FLEXPUB

Crompvoets, Joep; Bouckaert, Geert; Snoeck, Monique; HABRA, Naji; De Terwangne, Cecile; Vanden Berghe, Ingrid; Chantillon, Maxim; Kruk, Rink ; Simonofski, Anthony; Tombal, Thomas; Kruk, Rink W.

Publication date:
2020

Document Version
Publisher's PDF, also known as Version of record

BRAIN-be

BELGIAN RESEARCH ACTION THROUGH INTERDISCIPLINARY NETWORKS

Work Package Report

Sent to
BRAIN-be@belspo.be

Contract nr. BR/154/A4/FLEXPUB

Project – FLEXPUB

WP 5 – Case studies

Period : 01/11/2016 – 31/05/2020

D/2020/10107/003

NETWORK

COORDINATOR

Prof. dr. ir. Joep Crompvoets (KU Leuven – Public Governance Institute)

PARTNERS

- Prof. dr. Geert Bouckaert – Prof. dr. Ir. Joep Crompvoets (KU Leuven – Public Governance Institute)
- Prof. dr. Monique Snoeck (KU Leuven – Research Centre for Management Informatics)
- Prof. dr. Naji Habra – Dr. Benoit Vanderose (UNamur – Research Centre on Information Systems Engineering)
- Prof. dr. Cécile De Terwangne (UNamur – Research Centre on Information, Law, and Society)
- Ir. Ingrid Vanden Berghe – Jan De Waele (National Geographic Institute of Belgium)

AUTHORS

1. Prof. dr. ir. Joep Crompvoets (KU Leuven – Public Governance Institute)
2. Prof. dr. Monique Snoeck (KU Leuven – Research Centre for Management Informatics)
3. Prof. dr. Naji Habra – Dr. Benoit Vanderose (UNamur – Research Centre on Information Systems Engineering)
4. Prof. dr. Cécile De Terwangne (UNamur – Research Centre on Information, Law, and Society)
5. Maxim Chantillon (KU Leuven – Public Governance Institute)
6. Rink Kruk (National Geographic Institute of Belgium)
7. Dr. Anthony Simonofski (KU Leuven – Research Centre for Management Informatics)
8. Thomas Tombal (UNamur – Research Centre on Information, Law and Society)

PROJECT WEBSITE: WWW.FLEXPUB.BE

TABLE OF CONTENTS

EXECUTIVE SUMMARY

FLEXPUB aims to contribute to the development of a federal strategy for enabling flexibility, adaptability and innovation in the public sector with a focus on a next generation of geospatial electronic services (e-services). It is expected that the public e-services will continuously change as citizens have higher expectations towards them and technological developments provide new possibilities. During the last two decades, the Belgian federal government and administration have taken significant steps to satisfy (tomorrow's) stakeholders, i.e. citizens, businesses and public organisations.

"Work Package 5 - Case studies" (hereafter WP5) aims to present the challenges that were faced in three case studies having a strong link to location-based data and to echo these challenges with the key requirements for future e-service delivery by the federal administration identified in WP3 of the FLEXPUB research project. Moreover, WP5 aims at testing the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7) by confronting them to real-life scenarios. This iterative process will then allow to refine these strategic actions and guidelines.

The research is executed on the basis of case study research, whereby a multi-method approach is taken. Whereas WP2 and WP3, which focused on the analysis of challenges and requirements for geospatial e-services in the Belgian federal context, aimed to create a broad horizontal overview, the researchers applied, for this WP5, a methodology which allowed to gain an in-depth knowledge of three constellations in which geospatial data constitute the core of the e-service(s) that is/are offered or that might be offered in the future. The combination of a horizontal methodological approach in WP2 and WP3 and the in-depth approach in this WP5 created a complementarity that supports and underpins WP6 and WP7. As stated in the Methodology Chapter, the researchers based themselves on the expertise that can be found in the academic literature.

Three cases were selected for this WP, based on (1) the proposals put forward by the Members of the Follow-up Committee, and (2) the relevancy of the proposed cases compared to the results of WP2. The three selected and studied cases are the BeSt Address Project (BeSt Address & related aspects), the exchange of cadastral information in Belgium (URBAIN & Regional Relations) and the functioning of the emergency services in Belgium (FPS Interior Affairs / ASTRID Dispatching). The first two cases make use of geospatial information which is crucial for geospatial e-services: addresses and cadastral information. Both cases are also internally oriented. This means that the focus lies on the collaboration between public administrations, and not on the relation with external non-governmental organisations. The third case is focused on a key function of the state: Offering security and safety to its citizens.

Each of the cases is structure around the COBIT enablers used in WP3, namely Processes; Organisational structures; Service infrastructure & applications; People, skills & competencies; Culture, ethics & behaviour; Principles, policies & frameworks; Semantics and Location-based data. For all three case studies, the researchers made findings that could be related to one of the seven COBIT enablers. This demonstrates, once more, that the development of e-services is a highly complex phenomena which is influenced by various factors that influence each other. Indeed, several of the findings are not just connected to one enabler but have an overlap between various enablers.

Each of the case studies contains a number of findings which are highly relevant for the overall geospatial e-services context, and can support administrations in their quest for flexible and innovative e-services. For each of the case studies, the researchers provide a number of recommendations, based, on the one hand, on the information supplied via the respondents, the observations and the document analysis, and, on the other hand, on the project expertise in reaction to the requirements. This had led to a number of case specific and general recommendations, which are summarised in Chapter 3 – Case study results.

Then, on the basis of this analysis, some cross-case issues are identified in Chapter 4. Indeed, even if these cases all aim at tackling different problems, they face similar cross-cutting issues. In essence, nine cross-case issues are identified: i) Improving data quality; ii) Aiming for interoperability and standardisation; iii) Offering trainings to the civil servants; iv) Agreeing on Open Data licences; v) Defining authoritative sources of data; vi) Improving communication; vii) Streamlining cooperation; viii) Solving financial shortcomings; and ix) Increasing user

participation and inclusion.

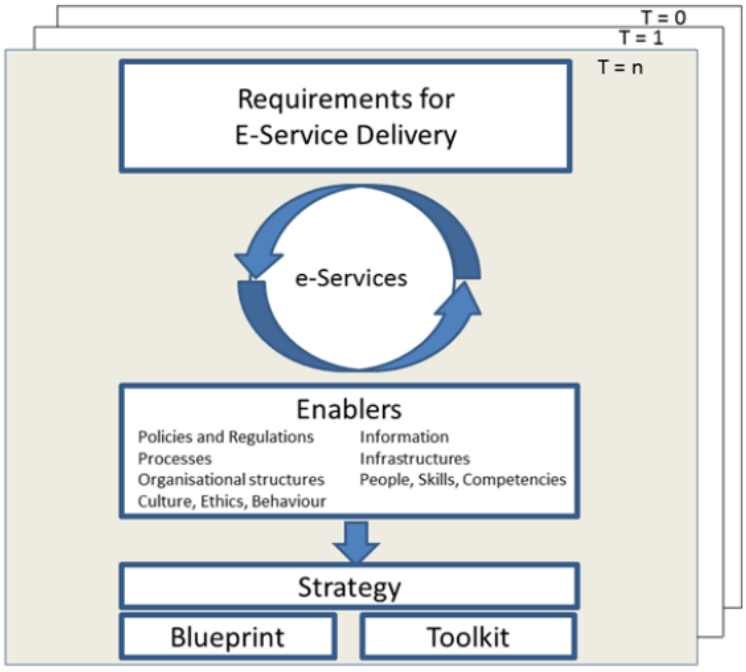
Finally, as the overall goal of those three case studies was to further refine the Strategy (WP6) and the Blueprint (WP7), the general recommendations, for each pillar, are discussed, in Chapter 5, in connection to the draft strategic actions and guidelines suggested in the draft Strategy and Blueprint.

1. INTRODUCTION

FLEXPUB aims to contribute to the development of a federal strategy for enabling flexibility, adaptability and innovation in the public sector with a focus on a next generation of geospatial electronic services (e-services). It is expected that the public e-services will continuously change as citizens have higher expectations towards them and technological developments provide new possibilities. During the last two decades, the Belgian federal government and administration have taken significant steps to satisfy (tomorrow's) stakeholders, i.e. citizens, businesses and public organisations.

"WP2 – Baseline Measurement" allowed the research team to understand the current situation about e-services in Belgium. The following step was to identify, in "WP3 – Requirements", the needs, ideas and requirements that the administrations have in order to be able to offer more flexible and innovative e-services, as well as the barriers that they face in doing so. The data was gathered and structured via the COBIT enablers (Processes; Organisational structures; Service infrastructure & applications; People, skills & competencies; Culture, ethics & behaviour; Principles, policies & frameworks; Location-based data and Semantics). On the basis of these requirements, the research team suggested, in "Work Package 4 – Enablers", leads for solutions to fulfil those needs and overcome those barriers. These requirements and leads for solutions were then used by the research team to suggest strategic actions in "Work Package 6 - Strategic Vision for Location-based e-Services" and to suggest guidelines in "Work Package 7 - Blueprint on Adaptive and Innovative Government".

Figure 1: FLEXPUB Methodological Approach



Source: FLEXPUB Research

The goal of "Work Package 5 - Case studies" is double. On the one hand, it aims to present the challenges that were faced in three case studies having a strong link to location-based data and to echo these challenges with the key requirements for future e-service delivery by the federal administration identified in WP3 of the FLEXPUB research project. On the other hand, it aims at testing the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7) by confronting them to real-life scenarios. This iterative process will then allow the research team to refine these strategic actions and guidelines.

To do so, a selection of three case studies closely linked to location-based data was made, on the basis of input the team received from the Members of the Follow-up Committee and of the relevancy of the proposed cases for the project, in light of the results of previous WPs. These cases are the following:

Case 1: BeSt Address

The BeSt Address project strives for the unification of the way of referencing addresses and the way of linking address data. To do so, the project aims to unify the references used for addresses, in particular by making recommendations on data models; to maintain the reference of addresses according to a Belgian standard; and to unify the rules for the allocation of addresses. This will make it possible to geolocate in a secure and unambiguous way, within administrations, each street and each address[1]. To do so, each Region will manage a register of addresses (authentic source) for its own territory.

This case, which focusses on a key type of location-based data, namely addresses, was signalled by a significant number of members of the Follow-up Committee as it includes various stakeholders (at the Federal, Regional and Local level), as it forms the basis for a well-functioning geospatial infrastructure, and as it has a strong historical-legacy (the premises of the project started at beginning of the 21st century), all of which is highly relevant to test the previous findings of the FLEXPUB project.

Case 2: Emergency Services in Belgium

A case study pertaining to the cartographic system of emergency services, with a specific focus on dispatching (ASTRID), was originally suggested by a member of the Follow-up Committee. After internal discussion, the research team decided to broaden this case study. Instead of focusing only on ASTRID, attention will go to the broader context of emergency services in Belgium. ASTRID nevertheless remains the starting point for this case study.

This case is relevant for FLEXPUB as it encounters several recurrent problems such as maintaining and automatically updating data, or the difficulty to include external data. Moreover, a number of technical challenges linked to the mapping of emergencies have been signalled. Yet, a well-functioning emergency system is part of the basic tasks of the State.

Case 3: Exchange of Cadastral Information

Cadastral information is managed by the federal public service Finance, and more precisely the General Administration for Patrimonial Information. This information is shared with partners at the federal, regional and local level, whereby the information is used for several policy goals. There are two main policy goals of cadastral information. On the one hand, there is a taxation purpose: the cadastral revenue is set on the basis of a number of factors, and it serves as a taxation basis for the various Belgian administrations. On the other hand, the cadatral information is used in the urban planning. This case study focused on the exchange of cadastral information in the Belgian federal context, and attempted to create an overview of the different challenges and requirements faced by the administrations working with the data.

This case, which focusses on a key type of location-based data was signalled by a number of stakeholders at different administrative levels. This is because the cadastral system is increasingly used by different stakeholders for urban planning, while it was originally created as a tool to tax landowners. Moreover, the complex organisational relations between the federal, regional and local administrations, especially regarding synchronisation of information, is a useful case study for the FLEXPUB project.

The rest of the report is organised as follows. Chapter 2 presents the overall methodological approach as well as the specific methodology used for each of the three cases. Chapter 3 presents, for each case studies, a number of findings which are highly relevant for the overall geospatial e-services context, and can support administrations in

[1] Accord de coopération du 22 janvier 2016 entre l'Etat fédéral, la Région flamande, la Région wallonne et la Région de Bruxelles-Capitale concernant l'unification de la manière de référencer les adresses et de la mise en relation des données d'adresses, *M.B.*, 15 février 2016. Available at http://www.ejustice.just.fgov.be.

their quest for flexible and innovative e-services. For each of the case studies, the researchers also provide a number of case specific and general recommendations. Chapter 4 relies on the analysis conducted in Chapter 3 in order to indentify some some cross-case issues. Indeed, even if these cases all aim at tackling different problems, they face similar cross-cutting issues. In essence, nine cross-case issues have been identified: i) Improving data quality; ii) Aiming for interoperability and standardisation; iii) Offering trainings to the civil servants; iv) Agreeing on Open Data licences; v) Defining authoritative sources of data; vi) Improving communication; vii) Streamlining cooperation; viii) Solving financial shortcomings; and ix) Increasing user participation and inclusion. As the overall goal of those three case studies was to further refine the Strategy (WP6) and the Blueprint (WP7), Chapter 5 discusses the general recommendations, for each pillar, in connection to the draft strategic actions and guidelines suggested in the draft Strategy and Blueprint. Chapter 6 concludes.

2. METHODOLOGY

OVERALL METHODOLOGICAL APPROACH

This Work Package was executed on the basis of case study research, whereby a multi-method approach was taken. Whereas WP2 and WP3, which focused on the analysis of challenges and requirements for geospatial e-services in the Belgian federal context, aimed to create a broad horizontal overview, the researchers applied, for this WP, a methodology which allowed to create an in-depth analysis of three constellations in which geospatial data constitutes the core of the e-service(s) that is/are offered or that might be offered in the future. The combination of a horizontal methodological approach in WP2 and WP3, and the in-depth approach in this WP, creates a complementarity that supports and underpins WP 6 and WP7. For the execution of the case studies, the researchers based themselves on the expertise that can be found in the academic literature, such as the work of, among others, Flyvbjerg (2006) and Yin (1981, 2003, 2014).

At the start of the FLEXPUB project, in 2016, the members of the Follow-up Committee were asked to suggest potentially relevant case studies. The members were asked to inform the researchers about case studies with a geospatial orientation as well as an e-service orientation. In total 16 case studies were suggested. An overview of these suggested case studies can be found in the table hereunder. In 2016 a first selection of the case studies was made on the basis of three main criteria and seven minor criteria. The three main criteria are: (1) internally oriented e-services of the federal government, (2) externally oriented e-services of the federal government with a traditional geo-oriented focus and (3) externally oriented e-services of the federal government with a non-traditional geo-oriented focus. The seven minor criteria are (1) usability of the case, (2) innovativeness of the case, (3) effectiveness of the case, (4) applicability of the case, (5) flexibility of the case, (6) overall impact of the case and (7) adaptability of the case to the changing environment. On the basis of those ten criteria, in total five cases were selected as being relevant for Work Package 5. Those cases were BeAlert, URBAIN & Regional relations, INFRABEL Railway Data Distribution, FPS Interior Affairs / ASTRID Dispatiching, and BeSt Address & related aspects.

Follow-up Committee Suggested Case Studies	
BeAlert	Regional traffic signs database
Proximus Analytics	Identification of black points on the road
URBAIN & Regional relations	European Location Framework
INFRABEL Railway Data Distribution	Crossroads Bank for Points of Interest
IRM-KMI-ULG Start-up	Aangifte van Werken – Déclaration de Travaux & Checkinatwork
FPS Interior Affairs / ASTRID Dispatching	BeSt Address & related aspects (POI – hectometre points)
State Archives Digitalisation: AAPD	Geo-OptiFed 1
e-TOD	Operational Cartography for Wildfire Fighting

At the Scientific Meeting of 18 May 2017, three cases were selected as final case studies for the project, based on (1) the proposals put forward by the Members of the Follow-up Committee, and (2) the relevancy of the proposed cases compared to the results of WP 2. The three selected and studied cases were as such part of this original list: The BeSt Address Project (BeSt Address & related aspects), the exchange of cadastral information in Belgium (URBAIN & Regional Relations) and the functioning of the emergency services in Belgium (FPS Interior Affairs /

ASTRID Dispatching). The first two cases make use of geospatial information which is crucial for geospatial e-services: addresses and cadastral information. Both cases are also internally oriented. This means that the focus lies on the collaboration between public administrations, and not on the relation with external non-governmental organisations.

The third case is focused on a key function of the state: Offering security and safety to its citizens. As can be seen from the titels of the cases, the researchers decided to broaden the scope of the third case study (emergency services). This was decided at the end of 2018. Furthermore, a meeting took place with one of the key actors of this case to further specify the scope of the case study. Originally it was only focused on ASTRID but the functioning of the emergency services in general, in which ASTRID is embedded as a key actor, proved to be more valuable for the purpose of this research. The case thus focussed on the governance of emergency systems, the information management of the data related to emergency services and the legal system in which the emergency services operate. This case is both internally and externally oriented: The focus lies also on the relation with the external users, and not only on the relation with the internal governmental actors.

Once the team presented the Strategic Vision for Location-based e-Services (WP6) in May 2018 to the Members of the Follow-up Committee, the team started to work actively on the case studies. In the period May 2018 – October 2018 attention was devoted to the selection of the relevant actors for each of the case studies, the preparation of the questionnaire and the development of the overall methodological framework. In December 2018 – January 2019, the first interviews were scheduled, and the interviews were launched in February 2019. The majority of the interviews took place in the first half of 2019, with a few remaining interviews taking place in the autumn of 2019.

The same methodological approach was applied for all three cases. The team created a questionnaire for each case study, based on the draft Strategy and Blueprint of WP 6 and WP 7 and a first understanding of the case which was studied. This questionnaire was then used for the interviews. Besides the interviews, the team also conducted desk research, and more specifically a document analysis for each of the three cases. The document selection was a combination of purposive sampling and snowball sampling (Bryman, 2016). Some documents were known by the researchers, others were signalled to the researchers by the interviewees and a final group of documents was retrieved on the basis of guidance via the two above-mentioned groups of documens. Finally, the team was allowed as observer to the BeSt Address Committee Meetings, so for this case also a field observation took place. This was not the case for the two other case studies. An overview of the approaches can be found in the table below. Overall, it can be said that a multi-method approach was followed for the case study research.

Case Study Approach		
Case 1 – BeSt Address	**Case 2 – Exchange of Cadastral Information**	**Case 3 – Emergency Services**
Semi-structured Interviews	Semi-structured Interviews	Semi-structured Interviews
Document Analysis	Document Analysis	Document Analysis
Field Observation		

All interviews were recorded, with the permission of the respondent(s) and transcribed afterwards. All respondents received the transcript afterwards and had the possibility to inform the researchers about issues related to the transcriptions. The analysis of the interview transcriptions was conducted via NVivo 12, a software program used for the analysis of qualitative text material. Coding via this specific software allowed for an objective analysis of the data. NVivo 12 is widely used for qualitative research. The data for all three case studies was structured around (1) the COBIT enablers, and in particular the identified challengens of WP2, and (2) the WP6/7 Strategy and Blueprint structure (De Haes, Van Grembergen, & Debreceny, 2013). In this way the case studies of this work package allowed for a direct connection to the other work packages.

Overall, the methodological approach can be summarised in the following graph:

Step	Action	Timing
Step 1	Case study **selection**	2016 – 2017
Step 2	Case study **refinement**	2018
Step 3	Case study **preparation** - interviews / document analysis / field observations	2018 – 2019
Step 4	Case study **data collection**	2019
Step 5	Case study **data analysis**	2019
Step 6	Case study **reporting**	2019 - 2020

Hereunder the different methodological steps for each of the three case studies can be found. First the methodology of the BeSt Address case study is presented, followed by the methodology of the cadastral information exchange case. Finally, more methodological information of the third case study, emergency services, is provided.

CASE 1: BEST ADDRESS

The methodology used for the BeSt Address case study relied on a combination of three research approaches, namely (i) interviews with selected actors having a key role in the project, (ii) field observation, (iii) and desk research.

QUESTIONNAIRE DEVELOPMENT

In order to have more coherence and consistency during the interviews that were conducted with key actors of the BeSt address project, a questionnaire containing a specific set of questions was developed by the FLEXPUB research team.

As one of the aims of the case study was to test the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7) by confronting them to real-life scenarios, the questions were structured according to the four pillars used for the Draft Strategy (Openness[2], Participation[3], Collaboration[4] and Geo-Orientation[5]) and echoed the suggestions made therein. The questions pertaining to the first three pillars[6] also echoed the guidelines made in the

[2] **Openness** is about sharing information and services as broadly as possible, when possible for free, in a secure and privacy compliant manner, in order to increase transparency and foster economic growth through collaboration and data re-use, and to generate value-added services.

[3] **Participation** is about involving all the stakeholders impacted by the digitalisation strategy, by taking into account their evolving requirements, needs, ideas or necessary training. This participation is essential to be able to match the expectations of the stakeholders regarding the e-services.

[4] **Collaboration** is about the administration's organisations embracing an ever more globalising world and society, in which they no longer act as single actors, but strive from an administration wide perspective towards alliances, cooperation and the sharing of data, tools and capacity to fulfil their tasks and duties towards a variety of stakeholders (public, private and citizens).

[5] **Geo-orientation** is about generating added value by answering the increasing demand for real-time and geo data and location-based services. This is not only relevant within a group of specialised actors, but also for actors from other policy fields, which might not always realise the potential of including a location component in their services. "What?", "When?" and "Where?" are the three simple questions that are to be considered in any e-service offered.

[6] Openness, Participation and Collaboration.

draft Blueprint, which is more general in scope and does not have a specific focus on location-based data.

This questionnaire can be found in Annex 1.

INTERVIEW SELECTION

The BeSt address project is piloted by an "Address committee", created by article 7 of the Cooperation agreement of 22 January 2016 underlying the project[7]. Therefore, it was clear for the research team that the key actors that should be interviewed, in order to collect their experience about the project and to see whether the Draft Strategy presents useful solutions or, on the contrary, should be adapted in certain respects, were the members of this committee.

However, given that it would have been too time consuming to meet all the members of the Address committee, a sampling approach was taken. This sampling approach aimed to match the balance found in the composition of this Address committee. Indeed, article 7 of the Cooperation agreement of 22 January 2016 provides that it is composed of two reprensatitives of each Region; two representatives of the Flemish and Walloon local communities; one representative of the Brussels and German community local communities; and six representatives of the Federal partners. There is thus a perfect balance (6 - 6 - 6) between the Federal, Regional and Local levels.

The sampling made for the interviews aimed to match this balance, as the aim was to conduct nine interviews in order to meet the three Regions, three Federal partners, and three representatives of the local communities.

In the end, eight interviews were conducted instead of nine, as it was only possible to meet two representatives of the local communities because the others never followed-up on the research team's invitation.

These interviews are the following:

Date	Level	Administration	Relevance
6 February 2019	Regional	Flemish Region - AIV	Manager of the register of Flemish addresses (CRAB)
14 February 2019	Regional	Walloon Region – Geomatic Department	Manager of the register of Walloon addresses (ICAR)
20 February 2019	Federal	FPS BOSA	Develops the information exchange platform
25 February 2019	Federal	FPS Economy – KBO/BCE	Key future user of the Regional registers
25 February 2019	Regional	Brussels Region – CIRB	Manager of the register of Brussels addresses (URBIS)
27 March 2019	Local	VVSG	Represents the Flemish local communities, who are the adresses' initiators
18 April 2019	Federal	FPS Interior – National Register	Key future user of the Regional registers
4 June 2019	Local	Local community	Represents the Walloon local communities,

[7] Accord de coopération du 22 janvier 2016 entre l'Etat fédéral, la Région flamande, la Région wallonne et la Région de Bruxelles-Capitale concernant l'unification de la manière de référencer les adresses et de la mise en relation des données d'adresses, *M.B.*, 15 février 2016. Available at http://www.ejustice.just.fgov.be.

			who are the adresses' initiators

FIELD OBSERVATION

As indicated above, the BeSt address project is piloted by an "Address committee", created by article 7 of the Cooperation agreement of 22 January 2016 underlying the project[8], which meets on a montly basis on average. Therefore, it was clear for the research team that it was necessary to attend those meetings, in order to observe the discussions that occurred between the members and to understand where the difficulties lie. Moreover, these meetings were highly valuable in order to gather additional information about the progress status of the project.

Via this field work, deeper insights were gained about the concrete challenges faced in the context of the project and about the working of the Address committee. These insights then allowed the researchers to ask, during the interviews, additional questions than those prepared in the questionnaire, in order to get individualised feedback by key members of the Address committee about discussion points that emerged during these meetings.

The team attended thirteen meetings of this "Address committee":

2018	2019	2020
29 March 2018	24 January 2019	21 January 2020
5 June 2018	26 March 2019	31 March 2020
6 September 2018	2 May 2019	
8 November 2018	26 June 2019	
11 December 2018	25 September 2019	
	21 November 2019	

DESK RESEARCH

The interviews and field observation were completed by desk research focussing on peripheric documents pertaining to the project. In this regard, the reports of the Address committee meetings were analysed, as well as the Cooperation agreement of 22 January 2016 between the Federal State, the Flemish Region, the Walloon Region and the Brussels-Capital Region on the unification of the way addresses are referenced and the linking of address data[9]; the Ministerial Circular "BeSt-Address - Guidelines and Recommendations for the Determination and Assignment of an Address and Housing Number" of 23 February 2018 issued by Jan Jambon, Minister of Security and Interior[10]; the Instructions for maintaining information in the National Register of natural persons up-to-date (Address of principal residence (TI 020) - New structure)[11]; and other background documents about the early stages of the project.

[8] Accord de coopération du 22 janvier 2016 entre l'Etat fédéral, la Région flamande, la Région wallonne et la Région de Bruxelles-Capitale concernant l'unification de la manière de référencer les adresses et de la mise en relation des données d'adresses, *M.B.*, 15 février 2016. Available at http://www.ejustice.just.fgov.be.

[9] Accord de coopération du 22 janvier 2016 entre l'Etat fédéral, la Région flamande, la Région wallonne et la Région de Bruxelles-Capitale concernant l'unification de la manière de référencer les adresses et de la mise en relation des données d'adresses, *M.B.*, 15 février 2016. Available at http://www.ejustice.just.fgov.be.

[10] Circulaire ministérielle "BeSt-Address - Directives et recommandations pour la détermination et l'attribution d'une adresse et d'un numéro d'habitation"du 23 février 2018 rédigée par Jan Jambon, Ministre de la Sécurité et de l'Intérieur : https://www.ibz.rrn.fgov.be/fileadmin/user_upload/fr/rn/circulaires/BeSt_Address_Recommandations_20180223.pdf

[11] SPF Intérieur, Direction générale Institutions et Population, Instructions pour la tenue à jour des informations au Registre national des personnes physiques - Adresse de la résidence principale (TI 020) - Nouvelle structure, 26 janvier 2017 : https://www.ibz.rrn.fgov.be/fileadmin/user_upload/fr/rn/instructions/notes-2017/20170127143951465.pdf

CASE 2: CADASTRAL INFORMATION SHARING

A combined qualitative research approach was followed for this case study, whereby the researchers decided to undertake the research by focusing on interviews and a document analysis (Bryman, 2016). It can, as such, be argued that a multi-method research approach was applied for this research. As discussed above, the two other cases had a similar research methodology. By applying a similar approach to the three cases, the comparability of the case study results in increased.

QUESTIONNAIRE DEVELOPMENT

In order to have more coherence and consistency during the interviews that were conducted with the selected actors related to the Cadastral Information Sharing, a questionnaire containing a specific set of questions was developed by the FLEXPUB research team.

As one of the aims of the case study was to test the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7) by confronting them to real-life scenarios, the questions were structured according to the four pillars used for the Draft Strategy (Openness[12], Participation[13], Collaboration[14] and Geo-Orientation[15]) and echoed the suggestions made therein. The questions pertaining to the first three pillars[16] also echoed the guidelines made in the draft Blueprint, which is more general in scope and does not have a specific focus on location-based data. Two specific comments need to be made here. It has to be underlined that the questionnaire served as a general backbone for the interviews. Firstly, depending on the specific expertise and/or role of the actor involved in the Cadastral Information Sharing, the questionnaire was modified. An example will clarify this: The actors from the local level were asked specific questions related to their local level, whereas the federal public service Finance received a number of specific questions related to their work. Secondly, during the interviews, and based on the responses of the interviewees, more in depth questions which were not taken up in the questionnaire were asked. Finally, it needs to be signalled that the federal public services Finance received, on their request, the questionnaire before hand. The other interviewees did not receive the questionnaire beforehand.

The general questionnaire which was created before defining the more specific questionnaires for the different interviewees can be found in Annex 2.

INTERVIEW SELECTION

The research applied two different selection approaches for the different governmental levels that were studied. For the federal administration as well as the regional administrations, a deliberate selection of the main actors was conducted. Because of earlier research and the active contacts with various actors involved in the cadastral information sharing context in light of the FLEXPUB project, the team was able to identify the main actors within the federal and regional administrations. The following organisations were contacted and granted the team an

[12] **Openness** is about sharing information and services as broadly as possible, when possible for free, in a secure and privacy compliant manner, in order to increase transparency and foster economic growth through collaboration and data re-use, and to generate value-added services.

[13] **Participation** is about involving all the stakeholders impacted by the digitalisation strategy, by taking into account their evolving requirements, needs, ideas or necessary training. This participation is essential to be able to match the expectations of the stakeholders regarding the e-services.

[14] **Collaboration** is about the administration's organisations embracing an ever more globalising world and society, in which they no longer act as single actors, but strive from an administration wide perspective towards alliances, cooperation and the sharing of data, tools and capacity to fulfil their tasks and duties towards a variety of stakeholders (public, private and citizens).

[15] **Geo-orientation** is about generating added value by answering the increasing demand for real-time and geo data and location-based services. This is not only relevant within a group of specialised actors, but also for actors from other policy fields, which might not always realise the potential of including a location component in their services. "What?", "When?" and "Where?" are the three simple questions that are to be considered in any e-service offered.

[16] Openness, Participation and Collaboration.

interview: FOD Financiën – SPF Finance, AIV, SPW – Département de la Géomatique, CIRB – CIBG and SCIP – CSPI.

At the local level, a random selection was conducted on all the local administrations of Belgium. A pool of local administrations was made for each of the three regions, i.e. Brussels Capital Region, Flemish Region and Walloon Region. From each of those three pools, a random selection of 10 local administrations was made. From this list of 10 local administrations, the first two were contacted for each region. In the Flemish Region and the Walloon Region this led to in total four successful interviews. In the Flemish Region the two first local administrations agreed with an interview. In the Walloon Region, the first local administration agreed, the second declined, and therefore the third local administration was contacted and agreed with an interview. In the Brussels Capital Region, however, the team was unable to find local administrations that were able to grant the reseachers with an interview. The researchers contacted all ten selected local administrations via mail and/or telephone, but none of them was willing to allow an interview. A combination of factors was mentioned: lack of time and resources, lack of interest, and lack of permission from the political level.

Date	Level	Organisation	Relevance
1 October 2019	Federal	FOD Financiën – SPF Finance	Federal actor responsible for cadastral information.
17 April 2019	Inter-federal	SCIP – CSPI	Inter-federal organisation for the sharing of patrimonial information.
21 May 2019	Regional	SPW – Département de la Géomatique	Actor responsible for the horizontal geospatial policy in the Walloon public administration.
9 May 2019	Regional	CIRB – CIBG	Actor responsible for the horizontal geospatial policy in the Brussels Capital Region public administration.
30 July 2019	Regional	AIV	Actor responsible for the horizontal geospatial policy in the Flemish public administration.
15 February 2019	Local	Flemish Local Community	Randomly selected local administration updating and using cadastral information.
20 February 2019	Local	Flemish Local Community	Randomly selected local administration updating and using cadastral information.
25 March 2019	Local	Walloon Local Community	Randomly selected local administration updating and using cadastral information.
9 August 2019	Local	Walloon Local Community	Randomly selected local administration updating and using cadastral information.

DESK RESEARCH

Besides the interviews, the researchers conducted desk research in the form of a document analysis. The selection was a combination of purposive sampling and snowball sampling (Bryman, 2016). As explained above, the documents were selected on the basis of prior knowledge related to this topic, because of references made to documents by the interviewees and on the basis of links in those documents to other documents. The document analysis helped the case study research in a number of ways. Firstly, it allowed to gain an excellent insight in the factual organisation of the exchange of cadastral information in Belgium. Secondly, it provided the possibility to validate and clarify a number of findings that were mentionned by the interviewees. And finally, it allowed to unveil a number of good practices and challenges. The document analysis focused both on legally binding documents, as well as policy documents and online websites. Indeed, the website of the main organisations at the federal and regional level provided us with useful information which allowed to improve the factual knowledge on the case study. Also, the websites of the local administrations that provided the researchers with an interview were analysed to see if any relevant information related to the exchange of cadastral information could be found. Examples of the analysed documents are Cooperation Agreements, federal Laws and Royal Decrees, regional Ordonnances and Decrees. Policy documents are for example the SCIP – CSPI Operation and Strategic Plan and factual information sheets available via the website of the FOD Financiën – SPF Finance.

CASE 3: EMERGENCY SERVICES

The methodology used for this case study relied on the combination of two elements, namely a questionnaire was developed (i) in order to conduct interviews with selected actors having a key role in the project (ii).

QUESTIONNAIRE DEVELOPMENT

In order to have more coherence and consistency during the interviews that were conducted with key actors of the emergency systems ecosystem in Belgium, a questionnaire containing a specific set of questions was developed by the FLEXPUB research team.

As one of the aims of the case study was to test the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7) by confronting them to real-life scenarios, the questions were also structured according to the four pillars used for the Draft Strategy (Openness, Participation, Collaboration and Geo-Orientation) and echoed the suggestions made therein. The questions pertaining to the first three pillars also echoed the guidelines made in the draft Blueprint, which is more general in scope and does not have a specific focus on location-based data.

This questionnaire can be found in Annex 3.

INTERVIEW SELECTION

In order to understand the ecosystem of stakeholders involved in the digitalisation of emergency services in Belgium, we decided to rely on a snowballing approach. Indeed, since the main focus of the case study was ASTRID, we started to conduct in-depth interviews with this organisation. From this central point, we then asked which stakeholders we should interview next, which led us to a list of other interviewees.

In the end, eight interviews were conducted. These interviews are the following:

Date	Level	Organisation	Relevance
2 March 2017	Federal	ASTRID	Geographical expert ASTRID and general overview of ecosystem and ASTRID
3 July 2018	Federal	NGI	Focus on Emergency System deployed for NATO Summit

17 July 2018	Private	CapGemini	Focus on Emergency Systems deployed for NATO Summit
28 September 2018	Federal	ASTRID / DRI	Geographical expert ASTRID, and discussion on NATO and challenges
9 May 2019	Federal	ASTRID	Geographical expert ASTRID, first validation of challenges and suggestion of other stakeholders to interview
22 May 2019	Federal	Federal Police – Direction de l'information policière et des moyens ICT (DRI)	Focus on users and federal collaboration
28 May 2019	Federal	NGI	Focus on data sources and data quality for ASTRID
17 July 2019	Local	Firefighters	Focus of users and operators of emergency system
19 November 2019	Local	Digipolis	Focus on innovative app to improve emergency services

DESK RESEARCH

On top of the conducted interviews, the researchers also performed desk research by analysing official documents and the websites of key organisations. The documents were selected on the basis of prior knowledge on the case and on references made by interviewees on the documents (specific questions were asked to the interviewees about potentially interesting documents). Examples of analysed documents include the challenges identified by ASTRID prior to the FLEXPUB project or the description of the ASTRID strategic goals and organigram.

Furthermore, we analysed the website of key organisations in the emergency services landscape such as ASTRID[17], Digipolis[18] or DRI[19].

[17] https://www.astrid.be/fr

[18] https://www.digipolis.be/

[19] https://www.police.be/5998/fr/a-propos/gestion-des-ressources-et-information/direction-de-linformation-policiere-et-des-moyens

3. CASE STUDY RESULTS

CASE 1: BEST ADDRESS

The BeSt Address project strives for the unification of the way of referencing addresses and the way of linking address data. To do so, the project aims to unify the references used for addresses, in particular by making recommendations on data models; to maintain the reference of addresses according to a Belgian standard; and to unify the rules for the allocation of addresses. This will make it possible to geolocate in a secure and unambiguous way, within administrations, each street and each address[20].

Before presenting the results of the analysis that was done based on the interviews, field observation and desk research, and the recommendations derived therefrom, it is first necessary to provide some background about the history of this project and the way it is structured, in order to better understand its purpose and challenges.

BACKGROUND

HISTORY

From our understanding, the first cooperation discussions between the Federal and Regional governments on the sharing of information or the joint setting up of authentic sources and their use started in 2003 at the initiative of the land register (Cadastre). It was called GeoCodi (Common Geo Dictionary). It was focussed on a common dictionary for the land register and it wanted to deal with a number of themes, such as cadastral information and addresses. GeoCodi was succeeded by DiCo, which was composed of two working groups[21], one dedicated to addresses and one dedicated to buildings. DiCo was then followed by DiCoAddress, which would eventually become (later on) BeSt address.

During the first five years, from 2003 to 2007, not much progress had been made in terms of finding an agreement on how the Federal and Regional governments could cooperate in order to define a common address framework. This was because this implied difficult political discussions.

However, a European Directive, adopted in 2007, brought the discussion back and gave it a new momentum, namely the INSPIRE Directive[22]. This is because this Directive contained the obligation for Member States to implement rules laying down technical arrangements for the interoperability and, where practicable, harmonisation of spatial data sets (Art. 7.1). According to the INSPIRE Directive, these implementing rules should notably provide for the creation of a common framework for the unique identification of spatial objects, amoung which addresses (Annex 1 of the Directive), to which identifiers under national systems can be mapped in order to ensure interoperability between them (Art. 8.2.a). These had to be adopted no later than 15 May 2009 (Art. 9.a).

Accordingly, in order to comply with the INSPIRE Directive, the discussions about the establishment of a common framework for the unique identification of addresses started over. This first led to the Cooperation agreement of 2 April 2010 between the Federal State, the Flemish Region, the Walloon Region and the Brussels-Capital Region for the coordination of a geographical information infrastructure[23].

However, the topic of creating a common framework for addresses was still highly sensitive from a political point of view, and a specific Cooperation agreement on the unification of the way of referencing addresses and the way

[20] Accord de coopération du 22 janvier 2016 entre l'Etat fédéral, la Région flamande, la Région wallonne et la Région de Bruxelles-Capitale concernant l'unification de la manière de référencer les adresses et de la mise en relation des données d'adresses, *M.B.*, 15 février 2016. Available at http://www.ejustice.just.fgov.be.

[21] One of the interwiewees also mentioned a working group named Strategis, that was ran by the land register, which could be one of these two working groups but we were not able to check how Strategis was linked to GeoCodi or DiCo.

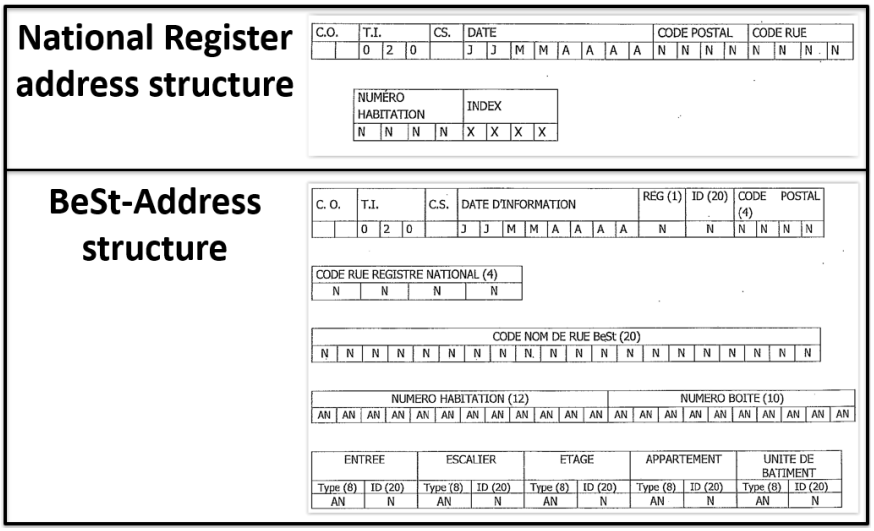
[22] Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), *OJ L 108*, 25 April 2007.

[23] Accord de coopération du 2 avril 2010 entre l'État fédéral, la Région flamande, la Région wallonne et la Région de Bruxelles-Capitale pour la coordination d'une infrastructure d'information géographique, *M.B.*, 12 avril 2011.

of linking address data was only adopted six years later, on the 22nd of January 2016[24].

As of this date, and through the means of the "Address committee" created by article 7 of this Cooperation agreement, representatives of the Federal, Regional and Local levels started working on this common address framework and on the integration of the three Regional registers (CRAB, ICAR and URBIS).

Figure 2: Unified address structure



Source: FLEXPUB (2019) based on the Instructions for maintaining information in the National Register of natural persons up-to-date – New TI 020 structure (2017)[25]

One of the missions of the "Address committee" was to set up a data exchange platform to connect the address registers and make the relevant address data contained in the address registers available to federal public authorities. It mandated the FPS BOSA to do so. Since 15 May 2019, the first two services (Full Download – including in Open Data - and Mutations) are operational. The other essential services were made available at the end of the summer of 2019. Finally, the secondary services, including the anomaly notification service, will be made available in spring 2020.

Finally, it should be mentioned that, for quite some time, there was an issue with the legal effect of the Cooperation agreement, as it took several years before it became clear that assenting laws and decrees were necessary in order to give legal effect to the Cooperation agreement[26]. This added some delay to the project as the legislation section of the Council of State, which reviewed the Federal assenting Law and the Regional assenting Decrees, required the Cooperation agreement of 22 January 2016 to be modified on some elements. Thus, the "Address Committee" had to agree on these modifications. The new text then had to be signed, once again, by the Federal and the Regional governments. This was done by the three Regions in April and May 2019. However, there was fear that it would not be signed by the Federal government during the 2014-2019 legislature, which would have meant that it would have had to been signed by all the new Regional and Federal governments of the 2019-2024 legislature, adding even more delay to the project. Fortunately, it was signed *in extremis* by the Federal government on 17 July 2019. The revised version of the Cooperation agreement should thus allow the assenting acts to be validated, and will then have full legal effect.

[24] Accord de coopération du 22 janvier 2016 entre l'Etat fédéral, la Région flamande, la Région wallonne et la Région de Bruxelles-Capitale concernant l'unification de la manière de référencer les adresses et de la mise en relation des données d'adresses, *M.B.*, 15 février 2016. Available at http://www.ejustice.just.fgov.be.

[25] SPF Intérieur, Direction générale Institutions et Population, Instructions pour la tenue à jour des informations au Registre national des personnes physiques - Adresse de la résidence principale (TI 020) - Nouvelle structure, 26 janvier 2017 : https://www.ibz.rrn.fgov.be/fileadmin/user_upload/fr/rn/instructions/notes-2017/20170127143951465.pdf

[26] Memo written by the "Laga" law firm on 23 May 2017.

This revised Cooperation agreement provides, in substance, that the three Regional address registers should be built by the 30th of June 2019 (Art. 3) and that the public authorities will have to use the addresses contained in these registers as of the 30th of June 2020 (Art. 11.2). It should be clarified that this date is only applicable for new encodings and modifications of addresses, but does not imply that these administrations have to change the addresses that they already have by this date. This will be done in a second step, at a later date that will have to be determined by the "Address committee" (Art. 11.2).

STRUCTURE OF THE PROJECT

The purpose of this BeSt Address project is to establish the organisational framework and minimum data model for the creation and ongoing maintenance, according to a common standard, of the data used for addresses and the establishment of a platform for the exchange of information on this data between the parties[27].

This relies on the constitution, by the three Regions, of address registers, recognised as authentic sources of data, each for their own territory[28]. These registers are CRAB in Flanders, ICAR in Wallonia and URBIS in Brussels. These Regions, named "Managers" in the project, not only have to build and manage these registers, but also have to give instructions to the "Initiators"[29], namely the local communities, who are responsible for the regular update of the address data corresponding to their territory (new, changed or deleted addresses and anomalies reported), on how this should be done. Moreover, the Regions have to set up a procedure allowing anyone to report any anomalies found[30].

Additionnaly, a limited list of Federal administrations[31], named "Partners" in the cooperation agreement, are provided with a free access to the addresses from address registers, but in exchange they are obliged to use these addresses, to cooperate in the development of the registers and to inform the "Managers" of any anomalies found in the address data[32].

To pilot this project, the Cooperation agreement created an "Address committee", composed of two representatitives of each Region; two representatives of the Flemish and Walloon local communities; one representative of the Brussels and German community local communities; and six representatives of the Federal partners[33]. There is thus a perfect balance (6 - 6 - 6) between the Federal, Regional and Local levels.

As said above, one of the missions of the "Address committee" was to set up a data exchange platform to connect the address registers and make the relevant address data contained in the address registers available to the Partners. It mandated the FPS BOSA to do so.

[27] Article 1 of the Cooperation agreement of 22 January 2016, as revised on the 17th of July 2019.

[28] Articles 2 to 4 of the Cooperation agreement of 22 January 2016, as revised on the 17th of July 2019.

[29] An "Initiator" is "*a public authority or third party that has received, by or under this cooperation agreement or by or under another legal or decreed provision, final and exclusive responsibility for the life cycle of one or more address data*" (Art. 2 of the Cooperation agreement of 22 Janurary 2016, as revised on the 17th of July 2019).

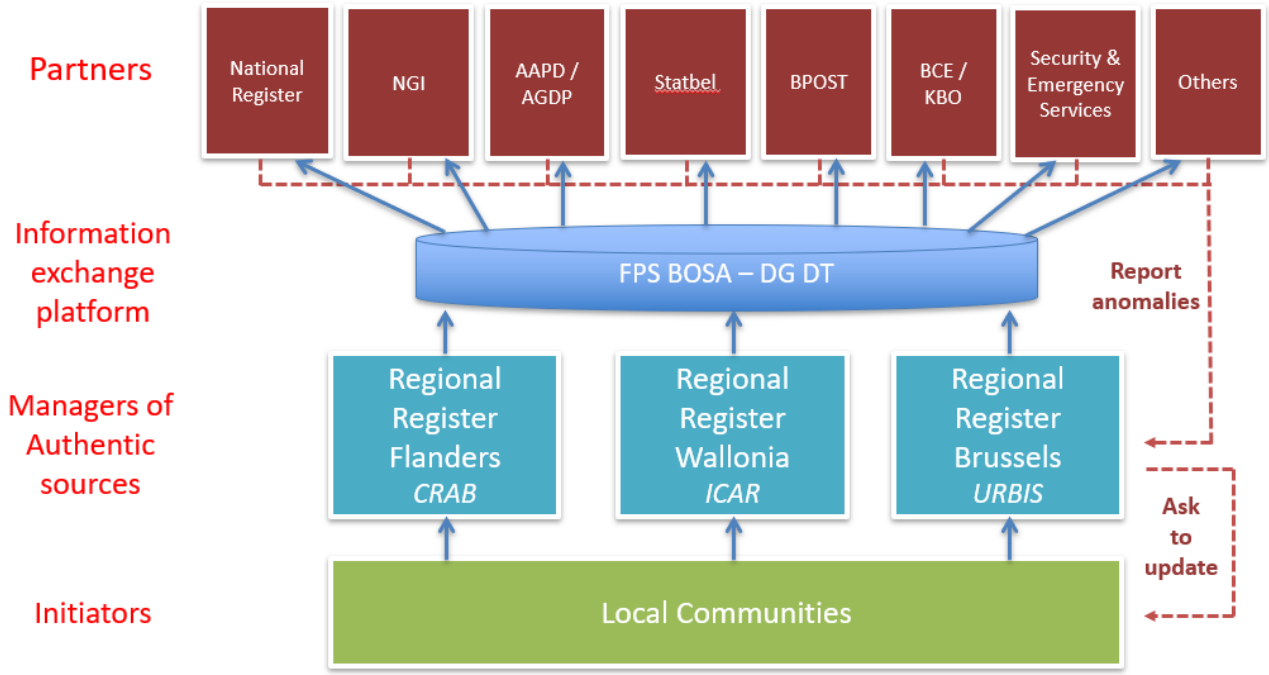
[30] Articles 4 and 5 of the Cooperation agreement of 22 January 2016, as revised on the 17th of July 2019.

[31] These "Partners" are the National Geographic Institute, the General Administration for the Patrimonial Documentation (FPS Finances), the National Register (FPS Interior), the DG Security and Prevention (FPS Interior), Statbel (FPS Economy), the Crossroad-Bank for Undertakings (FPS Economy), the DG Digital Transformation (FPS BOSA), the Agency for Administrative Simplification (Chancery of the Prime Minister) and B-POST. Other Partners can be added by the Address Committee (Art. 6.1 of the Cooperation agreement of 22 Janurary 2016, as revised on the 17th of July 2019).

[32] Articles 6.2 of the Cooperation agreement of 22 Janurary 2016, as revised on the 17th of July 2019.

[33] Article 7 of the Cooperation agreement of 22 Janurary 2016, as revised on the 17th of July 2019.

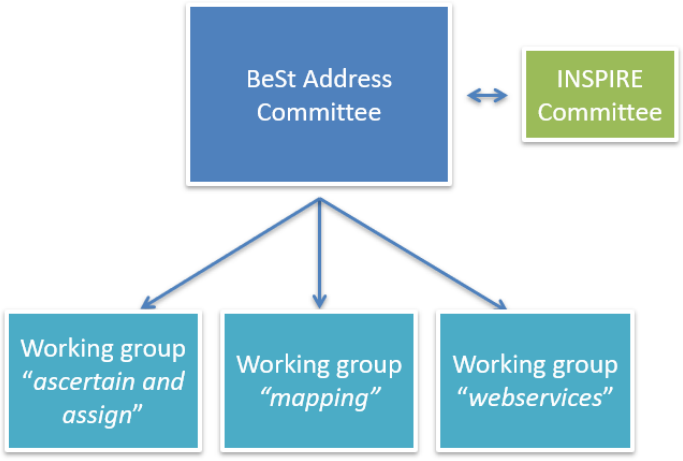
Figure 3: Roles in the BeSt address project



Source: FLEXPUB (2019)

Finally, it should be mentioned that the "Address committee" tasked three working groups to deal with critical elements of the project. The first working group is called "Ascertain and assign" and deals with the instructions to be given to the Initiators (local communities): how to name a street, how to create house numbers, avoid creating street names that sound the same or only have one letter that is different, etc. The second working group is called "Webservices" and deals with the technical aspects pertaining to the registers and the data exchange platform. The third working group is called "Mapping" and deals with how the addresses contained in the Regional registers can be mapped with the addresses contained in the current registers used by the Partners (Federal administrations). The goal is to have a sufficient degree of mapping in order to ensure a smooth transition towards the use of the Regional registers. We will see in the analysis below that this mapping issue is a crucial discussion point between the Managers and the Partners.

Figure 4: Address committee and working groups



Source: FLEXPUB (2019)

ANALYSIS

INTRODUCTION

The goal of the analysis conducted in WP5 is double. On the one hand, it aims to present the challenges that were faced in the three case studies and to echo these challenges with the key requirements for future e-service delivery by the federal administration identified in WP3 of the FLEXPUB research project. On the other hand, it aims at testing the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7) by confronting them to real-life scenarios.

Accordingly, the analysis of the challenges is done on the basis of the COBIT enablers used in WP3, namely Processes; Organisational structures; Service infrastructure & applications; People, skills & competencies; Culture, ethics & behaviour; Principles, policies & frameworks; Semantics and Location-based data[34].

Before diving into the core of the analysis, it is worth briefly discussing the overall visualisation of these challenges, as outlined by the analysis done via the Nvivo program.

Nodes name	Sources	References
Enablers		
• Processes	6	11
• Organisational structures	4	13
○ Federal discussion group	4	5
○ Lack of communication	6	18
• Service infrastructure & applications	5	11
○ Anomaly notification	2	2
○ Draaiboek	7	8
• People, skills & competencies	5	8

[34] According to the COBIT 5 framework (ISACA, *COBIT 5 Implementation*, 2012, p. 27):
- **Processes** "*describe an organised set of practices and activities to achieve certain objectives and produce a set of outputs in support of achieving overall (IT-related) goals*".
- **Organisational structures** "*are the key decision-making entities in an enterprise*".
- **Service infrastructure and applications** "*include the infrastructure, technology and applications that provide the enterprise with information technology processing and services*".
- **People, skills and competencies** "*are linked to people and are required for successful completion of all activities and for making correct decisions and taking corrective actions*".
- **Culture, ethics and behaviour** "*of individuals and of the enterprise are very often underestimated as a success factor in governance and management activities*".
- **Principles, policies and frameworks** "*are the vehicle to translate the desired behaviour into practical guidance for day-to-day management*".

The final enabler defined by the COBIT 5 framework, namely "Information" that is "*pervasive throughout any organisation and includes all information produced and used by the enterprise*", was renamed "**Location-based data**" by the FLEXPUB team, as the focus of the research project lies such type of data data. The team also added the **Semantics** enabler, to deal with interpretation and definition issues.

• Culture, ethics & behaviour	6	29
○ Data quality	8	24
○ Lack of political support	6	18
• Principles, policies & frameworks	7	20
○ Open data licences	5	9
○ Urban planning issues	4	9
• Semantics	1	3
• Location-based data	0	0

As can be seen, it is apparent that the most discussed enabler is "Culture, Ethics and Behaviour". This does not come as a surprise, as a change in the traditional way of working usually creates some resistance to this change. This enabler is also the most discussed because of data quality and mapping challenges.

On a second tier, come the "Principles, policies & frameworks" and "Organisational structures" enablers. For "Principles, policies & frameworks", this is mainly because of challenges pertaining to Open data, to urban planning, and to the difficulties in finding a way to convince (or to compel) local communitites to work with the new address structure. For "Organisational structures", this is mainly due to the difficulties deriving from the need to work with administrations across all levels of power.

On a third tier, come the "Service infrastructure & applications", "Processes" and "People, skills & competencies" enablers. For the first, this is mainly due to challenges of interoperability, user-friendliness and anomaly notifications. For the second, this is because of the challenges linked to the inclusion of users (Initiators). For the third, this is mainly linked to the lack of financial ressources that are necessary to implement the project.

The "Semantics" enabler was only marginally discussed during one of the interviews.

A final word should be said about the "Location-based data" enabler, which seems to not have been discussed at all. In reality, this enabler serves more as a background support to the others. Therefore, this should not be interpreted as meaning that location-based data was not discussed at all, but rather that it has been discussed in the context of other enablers, as addresses are location-based data. These discussion points were thus referenced in the other enablers but not in the "Location-based data" enabler.

PROCESSES

Stakeholder participation

As the BeSt address project involves the Federal, Regional and Local levels, one of the challenges of this project was to ensure the stakeholders' participation. While the project succeeded in involving the Regional and Federal stakeholders, it faces more difficulties in involving the local communities (at least in some of the Regions).

Indeed, FPS BOSA and the three Regions work hand in hand to set up the BeSt address model technically, in order to connect the three Regional registers via the information exchange platform created by BOSA, and to develop the services that can be used via this platform ("full download"; "mutations download"; "address history search"; ...). Moreover, the federal Partners are actively involved in the validation of the documents' analysis of the services and in the testing of these services. This is important and necessary because it would be hard for FPS BOSA to build those services on their own if they didn't receive feedback from the stakeholders.

This stakeholder participation is made possible by the fact that FPS BOSA employs AGILE methods. To be precise,

they work with "Prince 2" at high level and with ITIL at low level, as they realised the advantages of being able to react quickly to user requests. Being able to quickly adjust is highly important for such types of projects as, in the past, there were a number of failures in huge projects that were planned from the start over several years but were not able to adjust along the way.

However, while the stakeholder involvement is successful at the Federal and Regional level, it is much more of an issue at the Local level, at least in Wallonia and in Brussels. Indeed, while the local communities seem to be "on board" with the project in Flanders, this is less the case in Wallonia and in Brussels. One of the reasons for this is that the VVSG acted as a key link between the Flemish Region and the Flemish local communities for the creation of the CRAB project. Thus, the CRAB was built in co-creation and, naturally, the result of this is that the Flemish local communities are much more enclined to participate. In Wallonia and Brussels, there has been a much less "structured" participation by the local communities because there was no such relay as the one provided by the VVSG. Indeed, while the UVCW and Brulocalis were (and still are) invited to join the Address committee, they rarely (never) came. As a consequence, the liaison with the local communities was much more complicated to do than in Flanders. Quite interestingly, this more "structured" link was however present in the German speaking local communities, which explains why the BeSt address project is more accepted and followed there.

Linked to this is the fact that the local communities complained that they didn't have sufficient information about what to be expected about the change of paradigm and the influence it would have on their way of working. They would have liked to receive more concrete examples of how they will need to work with BeSt address, how to use the services etc. Yet, this was lacking, and the questions that they might have had about the services were sometimes left unanswered, which led to a lack of involvement and a decision to put the project "on the side". For instance, local communities have, for the moment, their own way of allocating numbers in apartment buildings and they would have liked to have a clearer information about how this will be impacted by BeSt address.

Private sector involvement

Another challenge relates to the involvement of the private sector, notably whether it should be provided access to the Regional register's data. According to one of the interviewees, this question has grown a little on its own, as many of the private actors need addresses that are located in the three Regions. While some see this as a crucial need for the future, others do not consider this as a priority and would rather focus on first achieving the core objective of the project before "losing focus" on such pereferical matters. Indeed, the BeSt address project was first and foremost built to benefit the public sector.

ORGANISATIONAL STRUCTURES

Inter-organisational relations between levels of power

As the BeSt address project involves the Federal, Regional and Local levels, another challenge of this project was to ensure a good collaboration between all the administrations, belonging to different levels of power. Indeed, it is complex to make all these various levels of power work together in Belgium, in light of the State reforms that occurred since the 1970s.

Before BeSt address, various administrations from various levels collected their own address data and structured this data according to their own need. To avoid such redundency and possible contradictions between the datasets, the use of a common address structure and of three authentic sources of address data was proposed as a solution. This led to the constitution of the Address committee, which was composed in such a way to ensure a perfect balance between the various levels of power involved in the project. Indeed, it is composed of two representatitives of each Region; two representatives of the Flemish and Walloon local communities; one representative of the Brussels and German community local communities; and six representatives of the Federal partners[35]. There is thus a perfect balance (6 - 6 - 6) between the Federal, Regional and Local levels.

[35] Article 7 of the Cooperation agreement of 22 Janurary 2016, as revised on the 17th of July 2019.

The challenge for this Address committee is to try to align with all of the parties' visions for the project. Indeed, these parties come with their own business cases, angles and needs, so they each have their own priorities, focus and way of working. Moreover, since there is no difference in hierarchy between the Federal level and the Regions, nothing can be imposed. Though this "network" approach might, at first sight, seem less efficient than a "hierarchy" approach, where one party decides and the others follow, it has its own advantages. Indeed, if all the parties are involved on an equal footing and participate together to the definition of a solution, this will ensure a greater "take-up" of the solution down the road, even if it takes more time to reach this solution, while the "hierarchy" model presents more risks of resistance by the non-deciding parties. In any case, in light of the political situation in Belgium, a "network" approach seems like the only viable solution.

Inter-organisational relations within a single level of power

This need for coordination is not only present between different levels of powers but also within a single level of power. In the context of BeSt address, this was mostly the case for the Federal level, as several Partners having their own priorities and needs were involved. None of these Federal administrations has a hierarchical superiority on the others and thus they need to find a common ground on the matters pertaining to the BeSt address project.

To do so, these Federal partners meet in an informal way when important decisions pertaining to the project have to be taken, in order to agree on a common position and to present a united front. These are purely *ad hoc* meetings organised when necessary and do not occur via an official organ. For instance, these informal meetings lately mostly occurred in order to discuss the update of the text of the Cooperation agreement and mapping issues between the Federal and Regional registers[36].

Communication difficulties

The BeSt address project has also encountered communication difficulties, and this at several levels.

First, there were some communication issues within the Address committee. On the one hand, some of the Federal Partners pointed out that they were never told why the initial deadlines for the readiness of the Regional registers and the services of the information exchange platform were not met. Indeed, the initial deadline was 1 January 2018. Until that date, nothing was ever said about a possible delay (though this had been questioned several months before by the Partners). It is only in January 2018 that it was finally acknowledge that the deadline was not met and that some extra time was needed, but a clear explanation was never given on the reasons of this delay. On the other hand, the Regions complained about the recurring absence of the National Register at the Address committee meetings and its unclear communication about the way it would adapt to BeSt address. Both these communication difficulties created some frustrations within the Address committee.

Second, there were some communication issues towards the Local communities. Indeed, some complaints were voiced about the fact that the progress of the project was not communicated often enough to these local communities. To be sure, some information was provided to the local communities via the Ministerial Circular "BeSt-Address - Guidelines and Recommendations for the Determination and Assignment of an Address and Housing Number" of 23 February 2018[37] and the Instructions for maintaining information in the National Register of natural persons up-to-date (Address of principal residence (TI 020) - New structure)[38], but these communications referred to the former deadlines. Yet, these deadlines are now exceeded and the local communities have very little visibility about the latest developments, and this leads to a lack of understanding about the effect it will have on them, as for many of them BeSt address is still a very abstract project. Not only does this prevent these local

[36] See *infra* "Culture, ethics & behaviour".

[37] Circulaire ministérielle "BeSt-Address - Directives et recommandations pour la détermination et l'attribution d'une adresse et d'un numéro d'habitation"du 23 février 2018 rédigée par Jan Jambon, Ministre de la Sécurité et de l'Intérieur : https://www.ibz.rrn.fgov.be/fileadmin/user_upload/fr/rn/circulaires/BeSt_Address_Recommandations_20180223.pdf

[38] SPF Intérieur, Direction générale Institutions et Population, Instructions pour la tenue à jour des informations au Registre national des personnes physiques - Adresse de la résidence principale (TI 020) - Nouvelle structure, 26 janvier 2017 : https://www.ibz.rrn.fgov.be/fileadmin/user_upload/fr/rn/instructions/notes-2017/20170127143951465.pdf

communities from anticipating the changes in order to smoothen the transition, but it also leaves the room for unfounded rumours to spread. For instance, according to an interviewee, some of these local communities even thought that the BeSt address project had been abandoned as it had been years since they last received information about the project. Once again, this communication issue is especially present in Brussels and in Wallonia, where the UVCW and Brulocalis didn't play their role as intermediaries, while it is less present in Flanders due to the relay done by the VVSG. This lack of communication with the parties that will have to implement the project "on the field" is a major challenge that has to be solved. Indeed, it is the local communities that, as Initiators, will have to validate the address contained in the three Regional registers and will have to work with these registers on a daily basis. According to some of the interviewees, this communication should not only come from the Address committee, but also from the National Register that should clearly state that, as of the 30th of June 2020, they will use the BeSt address model (as provided in the updated Cooperation agreement of 2019). In this context, this communication should not only target the civil servants in the local communities, but also the political deciders in these local communities so they can understand the ambit of the project and the need to allocate the necessary funds and workforce.

SERVICE INFRASTRUCTURE & APPLICATIONS

Interoperability

The integration of the three Regional registers through the platform developed by FPS BOSA creates interoperability challenges. This is because the delivery of the data by the Regions to BOSA runs parallel to the normal service they offer from their registers. Though it is the same data, the format and the data model are different, as well as the way in which the services are set up. This situation is comparable to the situation the Regions already face for the compliance with the INSPIRE Directive[39], which is a third parallel stream.

The consequence is that, while looking up an address via one of the regional Registers or via BOSA's platform should provide the same answer, the "packaging" will look different. For instance, it was decided that the names of the attibutes and objects (street, postal code, box number…) would be in English in BeSt address, while it will be in French and/or Dutch in the Regional registers. This explains why the integration work to be done by BOSA is not so straightforward because even though the three Regions have a common data model, their interpretation from this model and the way they implement it can present some differences.

While this interoperability requirement is a key challenge on the integration side, it is less of a problem on the user side. This is because BOSA is developing this integration platform on the Federal Service Bus (FSB), which is where the current services of the Federal Partners that will use this platform (National Register, KBO/BCE…) are already located. Hence, there is already some form of standardisation in this regard.

Another key challenge in terms of interoperability is the development of the "Anomaly notification" service. Indeed, in order to have qualitative and up-to-date Regional registers, it is fundamental that the users have the possibility to signal anomalies in order to correct potential mistakes or to fill potential gaps in the registers. Indeed, a register can never be 100% perfect and will always need to evolve to match the evolution of the situation on the field. So far, each Region has its own anomaly notification service for its own register, which is a must-have for any authentic source. In substance, the users signal the anomalies to the Regions, and the notification is then (automatically) forwarded to the relevant local community, that has to check the anomaly and act upon it if necessary, as it is these local communities who are the Initiators of addresses and thus have the competence to say what is correct and what is not (see for instance Article 11 of the Flemish CRAB decree[40]). Because of the integration of the three Regional registers on BOSA's platform, it is now necessary to develop a similar anomaly notification service for the

[39] Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), *OJ L 108*, 25 April 2007.

[40] Decreet van 8 mei 2009 betreffende het Centraal Referentieadressenbestand, *M.B.*, 1 juli 2009 ; Decreet van 1 juni 2012 houdende wijziging van het CRAB-decreet van 8 mei 2009, *M.B.*, 12 juni 2012.

users of this platform. According to BOSA, this will be ready by spring 2020.

User-friendliness

To ensure the take-up of the BeSt address model, the user-friendliness of the services developed by BOSA is absolutely vital. Indeed, the incentive for local communities to switch to the BeSt address services offered by BOSA might be very low if they only use the addresses from one Region.

Yet, making this switch can be highly valuable in some cases, and the user-friendliness of these services should be ensured in order to facilitate this switch. In practice, this requires to approach the service providers who develop applications for local communities in order to provide them with clear information about what is expected, and with the documentation pertaining to the services (What exactly do the services do? When should you use which service?).

It is also important to give clear procedures to the local communities on how they should do the validation of the Regional registers' addresses and how the switch to the BeSt address model will influence their way of working. This challenge was well understood by the Address committee, who delegated to the working group "ascertain and assign" the mission to create a "Draaiboek", containing clear instructions and illustrative exemples for the local communities. It is envisaged as a list of scenarios that could occur in real life and it makes recommendations about how the local communities could handle these situations. As these are simply recommendations, the local communities are free to follow them or not, but they at least are provided with advices.

The goal of this Draaiboek is to complement the Ministerial Circular "BeSt-Address - Guidelines and Recommendations for the Determination and Assignment of an Address and Housing Number" of 23 February 2018[41] and the Instructions for maintaining information in the National Register of natural persons up-to-date (Address of principal residence (TI 020) - New structure)[42]. This Draaiboek, which is based on a Danish document, will further refine the guidelines contained in these two previous documents, with clear exemples and use-cases. To ensure that this document is truly user-friendly, several local communities, coming from the three Regions, are involved in its creation (e.g. Liège, Schaarbeek, Uccle and Antwerp).

Finally, the technical information about the services developed by BOSA are documented on their website[43]. There, BOSA provides information about the description of the service and its use, as well as about the different versions of that service. There are also the technical descriptions and there is a general manual for services on the FSB.

PEOPLE, SKILLS & COMPETENCIES

Lack of financial resources

Another key challenge faced by the BeSt address project is the lack of sufficient financial ressources. This notably stems from the fact that no form of outside additional budget was foreseen for the project. Therefore, each administration involved in the project has to allocate some of its budget in order to participate. It is a form of "give and take". Each participant dedicates some budget and man power to the project, and expects the others to do the same. For one of the interviewees, though it would of course be nice to have more budget, this give and take model is workable as long as the tasks taken on by each party are clearly defined.

However, according to another interviewee, a more structured financing would notably help for the project management. Indeed, right now, the members of the Address committee have joined the project on a voluntary

[41] Circulaire ministérielle "BeSt-Address - Directives et recommandations pour la détermination et l'attribution d'une adresse et d'un numéro d'habitation"du 23 février 2018 rédigée par Jan Jambon, Ministre de la Sécurité et de l'Intérieur : https://www.ibz.rrn.fgov.be/fileadmin/user_upload/fr/rn/circulaires/BeSt_Address_Recommandations_20180223.pdf

[42] SPF Intérieur, Direction générale Institutions et Population, Instructions pour la tenue à jour des informations au Registre national des personnes physiques - Adresse de la résidence principale (TI 020) - Nouvelle structure, 26 janvier 2017 : https://www.ibz.rrn.fgov.be/fileadmin/user_upload/fr/rn/instructions/notes-2017/20170127143951465.pdf

[43] See https://dtservices.bosa.be/fr/services/fsb/catalogue/bestservices-s332/information-bestservices-s332

basis, and all do as much as they can within the Address committee and the three working groups, with the limited budget they have. This makes it very difficult to organise and prepare the meetings and working groups as people have very little time for that.

Moreover, this self-financing way of working can also be challenging when the project takes longer than expected, as is the case with BeSt address. For instance, one of the interviewees indicated that the problem for them was that they had planned the budget up to 2018, according to the initial deadlines. They had hired an external consultant as a project leader to organise everything but, given that the project was delayed and not ready, they had to give that person a different job. As a consequence, they now have to allocate new budget to the implementation of the project. In sum, one of the challenges of the self-financing way of working is that it is not always easy to provide the right resources at the right time.

Importantly for the implementation of the project, this budget issue is not only challenging for the members of the Address committee, but also for the local communities that will have to allocate budget and man power to the validation of the addresses contained in the Regional registers. This is a very time-consuming task and for the smallest local communities, who only have a handful of civil servants, this adds up to an already full list of things to do. Without extra budget, it might be difficult for these local communities to manage, especially if they do not see the need for it and if, in addition, their hierarchy is not aware of the project's necessity. While some call for help from the Regions, others have said that they would not do it without additional means.

Difficulty to retain IT oriented profiles in the public sector

It is also worth briefly mentioning a challenge that was faced by FPS BOSA. One of the reasons that the creation of the information exchange platform took more time than anticipated is that several project managers that they had originally appointed to work on this platform left during the first year of the project, in order to go work in the private sector. This testifies of the broader difficulty that the public sector has in retaining IT oriented profiles. In the same vein, another interviewee indicated that they still had a number of open IT oriented job offers and that the time where the public sector received a massive influx of candidates is over. Those who do apply look for the best possible deal and compare the public sector's offers with those of the private sector, who offer extra benefits. It is thus very complicated for the public sector to compete.

CULTURE, ETHICS & BEHAVIOUR

Fear of change and strong silo structure

As any project involving a change of paradigm in the way of working, a major challenge faced in the context of the BeSt-Address project is that of the natural fear of change and of the difficulty for the parties to abandon their strong silo structure culture.

Prior to the BeSt address project, many administrations worked with their own address registers (National Register, KBO/BCE, land registry, CRAB, ICAR, URBIS…), their own concepts, their own rules… This multiplication of sources was problematic as there was a redundancy of sources but also discrepencies between these sources. This could lead to confusing situations. The purpose of the BeSt address project was to clarify the situation by establishing three authentic sources of address data (CRAB, ICAR and URBIS) that would have to be used by all the other administrations. This would avoid redundancies and would ensure that everyone uses the same addresses. This is especially true for parties like the local communities who use addresses from both the Federal and the Regional levels. When there were discrepencies between the sources, this could lead to problematic situations. The goal of BeSt address is thus to ensure that everyone uses and exchanges the addresses coming from the authentic sources.

Naturally, this change of perspective creates some resistance to change by some administrations who have to give up their old way of working, corresponding to their specific needs, and fit into a new model, where they are no longer the source of the addresses they use. This is the classic "stay out of my kitchen and let me do my thing" reaction, as each party is convinced that its way of working is the best way. For instance, up to now, each local community was free to create addresses the way it wanted and this potentially led to as many ways of working as there are local communities. The BeSt address project aims at unifying these procedures and this will have an

impact on these local communities that will have to adapt their current way of working. Therefore, although they retain their autonomy in deciding on the street names, they will have to give up some of it in order to respect the structure of how this should be done. This creates a natural resistance to change reaction.

Another example of resistance to change stems from the fact that several Federal Partners have announced that their goal was not to be automatically connected to the Regional registers, but rather that they would copy these Registers on a regular basis in order to work on them internally. Namely, they argue that they do not want to delay the response time to requests formulated by their users, by having to interrogate the Regional registers because they do not have the information internally. This can seem surprising as an authentic source is the source where the data is kept up-to-date, so the Regions probably did not intend for the Partners to simply take a copy of their register and continue working from that copy. Yet, these Partners will say that they make this copy in order to add things that weren't in it and that there is a business reason for that (e.g. additional information useful for emergency services).

In sum, the challenge is that there are many parties with their own business cases, needs, priorities and focus. It it thus a matter of changing the cultures and bringing everyone together, which is why the Address committee is so important. Naturally, this is complicated by the fact that there isn't a single source, but rather three Regional sources, which means that each Region is free to build their source and their data model as they see fit, as long as they respect the common rules agreed upon. These rules nevertheless leave some room for slight discrepencies between the registers.

Debate over data quality / mapping

This resistance to change and strong silo structure culture is exacerbated, in the BeSt address project, by the core debate between the members of the Address committee about data quality / mapping. Indeed, there is still a certain reluctance on the part of the Federal Partners to switch to the Regional registers, because this would constitute a form of loss of control on the source of address data. Yet, they are responsible, towards there users, for the quality of the data so they want to ensure that the quality of the Regional registers is sufficient for them to accomplish their public service mission.

So in fact, while everyone agrees that no register can be 100% perfect (including the registers currently used by the Federal Partners, as they admit that their own registers are not perfect and that they contain mistakes) and that the best way forward and the best guarantee to improve the quality of the sources (notably thanks to the anomaly notification mechanism) is that as many people as possible use the same ones, the crux of the problem has shifted to the question: what is the mimimum level of quality to be reached by the Regional registers in order for the Federal Partners to agree to make the switch? This is a highly sensitive question as, on the one hand, each of the Regional registers has been recognised as an authentic source thus the Regions consider that they already offer such a minimal level of quality and that the most important thing is that everyone works with a single source per territory, that there is only one "reality" and that there are good anomaly notification mechanisms in place in order to increase the quality of these registers. On the other hand, the Federal Partners want to be able to do, before transitioning to the Regional registers, a near-perfect one-to-one matching between their registers and the Regional registers, because they are responsible towards there users for the quality of the data. Acording to the Regions, such a one-to-one mapping is, by essence, practically impossible as they Federal and Regional registers do not use the same identifiers, do not have the same way of working, etc.

During the Address committee meetings, this debate of data quality / mapping crystalised around two specific issues raised by the Federal Partners. The first one is that many of the "Box" numbers were missing in the URBIS register. According to the Federal Partners, this is a real problem as this information (contained in the National Register) is vital for social security services for instance. To this, the Brussels Region replies that the quality of the box numbers contained in the National Register (currently used by the social security institutions) is questionable, as the local communities simply verified, through the intervention of the proximity inspector, that the citizens indeed lived at the address that was given, but never verified that this housing was compliant with the urban planning legislation. To solve this issue, the Brussels Region indicated that it would import the box numbers from federal registers into its own register (URBIS). The second one is that the address ID lifecycle is not the same in the three Regions. For instance, in Flanders, a new address ID is allocated when an address is modified (e.g. when the street name

changes), while this is not the case in Wallonia and Brussels, where the address ID stays the same if the address is modified. This is a problem for the Federal Partners as they would like to use a harmonised system. They want to avoid the situation where an identifier that was given to them one year before no longer refers to the current situation as the address to which it referred to was modified. In this regard, they do not so much request that each Region changes the way it works, but rather that a solution should be found to translate this to a harmonised way of working. To solve this issue, the three Regions and BOSA have agreed to come up with a uniform "Solution Design" to tackle this issue. In practice, the Federal partners will document their concrete use cases, so that the Regions can themselves formulate solution proposals. This will be done through collaborative work sessions. Naturally, the objective is not to re-build completely the Regional registers on the basis of requirements that cannot (or should not) conceptually be tackled through the means of an authentic source of addresses. Conversely, it is also important for these Regional registers to be able to address the Federal use cases, in order to ensure a smooth transition towards the BeSt address model.

In light of the above, the results of the "mapping" working group will be a major turning point in the project because either these results are satisfactory for the Federal Partners and that allows the project to move on peacefully, either these results do not reassure these Federal Partners and this could cause more delay. In this regard, it should be mentioned that, in parallel to the work done by this "mapping" working group, the Federal Partners met in an informal manner in order to delegate to BOSA the mission to do the mapping for all of the Federal Partners, in order to give a single report / document to the Regions with the anomalies that they have spotted (it would then be for the Regions and the local communities to verify, and if need be correct, these anomalies). This initiative surprised the Regions which did not understand why such a parallel mapping was conducted. More importantly, what striked the Regions is that the Federal Partners seemed to imply that if this matching exercise showed that the quality wasn't sufficient for them, then they would not switch to the BeSt address model. This is not understandable for the Regions who underlined that these Federal Partners already made the commitment to switch to the BeSt model in the Cooperation agreement that they signed and that they are now adding extra-conditions that were not initially foreseen. All this adds to the already palpable tensions.

This whole debate on data quality is getting more intense as time goes by, since the revised Cooperation agreement of 2019 provides that the public authorities will have to use the addresses contained in the Regional Registers as of the 30th of June 2020 (Art. 11.2). Nevertheless, it should be clarified that this date is only applicable for new encodings and modifications of addresses, but does not imply that these administrations will have to change the addresses that they already have in their databases by this date. This will be done in a second step, at a later date that will have to be determined by the "Address committee" (Art. 11.2). According to one of the interviewees, the real challenge is therefore not so much in the first phase of the implementation (new encodings and modifications) but rather in the second phase (evolution of the existing addresses).

To sum the topic up, it seems clear that the level of the Regional registers must be good enough, in such a way that it is workable and usable by the various Federal Partners, but also that these Federal Partners must not be too critical and set the requirements too high, because this might give the feeling to the Regions that their registers will never be good enough in light of this resistance. Yet, everyone sees the added value of working with this BeSt address model, and as mentioned by one of the interviewees, it is a matter of not losing the momentum.

Lack of sufficient political support

Next to this matter of change and silo structure, another important challenge faced by some of the members of the Address committee is that of the lack of sufficient political support. Indeed, several interviewees told us that, though there is political support for the goal of the project, they wish they had had more support for the concrete implementation, in order to make things go faster. This is not a matter of bad will, but rather that these political deciders simply sometimes have other priorities. For instance, not much moved after the signature of the Cooperation agreement in 2016. Yet, the governments should have known that this, in itself, was not enough and that it required assenting Laws and Decrees. Yet the political level did not move on this issue, and it is only when the Address committee realised that this was a necessity and reverted to the political level that they reacted. Thus, the interviewees wish that the political deciders had been more proactive in the implementation of the project. A

good illustration of this is the very lengthy process that was necessary to obtain the political signatures from all the relevant governments for the updated version of the Cooperation agreement, as it is complicated to align the political will of all these various governments at the same time.

This deficit of sufficient political support mostly has an impact on the implementation of the project by the local communities. As pointed out by one of the interviewees, there was a stronger political will in Flanders, which led to the adoption of the CRAB-decree[44] and the obligation for the Flemish communities to use this Regional register. On the contrary, in Wallonia and Brussels, there is no such legal obligation so the local communities will be much less inclined to use the Regional registers, as they see this as another layer of additional work and are very attached to their autonomy. Indeed, because of the lack of relay at the political level for this project, the local communities also do not see the added value of it and thus relegate it to the things that they will do later, because they have limited financial means. However, it should be pointed out that the Walloon government intends to revise the atlas of municipal roads and that ICAR will be the tool that will allow the local communities to register their municipal roads. Hopefully this project, which benefits from a lot of political support, will create more pressure and incentives on the local communities to use ICAR, which will *de facto* be beneficial for the BeSt address project.

PRINCIPLES, POLICIES & FRAMEWORKS

INSPIRE

As mentioned in the historical background of the case, the discussions about the establishment of a common framework for the unique identification of addresses were given a new momentum in 2007 with the adoption of the INSPIRE Directive[45]. This is because this Directive contained the obligation for Member States to implement rules laying down technical arrangements for the interoperability and, where practicable, harmonisation of spatial data sets (Art. 7.1) and that these implementing rules should notably provide for the creation of a common framework for the unique identification of spatial objects, amoung which addresses (Annex 1 of the Directive), to which identifiers under national systems can be mapped in order to ensure interoperability between them (Art. 8.2.a). One of the legal challenges of the BeSt address project was thus to comply with this Directive.

Implementation by the local communities

As mentioned above, another challenge of the BeSt address project is its implementation by the local communities. In Flanders, this is less of a problem because of the adoption of the CRAB-decree[46], which obliges the Flemish communities to use this Regional register. On the contrary, in Wallonia and Brussels, there is no such legal obligation so the local communities will be much less inclined to use the Regional registers, as they see this as another layer of additional work and are very attached to their autonomy. Some of the interviewees therefore suggested to think about adopting a similar obligation in Wallonia and Brussels. Here, it should be reminded that the Walloon government intends to revise the atlas of municipal roads and that ICAR will be the tool that will allow the local communities to register their municipal roads. Hopefully this project, which benefits from a lot of political support, will create more pressure and incentives on the local communities to use ICAR, which will *de facto* be beneficial for the BeSt address project.

Personal data protection

A third legal challenge is whether the address data contained in the Regional registers constitutes personal data. On this issue, Flanders' position is that, as such, the Regional registers do not contain any personal data, but only addresses. If considered in isolation in these registers, these addresses are not personal data and only become so

[44] Decreet van 8 mei 2009 betreffende het Centraal Referentieadressenbestand, *M.B.*, 1 juli 2009 ; Decreet van 1 juni 2012 houdende wijziging van het CRAB-decreet van 8 mei 2009, *M.B.*, 12 juni 2012.

[45] Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), *OJ L 108*, 25 April 2007.

[46] Decreet van 8 mei 2009 betreffende het Centraal Referentieadressenbestand, *M.B.*, 1 juli 2009 ; Decreet van 1 juni 2012 houdende wijziging van het CRAB-decreet van 8 mei 2009, *M.B.*, 12 juni 2012.

once they are linked with other information taken elsewhere. Thus, as long as they provide access solely to the address registers and not to any other data, there is no problem. This position relies on two opinions of the Flemish Privacy Commission regarding the CRAB-decree[47]. In Wallonia, the position is that these addresses are personal data, but that the provisions of the GDPR[48] are respected.

Here, it should be pointed out that, from a legal point of view, the Walloon approach is the right one. Indeed, Art. 4.1 of the GDPR defines personal data as: "*any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier*". Recital 26 of the GDPR adds that: "*to determine whether a natural person is identifiable, account should be taken of all the means reasonably likely to be used, such as singling out, either by the controller or by another person to identify the natural person directly or indirectly*". It is thus clear from the GDPR that the register data cannot simply be considered "in isolation" of all the other data available to public administrations. Indeed, even if the data controller[49] of the Regional registers does not himself link the register data with other data, it is sufficient, for this register data to be considered as personal data, that another person (e.g. other administrations) can link this data with other data. The address data contained in the register can thus be considered as personal data if it relates to identifiable natural individuals. Only the address data corresponding to addresses where undertakings are established will not be considered as personal data.

This means that the data controllers of the Regional registers will have to ensure that they comply with the GDPR. They thus first need a lawful ground for the processing of this personal data, which in this case is the necessary processing for the compliance with a legal obligation[50]. Moreover, they shall ensure that access by third parties (e.g. by the Partners) complies with the purpose limitation principle, according to which it should be limited to specified, explicit and legitimate purposes[51]. Access should also be limited to the data that is necessary for this specific purpose, the quality of the data should be ensured and it should be stored for no longer than is necessary for this specific purpose[52]. This echoes the debate on the quality of data, and notably the fact that the quality of the address data used by the National Register has to be very high, as it will be the basis for any communication by the public administrations with the natural people. Additionnaly, both the data controllers of the Regional registers and the Partners will have to document how their use of this address data complies with these principles (accountability principle)[53]. They will also have to ensure that the data subjects can exercise their rights, such as a request for data rectification or erasure[54].

Open data

A fourth legal challenge that surfaced in the context of the BeSt address project pertains to the potential publication, in Open data, of the address data contained in the registers. Indeed, this data could be highly valuable for private

[47] Vlaamse Toezichtcommissie voor het elektronische bestuurlijke gegevensverkeer, Beraadslaging VTC nr. 01/2011, 23 februari 2011, Advies inzake het ontwerp van besluit van de Vlaamse Regering houdende de uitvoering van het decreet betreffende het Centraal Referentieadressenbestand, http://vtc.corve.be/docs/adviezen/VTC_advies_W_2011_01.pdf; Beraadslaging VTC nr. 02/2011, 16 november 2011, Advies inzake het voorontwerp van decreet houdende wijziging van het decreet van 8 mei 2009 betreffende het Centraal Referentieadressenbestand, available at http://vtc.corve.be/docs/adviezen/VTC_advies_W_2011_02.pdf.

[48] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), *OJ L 119*, 4 May 2016.

[49] "*The natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data*" (Art. 4.7 of the GDPR).

[50] Art. 6.1.c) of the GDPR.

[51] Art. 5.1.b) of the GDPR.

[52] Art. 5.1.c), d) and e) of the GDPR

[53] Art. 5.2 of the GDPR

[54] Arts. 15 to 22 of the GDPR.

sector undertakings, and according to article 3 of the PSI Directive[55], the public authorities shall make their data re-usable for commercial and non-commercial purposes.

A first question was raised as to the compatibility, with the GDPR[56], of opening up this address data. Indeed, the PSI Directive provides that it does not affect the level of protection granted to personal data[57]. In other words, the PSI Directive applies insofar as it is compatible with the rules contained in the GDPR. The common position of the Address committee is this compatibility is ensured and that these registers can be published in Open data. They are thus available for full download on BOSA's website[58].

A second challenge derived from the fact that, until recently, Flanders and Brussels gave access to their registers for free, while re-users of the Walloon register had to pay. This created a major inconsistency and set back for any re-user wishing to access the address data from the three Regions. Fortunately, the Walloon has recently changed its position on the topic and now also provide this data for free.

The third challenge derived from the matter of the open data licences to be used[59]. Indeed, each Region and the Federal level have their own licence for their own data. This might lead to potential difficulties for the re-users if they wish to combine data from the three Regions but that these Regions' licences contain incompatible clauses. The question is thus whether the access to the address registers, via BOSA's platform, should be subject to the acceptance, by the re-user, of all four licences (the three Regional and the Federal licences) or whether a specific common licence should be created for that access to the integrated address data via BOSA's platform.

According to one of the interviewees, it would not be workable to create a specific licence for BeSt address, that would operate in parallel to the existing four licences, because then you have different licences covering the same data. Rather, the debate should be whether each entity continues to work with its own licence or whether a common licence for all the Open data services of all the entities is created. He added that if this discussion is to be had, this should be managed at a higher level, for consistency purposes. Namely, these licensing considerations should be discussed by the INSPIRE committee and should not be limited to addresses.

Another interviewee seemed to agree with this position, saying that it would be necessary to have a standard licence for all (maybe including some variations for some specific datasets) that should be based on European standards,

[55] Directive 2013/37/EU of the European Parliament and of the Council of 26 June 2013 amending Directive 2003/98/EC on the re-use of public sector information, *OJ L 175*, 27 June 2013. Belgian transposition: Loi du 4 mai 2016 relatif(sic) à la réutilisation des informations du secteur public, *M.B.*, 3 juin 2016; Decreet van 12 juni 2015 tot wijziging van het decreet van 27 april 2007 betreffende het hergebruik van overheidsinformatie en het decreet van 18 juli 2008 betreffende het elektronische bestuurlijke gegevensverkeer, *M.B.*, 30 juni 2015; Ordonnance du 27 octobre 2016 visant à l'établissement d'une politique de données ouvertes (Open Data) et portant transposition de la directive 2013/37/UE du Parlement européen et du Conseil du 26 juin 2013 modifiant la directive 2003/98/CE du Parlement européen et du Conseil du 17 novembre 2003 concernant la réutilisation des informations du secteur public, *M.B.*, 10 novembre 2016; Dekret vom 29. juni 2015 zur Abänderung des Dekrets vom 18. Dezember 2006 über die Weiterverwendung öffentlicher Dokumente, *M.B.*, 17 juillet 2015; Décret du 12 juillet 2017 relatif à la réutilisation des informations du secteur public et visant à l'établissement d'une politique de données ouvertes (« Open Data »), *M.B.*, 7 août 2017; Décret conjoint du 12 juillet 2017 relatif à la réutilisation des informations du secteur public et visant à l'établissement d'une politique de données ouvertes (« Open Data ») pour les matières visées à l'article 138 de la Constitution, *M.B.*, 7 août 2017; Décret conjoint de la Région wallonne et de la Communauté française du 19 juillet 2017 relatif à la réutilisation des informations du secteur public et visant à l'établissement d'une politique de données ouvertes (« Open Data »), *M.B.*, 13 septembre 2017.
This Directive has been revised in 2019: Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information, *OJ L 172*, 26 June 2019. This recast version will have to be transposed in Belgian law before the 17th of July 2021.

[56] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), *OJ L 119*, 4 May 2016.

[57] Article 1.4 of the Directive 2013/37/EU.

[58] https://opendata.bosa.be/index.fr.html

[59] Article 8 of the Directive 2013/37/EU.

as there is no need to re-invent the wheel. In this regard, the choice would be between the CC-BY[60] and CC-0[61] Creative Commons licences. While the CC-BY offers more control than the CC-0, the problem of using the former in the context of BeSt address is that there might be attribution issues if the user gets the data from BOSA's platform.

Finally, it should be mentioned that, according to an interviewee, putting the address data in Open data might also encourage the local communities to work more proactively on the address validation. According to him, one of the reasons why the local communities are so reluctant to do this validation work is that they do not see the point nor the effect of their work. All they see is that they dedicate a lot of time and money to this task. However, if they see that the address data they create is re-used by someone and that this creates value, then this will give them more purpose. For instance, if they saw that the emergency services used these validated addresses, and that the use of correct and precise addresses allowed them to be more efficient and to save lives, this would make it clear for these local communities why they put so much time and energy into this validation.

Urban planning considerations

A final legal challenge is linked to the urban planning considerations. This challenge is intrinsically linked to the reason why the local communities are reluctant to take up the BeSt address model. To understand this, it is necessary to remind the current situation. When a person comes to the "Population service" to indicate that he has moved into a house in the local community, this "Population service" references the address given by the citizen in the National Register. There is first a temporary registration, that will be validated once the proximity inspector (police) has checked that the person does live at the registered address. However, this agent does not check the compatibility with the urban planning legislation.

The novelty with the BeSt address model, is that these "Population services" will only be able to register people at addresses that are referenced in the Regional register. If this address is not existant yet, then they will have to notify this anomaly. In practice, this means that the "Urban planning service" will have to check whether this address exists on the field and complies with the urban planning legislation.

This is precisely where the crux of the problem lies because, according to the interviewees, the local communities indicated that if they become aware of a violation of the urban planning legislation, they are legally obliged to prosecute the case. This is allegedly one of the reasons why they do not want to switch to this model because, for the moment, they do not feel compelled to check that the address they reference in the National Register complies with the urban planning legislation. With BeSt address, and this required check, they are afraid that it will lead to the discovery of too many urban planning violations and that they will not have the means to prosecute them all.

In reality, the legal situation is more nuanced than that. Admittedly, the local communities have the competence to prosecute cases of urban planning violations[62]. However, they do not have the obligation to do so, but rather a discretionary power to do so or not. Therefore, if they do discover a wide number of urban planning violations via the use of the BeSt address model, they will not be legally obliged to prosecute them all. The only legal risk that a local community might face if it doesn't prosecute a violation, that it has been made aware about, is if this violation then causes a damage to a third party (for example a damage caused to a neighbour by the fact that a unifamilial house has been transformed, without authorisation, in a housing with five separate apartments) and that this third party brings an action for damages against this local community. Nevertheless, it should be mentioned that the probability that such a procedure, based on Article 1382 of the Civil Code, will be successfully launched by a third party is very low.

[60] https://creativecommons.org/licenses/by/2.0/be/

[61] https://creativecommons.org/publicdomain/zero/1.0/deed.fr

[62] Code du Développement territorial du 20 juillet 2016, *M.B.*, 14 novembre 2016, articles D.VII.4 to D.VII.15 (Wallonia); Code bruxellois de l'aménagement du territoire (CoBAT) du 9 avril 2004, *M.B.*, 26 mai 2004, articles 301 to 310 (Brussels); Vlaamse codex ruimtelijke ordening van 15 mei 2009, *M.B.*, 20 augustus 2009, articles 6.2.4 to 6.2.14 (Flanders).

SEMANTICS

A small semantics challenge was discussed by one of the interviewees, namely about what constituted a "Register" in the sense of the Cooperation agreement[63]. The question was whether the Regional registers had to be recognised as an authentic source before being used in the context of the BeSt address project. In fact, the answer to this question is contained in Article 2 of this Cooperation agreement, which defines an address register as "*an authentic source of addresses*". Thus, this means that when Article 3 of this Cooperation agreement provides that the three Regions undertake to set up by 30 June 2019, each for its own territory, an address register, this also implies that these address registers had to have been recognised as authentic sources, by each of the Region for its own register, before this date. Fortunately, this was the case.

LOCATION-BASED DATA

As said in the introduction, though the "Location-based data" enabler seems to not have been discussed at all, in reality, this is because this enabler serves more as a background support to the others. Therefore, this should not be interpreted as meaning that location-based data was not discussed at all, but rather that it has been discussed in the context of other enablers, as addresses are location-based data. These discussion points were thus referenced in the other enablers but not in the "Location-based data" enabler.

SUMMARY

From all of the above, it can be concluded that, even though this project presents several challenges, there are essentially two main challenges that still need to be solved in order for the BeSt address project to be a success. These pertain to the data quality / mapping debate on the one hand, and to the lack of involvement and implementation by the local communities on the other hand.

Regarding the data quality / mapping debate, we have outlined that it was a typical case of resistance to change and strong silo structure culture. To summarise this debate, it seems clear that the level of the Regional registers must be good enough, in such a way that it is workable and usable by the various Federal Partners, but also that these Federal Partners must not be too critical and set the requirements too high, because this might give the feeling to the Regions that their registers will never be good enough in light of this resistance. Everyone sees the added value of working with this BeSt address model, and as mentioned by one of the interviewees, it is a matter of not losing the momentum.

During the Address committee meetings, this debate of data quality / mapping crystalised around two specific issues raised by the Federal Partners. The first one is that many of the "Box" numbers were missing in the URBIS register. According to the Federal Partners, this is a real problem as this information (contained in the National Register) is vital for social security services for instance. To this, the Brussels Region replies that the quality of the box numbers contained in the National Register (currently used by the social security institutions) is questionable, as the local communities simply verified, through the intervention of the proximity inspector, that the citizens indeed lived at the address that was given, but never verified that this housing was compliant with the urban planning legislation. To solve this issue, the Brussels Region indicated that it would import the box numbers from federal registers into its own register (URBIS). The second one is that the address ID lifecycle is not the same in the three Regions. For instance, in Flanders, a new address ID is allocated when an address is modified (e.g. when the street name changes), while this is not the case in Wallonia and Brussels, where the address ID stays the same if the address is modified. This is a problem for the Federal Partners as they would like to use a harmonised system. They want to avoid the situation where an identifier that was given to them one year before no longer refers to the current situation as the address to which it referred to was modified. In this regard, they do not so much request that each

[63] Accord de coopération du 22 janvier 2016 entre l'Etat fédéral, la Région flamande, la Région wallonne et la Région de Bruxelles-Capitale concernant l'unification de la manière de référencer les adresses et de la mise en relation des données d'adresses, *M.B.*, 15 février 2016. Available at http://www.ejustice.just.fgov.be. This cooperation agreement has been revised on the 17th of July 2019.

Region changes the way it works, but rather that a solution should be found to translate this to a harmonised way of working. To solve this issue, the three Regions and BOSA have agreed to come up with a uniform "Solution Design" to tackle this issue. In practice, the Federal partners will document their concrete use cases, so that the Regions can themselves formulate solution proposals. This will be done through collaborative work sessions. Naturally, the objective is not to re-build completely the Regional registers on the basis of requirements that cannot (or should not) conceptually be tackled through the means of an authentic source of addresses. Conversely, it is also important for these Regional registers to be able to address the Federal use cases, in order to ensure a smooth transition towards the BeSt address model.

The results of the "mapping" working group will be a major turning point in the project because either these results are satisfactory for the Federal Partners and that allows the project to move on peacefully, either these results do not reassure these Federal Partners and this could cause more delay. This whole debate on data quality is getting more intense as time goes by, since the revised Cooperation agreement of 2019 provides that the public authorities will have to use the addresses contained in the Regional Registers as of the 30th of June 2020 (Art. 11.2).

Regarding the lack of involvement and implementation by the local communities, the causes for this can be subdivided in four challenges.

First, this stems from a deficit of sufficient political support. As pointed out by one of the interviewees, there was a stronger political will in Flanders, which led to the adoption of the CRAB-decree[64] and the obligation for the Flemish communities to use this Regional register. On the contrary, in Wallonia and Brussels, there is no such legal obligation so the local communities will be much less inclined to use the Regional registers, as they see this as another layer of additional work and are very attached to their autonomy. Indeed, because of the lack of relay at the political level for this project, the local communities also do not see the added value of it and thus relegate it to the things that they will do later, because they have no legal obligation to do so.

Second, the local communities do not want to switch to the BeSt address model because, for the moment, they do not feel compelled to check that the address they reference in the National Register complies with the urban planning legislation. With BeSt address, and this required check, they are afraid that it will lead to the discovery of too many urban planning violations and that they will be legally obliged to prosecute them all.

Third, there are communication issues towards the local communities. Indeed, some complaints were voiced about the fact that the progress of the project was not communicated often enough to these local communities. To be sure, some information was provided to the local communities[65] but these communications referred to the former deadlines. Yet, these deadlines are now exceeded and the local communities have very little visibility about the latest developments, and this leads to a lack of understanding about the effect it will have on them, as for many of them BeSt address is still a very abstract project. Not only does this prevent these local communities from anticipating the changes in order to smoothen the transition, but it also leaves the room for unfounded rumours to spread. For instance, according to an interviewee, some of these local communities even thought that the BeSt address project had been abandoned as it has been years since they last received information about the project.

Fourth, the local communities lack the necessary budget and man power to ensure the validation of the addresses contained in the Regional registers. This is a very time-consuming task and for the smallest local communities, who only have a handful of civil servants, this adds up to an already full list of things to do. Without extra budget, it might be difficult for these local communities to manage, especially if they do not see the need for it and if, in

[64] Decreet van 8 mei 2009 betreffende het Centraal Referentieadressenbestand, *M.B.*, 1 juli 2009 ; Decreet van 1 juni 2012 houdende wijziging van het CRAB-decreet van 8 mei 2009, *M.B.*, 12 juni 2012.

[65] Circulaire ministérielle "BeSt-Address - Directives et recommandations pour la détermination et l'attribution d'une adresse et d'un numéro d'habitation"du 23 février 2018 rédigée par Jan Jambon, Ministre de la Sécurité et de l'Intérieur : https://www.ibz.rrn.fgov.be/fileadmin/user_upload/fr/rn/circulaires/BeSt_Address_Recommandations_20180223.pdf; SPF Intérieur, Direction générale Institutions et Population, Instructions pour la tenue à jour des informations au Registre national des personnes physiques - Adresse de la résidence principale (TI 020) - Nouvelle structure, 26 janvier 2017 : https://www.ibz.rrn.fgov.be/fileadmin/user_upload/fr/rn/instructions/notes-2017/20170127143951465.pdf

addition, their hierarchy is not aware of the project's necessity. While some call for help from the Regions, others have said that they would simply not do it without additional means.

RECOMMENDATIONS

INTRODUCTION

On the grounds of the above analysis of the challenges, recommendations for the future of the case can be made. These will be structured according to the pillars underlying the Strategy (WP6) and the Blueprint (WP7) (Openness; Participation; and Collaboration).

Once again, it is worth briefly outlining the most discussed strategic actions / guidelines, as apparent from the analysis done via the Nvivo program.

Nodes name	Sources	References
Strategy / Blueprint		
• Openness		
○ Guarantee personal data protection & security	1	2
○ Rethink the information management system	6	14
○ Sustainable funding for data quality and up-to-dateness	0	0
• Participation		
○ Aligning with internal stakeholders	1	2
○ Develop appropriate methods and tools	3	4
▪ Draaiboek	6	7
○ Integrate the input from users	6	15
• Collaboration		
○ Build new organisational structure to serve the end-user	7	35
▪ Data quality	6	23
▪ Single pilot for the project	7	11
○ Generate more cooperation across governments	2	3
▪ Next coordination steps	4	11
▪ Shared funding	6	10
○ Strengthen coordination and sharing within a single administration	2	5
▪ Federal discussion group	4	5

As can be seen, the most discussed Pillar is "Collaboration". Much like for the most discussed enabler ("Culture, Ethics and Behaviour"), this does not come as a surprise as discussions revolved mostly around how the collaboration between organisations that operate at different levels of power can be improved and how the data quality / mapping debate can be solved.

Then comes the "Participation" pillar, where discussions revolved mostly around the inclusion of users (Initiators). Finally, the "Openness" pillar was mostly dedicated to discussions about the Open data licences.

OPENNESS

Rethink the information management system – Open data licences

As mentioned in the analysis, one of the challenges of the BeSt address project pertains to the potential publication, in Open data, of the address data contained in the registers. More specifically, the focus is on the open data licences to be used[66]. Indeed, each Region and the Federal level have their own licence for their own data. This might lead to potential difficulties for the re-users if they wish to combine data from the three Regions but that these Regions' licences contain incompatible clauses. The question is thus whether the access to the address registers, via BOSA's platform, should be subject to the acceptance, by the re-user, of all four licences (the three Regional and the Federal licences) or whether a specific common licence should be created for that access to the integrated address data via BOSA's platform.

Our recommendation in this regard would align with the position of the two interviewees outlined in the analysis, according to which it would not be workable to create a specific licence for BeSt address, that would operate in parallel to the existing four licences (one Federal and three Regional), because then you have different licences covering the same data. Indeed, given that BeSt address provides for an integrated data model, it makes sense to have a single licence. This is because, for someone who wants to use address data, the source of this data does not really matter and (s)he does not want to have to enquire about several licences if (s)he uses data from several sources. Therefore, we recommend to develop a common licence, for all the Open data services falling within the INSPIRE implementation framework, of the Federal and Regional entities, which would replace the current licence fragmentation. Accordingly, these licencing considerations should be discussed by the INSPIRE committee, in order not to be limited to addresses. The standard for such licence should be based on European standards, namely the CC-BY[67] or the CC-0[68] Creative Commons licence.

> *Recommendation 1: Develop a common licence, for all the Open data services of the Federal and Regional entities falling within the INSPIRE implementation framework, which would replace the current licence fragmentation. These licencing considerations should be discussed by the INSPIRE committee, in order not to be limited to addresses. The standard for such licence should be based on European standards, namely the CC-BY[69] or the CC-0[70] Creative Commons licence.*

PARTICIPATION

Develop the appropriate methods and tools – Anomaly notification

Another key challenge identified in the analysis pertains to the development of the "Anomaly notification" service. Indeed, in order to have qualitative and up-to-date Regional registers, it is fundamental that the users have the possibility to signal anomalies in order to correct potential mistakes or to fill potential gaps in the registers. Indeed, a register can never be 100% perfect and will always need to evolve to match the evolution of the situation on the

[66] Article 8 of the Directive 2013/37/EU.
[67] https://creativecommons.org/licenses/by/2.0/be/
[68] https://creativecommons.org/publicdomain/zero/1.0/deed.fr
[69] https://creativecommons.org/licenses/by/2.0/be/
[70] https://creativecommons.org/publicdomain/zero/1.0/deed.fr

field.

So far, each Region has its own anomaly notification service for its own register, which is a must-have for any authentic source. In substance, the users signal the anomalies to the Regions, and the notification is then (automatically) forwarded to the relevant local community, that has to check the anomaly and act upon it if necessary, as it is these local communities who are the Initiators of addresses and thus have the competence to say what is correct and what is not (see for instance Article 11 of the Flemish CRAB decree[71]). Because of the integration of the three Regional registers on BOSA's platform, it is now necessary to develop a similar anomaly notification service for the users of this platform. According to BOSA, this will be ready by spring 2020.

In the regard, we recommend that it must be ensured that the anomalies reported to BOSA are automatically forwarded to the relevant Region who can then, in turn, forward it to the local community. This new anomaly notification service system should thus not run parallel to the existing Regional anomaly notification services, but should rather be considered as an extra-layer that is connected to the existing Regional anomaly processes. This is also justified by user-friendliness considerations, as the end users do not need to know the source of the error. What matters to them is that they feel that there is an error and that this notification is relayed to the right party.

> *Recommendation 2: Ensure that the new anomaly notification service system, developed by BOSA for the information exchange platform, does not run parallel to the existing Regional anomaly notification services, but rather is considered as an extra-layer that is connected to the existing Regional anomaly processes; and ensure that the anomalies reported to BOSA are automatically forwarded to the relevant Region who can then, in turn, forward it to the local community.*

Develop the appropriate methods and tools – Draaiboek

As was outlined in the analysis, it is important to give clear information to the local communities on how they should do the validation of the Regional registers' addresses and to explain how the switch to the BeSt address model will influence their way of working.

This challenge was well understood by the Address committee, who delegated to the working group "ascertain and assign" the mission to create a "Draaiboek", containing clear instructions and illustrative exemples for the local communities. The goal of this Draaiboek is to complement the Ministerial Circular "BeSt-Address - Guidelines and Recommendations for the Determination and Assignment of an Address and Housing Number" of 23 February 2018[72] and the Instructions for maintaining information in the National Register of natural persons up-to-date (Address of principal residence (TI 020) - New structure)[73]. This Draaiboek, which is based on a Danish document, will further refine the guidelines contained in these two previous documents, with clear exemples and use-cases. To ensure that this document is truly user-friendly, several local communities, coming from the three Regions, are involved in its creation (e.g. Liège, Schaarbeek, Uccle and Antwerp).

As this Draaiboek will be a highly valuable tool for the local communities, we recommend to make sure that a clear communication strategy about its creation is elaborated, ideally relayed by the VVSG, the UVCW and Brulocalis, in order for each local community in Belgium to be made aware of its existence. Additionnaly, its effective dissemination in the hands of every local community should be ensured. Indeed, as mentioned in the "Analysis" section, the local communities would have liked to receive more concrete examples of how they will need to work with BeSt address, how to use the services etc. The questions that they might have had about the

[71] Decreet van 8 mei 2009 betreffende het Centraal Referentieadressenbestand, *M.B.*, 1 juli 2009 ; Decreet van 1 juni 2012 houdende wijziging van het CRAB-decreet van 8 mei 2009, *M.B.*, 12 juni 2012.

[72] Circulaire ministérielle "BeSt-Address - Directives et recommandations pour la détermination et l'attribution d'une adresse et d'un numéro d'habitation"du 23 février 2018 rédigée par Jan Jambon, Ministre de la Sécurité et de l'Intérieur : https://www.ibz.rrn.fgov.be/fileadmin/user_upload/fr/rn/circulaires/BeSt_Address_Recommandations_20180223.pdf

[73] SPF Intérieur, Direction générale Institutions et Population, Instructions pour la tenue à jour des informations au Registre national des personnes physiques - Adresse de la résidence principale (TI 020) - Nouvelle structure, 26 janvier 2017 : https://www.ibz.rrn.fgov.be/fileadmin/user_upload/fr/rn/instructions/notes-2017/20170127143951465.pdf

services were sometimes left unanswered, which led to a lack of involvement and a decision to put the project "on the side". Training sessions on how to use the BeSt address model, on the basis of this Draaiboek, are therefore crucial for the correct implementation of the project. It could also be interesting to reflect about providing the local communities with a workplan, containing the steps that need to be taken and the targets to be reached.

> *Recommendation 3: Elaborate a clear communication strategy about the creation of the Draaiboek (relayed by the VVSG, the UVCW and Brulocalis) in order for each local community in Belgium to be made aware of its existence. Additionaly, its effective dissemination in the hands of every local community should be ensured. Training sessions on how to use the BeSt address model, on the basis of this Draaiboek, should also be organised. A workplan containing the steps that need to be taken and the targets to be reached could also be provided.*

Integrate the input from the users – Involvement and implementation of the BeSt address project by the local communities

As indicated in the summary of the analysis, one of the key challenges for the BeSt address project pertains to the lack of involvement and implementation by the local communities, especially in Wallonia and Brussels. In Flanders, this is less of a problem because of the adoption of the CRAB-decree[74], which was elaborated in co-creation with the Flemish local communities thanks to the liaison role played by the VVSG, and because of the obligation for the Flemish local communities to use this Regional register.

We outlined above that there were four potential causes for this lack of involvement and implementation. First, this stems from a deficit of sufficient political support. Because of the lack of relay at the political level for this project, the local communities do not see the added value of it and thus relegate it to the things that they will do later, because they have no legal obligation to do so. Second, the local communities do not want to switch to the BeSt address model because, for the moment, they do not feel compelled to check that the address they reference in the National Register complies with the urban planning legislation. With BeSt address, and this required check, they are afraid that it will lead to the discovery of too many urban planning violations and that they will be legally obliged to prosecute them all. Third, there are communication issues towards the local communities. Indeed, some complaints were voiced about the fact that the progress of the project was not communicated often enough to these local communities. The local communities have very little visibility about the latest developments, and this leads to a lack of understanding about the effect it will have on them, as for many of them BeSt address is still a very abstract project. Fourth, the local communities lack the necessary budget and man power to ensure the validation of the addresses contained in the Regional registers. This is a very time-consuming task and for the smallest local communities, who only have a handful of civil servants, this adds up to an already full list of things to do.

In light of the above, we make three recommendations to tackle this problem of involvement and implementation by the local communities. These recommendations should not be understood as being cumulative, but rather alternative. Depending on the situation on the field, one or more of these recommendations might need to be set in place.

Our first recommendation would be to elaborate a clear communication strategy (relayed by the VVSG, the UVCW and Brulocalis) towards the local communities, about the progress of the BeSt address project. This should be done, on the one hand, by the Address committee who should communicate at each important step of the project, for instance when a new service has been developed by BOSA (such as the full download or the anomaly notification service). On the other hand, it will be very important for the National Register to communicate clearly, when the time comes (normally on the 30th of June 2020 according to the Cooperation agreement), that it has switched to the BeSt address model and that it will use the Regional registers' data. This is because the local communities currently work with the National Register so it would be a strong signal for them that it is now time to implement the BeSt address model. This communication should not only target the civil servants in the local communities, but

[74] Decreet van 8 mei 2009 betreffende het Centraal Referentieadressenbestand, *M.B.*, 1 juli 2009 ; Decreet van 1 juni 2012 houdende wijziging van het CRAB-decreet van 8 mei 2009, *M.B.*, 12 juni 2012.

also the political deciders in these local communities so they can understand the ambit of the project and the need to allocate the necessary funds and workforce.

Moreover, it should also be communicated about the fact that while the local communities have the competence to prosecute cases of urban planning violations, they do not have the obligation to do so. Therefore, if they do discover a wide number of urban planning violations via the use of the BeSt address model, they will not be legally obliged to prosecute them all. The only legal risk that a local community might face if it doesn't prosecute a violation, that it has been made aware about, is if this violation then causes a damage to a third party and that this third party brings an action for damages against this local community. Nevertheless, the probability that such a procedure will successfully be launched is very low.

> *Recommendation 4: Elaborate a clear communication strategy (relayed by the VVSG, the UVCW and Brulocalis) towards the local communities, about the progress of the BeSt address project. This should be done by the Address committee in a first phase, and by the National Register in a second phase. This communication should not only target the civil servants in the local communities, but also the political deciders in these local communities so they can understand the ambit of the project and the need to allocate the necessary funds and workforce. Moreover, it should also be communicated about the fact that while the local communities have the competence to prosecute cases of urban planning violations, they do not have the obligation to do so. The only legal risk that a local community might face if it doesn't prosecute a violation, that it has been made aware about via the use of the BeSt address model, is if this violation then causes a damage to a third party and that this third party brings an action for damages against this local community, which is very unlikely.*

Our second recommendation would be to provide the possibility for the local communities to file requests to obtain the budget and man power necessary to ensure the validation of the addresses contained in the Regional registers. This budget could, for instance, be made available in the context of the "Interfederal project fund" whose creation is recommended in Recommendation 7.

> *Recommendation 4bis: Provide the possibility for the local communities to file requests to obtain the budget and man power necessary to ensure the validation of the addresses contained in the Regional registers (for instance via the "Interfederal project fund" whose creation is recommended in Recommendation 7).*

Our third recommendation would be to create a legal obligation, in Wallonia and in Brussels, for the local communities to use the Regional registers, similarly to what is done in Flanders with the CRAB-decree[75]. Indeed, in Wallonia and Brussels, there is no such legal obligation so the local communities are much less inclined to use the Regional registers, as they see this as another layer of additional work, and are very attached to their autonomy. In this regard, it should be pointed out that the Walloon government intends to revise the atlas of municipal roads and that ICAR will be the tool that will allow the local communities to register their municipal roads. The use of ICAR could be made compulsory in this decree, which would *de facto* be beneficial for the BeSt address project.

> *Recommendation 4ter: Create a legal obligation, in Wallonia and in Brussels, for the local communities to use the Regional registers, similarly to what is done in Flanders with the CRAB-decree[76].*

COLLABORATION

Build new organisational structure to serve the end-user – Data quality / Mapping

The data quality / mapping debate that we have outlined in the analysis is, without any doubt, the biggest challenge

[75] Decreet van 8 mei 2009 betreffende het Centraal Referentieadressenbestand, *M.B.*, 1 juli 2009; Decreet van 1 juni 2012 houdende wijziging van het CRAB-decreet van 8 mei 2009, *M.B.*, 12 juni 2012.

[76] Decreet van 8 mei 2009 betreffende het Centraal Referentieadressenbestand, *M.B.*, 1 juli 2009 ; Decreet van 1 juni 2012 houdende wijziging van het CRAB-decreet van 8 mei 2009, *M.B.*, 12 juni 2012.

that remains to be tackled by the BeSt address project. To summarise this debate, it seems clear that the level of the Regional registers must be good enough, in such a way that it is workable and usable by the various Federal Partners, but also that these Federal Partners must not be too critical and set the requirements too high, because this might give the feeling to the Regions that their registers will never be good enough in light of this resistance. Everyone sees the added value of working with this BeSt address model, and as mentioned by one of the interviewees, it is a matter of not losing the momentum.

The results of the "mapping" working group will be a major turning point in the project because either these results are satisfactory for the Federal Partners and that allows the project to move on peacefully, either these results do not reassure these Federal Partners and this could cause more delay. This whole debate on data quality is getting more intense as time goes by, as the revised Cooperation agreement of 2019 provides that the Federal Partners will have to use the addresses contained in the Regional registers as of the 30th of June 2020 (Art. 11.2).

Nevertheless, it should be clarified that this date is only applicable for new encodings and modifications of addresses, but does not imply that these Partners will have to change the addresses that they already have in their own database by this date. This alignment of the existing addresses will be done in a second step, at a later date that will have to be determined by the "Address committee" (Art. 11.2). According to one of the interviewees, the real challenge is therefore not so much in the first phase of the implementation (new encodings and modifications) but rather in the second phase (alignment of the existing addresses).

In light of the above we recommend that the Federal Partners should start using the Regional registers and the BeSt address model as of the 30th of June 2020, as planned in the Cooperation agreement. This "leap of faith" is indeed absolutely vital for the success of the project. Indeed, though these Regional registers, like any other register (National Register, KBO/BCE…) are not perfect, they already contain a large amount of addresses. Given that this first phase of the project will only entice the use of these Regional registers for new encodings and modifications, and not for the alignment of the existing addresses in the Federal registers, the quality of these Registers should be taken "as is", as the impact of this first phase will be limited on the Federal registers. Moreover, the best way to increase these Regional registers' quality in order to prepare for the second phase is precisely if all the Federal Partners start working with them, because if everyone uses the same source, the quality will necessary improve, thanks to the anomaly notification service, whose development and functioning is crucial for the project. This will be the only way to ensure that the quality of these Regional registers increases in order to reach a sufficient level in order to move on to the second phase of the project (alignment of the existing addresses). As stated by one of the interviewees, an ideal situation in phase 2 would be to arrive to a situation where all the Partners only have address IDs in their database, which refer to a specific and unique address contained in one of the three Regional registers. This would be the final level of integration.

> *Recommendation 5: The Federal Partners should start using the Regional registers and the BeSt address model as of the 30th of June 2020, as planned in the Cooperation agreement. Given that this first phase of the project will only entice the use of these Regional registers for new encodings and modifications, and not for the alignment of the existing addresses in the Federal registers (second phase), the quality of these Registers should be taken "as is", as the impact of this first phase will be limited on the Federal registers. Moreover, the best way to increase these Regional registers' quality in order to prepare for the second phase is precisely if all the Federal Partners start working with them, because if everyone uses the same source, the quality will necessary improve, thanks to the anomaly notification service.*

As mentioned earlier, this debate of data quality / mapping crystalised around two specific issues raised by the Federal Partners.

The first specific issue is that many of the "Box" numbers were missing in the URBIS register. According to the Federal Partners, this is a real problem as this information (contained in the National Register) is vital for social security services for instance. To this, the Brussels Region replies that the quality of the box numbers contained in the National Register (currently used by the social security institutions) is questionable, as the local communities simply verified, through the intervention of the proximity inspector, that the citizens indeed lived at the address

that was given, but never verified that this housing was compliant with the urban planning legislation.

Therefore, on the basis of discussions that occurred during the BeSt address committee meetings, the Brussels Region indicated that it would import the box numbers from federal registers (notably the National Register) into its own register (URBIS). In this perspective, we recommend that the Brussels government requests the local communities of Brussels to validate these imported box numbers by analysing the situation on the field. Moreover, it should be requested from Civadis, which is the service provider of the local communities in Brussels, to adapt its application named "Saphir", used by the local communities when registering addresses, in order to ensure that the local communities will no longer be able, as of the 30th of June 2020, to register (new encodings or modifications) addresses that are not contained in URBIS. In case such a problem occurs, Civadis should ensure a link towards the URBIS anomaly notification service (or the integrated one developed by BOSA).

> *Recommendation 5bis: The Brussels government should request the local communities of Brussels to validate the box numbers imported from the federal registers into URBIS. Moreover, it should be requested from Civadis, which is the service provider of the local communities in Brussels, to ensure that the local communities will no longer be able, as of the 30th of June 2020, to register addresses that are not contained in URBIS. In case such a problem occurs, Civadis should ensure a link towards the URBIS anomaly notification service.*

The second specific issue is that the address ID lifecycle is not the same in the three Regions. For instance, in Flanders, a new address ID is allocated when an address is modified (e.g. when the street name changes), while this is not the case in Wallonia and Brussels, where the address ID stays the same if the address is modified. This is a problem for the Federal Partners as they would like to use a harmonised system. They want to avoid the situation where an identifier that was given to them one year before no longer refers to the current situation as the address to which it referred to was modified. In this regard, they do not so much request that each Region changes the way it works, but rather that a solution should be found to translate this to a harmonised way of working.

Following discussions that occurred during the BeSt address committee meetings, the three Regions and BOSA have agreed to come up with a uniform "Solution Design" to tackle this issue. In practice, the Federal partners will document their concrete use cases, so that the Regions can themselves formulate solution proposals. This will be done through collaborative work sessions. Naturally, the objective is not to re-build completely the Regional registers on the basis of requirements that cannot (or should not) conceptually be tackled through the means of an authentic source of addresses. Conversely, it is also important for these Regional registers to be able to address the Federal use cases, in order to ensure a smooth transition towards the BeSt address model.

We believe that this is the right way forward, and we therefore recommend the three Regions and BOSA to dedicate sufficient time and resources in order to come up with a successful "Solution Design" in order to ensure harmonisation between the three Regional Registers regarding the address ID lifecycle.

> *Recommendation 5ter: The three Regions and BOSA should dedicate sufficient time and resources in order to come up with a successful "Solution Design" in order to ensure harmonisation between the three Regional Registers regarding the address ID lifecycle.*

Build new organisational structures to serve the end-user – Project governance

An additional challenge faced by the Address Committee was that their participation in the BeSt address project had to be done under the "give and take" approach. Each entity had to dedicate some of its budget and man power to the project, and expected the others to do the same. For one of the interviewees, this "give and take" approach is workable as long as the tasks taken on by each entity are clearly defined. However, according to another interviewee, a more structured project management approach could have been followed. Indeed, the members of the Address committee have joined the project on a voluntary basis (for instance François Dumortier of the Brussels Regions has volunteered to be the president of the Address committee), and all do as much as they can within the Address committee and the three working groups, with the limited budget they have. This makes it very difficult to organise and prepare the meetings and working groups as people have very little time for that.

In this context, we asked the interviewees whether another project governance approach could have been useful to make the project go faster. Namely, we asked whether it would have helped to appoint, from the start, a project leader (either from one of the entities participating in the project or a private sector consultant hired specifically for this) to pilot the project, to do the necessary work to organise and prepare the meetings and working groups and to give clear instructions to the participants about what is expected from them, with set deadlines.

Interestingly, the interviewees did not all share a common position towards this proposition. For some, this might have indeed been useful, as the project would have certainly gone faster if it was piloted by someone who was specifically appointed to do so and had more time to dedicate to the project than the current members of the Address committee. Naturally, this would require to allocate budget to pay this project manager, which in itself might be a challenge but it could turn out to be a very useful expense. However, for others, though this might sound more efficient as first sight, they believe that one of the strengths of the project is precisely to gather people around the table who want to contribute to the project and make things move forward. Accordingly, they indicate that a project will always be welcomed better down the road if the people that have to implement it contributed more actively to its creation. Moreover, in light of the network approach taken in Belgium and reflected in the project (there is no hierarchy between the Federal and Regional levels and they are represented equally in the Address committee), it would have been difficult to create such a form of hierarchy by appointing a project leader, as it might have created some resistance from the other participants to the project who would be requested to do something by this project leader.

In sum, while some saw the added value of appointing such a project leader in order to make the project run faster and more efficiently, others favoured a more collaborative approach, which will often be less efficient and fast but will have the advantage of creating less resistance to change and increases the successful implementation of the project down the road.

In light of these answers, we believe that a middle ground could be found. Therefore, we recommend that the collaborative approach adopted for the BeSt address project should be repeated in the future, but that, for these future projects, it should be reflected on the possibility to designate a specific project facilitator for organisational tasks (organise and prepare the meetings and working groups; set (non-binding) deadlines; manage the potential conflicts between the participants…) who would be paid to make the project run more efficiently. This project facilitator could either come from one of the entities participating in the project or could be a private sector consultant (which might be easier to accept for all the parties in light of the fact that there is no hierarchy between the Federal and Regional levels). To be sure, the decisional power should remain in the hands of the participants of the project, as the project facilitator should not decide anything but rather provide them with the necessary support and preparatory work.

> *Recommendation 6: Ensure that the collaborative approach adopted for the BeSt address project is repeated in the future. For these future projects, it should be reflected on the possibility to designate a specific project facilitator for organisational tasks who would be paid to make the project run more efficiently. This project facilitator could either come from one of the entities participating in the project or could be a private sector consultant (which might be easier to accept for all the parties in light of the fact that there is no hierarchy between the Federal and Regional levels). To be sure, the decisional power should remain in the hands of the participants of the project, as the project facilitator should not decide anything but rather provide them with the necessary support and preparatory work.*

Stimulate more cooperation across governments – Interfederal project fund

Another key challenge faced by the BeSt address project is the lack of sufficient financial ressources. This notably stems from the fact that no form of outside additional budget was foreseen for the project. Therefore, each administration involved in the project had to allocate some of its budget in order to participate.

This lack of budget is first challenging for the members of the Address committee, especially because the project takes longer than expected. For instance, one of the interviewees indicated that the problem for them was that they had planned the budget up to 2018, according to the initial deadlines. They had hired an external consultant to

organise everything but, given that the project was delayed and is not yet ready, they had to give that person a different job. As a consequence, they now have to allocate new budget to the implementation of the project. In sum, one of the challenges of the self-financing way of working is that it is not always easy to provide the right resources at the right time.

Second, and importantly for the implementation of the project, this budget issue is also challenging for the local communities that will have to allocate budget and man power to the validation of the addresses contained in the Regional registers. This is a very time-consuming task and for the smallest local communities, who only have a handful of civil servants, this adds up to an already full list of things to do. Without extra budget, it might be difficult for these local communities to manage, especially if they do not see the need for it and if, in addition, their hierarchy is not aware of the project's necessity.

In light of the above, we asked the interviewees whether it would be useful to create an "Interfederal project fund". The idea of this fund, which would be financed by the Federal level and the three Regions, would be to offer the possibility to the parties participating in an interfederal collaboration project – thus a project where the four entities (Federal and Regions) collaborate, such as BeSt address – or to the parties that have to implement this project (e.g. the local communities in BeSt address) to file a request to obtain some budget from this fund. In the context of BeSt address, this fund could have notably been used to finance the appointment of a project facilitator (see Recommendation 6) or to provide the possibility for the local communities to file requests to obtain the budget and man power necessary to ensure the validation of the addresses contained in the Regional registers (see Recommendation 4*bis*).

The general reaction by the interviewees to this proposal was that, for certain projects, this may indeed be a useful solution, but it might be difficult to create in practice, in light of the structure of the Belgian State. This is because it is politically sensitive to discuss such cofinancing models, as questions of "who has to pay how much" are always complex. One of the interviewees also underlined that the "welcome" given to this proposal would also be function of who makes it. To ensure that it is received more optimally, it should be formulated by a group of representatives coming from all four entities (the Federal level and the three Regions).

In light of the above, we recommend that it should be reflected on the possibility to create an "Interfederal project fund", financed by the Federal level and the three Regions, which would offer the possibility to the parties participating in an interfederal collaboration project involving the Federal level and the three Regions, such as BeSt address, or to the parties that have to implement this project, to file a request to obtain some budget from this fund.

> *Recommendation 7: Reflect on the possibility to create an "Interfederal project fund", financed by the Federal level and the three Regions, which would offer the possibility to the parties participating in an interfederal collaboration project involving the Federal level and the three Regions, such as BeSt address, or to the parties that have to implement this project, to file a request to obtain some budget from this fund.*

Stimulate more cooperation across governments – Next cooperation projects

As already mentioned several times in this report, the BeSt address project is an encouraging example of cooperation between the Federal and Regional levels, in order to create some form of standardisation and interoperability, and to rely on authentic sources in order to create a common way of working across Belgium. However, this collaboration should not stop here, as this project is limited to addresses. Therefore, we asked the interviewees what could be the next cooperation projects that could be pursued in terms of location-based data.

From the answers we gathered, it seems that, from a general perspective, it is necessary to create an interoperability framework within which each entity (Federal and Regions) can exchange their information in an appropriate manner. The idea would be to effectively arrive to a situation, comparable to the Netherlands, where there is a system where all authentic data sources are linked to each other in one way or another.

From a more specific perspective, the next step would be to create such a cooperation project for the integration of building registers. In time, this would allow to make a switch from addresses to buildings, as, according to some of the interviewees, in the future, more and more things should be linked to buildings and not to addresses. For

instance, it was suggested by one of the interviewees that, in the future, people should be registered in the National Register in a specific building rather that at an address. He explains that this is necessary because, for the moment, if someone comes to register to a local community and gives an address that doesn't exist, the "Population service" says "*We have to make an address, otherwise we can't register that person*". To that, the "Urban planning service" answers that "*If you create an address, it potentially gives rise to an urban development permit, even though there is no such permit at all*". This obviously creates problems for the local communities and this is why he suggests that this could be solved by registering people in a specific building rather that at an address. In the same vein as BeSt address, these building registers could be Regional registers, each managed by a department or observatory within each Region.

Finally, it was also suggested to reflect on the possibility of creating an integrated register of cadastral parcels, that would be linked with the integrated building registers.

In light of the above, we recommend that Belgium should strive for the creation of an interoperability framework within which each entity (Federal and Regions) can exchange their information in an appropriate manner, within a system where all authentic data sources are linked to each other. From a more specific perspective, it should be reflected on the possibility to launch, in the near future, a cooperation project for the integration of building registers. Later on, it should also be reflected on the possibility of creating an integrated register of cadastral parcels, that would be linked with the integrated building registers.

> *Recommendation 8: Strive for the creation of an interoperability framework within which each entity (Federal and Regions) can exchange their information in an appropriate manner, within a system where all authentic data sources are linked to each other. From a more specific perspective, it should be reflected on the possibility to launch, in the near future, a cooperation project for the integration of building registers. Later on, it should also be reflected on the possibility of creating an integrated register of cadastral parcels, that would be linked with the integrated building registers.*

SUMMARY

On the basis of the above analysis of the challenges, twelve recommendations for the future have been made. While some are specific to the BeSt address project, others have a larger scope than this project.

Recommendations specific to the BeSt address project	***Recommendation 2:*** *Ensure that the new anomaly notification service system, developed by BOSA for the information exchange platform, does not run parallel to the existing Regional anomaly notification services, but rather is considered as an extra-layer that is connected to the existing Regional anomaly processes; and ensure that the anomalies reported to BOSA are automatically forwarded to the relevant Region who can then, in turn, forward it to the local community.* ***Recommendation 3:*** *Elaborate a clear communication strategy about the creation of the Draaiboek (relayed by the VVSG, the UVCW and Brulocalis) in order for each local community in Belgium to be made aware of its existence. Additionaly, its effective dissemination in the hands of every local community should be ensured. Training sessions on how to use the BeSt address model, on the basis of this Draaiboek, should also be organised. A workplan containing the steps that need to be taken and the targets to be reached could also be provided.* ***Recommendation 4:*** *Elaborate a clear communication strategy (relayed by the VVSG, the UVCW and Brulocalis) towards the local communities, about the progress of the BeSt address project. This should be done by the Address committee in a first phase, and by the National Register in a second phase. This communication should not only target the civil servants in the local communities, but also the political deciders in these local communities so they can understand the ambit of the project and the need to allocate the necessary funds and workforce. Moreover, it should also be communicated about*

	the fact that while the local communities have the competence to prosecute cases of urban planning violations, they do not have the obligation to do so. The only legal risk that a local community might face if it doesn't prosecute a violation, that it has been made aware about via the use of the BeSt address model, is if this violation then causes a damage to a third party and that this third party brings an action for damages against this local community, which is very unlikely. ***Recommendation 4bis:*** *Provide the possibility for the local communities to file requests to obtain the budget and man power necessary to ensure the validation of the addresses contained in the Regional registers (for instance via the "Interfederal project fund" whose creation is recommended in Recommendation 7).* ***Recommendation 4ter:*** *Create a legal obligation, in Wallonia and in Brussels, for the local communities to use the Regional registers, similarly to what is done in Flanders with the CRAB-decree*[77] *.* ***Recommendation 5:*** *The Federal Partners should start using the Regional registers and the BeSt address model as of the 30th of June 2020, as planned in the Cooperation agreement. Given that this first phase of the project will only entice the use of these Regional registers for new encodings and modifications, and not for the alignment of the existing addresses in the Federal registers (second phase), the quality of these Registers should be taken "as is", as the impact of this first phase will be limited on the Federal registers. Moreover, the best way to increase these Regional registers' quality in order to prepare for the second phase is precisely if all the Federal Partners start working with them, because if everyone uses the same source, the quality will necessary improve, thanks to the anomaly notification service.* ***Recommendation 5bis:*** *The Brussels government should request the local communities of Brussels to validate the box numbers imported from the federal registers into URBIS. Moreover, it should be requested from Civadis, which is the service provider of the local communities in Brussels, to ensure that the local communities will no longer be able, as of the 30th of June 2020, to register addresses that are not contained in URBIS. In case such a problem occurs, Civadis should ensure a link towards the URBIS anomaly notification service.* ***Recommendation 5ter:*** *The three Regions and BOSA should dedicate sufficient time and resources in order to come up with a successful "Solution Design" in order to ensure harmonisation between the three Regional Registers regarding the address ID lifecycle.*
Recommendations that have a larger scope than the BeSt address project	***Recommendation 1:*** *Develop a common licence, for all the Open data services of the Federal and Regional entities falling within the INSPIRE implementation framework, which would replace the current licence fragmentation. These licencing considerations should be discussed by the INSPIRE committee, in order not to be limited to addresses. The standard for such licence should be based on European standards, namely the CC-BY*[78] *or the CC-0*[79] *Creative Commons licence.* ***Recommendation 6:*** *Ensure that the collaborative approach adopted for the BeSt address project is repeated in the future. For these future projects, it should be reflected on the*

[77] Decreet van 8 mei 2009 betreffende het Centraal Referentieadressenbestand, *M.B.*, 1 juli 2009 ; Decreet van 1 juni 2012 houdende wijziging van het CRAB-decreet van 8 mei 2009, *M.B.*, 12 juni 2012.

[78] https://creativecommons.org/licenses/by/2.0/be/

[79] https://creativecommons.org/publicdomain/zero/1.0/deed.fr

	possibility to designate a specific project facilitator for organisational tasks who would be paid to make the project run more efficiently. This project facilitator could either come from one of the entities participating in the project or could be a private sector consultant (which might be easier to accept for all the parties in light of the fact that there is no hierarchy between the Federal and Regional levels). To be sure, the decisional power should remain in the hands of the participants of the project, as the project facilitator should not decide anything but rather provide them with the necessary support and preparatory work. ***Recommendation 7:*** *Reflect on the possibility to create an "Interfederal project fund", financed by the Federal level and the three Regions, which would offer the possibility to the parties participating in an interfederal collaboration project involving the Federal level and the three Regions, such as BeSt address, or to the parties that have to implement this project, to file a request to obtain some budget from this fund.* ***Recommendation 8:*** *Strive for the creation of an interoperability framework within which each entity (Federal and Regions) can exchange their information in an appropriate manner, within a system where all authentic data sources are linked to each other. From a more specific perspective, it should be reflected on the possibility to launch, in the near future, a cooperation project for the integration of building registers. Later on, it should also be reflected on the possibility of creating an integrated register of cadastral parcels, that would be linked with the integrated building registers.*

CASE 2: CADASTRAL INFORMATION SHARING

Contrary to the BeSt Address project, the exchange of cadastral information sharing is not an existing and ongoing project. Rather it is an existing governance approach of a specific type of geospatial data, i.e. cadastral information, which in itself consist of various types of data, that is used by public administrations and actors in the delivery of services. Those services can be digital and non-digital. The collection, management and keeping of cadastral information is of crucial importance for the well-functioning of the Western society and state, as it ensures one of the fundaments of society: the right of ownership. Via this right of ownership, citizens, businesses, organisations and the state itself can ensure that real estate is recognised as their property. At the same time, the data allows the state to develop policies, such as (1) the taxation policy based on real estate and (2) urban planning. Via this case study, the researchers aimed (1) to analyse the functioning of the governmental cadastral information exchange system in the Belgian federal state and (2) to understand to what extent the recommendations made in WP6 and WP7, i.e. the Strategy and the Blueprint, that were formulated on the basis of the general horizontal analysis conducted in WP2 and WP3, are feasible for this particular case of exchanging cadastral information.

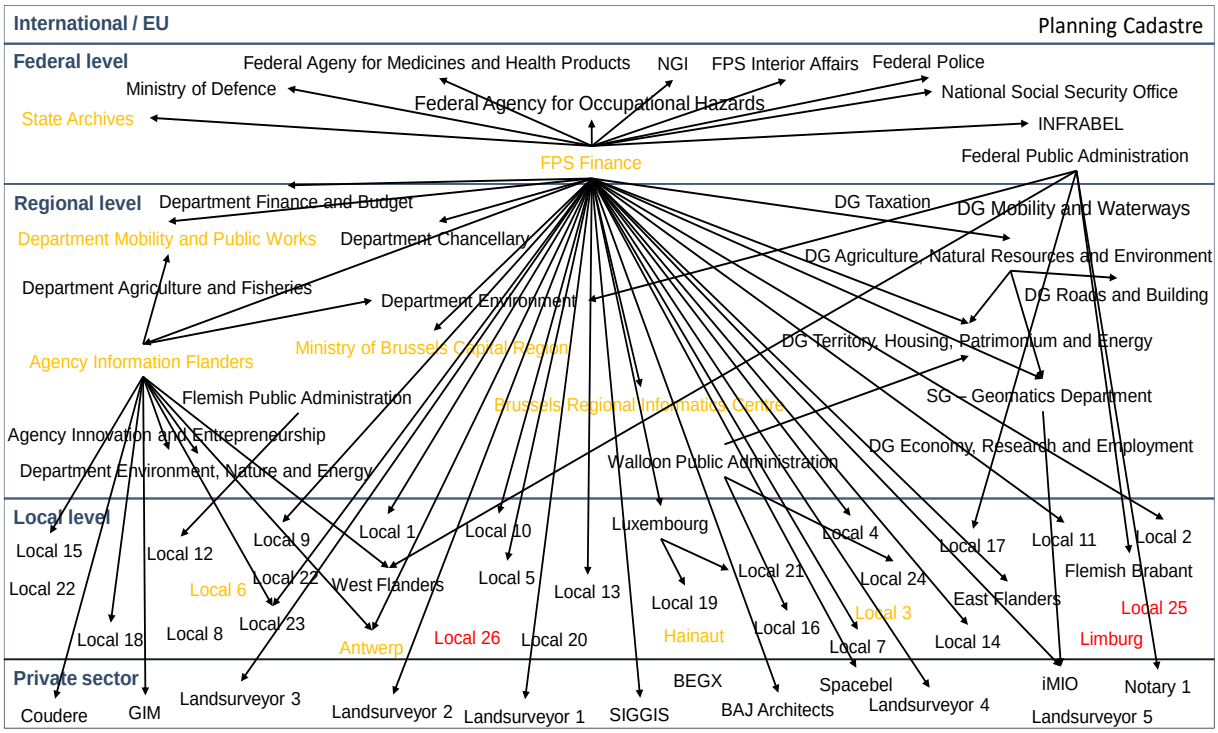
Firstly, the governance of exchanging cadastral information in the Belgian federal state is explained, whereby an overview is provided of the key concepts, the key actors, key data-sets and e-services that are provided. Afterwards, an analysis follows, based on the COBIT enablers. Finally, a number of recommendations, specific to this case study are formulated.

BACKGROUND

Before diving into the governance of the cadastral information exchange, it is necessary to define what is meant with exchanging cadastral information. The meaning of what cadastral information is cannot be disconnected from the principle actor who is responsible for the cadastral information, i.e. the Federal Public Service Finance and in particular the Patrimonial Documentation (Federale Overheidsdienst Financiën, n.d.-g). In WP2, the researchers found that the sharing of cadastral information is one of the most organised types of geospatial data. The figure below shows clearly that the Federal Public Service Finance has a crucial role in the exchange of cadastral information. This data is the result of the survey conducted in WP2. It was, at that time, the only type of geospatial

data with such a strong dominance of one single actor.

Figure 5: Cadastral Information Sharing



Source: Chantillon et al. (2017)

The so-called "**cadastre**" consists of three main elements: the **cadastral extract** (NL: het kadastraal uitreksel / FR: l'extrait cadastral), the **cadastral parcel plan** (NL: het kadastraal percelenplan / FR: le plan parcellaire cadastral) and the **cadastral revenue** (NL: het kadastraal inkomen / FR: le revenu cadastral).

They are defined, by the Federal Public Service Finance, as follows (Federale Overheidsdienst Financiën, n.d.-d, n.d.-c, n.d.-e):

- **Cadastral parcel plan**: "[…] 'A graphical presentation and the collection, on a plan, of all cadastral parcel plans of the Belgian territory.' It is one of the datasets of the geospatial information system of the patrimonial documentation. The dataset consists mainly of the following layers:
    - the immovable goods […]
    - the street names, addresses and place names
    - the borders of land consolidations as well as polders and public bodies in charge of protection against flooding
    - the administrative and cadastral border."[80]
- **Cadastral extract**: "An extract from the patrimonial documentation that consists of (1) the cadastral parcel plan and (2) the database of patrimonial information, containing the following information:
    - the cadastral parcel plan;
    - the database with patrimonial information is a register that contains, for all property owners, the following elements:

[80] Authors own translation.

- his/her rights
- his/her parcels
- the size and non-indexed cadastral revenue of the parcels
- the type of property (house, garden etc.) and the building year of the construction(s)."[81]

- **Cadastral revenue**: "A fictive revenue that corresponds with the average annual net income that the owner of a property would be able to receive from his/her property at a given moment in time (until now 1 january 1975). The cadastral revenue constitutes the basis for the property tax and for the fixation of the real estate income in the personal income tax."[82]

A variety of public administrations make use of the information provided by the Federal Public Service Finance. As can be seen in Figure 5 above, the Federal Public Service Finance is the key actor for the distribution of cadastral information among the various actors.

GOVERNANCE, MAIN ACTORS AND ONGOING ACTIVITIES

In this section the overall governance approach of the cadastral information will be presented, whereby the main focus lies on the different actors involved – at federal, regional and local level – and the relations between those actors – both bilaterally and via the coordination bodies.

The first and most important actor related to cadastral information is the Federal Public Service Finance, as described above. It collects and maintains the cadastral parcel plan, the database with patrimonial information and the cadastral revenue. The Federal Public Service Finance takes the decisions, and relies therefore on the input of data from various other actors. One can as such speak of an exchange of data: the Federal Public Service Finance shares its data with various actors, but also receives the data from actors. Therefore, it relies on (e-)services. The main actors with whom the Federal Public Service Finance shares its information are the local administrations, who have three main channels for accessing the information: the e-service URBAIN, the e-service CADGIS and the e-service ConsultImmo. In the next section those e-services will be explained in detail. The e-service URBAIN not only allows local administrations to access information, but also to send information to the Federal Public Service Finance. Besides those three e-services, there is also the possibility for local administrations to interact via post, e-mail and telephone. The relation between the Federal Public Service Finance and the local administations is of crucial importance for taxation purposes. Indeed, the cadastral revenue is decided upon by the Federal Public Service Finance but the local administrations are the ones that need to inform the Federal Public Service Finance of new buildings that will be erected or existing buildings that are modified and therefore require a modification in the cadastral revenue (Federale Overheidsdienst Financiën, n.d.-c).

Besides the local administrations, the Federal Public Service Finance, shares it information with actors within the federal public administration, the regional administrations and other public administrations who need the cadastral information for the execution of their public task(s). Within the federal public administration, one can thereby think of the State Archives of Belgium, the National Geographic Institute, the Federal Police, etc. Depending on the intensity of the exchange of information, a specific service relation is negotiated and agreed upon. Concerning the relationship with the regional actors, a similar situation is applicable, whereby the Federal Public Service Finance negotiated a relationship with the demanding actor of cadastral information, and shares the information if an agreement is reached. The main regional actors with whom the Federal Public Service Finance shares cadastral information are the Brussels Regional Informatics Centre (CIRB), the Service Public de Wallonie – Département de la Géomatique (SPW-DG) and the Agentschap Informatie Vlaanderen (AIV). As said, also other public administration actors who need cadastral information for the execution of their public task(s) can rely on the information of the Federal Public Service Finance, if an agreement is reached.

[81] Authors own translation.
[82] Authors own translation.

Important to underline is the interaction between the activities of the Federal Public Service Finance on the one hand, and the three main regional actors dealing with geospatial information, the CIRB, the SPW-DG and the AIV, on the other hand. As said above, the three regional organisations make use of the cadastral information data of the Federal Public Service Finance. The three regions have, in the last two decades, developed their own digital topographic reference maps. Flanders developed het Grootschalig Referentiebestand (GRB – administrative parcel plan), Wallonia developed the Projet Informatique de Cartographie Continue (PICC) and the Brussels Capital Region developed UrbIS, which consists of various geospatial datasets (Agentschap Informatie Vlaanderen, n.d.-c; CIRB, n.d.; Service Publique de Wallonie, 2019). Those datasets were developed by the regions, whereby they made use of the cadastral parcel plans provided to them by the Federal Public Service Finance. The Flemish Region, the Brussels Capital Region and the Federal Public Service Finance are currently working together on the quality improvement of the cadastral parcel plan in light of the quality increase demanded by the INSPIRE Directive (European Parliament & Council, 2007; Federale Overheidsdienst Financiën, n.d.-f)[83]. This is an ongoing process, whereby the Federal Public Service Finance negotiates, on a bilateral basis, an agreement with each region. For Flanders this is the *Uniek Percelenplan*, for Wallonia this is the quality improvement of the cadastral parcels and for the Brussels Capital Region this is the *Samenwerking UrbIS – Collaboration UrbIS*.

The *Uniek Percelenplan* aims "to set-up an efficient exchange of information concerning parcels, buildings and address between both organisations, to ensure that the products of both organisations (GRB and CADGIS) are deduced from the same information and there is no double keeping up any more."[84]. The plan is currently being implemented (2018 – mid-2021) and has been legally agreed via the cooperation agreement of May 2014. Specifically, "the Federal Public Service Finance takes over the geometry of the administrative parcels in the GRB and replaces as such the geometry of the cadastral parcels in the cadastral parcel plan"[85]. Once the plan is fully executed, the Federal Public Service Finance will ensure the management of the cadastral parcel plan and ensure that AIV can use this data, whereas the representation of the buildings on the cadastral parcel plan will be replaced by the data from AIV. This plan will, as such, lead to a unique parcel plan between AIV and the Federal Public Service Finance at the level of the parcel and the building (Federale Overheidsdienst Financiën, n.d.-i).

The *Samenwerking UrbIS – Collaboration UrbIS* has a similar objective as the Uniek Percelenplan. More specifically it aims to "set-up an efficient exchange of information concerning parcels and buildings between organisations, to ensure that products of both organisations are deduced from the same common information and there is no double keeping up any more."[86]. The process is exactly the same as in relation to Flanders, and runs from 2018 until 2019. The results will also be the same. Note that there is a small difference between the cooperation between Flanders and the Federal Public Service Finance on one hand and the Brussels Capital Region and the Federal Public Service Finance on the other hand. Where the cooperation agreement with Flanders also mentions addresses, this is not the case for the cooperation agreement with the Brussels Capital Region (Federale Overheidsdienst Financiën, n.d.-a).

Concerning the Walloon Region, the Federal Public Service Finance works on an internal improvement of the data quality. The focus lies thereby on the repositioning of the cadastral parcel plans on the basis of the information derived from, among others, regional data – think of the PICC and aerialphoto's. No cooperation agreement exists as such between the Federal Public Service Finance and the Walloon Region. There is, as such, also no uptake of data concerning data from the Walloon Region to the Federal Public Service Finance (Federale Overheidsdienst Financiën, n.d.-j).

Besides the bilateral cooperation between the various key actors, there are also two crucial coordination bodies that bring together the various actors involved with cadastral information. The first one is the INSPIRE Coordination

[83] The INSPIRE Directive recommends that the average absolute positional accuracy has to be 1m in urban areas and 2,5m in rural areas (INSPIRE Thematic Working Group Cadastral Parcels, 2014).

[84] Authors own translation.

[85] Authors own translation.

[86] Authors own translation.

Group that groups representatives of the different involved Belgian administrations. As demonstrated by Chantillon, Crompvoets, & Peristeras (2017) the 2007 INSPIRE Directive was highly important for the development of a geospatial coordination system in Belgium between the different administrations. The key organisations that are part of this INSPIRE Coordination Group are the National Geographic Institute for the federal administration, the AIV for the Flemish Region, the CIRB for the Brussels Capital Region and the SPW-DG for the Walloon Region (INSPIRE Member State Contact Point Belgium, 2015, 2016). A working group that functions as part of the INSPIRE Coordination Committee is the Groupe de Travail Bâtiment (GT-BUNI). This group prepares a cooperation agreement for the development and implementation of a system for the streamlined exchange of building information in Belgium (Agentschap Informatie Vlaanderen, n.d.-a).

The second important coordination body is Coordination Structure for Patrimonial Information (SCIP-CSPI). The inter-federal organisation supports the public administrations of the three regions and the federal administration in the management and exchange of patrimonial information. It was created by the Cooperation Agreement of 18 April 2014 (Coördinatiestructuur voor Patrimoniuminformatie, n.d.-a). In particular the organisation has four tasks: (1) it helps public administrations in ensuring to find the single point of contact when a public administration wishes to request patrimonial information from another region or the federal administration; (2) it verifies if all conditions related to the exchange of patrimonial information are completed; (3) it optimises the process of information exchange; and (4) it follows new techniques, applications and good practices (Coördinatiestructuur voor Patrimoniuminformatie, n.d.-a). The Board of the SCIP – CSPI consists of representatives from the federal administration as well as the three regions. The following organisations are member of this board: Federal Public Service Finance for the federal administration, Brussel Fiscaliteit-Bruxelles Fiscalité and Brussel Plaatselijk Besturen-Bruxelles Pouvoirs locaux for the Brussels Capital Region, the Direction Générale Opérationnelle de la Fiscalité and Direction Générale Transversale du budget de la logistique et des TIC for the Walloon Region and the Vlaamse Belastingdienst and AIV for the Flemish Region (Coördinatiestructuur voor Patrimoniuminformatie, n.d.-b).

E-SERVICES

In what follows, a number of relevant e-services that interconnect the higher administrations, i.e. the Federal Public Service Finance and the three geospatial regional actors (AIV, SPW-DG and CIRB) to the local administrations are discussed. As the local administrations indicated during the interviews that they also make use of the publically available e-services of the higher administrations, those are also briefly discussed.

A first e-service to be described here is URBAIN, which allows for the communication of information between the Federal Public Service Finance and the local administrations. URBAIN allows local administrations (1) to search for and download information on the cadastral revenue and sizes of cadastral parcels, (2) to search for and download cadastral layers and cadastral parcel plans and (3) to inform the Federal Public Service Finance on the delivery of granted persmissions (Federale Overheidsdienst Financiën, n.d.-h). The data available via URBAIN is updated once a year and contains the data for the situation on the 1st of January of that year. Local administrations are informed once a year when the data is updated. For example, the data of 1st of January 2019 became available on 22 July 2019. In 2018, the data of 1 January 2018 became available on 1 October 2018. This means also that the data used by the local administrations before the yearly update, still dates back to the previous year. Before 22 July 2019, this was as such the data of 1 January 2018, and before 1 October 2018, this was the data of 1 January 2017 (De Ryck, 2018; Herman, 2019). It is important to mention that local administrations can only access the data for their own territory.

Besides URBAIN, the Federal Public Service Finance also offers the possibility to access the cadastral parcel plan via CadGIS. This is a publically available e-service, which is also used by local administrations as it contains more recent information concerning the cadastral parcel plan than URBAIN (Federale Overheidsdienst Financiën, n.d.-b). Indeed, the difference between URBAIN and CadGIS lies in the information that is available and the communication that is possible. CadGIS only contains information on the cadastral parcel plan, URBAIN contains information on the cadastral parcel plan, cadastral revenue, and cadastral layers. Also, URBAIN allows to communicate with the Federal Public Service Finance. Also via Geo.be, the federal geoportal, the cadastral parcel plan is available to the wider public (Federale Belgische Geoportaal & Federale Overheidsdienst Financiën, 2019).

A final available service is ConsultImmo, via this service the local administrations can see the most recent information related to the cadastral layer for a specific parcel. Indeed, ConsultImmo does not provide the information for the entire territory of the local administration, but only for individual parcels (Sectoraal comité voor de Federale Overheid, 2017).

Looking at the regional level, the researchers found a number of relevant e-services concerning the sharing of cadastral information. The SPW-DG offers the cadastral parcel plan of the Walloon Region via the regional geoportail, the *Géoportail de la Wallonie* also known as WalOnMap. No specific service is offered to the local administrations, but the provinces do take an important role in this in the Walloon Region. An example is GiGWal, a tool offered by the provinces of Namur, Hainaut and Liège to the local administrations of those provinces (Groupement d'informations géographiques, 2019). AIV offers a similar service via the Flemish regional geoportal, *Geopunt*. Via the administrative parcels of the GRB, the user can see what the cadastral parcel number is. The cadastral parcel plans of the Federal Public Service Finance can also be downloaded via the Flemish geoportal (Agentschap Informatie Vlaanderen, n.d.-b). The Brussels Capital Region offers the e-service UrbIS, which includes the administrative parcels. The service does not include cadastral information (CIRB - CIBG, 2018).

ANALYSIS

INTRODUCTION

The goal of the analysis conducted in WP5 is double. On the one hand, it aims to present the challenges that were faced in the three case studies and to echo these challenges with the key requirements for future e-service delivery by the federal administration identified in WP3 of the FLEXPUB research project. On the other hand, it aims at testing the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7) by confronting them to real-life scenarios. Accordingly, the analysis of the challenges is done on the basis of the COBIT enablers used in WP3, namely Processes; Organisational structures; Service infrastructure & applications; People, skills & competencies; Culture, ethics & behaviour; Principles, policies & frameworks; Semantics and Location-based data[87].

Before diving into the core of the analysis, it is worth briefly discussing the overall visualisation of these challenges, as outlined by the analysis done via the Nvivo 12 program.

Nodes name	Sources	References
Enablers		

[87] According to the COBIT 5 framework (ISACA, *COBIT 5 Implementation*, 2012, p. 27):
- **Processes** "*describe an organised set of practices and activities to achieve certain objectives and produce a set of outputs in support of achieving overall (IT-related) goals*".
- **Organisational structures** "*are the key decision-making entities in an enterprise*".
- **Service infrastructure and applications** "*include the infrastructure, technology and applications that provide the enterprise with information technology processing and services*".
- **People, skills and competencies** "*are linked to people and are required for successful completion of all activities and for making correct decisions and taking corrective actions*".
- **Culture, ethics and behaviour** "*of individuals and of the enterprise are very often underestimated as a success factor in governance and management activities*".
- **Principles, policies and frameworks** "*are the vehicle to translate the desired behaviour into practical guidance for day-to-day management*".

The final enabler defined by the COBIT 5 framework, namely "Information" that is "*pervasive throughout any organisation and includes all information produced and used by the enterprise*", was renamed "**Location-based data**" by the FLEXPUB team, as the focus of the research project lies such type of data data. The team also added the **Semantics** enabler, to deal with interpretation and definition issues.

• Processes	8	144
• Organisational structures	8	137
• Principles, policies & frameworks	8	111
• People, skills & competencies	8	67
• Service infrastructure & applications	8	65
• Culture, ethics & behaviour	8	59
• Location-based data	6	36
• Semantics	0	0

As can be seen, it is apparent that the most discussed enablers are "Processes" and "Organisational structures". On a third tier, comes the enabler "Principles, policies & frameworks". After the first three enablers, there is a strong gap in references made to the next three enablers. On a fourth tier, come the "People, skills & competencies", "Service infrastructure & applications" and "Culture, ethics and behaviour" enablers. The "Location-based data" enabler was discussed during all interviews as the focus was cadastral information. A number of times it was also specifically refered to. A final word should be said about the "Semantics" enabler, which was not discussed during the interview. This is most likely related to the topics of the case study – cadastral information. For all actors, it was from the start clear what was meant with cadastral information.

PROCESSES

Concerning the enabler "Processes", a number of topics were indicated to the researchers by the respondents. Those topics can be summarised as follows: (1) Data flow and exchange between the Federal Public Service Finance and the local level, (2) Determination of the cadastral revenue, (3) Authoritative sources, (4) Process digitalisation, (5) Feedback mechanisms and (6) Citizen involvement.

A first finding related to this enabler is the overall cadastral information data flow from the Federal Public Service Finance towards the local administrations. Several tools are available for local administrations to access cadastral information. A distinction needs to be made between information related to the cadastral layer and information related to the cadastral map. The information related to the cadastral layer for the entire territory of the local administration is updated once a year via a data transfer from the Federal Public Service Finance towards the local administration. Besides this data transfer, the local administration can, via ConsultImmo, also receive the most up-to-date information of the cadastral layer for a specific parcel. The information related to the cadastral map can also always be accessed via CadGIS as this e-service contains the most up-to-date information. As will be further discussed in the enabler "Location-based data", local administrations would like to receive more than once a year the updated information related to the cadastral layer for their entire territory. The respondents from the higher public administrations underlined that, because of reasons related to resources, it is impossible to ensure a continuous update of the data. A potential agreement might be a more frequent but not-daily update of the information related to the cadastral layer, via a redesign of the processes.

A second finding is related to the determination of the cadastral revenue. This finding is also related to the enabler "Location-based data", and is also further discussed in that section. Important here is the fact that the digitalisation of the public administrations at local and regional level, leading to the electronic collection of a substantial amount of data, has created the possibility to redevelop the existing process for the determination of the cadastral revenue by the Federal Public Service Finance. Indeed, in the current process the local administration has to inform the Federal Public Service Finance that a building permit has been delivered or that a notification of building works

has been made to them. On the basis of this information, the Federal Public Service Finance will then take the necessary paper-based steps. Crucial in the process is the paper-based logic, whereby the owner of the property has to fill-out a registration form ("registration form 43B") and send it back to the Federal Public Service Finance (Federale Overheidsdienst Financiën, 2019). Several respondents indicated that with the currently available data this process for the determination of a cadastral revenue can be reformed, whereby data of other public administrations can be used – think for example of subsidies provided by regional, provincial and local administrations, or of data of other federal partners, such as the most recent aerial pictures.

Strongly related to the previous finding, is of course the use of authoritative sources. This finding is discussed in the section on the enabler "Principles, policies & frameworks". The importance of authoritative sources for this enabler is the fact that authoritative sources allow to redesign the existing processes and to become more efficient and effective. Related to this is the importance of interoperability: Without the necessary interoperability (legal, organisational, technical and semantic) it will not be possible to use the data in various organisations.

A fourth finding is related to the overall tendency to digitalise processes, and fits in a broader discussion. Indeed, although several respondents emphasised the need to further digitalise the processes, thereby also rethinking the processes, it was also underlined by several respondents that it is important to maintain the existing paper-based processes – not only in relation to the external non-governmental actors but also towards internal governmental actors such as local administrations. This creates, especially for the higher public administrations, a difficulty as it means that various channels need to be maintained. Especially towards the internal governmental actors it could be more efficient and effective to have a single-process approach for a number of services.

Another finding relates to the inclusion of feedback from the users of services in the development of services, and more in particular in the process that underpins a service. Various respondents indicated the high importance of feedback inclusion. Looking at the Federal Public Service Finance, it was underlined that there are several feedback mechanisms for both internal governmental actors and external non-governmental actors. Those feedback mechanisms are both directely and indirectly connected to services delivered by the organisation. Examples are the feedback mechanism via the existing services, the feedback received via the InfoCenters of the organisation, the feedback received via the organisation's presence at conferences and events etc. Taking the feedback of the users into account is one of the key priorities of the Federal Public Service Finance. Nonetheless, it has to be underlined that respondents from the local level still indicated that it is hard to reach the organisation with feedback. Some respondents indicated that there are, via the regional contact centres of the organisation, stable and well-organised relationships, while others indicated that this is still lacking.

A final finding related to this enbler is the citizen involvement in the development of services. It is an important part of the processes, as a potential inclusion of citizens in the development of services needs to be part of the pre-defined process and needs as such to be thought through in advance. All respondents indicated that they aim to include citizens in the development of their services, via the processes, but underlined the difficulties encountered for this. Two main reasons stand out for this. In the first place there is the need for resources, both financially and staff-related. Indeed, when there are insufficient resources, there is often a need for prioritisation, often leading to a focus on service delivery, but without citizen involvement. A second factor influencing this is the fact that the inclusion of citizens is often considered as difficult. Citizens needs to be contacted, they need to be willing to participate and to invest their time. Overall, it can be said that the inclusion of citizens is easier at the local level than for the higher public administrations. Indeed, citizens more easily see the added value for themselves when they contribute to the process of service development at the local level than at the higher levels (Chantillon et al., 2018).

ORGANISATIONAL STRUCTURES

Concerning the enabler "Organisational structures", a number of topics were indicated to the researchers by the respondents. Those topics can be summarised as follows: (1) Relation of Federal Public Service Finance with the local administration, (2) Role of SCIP – CSPI, (3) Relation of SCIP – CSPI towards other geospatial/digital coordination initiatives, (4) Role of service integrators.

The first topic to be discussed is the relation between the Federal Public Service Finance and the local administrations. This relation also comes back in the other enablers, as it is such an important one for the exchange of cadastral information. According to the respondents from the local administrations, the organisational structures that organise the relationship between the Federal Public Service Finance and the local administrations are not consistent. The respondents indicated that some local administrations have, on a recurrent basis, meetings with the regional office of the Federal Public Service Finance, while those meetings are not organised in other areas that dependent on another regional office. There seems to be an organisational discrepancy in how the Federal Public Service Finance, and more specifically the regional offices, organise their relation with the local administrations. It was however underlined by the Federal Public Service Finance that there is a structured and similar approach towards all local administrations, whereby the Contact Centers play an important role. Also for URBAIN, the main e-service for the relation between both actors, there is a specific contact point that can be used by the local administrations. Finally, also when local administrations have a specific problem or request, they can ask the Federal Public Service Finance for (technical) assistance and support.

A second topic is the development of the SCIP – CSPI, as well as its functioning and role in the ecosystem of the cadastral information exchange. One of the respondents summarised the creation and functioning as follows: "[…] Au cour des différentes réformes de l'état il y a [eu] des transferts de compétences. La SCIP a été créée suite à un accord entre les régions et le gouvernement fédéral, dans le but de faciliter l'échange des données, et c'est ce qu'ils font dant le pratique sur le terrain.". The SCIP – CSPI has two roles, it functions as a platform to facilitate the exchange of patrimonial information (and as such not only cadastral information) between actors of the federal administration and the three regional administrations, and secondly it functions as a platform for the exchange of information concerning patrimonial information between the federal and three regional administrations. Concerning the first element, it was indicated by the respondents that the process is slow but effective. It allows organisations belonging to one of the four partners to ensure that they can obtain patrimonial information in a structured way, with a clear process behind it. Especially for actors that only use this type of information in a sporadic way, it is highly useful. Important to underline here is that actors who already have an agreement with one of the sources of patrimonial information do not need to pass via the SCIP – CSPI process. An example are the local administrations: They have direct agreements with the Federal Public Service Finance and do not pass via the SCIP – CSPI. One of the respondents indicated that the existence of the SCIP – CSPI allows partner organisations to further develop their expertise and knowledge concerning the patrimonial information they possess and offer to other actors, as the SCIP – CSPI creates the possibility for a closer relationship to the user of the data. Secondly, the SCIP – CSPI functions as a platform for the exchange of information between the partners involved in the organisation. All respondents of the regional and federal level underlined the importance of such an institutionalised platform, not only for specific negotiations but also for the development of a common roadmap for the near future concerning patrimonial information. Also, the SCIP – CSPI does not only provide a platform for negotiations between all parties, but also ensures that all involved parties are informed on the ongoing bilateral activities between involved partners. Indeed, the existence of the SCIP – CSPI does not exclude that bilateral activities take place. An example of a theme discussed within the SCIP – CSPI are the regional purchasing committee (NL: regionaal aankoopcomité / FR: comité d'acquisation regional). Where the first role of the SCIP – CSPI is to support all actors of the federal and regional administrations, it seems that this second role is especially useful for the partners involved in the direct functioning of the SCIP – CSPI. One of the regional respondents indicated that the partners in the SCIP – CSPI Board are well informed and updated on the ongoing discussion but that this is not necessarily the case for the other interested actors in the federal and regional administrations. Ensuring the correct communication of information to the other organisations is the responsibility of the organisations representing the regional and/or federal administration and not of the SCIP – CSPI itself. A disturbed information channeling can however potentially undermine the efficiency and effectiveness of the second role of the SCIP – CSPI.

Another topic discussed by respondents is overall governance structure concerning geospatial and digital coordination initiatives. Several initiatives exist in which the topic of cadastral information is discussed and is important. There is the SCIP – CSPI, as indicated in the previous paragraph, there is the BeSt Address Committee, there is the INSPIRE Coordination Committee (with the Working Group on Buildings) and there is ICEG. All those

initiatives have specific and independent goals and governance structures, but at the same time are also strongly connected as they function within the same domain of geospatial e-government policies. Respondents underlined that those structures led to an increased and improved coordination between the different involved parties, which in turn led to an improved cooperation. At the same time respondents also indicated that the precise task division is not always clear. Als, the precise relation between the coordination structures can be improved. An example of a topic that would merit from an overaching view on the coordination structures is the authoritative source and the meaning of it in the Belgian context. Respondents underlined, however, that it is necessary to have, on the one hand, more strategic coordination structures and, on the other hand, more thematic and in-depth coordination structures – think for example of working groups. One of the respondents indicated in this respect that an overview or catalogue of who is doing what in which organisation and coordination intiative could be relevant.

A final finding is the fact that almost none of the respondents made a reference concerning the service integrators. The Belgian approach of connecting the different involved actors within different public administrations via the service integrators seems as such to be a well functioning system. As one of the respondents indicated, the local administrations do not 'see' that the service integrators at the federal and regional level are intervening in the data exchange process, but they are of high importance for the efficient and effective exchange of data. The Federal Public Service Finance exchanges the cadastral information with the local administrations via MAGDA (for the Flemish Region), FIDUS (for the Brussels Capital Region) and in the future also via BCED (for the Walloon Region). An important reference to the service integrators was however made in relation to the SCIP – CSPI: The efficient exchange of patrimonial informaiton is the key objective of the SCIP – CSPI. When two actors among the four involved public administrations exchange patrimonial information, it was underlined that there is no guarantee that this exchange will happen via the service integrators. Indeed, this might not be the most efficient approach. The SCIP – CSPI will however not decide on this. It is up to the involved actors to take this decision.

SERVICE INFRASTRUCTURE & APPLICATIONS

Concerning the enabler "Service infrastructure & applications", a number of topics were indicated to the researchers by the respondents. Those topics can be summarised as follows: (1) Proliferation of applications, (2) Local administration data platforms, and (3) Local administration building blocks. Interesting here is that all finding related to this enabler are related to the local administrations.

The first finding is connected to a perception of the local administrations, whereby several respondents underlined that it is often difficult to continue to understand which application is exactly used for which purpose. The Federal Public Service Finance offers a number of applications (think of URBAIN, ConsultImmo, CadGIS), and also the different regional administrations offer a number of applications. This creates the perception among local administrations that there is a proliferation of e-services available to them, increasing the complexity of their daily work. This finding is not only related to the federal services offered to local administration, but to the entire range – and as such also regional services – that are offered to the local administrations.

Secondly, and related to this first finding, was the request of local administrations to provide them only with the data they require for the execution of their role, and not with pre-build e-services which block the development of a local data platform. Indeed, local administrations aim to develop their personialised local platform that allows them to execute their tasks. An example was provided by one the respondents who indicated that the "GIS-tool of the Federal Public Service Finance cannot be personalised by local administrations". At the same time it also needs to be underlined that not all local administrations have their own personalised local platform and therefore in favour of keeping pre-defined e-services.

A final and third element related to this enabler was the request from local administrations to develop building blocks that local administrations can use in the development of their e-services. Those general building blocks do already exist – think of the building blocks offered by the Federal Public Service BOSA for authentication and access management – but only for general services. Also more policy oriented services, think for example of the relation between local administrations and notaries, could benefit from such a pre-defined approach of building blocks. Other processes can be re-designed via those building blocks, examples are the required advices from the

fire department for granting a building permit. This comes back to the importance of resources – both financial and staff resources – as those building blocks would take away part of the work and investments of local administrations.

PEOPLE, SKILLS & COMPETENCIES

Concerning the enabler "People, skills & competencies", a number of topics were indicated to the researchers by the respondents. Those topics can be summarised as follows: (1) Skills and competencies of staff, (2) Training of local administrations by higher administrations, (3) Relation of other administrations to the Federal Public Service Finance, (4) Financial resources and (5) Development of data and tools.

The first finding relates to the skills and competencies of staff. There are two parts to this finding. The first aspect relates to finding the necessary staff. All respondents, apart from one, indicated that finding staff with the necessary skills and competencies is difficult for their organisations. The respondents indicated that there are several reasons for this difficulty. In the first place there is the market which influences the availability of the necessary qualified staff, secondly there is the difficult combination of skills (i.e. strong knowledge of both digital and geospatial areas). And thirdly, there is also the overall atractiveness of the public sector. Regarding the second aspect, the competencies and skills of the staff is often (very) diverse, both within one public administration – whereby this is especially an issue at the local level – and between various public administrations – whereby the gap between the skills and compentencies of local staff and the staff of higher public administrations sometimes undermines the well-functioning of the service delivery. Finally, also between the local administrations themselves there are often considerable differences in the quality of the skills and competencies of the staff. This should not be a surprise, as the diversity in size of local administrations is high – e.g. a larger city is not comparable with a small local administration. Because of those difficulties, several respondents of local administrations indicated that it is up to the local level to ensure that the staff possesses the necessary skills and competencies, and consider that they should themselves assume this training role.

A second finding, strongly related to the first finding, is the need to ensure that the staff possesses the necessary competencies and skills once they are part of the public administration. As indicated in the previous paragraph, the respondents highlighted that it is up to local administrations to train their own staff. However, it was also underlined by the respondents of the local administrations that there is need for training by higher administrations. Three reasons were mentioned for this: local administrations are confronted with increasingly more obligations imposed by higher public administrations; there is the general obligation for local administrations to work with tools developed by higher administrations – think of URBAIN and CadGIS developed by the Federal Public Service Finance –; and finally the local administrations function as the first entry gate for citizens but the staff of local administraitons is often insufficiently aware of why certain decision are taken – think for example of the calculation of the cadastral revenue by the Federal Public Service Finance.

It has to be underlined that the higher administrations, both at federal and regional level, provide active and passive training possibilities for the staff of local administrations to increase their knowledge and to improve their skills and competencies related to the cadastral information tools and data. For example, the Federal Public Service Finance offers user manuals for local staff that need to work with URBAIN, the local staff can also contact the Info Centers via telephone or contact the responsible regional or central offices of the Federal Public Service Finance. Nevertheless, respondents indicated that a more interactive approach would be welcomed – one can thereby think of digital user manuals, short online videos addressing urgent questions, proactively organised training days etc. It was also indicated by the local respondents that there are strong differences between the different higher administrations – at least between the Agency Information Flanders and the Federal Public Service Finances. Specially concerning the relation to the Federal Public Service Finance, it was indicated by the local administrations that there are strong differences in the relation to the regional offices of the Federal Public Service Finance. The main risk of a lack of skills and competencies of the staff, and the perceived lack of training by local staff, lies in the fact that it leads to insufficient and/or incorrect use of the tools offered by the higher public administrations, which potentially undermines the efficiency and effectiveness of the local administration as well as the higher administration that relies on the data transfer.

Another element that was underlined by the respondents is the relation between the Federal Public Service Finance and the other higher public administrations. Although it was underlined that there is a stable cooperation, it was also mentioned that the size of the Federal Public Service Finance does affect the potential for an efficient response. Indeed, it was made clear that because of the size it is not always easy to find the correct staff within the organisation or to ensure that the message brought is covering all related services. At the same time however, it needs to be underlined that this is most likely related to coordination issues – something that is present in all large (public) organisations (Bouckaert, Peters, & Verhoest, 2010) – as the required knowledge and expertise concerning cadastral information is present in the Federal Public Service Finance.

Another finding is the fact that various respondents indicated that a lack of sufficient financial resources is not per se an issue. Although all respondents indicated that the financial resources that are available to them are limited, the main issue is the above discussed quality and skills of the staff. Also, when financial resources are an issue for the organisation, it was indicated that the focus of the organisation should be put on the maintenance of existing e-services instead of the development of new services. Indeed, the main challenge for organisations with limited resources, as indicated by the respondents, is the maintenance of e-services (and the related data).

A final finding related to this enabler concerns the development of digital tools. One of the respondents indicated that the main challenge of data and new tools – e-services – lies in the fact that those developing the data and tools are not the same as those using the data and tools in their daily work. This does, according to the respondent, lead to the potential risk that data and tools are insufficiently understood, which in turn might lead to an inefficient and ineffective use of these data and tools. However, there is also another risk behind it, namely that those developing the tools, that use data collected by other, do not sufficiently understand the needs of the users. There is a high risk for miscommunication between 'builder' and 'user'. Therefore, a close connection between the two needs to be established. It is in this respect highly interesting that the Federal Public Service Finance used (and continues to use) for the development of the Federal Public Service Finance e-service 'myMinFin' an AGILE approach, bringing together the developer and internal user of 'myMinFin'. However, the other users – i.e. citizens and businesses – are only represented in an indirect way in this development process.

CULTURE, ETHICS & BEHAVIOUR

Concerning the enabler "Culture, ethics & behaviour", a number of findings were indicated to the researchers by the respondents. Those findings can be summarised as follows: (1) Prioritisation of policy needs, (2) Preparedness for the digital transformation, (3) Culture of cooperation, (4) Relation Federal Public Service Finance to local level, (5) Citizen (and other actors) participation and (6) Culture of consultancy and outsourcing. It needs to be underlined that although this case study is focused on the exchange of cadastral information, the findings related to this enabler are broader. This should not come as a surprise as the cultural element of an organisation has a broader scope than just one policy domain.

A first finding is focused on the prioritisation of policy needs, and is related to the creation of a fund that foresees extra financial resources for cooperation between different actors when they aim for a new project. Several respondents underlined however that new projects, which involve a certain level of cooperation between various actors, do not always succeed, not because of the financial needs, but because of the lack of attention for the project from higher actors in the hierarchy – think of senior management of public organisations or of a lack of political support. It was as such underlined by the respondents that a fund with extra financing is in itself not useful as long as there is not more support for a specific policy priority.

Connected to this first finding is the overall digital transformation and the preparedness of public administrations to make this transformation. Especially within smaller local admininistrations this is an issue that is still present. There are three reasons why, especially at the local level, the digital transformation is still under discussion: the lack of administrative and/or political support – as discussed in the previous paragraph –; the lack of sufficient capacity from a financial and staff perspective; and, most importantly and related to cadastral information, the low number of administrative requests from citizens and businesses. Indeed, this final reason is highly important for small local administrations. When the local administration receives only a few applications per month/year, there

is no perceived need of changing the traditional paper-based working method to a digitalised working method. At the same time however, it also needs to be recognised that other local administrations want to speed up their digital transformation. As one local administration put it: "*We are digitizing the processes via GIS and [other] data. But that is hard work and costs a lot of money. And then you have a federal government that provides a map with cadastral data. So again, as a municipality, if you want to survive and provide more efficient services to the citizen, then you just have to do it all yourself. And otherwise you stand still.*". It must be clear that this leads to a potential straddle for higher public administrations that need to deal with local administrations that have different degrees of digital development and willingness for a digital transformation.

Specifically concerning the Federal Public Service Finance, it was underlined by several other respondents that strong progress has been made and that a cultural change has to take place within the organisation. An example is the recently created department within the Federal Public Service Finance that is responsible for the set-up of an information architecture. The set-up and further development of the myMinFin in an AGILE (specific approach: SCRUM) and cooperative way is another example of how the organisation deals with the future development of its internal functioning. It leads to increased efficiency for the administration, and allows for the rapid rethinking / restructuring of e-services when legal changes take place. It was also indicated that there is a tendency to think further than only sharing data: The question is not only how the data can be shared, but also what the other can do with that data and how the organisation can contribute to the achievement of this objective via its knowledge and expertise. Respondents also understand that cultural changes are going slower in the Federal Public Service Finance than in other public administrations: It is, as indicated before, a big organisation that had to deal with several changes in the last two decades as a consequence of several State Reforms (especially State Reform Five of 2001 and State Reform Six of 2012).

Concerning the culture of cooperation, and also related to the State Reforms (in particular State Reform Five), an important step was the creation of the Coordination Structure for Patrimonial Information (SCIP – CSPI). This inter-federal organisation has been discussed above, but it is important to underline that the organisation led to and further reinforces the possibility of the four involved public administrations to inform, consult and cooperate with each other. The organisation also considers it as its role to ensure that topics that are important for the four involved public administrations are kept on the 'agenda' by the organisation. Although the creation of the SCIP – CSPI is in itself mainly an organisational change, it also serves as an important stimulus of change concerning the culture and behaviour of the involved public administrations.

Concerning this increased cooperation, the research found that between the local administrations in Flanders, there is an online network available that allows staff of local administrations to inform and collect information from colleagues in the same local administration or in other local administrations in Flanders. The tool, Yammer, creates as such the possibility for the development of a cooperation culture (Vlaamse Overheid, 2020). This finding is related to the enabler "People, skills & competencies" as it not only contributes to a change in the culture, but also allows local administration staff to learn from each other and to improve their knowledge.

The fourth element related to this enabler is the relation between the Federal Public Service Finance and the local level, and more particularly the involvement of the local administrations in the development of policies and e-services that the local administrations need to use in their work related to the cadastral information. It is necessary to underline that the messages received from the respondents of the local level, on the one hand, and the respondents from the Federal Public Service Finance, on the other hand, are different. Both views will be presented here. According to the local administrations, and this is related to the enabler "People, skills & competencies", there is need for an increased training from the Federal Public Service Finance to the local level. All local administrations indicated that there is no pro-active request from the Federal Public Service Finance towards the local administrations to be involved in the development of the policy and/or e-services related to cadastral information. It remains a hierarchical relationship whereby the higher administration requests the lower administrations to execute tasks and to inform the higher administration. Some of the respondents, but not all, indicated that they would like to be involved more (actively) in the development of the policy and/or e-services related to cadastral information by the Federal Public Service Finance. The Federal Public Service Finance, on the

other hand, indicated that various channels are available for the local administrations to contact them and that they are also present at various events organised by both the federal and regional administrations. Examples are BeGeo, PICC User Days and Trefdag Informatie Vlaanderen. The Federal Public Service Finance is also in contact with the local administration representative organisations. It seems however that a direct and proactive involvement of the local administrations – e.g. via a regular survey, interviews, focus groups – is missing.

Concerning the cadastral information e-services offered to the wider public and specific target groups that do not belong to the public administrations, such as notaries and land surveyors, there is a strong effort made by the Federal Public Service Finance to receive their feedback. A proactive involvement of citizens remains difficult for the organisation – however, it needs to be recognised that this is difficult for all public administraitons at a higher level, not only because of the distant relationship to citizens, but also because of limited financial and staff resources. Feedback received via the website and the contact line are taken actively into account. Plus, it needs to be recognised that even local administrations indicated that it remains difficult to involve citizens in the development of their services. Other non-public administration actors are however more actively involved, both proactively – via organised meetings – and reactively – via participation in conferences and events. The regional public administrations follow a similar strategy concerning the involvement of citizens and non-public administration actors. Here, it is important to indicate that the higher administrations have a clear willingness to include the feedback from citizens and non-public administration actors in the development of their services. This clearly points to a change in the overall culture of the higher public administrations.

Finally, a finding which has been classified as being part of this enabler, but which is also part of the previous enabler "People, skills & competencies", refers to the culture of consultancy and outsourcing. This allows public administrations to decrease their staff costs as consultancy is financed by other financial resources, but it also leads to a decrease in the expertise within the organisation. However, it should be recognised that this culture of consultancy and outsourcing is broader than this case study, and forms part of the broader public administration paradigm New Public Management (Hondeghem, 2017)

PRINCIPLES, POLICIES & FRAMEWORKS

Concerning the enabler "Principles, policies & frameworks", a number of topics were indicated to the researchers by the respondents. Those topics can be summarised as follows: (1) Prioritisation differences, (2) Collaboration between federal and local administrations, (3) Importance of authoritative sources, (4) Open data licences and (5) Role of SCIP – CSPI.

A first finding, mentioned by several respondents from the higher public administration levels, is the differentiation in the setting of priorities. This finding is not related to the specific case of cadastral information sharing, but can be considered as a general factor that influences, in general, policy areas in which various actors are involved. Such differences in prioritisation become problematic when the different actors do not find a ground to discuss those differences and to define a common ground. This might lead to different policies, underming the overall service delivery. Looking specifically at the cadastral information sharing case teaches us that a differentiation in the policy of the three regions might lead to different approaches in relation to the Federal Public Service Finance – and as such growing inefficiencies for the Federal Public Service Finance. In this respect, the creation of the SCIP – CSPI as well as the INSPIRE Coordination Committee has been of crucial importance: Both coordination instruments allow the different involved actors to share policy information and prioritisation with each other. The use of those structural coordination instruments, which are based on a combination of the network and hierarchy coordination approaches, allow the different involved actors to be updated and informed on the ongoing activities and to take, when necessary, the required steps in light of their own policy.

A second finding for this enabler is the approach on the collaboration protocols between the Federal Public Service Finance and the local administrations. The Federal Public Service Finance and each local administration need to conclude a collaboration protocol. It is highly interesting in this respect that the Federal Public Service Finance takes the necessary steps to, on the one hand, ensure that the document includes as much as possible a standardised approach, and on the other hand, also tries to accommodate the specific requirements of local administrations.

Indeed, those collaboration protocols are not necessarily the same for each local administration. For the Federal Public Service Finance, it is of crucial importance that the applicable legal framework is respected – think for example of the EU General Data Protection Regulation. At the same time, it was also underlined by local administrations that changing requirements from the federal and regional administrations – which are binding for the local administrations – do not always take into account the (limited) available resources at the local level. This can refer to financial resources as well as staff resources and/or the related competencies. An example clarifies this. When a local administration develops a local GIS-platform in order to improve its service delivery, and the higher public administration(s) have new requirements, also in light of an improved service delivery, then this might imply an increased financial cost for the local administration, which is not compensated by the higher public administration.

A third finding refers to the authoritative sources (NL: Authentieke bronnen / FR: Sources authentiques). There is no unity between the federal administration and the three regions. This is not only a finding which is relevant for the cadastral information, but also for other sources of data, and more widely, policy areas. There is no unity among the different public administrations on the meaning of the concept, the approach to decide on what is an authoritative source of data (and as such also not on the conditions) and there is no clear view on what the current status is of the authoritative sources. As FLEXPUB is a federal research project, the attention goes here only to the federal level. The *Wet op de Unieke Gegevensverzameling / Loi sur la collecte unique des données* focuses on the development and use of a system of authoritative sources at the federal level, and as this would lead to the implementation of the once-only principle. However, the Law requires that Royal Decrees are agreed upon in order to allow for the creation of authoritative sources, and as such for the implementation of the once-only principle (Federal Parliament, 2014). Unfortunately, the required Royal Decrees are missing. What makes the situation even more problematic is that a list of so-called authoritative sources has been published by the Federal Public Service BOSA, without any legal foundation. This not only undermines the law, but also the meaning, usability and value of the concept of authoritative data. An interesting example is the situation of the SCIP – CSPI: It publishes the list of available authoritative sources, but can only rely on the information provided to the organisation by the involved actors. If those actors provide partially correct or non-correct information, then this undermines the value of the work of the SCIP – CSPI. Another example was provided by one the respondents: If the law is not followed, and the actor responsible for the authoritative source does not maintain or update the data, which is used by the others (as this is the aim of the once-only principle), then the users of the data cannot fall back on a legal framework. It was underlined by the SCIP – CSPI that this is a point that requires further attention from the different involved actors. Potentially the SCIP – CSPI might have a role in this.

A final point related to the authoritative sources is the position of the Federal Public Service Finance. They aim to position themselves as maintainer of their authoritative data and aim to rely, in the future and for the other required data, on the sources of other actors. An example of this the Uniek Percelenplan Agreement between the Federal Public Service Finance and the Flemish Region.

Another finding is related to the open data licenses. Whereas within one public administration a common approach towards the licenses for open data is accepted, this remains an issue between different public administrations. Indeed, the licences between the federal administration and the regions are highly similar but also contain a number of differences, complicating the potential use of the open data by external users. In this respect, it was interesting to hear that the Federal Public Service Finance is only distributing data that it owns via its open data. Data received from other public administrations is not distributed under the open data licence of the organisation. The regions however are distributing the cadastral information that falls under the open data of the federal administration. There is, as such, a discrepancy between the approach taken by the Federal Public Service Finance and the regional administrations. A coordinated approach from the different involved public administrations would, at least for the end users, be useful. One of the coordination platforms – think of SCIP – CSPI, INSPIRE Coordination Committee and/or ICEG could be used for this.

A fifth finding is related to the definition of the tasks of SCIP – CSPI. The tasks of the organisation are defined in Article 5 of the SCIP – CSPI Cooperation Agreement, and originate from before the INSPIRE Directive and as such

also the implementation of the INSPIRE Directive in Belgium (Federale Staat, Vlaamse Gewest, Waalse Gewest, & Brusselse Hoofdstedelijke Gewest, 2014). The SCIP – CSPI definition includes both non-geospatial and geospatial aspects, as it refers to "patrimonial information". As a consequence, the SCIP – CSPI definition is in overlap with the definition of the INSPIRE Coordination Committee. For a number of respondents this is a difficult issue to deal with as it blurs the lines and responsibilities of both coordination platforms. SCIP – CSPI however underlined in this respect that the definition is interpreted in a restrictive way, thereby trying to exclude any potential overlap between the two.

SEMANTICS

As indicated in the introduction of this analysis, the interviews did not lead to the discovery of specific challenges related to the enabler "Semantics". The only finding that could fit in this enabler is the meaning of the concept authoritative data. The document analysis, as well as a study of Wouters & Crompvoets (2020), point out that there are two specific challenges related to authoritative sources (NL: Authentieke bron / FR: Source authentique). A first challenge is related to the enabler "Principles, policies and frameworks", and the second one is related to this enabler. The main Belgian public administrations, i.e. the federal administration as well as the three regional administrations, have four different understandings of what an authoritative source is, leading to different interpretations within the four public administrations and difficulties to communicate on the topic with each other. Related to this lack of conceptual clarity is the fact that within one public administration, looking in particular to the federal administration, there are different legal frameworks defining the meaning of what an authoritative source is, whereby some authoritative sources are defined by a horizontal law, while others are defined by a policy law. For instance, the cadastral information of the Federal Public Service Finance is considered by various actors as an authoritative source of data. However, this is only *de facto* correct, as the legal frameworks for the *de jure* recognition are lacking. Also, the actions of the Federal Public Service BOSA to create a list of authoritative sources for the federal public administration without following the necessary legal steps undermines the conceptual clarity of the concept of authoritative source.

LOCATION-BASED DATA

Concerning the enabler "Location-based data", a number of findings were indicated to the researchers by the respondents. Those findings can be summarised as follows: (1) Data quality, (2) Data crossing and combinations, (3) Data exchange between federal administration and regional administrations, and (4) Collaboration between administration and private sector.

The first finding is related to the overall data quality, which is according to several of the respondents insufficient. An insufficient data quality is problematic as it constitutes the basis for the development of information and service delivery towards end users, such as citizens and businesses. One aspect is the data precision which is insufficient, another aspect is the up-to-dateness of the data, and as such the information. Concerning the first element one of the respondents stated the following: "*The difficulty is that the quality of the cadastral data is still not good enough. […] In certain locations, we really have doubts about the position of the cadastral parcel limits with a few meters.*". It needs to be underlined that the INSPIRE Directive and related documents allow for an uncertainty of a few meters, but only in a non-built area. The respondent however indicated that the problem of "a few meters" takes place in a non-rural area. However, it was also recognised that the ongoing negotiations between the Walloon region and the Federal Public Service Finance are expected to lead to an improvement of the data quality. This last point is also an aspect that was underlined by the Federal Public Service Finance, and is also one of the reasons why there are cooperations with the Flemish Region and Brussels Capital Region – think of the Uniek Percelenplan.

The second aspect is the up-to-dateness of the data. This is not only an issue in the Walloon Region, but for the entire Belgian territory. It was underlined by the respondents of the local administrations that the updates of the cadastral information are insufficient to fulfil their policy needs, and undermine the overall service delivery towards the end users. One of the respondents has put it in the following way: "*Once a year is not enough, especially for public consultations because you unnecessarily bother people who also have no message that they must go to the mail to get a registered letter*". An example illustrates this difficulty: in June 2019 the local administrations received

an update of the cadastral information to upload on their local URBAIN-tool. In September 2019 a person possessing parcels and a house in the territory of the local administration dies, and the local administration is informed of this. In February 2020, the local administration starts a public consulation and therefore informs the owners of parcels and buildings in a certain area. Therefore the local administration makes use of the cadastral information received in June 2019. Unfortunately, this data is not yet updated with the information of the deceased person, and therefore the deceased person is still addressed in the public consulation of the local administration. This is – as indicated by several local respondents – problematic, as citizens do not understand why this data is not connected and updated. Both the Federal Public Service Finance and the regional administrations recognise this difficulty and underline that this is problematic, but also made clear that the resources and processes do not allow to increase the number of updates that local administrations receive. As one respondent has put it: "*That is a desire but the complexity often surpasses what is being asked.*".

A second finding is focused on the potential and possibilities to combine data from different sources, which includes various sub-findings. A first sub-finding is related to the fact that local administrations use, in their daily work, not only cadastral information but also other geospatially related information, such as aerial pictures of their territory. Often, local administrations make use of products available on the private market, such as Google Maps. Although this is, in itself, not a problem, it is rather remarkable that the high quality aerial pictures of both the federal and regional administrations are not as intensively used by local administrations as the private sector data. Especially as the public aerial pictures are funded by taxpayers money and are also trustworthy. Secondly, and this finding relates specifically to the Federal Public Service Finance and the decision of the cadastral revenue, there is room for an improvement of data use. In the current cadastral revenue decision system, it is up to the local administration to ensure that the Federal Public Service Finance is aware of the construction of a building / modification of a building that might impact the cadastral revenue. The local administration can only inform the Federal Public Service Finance when it is aware of a modification – there is as such a need for a building permission or a reporting duty by the building owner. The Federal Public Service Finance will only be able to act on the cadastral revenue when it is aware of changes, and needs as such to be informed by the local administration. At the same time, there are within several other public administrations – especially at regional, provincial and local level – several other datasets that can indicate when a modification to a building happened. Examples of this are the subsidies that owners of buildings can receive – also when the owner did not need a building permission or had a duty to report modifications. These types of data could be highly useful for the Federal Public Service Finance to increase the efficiency of its functioning and service delivery.

A third finding relates to the data exchange between the federal administration and regional administrations, which impacts the service delivery of local administrations. Local administrations make use of the data they receive from both the Federal Public Service Finance as well as the regional actors for their service delivery. As discussed earlier, there is a long time-span before the local administrations receive the updated cadastral information (the cadastral layer). Local administrations can however also make use of CadGIS, which is the open data portal for all users – also citizens – which includes only the cadastral map and some basic information related to the cadastral map. Via the different tools of the regional administrations, the local administrations can then also access the cadastral information (cadastral layer and cadastral map – depending on the region). This leads to a potentially confusing situation for local administrations as the same type of data, with however small differences because of the update timing, is applied in the service delivery. Therefore, the steps taken by the Federal Public Service Finance and the regional actors to come to a clear division of tasks and responsibilities concerning patrimonial information are of crucial importance. Also, the application ConsultImmo of the Federal Public Service Finance is key for local administrations as it allows (will allow) local administrations to have constant access to the most up-to-date information on the cadastral layer.

A fourth, and final finding, is related to potential collaboration between the public administrations and the private sector. It is considered as a finding of minor importance, as no strong attention was devoted to this topic by the respondents. The only references made to collaboration between the public and private sector refered to the Grootschalig Referentie Bestand (GRB), which was born partially out of a need from the private sector to have a high-quality parcel map – with the parcels being refered to in a physically correct way instead of a cadastrally

correct way.

RECOMMENDATIONS

INTRODUCTION

On the grounds of the above analysis of the challenges, recommendations for the future of the case can be made. These will be structured according to the pillars underlying the Strategy (WP6) and the Blueprint (WP7) (Openness; Participation; and Collaboration).

Once again, it is worth briefly outlining the most discussed strategic actions / guidelines, as apparent from the analysis done via the Nvivo program.

Nodes name	Sources	References
Strategy / Blueprint		
• Openness	6	43
• Participation	7	52
• Collaboration	5	34

On the basis of the analysis of the challenges, 15 specific recommendations for the future have been made.

OPENNESS

Commonly define the meaning of the concept Authoritative Source

This recommendation is related to two enablers, and two specific findings described above: "Processes – 3. Authoritative sources" and "Principles, policies & frameworks – 3. Importance of authoritative sources". A full description of the findings can be found above. As indicated there is no common understanding among the Belgian federal and regional administrations of what an authoritative source is, which undermines the possibility to apply the once-only princinple and to – as a result – improve the service delivery towards users. Therefore, it is recommended to establish a coordinated approach on the concept of authoritative source, whereby the federal administration and the three regional administrations commonly define what the concept refers to and what the precise quality requirements are. On the basis of the common definition and the common quality requirements, the public administrations can establish the processes to internally agree on an authorititative source.

> *Recommendation 1: Establish a coordinated approach on the concept of "authoritative source" and agree on quality requirements*.

Redesign data flows between involved actors

This recommendation is related to three enablers, and three specific findings described above: "Processes – 1. Data flow and exchange between the Federal Public Service Finance and the local level", "Service Infrastructure & Applications – 2. Local administration data platforms", and "Location-based data – 1. Data quality". A full description of the findings can be found above. Overall, it can be said that all actors – ranging from local, to regional and federal – agree with the need for high quality cadastral data. The data update schedule can also be discussed, but needs to take several factors into account – think of service delivery toward end users, internal resources (financial and staff) and connections to other datasets. Ongoing activities of the Federal Public Service Finance in relation to the regional administrations are promising and need to be futher continued. Also, the format in which the data is provided to the different administrations should allow the receiving organisation to upload it in the own internal tools and/or platforms. It is therefore of high importance that interoperability standards are agreed upon among the different involved public administrations.

Recommendation 2a: Continuously improve data quality and data update schedules towards the different actors, taking into account the service delivery towards end users, internal resources and connections to other datasets.

Recommendation 2b: Provide data in a format that allows the receiving organisation to develop a personalised tool/platform.

Recommendation 2c: Agree on interoperability standards that are applicable to the different Belgian public administrations, thereby focusing on legal, organisational, semantic and technical interoperability.

Agree on a common Open Data License

This recommendation is related to one enabler, and one specific finding described above: "Principles, policies & frameworks – 4. Open data licenses". A full description of the findings can be found above. The current open data licences of the different Belgian public administrations are mostly similar but do contain a number of small differences. This leads to difficulties for the end users, in the first place because data related to the same domain but coming from different public administrations, can fall under different licences. Secondly, and related to the first difficulty, this can undermine the original aim of the European Directice on Open Data – i.e. stimulate the re-use of open data for economic purposes.

Recommendation 3: Agree on a common open data licence across the different Belgian public administrations.

PARTICIPATION

Further establish the local level communication approach

This recommendation is related to five enablers, and seven specific findings described above: "Processes – 4. Process digitalisation and 5. Feedback mechanisms", "Organisational structures – 1. Relation of Federal Public Service Finance with the local administration"," People, skills & competencies – 1. Skills & competencies of staff and 2. Training of local administrations by higher administrations", "Culture, ethics & behaviour – 3. Culture of cooperation" and "Principles, policies & frameworks – 2. Collaboration between federal and local administrations". A full description of the findings can be found above. This set of recommendations mainly refers to the relation between the local administrations, and in particular the staff working with cadastral information, and the Federal Public Service Finance. The recommendations are related to two aspects that have a close connection, on the one hand the overall communication towards the local administrations and the possibilities of local administrations to transfer their requirements to the higher public administration, and, on the other hand, the growing need for local administrations to increase their competencies and skills. Especially this last aspect is also relevant for the regional public administrations.

Recommendation 4a: Evaluate the overall communication approach towards the local level, thereby focusing on the need for an established two-way communication which allows local administrations to transfer their requirements to the higher public administrations. Redesign the communication approach towards the local level on the basis of this evaluation.

Recommendation 4b: Set-up an online communication platform that allows local administration staff working with cadastral information to communicate with other local administration staff, that is managed, both from a technical and content wise perspective, by the Federal Public Service Finance. Such a platform will allow for a structured network communication among local administrations, and create the possibility for the Federal Public Service Finance to see what specific requirements exists among local administrations.

Recommendation 4c: Continuously invest in skills and competencies trainings for local administration staff that is working with the data and tools offered by a higher public administration, focused on continuous learning and the use of new technologies.

Include data sources in cadastral revenue determination process

This recommendation is related to two enablers, and two specific findings described above: "Processes – 2. Determination of cadastral revenue" and "Location-based data – 2. Data crossing and combinations". A full description of the findings can be found above. Currently, the Federal Public Service Finance defines and updates the cadastral revenue on the basis of (1) information provided by the owners of the property and (2) via a possible field visit to the property. This procedure starts via a notification of the local administration. Currently, however, a high amount of potentially relevant data is available at the regional, provincial and local level, that can also be of help for the Federal Public Service Finance to define the cadastral revenue. It is therefore recommended that the Federal Public Service Finance will look into the possibilities to include the use of other relevant data into the process for defining the cadastral revenue.

> *Recommendation 5: Rethink the possibilities to define the cadastral revenue from a data perspective, by increasingly taking into account the potentially relevant data collected at regional, provincial and local level.*

Design e-service building blocks for vertical policies

This recommendation is related to two enablers, and two specific findings described above: "Processes – 4. Process digitalisation" and "Service infrastructure & applications – 3. Local administration building blocks". A full description of the findings can be found above. The federal administration, especially via the Federal Public Service BOSA, already provides a number of e-service building blocks. Other public administraitons, such as the local administrations, can make use of those e-service buildings blocks. The e-service building blocks are however all horizontally oriented. As all local administrations also have to deliver the same services to non-state actors, think of notaries, and as local administrations have to deal with limited internal capacity and limited resources, it could be recommended that higher public administrations also develop e-service building blocks for vertical policy areas. This would lead to an increased role for the higher public administration, but also to an increased efficiency at the local level and towards the users – if the e-service building blocks are well-developed.

> *Recommendation 6: Reinforce the creation of e-service building blocks (e.g. generic API's and open services) for local administrations and other interested parties, in collaboration with the target groups.*

Increase user involvement in service development process

This recommendation is related to three enablers, and three specific findings described above: "Processes – 5. Feedback mechanisms and 6. Citizen involvement", "People, skills & competencies – 5. Development of data and tools" and "Culture, ethics & behaviour – 5. Citizen (and other actors) participation". A full description of the findings can be found above. Higher public administrations already took various steps to increase the user perspective in the development of cadastral e-services. Think of land surveyors, local administrations, notaries etc. Both directly and indirectly received information is important. The direct inclusion of citizens and non-traditional target groups remains however difficult for various public administrations. Especially citizens are difficult to reach for higher public administration, as the distance between them and the citizens is bigger compared to local administrations. It is therefore recommended that further action is taken to consequently include service users, i.e. external non-governmental actors, in the service development process. The difficulties encountered to include citizens need to be considered. Related to this is also the internal service user: Connect the technical service development to the internal users of the service, so that both parties are aware of each other's needs.

> *Recommendation 7a: Include service users in a consistent way in the service development process, thereby relying on good practices from other public administrations and the literature – especially on how to include the citizens' perspective in the service development process.*

> *Recommendation 7b: Ensure a close connection between the internal service users, i.e. the organisation's staff working with the (future) service, and those actors developing, from a technical perspective, the service. A close connection in the service development process will lead to an efficient and effective use of the developed service.*

COLLABORATION

Agree on a common roadmap

This recommendation is related to four enablers, and three specific findings described above: "Service Infrastructure & Applications – 1. Proliferation of applications", "Culture, ethics & behaviour – 1. Prioritisation of policy needs and 2. Preparedness for the digital transformation", "Principles, policies & frameworks – 1. Prioritisation differences" and "Location-based data – 3. Data exchange between federal administration and regional administration". A full description of the findings can be found above. The four main public administration, i.e. the Federal Public Service Finance and the three regions have different policy needs and priorities. There are also common needs, and as such potential common priorities. In order to be as efficient and effective as possible towards the end users, i.e. citizens, businesses and other non-governmental actors, a roadmap with common policy objectives and priorities could be highly relevant. For local administrations this could be highly beneficial as it allows them to further structure their work. Examples of topics to be included are authoritative sources, the improvement of the data quality (which is ongoing), the delivery of updated data to local administrations etc.

> *Recommendation 8: Agree on a roadmap with common policy objectives and priorities to increase the overall service delivery in the area of cadastral information sharing towards the end users.*

Define relationship between different coordination bodies

This recommendation is related to two enablers, and three specific findings described above: "Organisational structures – 2. Role of SCIP – CSPI and 3. Relation of SCIP – CSPI towards other geospatial/digital coordination initiatives" and "Principles, policies & frameworks – 5. Role of SCIP – CSPI". A full description of the findings can be found above. Both at the federal level, and in relation to the three regional administrations, there are several coordination bodies for actors dealing with the topic of geospatial and/or digital policies. Those coordination bodies have different objectives and the connections between those coordination bodies are not (always) established. This leads to a potential overlap in roles and tasks, and a potential difficulty in defining which coordination body needs to handle a particular topic. An example is authoritative data. This could be handled by SCIP – CSPI, by the BeSt Address Committee and by ICEG. Therefore, it is recommended that the different objectives of those coordination bodies are well defined and that the definition of the relations between those coordination bodies is also improved.

> *Recommendation 9a: Clearly define the responsibilities, and also the relations, between the different coordination bodies active the geospatial and/or digital domain.*

> *Recommendation 9b: Establish, in policy domains that require the exchange of data and information between federal organisations and the three regional organisations, coordination bodies with the necessary resources that can stimulate the exchange of data and information.*

SUMMARY

Recommendations specific to the Cadastral Information Exchange Case	***Recommendation 2a:*** *Continuously improve data quality and data update schedules towards the different actors, taking into account the service delivery towards end users, internal resources and connections to other datasets.* ***Recommendation 4a:*** *Evaluate the overall communication approach towards the local level, thereby focusing on the need for an established two-way communication which allows local administrations to transfer their requirements to the higher public administrations. Redesign the communication approach towards the local level on the basis of this evaluation.* ***Recommendation 4b:*** *Set-up an online communication platform that allows local administration staff working with cadastral information to communicate with other local administration staff, that is managed, both from a technical and content wise perspective, by the Federal Public Service Finance. Such a platform will allow for a structured*

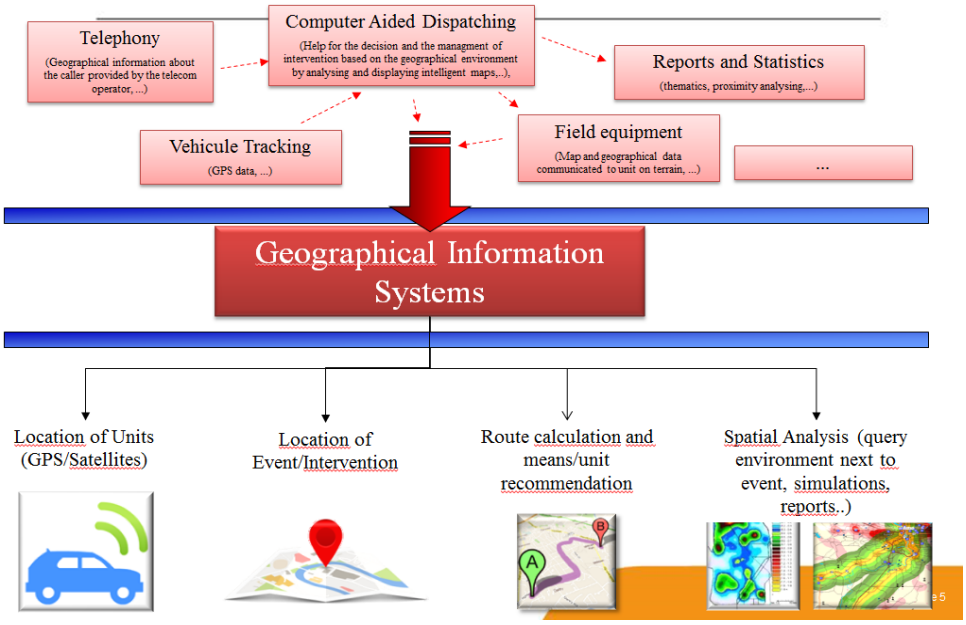
	network communication among local administrations, and create the possibility for the Federal Public Service Finance to see what specific requirements exists among local administrations. ***Recommendation 5:*** *Rethink the possibilities to define the cadastral revenue from a data perspective, by increasingly taking into account the potentially relevant data collected at regional, provincial and local level.* ***Recommendation 8:*** *Agree on a roadmap with common policy objectives and priorities to increase the overall service delivery in the area of cadastral information sharing towards the end users.* ***Recommendation 9a:*** *Clearly define the responsibilities, and also the relations, between the different coordination bodies active the geospatial and/or digital domain.*
Recommendations that have a larger scope than the Cadastral Information Exchange Case	***Recommendation 1:*** *Establish a coordinated approach on the concept of "authoritative source" and agree on quality requirements.* ***Recommendation 2b:*** *Provide data in a format that allows the receiving organisation to develop a personalised tool/platform.* ***Recommendation 2c:*** *Agree on interoperability standards that are applicable to the different Belgian public administrations, thereby focusing on legal, organisational, semantic and technical interoperability.* ***Recommendation 3:*** *Agree on a common open data licence across the different Belgian public administrations.* ***Recommendation 4c:*** *Continuously invest in skills and competencies trainings for local administration staff that is working with the data and tools offered by a higher public administration, focused on continuous learning and the use of new technologies.* ***Recommendation 6:*** *Reinforce the creation of e-service building blocks (e.g. generic API's and open services) for local administrations and other interested parties, in collaboration with the target groups.* ***Recommendation 7a:*** *Include service users in a consistent way in the service development process, thereby relying on good practices from other public administrations and the literature – especially on how to include the citizens' perspective in the service development process.* ***Recommendation 7b:*** *Ensure a close connection between the internal service users, i.e. the organisation's staff working with the (future) service, and those actors developing, from a technical perspective, the service. A close connection in the service development process will lead to an efficient and effective use of the developed service.* ***Recommendation 9b:*** *Establish, in policy domains that require the exchange of data and information between federal organisations and the three regional organisations, coordination bodies with the necessary resources that can stimulate the exchange of data and information.*

CASE 3: EMERGENCY SERVICES

Emergency Services in Belgium are based on an ecosystem of stakeholders interacting with each other. The entry point to this use case resides in ASTRID. It is a private company of public law that operates as a private company

but is financed and under the control of the Ministry of Interior. ASTRID can only help the public organisations listed in the law and can provide punctual services to specifically identified private companies. It offers four basic services: a radio network (TETRA), a paging system for fire-fighters (POCSAG), a Mobile Virtual Network, and a Computer aided dispatching system, which is the service that will particularly interest us for this case study. It encompasses all the police emergency systems as well as the fire-fighters and medical ones. The figure below represents the core activities of ASTRID.

Figure 6: ASTRID Emergency Service Structure



Source: Modelisation of ASTRID (Provided by geographical expert of ASTRID at the start of the project)

ASTRID uses two complementary systems:

- First the Computer Aided Dispatching (CAD) system (Intergraph), which is fast, for first localisation and route calculation in order to give an operational response. This is labelled as "operational intelligence". This is not available in a GIS tool.
- Second, ASTRID created a GeoPortal which is slower but is much more elaborated from a geo point of view and allows to specify the CAD system in real-time and include the real-time info. This allows to draw on the map and to share this with other platforms, via the webservice, as a communication tool (this is not possible with the CAD system). This is labelled as "cartographic intelligence".

So operational intelligence is used for planning and decision-making and cartographic intelligence is used for real-time support provided to the emergency operators. Both systems are used, and are complementary. The CAD system is used by emergency services only and the GeoPortal is also used by police for other events (e.g.: missing persons or big events).

In order to broaden the scope beyond ASTRID, we decided to examine in-depth a project conducted with a lot of emergency services stakeholders: the NATO Summit of 2018. The goal was to develop a tool using a map from the NGI. Different stakeholders wanted to see where everybody was during the event of July 2018 and also check additional thematical data such as traffic. There were a diverse range of staholders involved: the NGI provided the map, ASTRID iwas the key for emergency systems in collaboration with interior affairs, SIGGIS was the developing company and the end users were coming from different disciplines.

ANALYSIS

Before diving into the core of the analysis, it is worth briefly discussing the overall visualisation of these challenges,

as outlined by the analysis done via the Nvivo program.

Nodes name	Sources	References
Enablers		
• Processes	6	25
• Organisational structures	4	14
• Service infrastructure & applications	3	8
• People, skills & competencies	3	6
• Culture, ethics & behaviour	3	5
• Principles, policies & frameworks	3	8
• Semantics	0	0
• Location-based data	4	16

In this case, three main good practices have been identified:

- First, the applications that ASTRID uses (Dispatching tool and GeoPortal) are complementary and enable a lot of the users' needs. Furthermore, the GeoPortal offers real-time data and integrates data from numerous sources.
- Second, ASTRID has a "community of practices" (COP) where the different stakeholders can discuss and decide on investments at the cartography level (DRI for 101, BIZA (Ministry of Interior) for 112, Ministry of public health and ASTRID). This comes from the "culture of participation" that ASTRID has since its founding. Furthermore, this culture of participation is also seen in some innovative development practices that ASTRID implements (V-Model of programming, SCRUM or CANBAN).
- Third, the communication of ASTRID to the operators is innovative as ASTRID uses a set of communication methods: meetings, documents, cartoons, videos.

Three main challenges have also been identified, and are linked with the three good practices.

- First, even though ASTRID manages to integrate data for numerous sources, challenges remain. It is hard to integrate operational information (that belong to users) to the data of ASTRID and to maintain them with the releases and updates. Indeed, the collaboration and data exchange between the core actors of the emergency services works well but the collaboration with external actors is still difficult. Furthermore, it is difficult for operators to report the problems seen in the data and to know how the issue is dealt with. The service management process (documentation, reliability and indicators) is also challenging as a consequence.
- Second, ASTRID uses innovative development practices but two challenges remain for the implementation of AGILE methods. There is a cultural fear to show non-finished products (sprints) to the users and to collect feedback from them. There is also a close budget monitoring of the spending of ASTRID which makes the flexibility advocated by AGILE methods difficult. Finally, the integration and the processing of the users' requirements is not always perceived as transparent by the users.
- Third, there is a very high disparity in terms of technical maturity and digital literacy between operators, depending on the zone, which makes the explaining of the system challenging. Accordingly, the innovative

communication towards those operators, the training and explaining of the use remain a challenge.

The following sub-sections will discuss the challenges identified in the case study, using the enabler structure of the COBIT Framework.

PROCESSES

Updates to the ASTRID emergency systems are made thanks to the collection of the users needs, which are then translated into objectives for the update by ASTRID. These requirements are identified in collaboration with the civil servant users through continuous involvement in the project. There are two profiles of participants: technical profiles (for feasible requirements) and operational & organisational profiles (for functional requirements). Users express operational needs and ASTRID translates it in technical objectives and then execute the solution via projects. This culture of participation is born because, in the beginning, only the direct users (policemen) were part of ASTRID. There are rarely conflict between users' requirements (even though there are many stakeholders involved).

However, despite this culture of participation, some challenges remain to collect users' insights. A users' committee exists but there is a perception that their opinion is not always taken into account. ASTRID also uses intermediaries to discuss with user groups. In that regard, the relationship between Astrid and FedPol – DRI is very important. They are the SPOC for all the police zones. ASTRID does not communicate with all the zones. The zones mention their needs to DRI and DRI forwards it to ASTRID. They use the "V" method to identify the user requirements, coming from the field. DRI centralises all the field user requirements, analyse them and then forward the requirements to ASTRID. Then they decide within COP which ones they will work on. They also have a "technical meeting platform" where people from the call centers and the intermediaries can come and discuss. However, the attendance is still low with only "lead users" being present due to the constraints in terms of time to be there.

Another key challenge related to user participation comes from the use of Agile methods. In the collaboration with users for the NATO project, ASTRID used CANBAN practices. Other practices such as the delivery of non-finished products (Sprints) for user validation were not implemented as there was a fear about what the users might say and that they might be disappointed. Other SCRUM practices were difficult to implement. For instance, the daily-stand ups were difficult to organise due to the lack of availability of stakeholders or of appropriate tools (e.g. Skype). In SCRUM, you are supposed to have "daily stand-ups" of 10-15 minutes, where everybody involved in the project says what they did and what they will do. But here, it was impossible to do it, as they all work in different locations and video-conference is not generally accepted. On top of that, the product backlog was long and not read by everyone. Finally, the product owner was not clearly appointed. They never had anybody representing the customers, ranking the requirements, and somebody who can evaluate how much man/days each requirement represents. This led to a difficult view of the priorities and time necessary for requirements, and a difficulty to chose which requirements they would develop. Finally, they didn't use heavily AGILE mostly for budgetary reasons, because they had a lot of budgetary restrictions and many controls by the "Cour des Comptes", who really checks that the money is well spent. So if a provider says that it is 60 man/days, it must not be 70 man/days. It must also not be 50 man/days, because, for the next time, the "Cour des Comptes" will say that they over-evaluate and they will give them less than what they ask for. It is really frustrating because they have to make choices. But this budget control is really necessary. Often, they work with study phases of more or less 50 days, which gives them a better view of how much this will cost concretely. They thus consider this as incompatible with AGILE.

One ASTRID interviewee mentioned that only 10% of the projects he was involved in used AGILE because the needs were clearly defined and he did not feel the need to go AGILE. On top of that, the "marchés publics" regulation made it even more difficult.

ORGANISATIONAL STRUCTURES

A lot of organisations are involved in the emergency services landscape in Belgium and ASTRID constitutes a key partner to these organisations. The cooperation between ASTRID and the core actors (i.e. FPS Interior Affairs, Police, Fire Fighters and Medical Aid) is considered as good. A COP platform has been created with DRI for 101, BIZA

(Ministry of Interior) for 112, Ministry of public health and ASTRID. They each represent a different focus, and the COP platform decides of the investments at the cartography level. However, the relation with external partners to this core circle seems to be more blurred due to insufficient judicial, administrative and technical agreements.

Indeed, numerous data are currently integrated into the ASTRID systems to allow for localisation. This calls for a standardisation of data (e.g. addresses). Sometimes, organisations don't use the same maps (TomTom, Cartoweb, etc) and the integration of data raises issues. The standardisation of data is only possible if there is cooperation between organisations (e.g. Best Adress for addresses).

More specifically, their difficulty is that not all local municipalities use the same reference systems for addresses (and it is only the municipalities who decide of the name of the street and don't want to change the names as it is expensive). Furthermore, data is, most of the time, only available to ASTRID after the new street or object has already been created in reality.

Therefore, ASTRID developed its own standard, with the police, for the naming of the streets, in order to avoid dispatching mistakes which can be disastrous. But it inevitably faces issues such as an enormous amount of time to update and merge datasets manually. Thus, there is already a certain level of standardisation, but there is a hope that BeSt Address improves this situation.

SERVICE INFRASTRUCTURE & APPLICATIONS

Some key infrastructure choices have to be made. For instance, the Ministry of Interior tries to integrate the infrastructure and software of 101 and 100. But for other services, it is not clear if they will choose for common infrastructure or just create an interface between them. Furthermore, the integration of operational and cartographic intelligence will induce a key infrastructure decision to be made in the future. Finally, on the user-friendliness side, the interface of the systems must be improved so that operators can use them properly due to their disparity in terms of digital literacy.

PEOPLE, SKILLS & COMPETENCIES

There is a need for practical education, information and training of the system users so that they can exploit fully the ASTRID System. Depending on the zones (Police, or Firefighter), there are different maturity levels in terms of IT (due to investments but also motivation and training of people). For instance, during the terror attacks, the network was operational and the "control rooms" were available but people were not aware of the "crisis control rooms". Also, system users were using the tools in a wrong way.

There is a big rotation of personnel in the operators which makes the explanation of the systems difficult. The profiles of the operator are not technical but really operational. They tried to use meetings, documents, cartoons, videos and e-learning but it is still challenging. These operators consider that "they are not paid to go to trainings". The best communication channel remained the cartoon thanks to the easy-to-understand images.

Another big difficulty is that ASTRID has difficulties to present their cartography issues to the operators, which don't always understand that it is not as easy as Google maps. Indeed, all this requires a strategy, a certain logic, a certain way of working.

In terms of the financial ressources and the hiring of staff, it is difficult to find them to ensure the updates of the operational data.

CULTURE, ETHICS & BEHAVIOUR

The main problem from this enabler is related to the implementation of AGILE methods, as it requires horizontal collaboration between stakeholders and the participation of users. However, it is reported that the culture of administrations is not appropriate for this close collaboration. Furthermore, there was also a fear of change in the work practices and the fear to show an unfinished tool to the customer, even though stakeholders were asking for rudimentary framework and website (in the context of the NATO project). Furthermore, there is a strong budgetary control in administration which makes the implementation of agile methods more difficult due to their flexibility

in time, scope or budget.

PRINCIPLES, POLICIES & FRAMEWORKS

There is not a strong impact of the GDPR on the emergency services operations as operational information is confidential and cannot get out of the dispatching systems. The security requirements were already really high before. Indeed, some data can't be extracted from the call centers. Furthermore, the data that is stored in other places (e.g. NGI) is not the confidential data. Some data are stored locally and must be aggregated when working with the geoportal. This is not ideal but it is the best way to work considering the legal requirements.

In the emergency service landscape, they are not really concerned with open data in terms of publications. However, stakeholders from ASTRID mentioned that the more the data are opened in other administration, the better.

SEMANTICS

No challenges related to semantics have been identified in this case.

LOCATION-BASED DATA

The relevance of location-based data was discussed mainly in two above enablers: "Principles, Policies and Frameworks" and "Organisational Structures".

We can underline here the importance of data quality and update (for example administrative and country borders which don't really matter for TomTom but are critical for the police). Two people within the NGI work for ASTRID and update their map since 2006 with "operational data" from the emergency operators (CIC) (more or less 100.000 data) to merge them into the ASTRID systems.

The operators report problems in data via a logbook system. However, since this process takes time, ASTRID cannnot know whether the problem was already handled or not which causes redundancy in the reported issues. A flagging system would enable the process to be more transparent for everyone. This is the most urgent challenge in terms of data update for the data providers. It is frustrating for dispatching users to issue feedback and not have news for 3 months.

Users exploit but also feed the data. There is a need for speedy updates and for a system of storage of the data, to save the updates. In average, they have 100.000 confidential information per province that enrich the map. This puts a lot of constraints on the strategy, especially that 5% of these modifications always have to be done manually. There is thus a lack of resources. The solution will only come out of the collaboration between all the actors.

RECOMMENDATIONS

INTRODUCTION

On the grounds of the above analysis of the challenges, recommendations for the future of the case can be made. These will be structured according to the pillars underlying the Strategy (WP6) and the Blueprint (WP7) (Openness; Participation; and Collaboration).

Once again, it is worth briefly outlining the most discussed strategic actions / guidelines, as apparent from the analysis done via the Nvivo program.

Nodes name	Sources	References
Strategy / Blueprint		
• Openness	3	4
• Participation	6	23

• Collaboration	4	18

On the basis of the analysis of the challenges, six case specific recommendations for the future have been made.

OPENNESS

Within the emergency service ecosystem of stakeholders, there are a lot of data exchanges. However, the integration of data from numerous sources remains a challenge particularly in the standards and updates of this data. Therefore, we issue the following recommendation:

> *Recommendation 1: "Explore Open Data solutions for the emergency services ecosystem, in order to standardise and collect data from several sources". The point of this recommendation is to test open data best practices (standards, licenses, portals, etc.) within a small ecosystem of emergency service stakeholders to see if the exchange of data could be improved in consequence.*

COLLABORATION

Linked with the update of data, there is a big challenge on the improvements that the users of the services of ASTRID can make. Indeed, the notification of problems is not made in real-time which leads to redundancy in the issues raised and insatisfaction from users. Therefore, we issue the following recommendation:

> *Recommendation 2: Develop a new updating system for the data in collaboration with the NGI. This new updating system could take the form of a flagging that would enable the updating process to be more transparent for everyone (NGI, Operators, ASTRID).*

ASTRID has developed a Community of Practice to discuss investments among the emergency services ecosystem. However, the users and external stakeholders (with whom the collaboration is more difficult) are not represented. Therefore, we issue the following recommendation.

> *Recommendation 3: Extend the Community of Practice (or create a new community) with external stakeholders, fueled with the insights collected from users. Thanks to a new meeting platform or the improvement of an existing one, the collaboration with actors outside the "core" of emergency services will be easier. Furthermore, a study on the motivation of stakeholders to come to those meetings should be performed to increase attendance.*

PARTICIPATION

Even though ASTRID use a culture of participation with user intermediaries, more efforts can be done in the direction of participation to have a more transparent collection of users' requirements and feedback. Therefore, we issue the following recommendation:

> *Recommendation 4: Implement the participation of users through complementary methods and make the processing of requirements transparent. A number of methods could be used such as workshops, interviews, online platforms, etc. The focus should be set on the complementarity of these methods and on the transparency of the requirements process.*

ASTRID tests several innovative development practices such as SCRUM practices or the V-Model. However, several challenges impede the implementation of a full methodology. Therefore, we issue the following recommendation:

> *Recommendation 5: Tailor several AGILE practices to the constraints of the public sector. For instance, the budget challenge may be handled by keeping a waterfall process at the beginning of the project, or around the release time, while implementing an AGILE process throughout the system development phases. Various change management models could be considered to change the culture of ASTRID for AGILE or to justify budgeting, e.g., the Satir process model and the Kotter's eight steps model.*

Recommendation 4 would be an essential sub-element of the AGILE method implementation as user participation

constitutes a key feature of AGILE methods.

Since the operators of the emergency service landscape have different competences on the technical level, we suggest the following recommendation:

> *Recommendation 6: Continue to innovate in the training of the operators and to test interface adaptation depending on the different maturity level. The adaptation of the interface should be iteratively performed so the best interface depending on the maturity of the users is chosen. The 10 principles of Nielsen of interface testing could be used as a structuring analysis theme to perform this study.*

Furthemore, recommendation 4 will also constitute a complementary lead for solution as the integration of different users' profiles will enable to develop systems more aligned with their needs.

SUMMARY

On the basis of the analysis of the challenges, six case specific recommendations for the future have been made.

Recommendations specific to the Emergency Services context	**Recommendation 2**: *Develop a new updating system for the data in collaboration with the NGI (Collaboration). This new updating system could take the form of a flagging that would enable the updating process to be more transparent for everyone (NGI, Operators, ASTRID).* **Recommendation 3**: *Extend the Community of Practice (or create a new community) with external stakeholders, fueled with the insights collected from users (Collaboration). Thanks to a new meeting platform or the improvement of an existing one, the collaboration with actors outside the "core" of emergency services will be easier. Furthermore, a study on the motivation of stakeholders to come to those meetings should be performed to increase attendance.*
Recommendations that have a larger scope than the Emergency Services context	**Recommendation 1**: *"Explore Open Data solutions for the emergency services ecosystem, in order to standardise and collect data from several sources" (Openness). The point of this recommendation is to test open data best practices (standards, licenses, portals, etc.) within a small ecosystem of emergency service stakeholders to see if the exchange of data could be improved in consequence.* **Recommendation 4**: *Implement the participation of users through complementary methods and make the processing of requirements transparent (Participation). A number of methods could be used such as workshops, interviews, online platforms, etc. The focus should be set on the complementarity of these methods and on the transparency of the requirements process.* **Recommendation 5**: *Tailor several AGILE practices to the constraints of the public sector (Participation). For instance, the budget challenge may be handled by keeping a waterfall process at the beginning of the project, or around the release time, while implementing an AGILE process throughout the system development phases. Various change management models could be considered to change the culture of ASTRID for AGILE or to justify budgeting, e.g., the Satir process model and the Kotter's eight steps model.* **Recommendation 6**: *Continue to innovate in the training of the operators and to test interface adaptation depending on the different maturity level (Participation). The adaptation of the interface should be iteratively performed so the best interface depending on the maturity of the users is chosen. The 10 principles of Nielsen of interface testing could be used as a structuring analysis theme to perform this study.*

4. CROSS-CASE ANALYSIS

From the three case studies presented above, some cross-case issues have been identified via an analysis of the case study results. Both the specific case study results as well as the recommendations (case specific and general scope) have been compared. Even if these cases all aim at tackling different problems, they face similar cross-cutting issues. These cross-cutting issues are presented in the list and table below. In essence, nine cross-case issues have been identified:

- **Improving data quality**: This issue is present in all three case studies and relates to the fact that any form of collaboration relies on the definition and implementation of sufficient data quality requirements, in order for the various partners of the project/case to trust each other and move forward with its roll-out.
- **Aiming for interoperability and standardisation**: This issue is present in all three case studies and relates to the fact that defining standards and achieving interoperability (whether legal, organisational, technical or semantical) is key in order to develop flexible and innovative public e-services that are useful across organisations and levels of powers.
- **Offering trainings to the civil servants**: This issue is present in all three case studies and relates to the fact that providing civil servants with sufficient information about the evolution of the tools / services / workflows, and offering accompanying training possibilities to them, is fundamental in order for these civil servants to adapt to the new tools / services / workflows.
- **Agreeing on Open Data licences**: This issue is common for two case studies (BeSt-Address and Cadastral information) and relates to the fact that the various levels of power need to agree on their Open Data licencing conditions in order to avoid interoperability issues deriving from contradictory provisions in different licences. A common licence will not only reduce the administrative burden on the administrations, it will also stimulate re-use by the external non-governmental users (e.g. private sector).
- **Defining authoritative sources of data**: This issue is common for two case studies (BeSt-Address and Cadastral information) and relates to the fact that, in order for the cooperation between different levels of power to be efficient, some form of consensus needs to be found on the definition of, and the requirements to be met by, authoritative data sources.
- **Improving communication**: This issue is common for two case studies (BeSt-Address and Cadastral information) and relates to the fact that improving the communication towards the actors that will have to implement the new tools / services / workflows (and this not only at the end of the development process but also during the development process) is important in order for these actors to feel involved and to have time to plan the necessary adaptations.
- **Streamlining cooperation**: This issue is common for two case studies (BeSt-Address and Cadastral information) and relates to the fact that, while the various organisations and levels of power already collaborate to a large extent on certain initiatives, the way in which they collaborate could be streamlined in order to ensure more efficiency in the roll-out of the project, and to build up on successful existing collaborations and best practises.
- **Solving financial shortcomings**: This issue is common for two case studies (BeSt-Address and Emergency services) and relates to the fact that substantive financial resources are often necessary in order to implement the new tools / services / workflows that are being developed. This should be anticipated and taken into account during the development process, in order to ensure that the necessary financial resources will be provided.
- **Increasing user participation and inclusion**: This issue is common for two case studies (Cadastral information and Emergency services) and relates to the fact that ensuring the inclusion of the future users in the development of new tools / services / workflows, and increasing their participation in this development, is essential in order to make these users feel more involved in the transition, which will in

turn increase the chance of successful take-up of the development by the field actors.

Cross-case issues	Relevant recommendation(s) in the BeSt-Address case study	Relevant recommendation(s) in the cadastral information exchange case study	Relevant recommendation(s) in the emergency services case study
Improving data quality	***Recommendation 5:*** *The Federal Partners should start using the Regional registers and the BeSt address model as of the 30th of June 2020, as planned in the Cooperation agreement. (…) the best way to increase these Regional registers' quality (…) is precisely if all the Federal Partners start working with them, because if everyone uses the same source, the quality will necessary improve, thanks to the anomaly notification service.* ***Recommendation 5bis:*** *The Brussels government should request the local communities of Brussels to validate the box numbers imported from the federal registers into URBIS (…).*	***Recommendation 1:*** *Establish a coordinated approach on the concept of "authoritative source" and agree on quality requirements.* ***Recommendation 2a:*** *Continuously improve data quality and data update schedules towards the different actors, taking into account the service delivery towards end users, internal resources and connections to other datasets.* ***Recommendation 5:*** *Rethink the possibilities to define the cadastral revenue from a data perspective, by increasingly taking into account the potentially relevant data collected at regional, provincial and local level.*	***Recommendation 2:*** *Develop a new updating system for the data in collaboration with the NGI. This new updating system could take the form of a flagging that would enable the updating process to be more transparent for everyone (NGI, Operators, ASTRID)*
Aiming for interoperability and standardisation	***Recommendation 2:*** *Ensure that the new anomaly notification service system, developed by BOSA for the information exchange platform, does not run parallel to the existing Regional anomaly notification services, but rather is considered as an extra-layer that is connected to the existing Regional anomaly processes (…).* ***Recommendation 5ter:*** *The three Regions and BOSA should dedicate sufficient*	***Recommendation 2b:*** *Provide data in a format that allows the receiving organisation to develop a personalised tool/platform.* ***Recommendation 2c:*** *Agree on interoperability standards that are applicable to the different Belgian public administrations, thereby focusing on legal, organisational, semantic and technical interoperability.* ***Recommendation 6:*** *Reinforce the creation of e-*	***Recommendation 1:*** *Explore Open Data solutions for the emergency services ecosystem, in order to standardise and collect data from several sources. The point of this recommendation is to test open data best practices (standards, licenses, portals, etc.) within a small ecosystem of emergency service stakeholders to see if the exchange of data could be improved in consequence.*

	time and resources in order to come up with a successful "Solution Design" in order to ensure harmonisation between the three Regional Registers regarding the address ID lifecycle. ***Recommendation 8:*** *Strive for the creation of an interoperability framework within which each entity (Federal and Regions) can exchange their information in an appropriate manner, within a system where all authentic data sources are linked to each other.* [For example] *(…) cooperation project for the integration of building registers (…)* [and] *possibility of creating an integrated register of cadastral parcels, that would be linked with the integrated building registers.*	*service building blocks (e.g. generic API's and open services) for local administrations and other interested parties, in collaboration with the target groups.*	
Offering trainings to the civil servants	***Recommendation 3:*** *(…) The effective dissemination of the Draaiboek in the hands of every local community should be ensured. Training sessions on how to use the BeSt address model, on the basis of this Draaiboek, should also be organised. A workplan containing the steps that need to be taken and the targets to be reached could also be provided.*	***Recommendation 4c:*** *Continuously invest in skills and competencies trainings for local administration staff that is working with the data and tools offered by a higher public administration, focused on continuous learning and the use of new technologies.*	***Recommendation 6:*** *Continue to innovate in the training of the operators and to test interface adaptation depending on the different maturity level. The adaptation of the interface should be iteratively performed so the best interface depending on the maturity of the users is chosen (…).*
Agreeing on Open Data licences	***Recommendation 1:*** *Develop a common licence, for all the Open data services of the Federal and Regional entities falling within the INSPIRE implementation framework, which would replace the current licence*	***Recommendation 3:*** *Agree on a common open data licence across the different Belgian public administrations.*	

	fragmentation. These licencing considerations should be discussed by the INSPIRE committee, in order not to be limited to addresses. The standard for such licence should be based on European standards, namely the CC-BY[88] *or the CC-0*[89] *Creative Commons licence.*		
Defining authoritative sources of data	***Recommendation 5:*** *The Federal Partners should start using the Regional registers and the BeSt address model as of the 30th of June 2020, as planned in the Cooperation agreement. (…) the best way to increase these Regional registers' quality (…) is precisely if all the Federal Partners start working with them, because if everyone uses the same source, the quality will necessary improve, thanks to the anomaly notification service.*	***Recommendation 1:*** *Establish a coordinated approach on the concept of "authoritative source" and agree on quality requirements.*	
Improving communication	***Recommendation 3:*** *Elaborate a clear communication strategy about the creation of the Draaiboek (relayed by the VVSG, the UVCW and Brulocalis) in order for each local community in Belgium to be made aware of its existence (…).* ***Recommendation 4:*** *Elaborate a clear communication strategy (relayed by the VVSG, the*	***Recommendation 4a:*** *Evaluate the overall communication approach towards the local level, thereby focusing on the need for an established two-way communication which allows local administrations to transfer their requirements to the higher public administrations. Redesign the communication approach towards the local level on the basis of this evaluation.*	

[88] https://creativecommons.org/licenses/by/2.0/be/
[89] https://creativecommons.org/publicdomain/zero/1.0/deed.fr

	UVCW and Brulocalis) towards the local communities, about the progress of the BeSt address project. This should be done by the Address committee in a first phase, and by the National Register in a second phase (…).	***Recommendation 4b:*** *Set-up an online communication platform that allows local administration staff working with cadastral information to communicate with other local administration staff (…). Such a platform will allow for a structured network communication among local administrations (…).*	
Streamlining cooperation	***Recommendation 6:*** *(…) It should be reflected on the possibility to designate a specific project facilitator for organisational tasks who would be paid to make the project run more efficiently. This project facilitator could either come from one of the entities participating in the project or could be a private sector consultant (…). To be sure, the decisional power should remain in the hands of the participants of the project, as the project facilitator should not decide anything but rather provide them with the necessary support and preparatory work.*	***Recommendation 8:*** *Agree on a roadmap with common policy objectives and priorities to increase the overall service delivery in the area of cadastral information sharing towards the end users.* ***Recommendation 9a:*** *Clearly define the responsibilities, and also the relations, between the different coordination bodies active the geospatial and/or digital domain.* ***Recommendation 9b:*** *Establish, in policy domains that require the exchange of data and information between federal organisations and the three regional organisations, coordination bodies with the necessary resources that can stimulate the exchange of data and information.*	
Solving financial shortcomings	***Recommendation 4bis:*** *Provide the possibility for the local communities to file requests to obtain the budget and man power necessary to ensure the validation of the addresses contained in the*		***Recommendation 5:*** *Tailor several AGILE practices to the constraints of the public sector. For instance, the budget challenge may be handled by keeping a waterfall process at*

	Regional registers (…). ***Recommendation 7:*** *Reflect on the possibility to create an "Interfederal project fund", financed by the Federal level and the three Regions, which would offer the possibility to the parties participating in an interfederal collaboration project involving the Federal level and the three Regions, such as BeSt address, or to the parties that have to implement this project, to file a request to obtain some budget from this fund.*		*the beginning of the project, or around the release time, while implementing an AGILE process throughout the system development phases. Various change management models could be considered to change the culture of ASTRID for AGILE or to justify budgeting, e.g., the Satir process model and the Kotter's eight steps model.*
Increasing user participation and inclusion		***Recommendation 7a:*** *Include service users in a consistent way in the service development process, thereby relying on good practices from other public administrations and the literature – especially on how to include the citizens' perspective in the service development process.* ***Recommendation 7b:*** *Ensure a close connection between the internal service users, i.e. the organisation's staff working with the (future) service, and those actors developing, from a technical perspective, the service. A close connection in the service development process will lead to an efficient and effective use of the developed service.*	***Recommendation 3:*** *Extend the Community of Practice (or create a new community) with external stakeholders, fueled with the insights collected from users. Thanks to a new meeting platform or the improvement of an existing one, the collaboration with actors outside the "core" of emergency services will be easier. Furthermore, a study on the motivation of stakeholders to come to those meetings should be performed to increase attendance.* ***Recommendation 4:*** *Implement the participation of users through complementary methods and make the processing of requirements transparent. A number of methods could be used such as workshops, interviews, online platforms, etc. The focus should be set on the complementarity of these methods and on the*

			transparency of the requirements process.

5. IMPACT ON WP6 STRATEGY AND WP7 BLUEPRINT

In this Chapter, the impact of the recommendations, made for the three case studies, on the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and on the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7) will be outlined. Namely, the recommendations that have a scope that is larger than the case study in the context of which they have been formulated will be underlined.

CASE 1: BEST ADDRESS

Out of the twelve recommendations made in the context of the BeSt address project, four are not only valuable for this project, but also for any project led by the public administrations. Therefore, the table below indicates the impact of these four recommendations on the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and on the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7).

Recommendations that have a larger scope than the BeSt address project	Impact on WP6 Strategy and WP7 Blueprint
Recommendation 1: *Develop a common licence, for all the Open data services of the Federal and Regional entities falling within the INSPIRE implementation framework, which would replace the current licence fragmentation. These licencing considerations should be discussed by the INSPIRE committee, in order not to be limited to addresses. The standard for such licence should be based on European standards, namely the CC-BY*[90] *or the CC-0*[91] *Creative Commons licence.*	This recommendation echoes the strategic action suggested in the Draft Strategic Vision for Location-based e-Services (WP6), according to which the Federal, Regional's and Communities' governments should harmonise their "data re-use licences" in order to avoid licensing incompatibilities' issues. This strategic action will thus be further refined on the basis of this recommendation.
Recommendation 6: *Ensure that the collaborative approach adopted for the BeSt address project is repeated in the future. For these future projects, it should be reflected on the possibility to designate a specific project facilitator for organisational tasks who would be paid to make the project run more efficiently. This project facilitator could either come from one of the entities participating in the project or could be a private sector consultant (which might be easier to accept for all the parties in light of the fact that there is no hierarchy between the Federal and Regional levels). To be sure, the decisional power should remain in the hands of the participants of the project, as the project facilitator should not decide anything but rather provide them with the necessary support and preparatory work.*	As this recommendation has stemmed thanks to the analysis made in the context of the BeSt address project and proves valuable for any project led by the public administrations, it will be added to the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and to the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7).
Recommendation 7: *Reflect on the possibility to create*	This recommendation echoes the strategic action

[90] https://creativecommons.org/licenses/by/2.0/be/
[91] https://creativecommons.org/publicdomain/zero/1.0/deed.fr

an "Interfederal project fund", financed by the Federal level and the three Regions, which would offer the possibility to the parties participating in an interfederal collaboration project involving the Federal level and the three Regions, such as BeSt address, or to the parties that have to implement this project, to file a request to obtain some budget from this fund.	suggested in the Draft Strategic Vision for Location-based e-Services (WP6), according to which an Innovation and Collaboration Funding Mechanism should be created to support federal organisations dealing with innovative and collaborative projects. This strategic action will thus be further refined on the basis of this recommendation, as it targets collaboration between levels of power, and not just collaboration within the Federal level.
Recommendation 8: *Strive for the creation of an interoperability framework within which each entity (Federal and Regions) can exchange their information in an appropriate manner, within a system where all authentic data sources are linked to each other. From a more specific perspective, it should be reflected on the possibility to launch, in the near future, a cooperation project for the integration of building registers. Later on, it should also be reflected on the possibility of creating an integrated register of cadastral parcels, that would be linked with the integrated building registers.*	This recommendation echoes, to a certain extent, two of the strategic actions of the Draft Strategic Vision for Location-based e-Services (WP6), namely: i. The suggested creation of a Working Group on Standardisation, with representatives of all federal organisations, to discuss, and when possible and feasible, propose and approve common standards, thereby respecting the organisational independence and expertise; ii. That this Working Group on Standardisation should work with the FPS BOSA – DG DT on the establishment and implementation of common standards derived, if possible, from other already existing standards, be it at the supranational (preferably) or regional level. This recommendation however goes further than the Draft Strategic Vision, as it not only calls for cooperation at the Federal level, but rather between the Federal and the Regional levels. Accordingly, the suggested strategic actions will be adapted in order to call for such a wider cooperation.

CASE 2: CADASTRAL INFORMATION SHARING

Out of the fifteen recommendations made in the context of the cadastral information sharing case study, nine are not only valuable for this project, but also for any project led by the public administrations. Therefore, the table below indicates the impact of these nine recommendations on the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and on the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7).

Recommendations that have a larger scope than the case	Impact on WP6 Strategy and WP7 Blueprint
Recommendation 1*: Establish a coordinated approach on the concept of "authoritative source" and agree on quality requirements.*	This recommendation echoes the strategic action suggested in the Draft Strategic Vision for Location-based e-Services (WP6), that suggests that "a Belgian approach towards authoritative data sources is further developed, including the three regional administrations

	and the federal administration". The strategic action will be further refined on the basis of this recommendation. This recommendation was not present in the Draft Blueprint for Adaptive and Innovative Government (WP7) as has been included as one of the Strategic Actions suggested in the draft.
Recommendation 2b: *Provide data in a format that allows the receiving organisation to develop a personalised tool/platform.*	This recommendation echoes the strategic action suggested in the Draft Strategic Vision for Location-based e-Services (WP6), that suggests that "the federal organisations work on making their data available via Application Programming Interfaces (APIs)". Also, on the basis of this case study and BeSt Address case study, an extra strategic action is suggested: "the federal organisations explore open data solutions (standards, licenses, platforms, etc.) to foster the collaboration between an ecosystem governmental organisations". This recommendation echoes the Strategic Action suggested in the Draft Blueprint for Adaptive and Innovative Government (WP7) that refers to the need to "making its data availbale via Application Programming Interfaces (APIs).".
Recommendation 2c: *Agree on interoperability standards that are applicable to the different Belgian public administrations, thereby focusing on legal, organisational, semantic and technical interoperability.*	This recommendation was not present in the Draft Strategic Vision for Location-based e-Services (WP6) and has therefore been included in the following way: "strives for the creation of an interoperability framework within which each entity (Federal and Regions) can exchange their information in an appropriate manner, within a system where all authentic authoritative data sources are linked to each other". This recommendation was partially present in the Draft Blueprint for Adaptive and Innovative Government (WP7), and has been further strengthened.
Recommendation 3: *Agree on a common open data licence across the different Belgian public administrations.*	This recommendation was partially present in the Draft Strategic Vision for Location-based e-Services (WP6) and has therefore been included in the following way: "the federal, regional's and communities' governments develop a common licence for all the Open data services of the Federal, Regional and Community entities falling within the INSPIRE implementation framework, which would replace the current licence fragmentation in order to avoid licensing incompatibilities' issues. The standard for such licence should be based on European standards, namely the CC-BY or the CC-0 Creative Commons licence". This recommendation echoes the Strategic Action in the Draft Blueprint for Adaptive and Innovative Government

	(WP7) that refers to the need to "strive towards harmonising the various "data re-use licences".
***Recommendation 4c**: Continuously invest in skills and competencies trainings for local administration staff that is working with the data and tools offered by a higher public administration, focused on continuous learning and the use of new technologies.*	This recommendation was partially echoed in the strategic action suggested in the Draft Strategic Vision for Location-based e-Services (WP6), that suggests that "training activities are not only offered to staff of the own administration, but also to staff of local administrations working with specific services offered by the federal administration". As this strategic action only partially reflects this recommendation, it was decided to include also the following recommendation in the Draft Strategic Vision for Loaction-based e-Services (WP6): "that training activities are not only offered to staff of the own administration, but also to staff of local administrations working with specific services offered by the federal administration". This recommendation was not present in the Draft Blueprint for Adaptive and Innovative Government (WP7) as has been included as one of the Strategic Actions suggested in the draft.
***Recommendation 6**: Reinforce the creation of e-service building blocks (e.g. generic API's and open services) for local administrations and other interested parties, in collaboration with the target groups.*	This recommendation echoes the strategic action suggested in the Draft Strategic Vision for Location-based e-Services (WP6), that suggests that "the federal organisations work on making their data available via Application Programming Interfaces (APIs)". Also, on the basis of this case study and BeSt Address case study, an extra strategic action is suggested: "the federal organisations explore open data solutions (standards, licenses, platforms, etc.) to foster the collaboration between an ecosystem of governmental organisations". This recommendation echoes the Strategic Action suggested in the Draft Blueprint for Adaptive and Innovative Government (WP7) that refers to the need to "making its data availbale via Application Programming Interfaces (APIs).".
***Recommendation 7a**: Include service users in a consistent way in the service development process, thereby relying on good practices from other public administrations and the literature – especially on how to include the citizens' perspective in the service development process.*	This recommendation echoes the various suggested strategic actions under the title "Participation" in the Draft Strategic Vision for Location-based e-Services (WP6). Also, on the basis of this case study and Emergency Services case study, an extra strategic action is suggested: "the public administrations implement participation through complementary methods (offline and online) and make the processing of the requirements transparent so that their impact on the public e-service is clear to users". This recommendation echoes the Strategic Actions

	suggested in the Draft Blueprint for Adaptive and Innovative Government (WP7) that refer to the integration of the "input from citizens and external users" as well as the need to develop "the appropriate methods and tools".
***Recommendation 7b**: Ensure a close connection between the internal service users, i.e. the organisation's staff working with the (future) service, and those actors developing, from a technical perspective, the service. A close connection in the service development process will lead to an efficient and effective use of the developed service.*	This recommendation echoes the strategic action suggested in the Draft Strategic Vision for Location-based e-Services (WP6), that suggests • "that, given that our attention was drawn to the need for stronger involvement, ownership, responsibility and accountability of civil servants in e-services and the development process, the civil servants are to be actively supported by their top- and middle-management to participate in the development of those e-services"; • "that, the DG DT and the DG Recruitment and Development of the FPS BOSA develop a platform serving as a repository of good practices, of which the different federal organisations could make use when (re)developing an e-service, to guide civil servants in the e-service transition process. This toolbox can be made available via the federal intranet or FEDWEB website". Also, on the basis of this case study and Emergency Services case study, an extra strategic action is suggested: "appropriate training is suggested to public servants to enable them to participate in the development. This training could draw from innovative principles such as SCRUM methods, drawings, improvisation principles, etc.". This recommendation echoes the Strategic Actions suggested in the Draft Blueprint for Adaptive and Innovative Government (WP7) that refer to the integration of the "input from citizens and external users" as well as the need to develop "the appropriate methods and tools".
***Recommendation 9b**: Establish, in policy domains that require the exchange of data and information between federal organisations and the three regional organisations, coordination bodies with the necessary resources that can stimulate the exchange of data and information.*	This recommendation was not echoed in the Draft Strategic Vision for Location-based e-Services (WP6), therefore the following Strategic Action is suggested: "when the federal administration as well as three regional administrations need to actively coordinate their policy, an interfederal coordination body is established, which can rely on the necessary resources, to stimulate collaboration across public

	administrations." This recommendation echoes the Strategic Actions suggested in the Draft Blueprint for Adaptive and Innovative Government (WP7) that refer to "the intensified back-office collaboration and cooperation with the other governmental levels".

CASE 3: EMERGENCY SERVICES

Out of the six recommendations made in the context of the emergency services case study, four are not only valuable for this project, but also for any project led by the public administrations. Therefore, the table below indicates the impact of these four recommendations on the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and on the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7).

Recommendations that have a larger scope than the case	Impact on WP6 Strategy and WP7 Blueprint
Recommendation 1: *Explore Open Data solutions for the emergency services ecosystem, in order to standardise and collect data from several sources.*	Echoes the recommendation "Rethinking the information management system" (Openness Pillar) and "Builds on common service and data approaches to stimulate cooperation across governments" (Collaboration Pillar).
Recommendation 4*: Implement the participation of users through complementary methods and make the processing of requirements transparent.*	Echoes the recommendation "Integrates the input from citizens and external users" (Participation Pillar).
Recommendation 5*: Tailor several AGILE practices to the constraints of the public sector.*	New recommendation that will be added to the strategic actions in WP6 and to the guidelines in WP7.
Recommendation 6*: Continue to innovate in the training of the operators and to test interface adaptation depending on the different maturity level.*	New recommendation that will be added to the strategic actions in WP6 and to the guidelines in WP7.

6. CONCLUSION

This WP aimed to present the challenges that were faced in three case studies having a strong link to location-based data and to echo these challenges with the key requirements for future e-service delivery by the federal administration identified in WP3 of the FLEXPUB research project. Moreover, WP5 aimed at testing the strategic actions suggested in the Draft Strategic Vision for Location-based e-Services (WP6) and the guidelines suggested in the Draft Blueprint on Adaptive and Innovative Government (WP7) by confronting them to real-life scenarios. This iterative process allowed to refine these strategic actions and guidelines.

The research for WP5 was executed on the basis of case study research, whereby a multi-method approach was taken. Whereas WP2 and WP3, which focused on the analysis of challenges and requirements for geospatial e-services in the Belgian federal context, aimed to create a broad horizontal overview, the researchers applied, for this WP5, a methodology which allowed to gain an in-depth knowledge of three constellations in which geospatial data constitute the core of the e-service(s) that is/are offered or that might be offered in the future. The combination of a horizontal methodological approach in WP2 and WP3 and the in-depth approach in this WP5 created a complementarity that supports and underpins WP6 and WP7. As stated in the Methodology Chapter, the researchers based themselves on the expertise that can be found in the academic literature.

Three cases were selected for this WP, based on (1) the proposals put forward by the Members of the Follow-up Committee, and (2) the relevancy of the proposed cases compared to the results of WP2. The three selected and studied cases are the BeSt Address Project (BeSt Address & related aspects), the exchange of cadastral information in Belgium (URBAIN & Regional Relations) and the functioning of the emergency services in Belgium (FPS Interior Affairs / ASTRID Dispatching). The first two cases make use of geospatial information which is crucial for geospatial e-services: addresses and cadastral information. Both cases are also internally oriented. This means that the focus lies on the collaboration between public administrations, and not on the relation with external non-governmental organisations. The third case is focused on a key function of the state: Offering security and safety to its citizens.

Each of the cases is structure around the COBIT enablers used in WP3, namely Processes; Organisational structures; Service infrastructure & applications; People, skills & competencies; Culture, ethics & behaviour; Principles, policies & frameworks; Semantics and Location-based data. For all three case studies, the researchers made findings that could be related to one of the seven COBIT enablers. This demonstrates, once more, that the development of e-services is a highly complex phenomena which is influenced by various factors that influence each other. Indeed, several of the findings are not just connected to one enabler but have an overlap between various enablers.

Each of the case studies contained a number of findings which are highly relevant for the overall geospatial e-services context, and can support administrations in their quest for flexible and innovative e-services. For each of the case studies, the researchers provided a number of recommendations, based, on the one hand, on the information supplied via the respondents, the observations and the document analysis, and, on the other hand, on the project expertise in reaction to the requirements. This had led to a number of case specific and general recommendations, which are summarised in Chapter 3 – Case study results.

Then, on the basis of this analysis, some cross-case issues have been identified in Chapter 4. Indeed, even if these cases all aim at tackling different problems, they face similar cross-cutting issues. In essence, nine cross-case issues have been identified: i) Improving data quality; ii) Aiming for interoperability and standardisation; iii) Offering trainings to the civil servants; iv) Agreeing on Open Data licences; v) Defining authoritative sources of data; vi) Improving communication; vii) Streamlining cooperation; viii) Solving financial shortcomings; and ix) Increasing user participation and inclusion.

Finally, as the overall goal of those three case studies was to further refine the Strategy (WP6) and the Blueprint (WP7), the general recommendations, for each pillar, were discussed, in Chapter 5, in connection to the draft strategic actions and guidelines suggested in the draft Strategy and Blueprint.

BIBLIOGRAPHY

Agentschap Informatie Vlaanderen. (n.d.-a). Gebouwenregister – Visie. Retrieved November 27, 2019, from https://overheid.vlaanderen.be/gebouwenregister-visie

Agentschap Informatie Vlaanderen. (n.d.-b). Geopunt Catalogus AAPD.

Agentschap Informatie Vlaanderen. (n.d.-c). Wat is het GRB? Retrieved December 2, 2019, from https://overheid.vlaanderen.be/grb-wat-is-het-grb

Bouckaert, G., Peters, B. G., & Verhoest, K. (2010). *The Coordination of Public Sector Organisations. Shifting Patterns of Public Management*. Basingstoke: Palgrave Macmillan.

Bryman, A. (2016). *Social Research Methods* (5th ed.). Oxford: Oxford University Press.

Chantillon, M., Crompvoets, J., & Peristeras, V. (2017). The Governance Landscape of Geospatial E-Services—The Belgian Case. *ISPRS International Journal of Geo-Information*, *6*, 1–25. https://doi.org/10.3390/ijgi6090282

Chantillon, M., Simonofski, A., Tombal, T., Kruk, R., Crompvoets, J., de Terwangne, C., … Vanderose, B. (2017). *FLEXPUB Public e-Service Strategy - Report WP2. FLEXPUB - Work package 2 - Baseline Measurement*. Leuven.

Chantillon, M., Simonofski, A., Tombal, T., Kruk, R., Crompvoets, J., de Terwangne, C., … Vanderose, B. (2018). *FLEXPUB Public e-Service Strategy - Report WP3. FLEXPUB - Work package 3 - Requirements Identification*. Leuven.

CIRB. (n.d.). UrbIS Data. Retrieved December 2, 2019, from https://bric.brussels/en/our-solutions/urbis-solutions/urbis-data?set_language=en

CIRB - CIBG. (2018). UrbIS data. Retrieved from https://cibg.brussels/nl/onze-oplossingen/urbis-solutions/urbis-data

Coördinatiestructuur voor Patrimoniuminformatie. (n.d.-a). CSPI – Wij organiseren de uitwisseling van patrimoniuminformatie. Retrieved November 27, 2019, from https://www.scip-cspi.be/nl/cspi

Coördinatiestructuur voor Patrimoniuminformatie. (n.d.-b). Samenstelling Raad van Bestuur. Retrieved November 27, 2019, from https://www.scip-cspi.be/sites/default/files/atoms/files/Samenstelling RvB_0.pdf

De Haes, S., Van Grembergen, W., & Debreceny, R. S. (2013). COBIT 5 and Enterprise Governance of Information Technology: Building Blocks and Research Opportunities. *Journal of Information Systems*, *27*(1), 307–324. https://doi.org/10.2308/isys-50422

De Ryck, W. (2018). De kadastrale gegevens toestand 01.01.2018 zijn beschikbaar via URBAIN. Brussels: Federale Overheidsdienst Financiën.

European Parliament, & Council. Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), Official Journal of the European Union § (2007). Brussels: European Parliament / Council of the European Union. Retrieved from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:108:0001:0014:EN:PDF

Federal Parliament. Wet van 5 mei 2014 houdende verankering van het principe van de unieke gegevensverzameling in de werking van de diensten en instanties die behoren tot of taken uitvoeren voor de overheid en tot vereenvoudiging en gelijkschakeling van elektronische en papi (2014). Brussels: Federal Parliament.

Federale Belgische Geoportaal, & Federale Overheidsdienst Financiën. (2019). Belgische kadastrale percelen. Retrieved November 25, 2019, from https://www.geo.be/#!/catalog/details/tt098dcb-f5c7-49b8-8e0b-7c3811630d85?l=nl

Federale Overheidsdienst Financiën. (n.d.-a). Brussels Hoofdstedelijk Gewest – Samenwerking UrbIS – Collaboration UrbIS. Retrieved November 28, 2019, from https://financien.belgium.be/nl/particulieren/woning/kadaster/kadastraal-plan/proces-kwaliteitsverbetering-brussels-hoofdstedelijk

Federale Overheidsdienst Financiën. (n.d.-b). CADGIS.

Federale Overheidsdienst Financiën. (n.d.-c). Kadastraal Inkomen. Retrieved December 1, 2019, from https://financien.belgium.be/nl/particulieren/woning/kadaster/kadastraal-inkomen

Federale Overheidsdienst Financiën. (n.d.-d). Kadastraal Plan. Retrieved December 1, 2019, from https://financien.belgium.be/nl/particulieren/woning/kadaster/kadastraal-plan

Federale Overheidsdienst Financiën. (n.d.-e). Kadastraal Uitreksel. Retrieved December 1, 2019, from https://financien.belgium.be/nl/particulieren/woning/kadaster/kadastraal-uittreksel

Federale Overheidsdienst Financiën. (n.d.-f). Kwaliteitsverbetering van het kadastrale percelenplan. Retrieved December 5, 2019, from https://financien.belgium.be/nl/particulieren/woning/kadaster/kadastraal-plan/kwaliteitsverbetering

Federale Overheidsdienst Financiën. (n.d.-g). Patrimoniumdocumentatie. Retrieved December 1, 2019, from https://financien.belgium.be/nl/over_de_fod/structuur_en_diensten/algemene_administraties/patrimoniumdo

cumentatie
Federale Overheidsdienst Financiën. (n.d.-h). URBAIN. Retrieved November 26, 2019, from https://financien.belgium.be/nl/E-services/Urbain
Federale Overheidsdienst Financiën. (n.d.-i). Vlaams Gewest – Het Unieke Percelenplan. Retrieved December 4, 2019, from https://financien.belgium.be/nl/particulieren/woning/kadaster/kadastraal-plan/proces-kwaliteitsverbetering-vlaams
Federale Overheidsdienst Financiën. (n.d.-j). Waals Gewest – Kwaliteitsverbetering van het kadastrale percelenplan. Retrieved November 28, 2019, from https://financien.belgium.be/nl/particulieren/woning/kadaster/kadastraal-plan/proces-kwaliteitsverbetering-waals-gewest
Federale Overheidsdienst Financiën. (2019). Aangifte. Retrieved January 13, 2020, from https://financien.belgium.be/nl/particulieren/woning/kadaster/aangifte
Federale Staat, Vlaamse Gewest, Waalse Gewest, & Brusselse Hoofdstedelijke Gewest. Samenwerkingakkoord tussen de Federale Staat, het Vlaamse Gewest, het Waalse Gewest en het Brusselse Hoofdstedelijke Gewest met betrekking to de Coördinatiestructuur voor Patrimoniuminformatie (2014). Brussel: Federaal Parlement / Vlaamse Parlement / Waalse Parlement / Brussels Hoofdstelijk Parlement.
Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquire*, *12*(2), 219–245. https://doi.org/10.1177/1077800405284363.CITATIONS
Groupement d'informations géographiques. (2019). Qui sommes-nous? Retrieved January 14, 2020, from http://www.gigwal.org/portal-gig/#section-0
Herman, P. (2019). De kadastrale gegevens toestand 01.01.2019 zijn beschikbaar via URBAIN. Brussels: Federale Overheidsdienst Financiën.
Hondeghem, A. (2017). Van bureaucratie over New Public Management naar New Public Governance. In A. Hondeghem, W. Van Dooren, F. De Rynck, B. Verschuere, & S. Op de Beeck (Eds.), *Handboek Bestuurskunde* (p. 493). Brugge: Vanden Broele.
INSPIRE Member State Contact Point Belgium. (2015). *INSPIRE Member State Report: Belgium (2013-2015)*.
INSPIRE Member State Contact Point Belgium. (2016). *INSPIRE Action Plan for Belgium 2016-2020*.
INSPIRE Thematic Working Group Cadastral Parcels. (2014). INSPIRE - D2.8.I.6 Data Specifications on Cadastral Parcels - Technical Guidelines. European Commission Joint Research Centre.
Sectoraal comité voor de Federale Overheid. (2017). Beraadslaging FO nr 04/2017. Brussel: Federale Overheidsdienst Financiën. Retrieved from https://financien.belgium.be/nl/particulieren/woning/kadaster/aangifte
Service Publique de Wallonie. (2019). Projet Informatique de Cartographie Continue. Retrieved December 2, 2019, from http://geoportail.wallonie.be/catalogue/b795de68-726c-4bdf-a62a-a42686aa5b6f.html
Vlaamse Overheid. (2020). Yammer-netwerk Informatiemanagement. Retrieved December 19, 2019, from https://overheid.vlaanderen.be/informatiemanagement/yammer
Wouters, S., & Crompvoets, J. (2020). *Een digitale Vlaamse overheid: Authentieke gegevensbronnen*. Leuven.
Yin, R. K. (1981). The Case Study as a Serious Research Strategy. *Knowledge: Creation, Diffusion, Utilization*, (1), 97–114.
Yin, R. K. (2003). *Applications of case study research*. *Applied Social Research Methods Series* (Vol. 34).
Yin, R. K. (2014). *Case Study Research: Design and Methods*. *Sage Publications* (Vol. 26). https://doi.org/10.1097/FCH.0b013e31822dda9e

ANNEX

ANNEX 1 – QUESTIONNAIRE FOR BEST ADDRESS CASE STUDY

Introduction

For the purpose of this questionnaire, and in light of the cooperation agreement of 22nd January 2016:

- The "managers" (of the address registers) are the three Regions;
- The "initiators" (of the addresses) are the local communities; and
- The "partners" are the administrations who are entitled to access and use the address registers.

Introductory question

- What is your role in the organisation?
- What is your role in the project?
- How long has your organisation been involved in the project (and you as a person – e.g. did you replace someone)?
- At what level of your organisation is the project dealt with?

Project questions

- What are the main challenges that the project faces? Why is it difficult to implement the project?
- What would your suggestions be to implement the project in the near future? What actions need to be taken to finish the project?
- What is the added value of the project for your organisation?

Questions based on the pillars of the Strategy

Openness

- Are the partners involved in the discussion on the tools that the FPS BOSA is building and that allow access and search facilities to the data? What about the standards used by the organisation? Would a common Standardization Working Group be beneficial?
    - How are the partners involved in it? Are the Regions and local level also participating?
- Have the data licenses of the Regions been developed taking in mind the development of inter-Federal project?
- What would be the preferred license approach for your organisation (one versus four – three Regions & FPS BOSA)? (license approach: everything that is not explicitly mentioned is forbidden)
- How are data protection concerns taken into consideration in the project?

Participation

- FPS BOSA / Regions:
    - Does the inclusion of the partners facilitate or complicate the project? How does it influence the way the project functions? Are you used to work with the end-users? (Specify who are the partners – not the private sector)
    - Is the inclusion of the partners in the project one of the difficulties for the project?
    - [FPS BOSA]: What kind of development methodology is used for the development of the service?

- Partners:
    - Do you have the feeling that your organisation is actively involved in the project or is it more an obligation? Do you feel listened by the FPS BOSA and the three Regions? Do those actors take your advice and needs sufficiently into account?
    - Is a specific methodology used for the development of the service by FPS BOSA?
    - Would a different methodology be beneficial to the project?
- Will a user manual be developed on how to use the service? Would it be useful to develop such a manual?
- Is there within your organisation resistance towards this project? Is it a general feeling that also exists with other comparable projects? Is it against the project as such or against specific issues in the project? Where does the resistance come from (top management / bottom civil servants)?
- Is there support from the top-management towards the project?

Collaboration

- Given that it is a project involving the Federal and the Regions,
    - Would it be beneficial if the Federal partners had a meeting platform on common positions to be discussed with the custodian/managers?
    - Which is the most suitable hierarchical level to discuss those common issues?
- From a political point of view, what is the position towards this project? Support – no attention – resistance?
- How will the data in the project be updated once the project is implemented and running?
- In order to support the overall funding of the project, would it be beneficial to have a Funding & Collaboration Mechanism to fund the project? E.g. for legal advice, for the creation of websites, organisation of events, permanent staff etc.
- Federal actors:
    - Would it be beneficial for the Federal organisations to have a common data policy and meeting platform (a data eco system)?
- Regions:
    - How do you perceive your local level's participation in the project?
    - Do you feel that the local communities are sufficiently involved in the project? What actions should be taken to motivate them?
    - Are the guidelines on how to use the data and use the service clear enough? Are they accessible enough?

Geo-orientation

- Once the project is implemented and running,
    - Who should maintain the service, should it be the FPS BOSA or a geo-organisation (NGI, any other organisation, or a mix)?
    - What are the next potential steps and areas for collaboration? Which domains need to be tackled?
    - How will this project be connected to the future?
- Would a more structured approach towards the use of geo data be beneficial for the Federal level?

ANNEX 2 – QUESTIONNAIRE FOR CADASTRAL INFORMATION SHARING

Introduction

The following actors have been interviewed:

- FOD Financiën – SPF Finance: Main manager of cadastral information in the Belgian state, authoritative source for the cadastral layer and the parcels.
- Regions (i.e. Agentschap Informatie Vlaanderen, Centrum voor Informatica voor het Brussels Hoofdstedelijk Gewest / Centre d'Informatique pour la Région Bruxelloise, Service Public de Wallonie – Département de la Géomatique): Users of cadastral information, manager of the buildings information in the cadastral layer and maps.
- Coördinatiestructuur voor Patrimoniuminformatie - Structure de Coordination de l'Information Patrimoniale: inter-federal actor for the management and exchange of patrimonium information between the federal administration and the three regions.
- FOD BOSA – SPF BOSA: Provides support for the exchange and management of data by the FOD Financiën – SPF Finance.
- Local level: Initiators and users of cadastral information.

Please note that the questionnaire presented below is the general questionnaire. This questionnaire has been modified on the basis of the respondent and the specific function taken by the organisation for which the respondent works.

Introductory question

- What is your role in the organisation?
- What is your role in the management of Cadastral information?
- Can you explain the governance approach for Cadastral Information?
- What is the attitude of your organisation / you towards the current system for the exchange of Cadastral Information?
- What are the main challenges that the current system for the exchange of Cadastral Information faces? Are there any necessary changes that you would like to see happen?
- What would your suggestions be for the development of the exchange of Cadastral Information in the next years? What actions need to be taken?

Questions based on Strategy

Openess

- What is your organisations position on the way in which the Cadastral Information data is currently being shared with
    - Other public administration & organisations? (role of the SCIP / CSPI)
    - The general public (Geopunt / CADGIS / …)
    - Is opening the data a challenge?
    - If funding is a problem, would a sustainable open data funding solve the issue?
    - If funding is a problem, would a Freemium Model be an option for the organisation?
- Are the partners involved in the maintenance and development of the tools that the FOD Finance / AIV /

CIRB / SPW is building and that allow access and search facilities to the data?

- Are there common standards that are used by the different master partners (FOD Finance / AIV / CIRB / SPW)?
    - Would a common Standardization Working Group be beneficial?
    - How are the partners involved in it? Is the local level also participating?
- What kind of data license model is applicable between
    - Federal – federal
    - Federal – regional & regional – federal
    - Federal – local & local – federal
    - Regional – local & local – federal Have the data licenses of the regions been developed taking in mind the development of inter-federal project?
    - Have the already existing data licenses of the regional been taken into account in the development of the other data licenses?
    - Has there been a role for the SCIP / CSPI? Will there be a role for the SCIP / CSPI?
    - What would be the preferred license approach for your organisation? (license approach: everything that is not explicitly mentioned is forbidden)
- How are data protection concerns taken into consideration in the exchange of Cadastral Information?

Participation

- All: What is the role of … in the development and maintenance of Cadastral Information services?
    - Societal organisations
    - Private sector organisations
    - Citizens
    - In no participation: why are those actors not included? Is your organisation prepared to include those actors?
- FOD Finance & regions:
    - What kind of development methodology (e.g. user-participation methods) is used for the development of the service?
    - Does the inclusion of the partners facilitate or complicate the project? How does it influence the way the project functions? Are you used to work with the end-users? (Specify who are the partners – not the private sector)
    - Are there user manuals and training days organised by your organisations to explain how Cadastral Information services function? Would it be useful to develop such a manual or to have training days?
- Partners:
    - Do you have the feeling that your organisation is actively involved in the project or is it more an obligation? Do you feel listened by the FPS BOSA and the three regions? Do those actors take your advice and needs sufficiently into account?
    - Is a specific methodology used for the development of the service by FPS BOSA?

- Would a different methodology be beneficial to the project?

- Is finding skilled people, with a background in both geospatial data and ICT, one of the challenges for the future development of Cadastral Information services? Is staff being hired via the Egov Select (Egov VZW)? What can be done about this according to you?
- Is there within your organisation resistance towards the development of new Cadastral Information services? Is it a general feeling within your organisation that also exists with other comparable projects? Is it a matter of principle or against certain issues in the project? Where does the resistance come from (top management / bottom civil servants)
- It there support from the top-management towards the development of new Cadastral Information services?

Collaboration

- Given that it is Cadastral Information is a product being used at different governmental levels and serves different purposes (besides taxation),
  - would it be beneficial if the different governmental partners would have a meeting platform to discuss certain situations?
  - which is the most suitable hierarchical level to discuss those common issues?
- Cadastral Information is currently being dealt with by the FOD Finance, how is this situation being looked at from an internal position?
  - Does the FOD Finance remain the correct organisation for the management of Cadastral Information?
  - Is the FOD Finance capable to keep the data up-to-date? Or is a different governance approach needed to ensure that quality of the data?
  - Is there need for certain investments in new services and products?
- In order to support the development of new service and products based on Cadastral Information, would it be beneficial to have a Funding & Collaboration Mechanism to fund those kind of projects? E.g. for legal advice, for the creation of websites, organisation of events, permanent staff etc.
- Federal actors:
  - Would it be beneficial for the federal organisations to have a common data policy and meeting platform (a data eco system)?
- Local level:
  - How do you perceive your local levels role in the management of Cadastral Information?
  - Are there inconsistencies in the demands and requests from the federal and the regional level?
- Regional / Federal:
  - Do you feel that the local communities are sufficiently involved in the management of Cadastral Information? What actions should be taken to motivate them?
  - Are the guidelines on how to use the data and use the service clear enough? Are they accessible enough?

Geo-orientation

- Once the project is implemented and running,
  - who should maintain the service, should it be the FPS BOSA or the a geo-organisation (NGI, any

other organisation, or a mix)?

- what are the next potential steps and areas for collaboration? Which domains need to be tackled?
- how will this project be connected to the future?

- Would a more structured approach towards the use of geo data be beneficial for the federal level?

ANNEX 3 – QUESTIONNAIRE FOR EMERGENCY SERVICES CASE STUDY

Introductory Questions

- What is your role in the organisation?
- How do you fit in the emergency service landscape in Belgium?

FLEXPUB Questions

- Are the challenges elicited in WP2 comparable with the challenges you currently face ?
- Overall, what do you think about the blueprint ? In which pillar do you find yourself ?
- Overall, what do you think about the strategy ? In which pillar do you find yourself ?

Questions based on the pillars of the Strategy

Collaboration

- What is your relation with the other actors of the emergency services landscape in Belgium? (Police/DRI, Crisis Center, NGI, ASTRID, Firefighters, Operators, etc...)
- Does the collaboration with this ecosystem of partners facilitate or complicate your daily work? How is the collaboration handled ?
- Numerous data are currently integrated into the ASTRID systems to allow for localization and there is a need for speedy update. Why is there need for standardization of addresses (Link with Best-Address) ?
- Would it be beneficial if the federal partners would have a meeting platform on common positions to be discussed with the partners? How does the COP Platform function ?
- Is there a strong silo structure within your organisation ? How do you try to tackle it

Participation

- What kind of development methodology is used for the development of the service? Agile Methodology?
- Does your organisation include the end-users in the development of its e-services?
- Why does your organisation include users in the creation of e-services?
- At which stage does your organisation include the users in the creation of e-services?
- How does your organisation collect the requirements of users?
- Does your organisation use one of the following methods to integrate users ? Interviews/Social Media/ Innovation Ecosystem/Workshops/Survey/Dedicated Software/Representation in team
- How often does your organisation use one of those methods?
- Why did you choose this particular method ?
- Did you consider crowdsourcing as a viable solution for emergency services digitalisation in Belgium ? (Training citizens and having them as reliable points to perform the first aid or actions themselves before the arrival of the services). To solve the data update problem ?

- Do you think that the emergency services digitalisation is difficult because it is difficult to keep skilled people in the public sector? Is staff being hired via the Egov Select (Egov VZW)? Do you have training in that regard ?

Openness

- What is your organisations position on opening the data about your day-to-day operations to facilitate innovation/re-use ?
- How are data protection concerns (e.g. GDPR) taken into consideration in your day-to-day operations ?
- Regarding the different data sources related to emergency services in Belgium, do you experience interoperability issues ? Do you have a platform cross-actors to discuss these issues ?

Geo-orientation

- Which data sources do you use and collaborate with ?
- Since the NGI is an important source of data:
    - How do you collaborate with them ?
    - Are you satisfied in terms of data quality and update ?
    - What are the other data sources ?
- Would a more structured approach towards the use of geo data be beneficial for the federal level?