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INTEROPERABILITY BETWEEN IT AND LAW

Some challenges and opportunities for legal tech developers and educators (from IT practitioner’s point of view)

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Estonian Information System Authority
“Simple truth of Being nullifies all Plans Systems Programs” -- Jacques Tornay

“New systems are always developed by breaking some law” -- One of the founders of the Estonian IT success story, private conversation
Estonian Information System Authority
We are responsible for technical co-ordination of Estonian public sector IT
We develop and operate governmental infrastructural systems: X-Road, e-Identity, Citizen’s Portal, Metadata Repository etc.
We are cyber security leaders & specialists
100+ IT professionals
100+ IT projects in the pipeline

Priit Parmakson
areas of work: interoperability, protocol design, metadata management, development workflow
leader in open development (avaarenduse eestvedaja) [1]
eat-your-own-dogfooder (veendunud koeratoitlane)[2]
some academic background, teaching IT at Tallinn University

What do we believe in IT?
Toimiv koostöö ja töötav kood
(Toimiv koostöö ja koostalitlusvõimeline kood)
“Rough consensus and working code” [1][2]

David Clark,
computer scientist and
Internet pioneer

https://www.ietf.org/tao.html
Co-operation
No working code without human co-operation.
Contributions in IT projects (*tööpanused*): directed either
to improve code (50%) or to improve co-operation (50%).
- Human-to-human co-operation – organisational
  interoperability
- Machine-to-machine co-operation – technical
  interoperability
- Human-machine – user experience (UX)

Working code
No real IT without working code.
Code here in sense of programming
Code = executable ... by machines ... by humans?
Code = human-readable at the same time
How important is code in IT today?
“Our children — including our girls — need the opportunity to learn computer science.”

-- Sheryl Sandberg, COO
Facebook

Source: https://code.org/
Interoperability

"Interoperability means working together - collaboration of systems, services and people." — European Interoperability Framework

If you want a legal definition then it’s here:

"Interoperability" means the ability of disparate and diverse organisations to interact towards mutually beneficial and agreed common goals, involving the sharing of information and knowledge between the organisations, through the business processes they support, by means of the exchange of data between their respective ICT systems.” — Article 2 of the ISA2 decision

Compare the first definition with the second - and we come to terminology issue. More about it later.
In more technical sense, interoperability means that

“The hard problem has always been interoperability [...] The point of a standard is to establish interoperability such that anyone can read the standard, implement it, and is guaranteed interoperability from others that have implemented the standard.”

“Ultimately, the purpose of a standard is to propose a solution to a problem that ensures interoperability among implementations of that standard. Furthermore, standards that establish a network of systems, like the Web, must detail how interoperability functions among the various systems in the network. This is the golden rule of standards - if you don’t detail how interoperability is accomplished, you don’t have a standard.” -- Manu Sporny
Many Sporny, internet standards renowned leader, W3C Web Payments Working Group, 10,000th Estonian e-resident

Source: https://twitter.com/manusporny/status/733330242388037632?lang=en
European Interoperability Framework

a high-level EU IT policy document [1], regulates EU cross-border public services.
- version 1.0 in 2004; version 2.0 in 2010
- currently under review [2]

An interoperability framework is a commonly agreed approach to interoperability for organisations that wish to work together towards joint delivery of public services and/or exchange of information.

It specifies a set of common elements such as a common vocabulary, concepts, principles, policies, guidelines, recommendations, standards, specifications and practices.

[1] European Interoperability Framework (EIF) for European Public Services,
[2] EIF review public consultation,
Interoperability levels

Current model:

- **Political Context**
  - Cooperating partners with compatible visions, aligned priorities, and focused objectives
  - Aligned legislation so that exchanged data is accorded proper legal weight

- **Legal Interoperability**
  - Legislative Alignment

- **Organisational Interoperability**
  - Coordinated processes in which different organisations achieve a previously agreed and mutually beneficial goal
  - Organisation and Process Alignment

- **Semantic Interoperability**
  - Precise meaning of exchanged information which is preserved and understood by all parties
  - Semantic Alignment

- **Technical Interoperability**
  - Planning of technical issues involved in linking computer systems and services
  - Interaction & Transport


Note the focus on alignment of items on the same level.

Source: EIF Revision. Draft intermediate version.
See also: Peristeras V (2016) The revision of the European Interoperability Framework,
What is legal interoperability?
Current view of main legal barriers for interoperability of EU cross-border public services [1]:
- Incoherent multiple laws for the same subject, i.e. base registries at national level;
- Law that restricts digitalisation of services and interoperability;
- Non-harmonised references from the legal text to ICT requirements for solutions that will support/implement the concerned legislation;
- Security, data protection and related issues that apply in different forms across the EU Member States.


Interoperability barriers; Interoperability conflicts
Purpose of law? Less conflicts!

Recommendation 41.
Public administrations should carefully consider all relevant legislation relating to data exchange, including data protection, when seeking to establish a European Public Service.

What is technical interoperability?
Interoperability standards


Case: International standardisation of X-Road. Cannot sell without standard.
Horizontal and vertical interoperability
Legal analysis is standard element in our IT projects (5-10%... up to 100%). Legal aspect is often critical in information system lifecycle.

Legal aspect is easy to undervalue. Case: National e-invoicing network
Invisible (for traditional IT system analysis) web of contracts. Contracts are costly!

**Web of contracts**
Case 2: X-Road international federation

Trust agreement
Co-ordination of Legal and IT

Preparation

Open for bids

Winner

Contract

Development

Complete

Public procurement process

Financing process (EU)

Preliminary application

Submit

Decision

Full Application

Decision

Submit

Concept description

Approval for establishment

Enhance the description

Approval for launch

Registration

Drafting the statute

Writing and processing the draft

RIHA process

Submit

Approval for establishment

Writing and processing the draft

Legislative process

Passing the statute

Launch ("Live")

Operations

Planning for security measures

All essential security measures in place

INFOSEC process

X-Road process

Determination of security requirements

Joining X-Road

Access to test environment

Access to production environment

Co-ordination of Security and IT

Co-ordination of Legal and IT
In information society:
- law is largely implemented through e-services and information systems.
- innovation is largely driven by IT.

Well-known IT educator Peter Denning has distinguished four core practices of IT: (1) programming; (2) systems thinking; (3) modeling; (4) innovating. [1] [1] Denning P (2003) Great Principles of Computing. Comm. ACM, 46, 11

But often, IT cannot keep up with Law..
..or Law cannot keep up with IT.

Agile development + Traditional legislative process
Would “fast legislation” be good idea?
Tax & Customs Board, Work Registry (TÖR)

- Open: 05.07.2013
- Preparations
- Development
- Contract

Idea discussion in ministries 2012

Business case: 5-12 milj €/a

Public procurement process
Financing process
Interoperability authorisation process (RIHA)

Draft in EIS in Parliament
Law passed

Legislative process
07.012014
22.10.2013 - 05.11.2013

Go "Live" Operations
01.07.2014
“Legislative logic” of IT
“The Internet is governed by standards. You might not know about most of them, but they are there.”
“OpenStand” principles:
- Voluntary adoption. Standards are voluntarily adopted and success is determined by the market. [1]


Modern standardisation workflow: experimentation first -> then reference implementation -> THEN standardisation. X-Road was operated for years with no legal act. And this is not unusual.
“Philosophy that we don’t solve a problem until the problem exists and several people have real experiences solving it.” [2]


“IT laws”:
- Conway’s law, Moore’s law, DRY, YAGNI, “Once only” etc (adages)
- “patterns” (e.g. integration patterns)
- “Eternal laws of systems architecture”
- Ecological laws
- IT standards
- Internet memes
Concrete or generic standards (laws)?

“There is often an interesting tussle about what aspects need to be standardised (e.g., fully specified real-time communication protocols vs. frameworks such as WebRTC that can be used to build solutions). Finding the right balance between these types of approaches is important.”

-- Jari Arkko, IETF Chair, 2013

“The European Interoperability Framework, as a generic framework [my emphasis -P.P] applicable in all Member States, EU institutions and all policy domains, provides guidance for developing interoperable European Public Services. This is achieved through a set of core concepts to be used for the design and update of NIFs, policies, strategies, guidelines, and action plans that promote interoperability.”

-- That’s BS! It’s too general!

Voices for clear and actionable law
Insufficient informatisation of law

Case 1: Classification of Access Restrictions
(Juurdepääsupiirangu klasifikatsioon).

- Catalogue of 130+ legal reasons for restricting access to documents.
- Machine-readable. Used in document management systems.
- Compiled by browsing law and interviewing legal experts.
- Time-consuming, manual, and possibly omission-ridden process.

Case 2: RIHA compliance requirements catalogue (Nõuete kataloog)

- Machine-readable catalogue of compliance requirements (120+)
- Gathered from a number of laws
- Inter-agency process (5 agencies
- Basis for automated validation module, authorisation module a.o. functionalities
- Time-consuming, manual, and possibly omission-ridden process.

Current practice:
- Law “hard-coded” into information systems
- Simple links to legal acts in Official Gazette
Low informatisation of law produces waste and hinders quality
There’s substantial body of law applied to IT itself
- information security (ISKE 1,000s of pages), technical standards, data protection, geo, ITIL, best practice, etc
IT practice is largely driven by requirements
Which requirements do apply? -> Manual process -> Too much work!
How to check compliance? -> Manual process -> Too much work!

Challenge/Opportunity: Need user-friendly requirement management tools, automated validators

Challenge/Opportunity: More machine-readable Law
- basis for value-added services
- provide through API - “API First” policy [1] - Open API [2] - RESTful, JSON etc
- Value-added annotation: workflow, annotation formats (language(s)) and tooling

Informatisation of law: how?
To think that legal text should become more like a program code - with syntax highlighting, code autocomplete, visual code maps a.o. features of tools of modern programmer (in IDEs, integrated development environments).

To think that visualisation, modeling (“arrows and boxes”) and formal languages (UML, BPML, RDF, OWL etc) can raise quality of legal text to new level.

The answer is unknown. (Maybe YES and NO.)

Natural language, with it’s elaborated system of cases (14 in Estonian), tenses, modalities, subjects, verbs, objects a.o. grammatical categories is very powerful - oftentimes the best - modeling instrument.

IT education: It’s important to learn to code, but it’s equally important to learn to reason and write (in human language).
What appears to work? **Lightweight methods, languages and tools**

Lightweight languages: Markdown [1], JSON [2], JSON-LD [3] etc.

[1] [https://en.wikipedia.org/wiki/Markdown](https://en.wikipedia.org/wiki/Markdown)

Lightweight annotation versus heavyweight logic languages. @Username has become an universal annotation construct.

"Typing an @ symbol, followed by a username, will notify that person to come and view the comment." -- GitHub

John Gruber and Aaron Schwartz, inventors of Markdown
Should law become more like a system specification?
Ideal workflow?: ontology (vocabulary) + conceptual data model + process model -> legal text

Is that ever possible?

Professional system analysis: complete, full specification. Without that, software will not work.

Legal text, however, oftentimes is only partial, incomplete solution to urgent social problems, intractable problems.
New reasoning skills, new ways of thinking are needed

Challenge/Opportunity: IT today is not any more just modeling, programming and running computer systems. It’s about policy formulation, security analyses, ecosystem management, economic analysis, risk management etc. New fields require new ways of thinking. Reasoning and argumentation building are often critical in these new fields. Legal profession has a deep bag of methods that are applicable here.

Security mindset versus Think like a lawyer

Security is one explosively grown IT subfield, where leading experts stress the need for different thinking, the “Security mindset” [1][2].

Schneier

Bruce

Bellovin

Steve

Legal professionals can be best prepared for some of these new challenges.

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Think like a lawyer

“Thinking like a lawyer means, in the first instance, thinking with care and precision, reading and speaking with attention to nuance and detail. It means paying attention to language, but also understanding that words can have myriad meanings and can often be manipulated. It thus also means paying attention to context and contingency.”

“Thinking like a lawyer also means that you can make arguments”

On Thinking Like A Lawyer” Anne-Marie Slaughter
Interoperability: a “common language”
Interoperability is about the ability to speak a “common language”.

But!: One of the European Interoperability Framework (EIF) 11 interoperability principles is Multilingualism.

Terminology work is a ground stone in every IT project.

However, only primitive methods are often used. Typically only a simple “flat” glossary is produced.

This is not enough. Quality of definitions is low. Time wasted in attempts to agree in terminology. Arusaamistörked, semantic conflicts are costly.

“To get us all agree” on single definition of a concept - often futile, yet hugely resource consuming undertaking. More realistic goal - semantic reconciliation (semantiliste lahknevuste lepitamine).
Is there really conflict between legal language and IT language?
Many different views [1].

EU Law is one of best sources of Estonian-language IT terminology.

http://arvamus.postimees.ee/3318409/rivo-reitmann-palun-inimkeelsemalt

Promise of ontology engineering, The Semantic Web etc has proven far-fetched from real resources.

Small, modular terminologies appear to work better. But even these require infrastructure, methods, and tools.

Machine-readability, and linkability is important.

Move to cloud-based solutions, virtualisation (software-based networking etc) -> objects no more have concrete manifestations, clear boundaries.

Semantic jaywalk, tähenduslik tiirataaratamine.
Paradoxically, some most fundamental concepts of IT may be extremely difficult to define and agree on.

- What is “environment”? In IT organisation it can mean different things to different people. Hard to define and explain. Hard to avoid misunderstandings.
- What is “service”? 
- What is “infosüsteem”? (And Estonian speciality: How does relate to “andmekogu”?)
- What is “machine-readable”?

These are not purely academic questions. Legal terms open (or deny) very real opportunities (or bring burdens) to different actors.

**Challenge/Opportunity:** Need new methods for terminology work, that better reflect the dynamism and multi-lingualism of the information society. Need better tool support (cloud-based simple terminology tools?). Would need a tool to extract and build machine-readable database of legal definitions from Estonian Law (from the Official Gazette/Riigi Teataja).
Duck test (abductive reasoning)
1 If it looks like a duck, swims like a duck, and quacks like a duck, then it probably is a duck [1]
2 If it swims with ducks -> it probably is a duck [2]
3 It it has decorated herself with feathers of duck -> it probably is not a duck
4 If it is a donkey wearing a label “DUCK”, then do not believe your eyes. [3]

CONCLUSION
I attempted to bring a few Legal-IT challenges to your attention.

Some of these problems are old, some may be new.

Anyone willing to tackle be warned - there are no easy solutions.

On the other hand, these are extremely interesting issues indeed - and important for practitioners.

We need better workflows, methods, and tools.

There’s a lot of room for creativity and innovative legal tech products.

FINAL REMARK
Challenge/Opportunity: Would we need a Legal - IT interoperability framework?