THE NEXT GENERATION INTERNET FORUM:
EXPLORING THE TRENDS, PRIORITIES AND CHALLENGES OF BUILDING THE NGI ECOSYSTEM

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NGI Governance: Beyond Technology Challenges

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commercial-in-confidence
We live in an increasingly connected world. (Open) Linked Data is the term coined by Tim Berners-Lee to refer how structured data and metadata can be used to connect people and digital objects on the web. In fact, semantic web languages (XML, RDF, OWL…) and the so-called Big-Data and the Internet of Things, are challenging the way we perceive our identity, our social relations, and their institutional bonds. **We are experiencing a deep cultural change.**

How is the law coping with this? Are our current ruling instruments enough to define and regulate rights and norms that are already expressed mainly through computational means? And what about the rule of law inherited from the 20th century? Is it still able to set the general framework for representing how the law might work on the web of data?
Three preliminary concepts

- **Meta-rule of law**: protections and principles of the rule of law can be represented into the languages of the web of data, and embedded into compliance systems to generate trust and to define the global space as a public space.

- **Linked democracy**: in absence of a rule of law with international scope, the notion of linked democracy operates within this space in which corporations, companies, rulers, providers, consumers and citizens are using all kind of linked-data repositories that cannot be treated as separate silos, as they are linked through graph-driven mechanisms.

- **Compliance through design (CtD)**: The allocation of behavioural expectations (assignment of rights and obligations) in terms of a shared technological framework; computer systems and human-machine interfaces that create an aggregated value fostering the connection between Web 2.0 and Web 3.0 (linking / security)
Three Trends

**Transparency Immersive Experiences**
- Human Augmentation
- 4D Printing
- Brain-Computer Interface
- Human Augmentation
- Volumetric Displays
- Affective Computing
- Connected Home
- Nanotube Electronics
- Augmented Reality
- Virtual Reality
- Gesture Control Devices

**Perceptual Smart Machine Age**
- Smart Dust
- Machine Learning
- Virtual Personal Assistants
- Cognitive Expert Advisors
- Smart Data Discover
- Smart Workspace
- Conversational User Interfaces
- Smart Robots
- Commercial UAVs (Drones)
- Autonomous Vehicles
- Natural-Language Q & A
- Personal Analytics
- Enterprise Taxonomy and Ontology Management
- Data Broker PaaS (dbPaaS)
- Context Brokering

**Platform Revolution**
- Neuromorphic Hardware
- Quantum Computing
- Blockchain
- IoT Platform
- Software-Defined Security
- Software Defined Anything (SDx)
“Knowing an average is not that useful for us, **what we want is really the individual**. This is me…(…) How to reskill this up? Well… traditionally what’s done is that you give each person a survey. You ask them a set of questions, and at the end you can infer something about that personality. But to get a reliable estimate of that personality you may need hundreds of persons. (…). It’s a look to ask for the person. So, what I want to do instead is using the Facebooks like of these individuals, use them as an input to machine learning models, to be able to predict their personality and bypass the survey completely.”
• All persons and organisations including the government are subject to and accountable to the law
• The law is clear, known, and enforced
• The Court system is independent and resolves disputes in a fair and public manner
• All persons are presumed innocent until proven otherwise by a Court
• No person shall be arbitrarily arrested, imprisoned, or deprived of their property
• Punishment must be determined by a Court and be proportionate to the offence
CAPER Architecture flow
<table>
<thead>
<tr>
<th>CAPER Architecture Flow and Rules</th>
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<table>
<thead>
<tr>
<th>I Data Collection and Storage</th>
<th>R1.1 Every LEA should perform a specific Privacy Impact Assessment (PIA) according to the general framework offered by the CAPER Regulatory Model (CRM).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R1.4 No automated classification of suspects, victims and witnesses can be inferred from CAPER results.</td>
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<table>
<thead>
<tr>
<th>II Data Management</th>
<th>R.2.3 Access to CAPER database should be granted for the purpose of prevention, detection or investigation of organized crime.</th>
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<tbody>
<tr>
<td></td>
<td>R.2.4 Any other request of access for other purposes should be rejected.</td>
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<tr>
<td></td>
<td>R.2.5 Non-authorised LEA and intelligence services or administrative bodies of authorized LEA should not have access to CAPER data.</td>
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<td></td>
<td>R.2.6 The use of system integrity tools should enable detection and reporting of changes applied on servers. In case of such an event the system should be able to notify specific users such as the creator of the query which results have been modified.</td>
</tr>
<tr>
<td></td>
<td>R.2.7 Regular audits of the CAPER system should be performed by the external supervisor. The competent authority should be informed of the results, if necessary, according to national legislation, including the plans for enforcing recommendations.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>III. Data Reuse and Transfer</th>
<th>R3.2 No automated classification of suspects, victims and witnesses can be inferred from CAPER results.</th>
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<tr>
<th>IV Right of Data Access</th>
<th>R.4.2 The reasons to deny access should be clear and defined. Access can be denied when the access may jeopardise the fulfilment of the LEA tasks, or the rights and freedoms of third parties.</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>R.4.2 The alleged reasons to deny access should be open to external supervision. The external supervisory authority should have free access to documents justifying the refusal. A short time-span of three months to give an answer to a previous request of access should be implemented.</td>
</tr>
</tbody>
</table>

• Directive (EU) 2016/680 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data by competent authorities for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and on the free movement of such data, and repealing Council Framework Decision 2008/977/JHA.

<table>
<thead>
<tr>
<th>Legal Instruments</th>
<th>URI</th>
<th>RDF Statement</th>
<th>RDF Dataset and Mappings</th>
<th>Ontology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copyright Directive</td>
<td>No</td>
<td>No</td>
<td>Seldom</td>
<td>Often</td>
</tr>
<tr>
<td>Database Right Directive</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Data Protection Directive</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Trade Secrecy Law</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Seldom</td>
</tr>
<tr>
<td>Computer Program Directive</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Patent Law</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Law + “Smart Regulations”

- Constitution, statutes, acts, rulings (case law)...
- Policies, best practices (W3C), protocols, ISOs...
- Ethics (values and principles embedded into systems)
- Regulatory ontologies, ODP, RELs...
- Privacy, Data Protection, Security, Compliance... by design (CbD)
Regulatory Methodologies for Corporate Governance

- ISO 17799 (developed today by ISO 27001/02)
- ISO/IEC 27002
- COmmittee of Sponsoring Organizations of the Treadway Commission (COSO)
- Control OBjectives for Information and related Technology (COBIT) (ISACA org.)
- The Security Quality Requirements Engineering (SQUARE, Carnegie Mellon)
PROBLEM: How all these smart regulations and regulatory languages can be (legally) implemented?

Semantic regulatory languages

• Business, Legal, and Regulatory Compliance
• Linked Open Data (e.g. Dbpedia)
• Rights Expression Languages (e.g. licenses)
• Open Digital Rights Expression Languages (ODRL)
• ODRL governance
• Ontology Design Patterns (ODP)
• Multi-lingual repositories and ontologies (e.g. EU CELLAR, terms banks -OntoLemon)
• eXtreme Design methodologies, gGraph standardisation of ontology reuse practices (e.g. Framester: hub between WordNet, VerbNet, BabelNet, Predicate Matrix…)
• 1 million different resources in 9.9 million linguistic versions
• 220 million identifiers
• 114 million files (with an actual growth rate of about 10%)
• 1.473 billion RDF triples
RDF Datasets coloured by license type. Green indicates “share-alike” style (cc-by-sa, gfdl, odchttp://lod-cloud.net/ 14-odbl licenses), blue nodes indicate in the public domain (expressed with cc-zero or odc pddl) or only attribution (like cc-by, odc-by licenses), orange nodes indicate with ‘some restrictions’, like “non-commercial” or “no derivatives”. Source: http://lod-cloud.net/
Rights Expression Languages (REL) are computer languages created to handle and manage rights and obligations (permissions and prohibition) about content use, i.e. a “format for describing rights, i.e. permissions and constraints, related to the use of content.”

A REL may use Entity-Attribute-Value model, as for RDF, to structure its description of a rights as a list of (i) entities (such as a “work”, or “asset” for a license), (ii) attributes (properties, such as actions that are permitted or forbidden, as constraints), (iii) values for these properties, from a pre-defined vocabulary, i.e. using or modifying the work.

Well-known REL are ccREL (Creative Commons language to express their licenses), XrML, the eXtensible Rights Markup Language which has also been standardised as the Rights Expression Language (REL) for MPEG-21, and W3C Open Digital Rights Language (ODRL).
ONTOLOGY DESIGN PATTERNS

- An ODP is a structural pattern, a reusable successful solution to a recurrent modelling problem. It brings together expert and engineering knowledge, and can be used to build other domain or core ontologies for a particular field of knowledge (Gangemi and Presutti, 2009)

- Methods: (i) controlled vocabularies, implemented in a terminology database (such as IATE run by all the main EU Institutions), (ii) thesauri (as EUROVOC), (iii) semantic lexicons or lightweight ontologies (as WordNet, EuroWordNet and, in the legal domain, JurWordNet, EuroVoc Thesaurus), (iv) structural patterns (Ontolex-Lemon: standard to represent lexicons relative to ontologies)

- Linked data resources: e.g. Framester is a large RDF knowledge graph (currently including about 30 million RDF triples) acting as a hub between FrameNet, WordNet, VerbNet, BabelNet, Predicate Matrix, etc.

**ODRL Terminology (Policy concepts).**

- **Policy**: A set of Rules defining what is allowed, disallowed or obligatory over an Asset.
- **Rule**: A set of Actions defining the precise Permissions, Prohibitions and obligations over an Asset.
- **Action**: An operation that can be allowed by Permissions, disallowed by Prohibitions, or made obligatory by Duties.
- **Permission**: A set of Actions that are allowed to be performed over an Asset.
- **Prohibition**: A set of Actions that are forbidden to be performed over an Asset.
- **Duty**: A set of Actions that are obliged to be performed for Permissions.
- **Asset**: The subject of a Policy that Rules are applied to.
- **Party**: An identifiable entity who undertakes a role in the Policy e.g., a person, a group of people, an organisation, or an agent.
- **Constraint**: The limits and restrictions to Actions in Rules.
http://creativecommons.org/licenses/

The licenses on Creative Commons content, to search for Creative Commons content, look up pictures at Flickr, albums at Jamendo, and general media at spinexpress. The Wikimedia Commons, the multimedia repository of Wikipedia, is a core user of our licenses as well.

Taken together, these three layers of licenses ensure that the spectrum of rights isn’t just a legal concept. It’s something that the creators of works can understand, their users can understand, and even the Web itself can understand.

mechanisms that [if chosen] helps the digital commons grow over time.
ShareAlike is inspired by the GNU General Public License, used by many free
and open source software projects.

Three “Layers” of Rights Expression Languages

Rights
Expression
Languages

Rule of law

Law

Meta-rule of law

Expert Language

Natural Language

Formal Language
<table>
<thead>
<tr>
<th>SOCIAL RULES</th>
<th>PRIMARY RULES</th>
<th>SECONDARY RULES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) General</td>
<td>(1') Lack of certainty</td>
<td>(1'') Recognition</td>
</tr>
<tr>
<td>(2) Permanent</td>
<td>(2') Static quality</td>
<td>(2'') Change</td>
</tr>
<tr>
<td>(3) Coactive</td>
<td>(3') Spread social pressure</td>
<td>(3'') Adjudication</td>
</tr>
<tr>
<td></td>
<td>PRE-LEGAL</td>
<td>LEGAL</td>
</tr>
</tbody>
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**LAW'S MINIMUM CONTENT:**
- "NATURAL NEEDS"
- Vulnerability (Prohibition of violence)
- Approximate equality (Obligations and concessions' system)
- Limited altruism (Obligations and concessions' system)
- Limited resources (Property)
- Understanding and limiting power (Need of sanctions)

**EXTERNAL POINT OF VIEW**
- External factual statement (Effectiveness of rules)

**INTERNAL POINT OF VIEW**
- Internal sense statement (Validity of rules)

**DESCRIPTIVE USE OF LANGUAGE**
- Prediction, explanation

**OPERATIVE USE OF LANGUAGE**
- Understanding

**PRIMARY RULES' OBEDIENCE BY CITIZENS**

**EFFECTIVE ACCEPTATION BY THE CIVIL SERVANTS AS A GUIDELINE OR PUBLIC MODEL OF OFFICIAL CONDUCT**

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**Valid rule = Legal rule**

**NATION-STATE Vs. Global Law, Global Ethics**

Regulations
- Hetero-regulation
- Co-regulation
- Self-regulation

Institutionalisation of the Web of Services (meta-rule of law)
Institutionalisation of the Web of Services (meta-rule of law)
Institutionalisation of the Web of Services (meta-rule of law)
The Internet was built without a way to know who and what you are connecting to. This limits what we can do with it and exposes us to growing dangers. If we do nothing, we will face rapidly proliferating episodes of theft and deception that will cumulatively erode public trust in the Internet. [...] Our approach has been to develop a formal understanding of the dynamics causing digital identity systems to succeed or fail in various contexts, expressed as the Laws of Identity. Taken together, these laws define a unifying identity metasystem that can offer the Internet the identity layer it so obviously requires. (Kim Cameron, 2005)
<table>
<thead>
<tr>
<th><strong>1. Openness and transparency</strong></th>
<th>There should be no secret record keeping. This includes both the publication of the existence of such collections, as well as their contents.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2. Individual participation</strong></td>
<td>The subject of a record should be able to see and correct the record.</td>
</tr>
<tr>
<td><strong>3. Collection limitation</strong></td>
<td>Data collection should be proportional and not excessive compared to the purpose of the collection.</td>
</tr>
<tr>
<td><strong>4. Data quality</strong></td>
<td>Data should be relevant to the purposes for which they are collected and should be kept up to date.</td>
</tr>
<tr>
<td><strong>5. Use limitation</strong></td>
<td>Data should only be used for their specific purpose by authorized personnel.</td>
</tr>
<tr>
<td><strong>6. Reasonable security</strong></td>
<td>Adequate security safeguards should be put in place, according to the sensitivity of the data collected.</td>
</tr>
<tr>
<td><strong>7. Accountability</strong></td>
<td>Record keepers must be accountable for compliance with the other principles.</td>
</tr>
</tbody>
</table>

**PRINCIPLES OF FAIR INFORMATION PRACTICES (FIPs)**

Institutionalisation of the Web of Services (meta-rule of law)
Regulations
Hetero-regulation
Co-regulation
Self-regulation

Institutionalisation of the Web of Services (meta-rule of law)
Regulations
- Hetero-regulation
- Co-regulation
- Self-regulation

Governance
- Networked Governance
- Policies, Regulations, Efficiency, Assent

Soft Law
- Expertise, Standards, Recommendations, Conformance

Hard Law
- Laws, Acts, Sentences, Enforcement, Abidance

Emergency
- Justice, Values, Principles, Concurrence

Institutionalisation of the Web of Services (meta-rule of law)

Web 2.0
- Social Networks, Prosumption, Crowdsourcing, Participation

Web 3.0
- Web of Data, Web of Service, Open Linked Data, ODL, Ontologies, DRM, Users’ Empowerment

Web 4.0
- Internet of Things, MAS, AI, Robotics
**Institutionalisation of the Web of Services (meta-rule of law)**

**Governance**
- Networked Governance
- Policies, Regulations, Efficiency, Assent

**Web 2.0**
- Social Networks,
  - Prosumption,
  - Crowdsourcing Participation

**Web 3.0**
- Web of Data, Web of Service, Open Linked Data, ODL, Ontologies, DRM, Users’ Empowerment

**Web 4.0**
- Internet of Things, MAS, AI, Robotics

**Hard Law**
- Laws, Acts, Sentences,
  - Enforcement
  - Abidance

**Soft Law**
- Expertise, Standards,
  - Recommendations,
  - Conformance

**Legal Dimension**

**Social Dimension**

**Semantic Dimension**

**Regulations**
- Hetero-regulation
- Co-regulation
- Self-regulation

**Ethics**
- Justice, Values, Principles, Concurrency

**Institutionalisation of the Web of Services (meta-rule of law)**
Institutionalisation of the Web of Services (meta-rule of law)

Legal Dimension
- Hard Law
  - Laws, Acts, Sentences
  - Enforcement
  - Abidance

- Regulations
  - Hetero-regulation
  - Co-regulation
  - Self-regulation

Semantic Dimension
- Web 2.0
  - Social Networks
  - Prosumption
  - Crowdsourcing
  - Participation

- Web 3.0
  - Web of Data
  - Web of Service
  - Open Linked Data
  - ODL, Ontologies, DRM
  - Users’ Empowerment

- Web 4.0
  - Internet of Things
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Soft Law
- Expertise, Standards, Recommendations, Conformance

Hard Law
- Legal Dimension

Ethics
- Justice, Values, Principles, Concurrence
Institutionalisation of the Web of Services (meta-rule of law)
Regulatory Meta-Model

Institutional Strengthening

Continuum of legal institutional strengthening

Hard Law

Soft law

Policies

Ethics

Binding Power

(-/+)

Social Dialogue (+/-)
Hard Law

Soft Law

Policies

Ethics

Institutional Strengthening: TRUST/SECURITY

Validity

Efficiency

Enforceability

Justice

Continuum of legal institutional strengthening

Regulations

Binding Power (+/-)

Social Dialogue (-/+)

Validity

Efficiency

Enforceability

Justice
1 Principles, Values
2 Standards, Recommendations
3 Regulations, Administrative acts
4 Legal Norms

Rule of law
1 Principles, Values
2 Standards, Recommendations
3 Regulations, Administrative acts
4 Legal Norms

Rule of law
Market Constraints (+/-)

Relational Law

Negotiations (-/+)

Regulatory Ecosystem

Parl./Courts

Agencies

Expertise

Citizens

Institutional Strengthening:

TRUST/SECURITY

1. Principles, Values
2. Standards, Recommendations
3. Regulations, Administrative Acts
4. Legal Norms

Rule of law

Meta-rule of law
Parl./Courts

Agencies

Expertise

Citizens

Market Constraints (+/-)

Negotiations (-/+)

Legal Ecosystem

1 Principles, Values
2 Standards, Recommendations
3 Regulations, Admin. Acts
4 Legal Norms

Rule of law

Meta-rule of law
Thank you very much!

Castillos en el aire? A pie in the sky? Bâtir des châteaux en Espagne?