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ACTING COLLECTIVELY TO
BRIDGE SPACE AND SOCIETY

SATELLITES FOR SOCIETY

REPORTING ON OPERATIONAL USES OF SATELLITE-BASED SERVICES IN THE PUBLIC SECTOR

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Reporting on operational uses of satellite-based services in the public sector

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FOREWORD

Time and again, the economic return on investments made in satellite infrastructure and services has been qualified and quantified in terms of revenues, employment or economic growth in the space sector itself. However, economic variables for the space sector alone are not enough to measure and qualify the benefits produced by satellites. Indicators such as public health, sustainability and social well-being have also to be considered. Even though the potential of satellites to have an impact on the society and the environment is undeniable — e.g. for disaster management, environment monitoring and transport — the uptake of the European downstream space market has been so far below expectations and is still largely below the level attained by the US[1]. Indeed, the use of satellite-based services in Europe has not yet reached its full potential.

This report aims to identify and, where possible, to quantify social, economic and environmental impacts of satellite-based services on the delivery of public services. Public authorities were chosen as a focus for this analysis as they work for the benefit of all individuals found within their jurisdiction. Therefore, improving the tools and processes available to them in order to fulfil their mandates is expected to serve the interest of their community as a whole. This analysis is grounded on the assumption that satellite-based services can potentially increase the quality of the information available to public authorities, as well as to improve the services they deliver. Furthermore, public entities are the main customers of satellite-based commercial applications. A recent survey conducted by the European Association of Remote Sensing Companies (EARSC), indicates that approximately 65% of the market relies on public customers[2].

To understand how public authorities use satellite applications and the impact of these tools on their work, Eurisy has set up a mechanism that will allow for a periodic review of the European public sector. As of March 2015, the association launched an online survey targeting public authorities at all levels. In order to monitor the evolution of the selected variables and parameters over time, the survey is currently being implemented on an annual basis. This report describes part of the outcomes obtained from the first rollout of the survey between March and September 2015. The analysis summarises the information obtained from 106 European public authorities, and aims to provide policy and decision-makers with valuable information on how to better support and maximise the benefits derived from satellite-based services.

Beyond underlining the challenges encountered and the impact of satellite services, Eurisy aimed to offer a voice to the user community and to provide a distinctive point of view on the discussion on the benefits of satellites for society. The results of this analysis are not to be considered as being representative of how satellite-based services are used within the entire EU public sector. Rather, the feedback collected by Eurisy represents a first insight into a matter that deserves further exploration and analysis.

[1] European Commission Directorate General for Internal Policies. Policy Department A: Economic and Scientific Policy, *Space Market Uptake in Europe*, Brussels, 2016 [hereinafter Directorate General for Internal Policies, 2016].
[2] European Association of Remote Sensing Companies (EARSC), *A Survey into the State and Health of the European EO Services Industry*, Brussels, 2015 [hereinafter EARSC, 2015].

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MAIN FINDINGS AND CONSIDERATIONS

Surveyed public authorities are consistently using and supporting the development of satellite-based services

The results of the survey suggest that satellite-based services are today regularly integrated into procedures and working methods of respondent public authorities.

In 93% of cases, public authorities declared that they currently rely on satellite-based services to perform operational tasks (Graph 2.1.). In addition, 70% of respondents have been using these services for more than five years (Graph 2.2.).

Based on the outcomes obtained from this study, we could argue that public authorities are not only passive users of satellite-based services, but rather that they actively participate in their development, improvement and provision.

Indeed, most public administrations did not need a demonstration project to take up these services, but started using them within the framework of their regular operations (Graph 3.2.). This is true also for services adopted 10 or 15 years ago (Graph 3.3.). One can therefore reason that public authorities have been historically at the frontline of satellite data exploitation.

Further reinforcing the engagement of public authorities towards the innovation of satellite-based services, 17% of respondents procure their services fully or partially from other public administrations. Moreover, one fourth produce the services — or part of them — in-house, either alone or in collaboration with international organisations, research centres and private companies (Graph 3.6.).

The services based on the European constellations of satellites are becoming progressively available. Public administrations are expected to keep playing a pioneering role in the use and validation of satellite signals and information in the coming years. They will not only be fundamental to head the use of these services, but they will also significantly contribute to the development of more efficient, user-oriented future services.

Hence, public authorities should not be considered as mere final customers of satellite-based services, but their experiences and feedback should be taken into account to develop and improve satellite-based services for their use.

Satellite-based services support public managers in key policy areas

The respondent public authorities indicate environmental protection, agriculture, risk management, and transport as the fields in which satellite-based services are most used (Graph 1.9.).

These sectors are and will continue to be of outmost importance to secure a competitive European market and the well-being of its society[3].

Regional and European programmes and diverse support and funding schemes have been launched to support public authorities meeting new policy priorities in these areas. The case study preliminary analysis includes concrete examples of how support mechanisms have enabled public authorities to better respond to new national or European regulations.

The European Commission and other international organisations, such as ESA, were not the only ones to put in place support mechanisms to develop user-oriented satellite-based services. Member States have also implemented policies and initiatives aimed at stimulating access to satellite data. For example, the Italian Decree-Law n. 95 of 6 July 2012 established that all data acquired from satellites under publicly-funded activities must be collected, catalogued and made available to all national potential users. Meanwhile, the Netherlands Space Office (NSO) provides raw and pre-processed satellite data free of charge to both private and public organisations[4].

Governments should continue encouraging innovation in the fields in which satellites have proved their added value, not only by stimulating the creation of new satellite-based services, but also by fostering the use of existing products which have already proved their effectiveness.

Moreover, national governments, ministries, EU institutions, and other cluster organisations should support knowledge sharing by facilitating platforms that will allow for valuable exchange of expertise among peers. Such platforms could prove fundamental in tackling uptake challenges and extending dissemination.

Public administrations use innovative solutions to respond to existing needs

In most cases, satellite services are preferred over other technologies not because of their capacity to face emerging demands, but rather because they allow users to better respond to their current and pre-existing needs.

Indeed, 69% of respondents declared to have decided on the adoption of satellite-based services to improve their existing services (Graph 2.3.). Meanwhile 53% declared that the satellite-based services substituted, fully or partially, other technologies or procedures previously employed to achieve the same goals (Graph 2.4.).

[3] The survey conducted by EARSC in 2015 on the European EO Services Industry mentions the sector of Environment, pollution & climate as the market segment generating more revenues after Security, defence & military. The Agriculture segment is on the fifth position, after Oil & gas and Maritime. EARSC, 2015, *supra* note 2.
In 2013, the DORIS_Net project mapped thematic needs among regional authorities in Europe with reference to EO data. Needs were grouped in the following classes: sustainable development and nature protection (35,7%), management of urban areas (16%), emergency (14,3%), agriculture, forestry and fishery (14,2%), regional and local planning (5,4%), transport (5,4%), health (5,3%) and tourism (3,6%). Downstream Observatory organised by Regions active in Space – Network (DORIS_Net), *Report on segmentation of user needs WP 3 Report D3-5,* 2013.
[4] For more examples of National initiatives aimed at promoting the access to satellite data please refer to the "Space Market Uptake in Europe", study for the ITRE Committee. Directorate General for Internal Policies, 2016, *supra* note 3.

Therefore, for public administrations to adopt them, satellite-based services must prove their ability to respond to current needs. Moreover, the services need to be flexible enough to integrate existing objectives, methods and resources.

This is a further reason to actively involve public administrations in the development of new services based on satellites. Drawing on the feedback received from public managers on their operational needs and procedures, service providers can design and build products that are more likely to be used. Products based on satellite data that take into account concrete operational needs are also more likely to be employed on the long term. Furthermore, public administrations will be more inclined to spend their budgets on products that can be easily embedded into their operations.

In addition, in the case of demonstration projects, public authorities should not be required to adapt themselves to the new technologies developed.

Long-term sustainability should be prioritised to the detriment of short-term funding. This is not to say that demonstration projects cannot convince authorities to invest on a long-term basis. However, in these cases, the continuous use of satellite-based services is not justified by the possibility of accessing external funds, but rather by the proven operational benefits entailed.

Satellite-based services are available at relatively small costs, but it is still difficult to quantify their benefits

Survey data indicates that satellite-based data and signals are accessible at relatively small costs.

When considering the initial adoption or implementation of the satellite-based services, 61% of respondents argued spending less than 5% of their annual budget. What is more, 41% of users spent as less as 1% of their budgets. To operate these services, 73% of respondents spend less than 5% of their annual budget, while 62% of them report expenses of less than 1% of their budget (Graph 4.1.).

Expenses are relatively low regardless of the kind of satellite applications used.

More than half (65%) of the surveyed public administrations use services based on satellite navigation signals. Another 63% of them use data derived from Earth observation (Graph 1.8.). Compared to Sat Nav technology, Earth observation applications are usually perceived as more expensive. This is because EO data needs to be further processed to be used operationally.

Interestingly, respondents have reported similar relative costs to adopt and use the services, irrespective of whether they are based on EO, satellite navigation or satellite communication (Graphs 4.12. and 4.13.). Nevertheless, one third of respondents still indicate economic challenges to adopt and use these technologies (Graphs 5.2. and 5.5.).

Only 25% of the contributing public authorities implemented a formal cost-benefit assessment of the satellite-based services used. Indeed, the analysis has shown a low level of awareness among public authorities with regard to the costs of the satellite-based services. The same low awareness level was also found towards quantitative benefits in terms of money and time savings.

The difficulty to quantify the costs of satellite-based services appears to hinder their adoption and sustainable use. This suggests that the adoption and the further sustainability of satellite-based services would benefit from prior cost-benefit assessments.

Following the adoption or implementation of the services, public authorities should conduct periodic reviews against their budgets dedicated to satellite services. Key performance indicators could be used to argue for further investments in satellite-based services, or to substitute these with other available technologies.

Frequent evaluations can also help authorities assess possible evolutions in needs and request modifications of the services where necessary (e.g. acquisition of different satellite images, change of service providers or improvements in processing the satellite data).

Establishing such internal evaluation procedures within the public sector could help better direct public spending and maximise its return for society. At the same time, periodical cost-benefit assessments of the technologies used could help secure the necessary funds to operate and improve them in the long run.

Satellite-based services can effectively boost the quality of public services

Public procurement management is important for public policy. With a yearly purchasing value estimated at 3.5% of Europe's GDP in 2011[5], public procurement plays a fundamental role in driving economic development. Total public expenditure on goods, works and services amounted to over €2 trillion in 2009. The amount is shared among more than 250,000 European public authorities. However, expenditure is complex and highly fragmented with public procurement rules and legislations varying greatly among member states[6].

At a time when public budgets are under growing pressure, innovative ideas are needed to boost the efficiency and quality of public services. Technology can therefore play a leading role in improving the delivery of public services and in boosting quality public investment[7].

As stated in the 2014 Recommendation of the OECD's Council on Effective Public Investment Across Levels of Government, "public investment shapes choices about where people live and work, influences the nature and location of private investment, and affects quality of life. If well-managed, public investment is a potentially growth-enhancing form of public expenditure. In contrast, poor investment choices waste resources, erode public trust and may hamper growth opportunities"[8].

Satellite-based services can help public authorities increase the efficiency of their services, by providing them with better tools to achieve their mission and objectives.

44% of respondents declared that services based on other technologies would have been less effective than satellite-based solutions to achieve the same goals. Meanwhile, 39% of respondents argued that only services based on satellite technology were able to respond to their needs (Graph 2.5.).

[5] Public procurement is regulated by two separate EU Directives: the Public Sector Directive on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts; and the Utilities Directive, coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors. Strand I., *et al.*, *Public procurement in Europe. Cost and effectiveness,* 2011.

[6] Internal Market and Services Directorate General of the European Commission, *EU public procurement legislation: delivering results, Summary of evaluation report*, 2011.

[7] European Commission Directorate General for Employment, Social Affairs and Inclusion, *Promoting good governance, European Social Fund thematic paper*, 2014.

[8] OECD, *Recommendation of the Council on Effective Public Investment Across Levels of Government,* 2014.

Moreover, a majority of the public authorities contributing to the Eurisy survey declared that they turned towards satellite-based services to improve existing services and procedures. More than half wanted to save money, time or human resources (Graph 2.3.).

Ultimately, their expectations were not disappointed. More than half declared that the satellite-based solutions adopted allowed them to provide better services, take better-informed decisions and save time (Graph 2.6.). Furthermore, most of them share the satellite-based data or system with other public administrations, hence increasing their potential benefits (Graph 2.9.).

The provision of better information and data to support decision-making is mentioned by the European Commission as one of the indicators assessing the quality of public administrations[9].

Drawing on Eurisy's experience in working with the public sector, the lack of awareness among public managers can lead them to use more conventional technologies, of lower added value.

As stated in Eurisy's 2010 Positions Paper, "more potential end-users should be informed of the benefits of satellite solutions. Although investments in space programmes (...) are significant, a lot of the intended beneficiaries — policy and decision-makers and practitioners — are yet unaware of the satellite solutions available to them. In addition, persisting misconceptions about satellite services as expensive, or as 'disproportionate solutions for local issues' etc., prevent end-users from exploring their benefits".

"Because of the current emphasis on technology, today the value proposition of the satellite services is insufficiently visible and clear to the potential end-users. Notably, potential users understand and evaluate satellite services with respect to the solutions they provide, the expected results and benefits, for instance gains of time, money, efficiency, quality, and not the technology itself. The business case for using operational satellite services has not been sufficiently demonstrated by the actors of the downstream sector"[10].

Within this context, knowledge exchanges among different types of users can help persuade public managers of the added value of investing in services that have already yielded efficient results.

The EC, national space agencies, governments and stakeholders should therefore increase dissemination efforts of operational, market-ready services. This could be achieved by establishing mechanisms to secure knowledge transfer beyond borders.

"The peer-to-peer dialogue established through the sharing of end-user good practices is the most effective tool to communicate on the value of satellite services with potential users, as demonstrated by Eurisy's User Programme. Good practice dissemination is effective as it occurs among professionals who share a working language and culture and evaluate satellite services on similar criteria. Furthermore, the role of community leaders in setting the example and stimulating their peers to follow suit is well-recognised"[11].

[9] European Commission Directorate General for Employment, Social Affairs and Inclusion, *Quality of Public Administration: A Toolbox for Practitioners*, Abridged Version, 2015.
[10] Eurisy, *Creating sufficient user pull to secure the benefits of satellite services for society*, 2010. Available at: http://www.eurisy.org/data_files/publications-documents/8/publications_document-8.pdf?t=1391445602
[11] *Ibidem*.

Training and knowledge exchanges can help public authorities overcome the technical challenges faced in adopting and using satellite-based services

Respondents declared facing mainly technical and organisational challenges to first adopt or implement the satellite-based services they use (Graph 5.2.). Another 75% of respondents also reported challenges — especially of technical and economic nature — to operationally use these technologies (Graphs 5.4. and 5.5.).

This is particularly true when organisations cannot count on experienced in-house staff members or on previous experience of use of these services (Graph 5.7.).

Survey results show that for 69% of respondents, challenges were overcome through training (Graph 5.10.).

It is therefore very important to launch programmes and initiatives aimed at training public managers on the technical and operational features of satellite-based services.

Investments in training could be integrated in the procurement budgets of satellite-based services. By securing a budget line for training, public authorities can avoid potential extra-budgetary expenses, as well as better ensure the continuous use of satellite-based services.

To support public authorities, the EC, national governments and regions could organise trainings for public administrations based on existing platforms that provide satellite data. Another solution could be setting up support mechanisms for public managers on a punctual basis.

As an example, Ministries offering platforms to access satellite-based data could appoint a pool of experts to support public managers at different administration levels on data usage or to write procurement specifications. A national initiative aimed at leveraging the return of space investments for society is the Space for Smarter Government Programme of the UK Space Agency, fostering the use of space-based technologies by public administrations.

The difficulties encountered by public authorities might also suggest that satellite-based services are not sufficiently user-friendly. In other words, they might not be conceived to be automatically integrated into the organisational culture and the procedures already in place within the public sector. As stated above in this chapter, such difficulties could be overcome by taking into account existing needs and procedures early on in the design of new satellite-based services.

Satellite services are actually going local…

When Eurisy named its collection of success stories of use of satellite-based services "Satellites Going Local", the formula expressed a wish, as well as an encouragement to use satellite services for concrete social and economic benefits. The wish was backed by the direct testimonials on the use of satellite applications gathered by Eurisy from local and regional authorities and SMEs. These actors were considered as pioneers, forward-looking professionals paving the way for a yet-to-come wider exploitation of satellite applications at the service of society.

Seven years after the launch of the Eurisy User Programme, survey results suggest that satellite-based services are now available and are being used operationally not only at a national level, but also within regional and local authorities.

63% of the contributing organisations to the survey operate mainly at the regional or local levels (Graph 1.3.). This information is particularly relevant in assessing the impact of satellite-based services, as a great percentage of public investments in Europe (70% to 80% in 2011)[12] are made by local and regional authorities. Moreover, regions have competences in key sectors such as water management, public transport, social services, environment, health, and urban planning. These sectors all directly affect everyday life and influence the economic competitiveness of territories[13].

As stated in the OECD's report "Government at a Glance 2015", "the need to improve the quality and efficiency of government spending has confirmed sub-central governments as important players in the implementation of public policies. Indeed, sub-central governments could be considered as better equipped than central governments to obtain information on local needs and better-placed to tailor the provision of public services"[14]. Indeed, in 2013, 37.8% of general government expenditures were undertaken by state and local governments across OECD countries[15].

Survey results attest that the diffusion of a culture of innovation exists within public administrations at all levels.

...but are they going local enough?

The results of the first rollout of the Eurisy survey therefore indicate that satellite applications are actually going local. However, are they reaching out also to local public managers?

Results showed that regions are profiting from the information and services made available through satellites. However, they also suggest that local authorities need more support to take up and operationally use satellite applications.

The weak representation of local authorities within the sample of respondents (18%) might suggest a top-down model of distribution of satellite-based data. Data is often collected at the ministerial level to be then transferred to regional and local administrations. When analysing the results, we must however take into account that the survey was disseminated mainly through Eurisy's Members. In their position, space agencies might have better-established communication channels with national and regional authorities than with local-level administrations. The preponderance of responses received from national and regional administrations can be thus explained by a difficulty in reaching out to local authorities. Further rollouts of the survey and the use of new communication channels are expected to help clarifying this point.

However, other indicators also suggest that knowledge transfer efforts on the benefits of satellite applications should be more locally-focused.

[12] Council of European Municipalities and Regions (CEMR), *Local and regional government in Europe. Structures and competences*, 2011.
[13] *Ibidem.*
[14] OECD, *Government at a Glance 2015,* OECD Publishing, Paris, 2015.
[15] *Ibidem.*

Considering previous in-house knowledge of satellite applications, it seems that public managers at the national and regional levels have been prepared to use these technologies before their colleagues working in local administrations (Graph 1.6.). Indeed, responses show that national administrations have been using satellite-based services before regional and local authorities, although this trend is decreasing over time (Graph 1.7.).

Surveyed local authorities seem to have been also less involved in demonstration projects than their peers at the national and regional levels. Almost half of the national authorities and 38% of the regional administrations have been able to profit from demonstration projects. In contrast, only 26% of responding local authorities reported to have accessed such schemes (Graph 3.4.).

Finally, respondent local authorities also declared to have had less access to data or expertise free of charge to implement and operate satellite-based services than regional and national authorities (Graph 4.10.).

These observations lead us to conclude that local authorities are in need of additional support in order to become familiar with satellite-based services. Increasing awareness on the available services and on the existing success stories can be achieved through peer-to-peer knowledge exchanges. In addition, local authorities need to benefit more from training opportunities and available data portals.

As a first step to better understand what are the needs of local authorities and how to boost the use of satellite-based services, awareness raising and training should not only focus on a "European dimension", but rather be extended at a local level.

As an example, Eurisy has recently organised a User Forum in Warsaw to discuss the replies submitted to the survey by Polish public authorities. This kind of exercise allows policy and decision-makers to contextualise the feedback provided by public managers according to the specific legal, administrative, environmental, social and economic features of the country. By understanding the local context, policy-makers at both regional and European levels can implement better-targeted strategies to transfer satellite-based solutions locally.

To help local managers adopt services based on satellites, the EU and its Member States could provide further economic support through funding schemes which are well-known by public administrations, in addition to dedicated space programmes.

Eurisy will keep supporting local managers by:

- Collecting their experiences on use of satellite-based services;
- Promoting peer-to-peer knowledge exchanges;
- Organising conferences and workshops in cooperation with regional and local authorities;
- Serving as an intermediary between policy makers and user organisations on the field.

Aiming to build a comprehensive knowledge base, Eurisy will continue collecting feedback from public administrations through the successive rollouts of its survey. This we believe will contribute to facilitating the full exploitation of satellite-based services to the profit of the social, economic and environmental well-being.

INTRODUCTION

Public authorities have been among the main backers and customers of satellite-based services. And they still are. More than half a century has passed since the launch of the first artificial satellite in October 1957. Currently, more than a thousand active satellites — both government and privately owned — are orbiting around us. The data and signals provided by these devices have become essential for many of our everyday activities.

European investments in EGNOS, Galileo and Copernicus[16] — EU space flagship programmes — clearly indicate the strategic role played by satellite-based services in achieving safety, growth and sustainability. Indeed, despite the economic crisis, the European Union (EU) allocated around €6.3 billion to Galileo, the European satellite navigation system, and 4.3 billion to the European Earth observation system GMES-Copernicus for the period 2014-2020. The Horizon 2020 EU Research and Innovation programme also dedicates a further 1.73 billion to space research and development[17]. Meanwhile, the European Space Agency alone is investing €309.2 million, i.e. 7% of its 4.4 billion budget for 2015[18], in telecommunications and integrated applications to support the development of market-oriented space-based services. In 2015, ESA is also investing €1.25 billion on Earth observation and 664 million on satellite navigation-related activities.

These investments, which rest largely on European taxpayers, are expected to yield significant benefits for Member States and for the European population. Indeed, the European Commission's communication "Towards a space strategy for the European Union that benefits its citizens"[19] defines space activities and applications as "vital" to our society's growth and development and prays for space policy to serve European social, economic and strategic needs. The benefits of using satellite navigation to ensure public transport information and fleet management are already widely known. As are those related to the use of satellite communication to better respond to emergencies or humanitarian crises, and of satellite imagery to produce weather forecasts and risk management maps. These are just a few examples of applications enabled by satellite technology.

Trans-national cooperation has also led to the development of highly valuable services based on satellites. An excellent example of such a service is CleanSeaNet, provided by the European Maritime Safety Agency (EMSA). The service delivers daily satellite imagery to coastal authorities in charge of spotting and managing oil spills at sea. The report on the first generation of the service[20] estimated that satellite monitoring used to cover wide and/or remote areas is up to ten times cheaper than aerial surveillance. The report also estimates that the area covered by CleanSeaNet between April 2007 and January 2011 would have otherwise amounted to a cost of least €30 million to monitor by aircraft. This estimation comes against the approximately €8 million spent to develop, implement and maintain the service based on satellite remote sensing during the same period.

[16] The European Geostationary Navigation Overlay Service (EGNOS) is Europe's first venture into satellite navigation. It improves the open public service offered by the USA's Global Positioning System (GPS), making it suitable for safety critical applications such as flying aircraft or navigating ships through narrow channels. Galileo is Europe's own global navigation satellite system. Galileo is set to deliver real-time positioning accuracy down to the metre range. The fully deployed Galileo system will consist of 24 operational satellites plus six in-orbit spares. Initial services will be made available by the end of 2016. Copernicus, previously known as GMES (Global Monitoring for Environment and Security), is the European Programme for the establishment of a European capacity for Earth Observation.

[17] Organisation for Economic Co-operation and Development (OECD), *The Space Economy at a Glance 2014*, OECD Publishing, p. 25.

[18] Including €1.05 billion of EU funds. European Space Agency (ESA) website, *ESA Budget 2015 by domain.*

[19] European Commission, *Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions "Towards a Space Strategy for the European Union that Benefits its Citizens"*, Brussels, European Union, 2011.

[20] European Maritime Safety Agency (EMSA), *CleanSeaNet First Generation Report – 16 April 2007 - 31 January 2011,* 2011, updated 2014.

Such reports help qualify and quantify the benefits of satellite-based services for the European society. Under its User Programme, Eurisy has collected a number of stories from public authorities reporting on the contributions of satellite-based services. Other entities, such as clusters of public authorities and service providers, space agencies and stakeholders, have also participated in this effort in recent years.

By collecting direct feedback from public managers, Eurisy's survey aims to provide a distinctive point of view on the socio-economic benefits of satellite-based services. Moreover, it aims at better understanding the needs and challenges of public managers, hence supporting policy and decision makers in their efforts to stimulate the uptake and exploitation of these services.

This report was produced at the instance of the Eurisy Members by Grazia M. Fiore, research and project coordinator. We are especially grateful to the public authority officials who shared their experiences by contributing to the Eurisy survey. Eurisy acknowledges the advice and methodological inputs kindly provided by the members of the Survey's Advisory Committee: Claire Jolly, Head of the OECD Space Forum, Piero Messina, Administrator in the Strategy Department of the European Space Agency, Zbigniew Burdzy, Chief Specialist at the Polish Space Agency, Roswitha Gruemann, Head of European Space Policy and Special Affairs at the German Aerospace Center, and Peter Hulsroj, Director of the European Space Policy Institute (ESPI). Stefaan De Mey, Eurisy secretary general, performed the Pearson's Chi Square Test of Independence on selected variables and supported the overall implementation and analysis of the survey here presented. Editorial assistance was provided by Laure Lepastier, Alexandra Jercaianu, Teodora Secara, and Eleonora Lombardi, from the Eurisy Secretariat.

THE SURVEY

The survey "Operational uses of satellite-based services in the public sector" was launched in March 2015.

The survey was preceded by a preliminary test phase during which the questionnaire elaborated by Eurisy was submitted to ten public authorities using satellite-based services at the national, regional or local levels. The contributing organisations operate in sectors ranging from transport to environmental protection, risk management, and health in Germany, the United Kingdom, Italy, the Netherlands, Belgium and France. Representatives of public authorities received the questionnaire by email and filled it in during a telephone interview with the support of the Eurisy staff.

The implementation of the preliminary phase of the survey was supported by the Space for Smarter Government Programme (SSGP) of the UK Space Agency (UK SA), which partially funded the initiative. The survey has also received strong support from the OECD Space Forum, and from the Strategy Department of the European Space Agency (ESA).

The information gathered during the testing phase was presented in an analytical report including ten case studies[21]. Annex I presents the main results obtained during the preliminary phase of the survey. The full analytical report and the ten case study reports are available on the Eurisy website. Brief descriptions of the case studies are included in the "Results" section of this report.

The feedback received from the ten public authorities surveyed in the preliminary phase was encouraging. They understood the terminology of the questionnaire and were able to systematise their experiences according to its structure. Information resulting from the preliminary phase has been also used in an analytical study of the Policy Department on "Economic and Scientific Policy" of the EU DG for Internal Policies commissioned by the European Parliament's Committee on Industry, Research and Energy (ITRE), Directorate A – Economic and Scientific Policy[22].

Following the case study analysis, Eurisy decided to enlarge the sample in order to verify the results obtained. This represented an opportunity for the association to also widen its insight into the use of satellite-based services within the public sector. In addition, drawing on the results obtained, Eurisy aimed to influence the choices of other public authorities, of Eurisy Members and of relevant stakeholders and policy makers.

In 2015, the questionnaire was thus amended and its contents shortened to allow public managers to reply in approximately ten minutes[23]. In March 2015, the survey was launched online through the Eurisy website. To reach a higher number of public authorities, the questionnaire was made available in nine languages: English, French, Spanish, Italian, German, Polish, Dutch, Greek and Romanian.

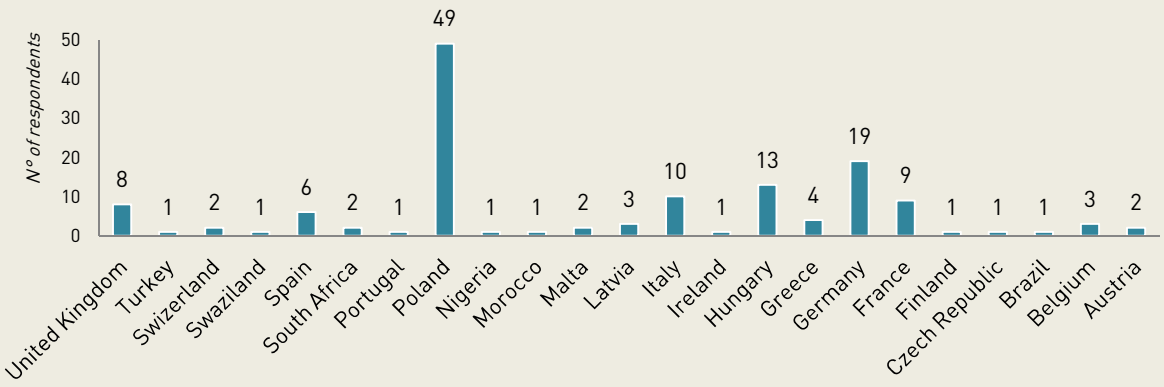
To assist with the implementation of the survey and the analysis of the results, an advisory committee has been conveyed. The committee includes representatives from the Polish Ministry of Economic Development (former Ministry of Economy), the German Aerospace Center (DLR), the European Space Policy Institute (ESPI), the OECD Space Forum, and the European Space Agency (ESA). The Geo Secretariat and the Space for Smarter Government Programme (SSGP) of the UK Space Agency have also acted as observers within the advisory committee.

[21] Eurisy, *Operational uses of satellite-based applications in the public sector: a case study review*, Paris, January 2015 [hereinafter Eurisy, 2015].
[22] The document aims to shed light on the potential applicability of data acquired from the EU Galileo and Copernicus satellite systems in both the public and private sectors, and on the reasons why such potential still remains largely underutilised. European Commission Directorate General for Internal Policies, 2016.
[23] Annex II: Survey questionnaire. To access the questionnaire in all available languages, please visit the Eurisy website at: www.eurisy.org/event-survey/survey-en.

Dissemination efforts have been supported by Eurisy's Members and partner institutions through their websites and social media channels. In order to obtain a further engagement of the space community and foster feedback from public authorities, Eurisy has promoted the survey during international meetings and workshops.

Between March and September 2015, 151 replies have been received. From the total number of replies, 141 cases — representing 23 European and non-European countries — have been validated. To be validated, responses had to be submitted by public authorities that use satellite-based services at an operational level to achieve their mission. Replies submitted by research centres working under the direct mandate of public administrations have been also included in the sample. Furthermore, the analysis only considers replies coming from individuals whose identities could be verified by the Eurisy Secretariat.

Country of respondent public administrations
All valid replies received between March and September 2015 (N=141)



To have a more homogeneous sample, the maximum number of replies accepted per country was fixed as being the number of replies received by the second most represented country — in this case Germany. Following sample balancing, 19 replies have been selected among those received from Poland (49 in total), giving preference to the public authorities which replied to the larger number of questions and previously in time. To include a higher number of organisations, this first analysis only includes the first set of replies received from each contributing institution.

Moreover, the first analysis of the results only includes responses from European countries, with the exception of Morocco and Turkey, whose space agencies — the Royal Centre for Remote Sensing (CRTS) and Tübitak — figure among the Eurisy Members. This selection, including administrations facing similar challenges and which are subject to similar policies, should grant a greater coherence to the data analysed.

After screening all the responses received, 106 have been selected to be included in the current report. Remaining results are to be included in the successive rollouts of the survey, which remains open to further replies.

Given the consistent number of replies received from Poland, Eurisy and the Polish Ministry of Economic Development have decided to analyse these results separately in a country report. The report was presented and discussed within a User Forum organised in Warsaw in April 2016. Similar User Forums could be envisaged in the future within specific national, regional or sectorial frameworks. Furthermore, Eurisy invites interested organisations to consider future joint initiatives linking the survey with relevant research on the socio-economic benefits of satellite-based services.

RESULTS OF ANALYSIS

Note on statistical analysis: The percentages included in the graphs were rounded to show no decimal places. Hence, manually adding the percentages in the graphs might show totals slightly over or below 100%.

Where relevant, the distribution of the observations has been analysed using Pearson's Chi Square Test of Independence between two variables. The corresponding *p*-values indicate whether or not a statistically relevant relationship exists between two variables. A lower *p*-value implies a higher likelihood that the variables are dependent and that the differences observed between categories within a sample are not accidental. The level of significance for this report has been set to 0.05.

The results of the statistical tests presented in this report should be interpreted with caution, due to the small number of replies taken into consideration for some specific variables. Not all respondents were able to answer all questions contained in the questionnaire. When testing the independence of the variables, the samples have been limited to the respondents that were able to answer the questions concerned, thus further limiting the overall sample size of N=106. The Pearson's Chi-Square test has not been applied to multiple response questions.

PUBLIC AUTHORITIES AT ALL LEVELS USE SATELLITE-BASED SERVICES IN KEY POLICY AREAS

Who are the public entities using satellite-based services?

This first analysis of the survey includes replies from 106 public administrations from 19 Countries (Graph 1.1.).

The satellite-based services described are operationally used by the respondent public authorities to achieve their specific missions at the local, regional or national levels.

More than half of respondents mainly operate at the regional or local levels, which indicates that satellite-based services are actually reaching out to public managers on the field. The remaining 37% have competencies at the national level (Graph 1.3.).

According to their mandate and their level of authority, these public authorities can count on very different annual budgets to perform their tasks, ranging from less than €1 million to more than 100 million (Graphs 1.2. and 1.4.).

The diversity in the size, budget, mandate and experiences of respondents indicates that satellite-based services of diverse complexity have reached the downstream market and are being used to improve different services of public interest.

Case study: The Alderney Airport (Channel Islands) relies on EGNOS to ensure safe aircraft landing

Weather conditions and constraints created by the location of the runways can make it very difficult even for experienced pilots to approach and land at the Alderney Airport. This regularly forced operators to delay, divert or cancel scheduled flights.

Alderney had always used a non-precision approach (NPA) supported by a non-directional radio beacon (NDB) to support landing operations. This approach provided lateral but not vertical guidance to pilots.

In 2011, ESSP (European Satellite Services Provider) proposed to the local airline to test the EGNOS system on its aircraft landing in Alderney. The new system provides both lateral and vertical guidance. Planes can hence approach the runaway with no need for ground-based navigation support, including in low-visibility conditions, which might have prevented or delayed landing in the past.

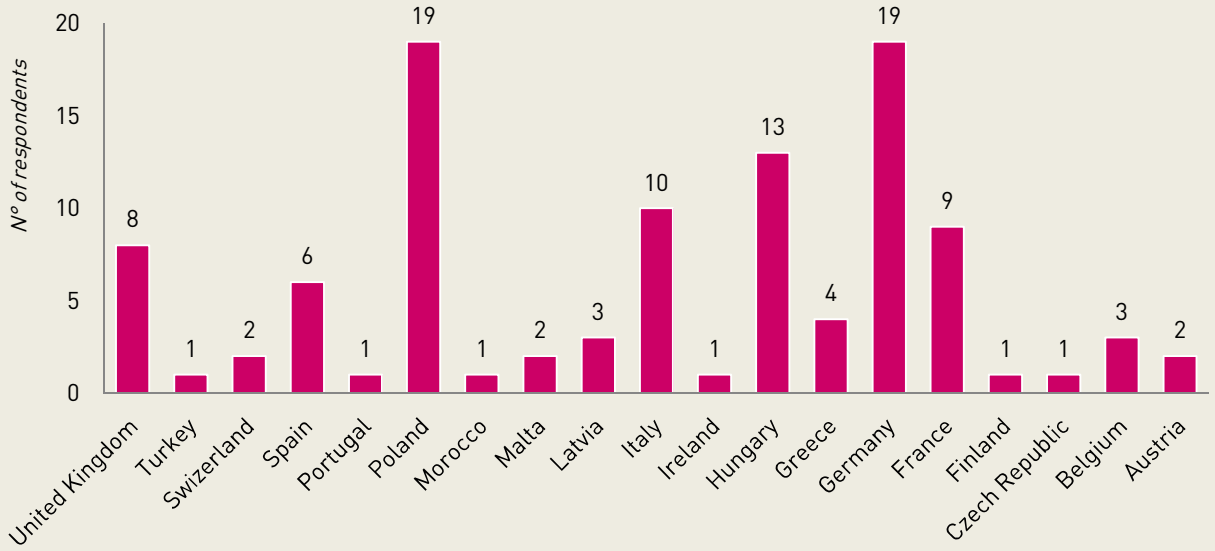
Area of operation:	Local
Sources of budget:	Local public funds
Annual budget:	€10m - 50m in 2013
N° staff:	40 (regular staff)
Implementation framework:	Demonstration project EC Trans-European Networks —TENs programme
User's implementation costs:	< 1% of annual budget in 2011
User's operational costs:	< 1% of annual budget in 2014

The EGNOS system was ready to use, and its provision was fully outsourced by the Airport, which was only requested to participate in the creation of new procedures which needed to be integrated with the operations of pilots and Airport authorities.

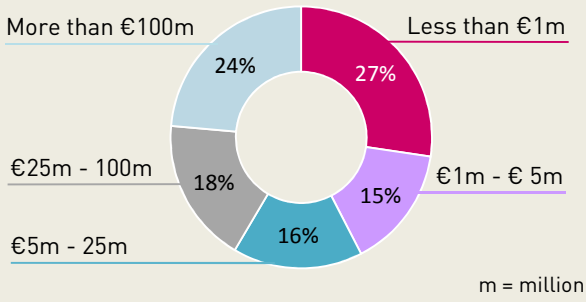
It would have cost £1,000,000 (€1,278,000) to achieve the same precision offered by EGNOS with ground equipment.

1.1. Country of respondent public administrations

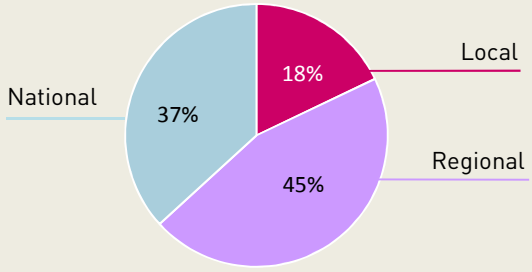
Selected replies included in the analysis (N=106)



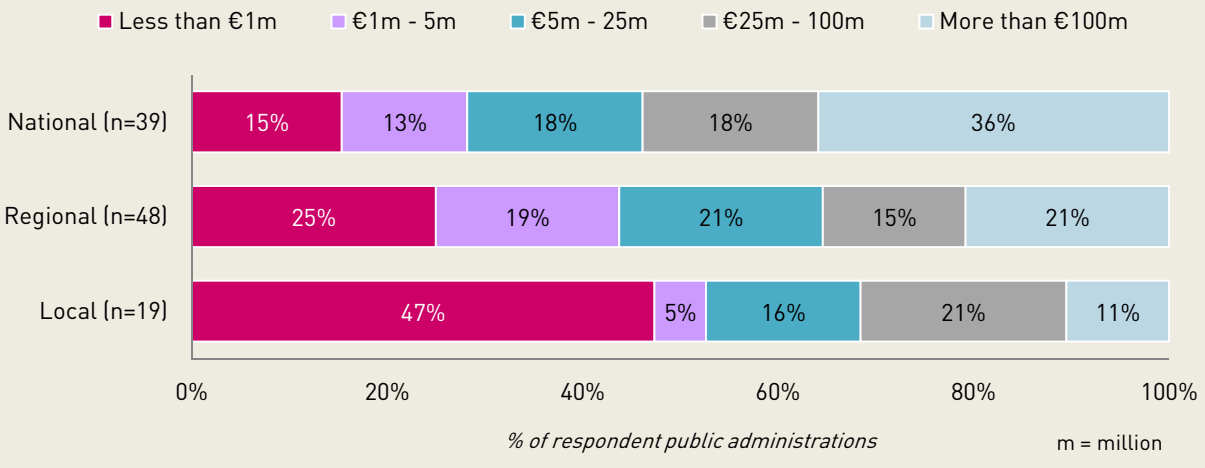
1.2. Organisations' annual budget in 2015



1.3. Organisations' level of authority



1.4. Public administrations' annual budget according to level of authority



Were public administrations familiar with satellite applications before they started using services based on them?

The contributing public administrations showed a good knowledge and experience of use of satellite-based services. Indeed, only less than one third of the sample had no previous experience or internal knowledge with these technologies before using the solutions described in the survey (Graph 1.5.).

The analysis suggests that public administrations working at the national and regional levels were better prepared to use satellite-based services than public administrations at the local level[24].

Indeed, only one fifth of respondent local authorities could count on some previous experience with these technologies before implementing the solutions described in the questionnaire, against 42% of regional authorities and 49% of administrations at the national level (Graph 1.6.).

This assumption is reinforced by the fact that only 12% of those who started using satellite-based services before the year 2000 were local authorities, while these represent 38% of the organisations which adopted these services after 2011[25].

Hence, if national administrations have been the most represented among the early users of satellite-based services in the public sector, regional and local authorities have been rapidly catching up, representing the majority of the organisations which adopted satellite-based services during the last five years (Graph 1.7.).

[24] Respondents with no experience at the national level (n=39): 23%, and at the regional level (n=48): 25%, versus respondents with no experience at the local level (n=19): 42%. *P*-value: 0.01

[25] Respondents at national level which started using satellite-based services more than 10 years ago (n=42): 50%; versus organisation s which started using the services less than 10 years ago (n=58): 27%. *P*-value: 0.02.

Case study: The Breast Screening Unit at University Hospitals Coventry and Warwickshire (UK) uses Sat Com in public health campaigns

The University Hospitals Coventry and Warwickshire (UHCW) is a teaching hospital in the West Midlands, UK.

The Breast Screening Service uses two vans, equipped with screening units, to perform breast screening tests outside the hospital. Until recently, the staff collected test results into hard disks that would later be transported to the hospital by car.

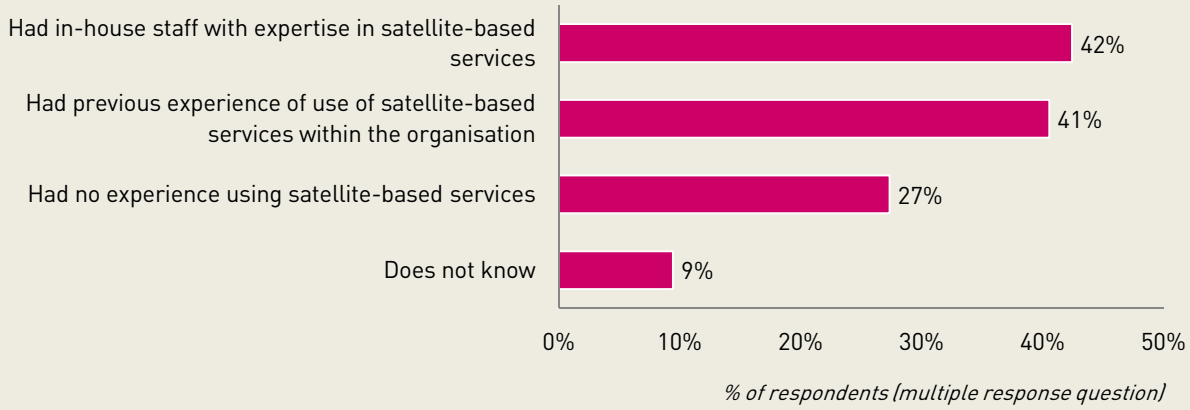
In 2012, within the ESA-funded "Mercury" project, the two vans were equipped with a satellite connection to secure the transfer of the test results directly to the radiologists in the hospital.

Area of operation:	Regional
Sources of budget:	National public funds
Annual budget:	€500 k - 2 m (2014)
N° staff:	40
Implementation framework:	February 2013 - July 2014: ESA Mercury project From August 2014: Operations
Users' implementation and operational costs:	Demo project: free of charge Since Aug. 2014: approx. 2% of annual budget of the Unit in 2014

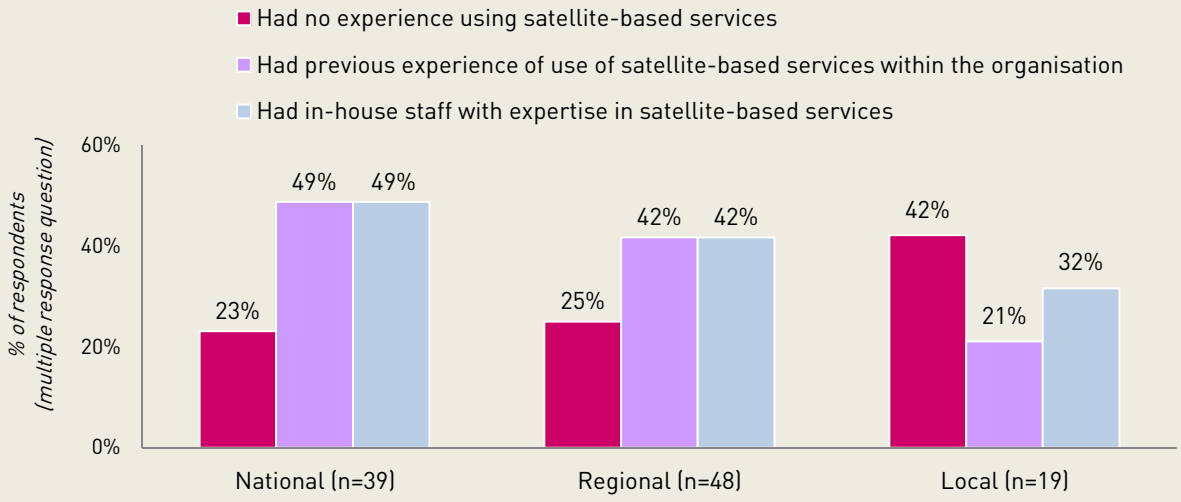
Moreover, GNSS data (date and location) was embedded into the patient's medical data. Two years later, after completion of the project, the organisation performed a cost-benefit assessment of the system. The satellite-based solution was evaluated as cost/neutral compared to the previous procedure, while enabling staff to save time and avoid the risk of losing clinical data during their transfer.

The service has improved, while costs remained stable.

1.5. Public administrations' previous knowledge of satellite-based services

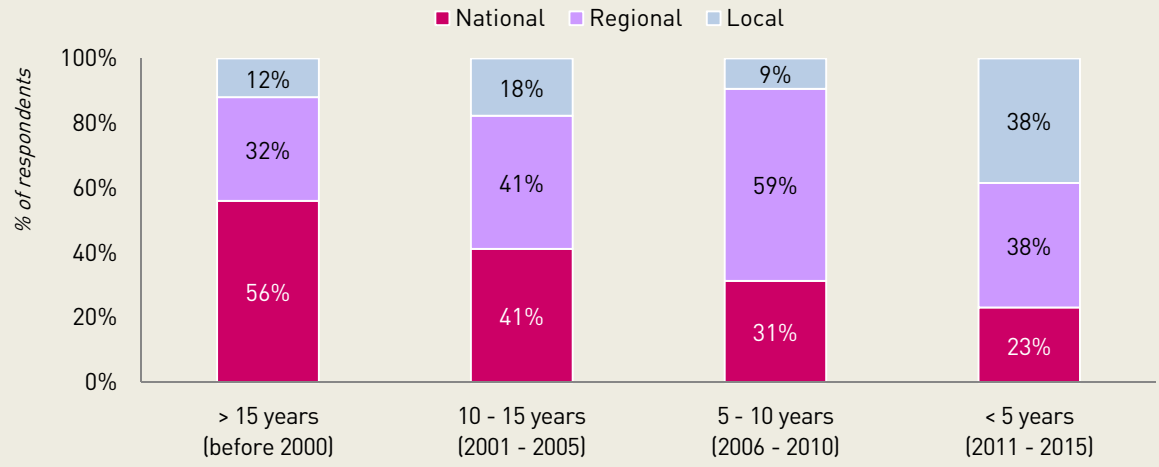


1.6. Organisations' previous knowledge of satellite-based services according to level of authority



1.7. Level of authority of public administrations according to start date of use of satellite-based services

(Blanks excluded, N=100)



Which satellite applications are used to provide such services?

From the total number of respondents, 63% report using only one satellite application, while 27% use two of them. Only 9% of respondents use all three satellite applications (Earth observation, satellite navigation and satellite communication).

Overall, 65% of respondents declare using satellite navigation, an application that is considered today as being widely available to both public and private entities. A similar percentage — 63% of respondents — use satellite imagery, alone or in combination with other applications (Graph 1.8.). The results hence show that also satellite remote sensing, often regarded as being difficult to access, has been integrated into systems that are consistently used by public authorities.

In which fields do public authorities employ satellite applications?

67% of the surveyed public authorities report using satellite-based services for multiple purposes. The most extended fields of application being: environmental protection (almost half of respondent public administrations), agriculture, risk prevention and management, as well as transport and logistics (Graph 1.9.).

The above-mentioned sectors are those in which governments, international organisations, service providers and the industry have invested the most to exploit satellite data.

Precision farming, early warning systems to manage natural hazards and real-time information on public transport, are but a few examples of the concrete results of these endeavours with an impact on our daily lives.

These fields have also benefitted from European policies and directives — such as the Water Framework Directive, the Habitat Directive, the Nitrates Directive, and the Intelligent Transport Systems Directive —, which are meant to prepare the Union to face future societal, economic and environmental challenges.

Case study: The Arno River Basin Authority, Italy, uses EO to improve monitoring of hydro-geological phenomena

The Arno River Basin Authority is responsible for annually updating the Inventory of Landslides for the Tuscany Region — in line with the Water Framework Directive — and for using it to implement the Basin Plan.

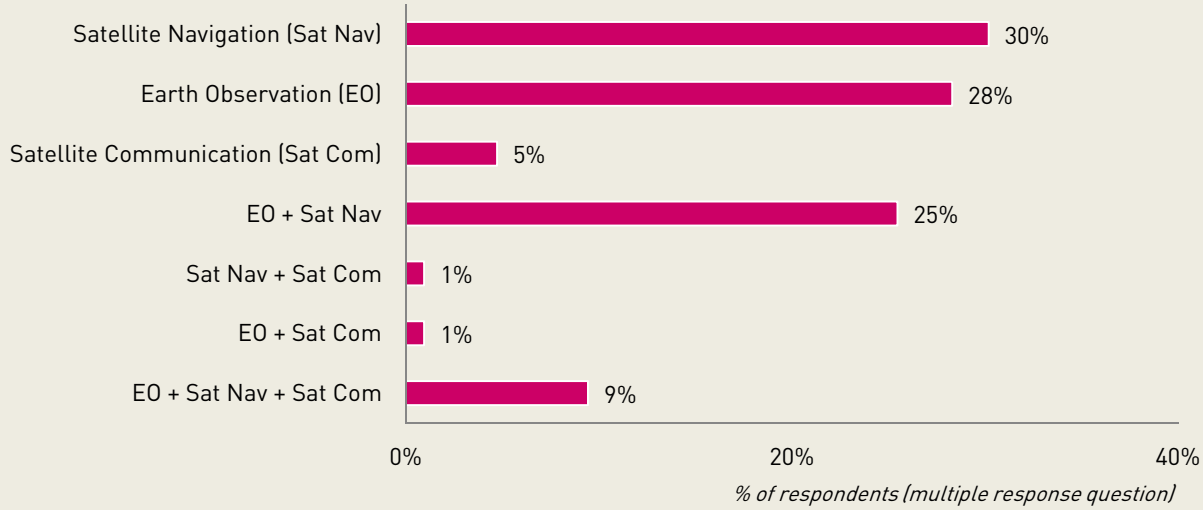
In 2005, the Authority profited from the ESA-funded project SLAM "Service for Landslide Monitoring" to build a Landslide Geographic Database using 350 satellite images and other data.

The database, showing old and new unstable areas, is used to map and monitor landslides and to build the Hydro-geological Structure Plan for the Arno River Basin.

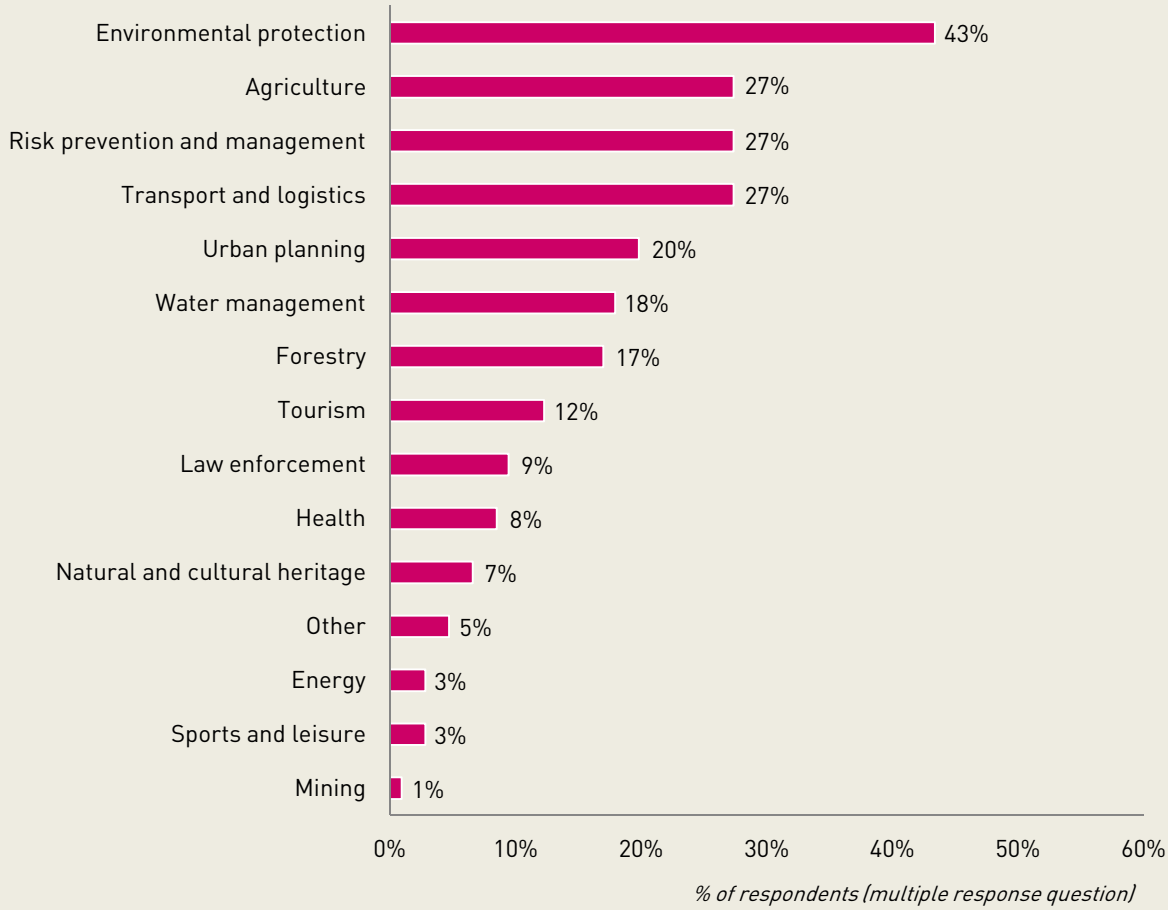
Area of operation:	Regional
Sources of budget:	National and EU public funds
Annual budget:	€2m - 5m in 2014
N° staff:	34
Implementation framework:	Demonstration project (ESA Data User Programme)
User's implementation costs:	1% - 5% of annual budget in 2005
User's operational costs:	1% - 5% of annual budget in 2014 (including human resources)

27,000 landslides were identified and 10,000 classified as active.

1.8. Kind of satellite applications used by public administrations



1.9. Fields of use of satellite-based services reported by public administrations



THE ADDED VALUE OF USING SATELLITE-BASED SERVICES

Are public administrations interested in satellite-based services?

93% of respondents declared that the satellite-based services described in the questionnaire are still operational (Graph 2.1.).

Since 70% of them have been relying on these services for more than five years and 40% for more than ten (Graph 2.2.), their enduring usage indicates their reliability and quality over time. Moreover, it suggests that public authorities have shown a consistent interest in exploiting the potential of satellites. Indeed, they have seen the services evolve throughout time, and have not only acted as pioneers in testing them, but have also provided useful feedback for their progressive improvement.

What motivates public authorities?

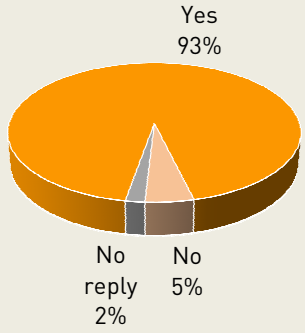
The enquired public authorities provided the following feedback when asked what motivated their decision to start using a satellite-based service: the need to improve an existing service or procedure, the urgency to save time and/or economic and human resources, the necessity to create a new service or procedure, as well as the obligation to comply with a policy or a regulation (Graph 2.3.).

The ability to respond to pre-existing needs, while improving current procedures or tools, has emerged as one of the main drivers behind the adoption of satellite services. Indeed, most respondents have declared that their decision to invest in satellite-based services was triggered by the need to partially or fully replace a previous system used to perform the same tasks. Less than half of respondents decided to use satellite applications to create a new service or procedure (Graph 2.4.).

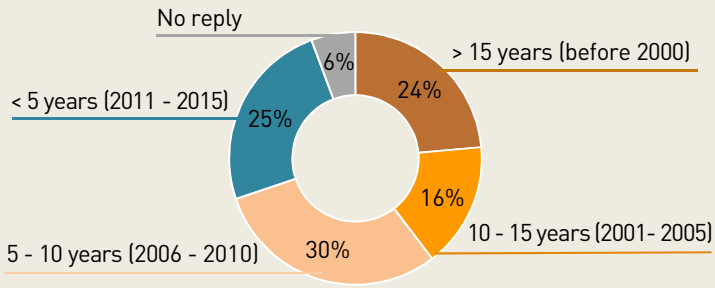
These figures confirm the results obtained from the preliminary case study analysis[26] (see Annex I). Respectively, public authorities look for satellite-based services which will allow them to perform their existing tasks more efficiently. Thus, in order to be competitive with other available technologies, satellite-based services should be conceived to respond to the current needs of public authorities. Furthermore, the services need to be adaptable to their established procedures.

[26] Eurisy, 2015, *supra* note 21.

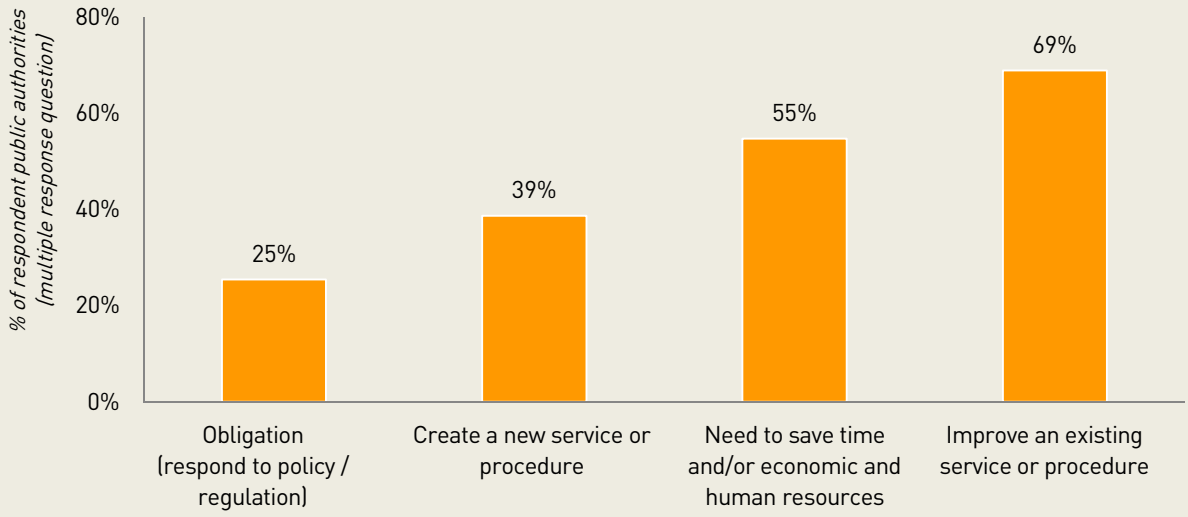
2.1. Satellite-based services still in use



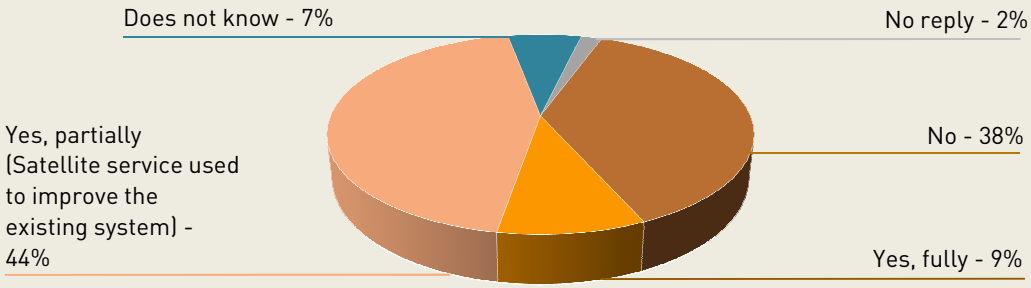
2.2. Start date of use of the satellite-based services



2.3. Drivers and motivations to start using satellite-based services



2.4. Satellite-based services used to replace previous systems to perform the same tasks



Which is the added value of satellite-based services as compared to other technologies?

Public authorities tend to choose the kind of technologies they procure according to performance expectations. Only 9% of respondents declared to have chosen a satellite-based service due to a mandatory condition of a funding scheme. Meanwhile, 44% considered that alternative technologies would have been less effective, and 39% replied that no other available technology would have responded to their needs.

Budget concerns clearly also play a role in orienting public authorities' procurement choices. As a result, 26% of respondents indicate that the satellite-based services adopted were less expensive than the other technological solutions considered to respond to the same needs (Graph 2.5.).

Which are the benefits reported by public administrations?

Only 25% of the public administrations included in the sample declared to have performed a formal quantitative assessment of the benefits of the satellite-based services they use. This rather low percentage highlights the need to further promote this kind of practices within the public sector.

Nevertheless, respondents were able to identify some quantitative and qualitative benefits deriving from the use of satellite-based services, such as the improvement of the services provided by the organisation or the ability to take better-informed decisions. Time management benefits were mentioned by more than half of respondents, followed by monetary savings (Graph 2.6.). However, a significant percentage of respondents was not able to quantify such savings (Graphs 2.7. and 2.8.).

Moreover, 43% of respondents declared that their experience inspired other public administrations, while 63% added that they share the satellite-based services/data with other public administrations or departments (Graph 2.9.).

Case study: The Central Command for Maritime Emergencies (Germany) relies on EO for oil spill detection

In 2006, the Central Command for Maritime Emergencies (CCME) participated in a consultation of the European Maritime Safety Agency (EMSA) on the possibility of using satellite remote sensing to detect oil spills in the sea.

The organisation actively participated together with private service providers, research and space institutions in the development of CleanSeaNet, a near real-time European satellite-based oil spill monitoring and vessel detection service, freely provided by EMSA to Member States.

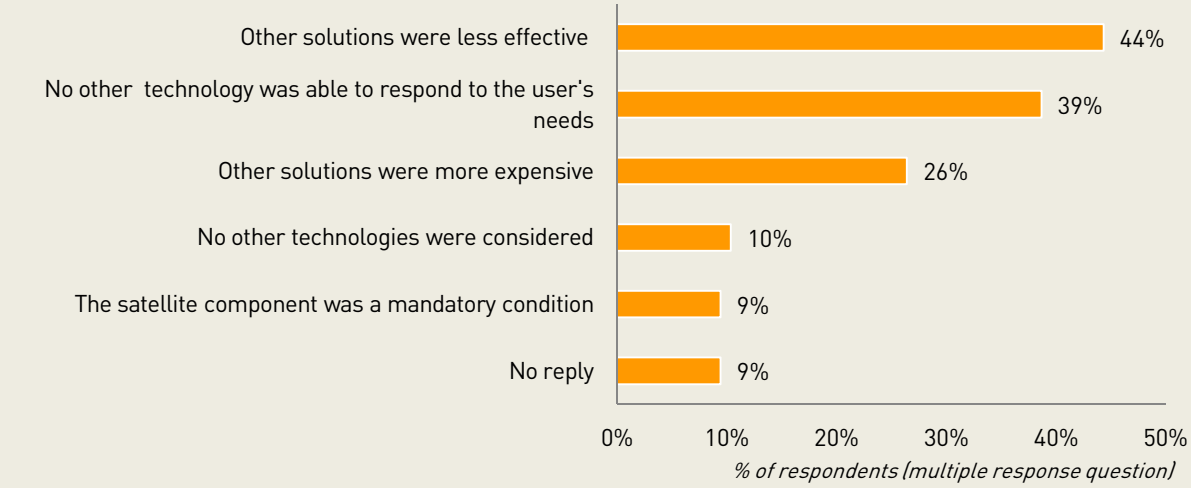
Since 2011, the CCME uses the service to spot and remove oil spills, as well as to identify potential polluters. Staff training sessions are regularly organised by EMSA for user public authorities.

Area of operation:	National
Sources of budget:	National public funds
Annual budget:	€10m - 50m in 2013
N° staff:	36 (regular staff)
Implementation framework:	Operational framework
User's implementation costs:	None
User's operational costs:	None in 2014 (human resources excluded)

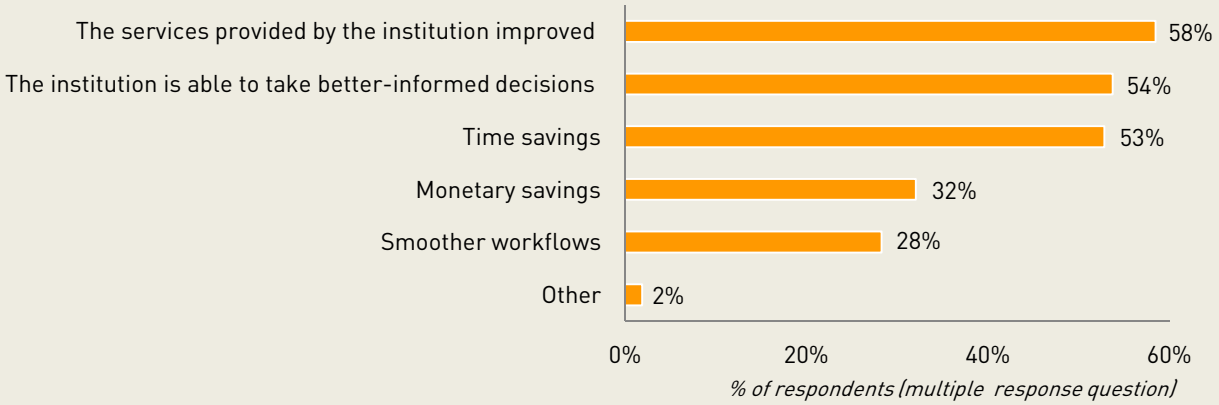
By addressing the issue of oil spills through a shared system among Member States, it was possible to reduce the costs of both building and operating the service.

Since the creation of the service, not only the amount but also the size of the detected oil spills has decreased.

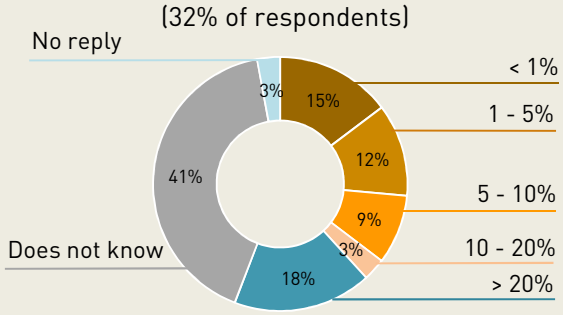
2.5. Reasons to prefer satellite-based services to other available technologies



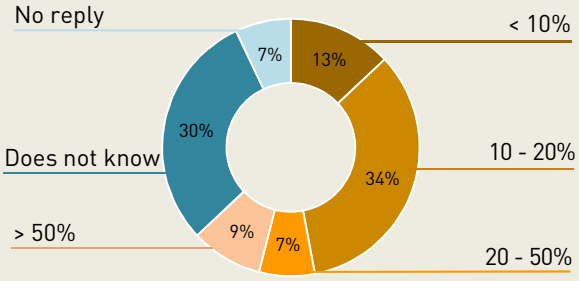
2.6. Benefits derived from the use of the services



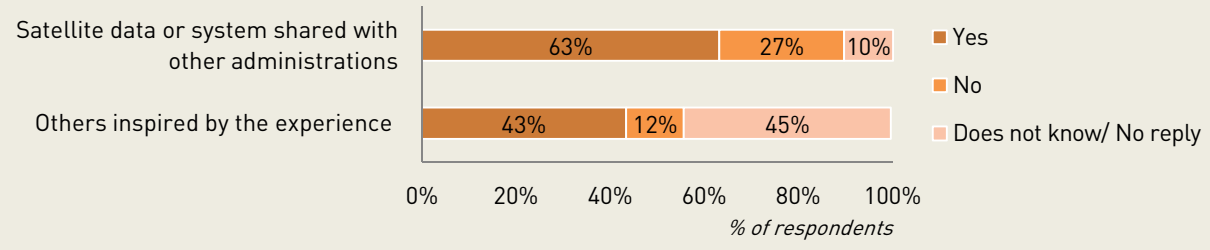
2.7. Monetary savings reported (32% of respondents)



2.8. Time savings reported (53% of respondents)



2.9. Other impacts of the satellite-based services



PUBLIC AUTHORITIES PROCURE SATELLITE-BASED SERVICES FROM PUBLIC AND PRIVATE ORGANISATIONS

How do public authorities start using satellite-based services?

40% of public administrations found that the satellite-based solutions they needed were already developed and ready to use. A lower, but similar percentage was instead in need of tailored solutions (Graph 3.1.).

A majority of the surveyed administrations adopted their satellite-based services within their regular operations. Nevertheless, a significant percentage also reported having adopted these services within the framework of a demonstration project (Graph 3.2.). This confirms that new services developed for demonstration purposes can actually result in operational long-term services.

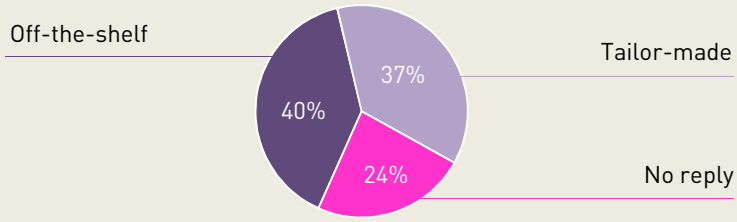
Public administrations report having decided to use these services mostly within their regular operations also when they adopted them more than 15 years ago (Graph 3.3.). This suggests that public administrations have been traditionally interested in the potential of satellite-based services and have actively participated to their testing and further improvement.

The data collected also indicate an increase in the percentage of organisations adopting satellite-based services after a demonstration project during the last five years (Graph 3.3.). This might be due to a higher availability of funds or trial opportunities. It might also depend from an increased level of awareness of public authorities, who are more willing to participate in demonstration projects than they were in the past.

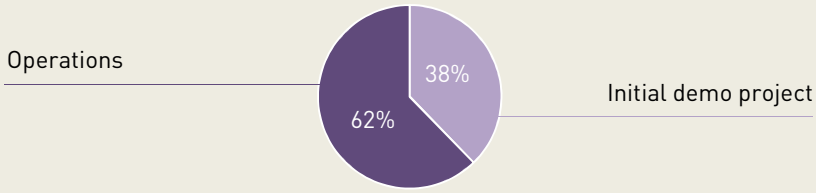
Although this trend does not seem to be statistically significant[27], national authorities seem to be the most involved in demonstration projects. Indeed, almost half of them report having adopted the satellite-based services after a trial, against a forth of the organisations working at the local level (Graph 3.4.).

[27] *P*-value: 0.197. More observations are needed to confirm this trend.

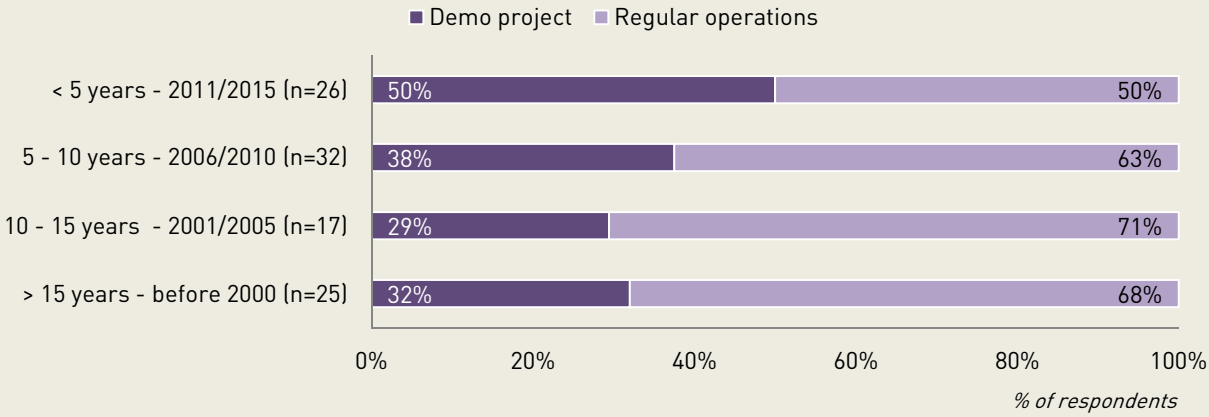
3.1. Acquisition of the satellite-based services



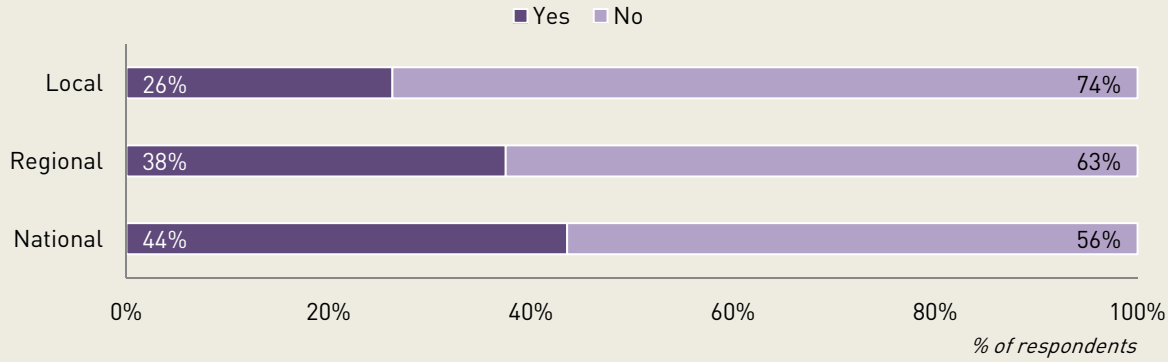
3.2. Implementation/adoption framework of the satellite-based services



3.3. Implementation/adoption framework according to start date of use of the satellite-based services
(Blanks excluded, N=100)



3.4. Adoption of satellite-based services falicitated by demonstration project according to organisations' level of authority



Who provides satellite-based services in the public sector?

Private companies alone provide satellite-based services to 25% of the surveyed public authorities. Only 16% of respondents access the services exclusively through international organisations. At the same time, for 9% of respondents the services were procured fully in-house.

37% of respondents have collaborated with more than one kind of service providers to acquire the satellite-based services described (Graph 3.5.).

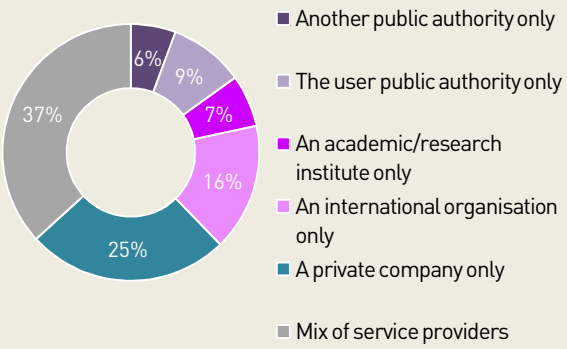
Overall, almost half of the users mentioned private companies among the suppliers of satellite-based services (Graph 3.6.). The private sector is gaining an increasingly relevant role in finding innovative uses for satellite applications and in making them available to civil society. Hence, initiatives to support private companies — and SMEs in particular — are expected to also positively impact public administrations.

32% of respondents collaborate with international organisations. These do not only offer platforms to establish multi-country and multi-level collaboration opportunities, but also figure among the main providers of satellite data and services. 25% of respondents work with research or academic institutes, which are extremely important in linking R&D activities to societal priorities.

As noted above, in some cases public authorities are not only users of satellite-based services, but also procurers. More specifically, in 17% of cases the satellite-based services are procured — fully or partially — from other public authorities, while one fourth of respondents are directly involved in their provision (Graph 3.6.).

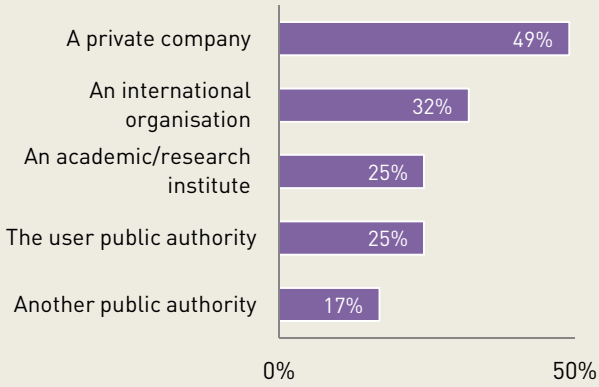
Private companies play a key role in delivering satellite-based services regardless of the procedures used to procure the services. They are the main providers whether the satellite-based services were adopted within demonstration projects or within regular operations (Graph 3.7.). The same is true when considering the process of acquisition of the services (off-the-shelf vs. tailor-made, Graph 3.8.).

3.5. Kind of service providers/suppliers (1)



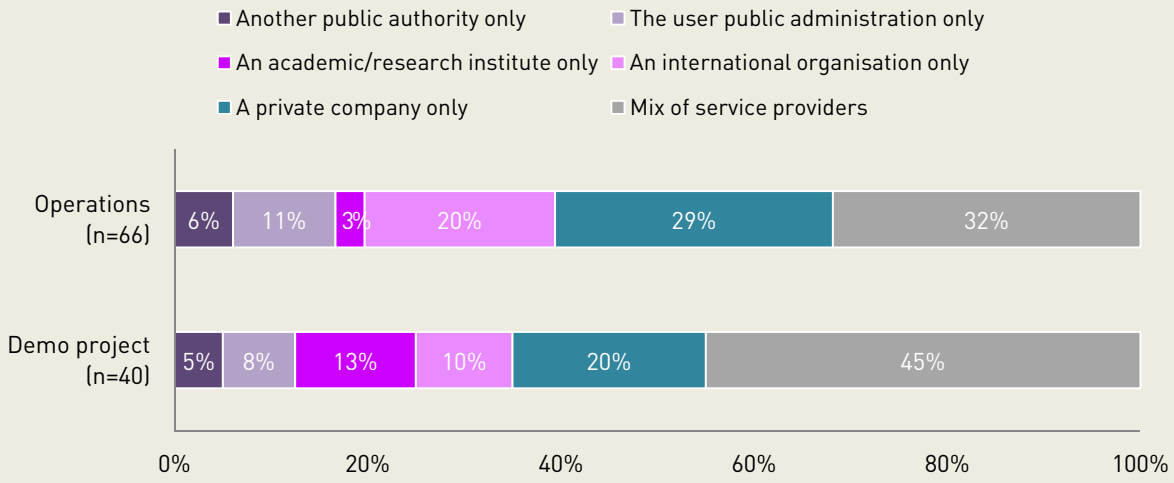
3.6. Kind of service providers/suppliers (2)

(Redistribution of organisations using more than one service provider among categories)



% of respondents (multiple response question)

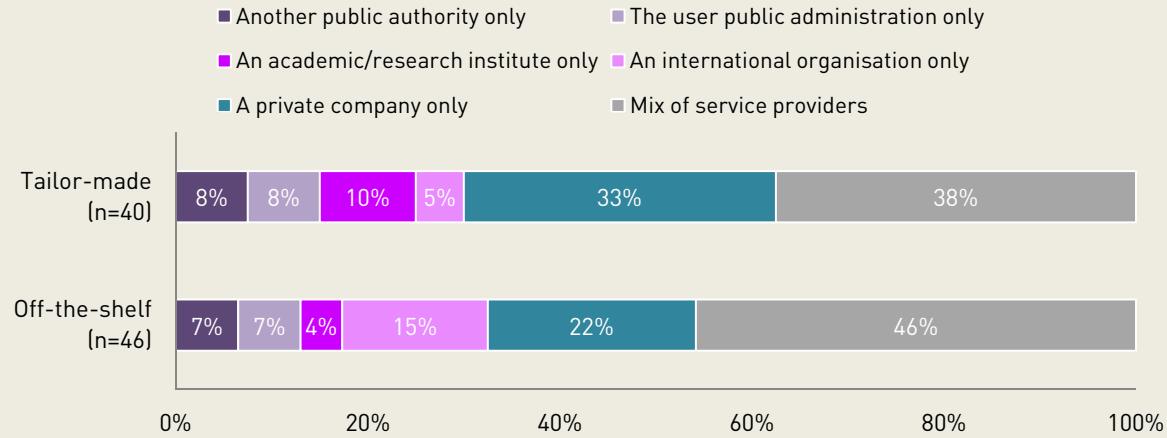
3.7. Kind of service providers according to implementation framework



% of respondents

3.8. Kind of service providers according to service acquisition

(Blanks excluded)



% of respondents

Are satellite-based services readily available to public administrations?

On the one hand, the results of the survey suggest that not only public administrations have become familiar with satellite-based services, but that many of the satellite-based solutions they need are already developed and ready to use. On the other, they show that there is still a need to further develop tailor-made solutions (Graph 3.1.).

While 65% of respondents that have adopted the services within their regular operations found them already available, only 31% of the services implemented within a demonstration project were off-the-shelf (Graph 3.9.)[28].

Drawing on the responses on the service acquisition process, a greater number of tailor-made services have been adopted by respondents during the last ten years (Graph 3.10.)[29].

Public authorities often seem to require additional adjustments for the services to comply with their specific needs. Thus, initiatives supporting public authorities — both technically and economically — to actively participate in the development of the satellite-based services, are to be encouraged.

These findings highlight the importance of a series of initiatives that foster innovation in public procurement practices, such as PPI (Public Procurement of Innovative Solutions) and PCP (Pre-Commercial Procurement). While PPI practices allow public administrations to access satellite-based services that have already reached the market, PCP remains fundamental to improve existing technologies. Furthermore, PCP is relevant in supporting the development of tailored services targeted to meet the needs and procedures of user public authorities.

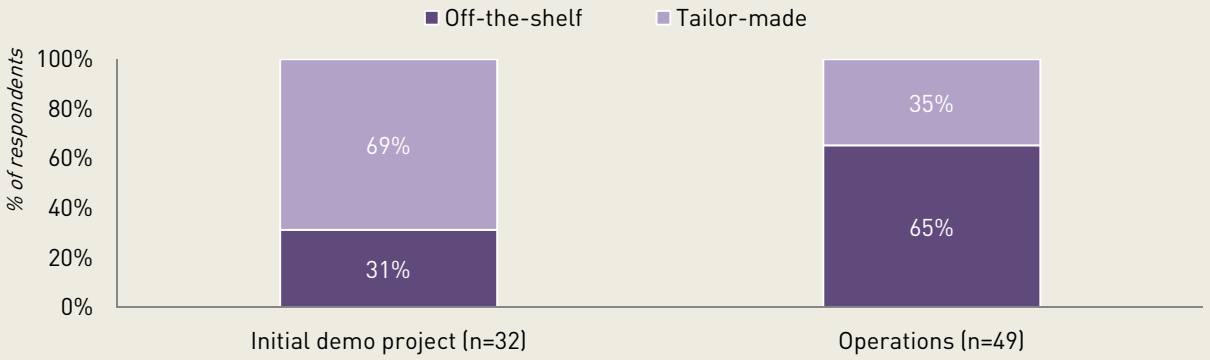
Within the Horizon 2020 EU Research and Innovation programme — the financial instrument implementing the Innovation Union, — €1.73 billion are dedicated to space research and development. Moreover, specific calls are being launched to support both PPI and PCP in public procurement to exploit EO data. In particular, two space working programmes are foreseen under Horizon 2020 between 2014 and 2020. The first call for projects under Horizon 2020 dedicated €167.57 million and 182.05 million to space research in 2014 and 2015 respectively. Additionally, €165.67 million are to be allocated to these projects in 2016 and 181.40 million in 2017[30].

[28] Demo projects (n=32): 31% Off-the-shelf services; Operations (n=49): 65% Off-the-shelf services. *P*-value: 0.003.

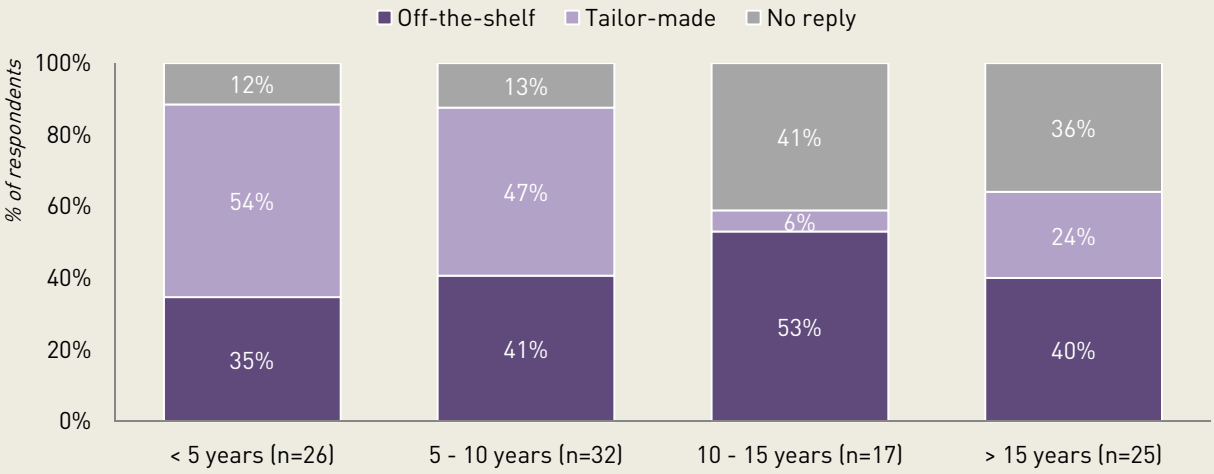
[29] Off-the-shelf services (n=41): 54% < 10 years, versus Tailor made services (n=36): 81% < 10 years. *P*-value: 0.013.

[30] To know more about Horizon 2020 – Space Work Programmes consult: www.ec.europa.eu/programmes/horizon2020/en/h2020-section/space

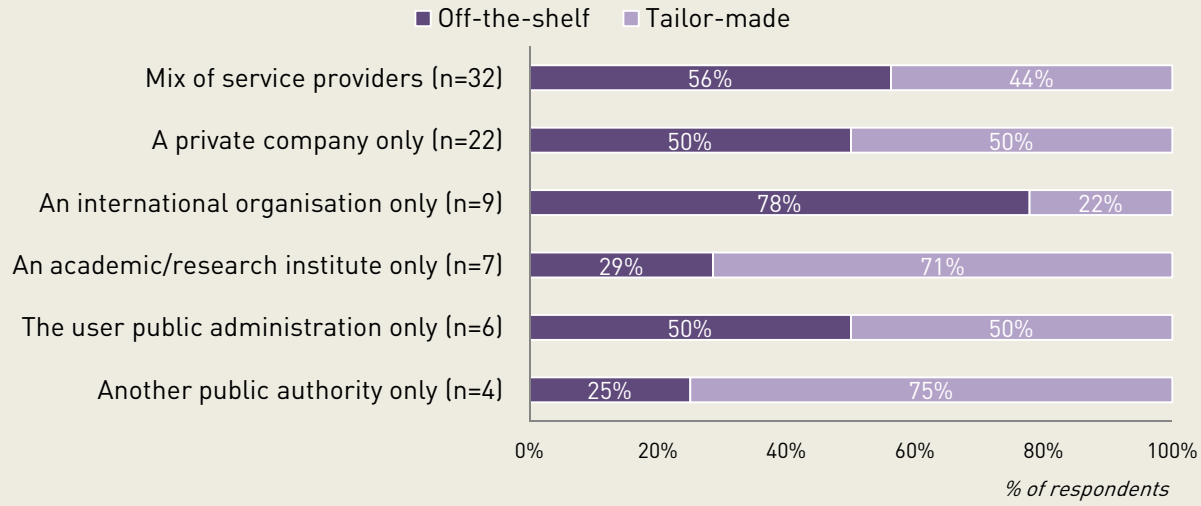
3.9. Service acquisition according to implementation framework
(Blanks excluded, N=81)



3.10. Service acquisition according to start date of use of satellite-based services
(No replies on start date of use excluded, N=100)



3.11. Service acquisition according to kind of service providers/ suppliers
(No replies excluded)



SATELLITE-BASED SERVICES ARE AFFORDABLE FOR PUBLIC AUTHORITIES

How expensive is it to use satellite-based services?

About 75% of respondents were willing or able to share information on the adoption, implementation and operational costs attributed to the satellite-based services they use.

According to the results, public authorities invest a small percentage of their budgets to use satellite-based services.

Implementation costs represented less than 5% of the annual budget for 61% of respondents, while operational costs account for less than 5% of the budget for 73% of them (Graph 4.1.).

Only 24 out of 106 respondents reported to have encountered economic challenges to first adopt or implement the satellite-based services used (Graph 5.2.).

Case study: The City of Diemen (The Netherlands) manages soil resilience with the support of satellite imagery

In Diemen soil can sink up to two centimetres per year, forcing the municipality to heighten the entire public space about once every twenty years.

The city's Department of Infrastructure was inspired by the experience of Italian scientists who used EO to monitor soil movements after the earthquake in L'Aquila.

The Department identified a local company which could provide the service, and in 2011 acquired a city-wide deformation map based on satellite imagery.

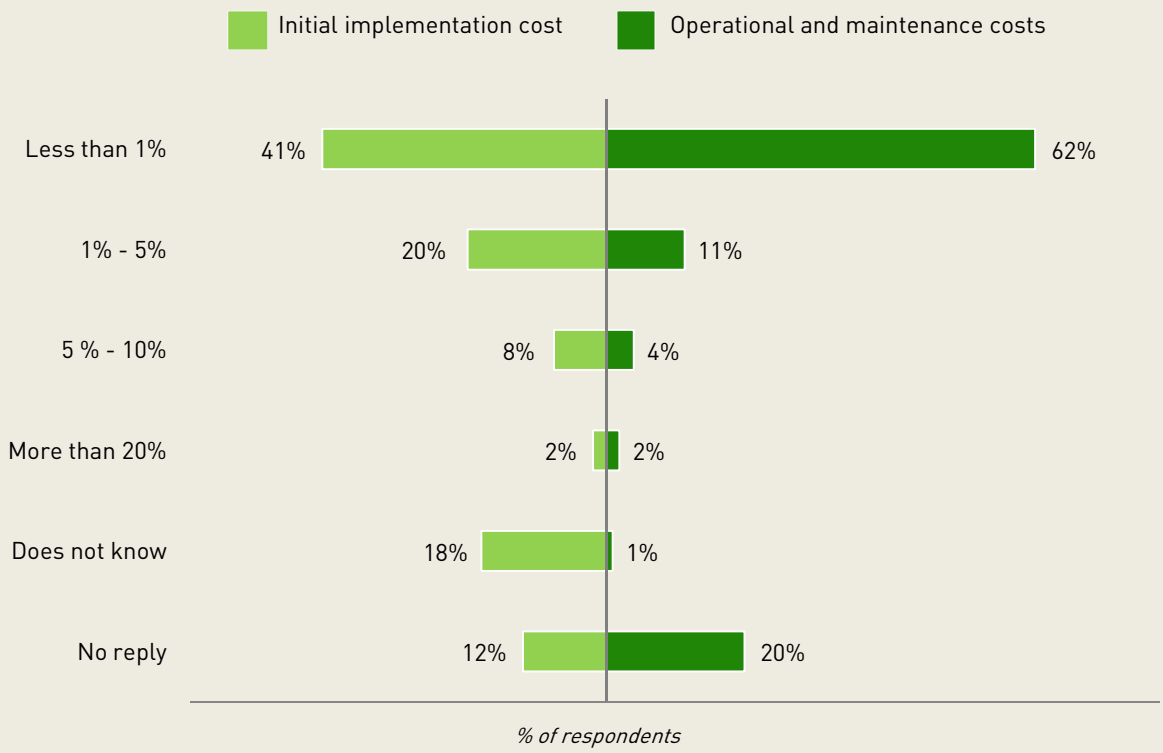
The map shows the resilience rate of the soil in specific locations, enabling the organisation to prioritise maintenance cycles with no or little need for ground measurements.

Area of operation:	Local
Sources of budget:	Local and national public funds
Annual budget for infrastructure maintenance:	Approx. €4m in 2014
N° staff:	60
Implementation framework:	Operations
User's implementation costs:	0.25% of annual budget for maintenance works in 2011
User's operational costs:	None in 2014

The map cost 0.25% of the organisation's annual budget for maintenance of roads, sewers, and other infrastructure in 2011. Its use does not entail any costs, excluding those associated with human resources and concrete infrastructure maintenance works. It will need to be updated with new satellite data every ten years.

The costs to assess soil resilience with ground measurements would be ten times those of the satellite-based deformation map.

4.1. Costs of the satellite-based services as a share of the organisations' annual budget



National authorities faced lower relative implementation costs than organisations at the regional and local levels, possibly due to their higher absolute budgets (Graph 4.2.).

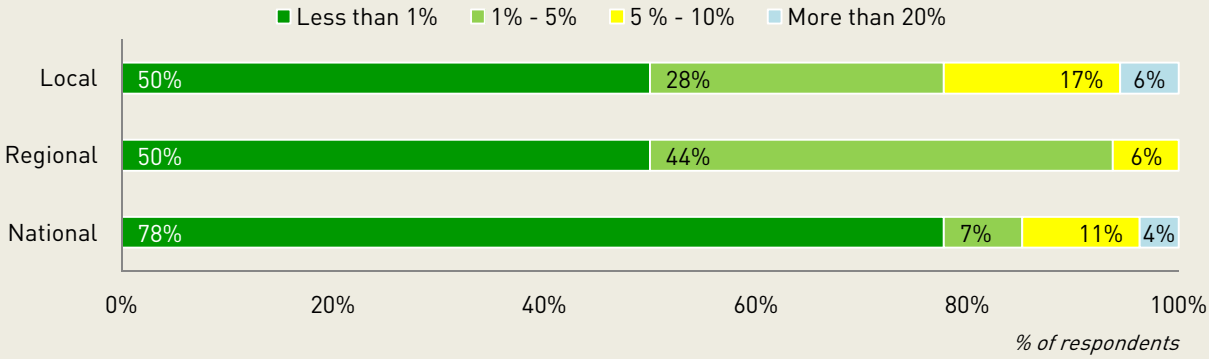
A closer look at implementation costs shows a decreasing trend over time. 45% of the organisations which started using the services more than 10 years ago report implementation costs of less than 1% of their annual budget. This percentage rises to 67% among respondents who adopted the service within the last 10 years[31] (Graph 4.4.).

This trend is not observed for the operational costs. Both those who started using satellite-based services more or less than ten years ago report mostly costs for less than 1% of their annual budget[32] (Graph 4.4.).

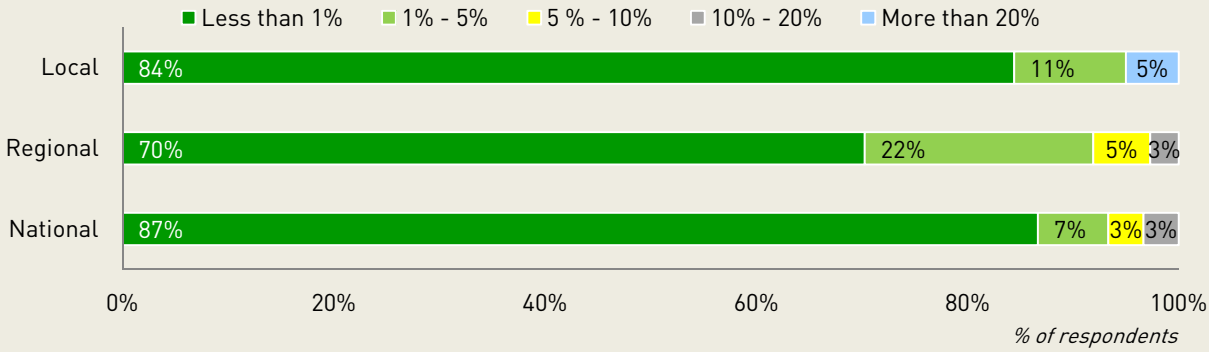
The decrease in the investments necessary to adopt and operate satellite-based services could be due to the advances made towards faster data exploitation. Also, the relative small costs reported might be partially induced by the fact that various financial mechanisms have been put in place to support public administrations.

[31] 45% (n=29) versus 67% (n=43) reported costs lower than 1%, *p*-value: 0.056.
[32] 76% (n=34) versus 79% (n=48) reported costs lower than 1%, *p*-value: 0.771.

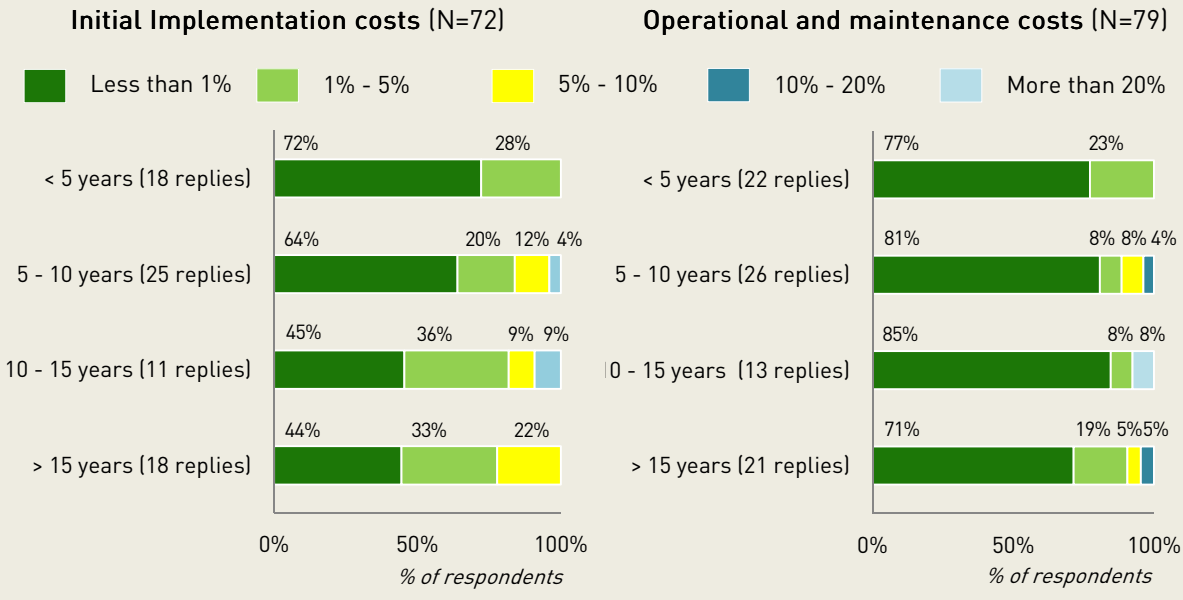
4.2. Initial level of investment as a share of organisations' annual budget according to level of authority
(Blanks excluded, N=74)



4.3. Operational and maintenance costs of the satellite-based services as a share of organisations' annual budget according to level of authority
(Blanks excluded, N=85)



4.4. Costs of the satellite-based services as a share of the organisations' annual budget according to the start date of use
(Blanks excluded)



How did public authorities finance their satellite-based services?

Half respondents relied on external funds to fully or partially cover the initial implementation costs for the services (Graph 4.5.).

Considering the type of external funds used to first adopt satellite-based services, 45% of respondents declared to have relied on national public funds. 39% received economic support from international organisations. This high degree of support confirms the engagement of such entities in facilitating the uptake of satellite-based services in the public sector.

In addition, 23% of respondents used local public funds and 5% benefitted from funds made available by universities or research centres. By making research results available to public entities, the aforementioned organisations also play an important role in promoting the use of satellite-based services (Graph 4.6.).

Case study: The Environment Agency England (UK) uses satellite imagery to manage floods

Traditionally, the Environment Agency (EA) has been relying on aerial imagery or ground measurements to assess flood extension, using aircraft and specialists on the field.

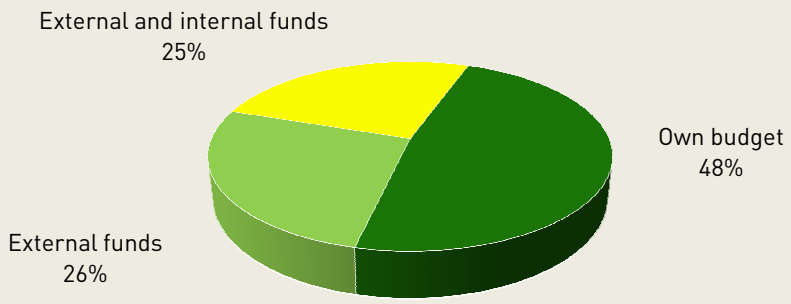
In 2007, the EA decided to acquire satellite imagery to better monitor water levels. For forecasting activities, the Agency acquires satellite imagery in collaboration with the Met Office. For the assessment and recovery phases, it profits from the EU Copernicus data and the International Charter on Space and Major Disasters.

Area of operation:	National, regional and local (England)
Sources of budget:	National public funds Private funds
Annual budget:	> €100m in 2014
N° staff:	10,000 (3,000 for flood-related activities)
Implementation framework:	Operations
User's operational costs:	€12,788 — one-off cost in 2013 and 2014

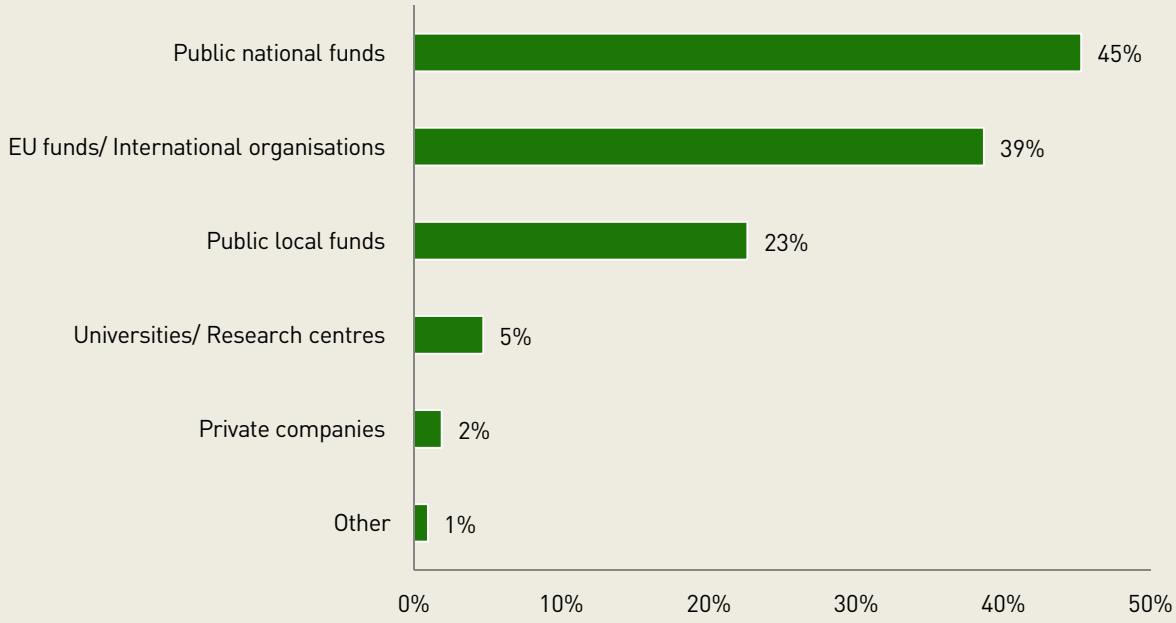
The only expense of the EA is the cost of the images. Since those provided by the International Charter are free of charge, the additional imagery purchased in 2014 amounted to a cost of €12,785 (£10,000).

During the floods in England in 2013 and 2014, the EA was able to produce and disseminate cartography of the flooded area within 24 to 48 hours after the activation of the Charter.

4.5. Initial funding of the satellite-based services



4.6. Kind of external funds used for the initial adoption of the satellite-based services
(Blanks excluded)



% of respondents (multiple response question)

The provision of free data or services can also contribute to the accessibility of satellite-based services. Indeed, 37% of respondents reported to have benefitted from free satellite-based data. 23% use satellite-based services free of charge. In addition, 21% of respondents also declared that the initial implementation of the satellite-based services was provided to them for free (Graph 4.7.).

A vast majority of respondents collaborating with more than one kind of service providers receives data or expertise free of charge. This is also the case for respondents who procured their satellite-based services in-house or who are relying only on international organisations, research institutes and other public administrations.

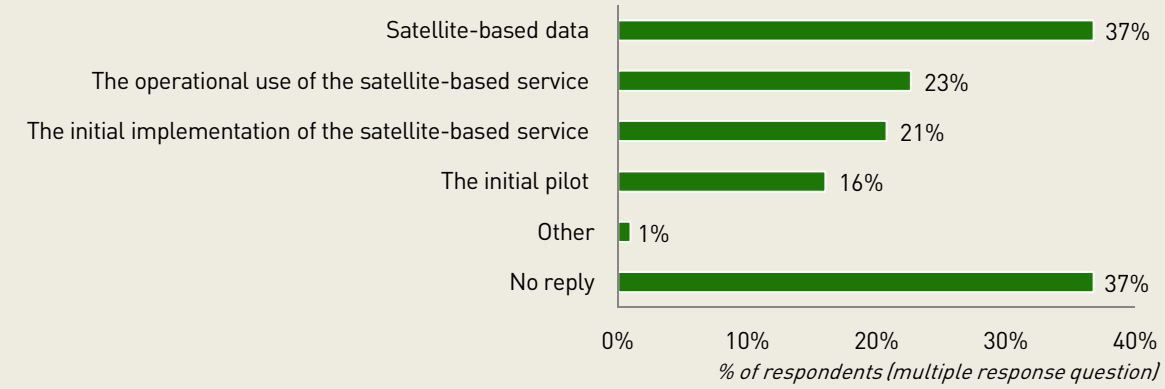
A significant difference is observed between public authorities procuring the services from private companies only and all others. Only 41% of those relying solely on private companies benefitted from free data or support, opposed to 73% of all other respondents (Graph 4.8.)[33].

Not surprisingly, 80% of those adopting satellite-based services within a demonstration project report the provision of data or expertise free of charge, against 53% of respondents who started using these services within their regular operations (Graph 4.9.)[34].

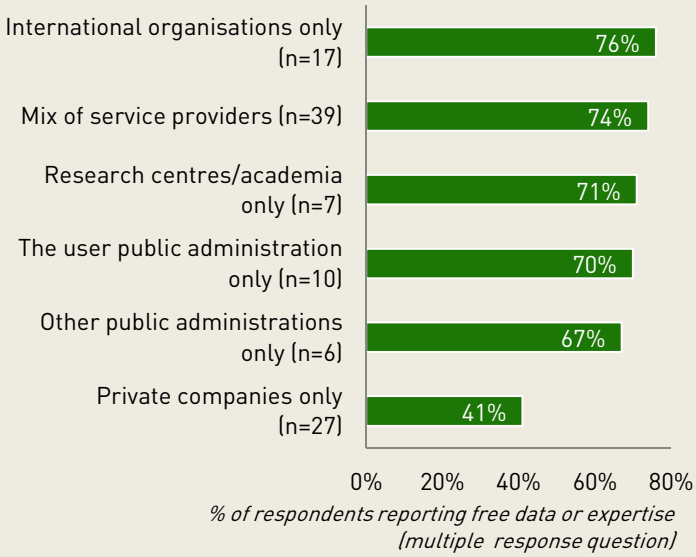
The prevision of free data or expertise is reported by most public administrations at all levels. National authorities seem to be better positioned to receive such kind of support than respondents at the regional and local levels (Graph 4.10.). However, this trend is not confirmed by the statistical test applied[35].

[33] 41% (n=27) versus 73% (n=79), *p*-value: 0.002.
[34] 80% (n=40) versus 53% (n=66), *p*-value: 0.005.
[35] Organisations reporting free data or expertise at the national level (n=39): 72% and at the regional level (n=48): 60%, versus organisations reporting free data or expertise at the local level (n=19): 53%. *P*-value: 0.314.

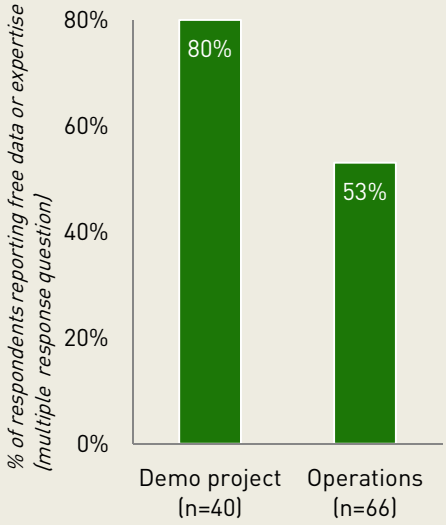
4.7. Data or expertise provided free of charge



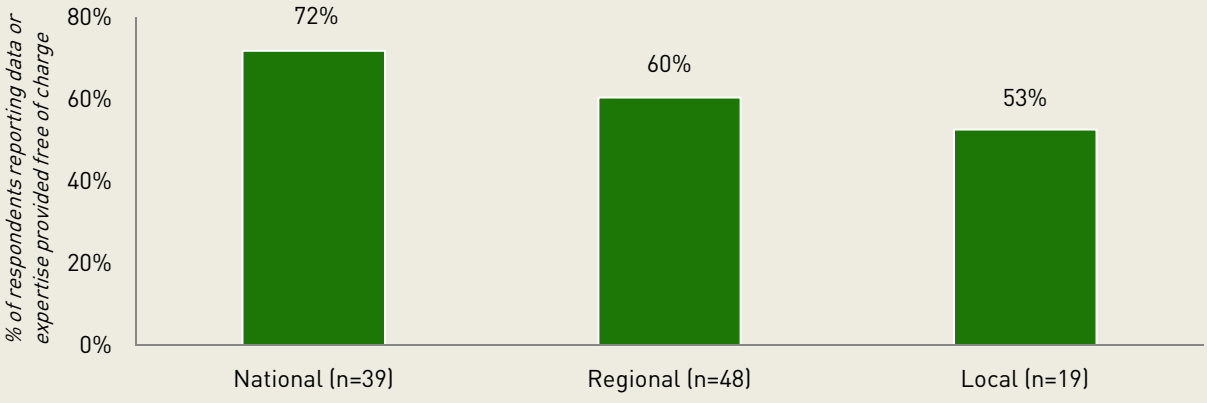
4.8. Data or expertise provided free of charge according to service providers



4.9. Data or expertise provided free of charge according to implementation framework



4.10. Organisations reporting data or expertise provided free of charge according to level of authority



What influences the cost of satellite-based services?

The cost of adopting and using satellite-based services varies according to the complexity of the services required.

Both for the initial implementation costs to set-up the services[36] and the yearly operational costs[37], no dependencies between these costs and the procedure of acquisition of the services were observed — services available off-the-shelf versus tailor-made (Graph 4.11.).

[36] Initial investments: Off-the-shelf services (n=34): 53% report investments for less than 1% of their annual budget, versus Tailor-made services (n=28): 64% report investments for less than 1% of their annual budget. *P*-value: 0.367.

[37] Operational costs: Off-the-shelf services (n=36): 71% report operational costs for less than 1% of their annual budget, versus Tailor-made services (n=33): 83% report operational costs for less than 1% of their annual budget. *P*-value: 0.286.

The data collected so far does not show differences in the initial implementation[38] and operational[39] costs according to the type of satellite services used, i.e. satellite navigation, Earth observation or satellite communication. The organisations using all three satellite applications seem to have relatively smaller expenses, although this might be due to their higher absolute budgets (Graphs 4.12. and 4.13.).

More replies to the survey will be needed to understand if the type of satellite applications and the sectors of use play a significant role in determining the costs of the services.

[38] Organisations using services based on EO (n=46) reporting investment costs for less than 1%: 61%, versus organisations not using EO (n=28) reporting investment cost for less than 1%: 54% (no replies excluded). *P*-value: 0.537.

[39] Organisations using services based on EO (n=52) reporting operational costs for less than 1%: 78%, versus organisations not using EO (n=33) reporting operational costs for less than 1%: 75% (no replies excluded). *P*-value: 0.568.

Case study: The Traffic and Telematics Division of the Flemish Agency for Roads and Traffic (Belgium) uses satellite navigation to optimise transit of regional trams

The Traffic and Telematics Division of the Flemish Agency for Roads and Traffic used a system of cables and physical loops to ensure priority in traffic for the trams and buses of the Flemish public transport company.

The management of this system was outsourced to a local private company. In 2008, the company proposed to test a system of virtual loops — supported by satellite navigation and short range radio signals — on the regional coastal tramway.

The Sat Nav solution was first tested on few trams and traffic lights, and then extended to the whole coastal tramway network between 2011 and 2013.

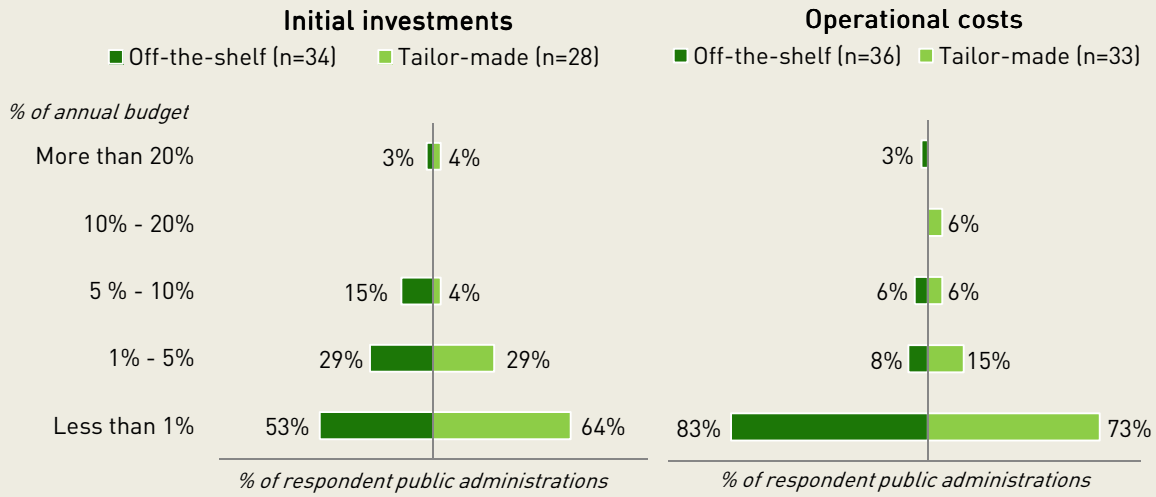
Special training was needed for the staff of the Agency and the provincial operators to start using the new system.

Area of operation:	Regional
Sources of budget:	Regional public funds
Annual budget:	€600m in 2014 (Agency)
Annual budget to reduce public transport congestion:	€18m in 2014
N° staff:	1,500 (Agency)
Implementation framework:	Operations
User's implementation costs:	0.2% of annual budget in 2014
User's operational costs:	< 1% of annual budget in 2014

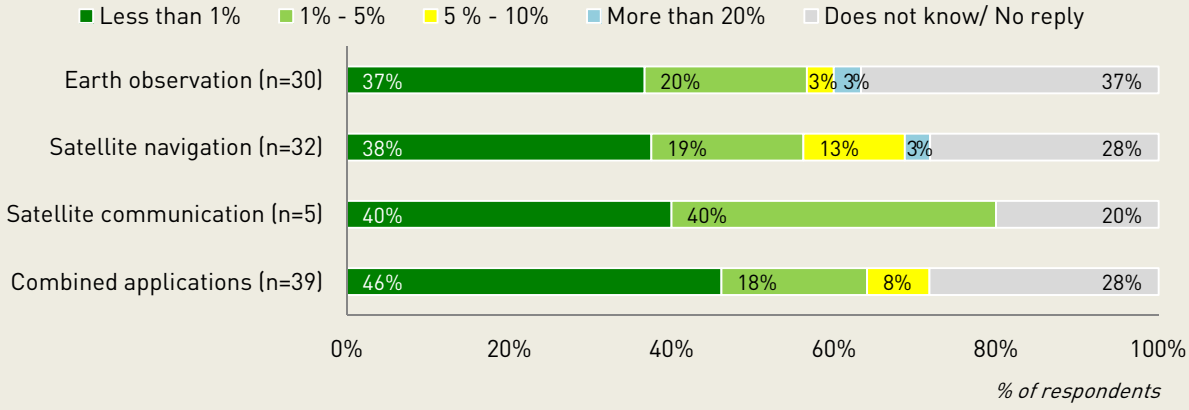
However, no organisational changes were necessary and the staff of the Agency did not resist innovation. Afterwards, the system has been operationally used with no further need for training or external assistance.

A first assessment of the new system estimates savings of about €140,000 per year, resulting from reduced annual maintenance costs. Time savings have been also documented, as well as an improved quality of the information available and of the services offered to the public.

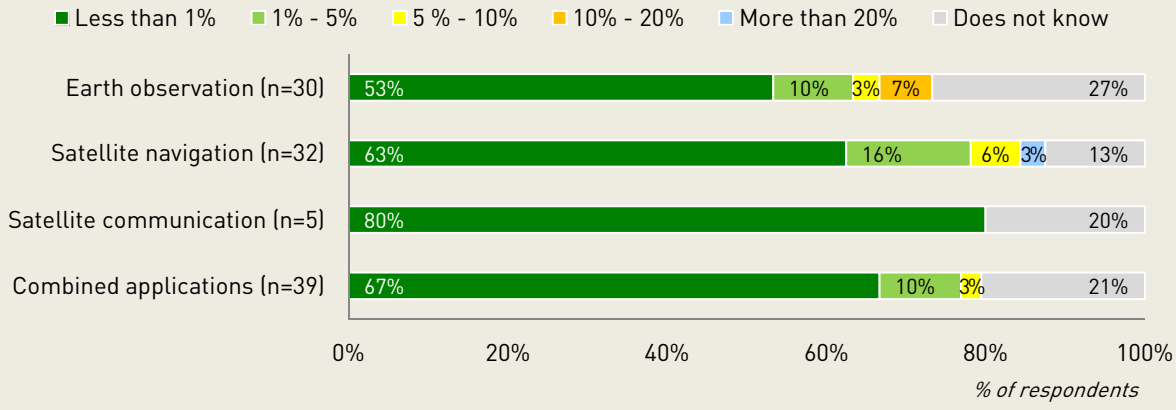
4.11. Costs of the satellite-based services as a share of public administrations' annual budget according to acquisition procedure
(No replies excluded)



4.12. Initial level of investments as a share of public administrations' annual budget according to type of satellite applications used



4.13. Operational and maintenance costs as a share of public administrations' annual budget according to type of satellite applications used



PUBLIC ADMINISTRATIONS STILL FACE TECHNICAL CHALLENGES TO USE SATELLITE-BASED SERVICES

Which are the challenges to adopt satellite-based services?

81% of the surveyed public authorities reported to have faced challenges in first adopting or implementing their satellite-based services (Graph 5.1.).

Technical and organisational challenges were mentioned by more than half of respondents (Graph 5.2.).

Proportionally, national authorities report more technical, economic, organisational, and administrative challenges to first adopt satellite services. This could be the case because, in comparison to regional or local authorities, their organisational structure and the services they use are more complex (Graph 5.3.).

Case study: Satellite imagery supports solar energy production in the sustainable city quarter Lyon Confluence (France)

The Local Public Society "Lyon Confluence" was created in 1999 by Grand-Lyon to manage the Lyon Confluence initiative, a major urban project of requalification of an area of 150 hectares near Lyon's historic centre.

Funded under the FP6 Concerto initiative, the project aimed at building a sustainable model neighbourhood relying on green energy.

Thus, 11 PV systems were installed on rooftops in the neighbourhood. The assessment of the energy potential and the implementation of a PV monitoring tool were entrusted to the local association Hespul.

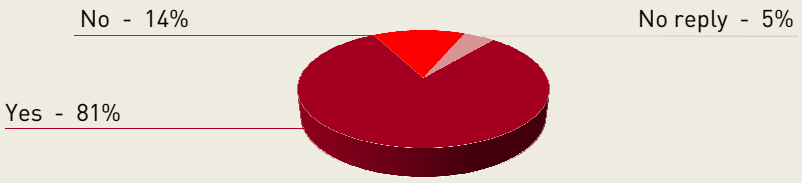
Area of operation:	Local
Sources of budget:	Local public funds and EU funds
Annual budget:	€15.7m in 2012
N° staff:	23 (regular staff)
Implementation framework:	Demonstration project (6th European Research Framework Programme -FP6)
User's implementation costs:	<1% of annual budget in 2009
User's operational costs:	€1,500 in 2013

Based on data extracted from satellite imagery, Hespul analysed solar radiations to assess the potential energy output of the panels. Furthermore, the association monitors the proper functioning of the installations by comparing the energy potential of a solar panel with its actual output. This comparison is performed every hour; in case of difference, an alert is sent so that the faulty PV system can be repaired as soon as possible.

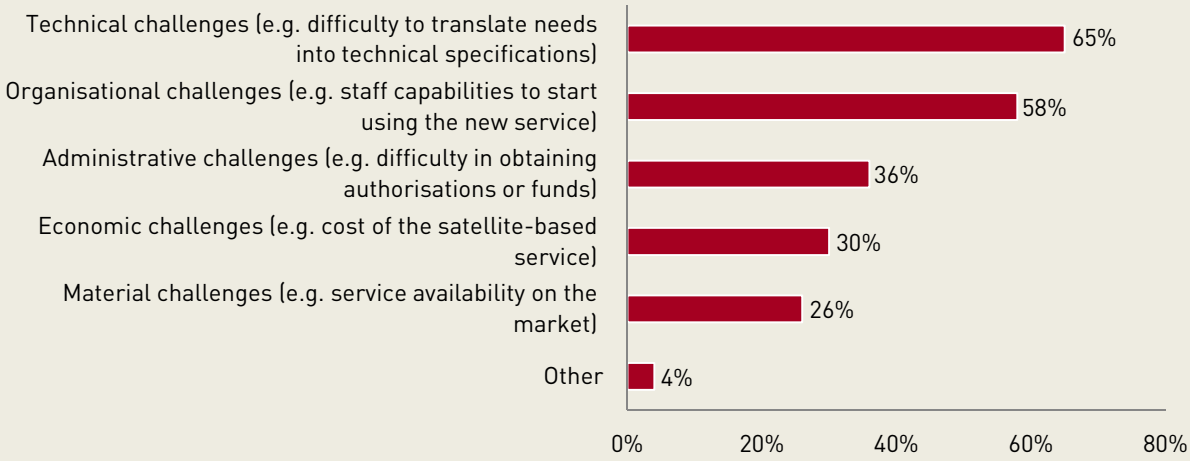
Hespul estimates that to operate and maintain the installations without the satellite-based solution, the cost would be almost double of what it is now. In addition, the team would require at least one additional hour of work per day on each installation.

The satellite-based solution costs 1% of the value of the energy annually produced: 250 kw per hour, for an annual production of approximately €125,000.

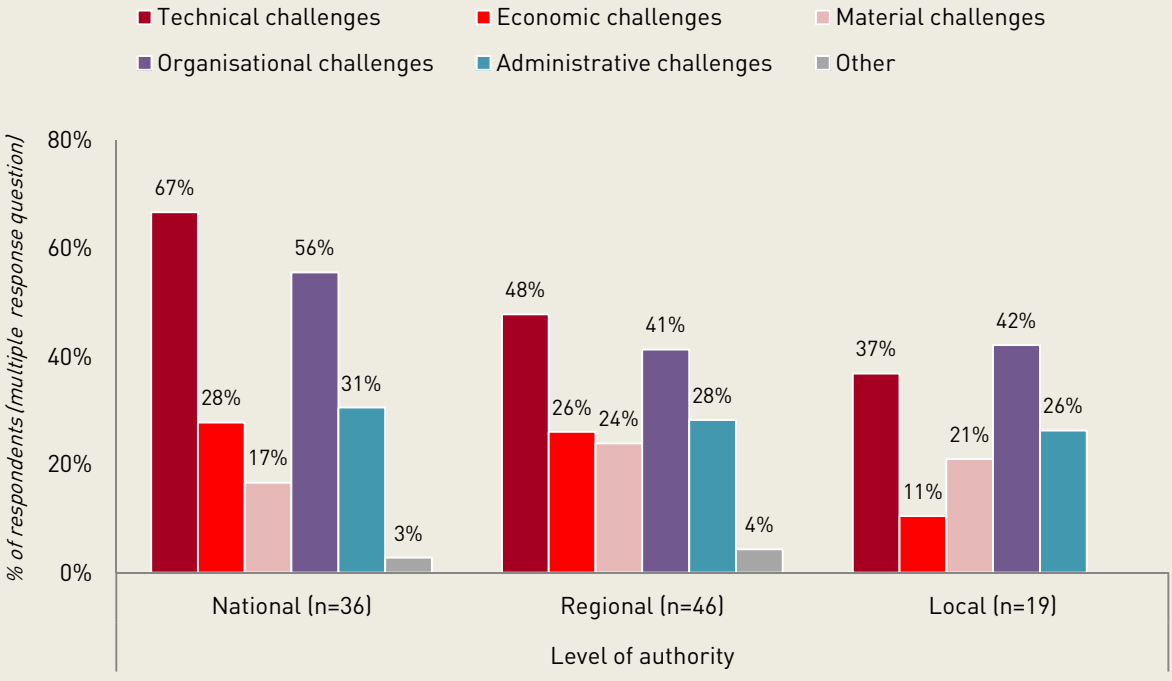
5.1. Implementation challenges faced



5.2. Kind of challenges faced to first adopt satellite-based services
(N=81)



5.3. Kind of implementation challenges faced according to organisations' level of authority
(Blanks excluded, N=81)



What are the challenges to use these services?

75% of respondents have also reported challenges to operationally use their satellite-based services (Graph 5.4.). These challenges are mainly of technical and organisational nature (Graph 5.5.).

Compared to regional or local authorities, national-level entities are proportionally reporting more technical, economic and organisational challenges in operating and maintaining the satellite-based services used (Graph 5.6.).

Case study: Natural Resources Wales (UK) relies on EO to map and monitor natural habitats

To comply with the EU Habitat Directive, the Welsh government needed a means to acquire spatially accurate, up-to-date information on landscape changes and on the habitats affected.

This task was carried out by the Countryside Council for Wales (CCW) and as from 2013 it is responsibility of the newly-formed Natural Resources Wales (NRW).

To comply with its mandate, the CCW relied on a map based on field surveys and aerial photography. However, the use of these methods proved very costly.

In 2004, with the assistance of the British National Space Centre (BNSC), the CCW decided to use remote sensing to map habitats.

At the time, the service did not exist and had to be specially developed. In addition to co-financing the feasibility study, the BNSC also contracted Environment Systems Ltd as a service provider on behalf of the CCW.

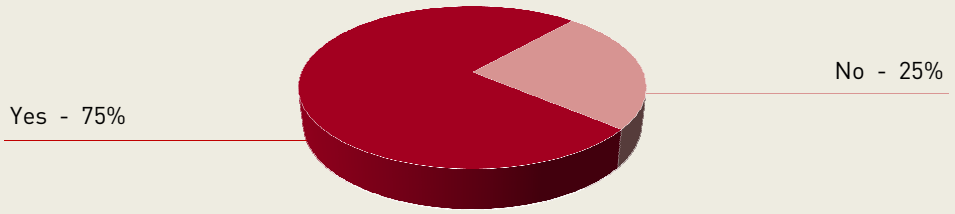
Area of operation:	National (Wales)
Sources of budget:	National public funds
Annual budget:	€226,239,000 in 2014
N° staff:	2,000
Implementation framework:	Demonstration project (Government Information from the Space Sector — GIFTSS programme, of the British National Space Centre — now UK SA)
User's implementation costs:	Own budget and external funds €894,441 from 2004 to 2012 › 20% of CCW's annual budget in 2004
User's operational costs:	€20k - 50k in 2014* ‹ 10% of NRW's budget for habitat monitoring* *Estimated figures, the actual cost will depend on the organisation of the NRW and the availability and cost of Sentinel imagery.

The CCW participated in the design and led the uptake of the satellite-based solution. The solution was developed in four distinct phases between 2004 and 2012, when a first up-to-date habitat map was released.

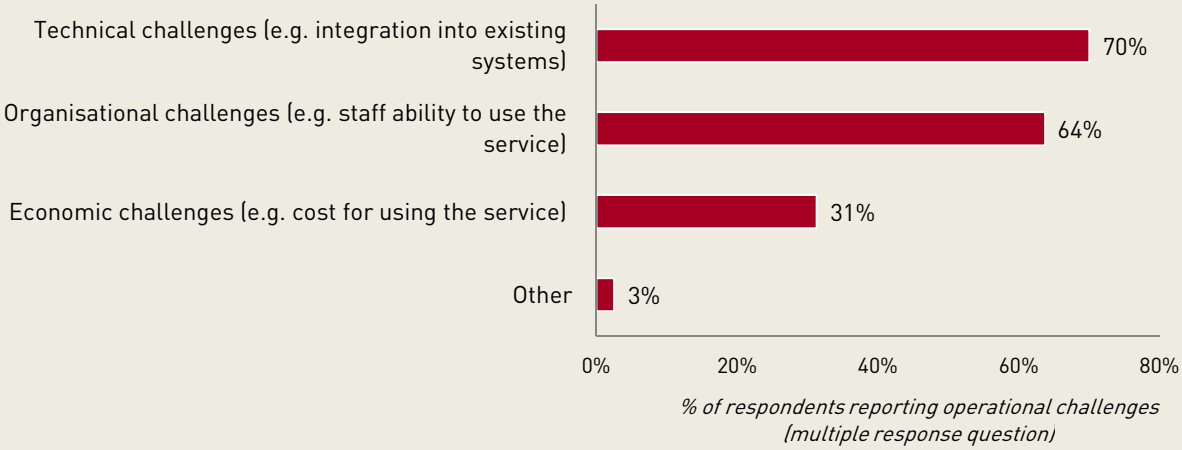
The satellite-based cartography allows for the identification of possible corridors between protected sites, which enable species to migrate safely. The personnel in CCW's regional offices used the maps to study the possible landscape impact of buildings and other public projects.

The CCW was able to develop the methodology, to produce the survey and to perform two partial updates at less than a forth of the cost of the previous map.

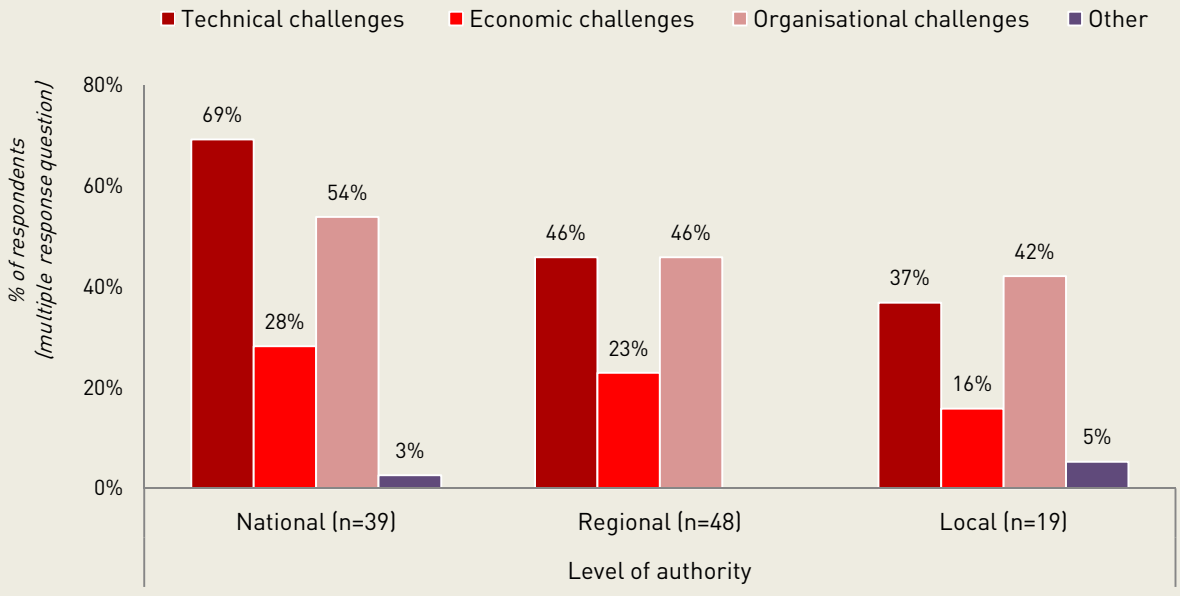
5.4. Operational challenges faced to use and maintain satellite-based services



5.5. Kind of challenges faced to operate and maintain satellite-based services (N=80)



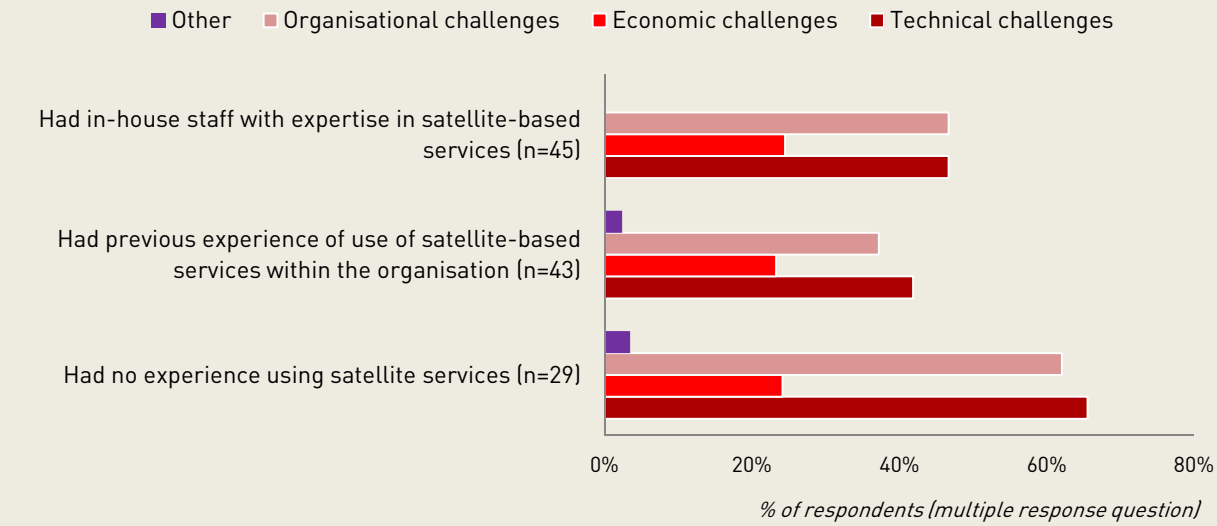
5.6. Kind of operational challenges faced according to organisations' level of authority



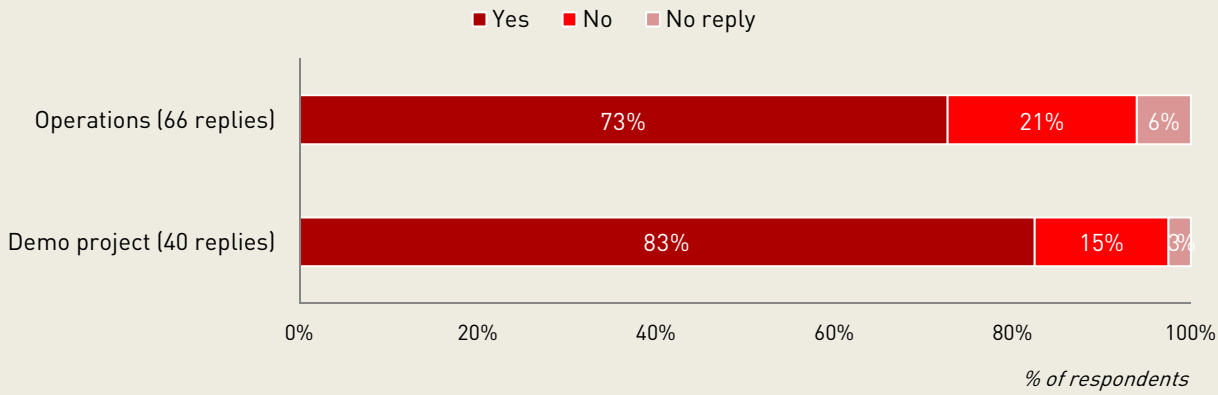
Not surprisingly, organisations with no previous experience with satellite-based services report more technical and organisational challenges to operationally use them than other experienced users. Nevertheless, also the organisations who could count on previous knowledge of these technologies still report difficulties to use them (Graph 5.7.).

Implementation and operational challenges are mentioned by the great majority of respondents, regardless of the implementation framework of the satellite-based services used (demonstration project vs. regular operations, see Graphs 5.8. and 5.9.).

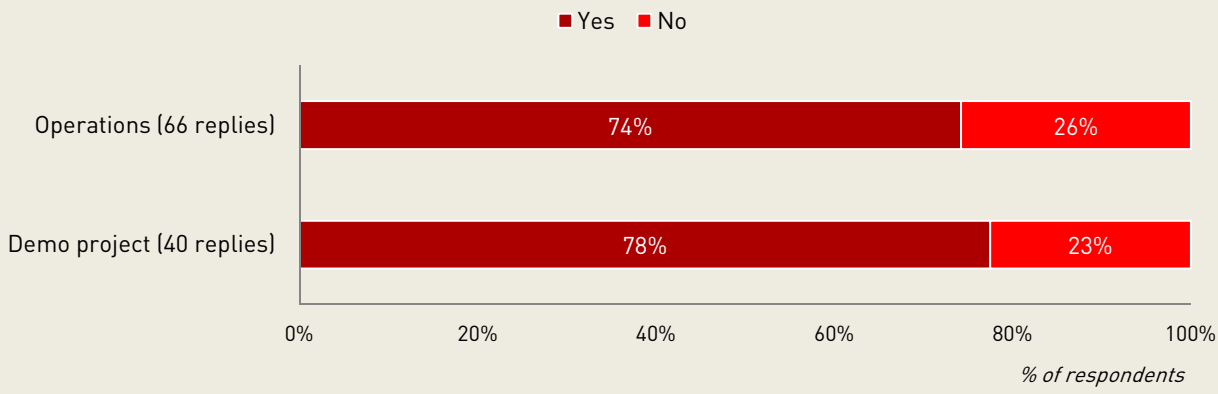
5.7. Operational challenges faced according to previous experience with satellite-based services
(Blanks excluded)



5.8. Implementation challenges according to implementation framework



5.9. Operational challenges according to implementation framework



How did public administrations overcome the challenges faced to adopt and use satellite-based services?

To tackle these challenges, a large majority of public authorities trained their staff. Only a small part of the sample moved on to hire consultants or new staff. One fifth benefitted from external free support. Only 9% of respondents declared that the challenges had not yet been solved (Graph 5.10.).

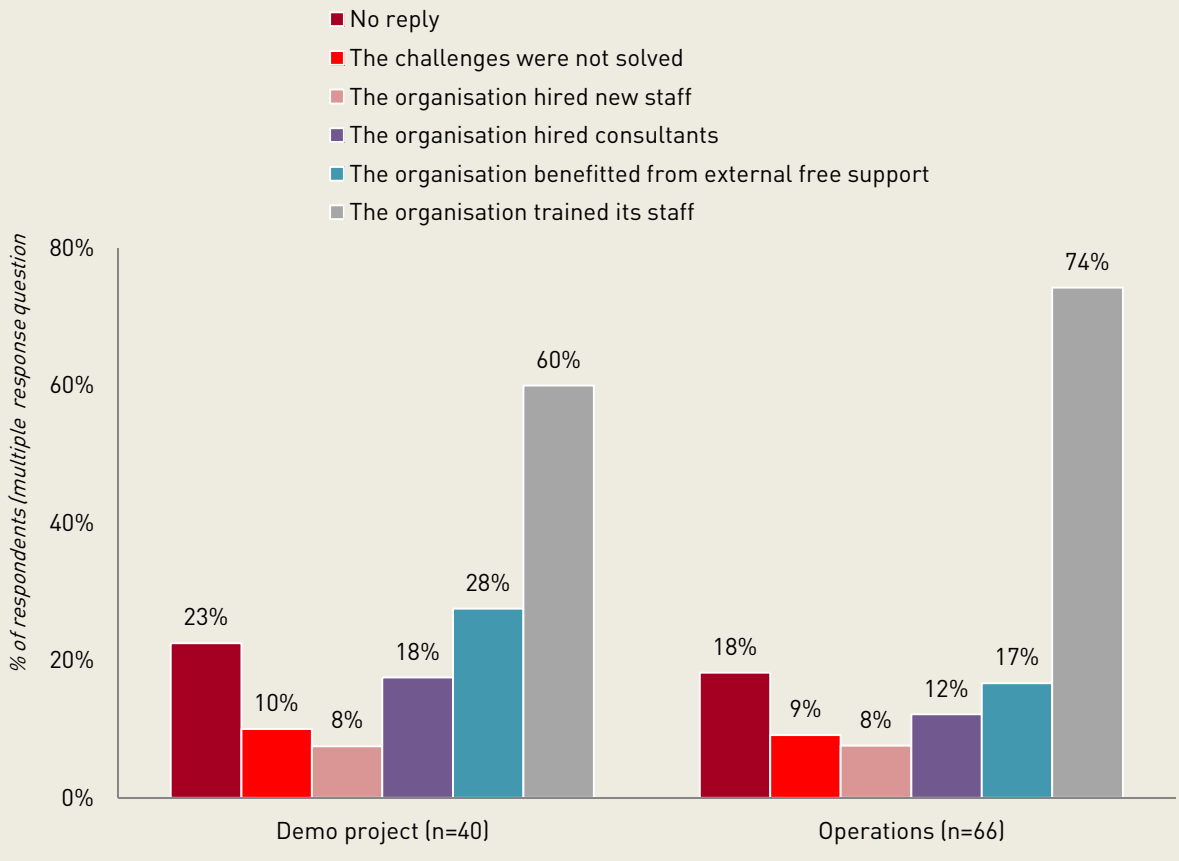
This means that in most cases, training can help public authorities overcome the challenges associated with the initial adoption or the subsequent use of satellite-based services. Therefore, public authorities are encouraged to invest in training their staff in order to fully benefit from existing technologies.

Training results as being fundamental in overcoming the challenges to adopt and use satellite-based services regardless of their implementation framework.

Nevertheless, public authorities participating in a demonstration project were able to benefit more from external free support to face their challenges and were less in need to train their staff than the entities starting to use satellite-based services within their regular operations (Graph 5.11.).

5.10. Challenge mitigators

5.11. Challenge mitigators according to implementation framework of the satellite-based services



Are satellite-based services sustainable?

A forth of the surveyed users expressed their concerns with regard to continuing using the satellite-based services in the future (Graph 5.12.).

30% of these respondents motivate their answer by arguing that the services have been questioned by their institutions or by stakeholders. In addition, 30% declare that other available technologies are being considered to substitute the satellite-based services, while 22% mention their excessive cost or possible budget constraints in the future.

Other reasons include changes in local regulations, difficulties to access data, and deadlocks due to current political orientations (Graph 5.13.).

Case study: The Hamster Mission of the DREAL Alsace (France) uses satellite imagery to save a European species from extinction

Although the Alsatian Hamster is a protected species, its number has dramatically decreased in the last decade. Since 2007, the European Commission had been warning France that, if adequate measures to protect the species were not taken, the country could be fined for as much as €17 million.

In 2010, the Alsace Regional Directorate for Environment, Planning and Housing (DREAL) ordered a cartography of the hamster's habitat based on EO. The map was used to identify priority sites in which agricultural measures should have been taken to improve the species' habitat.

Nevertheless, the entity decided not to use the service anymore in 2015.

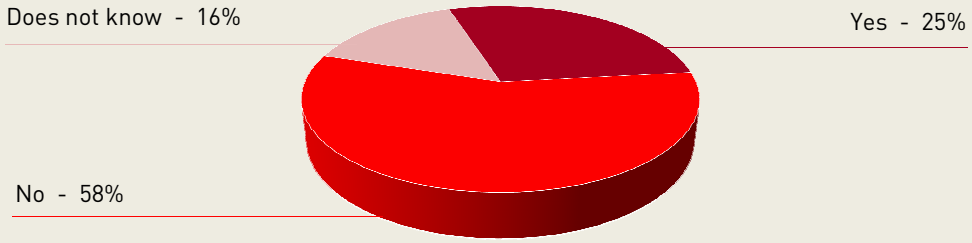
Area of operation:	Regional
Sources of budget:	National public funds
Annual budget of the Hamster Mission:	€525k in 2010
N° staff:	250
Staff of the Hamster Mission:	2
Service implementation framework:	Operations
User's implementation costs:	2% of Hamster Mission's annual budget in 2010
User's operational costs:	5.14% of the Hamster Mission's annual budget in 2010

Indeed, discrepancies were found between the results of the satellite-based cartography of the plantations and the declarations made by the farmers under the European Common Agriculture Policy.

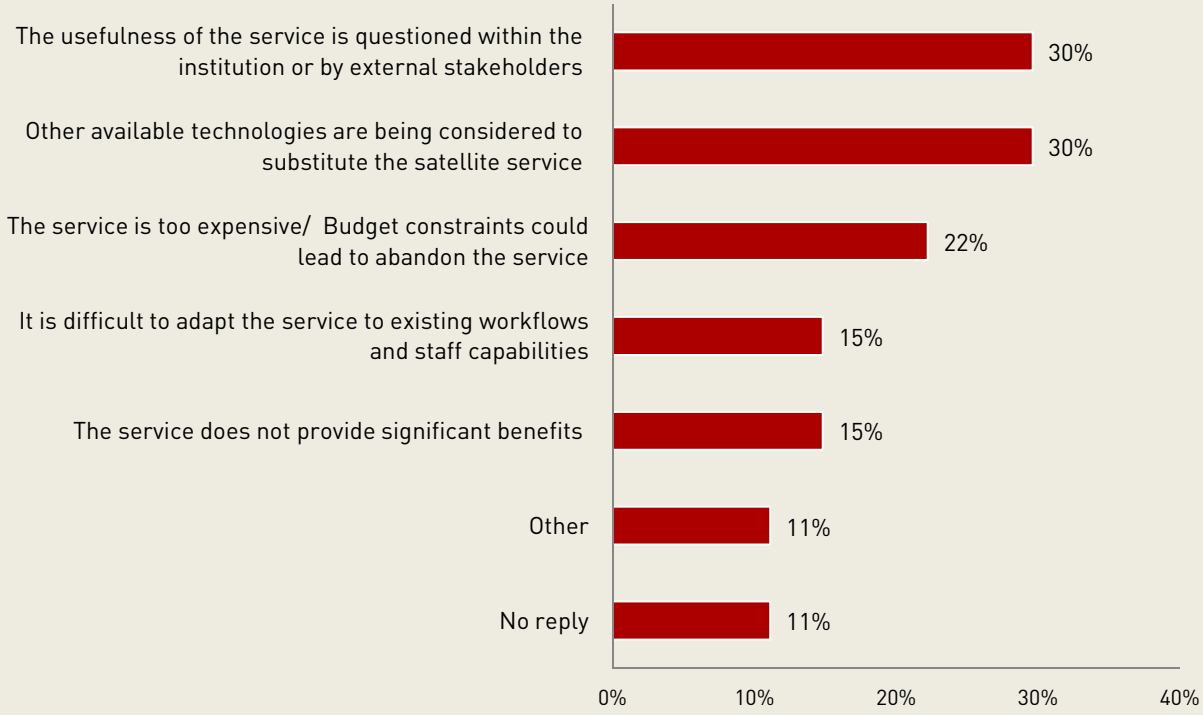
Confronted with the opposition of the farmers, the DREAL decided to stop updating the habitat cartography with satellite imagery and to rely on the declarations made by the farmers. Unfortunately, this method does not allow to automatically record habitat changes throughout the years in the same cartography.

The habitat map supported the implementation of effective conservation measures for the hamster, avoiding severe economic penalties for several million euros to France

5.12. Challenges to keep using the satellite-based services in the future



5.13. Threats to future use of the satellite-based services (N=27)



% of respondents reporting possible challenges to keep using the services in the future (multiple response question)

ANNEXES

ANNEX I - THE PRELIMINARY PHASE: A REVIEW OF TEN CASE STUDIES

CASE STUDIES:

- Guernsey and Alderney Airports: EGNOS to support landing in Alderney
- Arno River Basin Authority: EO for slope monitoring
- Central Command for Maritime Emergencies: EO for oil spill detection
- City of Diemen, Department of Infrastructure: EO to manage soil resilience
- DREAL Alsace, Hamster Mission: EO to protect biodiversity
- Environment Agency, England: EO to manage floods
- Flemish Agency for Roads and Traffic, Traffic and Telematics Division: Satnav to regulate traffic lights
- Natural Resources Wales (former Countryside Council for Wales): EO to map habitats
- SPL Lyon-Confluence: EO to monitor PV systems
- University Hospitals Coventry and Warwickshire, Breast Screening Unit: Satcom for remote breast screening

The survey "Operational uses of satellite-based services in the public sector" has been launched by Eurisy in March 2015.

The survey has been implemented after a testing phase supported by the Space for Smarter Government Programme of the UK Space Agency, which partially funded the initiative, the OECD Space Forum, and the Relations with Member States Office of the European Space Agency (ESA).

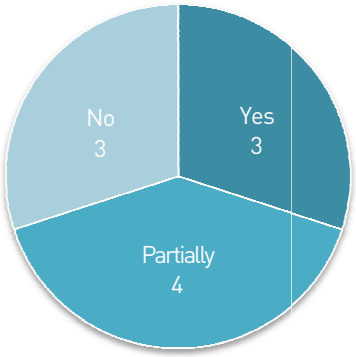
The testing phase included the design of a questionnaire inquiring about the public administrations, their previous knowledge of satellite-based services, the drivers and motivations behind the use of these services, the costs and benefits and the challenges faced to use them.

The sample considered in this phase included ten public administrations operating at the local, regional or national levels in sectors ranging from transport to environmental protection and from risk management to health in the United Kingdom, Italy, Germany, the Netherlands, Belgium and France.

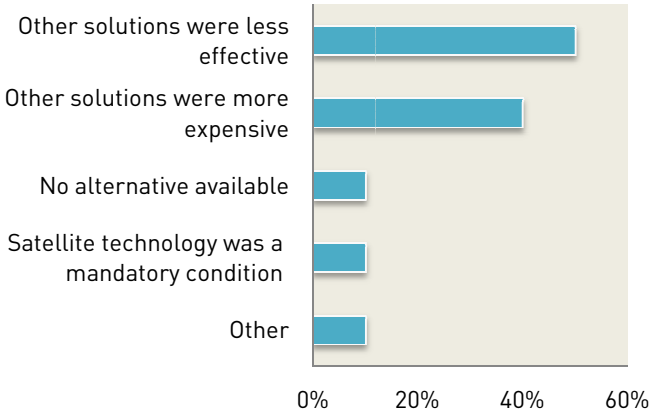
The feedback gathered during the testing phase was presented in an analytical report including ten case studies[40]. The analysis showed that public authorities play a crucial role in both creating the demand for satellite-based services and in facilitating their development.

[40] © Eurisy (2015).

Satellite-based service to replace previous system



Trade-off among technologies: reasons for choosing a satellite-based service

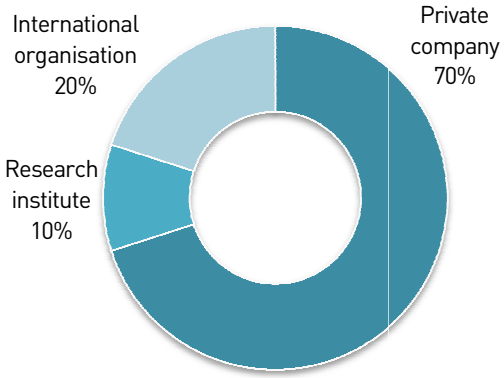


% of respondents (multiple response question)

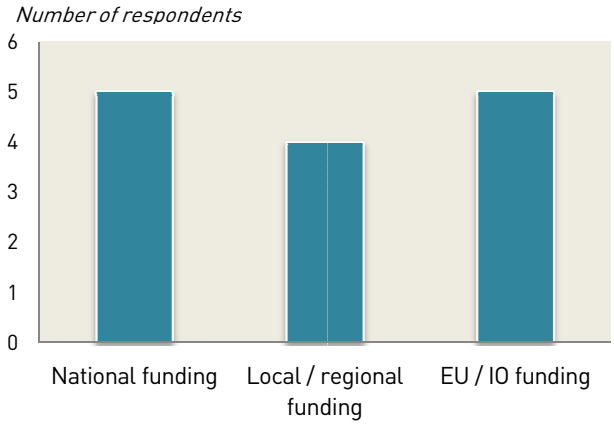
The public authorities consulted declared that they use satellite-based services to respond to pre-existing needs and that their decision to invest in satellite services was driven by their expected added value compared to other available technologies.

These figures indicate that public authorities ponder their investments according to the expected benefits and that the development of new satellite-based services likely to be used in the public sector should especially take into account pre-existing needs of public administrations.

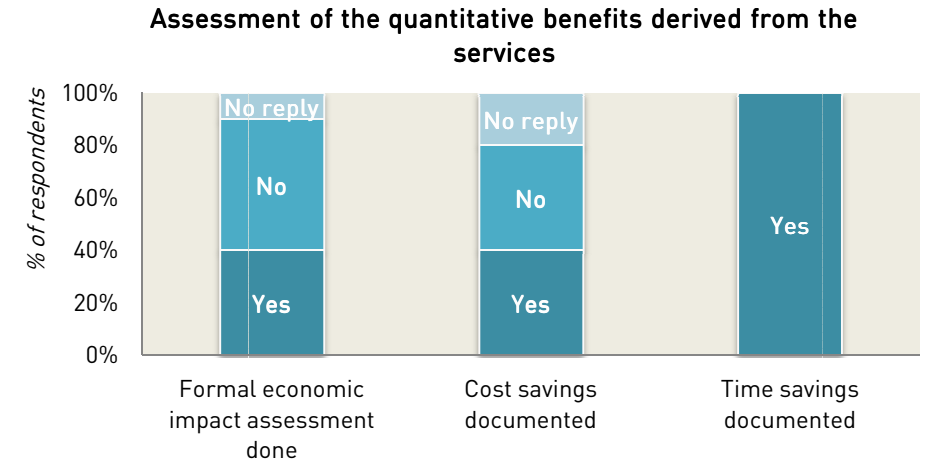
Main provider of the satellite-based service used

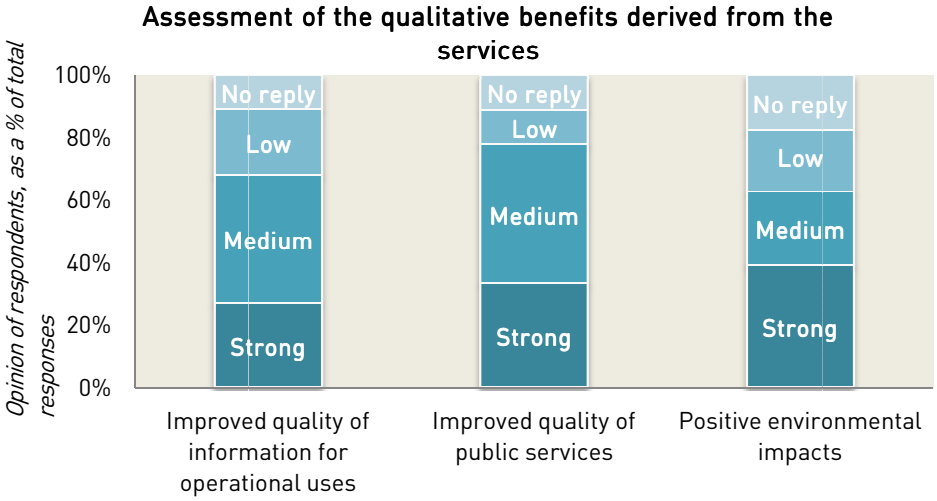


Sources of funding for the satellite-based services

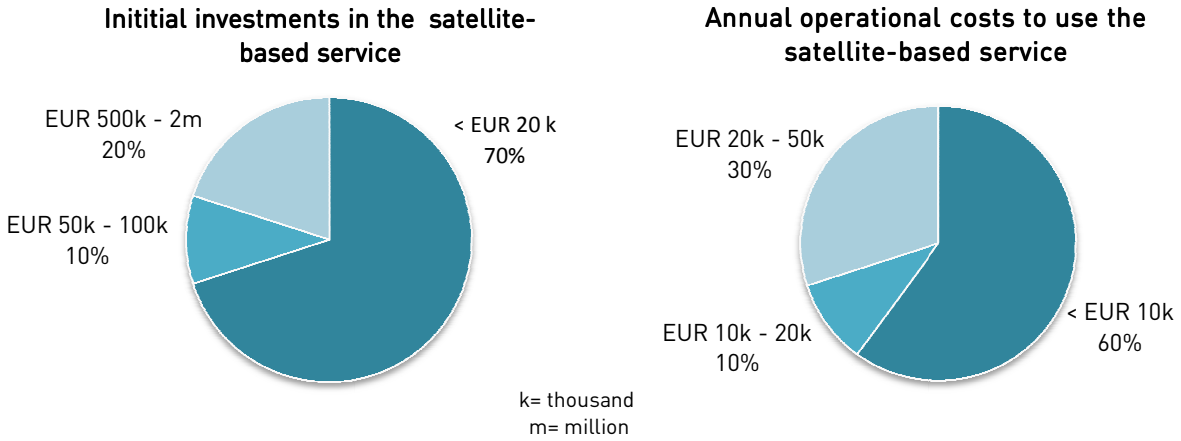


Moreover, the case study review showed that most public authorities collaborated, together with private companies, international organisations, research institutes and other public bodies, in both designing and implementing the satellite-based services. All these actors play an important role in enabling the use of new technologies to deliver better public services.





Concerning the impacts of using satellite-based services, all ten public authorities reported time savings. Other benefits include: an increase in the quality of the information available, an improvement in the services offered by the institutions, as well as positive environmental impacts.



The analysis also indicated that satellite-based services are available at relatively small costs. Service providers — be them private companies, international organisations or research institutes — not only develop and deliver new services, but also provide substantial support in training and assisting public authorities in the use of their new systems.

ANNEX II - SURVEY QUESTIONNAIRE

Page 1

OPERATIONAL USES OF SATELLITE-BASED SERVICES WITHIN THE PUBLIC SECTOR

Are you a public authority?

Do you use a service based on satellite applications routinely, to perform your work? (i.e. satellite navigation/ location-based services, satellite communication, Earth observation/ satellite images)

If so, help us document your experience with satellite-based services by responding to this short questionnaire.

We are not looking for technical details, but for information on the implementation process, as well as on the tangible and intangible benefits of the satellite-based service.

Please reply to these questions to the best of your knowledge and leave a blank space when you are not able to answer.

If you wish to raise awareness on your experience in particular, please indicate your intention by ticking the appropriate box on the last page of this questionnaire. The Eurisy Secretariat will contact you shortly to arrange an interview with you.

For more information about Eurisy, please visit our webpage at www.eurisy.org or write to grazia.fiore@eurisy.org

*mandatory

Page 2

Your Public Authority

Country *

Annual budget of your institution in 2015 *

Please select the corresponding range (N.B. k=thousands; m=millions)

- o Less than € 500k
- o € 500k - € 1m
- o € 1m - € 2m
- o € 2m - € 5m
- o € 5m - € 10m
- o € 10m - € 25m
- o € 25m - € 50m
- o € 50m - € 100m
- o More than € 100m

On which area does your institution operate? *

Please select one or more options

- o Local
- o Regional
- o National

Before adopting the satellite-based solution, did you have internal expertise or previous experience of use of satellite navigation/ location-based services, imagery or satellite communication within your institution?

Please select one or more options

- o We had staff with expertise
- o We had previously used satellite-based services
- o No
- o I do not know
- o Other:

Page 3

The satellite-based service you are using

Which kind of satellite application, or combination of them, is used by your institution? *

Please select one or more options

- o Satellite Imagery
- o Satellite Navigation/ Location-based services
- o Satellite Communication

In which field of application do you use the satellite-based service? *

Please, select one or more options

- o Agriculture
- o Air quality
- o Building and works
- o Climate change
- o Energy
- o Environmental protection
- o Forestry
- o Health
- o Law enforcement
- o Mining
- o Natural and cultural heritage
- o Risk prevention and management
- o Sports and leisure
- o Tourism
- o Transport and logistics
- o Urban planning
- o Water management
- o Other:

When did you start using the satellite-based service?

(YEAR)

Do you still use it?

- o Yes
- o No

If you are not using the satellite-based solution anymore, until when was the solution operational?

(YEAR)

Page 4

Motivations and framework under which you adopted the satellite-based service

What made you consider using a satellite-based service? *

Please select one or more options

- o Obligation (respond to policy / regulation)
- o Need to save time and/or economic and human resources
- o Improve an existing service or procedure
- o Create a new service or procedure
- o Other:

Why did you prefer a satellite-based service to other available technologies?

Please chose one or more options

- o We did not consider other technologies
- o No other alternative technology was able to respond to our need
- o Other solutions were more expensive

- Other solutions were less effective
- The satellite component was a mandatory condition under the funding scheme used to implement the solution described
- Other:

Did you adopt the service while participating to a demonstration project? *

- Yes
- No

The satellite-based service you are using was...

- Off-the-shelf
- Tailor-made for you
- Other:

Who is the provider of the satellite-based service you are using? *

Please, choose one or more of the options below

- Your own institution
- A private company
- An academic/research institute
- An international organisation
- Another public authority
- Other:

Page 5

Costs of adopting and operating the satellite-based solution

How was the initial implementation or adoption of the satellite-based service financed? *

Please select one or more options

- Own budget
- External funding

Please, specify what kind of external funds were used

Please select one or more options

- Public local funds
- Public national funds
- EU funds/ International organisations
- Private companies
- Universities/ Research centres
- Other:

Please specify if any of the following is provided for free

Please select one or more options

- The initial implementation of the satellite-based service
- The initial pilot
- The operational use of the satellite-based service
- Satellite-based data
- Other:

What percentage of the institution's annual budget did the initial investment to implement the service represent?

Please, select the corresponding range

- Less than 1%
- 1% - 5%
- 5 % - 10%
- 10% - 20%
- More than 20%
- I do not know

What percentage of the institution's annual budget does the cost to operate and maintain the service represent? *

Please, select the corresponding range

- o Less than 1%
- o 1% - 5%
- o 5 % - 10 %
- o 10% - 20%
- o More than 20%
- o I do not know

Page 6

Challenges for the Public Authority

When first implementing or adopting the satellite-based solution, did you face one or more of the following?

Please select one or more options

- o Technical challenges (e.g. difficulty to translate needs into technical specifications)
- o Economic challenges (e.g. cost of the satellite-based service)
- o Material challenges (e.g. service availability on the market)
- o Organisational challenges (e.g. staff capabilities to start using the new service)
- o Administrative challenges (e.g. difficulty in obtaining authorisations or funds)
- o No challenges faced
- o Other:

Once the satellite-based solution has been adopted, did you face one or more of the following challenges to use it? *

Please select one or more options

- o Technical challenges (e.g. integration into existing systems)
- o Economic challenges (e.g. cost for using the service)
- o Organisational challenges (e.g. staff ability to use the service)
- o No challenges faced
- o Other:

How did you solve these challenges?

Please select one or more options

- o We trained our staff
- o We hired new staff
- o We hired consultants
- o We benefitted from external free support
- o The challenges were not solved
- o Other:

Do you think it will be a challenge to keep using the satellite solution in the future? *

- o Yes
- o No
- o I do not know

If Yes, could you say why?

Please, select one or more options

- o The service does not provide significant benefits
- o The service is too expensive
- o Other available technologies are being considered to substitute the satellite service
- o The usefulness of the service is questioned within your institution or by external stakeholders
- o Other:

Page 7

Benefits of the use of the satellite-based solution

Did you make a formal assessment of the quantitative benefits resulting from the use of the satellite-based service? *

- o Yes
- o No
- o I do not know

Did the satellite-based solution replace a previous system to carry out the same tasks?

- o No
- o Yes, fully
- o Yes, partially (the satellite service was used to improve the existing system)
- o I do not know

What benefits does the service have for your institution? *

Please select one or more options

- o We are able to save money
- o We are able to save time
- o Workflows are smoother
- o The services provided by our institution improved
- o The institution is able to take better-informed decisions
- o Other:

If you save money, how much do you save per year?

Monetary savings to perform the same tasks, as compared to a previous system or lack of

- o Less than 1%
- o Between 1 - 5%
- o Between 5 - 10%
- o Between 10 - 20%
- o More than 20%
- o I do not know

If you save time, how much time do you save each year?

Time savings to perform the same tasks, as compared to a previous system or lack of

- o Less than 10%
- o Between 10 - 20%
- o Between 20 - 50%
- o More than 50%
- o I do not know

Did your experience inspire other public authorities to adopt a similar satellite-based solution?

- o Yes
- o No
- o I do not know

Do you share the satellite-based system, or the satellite-based information, with other departments/units or institutions?

- o Yes
- o No
- o I do not know

Page 8

Contact details of the person filling-in the questionnaire

Your name

Your institution

Your function

Email address*

Your phone number

Please, include this information if you wish Eurisy to contact you

Website

Would you agree to having an article on your experience featured on the Eurisy website?

If your answer is Yes, the Eurisy Secretariat will soon contact you to arrange an interview

- ○ Yes
- ○ No
- ○ Eurisy has already published an article on my experience

Thank you for participating to this survey! When the survey will be completed and its results analysed, you will receive a copy of the results obtained by Eurisy.

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- European Maritime Safety Agency (EMSA): www.emsa.europa.eu
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- Horizon 2020: ec.europa.eu/programmes/horizon2020
- Integrated Applications Promotion (IAP): www.esa.int/Our_Activities/Telecommunications_Integrated_Applications/Integrated_Applications_Promotion_IAP
- Network of European Regions Using Space Technologies (Nereus): www.nereus-regions.eu/
- Organisation for Economic Co-operation and Development (OECD): www.oecd.org/
- OECD Space Forum: www.oecd.org/futures/oecdspaceforum.htm
- Space for Smarter Government Programme (SSGP): www.spaceforsmartergovernment.uk
- The European Geostationary Navigation Overlay Service (EGNOS) Portal: egnos-portal.gsa.europa.eu

EURISY'S FULL MEMBERS

About Eurisy

Eurisy is a non-profit association of space agencies and government offices dealing with space affairs in Europe.

It is mandated and financed by its members to increase the access of society to the benefits of satellite information and services.

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