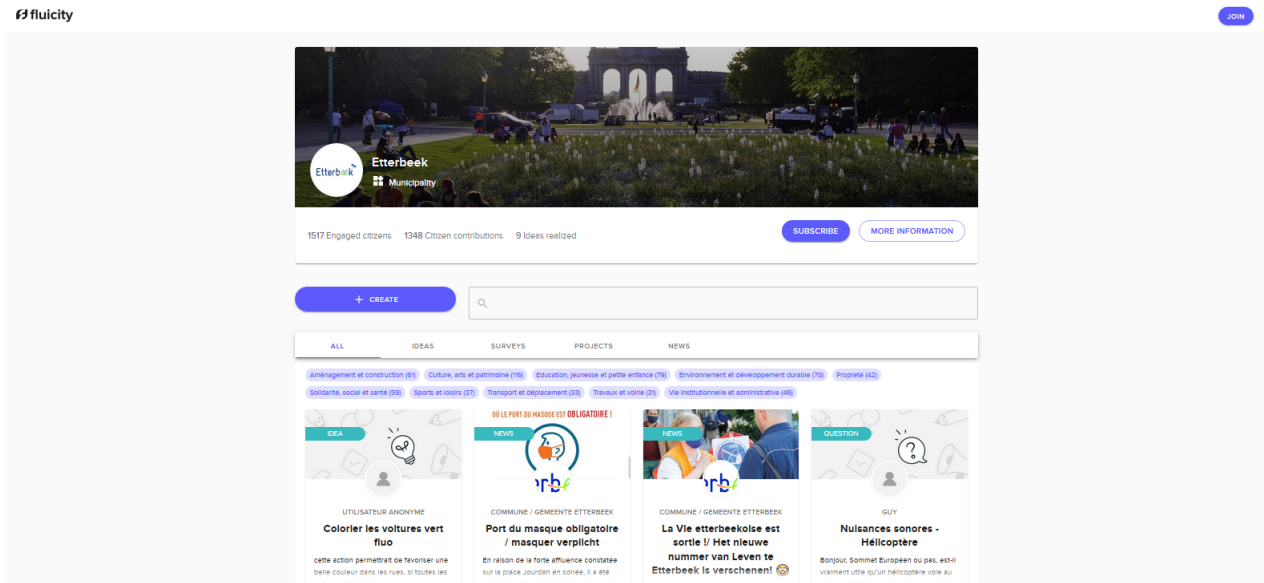


Figure 42: Home page

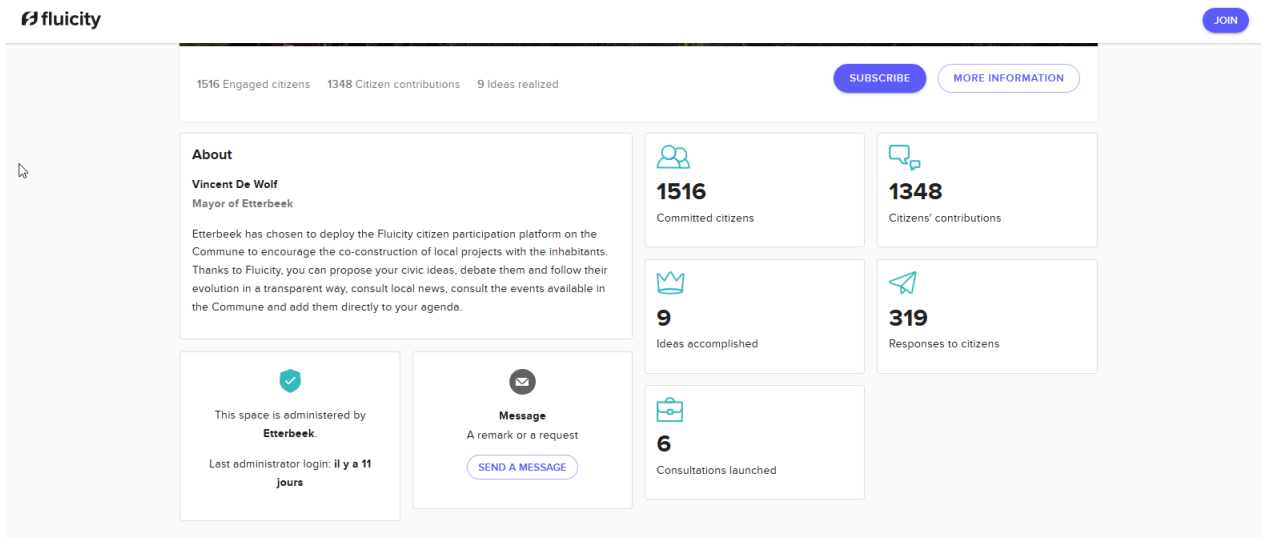


Figure 43: More information tab

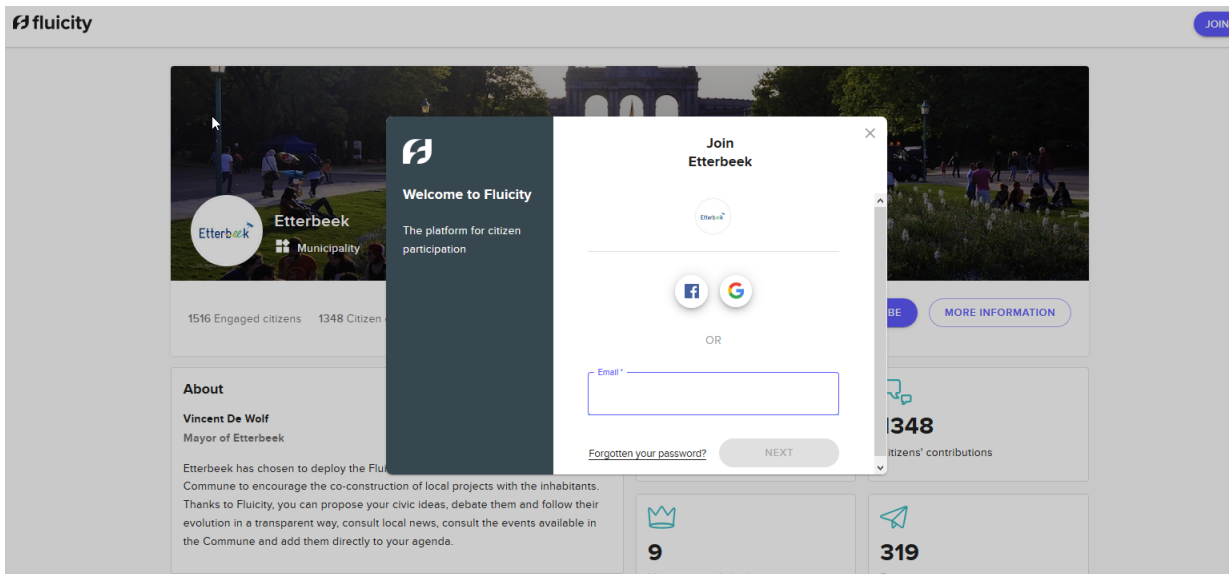


Figure 44: First step of the subscribe feature

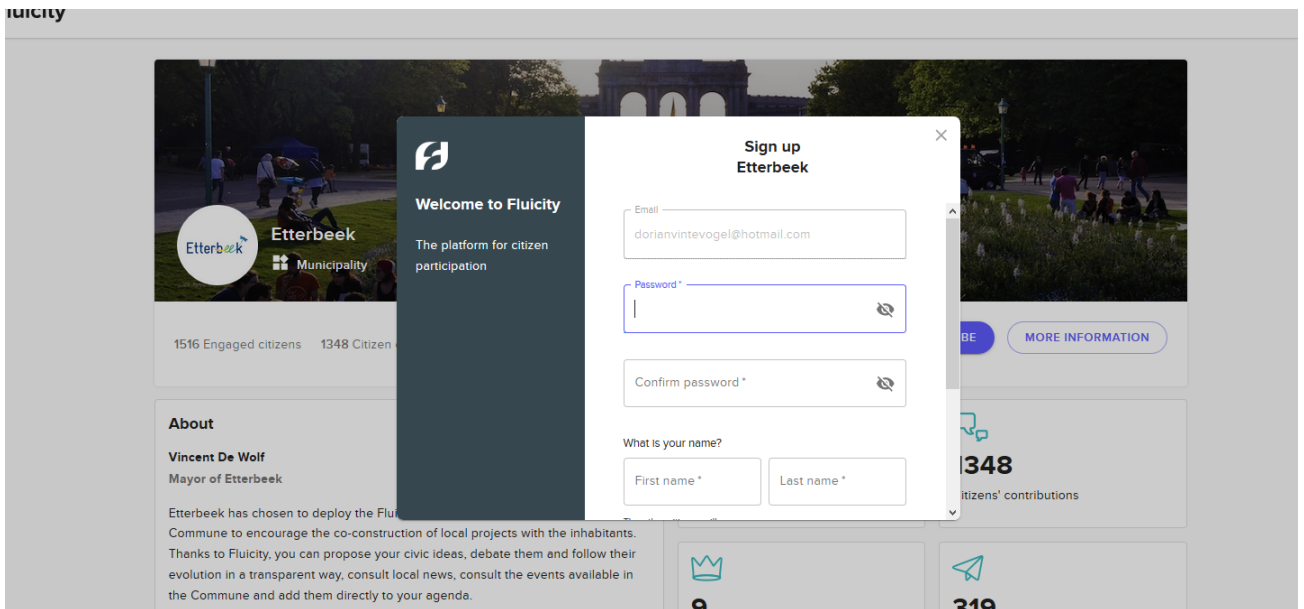


Figure 45: Second step of the subscribe feature

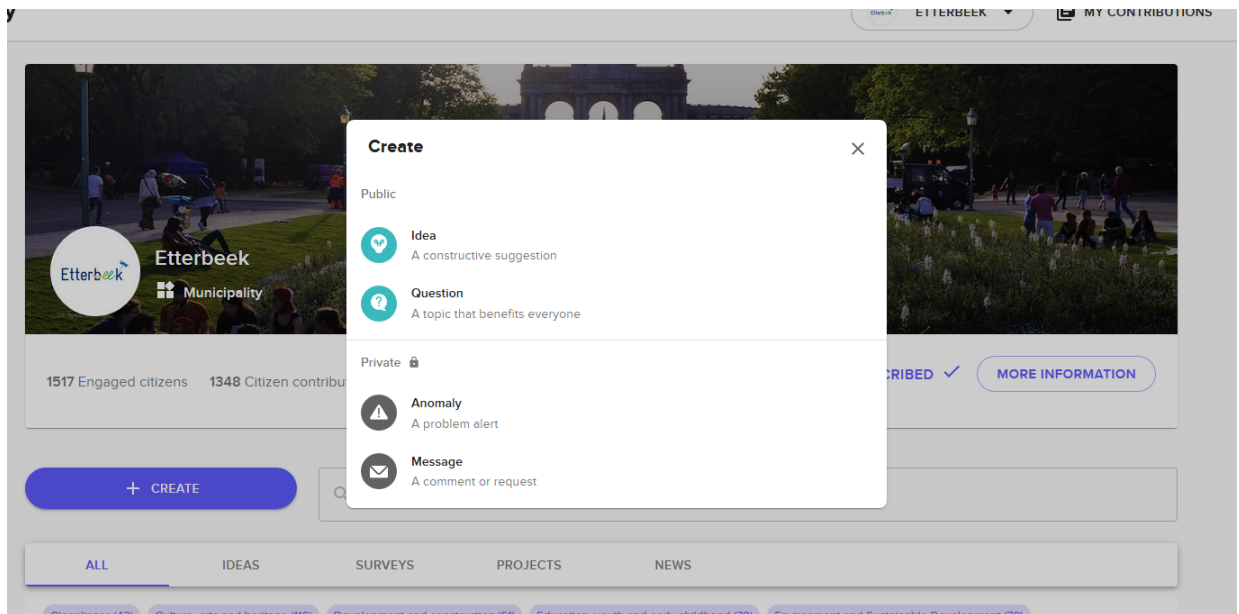
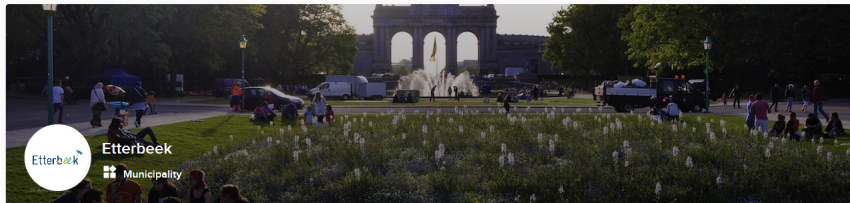


Figure 46: Create tab



Etterbeek Municipality

1516 Engaged citizens 1348 Citizen contributions 9 Ideas realized

SUBSCRIBED MORE INFORMATION

Suggest an idea

PUBLISH

Your idea will be public and debated. An organization may choose to make it happen.

To better answer you:

- 1 A proposal which can be put to the vote
- 2 Respectful, courtesy favours votes and concretizations
- 3 Clear and consistent, understandable by all

Title *
My idea in short is...

0/140

Category *
Select category

Description *
In concrete terms, I propose...

0/1200

Picture cover (optional)

Locate my idea (optional)

Figure 47: Idea proposal form

1517 Engaged citizens 1348 Citizen contributions 9 Ideas realized

SUBSCRIBE MORE INFORMATION

Idea #37924 in Etterbeek

Gilles D. 5 months ago

IDEA

Works and roads 6 4

Prohibit parking for pick-up truck type vehicles Place Saint-Antoine

Many vans park in Place Saint-Antoine resulting in the fact that motorists who have parked next to one of them cannot have proper visibility when trying to get out of their parking space. In addition, vans parked in front of the facade of some houses completely obstruct the view from inside the house, resulting in a drastic lack of light.

[See original text](#)

2 comments share tweet

2 Comments

improve this idea!
0/1200

SUBMIT

C M.
il y a 3 mois

Indeed, the ambulance company Klinicaire is very imposing in the area (parking) = lack of space for others! and don't always respect the traffic rules (screaming sirens and excessive speed just to get back to the medical center after a mission).
Wonder if he's paying for parking?

[See original text](#)

Figure 48: Display of an idea

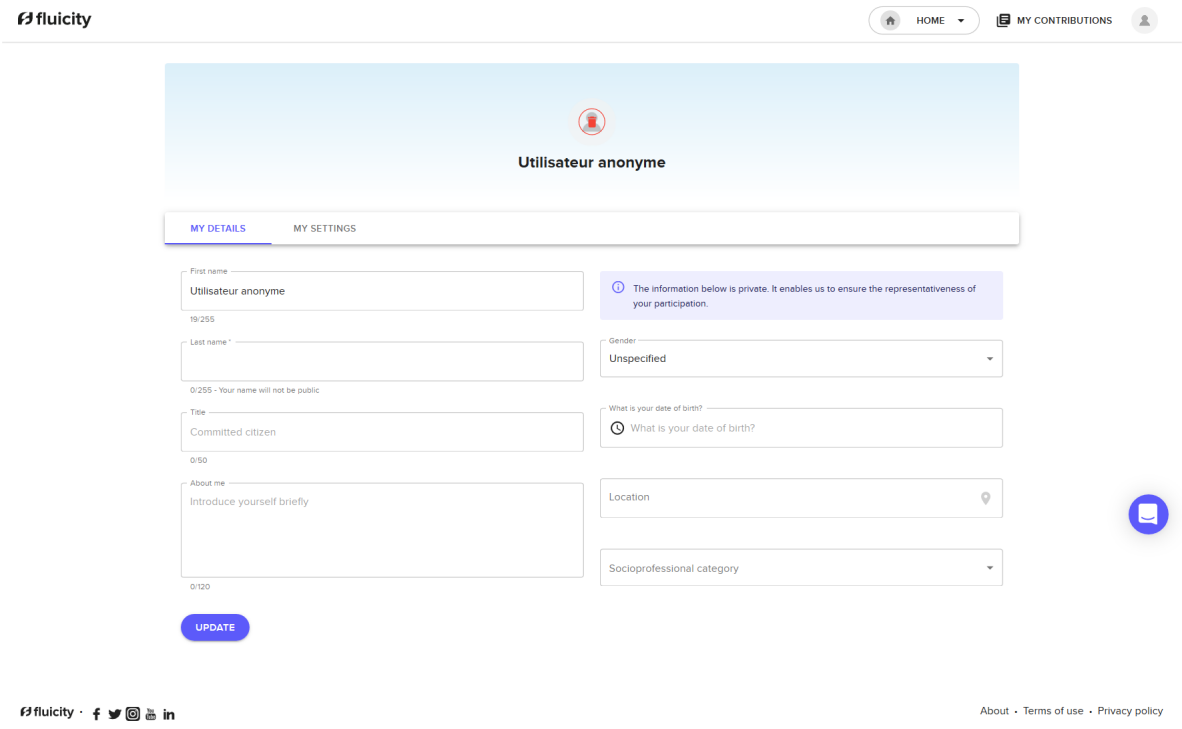


Figure 49: My details tab

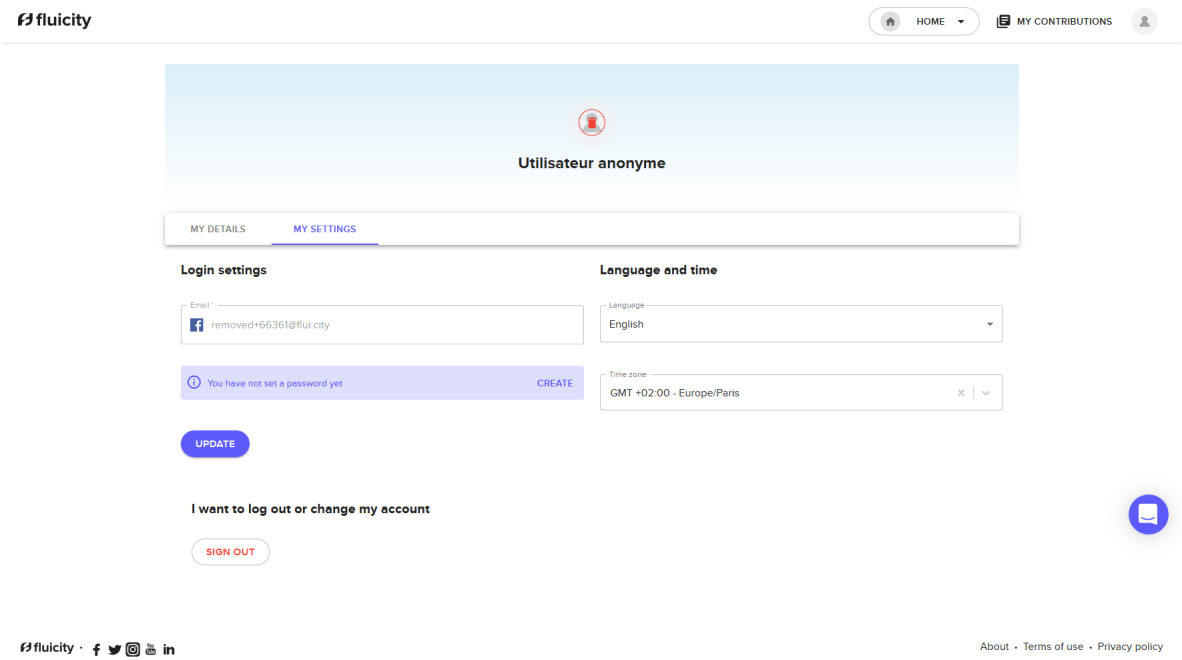


Figure 50: My parameters tab