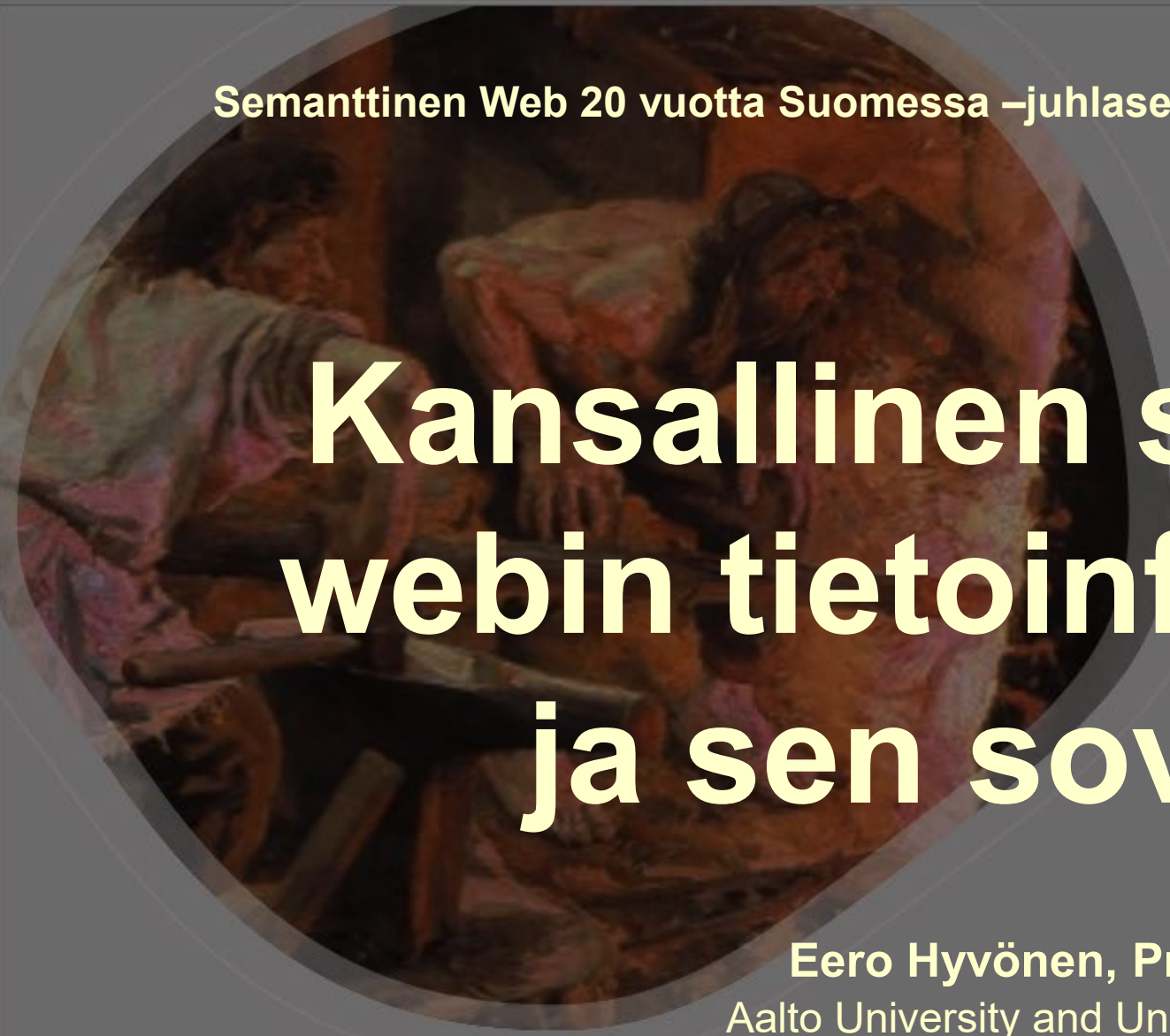
Semanttinen Web 20 vuotta Suomessa –juhlaseminaari, 2.11.2021, Aalto-yliopisto, Espoo



Kansallinen semanttisen webin tietoinfrastruktuuri ja sen sovellukset

Eero Hyvönen, Prof., Director
Aalto University and University of Helsinki
HELDIG – Helsinki Centre for Digital Humanities
Semantic Computing Research Group (SeCo)

Thanks to All
Members of SeCo (16)
SeCo Alumni and Visitors (57)
and Collaborators (many)!

2001-2021

450 articles & other publications

Aalto University
School of Science

UNIVERSITY OF HELSINKI

SeCo

HELDIG
Helsinki Centre for Digital Humanities

SeCo People

How to visit us?

Eero Hyvönen
Professor, Director

Senka Drobac
Postdoctoral Researcher

Matias Frosterus

Esko Ikkala
Doctoral Candidate

Joonas Kesäniemi
Doctoral Candidate

Mikko Koho
Staff Scientist

Matti La Mela
Postdoctoral Researcher

Rafael Leal
Doctoral Candidate

Petri Leskinen
Doctoral Candidate

Eetu Mäkelä
Visiting Researcher, Professor

Arttu Oksanen
Doctoral Candidate

Eljas Oksanen
University Researcher

Heikki Rantala
Doctoral Candidate

Laura Sinikallio
Research Assistant

Minna Tamper
Doctoral Candidate

Jouni Tuominen
Staff Scientist

SeCo Alumni & Visitors

Rami Aamulehto
Babatunde Anafi
Lia Gasbarra
Markus Holi
Tomi Kauppinen
Tuomas Korpilahti
Jussi Kurki
Nina Laurenne
Robin Lindroos
Katariina Nyberg
Sisko Pajari
Ville Piiparinen
Tuukka Ruotsalo
Sami Sarsa
Reetta Sinkkilä
Joeli Takala
Onni Valkeapää
Kim Viljanen
Mika Wahlroos
Mark van Assem

Eeva Ahonen
Kasper Apajalahti
Mikko Haaramo
Jouni Hyvönen
Suvi Kettula
Alex Kourijoki
Teppo Känsälä
Aleksi Lindblad
Glauco Mantegari
Antti-Jussi Nygård
Tuomas Palonen
Kimmo Puputti
Samppa Saarela
Satu Savia
Avril Styrman
Antti Tani
Arttu Valo
Mikko Virkkilä
Henri Ylikotila

Olli Alm
Mikko Apiola
Pejam Hassanzadeh
Thomas Häggström
Ville-Pekka Komulainen
Heini Kuittinen
Joonas Laitio
Petri Lindgren
Goki Miyakita
Jyrki Oraskari
Markus Palviainen
Vilho Raatikka
Mirva Salminen
Katri Seppälä
Osma Suominen
Seppo Törmä
Anne Varis
Nam Vu Hoang
Anu Ylisalmi

Miika Alonen
Jérémie Dutruit
Erkki Heino
Miikka Junnila
Aleksandra Konovalova
Johannes Kupiainen
Mikko Laukkanen
Thea Lindquist
Jouni Mäkeläinen
Panu Paakkarinen
Sini Pessala
Mikko Rinne
Mikko Salonoja
Teemu Sidoroff
Ahti Syreeni
Juha Törnroos
Antti Vehviläinen
Jari Väätäinen
Sampo Yrjänäinen

Latest News

Five new SeCo papers accepted for the ISWC 2021
The 20th International Semantic Web Conference (ISWC 2021), the...
2.8.2021 6:53 by eahyvone

FindSampo ? Finnish Archaeological Finds on the Semantic Web
FindSampo – Finnish Archaeological Finds on the Semantic Web, a...
19.5.2021 20:00 by eahyvone

In/Tangible European Heritage: New EU project starting in SeCo
The idea of the new 3-year project is to study how intangible cultural...
6.8.2020 8:57 by eahyvone

Latest Publications

Rafael Leal, Joonas Kesäniemi, Mikko Koho and Eero Hyvönen: Relevance Feedback Search Based on Automatic Annotation and Classification of Texts

Eero Hyvönen: How to Create a National Cross-domain Ontology and Linked Data Infrastructure and Use It on the Semantic Web

Eero Hyvönen, Esko Ikkala, Mikko Koho, Jouni Tuominen, Toby Burrows, Lynn Ransom, and Hanno Wijsman: Mapping Manuscript Migrations on the Semantic Web: A Semantic Portal and Linked Open Data Service for Premodern Manuscript Research

Toby Burrows, Laura Cleaver, Doug Emery, Eero Hyvönen, Mikko Koho, Lynn Ransom, Emma Thomson and Hanno Wijsman: Medieval manuscripts and their migrations: Using SPARQL to investigate the research potential of an aggregated Knowledge Graph

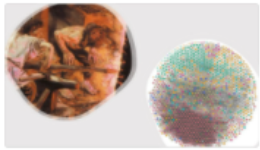
SeCo on Twitter

Tweets by @secoresearch

Semantic Computing Research Grou
@secoresearch
Avoin kutsu juhlaseminaariin:

SEMANTTINEN WEB SUOMESSA 20 VUOTTA
Tiistaina 2.11.2021, 13:00–17:00 (CET 12:00-16:00
seco.cs.aalto.fi/events/2021/20...

Tervetuloa!@HelsinkiDH #@HelsinkiDH @AaltoUniversity @CSAalto @helsinkiuni



Oct 12, 2021

Semantic Computing Research Group Retweeted

Embed View on Twitter

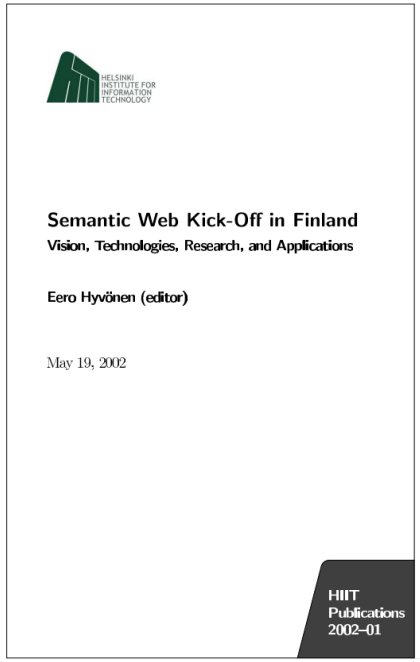
SeCo on Facebook

Semantic Computing ...

2.11.2001

Thanks to collaborators:

- W3C
- HIIT
- Suomen Tekoälyseura ry
- XML Finland ry
- Elisa Oyj



UNIVERSITY OF HELSINKI

Department of Computer Science
Faculty of Science

This page might not be updated

Department of Computer Science

Department information

- Homepage
- News and events
- Research
- Studies
- Admission
- Computing facilities
- Administration
- Quality manual
- Contact information

Helsingin yliopisto - Tietojenkäsittelytieteen laitos

Koti Yhteystiedot Laitos lyhyesti Henkilöt Palvelut Opiskelu Tutkimus Uutiset ja tapahtumat

SEMANTIC WEB KICK-OFF IN FINLAND - ÄLYKÄS WWW SUOMESSA

Helsingin yliopisto, Porthania, sali P3

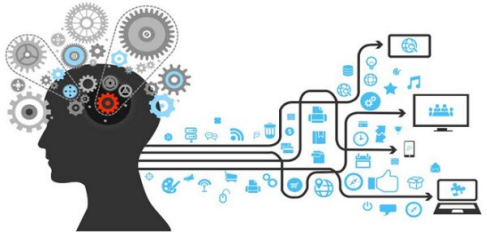
Perjantai 2.11.2001, klo 9:00-16:30

Miten WWW tulee älykkääksi ja viisaaksi?

- **Samalla tavalla kuin mekin koulussa!**

- **Tiedon avulla (”semanttinen” data)**
  Kerrotaan verkolle maailmasta oppilaan (verkon) ymmärtämällä tavalla!
  - Web of Data: Ontologies, Linked Data, Knowledge Graphs

- **Älykyyden avulla (algoritmit)**
  Ohjelmoidaan oppilas (WWW) oppimaan ja ratkomaan ongelmia itse!
  - Natural Language Understanding, Machine Learning,
    Knowledge Discovery, Artifical Intelligence, …



Mitä tarttis tehrä?

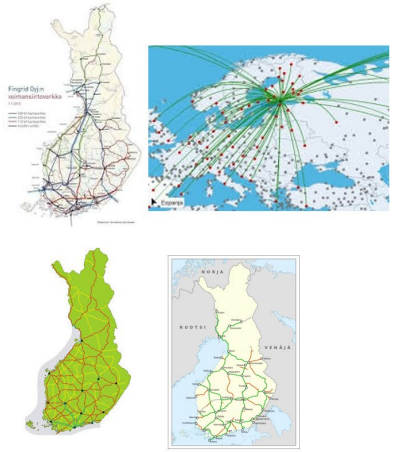
Image: Damian Navas

2

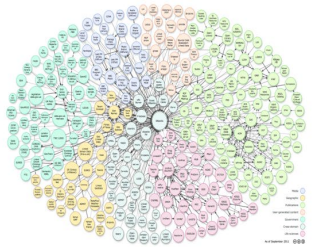
Semantic Data Infrastructure!

1

Traditional Infras:
(rail)roads, electricity, …



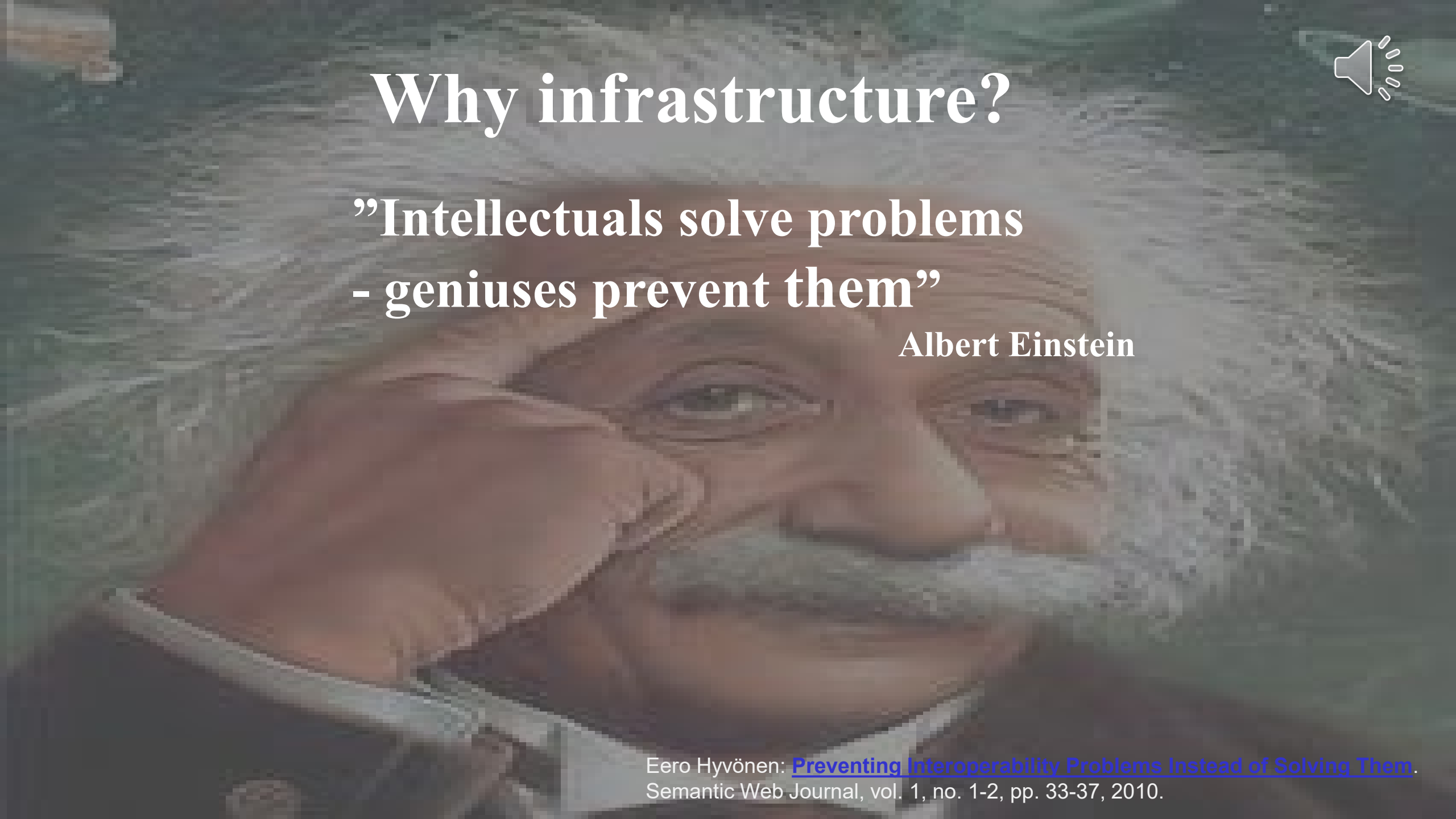
Semantic Content Infra:
Ontologies, linked data, metadata, …



Why infrastructure?

”Intellectuals solve problems
- geniuses prevent them”

Albert Einstein



Eero Hyvönen: Preventing Interoperability Problems Instead of Solving Them. Semantic Web Journal, vol. 1, no. 1-2, pp. 33-37, 2010.

Linked Open Data Finland:

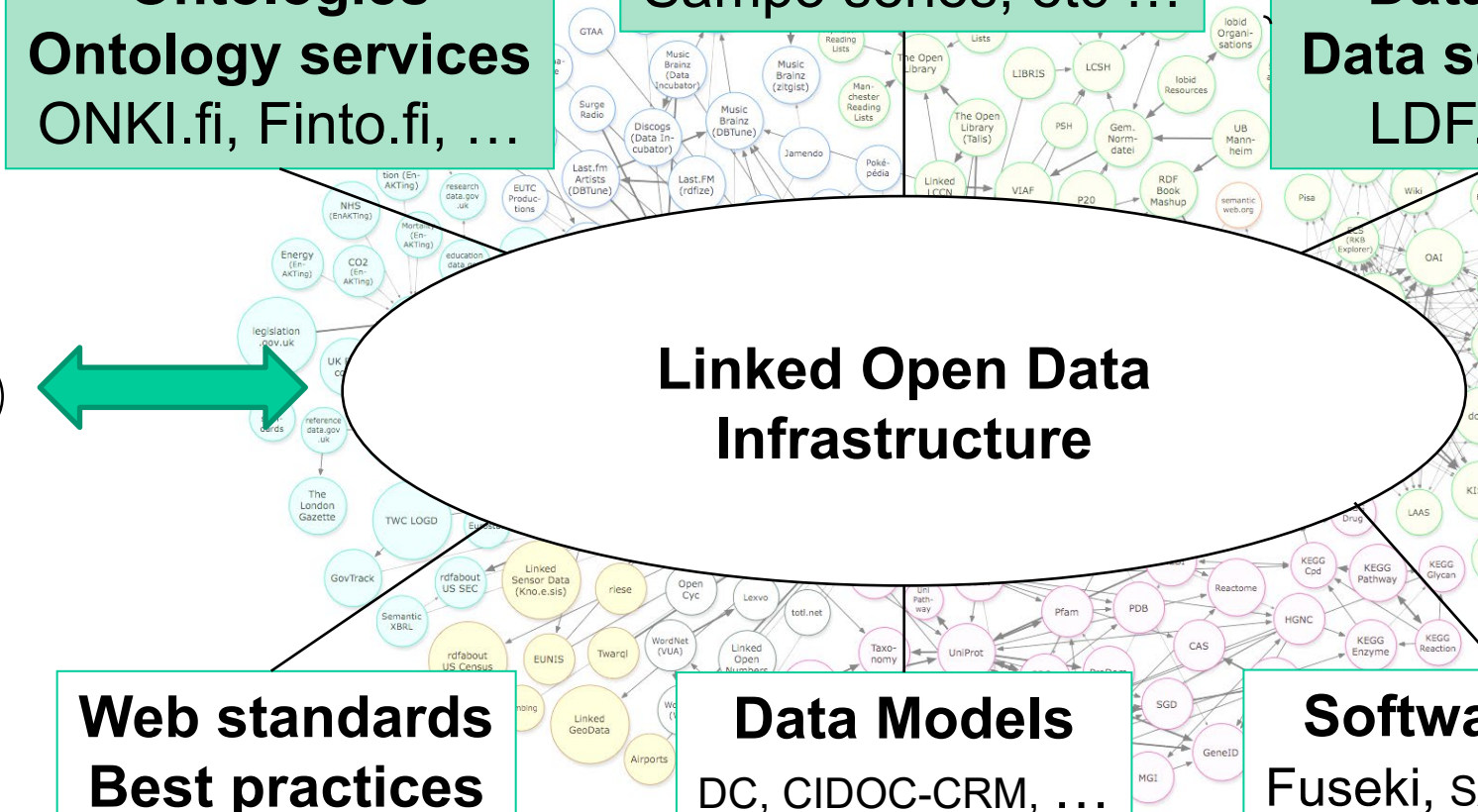
Elements of a National Linked Data Infrastructure

Applications
Sampo series, etc …

Ontologies
Ontology services
ONKI.fi, Finto.fi, …

Datasets
Data services
LDF.fi, …

Human Infrastructure



Linked Open Data Infrastructure

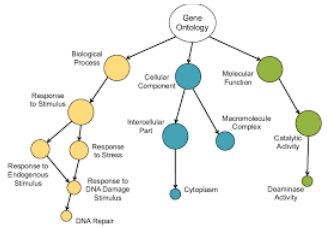
Web standards
Best practices
W3C, …

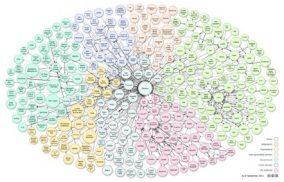
Data Models
DC, CIDOC-CRM, …

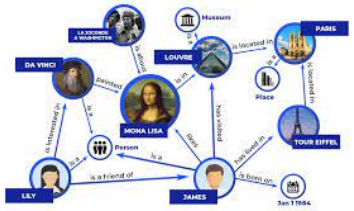
Software tools
Fuseki, SAMPO-UI, …

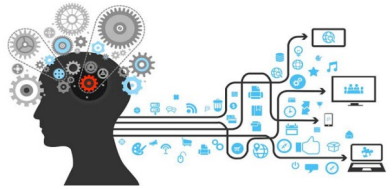
Semanttisen webin kehitysvaiheita Suomessa Aalto-yliopistossa ja Helsingin yliopistossa

Focus: Idea | Ontologies | Linked Data | Knowledge Graphs | AI Metaversum









1989 | **2001** | 2010 | **2021** | 2030

Semantic Web Kick-off in Finland

FINNONTO

finto

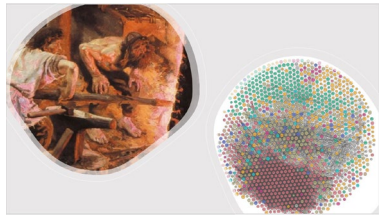
Developing the Digital World Together
HELDIG
Helsinki Centre for Digital Humanities

DARIAH-EU
FIN-CLARIAH

Linked Data Finland

SUOMEN AKATEMIA
FINLANDS AKADEMI
ACADEMY OF FINLAND

Sampos



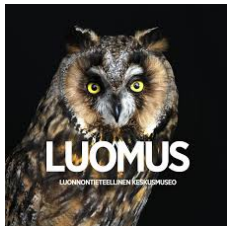
Ontologiat: FinnONTO-infrastruktuuri

- Museot
- Kirjastot
- Terveys
- Biologia
- Elinkeinoelämä
- Paikkatieto
- …

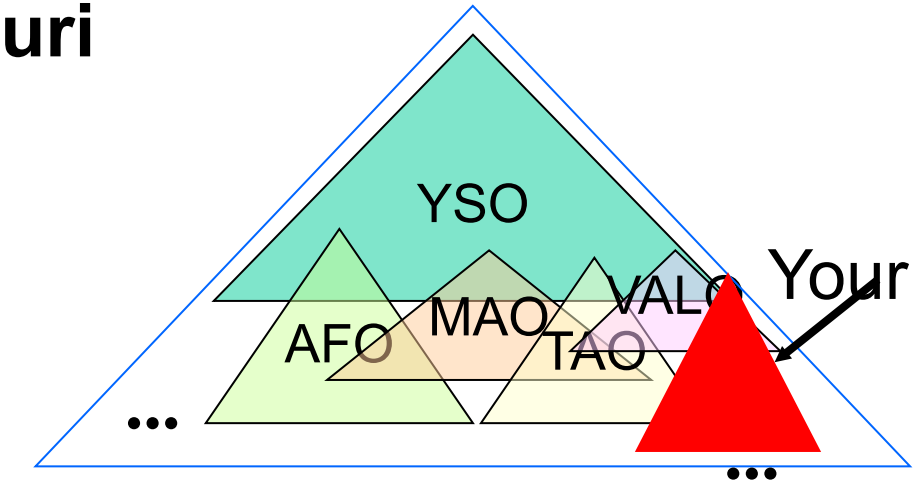
KIRJASTOT.fi

THL

THE FINNISH MEDICAL SOCIETY DUODECIM



MML MAANMITTAUSLAITOS



KOKO

	Name	Ontology domain	Underlying thesaurus	Size	Maintaining Organization
1	YSO	General domain	General Finnish Thesaurus, YSA, Allärs	23700	National Library, Åbo Academy
2	MUSO	Music	Thesaurus of Music, MUSA/CILLA	1000	National Library
3	MAO	Museum domain	Thesaurus of Museum Domain, MASA	6800	National Board of Antiquities
4	AFO	Agriculture, foresty	Agriforest Thesaurus	5500	Viikki Science Library
5	TAO	Applied arts	Thesaurus of Applied Arts	2600	University of Eastern Finland and Library of Aalto University
6	VALO	Photography	Thesaurus of Photography Literature, Thesaurus of Photography Technology	1900	Finnish Museum of Photography
7	MERO	Seafaring, shipping	Thesaurus of Seafaring	1400	Finnish Transport Agency
8	KAUNO	Literature subjects	Thesaurus of Literature, Bella	4900	Finnish Public Libraries, Kirjastot.fi
9	JUHO	Public government	Thesaurus of Finnish Government, VNAS	6400	Ministry of Finance
10	TERO	Health promotion	YSA, TESA, MeSH, Stameta	22000	Various organizations
11	KITO	Literature research	Thesaurus of Literature Research	900	Finnish Literature Society
12	KULO	Culture research	Thesaurus for Folk Culture Studies	1600	Finnish Literature Society
13	KTO	Linguistics	Thesaurus of Linguistics	1000	Research Institute for the Languages in
14	PUHO	Defense	Thesaurus of Defence Administration	2000	Finnish Defence Forces
15	POIO	Points of interest	TGN, Geonames, LDG, SUO	4600	Various organizations
	TOTAL			**86300**	

FinnONTO Funding Community: 50 Organizations

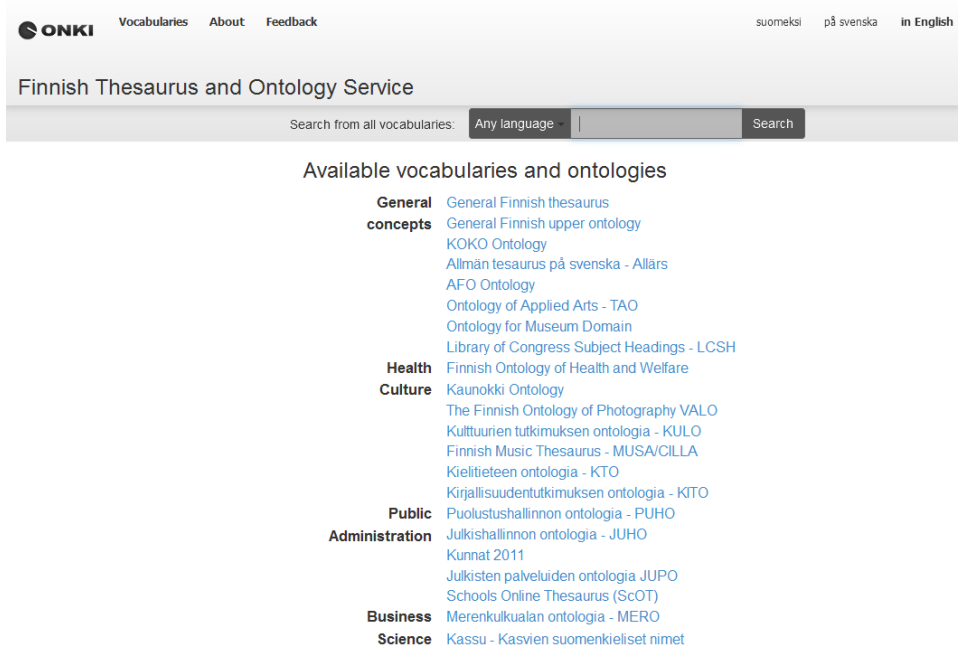
Antikvaria-ryhmä

Ontologiapalvelut: ONKI.fi (2008) -> finto.fi (2014)

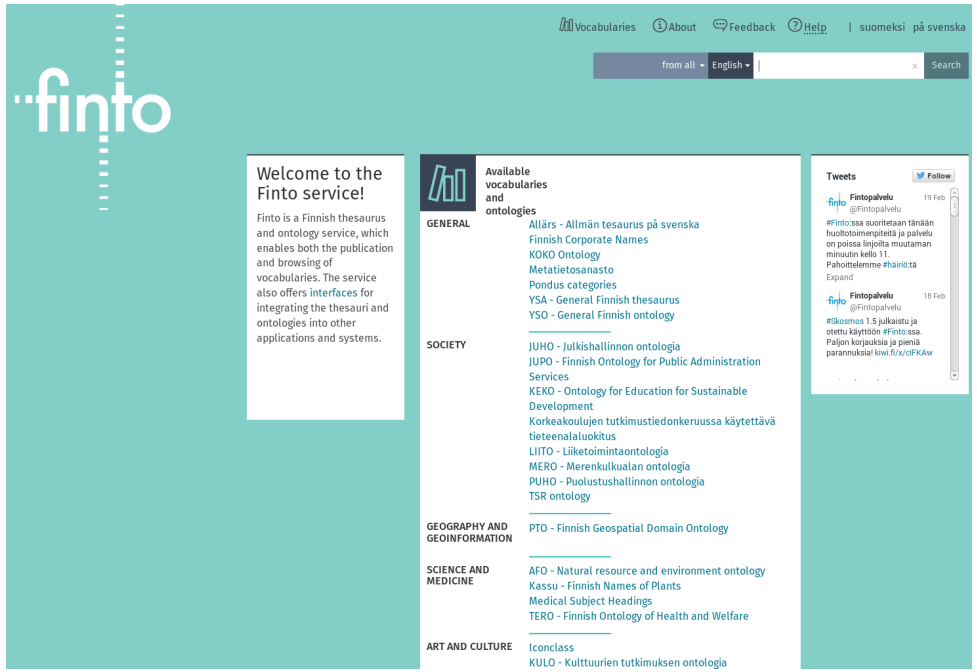
Permanent free national service funded my Finnish ministries

2019: 32 million API calls
2020: 2,1 million page visits
2020: 12% increase in use

ONKI.fi



finto.fi



Datasets & Data Services: Linked Data Finland LDF.fi (2014)

Client Side (Browser)

Application 2

Application 1

Application N

SPARQL

{REST API}

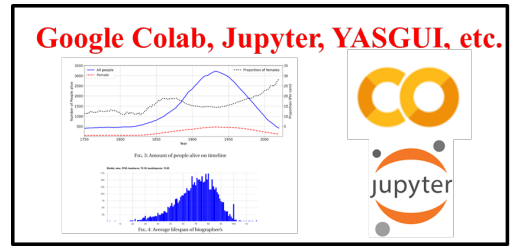
SPARQL End Point

Server Side https://ldf.fi

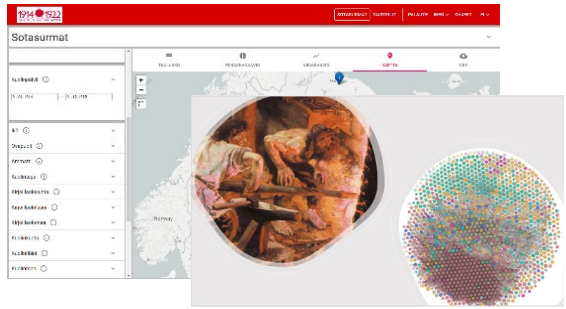
Linked Data Finland Service

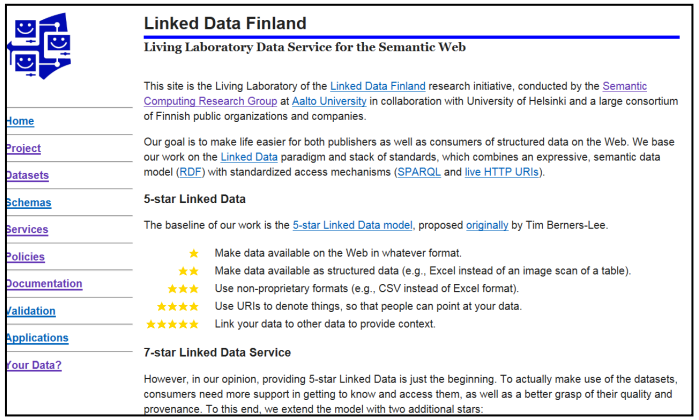
WWW Standard Model

Tools for research



Web services, portals





Linked Data Finland

Living Laboratory Data Service for the Semantic Web

This site is the Living Laboratory of the Linked Data Finland research initiative, conducted by the Semantic Computing Research Group at Aalto University in collaboration with University of Helsinki and a large consortium of Finnish public organizations and companies.

Our goal is to make life easier for both publishers as well as consumers of structured data on the Web. We base our work on the Linked Data paradigm and stack of standards, which combines an expressive, semantic data model (RDF) with standardized access mechanisms (SPARQL and live HTTP URIs).

5-star Linked Data

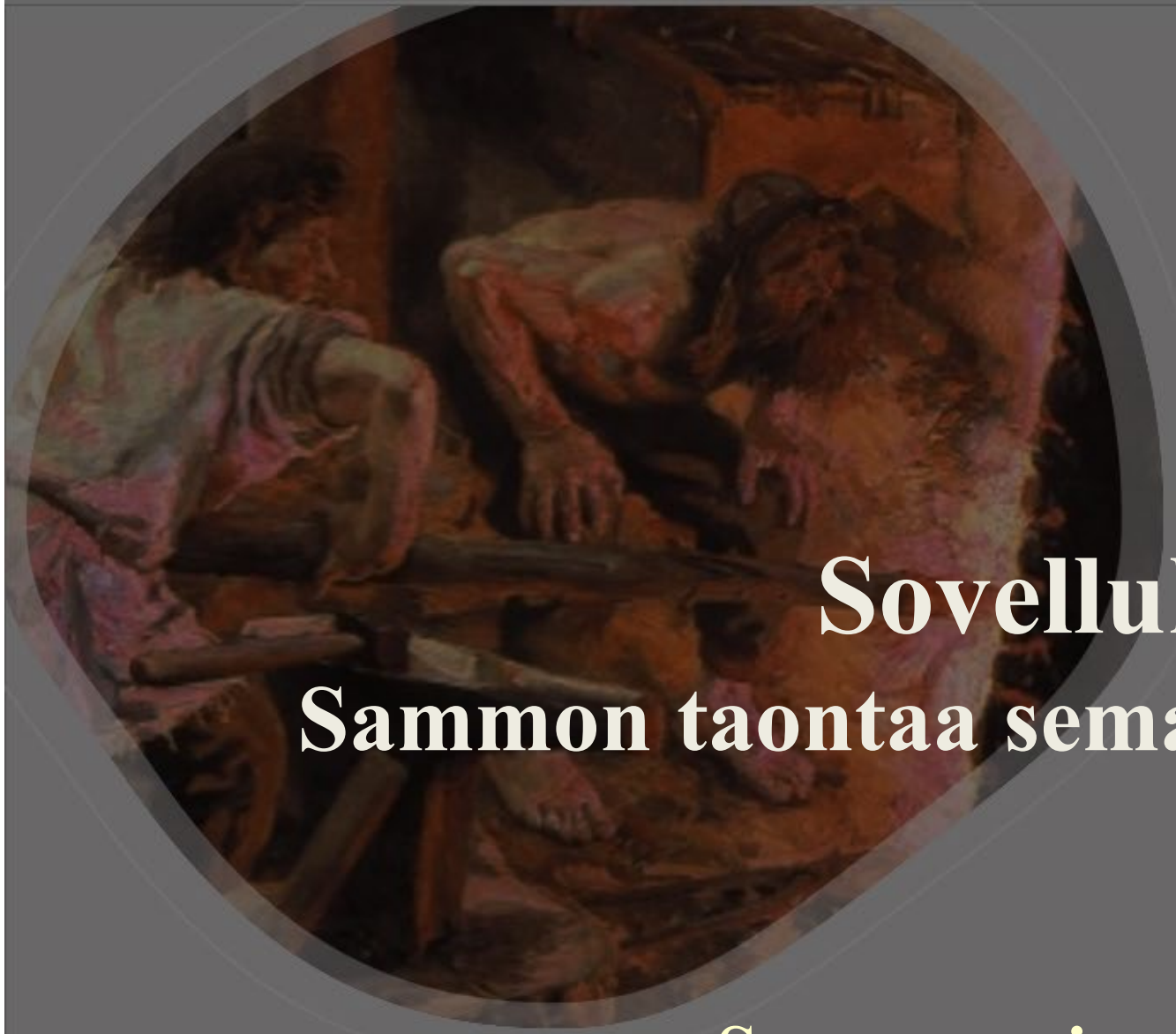
The baseline of our work is the 5-star Linked Data model, proposed originally by Tim Berners-Lee.

- ★ Make data available on the Web in whatever format.
- ★★ Make data available as structured data (e.g., Excel instead of an image scan of a table).
- ★★★ Use non-proprietary formats (e.g., CSV instead of Excel format).
- ★★★★ Use URIs to denote things, so that people can point at your data.
- ★★★★★ Link your data to other data to provide context.

7-star Linked Data Service

However, in our opinion, providing 5-star Linked Data is just the beginning. To actually make use of the datasets, consumers need more support in getting to know and access them, as well as a better grasp of their quality and provenance. To this end, we extend the model with two additional stars:

Home
Project
Datasets
Schemas
Services
Policies
Documentation
Validation
Applications
Your Data?

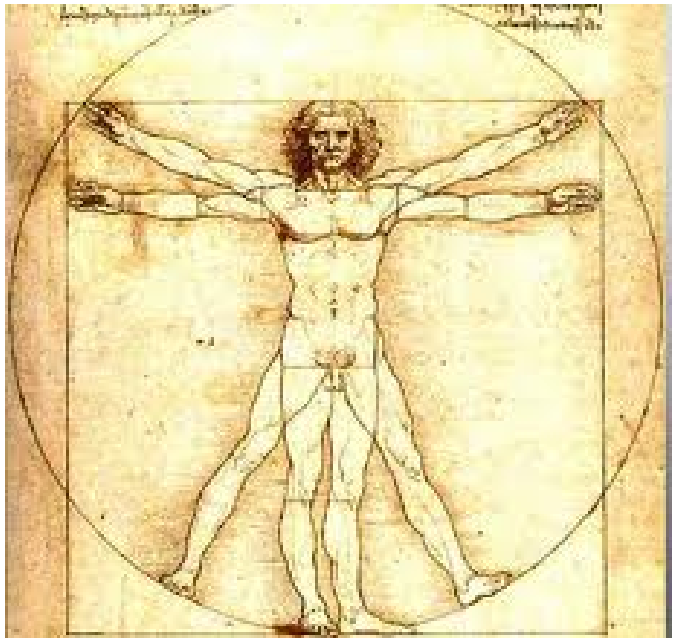


Sovellukset
Sammon taontaa semanttisessa webissä

Sampo-sarja
- Linked Data -palvelut
- Semanttiset portaalit

Lesson Learned in Application Development:
This Technology Can Be Applied Virtually Everywhere!

- Cultural Heritage
- Archaeology
- Manuscripts
- Epistolary data
- Folklore
- Media
- Government
- Legislation
- Parliamentary Studies
- Science
- History
- Learning
- Industry
- Defence
- …



Applications: Cultural Heritage
”Sampos” on the Semantic Web 2004-

Defense of Sampo, Ateneum,
A. Gallen-Kallela, 1896

1. **MuseumFinland** – Finnish Museums on the Semantic Web (2004) **[39 000 users]**
2. **CultureSampo** – Finnish Culture on the Semantic Web (2008) **[107 000 users]**
3. **TravelSampo** - Mobile Contextualized Services of Cultural Tourism (2011)
4. **BookSampo** – Finnish Fiction Literature on the Semantic Web (2011) **[2 million users in 2020]**
5. **WW1LOD** – World War I Linked Open Data (2014)
6. **WarSampo** – Finnish World War 2 on the Semantic Web (2015-19) **[857 000 users]**
7. **Norssi Alumni on the Semantic Web** – Historical person registry using LOD (2017)
8. **U.S. Congress Prosopographer** – U.S. Congress Legislators 1789-2018
9. **BiographySampo** - Finnish Biographies on the Semantic Web (2018-20) **[50 000 users]**
10. **NameSampo** – Linked Data Workbench for Toponomastic Research (2019) **[37 000 users]**
11. **WarVictimSampo 1914-1922** – National War History **[29 000 users]**
12. **Mapping Manuscript Migrations (MMM)** – medieval and Renaissance manuscripts (2020) **[9 100 ussers]**
13. **AcademySampo** – Finnish Academic People 1640 – 1899 (2021) **[8 200 ussers]**
14. **FindSampo** – Archaeological Finds on the Semantic Web (2021) **[3 100 ussers]**
15. **LetterSampo, LawSampo, ParliamentSampo**, … to be published

Time Machine

https://seco.cs.aalto.fi/applications/sampo/

Suomen Akatemian tuottama video https://vimeo.com/470313703

More Information – Questions?

https://seco.cs.aalto.fi/

450 publications about the infras and their applications:
https://seco.cs.aalto.fi/publications/
Videos and applications:
https://seco.cs.aalto.fi/applications/sampo/

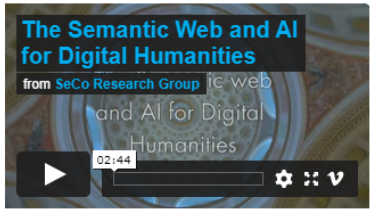
Semantic Computing Research Group (SeCo)
Making computers and the web more intelligent and interoperable!

HOMEPAGE
MISSION
NEWS
PROJECTS
EVENTS
PEOPLE
PARTNERS
CAREERS
TEACHING
CONTACT
PUBLICATIONS
APPLICATIONS
ONTOLOGIES
LINKED DATA
INFRA FOR DH
SERVICES
TOOLS
SOFTWARE
DOWNLOAD
Wikipedia: *Semantic web suomeksi*
Google this site
Search!

SeCo Welcomes You!

Semantic Computing Research Group (SeCo) researches machine-processable semantics related to, e.g., the Semantic Web. We are located at the Aalto University, School of Science, Department of Computer Science and HELDIG – Helsinki Centre for Digital Humanities, University of Helsinki, Faculty of Arts. Our group consists of researchers both from the Aalto University, School of Science, Department of Computer Science and University of Helsinki, Department of Computer Science, and HELDIG.

Our research is focused on semantic technologies, such as the Semantic Web and intelligent web services. In addition to research and publications, we also create prototype applications that demonstrate the new possibilities of semantic technologies, such as **semantic portals for end users**, **semantic infrastructural data and ontology services**, and **ontologies and tools** for creating semantic applications.



Application Domains

Our work is highly cross-disciplinary, including application domains, such as Digital Humanities, Health, Learning, Government, Commerce, Geography, and Biology.

Selected SeCo Applications and Demos for End Users

Mapping Manuscript Migrations
Online since 2020. Try it!

WarVictimSampo 1914-1922
Online since 2019. Try it!

BiographySampo - Finnish Life Stories on the Semantic Web
Online since 2018. Try it!

U.S. Congress Prosopographer
Online since 2018. Try it!

Norssi Alumni on the Semantic Web
Online since 2017. Try it!

Semantic Finlex - Finnish Law

WarSampo - Second World War

Hipla.fi - Finnish Ontology

Semantic National Biography

BirdWatch - Mobile Semantic

Latest News

Five new SeCo papers accepted for the ISWC 2021
The 20th International Semantic Web Conference (ISWC 2021), the...
2.8.2021 6:53 by eahyvone

FindSampo ? Finnish Archaeological Finds on the Semantic Web
FindSampo – Finnish Archaeological Finds on the Semantic Web, a...
19.5.2021 20:00 by eahyvone

In/Tangible European Heritage: New EU project starting in SeCo
The idea of the new 3-year project is to study how intangible cultural...
6.8.2020 8:57 by eahyvone

Latest Publications

Rafael Leal, Joonas Kesäniemi, Mikko Koho and Eero Hyvönen: Relevance Feedback Search Based on Automatic Annotation and Classification of Texts

Eero Hyvönen: How to Create a National Cross-domain Ontology and Linked Data Infrastructure and Use It on the Semantic Web

Eero Hyvönen, Esko Ikkala, Mikko Koho, Jouni Tuominen, Toby Burrows, Lynn Ransom, and Hanno Wijsman: Mapping Manuscript Migrations on the Semantic Web: A Semantic Portal and Linked Open Data Service for Premodern Manuscript Research

Petri Leskinen and Eero Hyvönen: Reconciling and Using Historical Person Registers as Linked Open Data in the AcademySampo Knowledge Graph

SeCo on Twitter

Tweets by @secoresearch
SeCo Research Group Retweeted
ManuscriptMigrations
@MSMigrations
"Harmonizing and publishing heterogeneous