Drivers for and Barriers to the Cross-border Implementation of the Once-Only Principle

Nele Leosk[1], Irma Põder[1(✉)], Carsten Schmidt[1,2(✉)] [iD], Tarmo Kalvet[1(✉)] [iD], and Robert Krimmer[1,2(✉)] [iD]

[1] Tallinn University of Technology, Ehitajate tee 5, 12616 Tallinn, Estonia
{nele.leosk,irma.poder,carsten.schmidt,tarmo.kalvet,
robert.krimmer}@taltech.ee
[2] Center for IT Impact Studies, Johan Skytte Institute for Political Studies, University of Tartu,
Lossi 36, 51003 Tartu, Estonia
{carsten.schmidt,robert.krimmer}@ut.ee

Abstract. The once-only principle (OOP) aims to reduce interactions between citizens and governments, but many factors challenge its cross-border implementation. Building on the results of the "The Once-Only Principle Project" (TOOP, 2017–2021), an analysis was undertaken of the factors that either support or hinder implementation of the cross-border OOP. Five domains of factors were examined - technological, organizational, institutional aspects, actors and miscellaneous. This research highlights the importance of awareness of the OOP, and its inherent benefits, as a key driver. Also, the activities of supranational entities are of key significance, as it is establishing a critical legal framework. Co-ordination between different levels of government and different countries remains an important barrier. One specific issue discovered and addressed during the project but uncovered here, relates to identity matching, and this requires EU level intervention to reach an effective and efficient solution.

Keywords: The once-only principle · Drivers · Barriers · Cross-border public services · Interoperability · The once-only principle project

1 Introduction

The once-only principle (OOP) aims to reduce interactions between citizens and governments. It is driven by the goal of designing user-centric public services and reducing administrative burdens for citizens and businesses when fulfilling government-imposed administrative requirements and consuming public services (Gallo et al. 2014). In order to reduce administrative burdens, public administrations seek to minimize instances in which citizens and businesses must provide data to the government. To this end, public administrations seek to replace requesting data from citizens with machine-to-machine data exchange; and reuse of data already stored digitally in public sector databases, hence allowing citizens to provide data to the government "only once" (Meyerhoff Nielsen and Krimmer 2015, Krimmer et al. 2017, Kalvet et al. 2018a, Kalvet et al. 2018b, Olesk 2020).

Although the OOP is not yet a widespread practice across European countries (Cave et al. 2017; Gallo et al. 2014), the European Commission recently took major policy steps to promote and adopt the OOP on a Europe-wide level, with the aim of developing cross-border e-government services for European citizens and businesses. The European Commission and 21 European countries launched a large-scale European interoperability initiative as a significant milestone – The Once-Only Principle Project (TOOP) – in 2017. TOOP is seeking to facilitate a Europe-wide OOP by developing a federated technical architecture, capable of interconnecting databases and data exchange layers in different countries (see Krimmer et al. 2017 for more details). Since cross-border OOP is an emerging concept, not yet practiced widely or discussed in literature, TOOP provided us valuable empirical information on drivers, barriers and obstacles for the OOP in Europe.

This section of the TOOP Book is structured as follows. After this introductory section, the second section identifies and categorizes, using state of the art for different determinants of the success of OOP initiatives (i.e., aspects identified as drivers or barriers in existing literature). After that, the third section briefly presents the method used to assess the importance of those factors. The following section of the chapter presents the results of data analysis. Finally, a discussion of the main findings, implications and some recommendations to address some aspects we identified, which hinder concretization and success of future OOP initiatives, is presented in section four. The section ends with our conclusions.

2 The Factors Impacting OOP Initiatives in a Cross-border Context

2.1 Factors Generally Impacting OOP Initiatives in a Cross-border Context

The aim of this chapter is to explore the barriers and drivers of cross-border OOP. Despite being fairly common concepts in e-governance literature, we nevertheless find it important, first of all, to clarify the use of the two terms. Said simply, drivers and barriers relate to the respective positive or negative impacts that a certain factor (or variable) presumably has on implementation and execution of OOP initiatives (or any type of undertaking for that matter). Therefore, the same factor, depending on its value, and sometimes even the context (e.g., country, domain), may either be a driver or a barrier for an initiative involving the OOP. Additionally, the effect, and even direction of certain factors could presumably also vary, depending on the stage of implementation of an OOP initiative we have determined.

Research on implementation of the OOP is still scarce – only a few studies on the implementation of the OOP exist, with the most notable studies on the topic being by Gallo et al. (2014) and Cave et al. (2017). However, existing literature on e-government, interoperability, public sector innovation, as well as acceptance of technology, can help us identify the key factors perceived to affect public administrations´ readiness, and ability to adopt the OOP for both national and cross-border transactions. This literature consistently suggests that factors impacting the provision of cross-border digital are plentiful and not related exclusively to technological dimensions (e.g., Gil-Garcia and Pardo 2005; Savoldelli et al. 2014; Cave et al. 2017). Furthermore, it has been postulated

that there is no one single factor influencing digitalization, but rather a combination of several determinants instead (Gil-Garcia 2012).

There are several typologies used to classify, and group together different factors affecting digital provision of public services. One early attempt to categorize these factors was made by Gil-Garcia and Pardo (2005). According to the authors, factors affecting ICT projects in the public sector can be grouped into five categories: 1) information and data; 2) information technology; 3) organizational and managerial; 4) legal; and 5) institutional and environmental (Gil-Garcia and Pardo 2005). While the first two concern the availability and quality of data and technology, respectively, the remaining three extend beyond the technological domain, relating to the existence of an organizational, legal and institutional environment that stimulates, or hinders, the provision of digital services. Some examples of these factors are: the size of a project or organizations´ staff, the project alignment with existing goals, the presence of a regulatory framework or incentives; and, finally, pressures from political actors, businesses, or civil society.

Subsequent works followed a similar approach to classify factors affecting e-government and adoption of ICTs. Regarding the development of e-government in the European Union (EU), Germanakos et al. (2007) also identified factors from several categories such as technical, legal, as well as social and institutional environments too. Similarly, Savoldelli et al. (2014) stressed, in addition to technological/operational aspects, the significance that managerial-organizational and political-institutional factors have for the adoption of e-government. Looking at determinants of e-procurement, in two European regions, Gascó et al. (2018) also take the source of the barriers into account, making a distinction between "outer context" and "inner" factors. While the former refers to wider environmental factors, such as economic, social and political factors, as well as the inter-institutional environment and dynamics, inner factors are the ones intrinsically related to the organizations (i.e., organizational, individual and technical). Even though the authors find political aspects to be significant, internal factors seem to be the most weighty determinants. Overall, whether examining the provision of e-services, the adoption of ICTs, or e-government maturity levels, the frameworks, or typologies, developed to identify determinants for these outcomes have remained relatively constant.

Olesk (2020) also found that collaborative digital government initiatives are subject to influences of a number of factors in their context. These factors relate to technology and innovation, stakeholders (characteristics, beliefs and the behavior of public officials and citizens), organizational and institutional contexts, public sector quirks and particularities, and developments in the broader environment. While some of the factors (e.g., championing innovations, political will or favorable regulatory environments) serve as drivers and enablers of innovation, many others (e.g., stakeholders' beliefs, organizational resistance to change, resource limitations) tend to pose constraints and barriers to adoption and institutionalization of innovative public governance practices (Table 1).

The research which exists on the OOP produced similar results. According to (Cave et al. 2017), regarding the European context, the key barriers for implementation of the OOP can be grouped into five distinct categories. Those categories are 1) legal; 2) organizational; 3) semantic; 4) technical; and 5) other. The last, less well-defined, category covers aspects such as political will, users' awareness or the existence of bi(multi)lateral

Table 1. Key categories and examples of context factors of collaborative digital public sector innovation

Technology	Innovation characteristics	Public officials	Citizens
Availability of hardware and software Features of specific technologies (e.g. security) Interoperability	Ease of use Cost Compatibility Trustworthiness Relative advantage	Characteristics of individual innovators Attitudes, beliefs Knowledge and competences Trust in citizens Leadership Human error in innovation management	Motivation to engage with government Interests Knowledge and competences Trust in government Time constraints Perceptions (e.g. usefulness of the innovation)
Organizations	Institutions	Public sector context	Broader environment
Capabilities Incentives Financial resources Human resources Organizational structures Organizational cultures Resistance to change Top management support Participation in networks	Regulations and legal constraints Informal norms Institutional histories Legal and administrative culture Coordination and governance mechanisms Existing power relations	Influence of politics and political will Stakeholder complexity, different agendas Multi-rationality Bureaucratic and democratic principles Organizational competition for power and legitimacy Expanding domain of public intervention	Public attention Media attention Mimetic pressures Technological development

Source: Olesk (2020)

agreements. Two points should be emphasized from this exhaustive examination focusing on the OOP. The first is that perspectives of individuals/businesses and public officials diverge in terms of perceived barriers to the OOP. The second stresses the importance of semantic aspects, particularly the need for certified translations and deviation in the content of documents and data (Cave et al. 2017). In this sense, this study places importance on the interoperability dimension and cross-country dynamics, which are, to a great extent, distinctive and crucial aspects of the OOP.

A similar and also enhanced taxonomy has been proposed, based on previous results of the TOOP project (Table 2).

Summing up, literature used fairly consistent models, or similar sets of independent variables, to study modernization of the public sector and adoption of e-government. However, with a few exceptions (e.g., Leosk 2019), the aspect of time has been overlooked in written works examining determinants of e-government. The importance of

Table 2. Barriers to cross-border OOP

Stakeholders	Organizational, institutional	Legal	Technology, interoperability
Lack of awareness of the OOP Unclear perceived benefits of the OOP Unclear motivation to adopt the OOP Hesitancy adopting cross-border data sharing	Organizational silos Complexity of organizational change Resource limitations Cultural resistance Lack of political priority	Legal restrictions on data sharing Data protection and confidentiality requirements Absence of legal basis for cross-border OOP Lack of legal validity of evidence exchanged	Heterogeneous ICT systems Heterogeneous data handling approaches Legacy systems Data fragmentation Differences in data quality Limited availability of digital data

Source: Olesk (2020), based on (Kalvet et al. 2018a)

barriers and drivers of OOP, particularly when discussing perceptions of the main intervening actors, should vary not only between contexts (e.g. countries, area of implementation) but also between different stages of implementation. This problem is addressed in this study, by considering two distinct phases of implementation of OOP projects. This approach allows us, among other things, to explore whether the significance of certain factors, perceived to be important, persists over time.

Overall, the same lenses that were used to focus on our study of determinants for electronic provision of public services, or e-government in general, also prove useful for exploring key barriers and drivers, in the case of the OOP. Nonetheless, we can also identify factors, or variables, that are particularly important in the case of OOP initiatives. The improved framework of technical enactment (Fountain 2001; 2008) is valuable for structuring the array of factors, which we have grouped for this study into 5 dimensions: 1) technological; 2) organizational; 3) institutional; 4) actors; and 5) others (or miscellaneous), largely context specific factors. Each dimension, and respective factor, is detailed in the paragraphs below.

2.2   Technological Factors

Technological factors are particularly relevant in the case of OOP due to its reliance on heterogeneous information and process models. In fact, technical issues, particularly those relating to interoperability, are perceived as the most challenging aspects of modern cross-organizational information systems (Mocan et al. 2011). Interoperability, a key element of the OOP, can be defined as the exchange of data between different organizations and respective ICT systems. It therefore requires organizations have the capacity to interact with each other to achieve mutually beneficial and common goals (Cave et al. 2017). This becomes more important, particularly on a semantic level, in the case of cooperation between different countries. Besides the interoperability aspect, in the case of the cross-border context of the OOP, other relevant factors concern data quality, the particularities of various databases or information systems and, finally, countries' overall e-government architecture/infrastructures (Cave et al. 2017).

The European Commission also acknowledges that, in order to put the OOP into practice, various organizations must collaborate to develop technical and semantic interoperability (European Commission 2017). Ensuring technical interoperability requires adopting common technical specifications and building infrastructures that enable linking systems, in order to secure data exchange between information systems. Ensuring semantic interoperability requires agreement to common data formats and developing vocabularies to allow communicating systems to understand the meaning of the data in the same way. The EC's concept of interoperability extends beyond technical factors, also covering the importance of organizational and legal interoperability; as described in the following sections.

2.3   Organizational Factors

The organizational dimension consists of all factors intrinsically related to organizations. This accounts for the significant changes imposed by the OOP in organizational structures and workflows. The required level of collaboration and coordination between different organizations, one core aspect of the OOP (e.g., Wimmer et al. 2020), is bound to face a number of organizational and administrative barriers affecting organizations' will and capacity to implement OOP. The most common barriers faced during implementation of OOP at a national level have been found to include governmental silos and lack of communication between government departments, the complexity of changes in organizational structures, working practices and cultures, and concerns about high implementation costs (Gallo et al. 2014). A set of constraints that are also very frequently present at a cross-border level (Cave et al. 2017).

The literature confirms the importance of organizations' capacity to adapt, transform and innovate, which in turn depends, to a great extent, on aspects such as organizational structure and culture, the existing networks and the existence/ development of cross-organizational and cross-border knowledge transfer networks (de Vries et al. 2016; Albury 2005; Ferguson et al. 2013). Finally, one cannot overlook the importance that organizations' financial and human resources may naturally convey for the adoption and successful implementation of electronic services or use of ICTs (Drew 2011; Bekkers et al. 2013). The lack of financial, technical and personnel (staffing) capacities in an organization are major obstacles to development of e-government (Moon 2002).

2.4   Institutional Factors

The third dimension of factors affecting the OOP deals with the institutional aspect and concerns the sets of rules, laws and principles that may influence the development of digital governance (Bellamy and Taylor 1996; Fountain 2008; Heeks and Bailur 2007; Luna-Reyes and Gil-García 2011). It is common knowledge that public sector organizations are also heavily affected by variables beyond the power of individual organizations, such as the legal culture and administrative traditions of a state (Bekkers et al. 2013). Even though these factors are exogenous to the organizations, and usually more stable, or slower to change, regulations can be determinants for change, and promote innovation by imposing, for example, legal obligations on administrations to implement innovative solutions (de Vries et al. 2016). The political environment is also another critical aspect,

with factors such as political stability having a positive effect on the development of e-government (Rodriguez et al. 2011).

Particularly in the case of the OOP, institutional and legal rules are critical for setting limits on data sharing and personal data protection systems. According to Gallo et al. (2014), resolving any legal obstacles and establishing a sound legal basis is one of the most important strategic issues for implementation of OOP. The role of intergovernmental and supranational institutions is fundamental for the case of the OOP. Although some directives and regulations have been adopted to support interoperability at the EU level (e.g., Single Digital Gateway Regulation – SDGR, regulation on electronic identification and trust services for electronic transactions – eIDAS, Services Directive and the General Data Protection Regulation – GDPR), there is still a need to establish a common legal basis at the EU level to fully support an EU-wide OOP (Cave et al. 2017).

2.5   Actors

The fourth important dimension of factors considered in this study are the actors. This dimension results from a revision of the technology enactment framework and the acknowledgment that technology, organizations and institutions cannot account alone for e-government and public sector's modernization (Dawes 1996; Gil-Garcia 2006; Dunleavy et al. 2006). As they are accountable to a number of public and private stakeholders, public sector organizations are highly dependent on political goals and tensions (Rashman et al. 2009). However, the modernization of services may be highly dependent not only on political will, but also on public and business demands (Heeks 2005; Panopoulou et al. 2010; De Vries et al. 2016).

The public is a pivotal element of e-government and "governments must be careful, in their zeal to modernize, not to unwittingly betray the public interest" (Fountain 2001:203). Here, aspects such as citizens´ level of education, one important predictor of internet usage according to Chinn and Fairlie (2007), may influence individuals' demand for digital solutions. In the case of OOP, the support of political actors, business and civil society, both at national and supranational level, is perceived as a crucial aspect (Cave et al. 2017). This support, however, seems to depend on previous experience with OOP and on its benefits having been clearly demonstrated to individuals, businesses and public administrations (Cave et al. 2017).

Overall, different types of actors are important for the adoption of OOP. Previous experience with this principle is likely to bolster different actors' support and the will for it. However, if certain groups also benefit from the inefficiency or complexity of a service, the organizations and political actors might encounter some resistance for the implementation of OOP. Moreover, as Akkaya and Krcmar (2018) highlight, some concerns regarding privacy and data-protection may also ease the demand, or support, for the OOP.

This takes us to the expected or anticipated benefits of OOP which different actors have attached to the OOP, and which serve as one of the main drivers of the OOP. The most essential ones are brought to the fore here. The main benefit associated with OOP relates to the increased efficiency of government apparatus and, generally, to better governance (Cave et al. 2017; van Veestra et al. 2017; Wimmer and Marinov 2017; Wimmer et al. 2020). Scholars agree that sharing data across organizations, as well as across

national boundaries, reduces administrative burdens and simplifies administrative processes which, in turn, leads to a reduction in time and financial resources required to support those administrative processes. In the same way, the OOP is seen as a contributor to increased user-friendliness and efficiency of digital service provision, but is also expected to leverage service quality across organizations or countries involved in providing these services (Bekkers et al. 2013; van Veenstra et al. 2013). There is an extended analysis of perceived benefits of the OOP in the chapter "Measuring the Impact of the Once Only Principle for Businesses Across Borders" in this book.

2.6   Other Factors

There are also other factors, which do not fit, or are transverse to the dimensions previously discussed. Factors which may, nevertheless, have an important impact on implementation and success of OOP initiatives. Variables such as gender, age, level of education, experience with a specific or related technology, and degree of voluntary use are considered to influence the adoption process (Carrizales 2008; Morris and Venkatesh 2000). The issue of ICT skills and the digital divide in society was also emphasized by Cave et al. (2017). In their review of literature, Van Veenstra et al. (2011) similarly conclude that a deficiency in or lack of IT skills presents hurdles for adoption of new technologies by public administrations. Furthermore, this category also accounts for unexpected, or extraordinary, factors that could account for the implementation, or smooth and efficient functioning of a particular OOP project (for example, the continued existence of supranational projects of a similar nature). It is crucial that these factors, which are difficult to specify a priori, are also taken into consideration in any study of OOP.

3   Methodology

This study builds on a multi-method approach, including several qualitative research methods such as semi-structured interviews, focus groups and surveys. The most informative collection of empirical data was completed via qualitative methods. A qualitative approach is broadly considered suitable for tackling research problems that are not clear-cut and require investigative processes and interactions in their natural, 'messy' context (Yin 2003).

By and large, the empirical data was collected in two waves. The first wave of data collection took place at the beginning of the TOOP Project in 2017, when project pilot activities had not yet commenced. This means the data collected then largely reflects TOOP Project participants' perceptions and expectations of the OOP cross-border determinants. The second wave of data collection took place towards the end of TOOP Project, in 2019 and in 2020, i.e., after implementation of TOOP pilot projects. These data reflect TOOP Project participants' real-life experiences when planning and testing the cross-border OOP. This allowed us to understand whether the perceptions of the OOP determinants, both drivers and barriers that were identified at the beginning of the Project played a role in TOOP pilot projects' progress and in implementation of the OOP.

To begin with, a thorough review of existing literature was completed; first, to understand the expected benefits of the OOP and; secondly, to understand the determinants, either supportive or otherwise, for implementation of the OOP. As a result of the review of the literature, the benefits associated with the OOP, but also with the OOP drivers and barriers, were identified and used as an input for developing the first survey questionnaire.

Based on the results of the first survey (but also the first focus groups), the inventory of perceived factors was updated and served as an input for refining the codebook. The final codebook used to analyze the data collected at the end of TOOP project includes 5 main dimensions: technology, institutions, organizations, actors, and other factors - overall comprising an exhaustive list which was further whittled down. More detailed information on the collection of empirical data is provided in a sequential order below.

First of all, at the outset of TOOP Project, a survey was conducted amongst TOOP Project participants in May to July 2017 in order to fathom and understand TOOP participants' perceptions of barriers and drivers for the OOP. The survey was sent out via e-mail to a total of 18 countries, and 15 country responses were returned.

As a second step, we organized focus groups. The first focus group was held on April 19, 2017 in The Hague, Netherlands over three sessions, one for each pilot area, each with 3–5 participants. The second focus group was held on May 23–24, 2017 in Rome, in Italy over two different sessions and included all pilot area participants. During these two focus group meetings, the expected OOP determinants of TOOP Project participants were identified, as described above. For a more detailed analysis of their results, see the publications by Kalvet and colleagues (Kalvet et al. 2018a and 2018b).

The second wave of data collection started in 2019 with the organization of focus groups, which were then held in Ljubljana, Slovenia on April 10, 2019 and in Tallinn, Estonia on June 3–4, 2019. In Ljubljana, two sessions were held with a total of 30 participants, whereas in Tallinn, three sessions were held, one for each pilot area. As already stated above, during the second wave of data collection, the OOP drivers and barriers were collected and analyzed based on the participants' real-life/actual experience in planning and testing cross-border OOP, that they had acquired through progression of TOOP pilot areas. The focus group sessions were organized in cooperation with TOOP Project impact assessment team, thus, the aim was to analyze both determinants and impacts of the OOP. The results of the impact assessment are discussed in detail in the chapter "Measuring the Impact of the Once Only Principle for Businesses Across Borders" of this book.

As part of the second wave of data collection, we also carried out semi structured interviews with TOOP participants from June-September 2020, totaling 11 people from 6 countries, representing all three pilot areas. Lastly, the second survey questionnaire was sent to 15 countries involved in TOOP pilot areas and a total of 16 responses were received from 13 countries.

This study presents a few limitations. The main one relates to comparability of the OOP determinants listed at the beginning and those that were identified towards the end of the TOOP project. As we already mentioned, in 2017, only the participants' perceptions of the OOP were identified whereas in 2019 and in 2020, participants reflected their real-time experiences with the cross-border OOP, acquired during the progress of the three pilot areas. TOOP Project members' experience with the OOP, however, may extend

beyond the Project so one could presume that there is a heterogeneity of experiences with OOP among TOOP members. In brief, the OOP level may vary between TOOP members at different points in time, to the extent that some members of TOOP could have reflected their real-time experience with the OOP in 2017 too, and some could still be reflecting theses perceptions in 2019 or 2020. Estonia and Finland, for example, had started preparations for cross-border data exchange between the two countries within the Nordic Institute for Interoperability Solutions (NIIS), to ensure development and strategic management of bilateral data exchange, before the start of TOOP Project which materialized in 2018 and focusing on multilateral data exchange.

4 Results

4.1 Technological Factors

An analysis of implementation of TOOP pilots suggests that implementation of the OOP is largely determined by technological readiness at a country-wide (nationwide) level – higher levels of digitalization are connected to faster progress also in implementation of cross-border OOP. Previous experience at national level with the OOP and with current technological solution for OOP help with the implementation of OOP cross-border. Examples included Estonia, Finland, but also Slovenia, that had launched the national level OOP solution before the TOOP Project, with swift progress in TOOP Pilot areas.

Despite the fact that the level of technological readiness and prior experience with implementation of the OOP at national level serves as an essential precondition for the OOP, the results of both waves of data collection revealed an interesting fact, which to some extent contradicts our initial expectations and the previous result. More concretely, the organizations' and countries´ high levels of digital technology, in certain contexts, could also hinder the progress of cross-border OOP initiatives. This fact results, for example, from concerns for sharing information with organizations and countries with lower levels of technological modernization and advancement, also connected to lower levels of security. As a representative commented during pilot phases "Data protection has a different meaning in different countries. For us it must be very secure, how data exchange proceeds and how people are identified, how do we know that we have not accidentally shared someone else's information or data or even how to gain access to the data".

Besides that, countries with long-term historical national OOP solutions, that are functioning well and widely used, may be less willing to adapt to alternative interoperability solutions used in other countries or/and on an EU/wide level, partly because of technological path dependency but also because of the additional human resources and financial means using that alternative systems may require, especially if the expected benefits are not entirely clear.

While the technical and semantic problems relating to operability initially entailed a crucial barrier to implementation of the OOP, they were also frequently mentioned as factors which TOOP pilots were able to overcome. Concerns for security and connectivity had also been reduced by the end of the pilots. Still, in a few cases, some technological issues relating to semantic interoperability, such as heterogeneity of concepts and meanings of data but also language differences continued to be troublesome

issues throughout TOOP pilot projects. A large part of the semantic interoperability cross-border concerns, also identified by interviewees, concerned the matter of data harmonization and the question of documents vs. data. A number of IT solutions have been developed over the years, in attempts to solve the data harmonization process. However, as already identified by the HUMBOLDT project in 2011 (Fichtinger et al. 2011), where the semantics of concepts are too heterogeneous or diverse, such solutions are not sufficient not advanced enough to understand language as well as people do. Therefore, more work between the domain experts themselves is needed to solve for the semantic issues. This was confirmed in many interviews, where the interviewees mentioned the limited work on semantics and lack of collaboration between the domain experts as a barrier to both the project and future implementation of the OOP - the project was directed more towards finding a technical architecture solution. In this case, semantic interoperability means not only that shared data is understood to be shared cross-border, and that language has been correctly translated and interpreted, but that that an understanding of the documents exists, which can be used to authenticate or authorize these same processes. For the sake of successful implementation of the OOP, continuing along the lines of using technological solutions which already exist and are in use in European Union Member States, we would need to solve the semantic questions rather than overwhelm public sector administrations across Europe with every type of document available, especially at a time where more and more Member States are moving away from documents and towards data.

Similarly, requirements and credentials may vary from Member State to Member State, which means that in the case of cross-border data exchange there could be difficulties in proving certain credentials. Digital authentication and signatures continued to be a problem until the end of the pilots and in this regard, the need to harmonize implementation levels of eIDAS across EU Member States remained an issue, slowing progress of the OOP.

4.2 Organizational Factors

Regarding the organizational dimension, the significance seems to have decreased slightly over time. Concerns regarding financial means and human capital, as well as organizations' capacity to implement the necessary technological changes remained of note; nevertheless, these were more salient at the start of the TOOP pilot than at the end. Moreover, factors such as inter-organizational communication and cultural differences, in line with organizations' willingness to share data, were very seldom perceived as important factors. With regard to the results from two waves of questionnaires, more concretely, our study suggests that concerns relating to financial and human resources, or alignment of processes between organizations' structures and processes, remained significant (Figs. 1 and 2).

A reason why these concerns could have been minimized was the legal push from the Single Digital Gateway Regulation (SDGR) that encouraged public administrations to take action to solve the problems regarding their bureaucratic proceedings. Pilot phase participants also identified SDGR as a solution to pushing OOP higher up the list of national political interests, in addition to solving some regulatory gaps in this field.
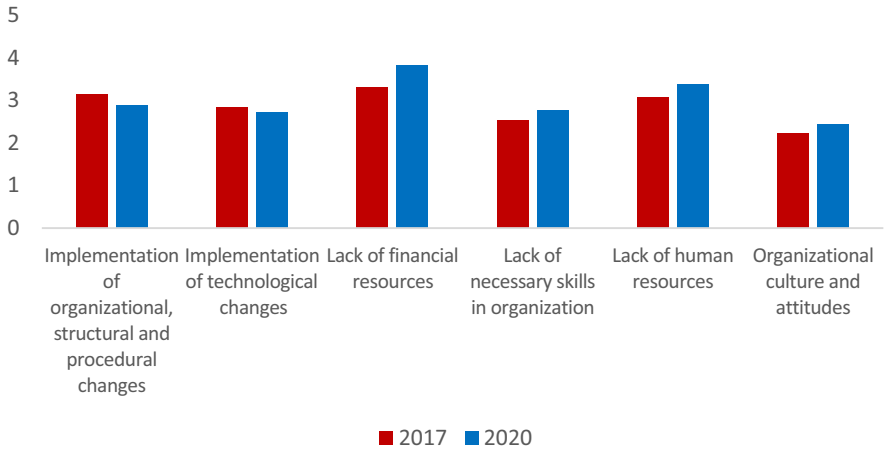
Fig. 1. Factors negatively impacting OOP implementation (scores are the mean value of all answers using a 5 point scale from 1 = very unlikely to 5 = very likely). Source: The Authors, based on survey responses.
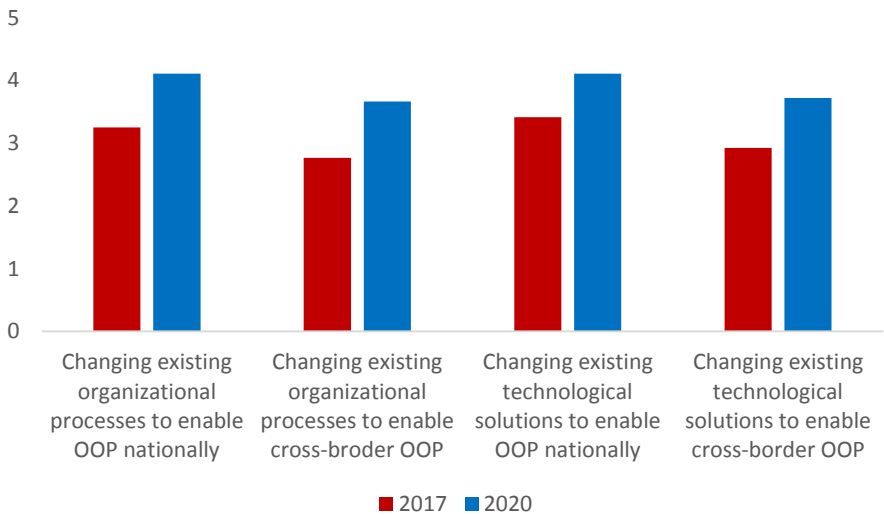
Fig. 2. Willingness to change existing technological solutions and organizational structures (5 = very open, 1 = very cautious) Source: The Authors, based on survey responses.

Even though there is a lower level of willingness to share personal information between countries, the implementing bodies' willingness to share this data with other organizations in the same country is not considerably lower. Furthermore, the results of the interviews and surveys show high levels of willingness to pursue organizational changes, in terms of processes, procedures, structures, as well as to adopt technological solutions, in order to enable OOP, both nationally and cross-border. The results indicate

that the benefits of the OOP became evident to most of the participants in TOOP pilots (Fig. 3).
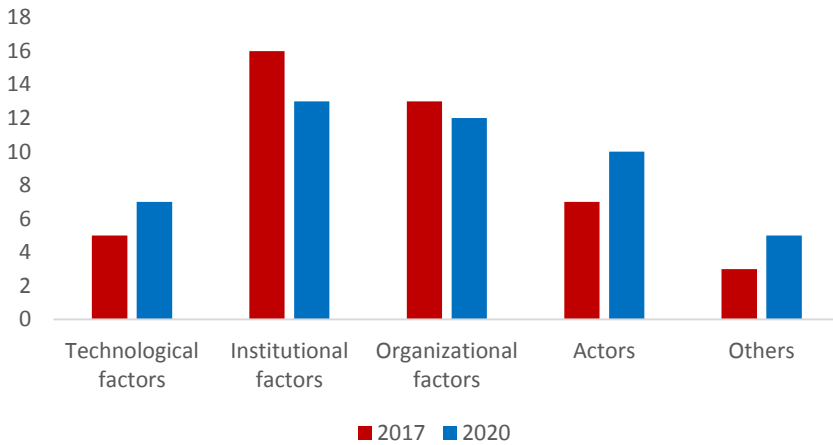
Fig. 3. Comparison of the most named barriers from the two surveys. Source: The Authors, based on survey responses (The number of respondents indicating as a barrier, multiple answers were possible).

One interesting finding uncovered here concerns the organization of IT developments in a given TOOP project partner or country, a factor not identified at the beginning of the Project. Namely, it turned out that TOOP Project partners and/or countries with in-house IT development units progressed faster with implementation of the OOP, compared to those outsourcing their IT developments to the private sector. Still, this organizational aspect might be specific to the TOOP Project as several country level TOOP developments had not been budgeted for, and those with local IT units and capacity, had the option to add TOOP Project related developments to their list of IT developments, whereas those relying on outsourcing were compelled to follow their budget cycle to allocate the financial resources required.

This last finding is in line with research on public procurement of innovation. Research shows that in cases where there are limited administrative capacities to procure innovative solutions, and if the solutions are purchased off-the-shelf (which OOP-related software elements are), there are barriers that slow down such developments and/or increase the risks (see Lember et al. 2014; Kalvet and Lember 2010).

4.3 Institutional Factors

Differently to technology and organizational dimensions, the institutional factors did not lose their importance throughout implementation of TOOP pilots. Our results suggest that two of the most important determinants for implementation of the OOP are both a sound legal basis and a clear political will and vision. In this sense, implementation of the OOP seems to rely heavily on the regulations put in place, but also on the key

actors´ will and conviction to pursue or demand that regulation and, at the same time, the ability to also integrate the OOP with rules and institutions already existing and in place. Legal obligation was previously categorized as more of a barrier during the ex-ante assessment due to limited legislation around implementation of the principle. The SDGR in some way filled that gap and was identified by many as the most influential driver for implementing OOP. As we can see, the prioritization to implement OOP on a cross-border scale increased at the central and regional government levels (Fig. 4).
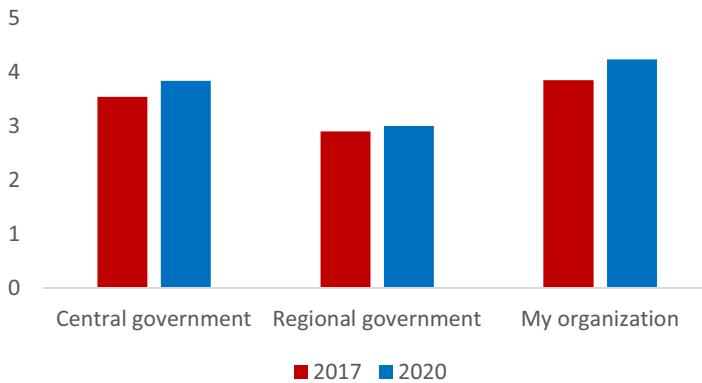

Fig. 4. Prioritization of OOP at different levels of implementation (5 = high priority, 1 = not a priority) Source: The Authors, based on survey responses.

While the SDG was regarded by most of the Member States in the project as a driver making the technological experiment that was TOOP a more purposeful and necessary endeavor, the Maritime pilot study had less impact due to the global nature of the sector. For the OOP to solve problems of efficiency in the maritime sector, it would need to be implemented on a much larger scale than just EU-wide; and the SDGR cannot solve for this.

More so than with the General Business Mobility pilot, the GDPR was mentioned as a factor contributing to the implementation of the OOP within the Maritime pilot. One of the reasons for this is the fact that crew certificates contain more personal information in them than certificates and licenses relating to businesses, which are often public information. The GDPR sets certain requirements for handling personal information, which could be a driver for favoring the TOOP solution for digital checks for crew certificates instead of the centralized system that is currently used by European Maritime Safety Agency (EMSA) to check ships' certificates. Maritime administrations already have the legal authority to store personal information while a centralized database would place the responsibility to securely store this data squarely on the shoulders of EMSA.

When piloting partners were asked to judge the willingness of their organizations towards different aspects of data sharing, the results were on average the same as for the original questionnaire completed in 2017. The only aspect towards which Member States actually became more cautious, if at all, was the sharing of personal data. One reason for this could be that the GDPR did not apply until 2018, which meant that, at

the start of the project, no wide-spread practice was in existence yet. At the end of the project, when considerable time in the project was dedicated to discussions on the impact of the GDPR to cross-border OOP, this resulted in higher openness of organizations to change (Fig. 5).
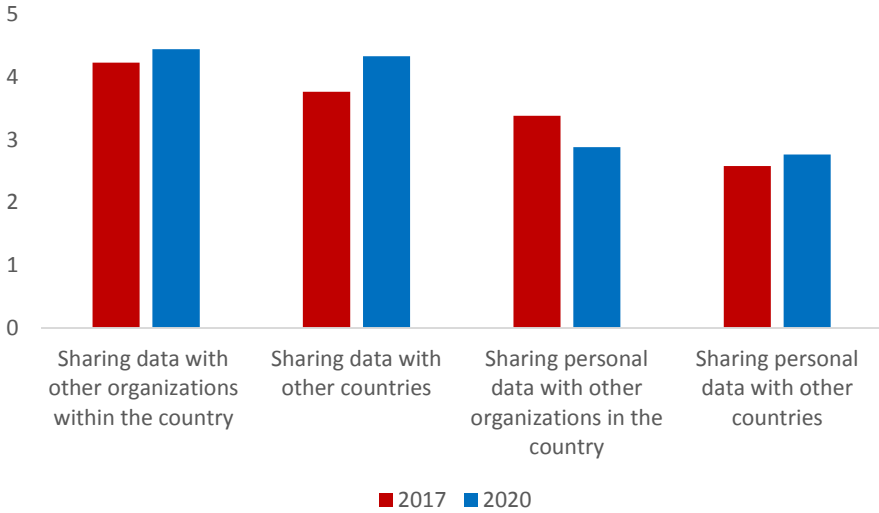
Fig. 5. Openness to sharing data (5 = very open, 1 = very cautious) Source: The Authors, based on survey responses

4.4 Actors

Government officials are critical for implementation of the OOP. Not only are their motivation and skills important, but a positive relationship also seems to exist between previous experience with the EU project, especially with the large-scale pilot project and willingness to drive the push forward and implement the OOP at a country level. TOOP pilot project participants also valued the contribution from their peers highly, in particular from more digitally advanced countries, for planning and implementation of national as well as cross-border OOP. There seems also to be a correlation between a partner implementing TOOP and/or a national coordinator with prior experience of EU Project management and/or involvement and national progress of the OOP, and personnel and staff with greater levels of EU project management experience, constituting more rapid progress of the OOP.

One aspect that was mentioned as a barrier on multiple occasions by interviewees across the pilot areas was the involvement or lack thereof of international regulatory organizations. In the Maritime pilot, this specifically includes regulatory bodies that have a wider scope than just EU such as the International Maritime Organization (IMO) and the Paris Memorandum of Understanding. Similarly, to issues with the SDGR, unless the once-only principle is taken on board by regulatory bodies with a wider scope than just the EC, implementation cannot achieve its full potential.

The importance of both institutional factors and actors is also evident in the barriers and obstacles pilot studies were unable to overcome. The low priority given to OOP, legal harmonization, low appeal to businesses (and therefore also to political agendas) and the existence of a national legal basis were all mentioned by respondents as barriers that persisted over time. Our results support the idea that the most important barriers to cross-border OOP come from external variables, rather that aspects intrinsic to the organization.

4.5   Other Factors

When it comes to implementing parties' perceptions after the end of pilot projects, there were primarily two perceived drivers of the OOP. On the one hand, most implementing bodies mentioned the importance of a legal basis existing, either on a national or supranational level. From the start, until the end of pilots, the institutional dimension continued to be perceived as a key, or perhaps even 'the key', driver for cross border implementation of OOP initiatives.

On the other hand, many participants also perceive the expected outcomes from the OOP as important drivers for implementation (e.g., simplification for citizens, businesses and public officials; reduced administrative barriers and burdens; and increased efficiencies of time and costs). This is an important aspect that implies that implementation and success of OOP projects relies on cost/benefit calculations carried out by their implementing parties. In this way, our results suggest that organizational and technological factors only indirectly drive implementation of the OOP, by affecting implementation costs and making the benefits of implementation easier to achieve. Previous experiences with national OOP implementations facilitate assessing the benefits and costs of cross-border OOP. This complements the findings on technical and operational level as mentioned in Sects. 4.1 and 4.2 (Fig. 6).
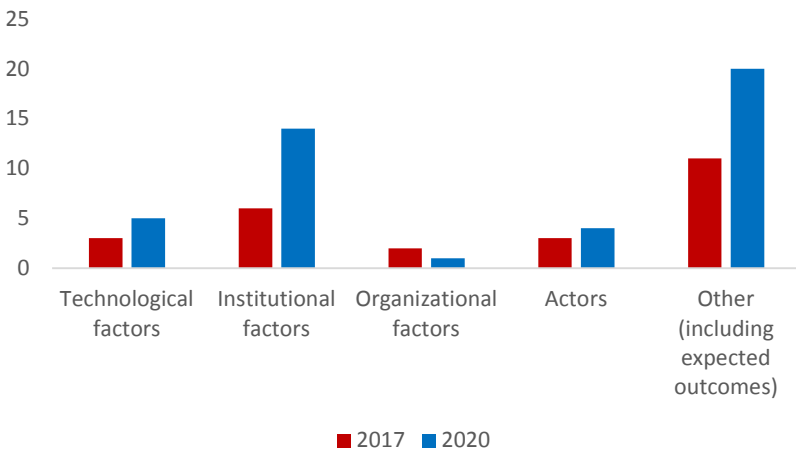
Fig. 6. Comparison of the most named drivers from the two survey results. Source: The Authors, based on survey responses (The number of respondents indicating as a driver, multiple answers were possible).

5 Discussion

The results of the research are clustered into (five) different areas.

Next to the influence of the law to the design of the technology, as laid out in the conceptual framework, it was identified that the **technological factors** further refined the legal framework as well as the organizational set up. The topology for solutions used across Europe is quite heterogeneous and technological path dependencies have emerged. Driven mainly by organizations or countries, different approaches were not, however aligned with one another (interoperability). Furthermore, in the past there was no coherent approach for interconnecting different actors (data providers and data consumers) relating to the OOP. In several cases, interconnections between actors were established just on a point to point / bilateral basis, and this led to optimization between a limited number of systems and caused a lack of interoperability. This situation gave rise to the need for some changes in technical and architectural approaches to create opportunities to exchange information between a wider range of parties. With the decision to create a technical layer permitting a multi connector exchange, a decision for a sound technical basis had been made.

On the part of **organizational factors**, the lack of a strong legal basis slowed down the whole process, when - based on the creation of SDGR - opportunities become necessities. These limiting factors are mainly determined by the capacity of the organizations involved. And these limitations are set into different dimensions, e.g. financial, organizational and capacity-wise.

Two different options are quoted to overcome these hurdles. These options were, on the one hand, to increase the resources required internally by organizations (insourcing) and, on the other hand, to buy in resources e.g,. via contracts with other entities (outsourcing).

- Two different options are quoted to overcome these hurdles. These options were, on the one hand, to increase the resources required internally by organizations (insourcing) and, on the other hand, to buy in resources e.g., via contracts with other entities (outsourcing).
- Insourcing on the plus side, ensures flexibility, and human resources in particular can be handled in a dynamic manner, in general reducing the related costs in comparison to costs for outsourcing. Furthermore, on the minus side, the risk for developing a proprietary solution is higher. This often includes the subject of interoperability.
- Outsourcing, on the plus side, reduces the internal workload and ensures that the necessary human and technical resources are available. Besides that, the opportunity to create a fully interoperable solution, complying with all respective standards is higher than with an in-house approach. One disadvantage is that this may lead to higher costs and limit flexibility.

An **institutional factor** was the lack of responsibility and coordination between different actors. Interconnections between different parties, especially in cross-border cases were made more based on needs than based on a structured and coherent approach. In an early stage of setup of the SDGR, the European Commission identified that European businesses criticized the lack of coordination and interoperability in ca. 80% of

cross-border cases as a major hurdle for administrative procedures Bieńkowska (2018). This caused additional costs and workloads for administrative procedures.

The different **actors** involved impacted the development of the SDGR in several ways: This first and foremost is the European Commission as a co-legislator of the SDGR that acts on the supra-national level., and then second the Member States, as aside of the EU Parliament, the other co-legislator and associated countries that bring in the national level perspective. With the initiative to set up the SDGR, the European Commission took on the responsibility for the first outline of the new regulation. The EC detected the wishes and needs on the one hand and the criticism that were addressed by businesses and citizens in Europe on the other hand. The main findings of this evaluation of the EC were, that the EU's national level services for information and assistance, and online procedures available now, are highly fragmented, with varying levels of cover and different levels of quality. They are also not user-centric, and are difficult to find and to use, especially for foreign users (European Parliament 2017). Thus, it is difficult for EU citizens and businesses to exercise their Single Market rights. As a co-legislator, the EC has initiated a process to create a regulation harmonizing the legal basis within Member States and associated countries. Those parties involved are at an early stage via representatives of the Points of Single Contact, chambers of commerce and several national and international authorities. Not only were they involved in the process to create the SDGR, but - to ensure the balance between the supra-national level of the EC and the national point of view - are still involved via the so-called SDG Coordination Group in the transition of the SDGR; and with setting up the subsidiary implementing act(s) and the associated technical specifications. It shows that the EC and the countries has chosen a collaborative and iterative approach to set up the legal framework for implementation and transition of the OOP in Europe.

Last but not least, **other factors** must also be taken into account. These are for example other players/stakeholders, e.g. supra national standardization bodies, such as ETSI and OASIS, but also GLEIF carrying its influence on the continued debate on updating the eIDAS regulation. Setting up the eIDAS regulation was a big step forward on the road to creating a common legal basis for the EU. Since the regulation assumed full legal effect in September 2018, implementation of a digital identity even within the eIDAS framework is recognized as being fragmented and not harmonized across Member States. This caused two main issues for interoperability.

Identity Matching Issue

Databases used by different administrations in the Member States are mostly designed for specific cases or services. The underlying structure of registers are often set up before generic rules for exchanging eIDs, such as in the eIDAS regulation have been established. The data schemes are strongly related to the services provided. This causes a gap for attributes permitting automated exchange of information and mapping of identities. Different information is collected about citizens and businesses and may identify people and organizations differently. To make things even more troublesome, some Member States (e.g., Germany) do not have persistent identifiers or only provide such persistent

identifiers as optional attributes. This causes a range of problems for matching the identity of a legal or natural entity even at a national but especially at a supranational level.

Record Matching Issue

Identification in Europe occurs via eIDs notified under eIDAS. In this case, there is a record matching issue depending on MS infrastructure. While using notified eIDs under the eIDAS Regulation, for the most part, allows data providers to match an identity with a record (evidence requested), using the attributes of the natural person provided by the eIDAS minimum data set, in some cases additional attributes are required to ensure a match. This is based on a lack of interoperability and the credentials defined in the eID schemes of the Member State.

Finally, for the OOP initiatives to succeed and in order to on-board the key stake-holders, the benefits of cross-border (such as administrative burden reduction, reduced time and costs for administrative processes, better quality data, improved reliability and validity) require further examination, and results of these studies must also be communicated.

6   Conclusions

This chapter offers an original empirical analysis of different factors affecting the adoption and functioning of cross-border initiatives of the Once Only Principle (OOP). We do so using a deductive approach and an exhaustive listing, based on relevant literature, for the different aspects have already been identified as potential barriers (or drivers) for the OOP. Those different factors were tested through interviews, surveys and focus group data.

Even though the readiness for implementation of the OOP varies considerably between countries, and financial/human resources are certainly an important factor for that, there are three aspects that consistently crop up as significant drivers/barriers for implementation of the OOP. The first one concerns the awareness of the OOP and its inherent benefits. The second one is enticements from external/supranational entities to make the cross-border OOP a national political priority. The third relates to establishing a critical legal framework, both at the EU and on a national level. In this sense, the political/decision-makers' will and institutional aspects are perceived as the most important drivers for the start and success of the OOP initiatives. When it comes to perceptions of the participants surveyed regarding implementation of the OOP, the "when" is far more relevant than the "how" can we do it. In this sense, to different degrees, all the countries studied demonstrated having the required technical and organizational conditions to implement the OOP.

When it comes to the OOP barriers, a major concern for the implementing parties is still the dimension of coordination required for implementation of a cross-border OOP project. This involves not only coordination between countries and organizations, but rather coordination at the EU level, including with other EU level projects. According to respondents, this barrier arises from different levels of readiness in countries/organizations, differences in the business models used by them, and also from concerns relating to the circulation of data and personal information. Even though the importance of this barrier decreased slightly during implementation of the project (i.e. there was an improvement in cooperation by the end of the pilot phases implemented), this is still a key factor to address/overcome in future cross-border OOP initiatives. Other barriers frequently mentioned dealt with semantic concerns, namely some level of distrust for translated documents and the differences of national standards on, where these exist.

When looking at key barriers towards implementation of pilot projects analyzed in this study, one could say that there has been some mystification regarding the EU countries' readiness to implement cross-border OOP. Not only are the existing perceived barriers relatively easy to overcome nowadays, but they also seem to have eroded considerably throughout the implementation process of TOOP pilot studies. This study suggests that, in very general terms, there are few factors, other than key actors´ will, hindering implementation of the OOP. However, we have also found some differences between the pilot study phases, regarding their barriers and drivers mentioned. When it comes to the different challenges faced by the TOOP pilot studies analyzed, there is some clear exceptionality in the case of piloting Online Ship and Crew Certificates. The barriers faced in that pilot were very specific to the global scale of that area (meaning that collaboration efforts, to have an impact, cannot be coordinated simply at an EU level. In addition to that, the fact that maritime certificates are produced in paper-based formats proves to be a great challenge to online data exchange. Concerns regarding security and privacy were also more relevant in this pilot).

To solve the issues relating to the problems described of identity matching mostly on the data provider side and record matching mainly on the data consumer side, a further alignment of the schemes and attributes in use is required. It is important to find solutions that cover the needs on national and international levels at the same time. Therefore, a European initiative is the most valuable approach. The recommendation would be to record the outcomes of the ongoing discussions on implementation of the SDGR in Members States, associated countries and on a European level and input them into updates of the eIDAS regulation. Preparation of the amendment of the eIDAS regulation is a great opportunity from a legal and technical point of view, to fix the existing problems.

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