PUBLISHING NUMISMATIC PUBLIC FINDS ON THE SEMANTIC WEB
FOR DIGITAL HUMANITIES RESEARCH

COINSAMPO LINKED OPEN DATA SERVICE AND SEMANTIC PORTAL

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HELDIG
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UNIVERSITY OF HELSINKI

Aalto University
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SeCo
semantic computing

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CONTEXT

1) Due to hobby metal-detecting public engagement with archaeology has hugely increased in many European countries.

2) When conducted responsibly and legally this can be characterized as archaeological citizen science and has produced a flood of new information about the past.

3) The most common reported object type is coins, which typically also possess the most semantically precise attribute information.

4) There is new demand to open the object data to the public in a meaningful and richly contextualized manner.

Image credit: Eljas Oksanen & Anna Wessman

AIMS

1. Design data service and digital platform for opening public finds data to multiple audiences including non-professionals.
   - Facilitate searching and Knowledge Discovery
   - New analytical and data visualization tools
   - Enrichment through data linking

2. Help along a shift in the traditional cultural heritage data management paradigm that has predominantly focused on individual objects for collections management purposes.
   - Promote digitized cultural heritage
   - Generating better quality Machine Readable information

NATIONAL MUSEM OF FINLAND: OLD COIN CABINET Image: Ehrnsten

Sampo Model:

Principles for creating LOD services

Principles for creating semantic portal interfaces

Sampo Model Principles P1–P6

P1	Support collaborative data creation and publishing
P2	Use a shared open ontology infrastructure
P3	Make clear distinction between the LOD service and the user interface (UI)
P4	Provide multiple perspectives to the same data
P5	Standardize portal usage by a simple filter-analyze two-step cycle
P6	Support data analysis and knowledge discovery in addition to data exploration

- References

- Eero Hyvönen: **Digital Humanities on the Semantic Web: Sampo Model and Portal Series**. Semantic Web – Interoperability, Usability, Applicability, in press, 2022.
- Esko Ikkala, Eero Hyvönen, Heikki Rantala and Mikko Koho: **Sampo-UI: A Full Stack JavaScript Framework for Developing Semantic Portal User Interfaces**. Semantic Web – Interoperability, Usability, Applicability, vol. 13, no. 1, pp. 69-84, 2022.

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

Sampo Series of LOD Services & Portals

A. Gallen-Kallela: The Defense of the Sampo, 1896, Turku Art Museum,

Sampo-UI

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) **[1.6 million users in 2022]**
5. **WW1LOD** – World War I Linked Open Data (2014)
6. **WarSampo –** Finnish World War 2 on the Semantic Web (2015-19) **[1 100 000 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) **[381 000 us**

IN USE

10. **NameSampo** – Linked Data Workbench for Toponomastic Research (2019) **[55 000 u**
11. **WarVictimSampo 1914-1922** – National War History **[80 000 users]**
12. **Mapping Manuscript Migrations (MMM)** – medieval manuscripts (2020) **[9100 users]**
13. **AcademySampo –** Finnish Academic People 1640 – 1899 (2021) **[26 000 users]**
14. **FindSampo** – Archaeological Finds on the Semantic Web (2021) **[7 000 users]**
15. **WarMemoirSampo** – Memoirs of Finnish WW2 veterans (2021) **[3 800 users]**
16. **LetterSampo** – Early Modern Letters on the Semantic Web (2022)
17. **ParliamentSampo** – Parliament of Finland on the Semantic Web (2023)
18. **LawSampo –** Finnish Legislation and Case Law on the Semantic Web (2023)
19. **BookSampo II** – Semantic Search, Browsing, and Data-analyses (2023)
20. **OperaSampo** – Opera and music theater performances in Finland 1830-1960 (2023)
21. **ConfermentSampo** – Conferment Ceremonies of the University of Helsinki 1640-1899 (2023)
22. **CoinSampo - Finnish Numismatic Public Finds 2013 – 2023 (2024)**
23.

Year of 5 Sampos 2023

Sampo = Mythical artifact of the Finnish Epic Kalevala that gives to its owner riches and good fortune. *A metaphore of amazing ancient technology.*
Links to all Sampos: https://seco.cs.aalto.fi/applications/sampo/

Eero Hyvönen: Digital Humanities on the Semantic Web: Sampo Model and Portal Series. *Semantic Web*, vol. 14, no. 4, pp. 729-744,, 2023. pdf link

Linked Data in archaeology and numismatics

- **Linked data is quite fashionable in archaeology:**
  - Swedigarch (large general project in Sweden)
  - FAIR Arch (large general planned project in Finland)
  - ARIADNEplus (European)
- **FindSampo - catalogued metal detecting finds in Finland**
- **Nomisma.org - ambitious international ontology for describing coins in RDF**

CoinSampo

- Data service (SPARQL)
- Web application
- In use since February 2024
- Small corrections planned, but not meant to be updated with new data

Data

- Archaeological numismatic citizen finds reported in Finland between 2013-2023 (Some 18000)
- Collected by Frida Ehrnsten, curator of coin finds in National Museum of Finland
- Includes all reported coin finds, not just the ones taken to museum collections
- Originally collected to help with personal research, and answering questions from the public

RDF conversion

- Original data in Excel format
- Converted partially using existing Python (RDFLib) code from FindSampo
- New schema to fit the data

Ontologies

- **Simple ontologies were created based on terms in data**
- **Ontologies are linked to and enriched from outside sources (mainly Wikidata)**
- **Includes small number of “uncertain concepts”**
  - For example concept for minting country that is either Denmark or Sweden
  - Small number of concepts, but often important
  - Uncertain concepts can be little bit difficult for enriching

Ontologies

- **Why not use FindSampo ontologies?**
  - focus on different things: mints, authorities etc
  - concepts have different meanings (for example time periods)
- **Why not use Nomisma.org**
  - Currently only comprehensive for classical era
  - Properties and classes not perfect for describing our data (could be used, but would lose some semantics)
  - Nature of data is different: museum collections vs citizen finds that are often in bad condition

Class	Num.	Explanation
coins:Municipality	242	Municipality, e.g., a town.
coins:Authority	193	Authority such as a ruler.
coins:Denomination	168	Face value of a coin.
coins:Mint	160	A place where coins have been minted.
coins:Context	49	General context of the find, such as “field”.
coins:Country	41	A country.
coins:Numismatic_type	34	Term describing the general properties of numismatic object.
coins:Period	9	Historical time period.
coins:Material	6	Material of manufacture.

Property	C	num.	Nomisma	Explanation
cs:denomination	1	18342	nmo:hasDenomination	Face value of a coin.
coins:context	1	18342	nmo:hasContext	Find context of a coin.
coins:period	0..1	18323	nmo:hasProductionDate	Production period of a coin find.
cs:material	0..1	18304	nmo:hasMaterial	Main material of a coin.
cs:municipality	0..1	18302	nmo:hasFindSpot	Municipality where a coin was found.
cs:country	0..1	18232	nmo:hasMint	Country or region where a coin was minted.
cs:authority	0..n	13394	nmo:hasAuthority	Authority (ruler) in whose name a coin has been issued.
cs:mint	0..1	13311	nmo:hasMint	The place where a coin has been minted.
cs:numismatic_type	0..n	2151	nmo:hasObjectType; nmo:hasPeculiarity; nmo:hasScholarlyName	Refers to possible miscellaneous numismatic type of a coin.

Linking ontologies

- **“fully” linked to outside sources**
  - Wikidata, Finnish Finto ontologies
- **Used for enriching data of CoinSampo**
  - Coordinates, images, translations for terms, hierarchies…
- **Can (theoretically) be used to make comparative research internationally**

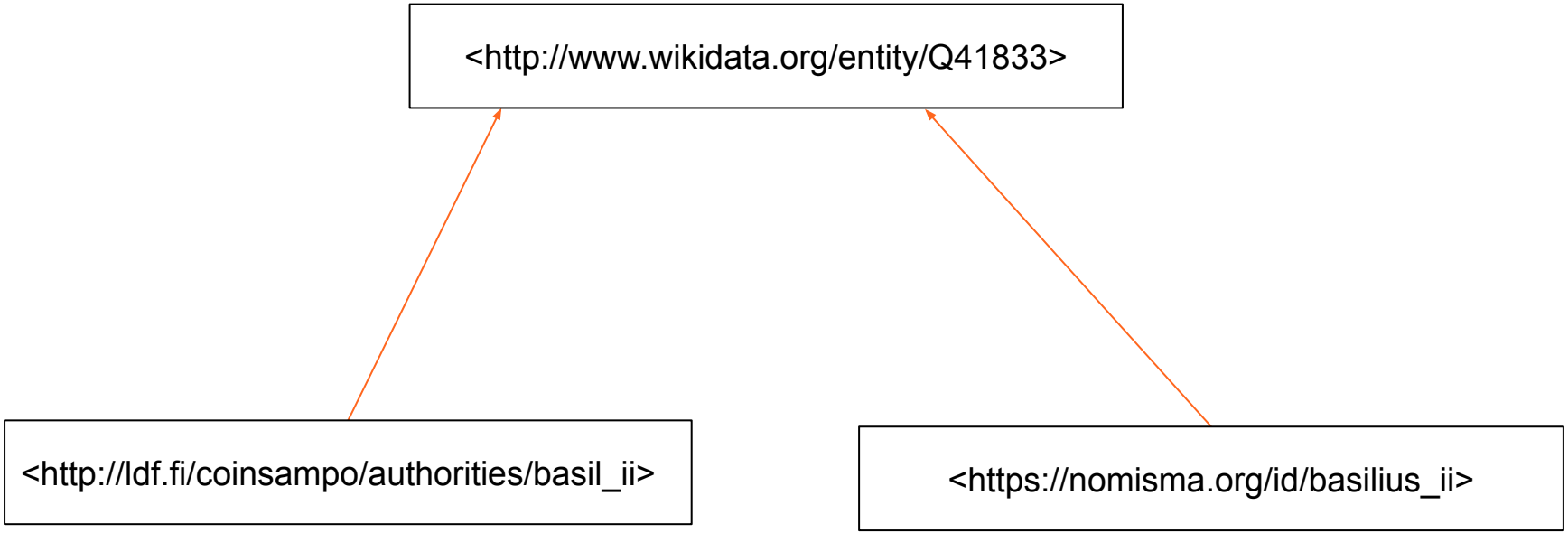
Linking to Nomisma.com

Out of the 160 mints in the CoinSampo data 44 currently have a mapping to Nomisma.org, and out of the over 18000 individual coins only 210 are connected to a mint with a Nomisma mapping. For authorities, a Nomisma mapping exist currently for 34 out of the 193 resources, and only 146 individual coins have an authority that is mapped to Nomisma.

Nomisma resources for describing the authority or mint exist only for around one percent of all the reported coin finds in Finland!

Links to Nomisma are extracted through Wikidata

Linking ontologies



Web application

- Based on Sampo-UI framework
- Uses the open SPARQL endpoint
- Easy way to search and visualize the data
- For general public and researchers
- Faceted search
- Visualizations: charts, maps, animations…
- Even simple faceted search really useful for data management!

CoinSampo

Finnish Numismatic Public Finds 2013 - 2023

CoinSampo is a prototype cultural heritage service that open data about the numismatic citizen finds reported in Finland in 2013-2023.

Guides

Guides and instructions for archaeology as a hobby

Ilppari

Reporting service for archaeological finds found in Finland

FindSampo

Service for representing archaeological citizen finds

Coin Finds

Results: 431 coins

Active filters:

REMOVE ALL

Period: 17th century

Material: Silver

Narrow down by:

Text search

Search...

Denomination

Numismatic type

Period

Search...

- [ ] 16th century (end of) [897]
- [ ] Viking Age (700 - 1100) [836]
- [ ] 18th century [537]
- [ ] 19th century [492]
- [x] 17th century [431]
- [ ] Middle Ages (1200 - 1560) [162]

TABLE | MAP | HEATMAP | PIE/BAR CHART | AORISTIC CHART | MINTS | MIGRATIONS | FIND YE

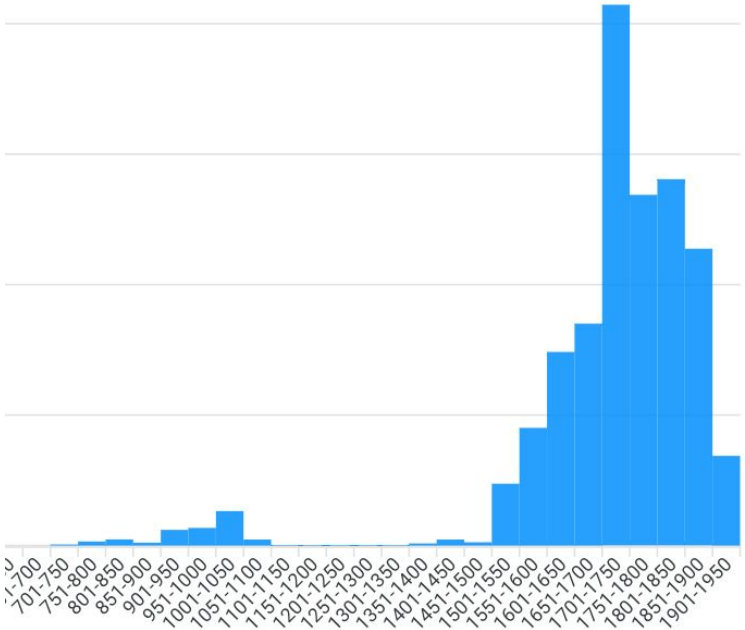
Rows per page 20 1-20 of 431

ID	Finna search	Denomination	Authority	t.p.q.	t.a.q.	Period
2014-0019		2 öre	Charles XI of Sweden	1664	1664	17th century
2014-0020		1 öre	Charles IX of Sweden	1609	1611	17th century
2014-0035		1 öre	Christina of Sweden	1649	1649	17th century
2014-0063		2 öre	Charles XI of Sweden	1666	1666	17th century

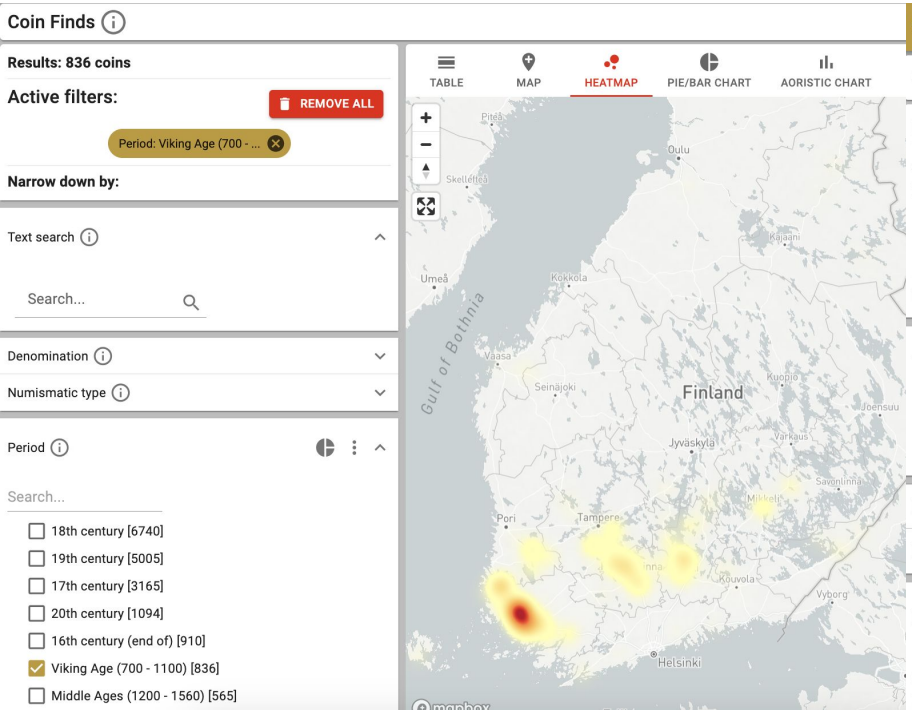
Aoristic tool: temporal spread

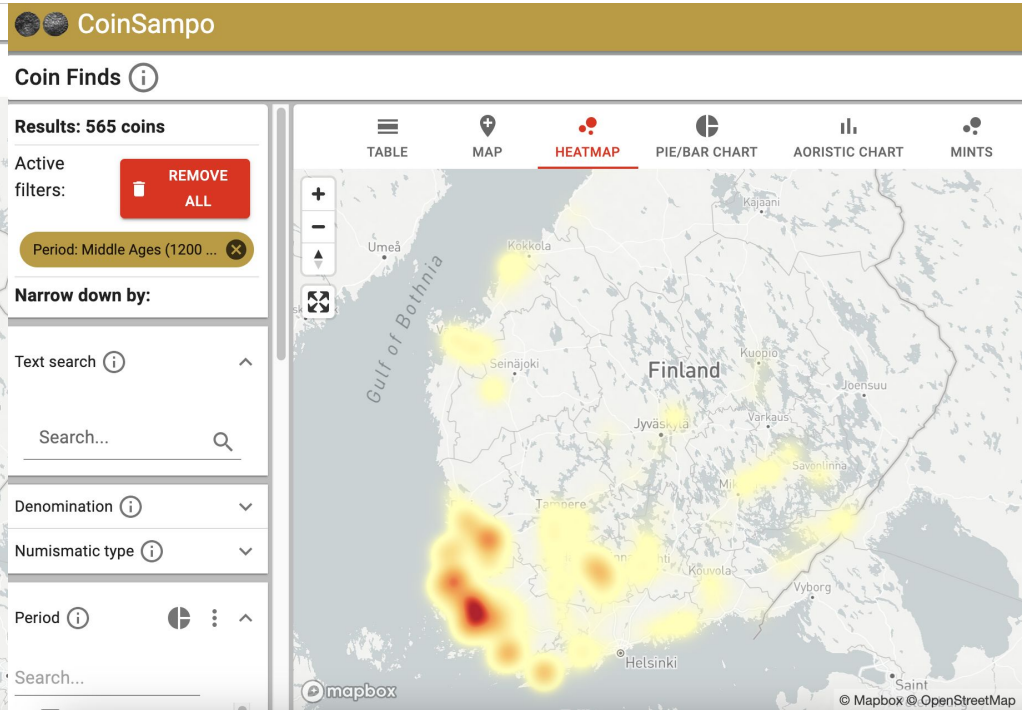
Tool for visualizing time spans as block based on weight

After Viking Age long period with almost no coin finds



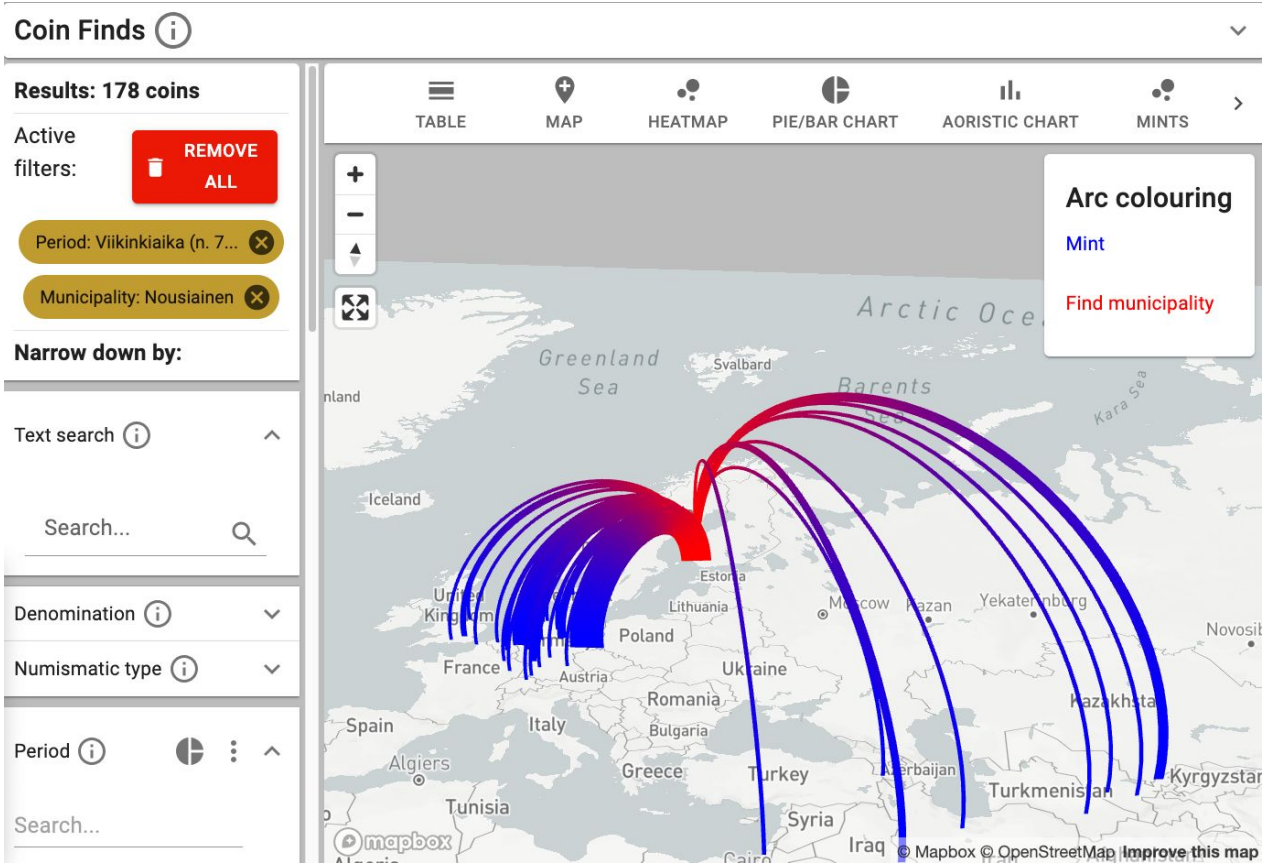
Spread of coin finds in Finland: Viking Age vs Middle Ages





Arch between findspot and mint

Relies on linking and enriched information from Wikidata



Thank you!

Web application: coinsampo.ldf.fi

Code: https://github.com/SemanticComputing/coinsampo-web-app

Data: https://www.ldf.fi/dataset/coinsampo

Sampo-UI:

https://seco.cs.aalto.fi/tools/sampo-ui/

https://github.com/SemanticComputing/sampo-ui

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