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Cloud challenges towards Free Flow of Data

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Abstract

The Free Flow of Data is an emerging challenge to which the European Commission is currently working on with a legislative proposal due for the end of 2016, as part of the Digital Single Market (DSM) strategy. The proposal aims at tackling unjustified "restrictions on the free movement of data" among Member States. This paper analyses a number of cloud challenges of trustworthy inter-cloud environments identified by on-going EU-funded research initiatives dealing with security, privacy and data protection issues of Cloud solutions.

1. Introduction

The European Commission is currently working on a legislative proposal on Free Flow of Data (due for the end of 2016), as part of the Digital Single Market (DSM), i.e. the Pilar I of the Europe 2020 Strategy[1]. The proposal aims at tackling "restrictions on the free movement of data for reasons other than the protection of personal data within the EU and unjustified restrictions on the location of data for storage or processing purposes. It address the emerging issues of ownership, interoperability, usability and access to data in situations such as business-to-business, business

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to consumer, machine generated and machine-to-machine data. It will encourage <u>access to public data</u> to help drive innovation"[1].

These restrictions are likely limiting the Single Market for cloud-based applications and cloud services, among others. According to the estimates in "SMART 2013/0043 - Uptake of Cloud in Europe" report[2], in year 2020, cloud computing business could reach €103b of net new GDP (including the public sector), a share of 0.71% of total EU GDP. Therefore, the Free Flow of Data is seen as a key enabler of the EU Data Economy growth in future years.

Other important cloud aspects such as certification of cloud services and switching of cloud service providers are in close relation to the Free Flow of Data and will also be tackled within the European Cloud Initiative to be launched by the Commission.

This paper analyses a number of cloud challenges of trustworthy inter-cloud environments which will be one of the architectural pillars of cross-border services in the Single Market. These challenges are those identified in the context of the collaborative activities of the DPSP Cluster[3], as explained in Section 2.

2. Methodology

The work presented in this paper was born from the activities of the Data Protection, Security and Privacy Cluster of EU-funded research projects on Cloud[3], a collaborative initiative made of 24 projects that work towards innovation on Cloud security and privacy. The clustered projects include mostly on-going H2020 projects but also a few FP7 projects and CIP projects. The DPSP Cluster, through a survey made among all the clustered projects, produced a whitepaper[4] which collects the research challenges that individual projects have identified with respect to the main areas of work of the Free Flow of Data (initiative #14 within the Digital Single Market strategy). It is worth noticing that some challenges proposed in the whitepaper have significant overlaps, due to the different source of information.

While the whitepaper collects the information on the challenges by project and topic, and the timeframe of the projects span from year 2016 to 2020 and beyond, in this paper we focus on all the challenges for the period of 2018-2020 that address the specific topic of *free movement of data*, trying to identify the open challenges that may affect the movement of data. For each challenge we propose our own interpretation of how it relates to and impacts the free movement of data.

According to the collected data, we conclude the paper with a brief summary of the challenges associated to the topic of free movement of data and our conclusions on the topic.

3. Free Movement of Data: The open Challenges

According to the DPSP whitepaper the main challenges related to free movement of data are briefly summarized in the following table, where we outline the relationship with the topic of *free movement of data*. For a detailed description of the challenge, we refer to the DPSP whitepaper[4]. In order to facilitate the references, for each challenge proposed we report the name of the source project that identified it.

Table 1. Open challenges for Free Movement of Data

#	Challenge	Relationship with Free Movement of Data	Keyword	Proposed by
1	Making the cloud ecosystem secure for outsourced data	The trust in Cloud Service Provider (CSP) is the key topic to enable easy movement of data.	Trust in CSP	CLARUS[5]
2	Privacy-enabling mechanisms to protect sensitive data	Customers need tools to control the protection of their data.	Privacy, Monitoring	CLARUS
3	Data protection and legal jurisdiction	Legal jurisdiction affect the security requirements of the applications, different laws imply different security requirements.	Law & regulation framework.	CLARUS
4	Interoperability-by-design to	Interoperability among CSP is the main	Interoperability	CLARUS