Scalable Policy-aware Linked Data Architecture for privacy, transparency and compliance

H2020-ICT-2016-1 Big Data PPP: privacy-preserving Big Data technologies (ICT-18-2016) call
Technological problem - General Data Protection Regulation supporting consent and transparency

Draft of the regulation: 7/22/2012
Revisions in the draft: 3/12/2013
Discussions in the EU Council: 5/19/2014
Trilogue starts: 6/24/2015
EU Council finalises the chapters: 8/6/2015
Trilogue agrees: 12/17/2015
Comes into force: 5/15/2018
Technological problem - General Data Protection Regulation supporting consent and transparency

Companies whose business models rely on personal data

Data subjects who would like to declare, monitor and optionally revoke their (often not explicit) preferences on data sharing

Regulators who can leverage technical means to check compliance with the GDPR
Technological problem - General Data Protection Regulation supporting consent and transparency
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• Policy management framework
  ❖ Gives *users control* of their personal data
  ❖ Represents *access/usage policies* and *legislative requirements* in a *machine readable format*

• Transparency and compliance framework
  ❖ Provides information on how data is *processed* and with whom it is *shared*
  ❖ Allows data subjects to take *corrective action*

• Scalable policy-aware Linked Data architecture
  ❖ Build on top of the Big Data Europe (BDE) platform *scalability and elasticity mechanisms*
  ❖ Extended BDE with *robust policy, transparency and compliance protocols*
Software components - Foundations

- **Big Data Europe** scalability and elasticity
- **PrimeLife** policy languages, access control policies, release policies and data handling policies
- SPECIAL uses the **Linked Data paradigm**
- All data items are identified by **globally unique identifiers** (i.e. Internationalised Resource Identifiers (IRI’s))
- By using HyperText Transfer Protocol (HTTP) IRI’s everythng is potentially linkable
• IRI’s allow SPECIAL to make semantic assertions (access/usage constraints) on the data items using **Linked Data annotations**

• Legacy systems can be integrated via **transformation middleware**
Software components - Policy Ingestion

- Record **context** information and **access/usage** constraints
- Handle a broad **variety of sources and formats**
- Take a **privacy-by-design** approach and allows for conscious decisions about data collection and data (re)use
• When sharing data or query results information is **securely stored and exchanged**

• Enable efficient **queryable encryption** based on **compressed** RDF data
• **Data sharing** can be done along data value chains in a way that includes the policy information

• Gluing policy information to the payload data persistently, even across company borders, is called “**sticky policies**”
  - Data protection **constraints**
  - Other **limitations** and obligations
• Categorise and subdivide data through annotations into sensitivity categories/levels or based on fine-grained user-policies
• Policy aware aggregation and anonymisation techniques
• Recording of the sharing event in a manner that supports non-repudiation
Software components - User Control

- Interactive Dashboard
  - Display **highly relevant information** to the user based on context
  - Map what the users sees to their **entire Linked Data graph**
  - Investigate how semantified data can cater for **better informed consent**
- Relieve the burden of policy management via **Templates**
- Support **versioning, revocation, and forgetting** functionality
Adversaries & Additional input

• Challenges
  ❖ Provide synthesised linked graph data (linked to existing open data sets) and challenge users to **reconstruct those encrypted graphs**
  ❖ Develop simulated synthesised policies and datasets and derive challenges to **retrieve and re-construct unauthorised information** from our system

• Workshops
  ❖ Discuss limitations and possible **additional challenges**
  ❖ Derive **challenges that can not be tested automatically** e.g. policies that cannot be enforced by automated means need to be protected by (legal) contracts

• Additional Input
  ❖ ICT-18-2016 and ICT-14-2016 projects
  ❖ Privacy & Us (Privacy & Usability) [https://privacyus.eu/](https://privacyus.eu/), Data markets Austria [https://datamarket.at/](https://datamarket.at/), etc...
  ❖ W3C standardisation activities
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