ConfermentSampo – A Knowledge Graph, Data Service, and Semantic Portal for Intangible Academic Cultural Heritage 1643–2023 in Finland

Eero Hyvönen[1,2][0000–0003–1695–5840], Patrik Boman[1][], Heikki Rantala[1][0000–0002–4716–6564], Annastiina Ahola[1][0009–0008–6369–4712], and Petri Leskinen[1][0000–0003–2327–6942]

[1] Semantic Computing Research Group (SeCo), Aalto University, Finland
[2] Helsinki Centre for Digital Humanities (HELDIG), University of Helsinki, Finland

Abstract. This article presents a model for representing and studying academic intangible cultural heritage pertaining to conferment ceremonies organized by universities in Europe since the 1100's. A new Linked Open Data (LOD) service and semantic portal on top of it in-use called CONFERMENTSAMPO – *100 conferments of the Faculty of Philosophy at the University of Helsinki 1643–2023* is introduced. It allows data related to conferment celebrations, rituals, and academics involved in different roles to be published, stored, and researched using Semantic Web technologies. A goal of our work is to preserve and foster conferment traditions for the future generations of academics.

Keywords: Linked Data· Digital Humanities· Intangible Cultural Heritage

1 Publishing and Studying Intangible Cultural Heritage

The UNESCO Convention[3] identifies five types of intangible cultural heritage (ICH): 1) Oral traditions and expressions; 2) Performing arts; 3) Social practices, rituals, and festive events; 4) Knowledge and practices concerning nature and the universe; 5) Traditional craftsmanship. The focus of this paper is on the Social practices, rituals, and festive events pertaining to academic traditions.

University students get their master and doctoral degrees in conferment ceremonies of universities where new members are accepted into the academic community. Such ceremonies started at the first European University of Bologna in the 1100's and were soon commonly organized in Europe in the 1300's. The conferment tradition with its rituals have been preserved in exceptionally rich form in Finland, where both masters and doctors still participate in the proceedings as before. In particular, the Faculty of Philosophy at the University of Helsinki, originally the Royal Academy of Turku, has been the driving force here [7]. In order to pass this tradition to new generations, conferment celebrations have been documented in student registers, anniversary books, photographs, on film, and related objects have been stored in collections of museums, libraries, and archives.

[3] UNESCO World Heritage Convention: `https://whc.unesco.org/en/conventiontext/`

The Web offers new opportunities for fostering intangible cultural heritage: digital materials can be published and accessed conveniently regardless of time and place. With the help of the linked data of the Semantic Web, distributed cultural materials published by different actors can be aggregated into the same triplestore and under a single user interface, the data can be enriched with links both internally and externally, new data can be inferred with the help of artificial intelligence, and the data can be analyzed and visualized computationally [11,12] using methods of Digital Humanities [6].

This paper addresses the following research question: *How can ICH of ceremonies be published on the Web for human consumption through intelligent user interfaces and in a machine "understandable" way, so that the data can be used for Digital Humanities research analyses, too?* As a case study, we consider publishing and using data about the academic conferment ceremonies (1643–2023) of the Faculty of Philosophy at the University of Helsinki, Finland. As a solution approach, representing the data as a Knowledge Graph (KG) based on ontologies [27] and linked data [8] is proposed in order to enrich the data semantically from related linked data and other data sources. In order to test and evaluate this idea, a practical application called CONFERMENTSAMPO in use on the Web is presented. It includes a knowledge graph hosted at a Linked Open Data (LOD) service[4] and a semantic portal[5] based on a SPARQL endpoint.

In the following, related works are first discussed (Section 2), conferment ceremonies at the University of Helsinki are overviewed (Section 3), and a data model for representing them is presented (Section 4). After this, the methods for LOD publishing and implementing the CONFERMENTSAMPO web services are discussed in Section 5. Using the data service and semantic portal is then illustrated by examples (Section 6). In conclusion, contributions of the work are summarized and directions for further research suggested.

2 Representing Intangible Cultural Heritage Events

Linked Data for digital Intangible Cultural Heritage (ICH) presents new challenges and possibilities for memory organizations. Systems have been developed pertaining to the different categories of ICH using semantically informed conceptualizations and practices [31]. Linked data has been used for representing war history, biographical data of people [30], music [23], musical performances [1], etc., but to the best of our knowledge not for academic traditions. However, CONFERMENTSAMPO is a continuation of our earlier work at the beginning of the 2000's with the University Museum of the University of Helsinki, the current Science Museum Liekki[6], for the RDF(S)-based[7] Promoottori system [16,10], whose goal was to publish and promote the conferment tradition of the University of Helsinki with the help of Semantic Web technologies. The innovation of this application was to create a formal data model, i.e., an ontology[27], describing conferment events, persons, places, and other concepts and entities. Based on the ontology, a "smart" semantic portal was created, which allowed the user to find

[4] LOD service available at: `https://ldf.fi/dataset/promootiosampo/`

[5] Portal available at: `https://promootiosampo.ldf.fi`

[6] Liekki Museum: `https://www.helsinki.fi/en/helsinki-university-museum-flame`

[7] RDF Schema recommendation of W3C: `https://www.w3.org/TR/rdf-schema/`

photos, artefacts, and other tangible material related to the tradition and to browse related linked information. This application was used for several years in the museum's premises on a client terminal, but due to the copyright of the materials, it could not be published online. The system did not contain data about the different conferment events, the focus of this paper, but contained only a generic model of them and data about related tangible objects.

From a data modeling point of view, various event-based models [2], most notably the CIDOC CRM model[8] [5], have been developed for representing intangible phenomena. These include not only historical events and performance processes but also, e.g., acts of conserving and exhibiting artifacts in memory organizations.

3 Conferment Ceremonies at the University of Helsinki

In May 2023, the Faculty of Philosophy of the University of Helsinki organized its 100th anniversary conferment[9]; the first one was organized 380 years earlier in 1643. The ceremonies of the Faculty of Philosophy have become an exceptionally eventful tradition, even on a global international scale, and has been a model for the new universities founded in Finland in the 20th century.

The ceremonies last for four days. In addition, ceremonial old group dances are being practiced in advance to be presented at the conferment by participating masters and doctors separately.

1. **Floora's Day.** On May 13, the celebrations start and consist of four major rituals, such as *Inviting of the official wreath binder* and *Procession to the field of Kumtähti*, where the national anthem of Finland was first sang for the first time in 1848.
2. **Conferment Preparations.** On Thursday, last week of May, five major ritual are performed pertaining to the preparations for the actual conferment day (cf. below). For example, the spouses of the promoted masters bind during a special dinner laurel wreaths, symbols for the academic degree, to be used at the act of the conferment, and there is another event for sharpening the doctors' swords. At another dinner, the doctors are given as an insignia the permission to wear swords that symbolize the spirit for defending what is true, right, and good.
3. **Conferment Day.** Friday, last week of May, is the day for the act of conferment at the university Great Hall. During the act academic insignia are delivered, including laurel wreaths for the masters and special top hats and swords for the doctors. In total, the day includes more than a dozen additional smaller acts and rituals, such as various official speeches, and an academic procession to the church and a service there.
4. **Conferment Celebrations.** Saturday, last week of May, some 16 additional rituals and smaller acts are performed, such as the Conferment sailing trip and picnic to the archipelago, the great dancing ball, and finally the nocturnal procession with

[8] CIDOC Conceptual Reference Model (CRM): `https://cidoc-crm.org`

[9] 110th jubilee conferment: `https://www.helsinki.fi/fi/projektit/promootion-riemuvuosi/promootion-historiaa`

speeches to various statues of national heroes. The procession goes from the dancing ball to the university main building where the final act is a speech to the raising sun given typically by a new doctor in astronomy.

People in over 20 different official roles participate in these over 40 official rituals and acts of the conferment ceremonies. CONFERMENTSAMPO publishes information about the one hundred conferment ceremonies of the Faculty of Philosophy at the University of Helsinki from 1643 to 2023, with a focus on the academics who participated in them in different roles. CONFERMENTSAMPO is a new member in the series of over twenty Sampo systems in twenty years (2004–2024), which have had up to millions of users online[10] [13].

4 Creating the Knowledge Graph

This section explains the data models used in our case study and how the knowledge graph based on them was created and enriched from external data sources.

4.1 Data Models for Conferments and People

General properties of the conferment class		
Property	**Description**	**Label (in Finnish)**
scprs:university	Name of the university	Yliopisto
scprs:year	Conferment year	Promootion vuosi
scprs:date	Date of the conferment	Tapahtumapäivä
scprs:conferment-Description	Short description of the events	Promootion kuvaus
scprs:conferment-DescriptionSource	Reference to data sources	Lähde promootion kuvaukselle
scprs:promovend	Number of students conferred	Promovendien lukumäärä
scprs:confermentPoem	Name of the conferement poem	Promootioruno
scprs:confermentCantata	Cantata presented at the conferment	Promootiokantaatti
scprs:externalLinks	Related externals links	Ulkoiset linkit
scprs:Image	URI of related person image	Kuva
scprs:ImageAttribution	License for the image	Valokuvan tekijänoikeusviittaukset
scprs:ImageDescription	Description of the image	Kuvaan liittyvä kuvaus
scprs:ImageSource	URI for the image source	Valokuvan lähdesivu

Table 1: Conferment class: general properties. *seprs* refers to the namespace of the data.

The core of CONFERMENTSAMPO data is a table of all 100 conferments of the Faculty of Philosophy of the University of Helsinki from 1643 to 2023. The University of

[10] Sampo systems: `https://seco.cs.aalto.fi/applications/sampo/`

Roles of people in conferments		
Property	**Description**	**Label (in Finnish)**
scprs:conferrer	Official conferrer	Promoottori
scprs:backupConferrer	Back-up conferrer	Varapromoottori
scprs:wreathWeaver	General wreath weaver	Seppeleensitoja
scprs:cantataPoet	Poet of the cantata	Kantaattirunoilija
scprs:cantataComposer	Composer of the cantata	Kantaattisäveltäjä
scprs:celebrationPreacher	Preacher of the celebration	Juhlasaarnaaja
scprs:confermentPoet	Poet of the conferment	Promootiorunoilija
scprs:danceMaster	Dance master	Tanssimestari
scprs:doctorPrimus	Primus doctor	Primustohtori
scprs:doctorUltimus	Ultimus doctor	Ultimustohtori
scprs:graphicDesigner	Grahic designer	Graafikko
scprs:goldsmith	Gold smith	Koruseppä
scprs:gratisti	Chairman of ceremonies	Gratisti (leader)
scprs:headMarshal	Head of ceremonies	Yliairut
scprs:honoraryDoctor	Honorary doctor	Kunniatohtori
scprs:jubileeDoctor	Jubilee doctor	Riemutohtori
scprs:jubileeGratisti	Jubilee gratisti	Riemugratisti
scprs:jubileeMagister	Jubilee magister	Riemumaisteri
scprs:jubileeWreathWeaver	Jubilee wreath weaver	Riemuseppeleensitojatar
scprs:magisterPrimus	Primus magister	Primusmaisteri
scprs:magisterUltimus	Ultimus magister	Ultimusmaisteri
scprs:doctorQuestioneer	Questioneer doctor	Tohtorikysymksen esittäjä
scprs:magisterQuestioneer	Questioneer master	Maisterikysymyksen esittäjä
scprs:masterOfCeremonies	Master of the ceremonies	Juhlamenojen ohjaaja

Table 2: Role properties of the data model for the conferment class. The range of the properties is the Person class (cf. Table 3 below.)

Helsinki was originally the Royal Academy of Turku, later also the Imperial Academy of Turku and the Imperial Alexander University of Finland during the time of the Grand Duchy of Finland (1809–1917).

A natural option for modelling data concerning ceremonial academic events would be to use an event-based ontology like CIDOC CRM. Its extensions have been used in various other Sampo systems, such as BiographySampo [15,28] and AcademySampo [20,21] whose data are re-used in CONFERMENTSAMPO. Here the lives of academics are represented as spatio-temporal sequences of biographical events participated by the people and other actors in different roles. However, the data related to conferment events is tabular in nature and it was decided that a simpler model would be enough in this case. Also presenting the data and maintaining it in the future would be easier in a tabular form than in CIDOC CRM.

The ontological model developed for the concept (class) of conferment ceremonies is therefore Dublin Core-like[11]. It consists of 38 metadata elements (properties). Firstly,

[11] Dublin Core Metadata Initiative: `https://dublincore.org`

each conferment is described in terms of 14 general properties, such as the number and year of the conferment, a short description of the celebration events, a related image etc. (cf. Table 1). Secondly, each conferment class instance is linked to instances of the class people that acted in the ceremony in the 24 different roles listed in Table 2.

Person properties		
Property	**Description**	**Label (in Finnish)**
scprs:Image	Person image URI	Kuva
scprs:ImageAttribution	Copyright of the image	Valokuvan tekijänoikeus-viittaukset
scprs:ImageDescription	Image description	
scprs:ImageSource	URI of the image source	Valokuvan lähdesivu
scprs:matrikkeliLink	URL to student registry	Ylioppilasmatrikkeli linkki
scprs:Nation	Nation of the person	Osakunta
scprs:ParticipatedIn	Conferment participated	
scprs:personID	Person identifier	Henkilö ID
scprs:prefLabel	Person name	Henkilön nimi
scprs:role	Roles of the person	Rooli
scprs:title	Profession or rank	Ammatti tai arvo
scprs:wikiLink	Link to Wikipedia	Wikipedia linkki

Table 3: Properties of the person class. *seprs* refers to the namespace of the data.

Another key data table of the system consists of 1179 people who are known to have participated in the conferments in various official roles. This number excludes the thousands of students conferred during the events in the role of ordinary promovendei. The concept of a person is defined by the person's biographical properties (cf. Table 3). Resources belonging to the Finnish ontology infrastructure [14] are used as property values. With the help of the common infrastructure concepts, the data can be enriched and linked to other linked data publications. In the knowledge graph, instances of people are linked to instances of conferments by the explicit role properties of Table 2.

For the years 1643–1899 detailed information was also available on all conferred students (promovendei), thanks to the AcademySampo KG and LOD service. Their data and analyses are available by following links to the AcademySampo portal. Student-wise data of the 20th and 21st centuries is unfortunately not available, due to, e.g., personal data protection issues. Due to this shortcoming, the portal's application views and visualizations have been divided separately for the years 1643–1899 (conferments 1–70) and 1900–2023 (conferments 71–100). A separate but semantically similar conferment class is used for them to make the distinction.

4.2 Data Transformation, Data Enrichment, and Linking

The data was first harvested from various web pages into two CSV tables representing the 100 ceremonies and people involved.

In addition, these data was enriched manually and by links and related data of several external data sources:

1. AcademySampo.fi [20] based on the university's 28 000 student matriculation records.
2. Biografiasampo.fi [15,28], based on the 13 600 biographies of the Finnish Literature Society.
3. Wikidata/Wikipedia (e.g., paintings depicting the academics).
4. The national Finna.fi service[12] hosted by the National Library that aggregates and publishes collections of Finnish memory organizations.
5. Fennica – Finland's national bibliography[13] containing, e.g., data about the dissertations of the academics.

Furthermore, the national FIN-CLARIAH infrastructure[14] as part of the Reserarch Council of Finland's research infrastructure roadmap[15] enabled the reuse of tools implemented in previous Sampo systems, e.g., visualizations with maps and timelines. At the same time, the data has been enriched also by reasoning as customary on the Semantic Web.

5 Methods

In our research, design science [22,9,24] methodology was used. The purpose of design science is to devise artifacts that are assessed against criteria of value or utility. The artifacts are created in an iterative fashion by building and evaluating them.

The data publication model of CONFERMENTSAMPO is based on the Sampo model [13] and the portal has been implemented with the Sampo-UI framework[16] [19,25] like other Sampos completed after NameSampo[17] published in 2018. The idea of the model is to gather mutually enriching data from different databases and sources, to harmonize the data using a shared infrastructure that includes shred data models (such as Dublin Core and CIDOC CRM) and ontological vocabularies (such as the ontological vocabularies of the National Library's Finto.fi service). The "standardized" principles and components of the Sampo-UI-based user interface included in the model makes the portal easy to use for end users on the one hand, and easy to implement for the application developers on the other hand.

The data aggregated and harmonized in a Sampo system is published as an open data service of linked data online in accordance with the standards and best practices of

[12] Finna portal: `https://finna.fi`

[13] Fennica portal: `https://kansalliskirjasto.finna.fi/Content/fennica`

[14] FIN-CLARIAH initiative, LOD part: `https://seco.cs.aalto.fi/projects/fin-clariah/`

[15] Finnish roadmap of research infrastructures: `https://www.aka.fi/tutkimusrahoitus/ohjelmat-ja-muut-rahoitusmuodot/tutkimusinfrastruktuurit/`

[16] Sampo-UI is openly available in Github: `https://github.com/SemanticComputing/sampo-ui`

[17] NameSampo project page: `https://seco.cs.aalto.fi/projects/nimisampo/`

the W3C that coordinates the global Web infrastructure development. For this purpose, a special Linked Data Finland platform LDF.fi[18] has been developed in Finland [18,17].

Once the linked data service has been published online, one can cost-efficiently use the data by SPARQL querying[19]. In this way it is possible, for example, to implement portals using the Sampo-UI tool [19,25] or use the data service directly in digital humanities studies. For example, in MMM-Sampo[20] (Mapping Manuscript Migrations) the triplestore related to medieval and Renaissance manuscripts of the University of Oxford, the Schönberg Institute of the University of Pennsylvania, and the French IRHT research center were combined into an open international data service and semantic portal utilizing international ontologies.

For CONFERMENTSAMPO there was no ready-made database of conferments available, but the data had to be mined, e.g., from the website of the University of Helsinki[21] and online services related to the topic, and to supplement the data manually based on literature. An important literary source has been Tero Halonen's new book on the Finnish conferment traditions [7]. As a result of the data aggregation, tabular data was created and harmonized and transformed into a linked open data service in a similar way as in other database-based Sampos. In the future, the collected data can be supplemented and maintained, for example, in connection with future conferments by updating the tables. Alternatively, native linked data can be maintained using an editor. It is also possible to extend the system to conferment ceremonies in other faculties or universities.

The CONFERMENTSAMPO KG[22] is available on the Linked Data Finland[23] platform with open CC BY 4.0 license. The Apache Jena Fuseki[24] triplestore with Lucene[25] text indexing is used with a SPARQL server that is accessible from an open SPARQL endpoint[26]. The Varnish Cache web application accelerator[27] is used for routing URIs, content negotiation, and caching. Deployment of applications with a data service is based on a microservice architecture with Docker containers[28] where each individual component (the application, Varnish, and Fuseki) is run in its own dedicated container, making the deployment of the services easy due to installation of software dependencies in isolated environments.

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[18] Linked Data Finland platform for LOD publishing: `https://ldf.fi`

[19] SPARQL query language: `https://www.w3.org/TR/sparql11-query/`

[20] MMM project homepage: `https://seco.cs.aalto.fi/projects/mmm/`

[21] Conferments at the University of Helsinki: `https://www.helsinki.fi/fi/tutustu-meihin/tama-helsingin-yliopisto/juhlat-ja-perinteet/promootio`

[22] ConfermentSampo data service: `https://www.ldf.fi/dataset/promootiosampo`

[23] `https://www.ldf.fi/`

[24] `https://jena.apache.org/documentation/fuseki2/`

[25] `https://lucene.apache.org/`

[26] `https://ldf.fi/promootiosampo/sparql`

[27] `https://varnish-cache.org`

[28] `https://www.docker.com`

6 Using the Data Service and Portal

Based on the Sampo model, the data is published in an open SPARQL endpoint that can be used directly for data analyses using tools, such as the Yasgui editor [26] or Jupyter notebooks[29], or by applications created on top of the data service, such as the semantic Sampo portals[30] using the Sampo-UI framework [19,25].

Sampo-UI aims at "standardizing" UI development by proving a framework where faceted search and browsing is seamlessly integrated with data visualization and analysis tools. This makes using the UI easy for end users and application developer to implement. Developing a new Sampo portal can be started from an existing portal project whose configurations are modified in a declarative fashion to meet desiderata and the data models of the new application.

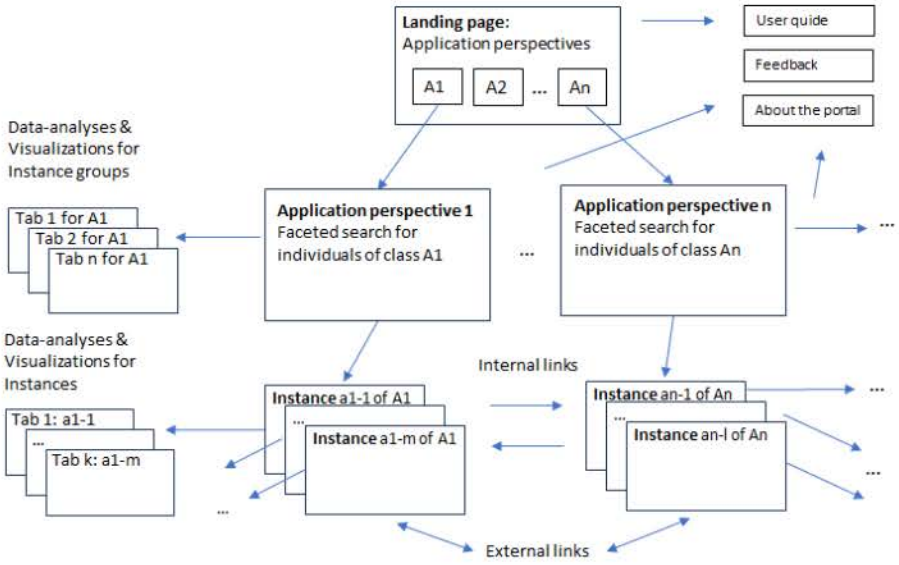

Fig. 1: The default navigational page structure of a portal based on Sampo-UI.

Fig. 1 illustrates the navigational structure of using a Sampo-UI-based portal. The user first lands on the *landing page* with several *application perspectives* to the data. The perspectives are based on classes of the underlying KG. The usage cycle of each perspective can be divided into two steps: 1) filter and 2) analyze. The user first filters the data by using the faceted semantic search [29] tools provided by the portal. The results as well as the facet options are updated after each selection of a facet, making it possible for the user to precisely filter the end-result entities by different properties.

[29] Jypyter notebooks: `https://jupyter.org/`
[30] Sampo portal series online: `https://seco.cs.aalto.fi/applications/sampo/`

After filtering the data to the wanted subset, the user can analyze the results set, i.e., a set of instances of the class corresponding to the application perspective, with integrated data-analytic tools available as tabs on the application perspective page.

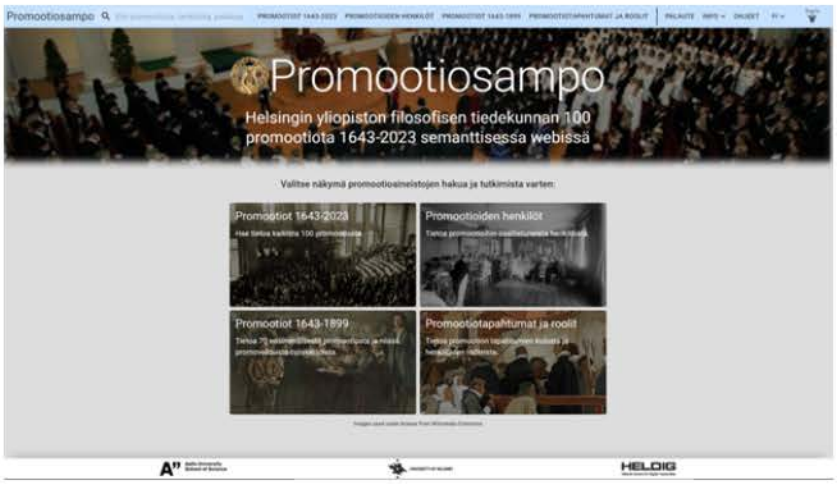

Fig. 2: CONFERMENTSAMPOs landing page with four application perspectives

The CONFERMENTSAMPO portal is based on Sampo-UI offering its user a landing page (cf. Fig. 2) from which different application perspectives can be selected for searching, browsing, and analyzing underlying linked data. In this case there are four perspectives for searching people, conferments 1643–1899, all conferments 1643–2023, and the last perspective offers a link to a page which explains the meanings of the official roles of the people participating in the promotion, as well as the course of ceremonial events, as explained in Section 3.

The perspectives are based on the key data types (classes) of the data model used, in this case the classes for conferments and people, and their properties described in Section 4. The top bar of the front page also contains links to additional information about the portal, a user manual, and a feedback channel for the end users to report possible errors and suggestion for further developments.

In the perspectives, one can search for individuals of the class related to the perspective, i.e., conferments and people, by using faceted search based on restrictions on the values of the class properties. In this way it is possible to limit the researched conferments only to, e.g., promotions held at the Royal Academy of Turku, or filter out people based on their roles. For example, one can find only promoters or cantata poets in the people application perspective.

In Fig. 3, the user has selected the perspective for conferments 1643–2023 and in the facet University the category Imperial Alexander University, in which case the search result will be 22 conferments. Facets are shown on the left and search results on the

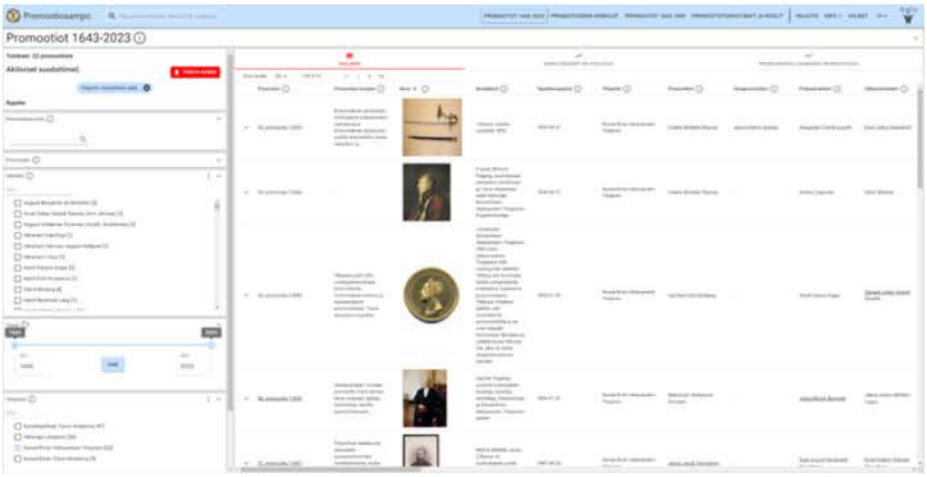

Fig. 3: Application perspective to search, browse, and analyze the conferment ceremonies 1643–2023

right. For each conferment, an image related to it in one way or another has been retrieved from different data sources, for example, a portrait of the promoter or an object related to the promotion, such as a sword. By clicking on the conferment link in the result set, one can access the homepage of the event, where various information and related links for further information have been collected. By clicking on the image, one gets additional information related to it.

By default, the search results are displayed as a table, but by changing the tab in the top bar, other data analytical visualizations are available for the search result. For example, in Fig. 3 there is a tab available for showing a histogram related to the number of people who participated in the promotions of the search result in different roles.

In faceted search, the information regarding the number of search hits for all facets is updated automatically after each selection. For example, the number of hits in the people facet tells how many times each person has been involved in an official role in different conferments. For instance, the total count for Professor Jakob Johan Wilhelm Lagus (1821–1909) is five; he was a central figure in developing the original student matriculation registry data behind AcademySampo and CONFERMENTSAMPO.

Fig. 4 shows the perspective for people with search facets Name, Person, Roles, Department, Profession or rank, and Conferment on the left. The Roles facet has been opened, which shows the number of roles of the people in the search result. Here, for example, it is possible to see that there have been a total of 320 jubilee doctors and 194 jubilee masters[31] in different conferments.

In a similar way to the conferment perspective, the search result for people is shown as a table by default, but the result can also be visualized prosophographically on different tabs. For example, in this case histograms of roles can be shown or maps used.

[31] The jubilee degree is given to people who were graduated in a conferment 50 years earlier

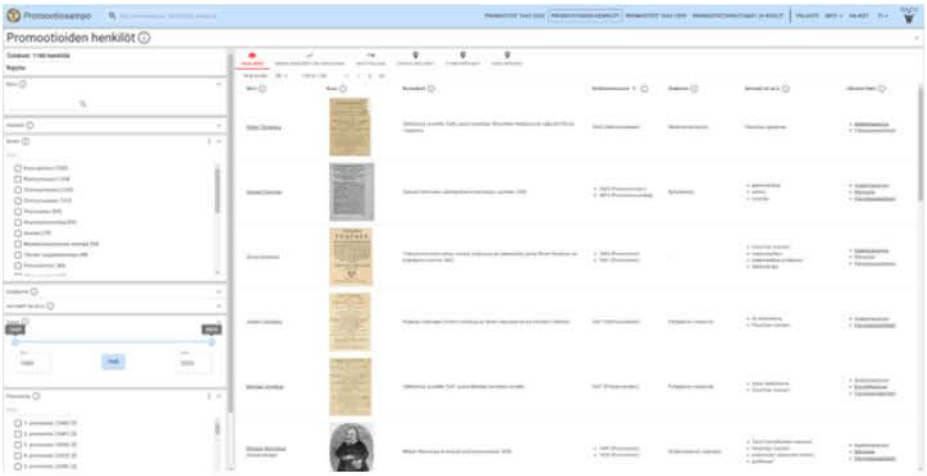

Fig. 4: The people application perspective of more than a thousand people in the official roles in 1963–2023

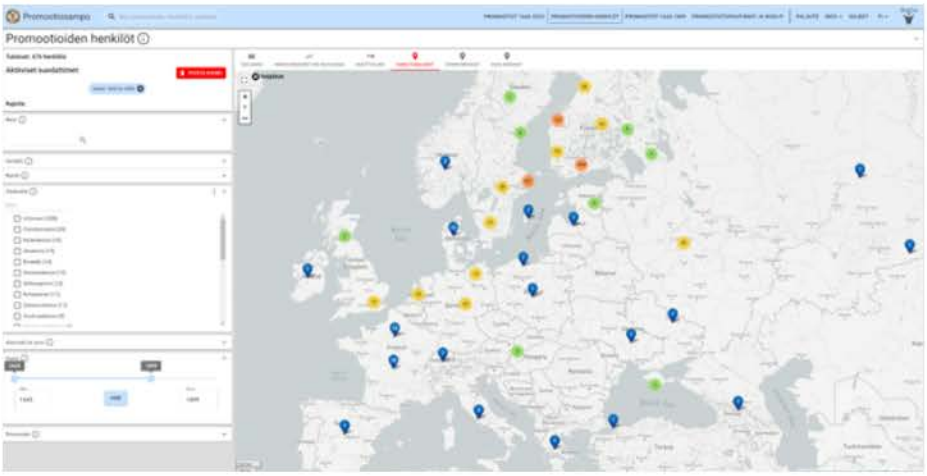

Fig. 5: Known events related to the persons of conferments 1643–1899, visualized on a map (© Mapbox, © OpenStreetMap). By clicking on the marker, you get information about the people associated with the place.

Fig. 5, for example, visualizes the career events related to the people in the result set on

a map[32] during the period 1643–1899. This data originates from the underlying AcademySampo system based on CIDOC CRM events.

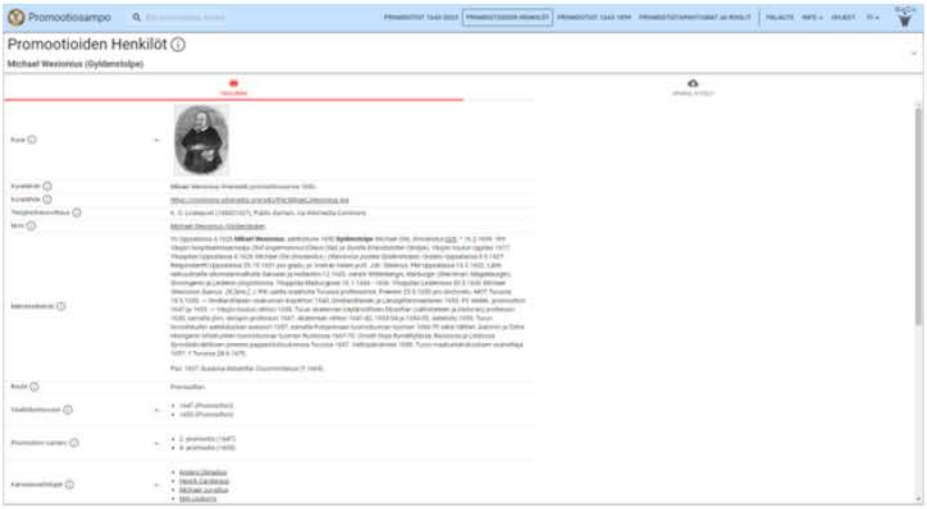

Fig. 6: Homepage of Professor Michael Wexionius (1609–1670), the official promoter of conferments 1647 ja 1653

Each person (class instance) has an automatically generated homepage that can be accessed by clicking on the person's link in the search result. For example, Fig. 6 shows the homepage of the promoter of the 1647 and 1653 promotions, Michael Wexionius (1609–1670), ennobled later as Michael Gyldenstolpe. His data has been compiled and linked to diverse information about his life. For example, if a person has published a dissertation available in the National Library's *Fennica – Finland's national bibliography*, a link to it is provided for a reference.

A key source of data re-used in CONFERMENTSAMPO for academics 1640–1899 has been AcademySampo [20] which contains detailed biographical information on all approximately 28 000 persons who received an academic education in Finland between 1640–1899. Most of them participated in one or more conferments in different roles. Based on CONFERMENTSAMPO the most active conferment person has been Zacharias Topelius (1818–1898), who has been involved in official roles in eight different promotions. Three people have been participant with six official roles: Adolf Moberg (1829–1895), professor of physics and chemistry and rector of the Imperial Alexander University of Finland; the poet and Finnish writer Otto Manninen (1872–1950), who has

[32] The map is generated with Mapbox service with data from Mapbox and OpenStreetMap and their data sources. To learn more, visit `https://www.mapbox.com/about/maps/` and `http://www.openstreetmap.org/copyright`.

participated as both a cantata poet and as an honorary doctor; the dance master Mrs. Sirpa Koivisto during the conferments 1986–2003.

Based on language agnostic semantic web technologies, the user interface of the portal is available in Finnish and English. The data is available only in Finnish but, e.g., Google Translate can be used for translations.

7 Conclusions

This paper presented a new in-use application of linked open data, based on data harvested from web pages, enriched with related data sources, and published as an open knowledge graph in a SPARQL endpoint for 1) end users to use and 2) application developers to create applications for digital humanities.

The Sampo-UI framework was successfully tested and demonstrated for these two tasks. The portal UI has not been formally evaluated. However, previous implementations of several popular portals utilizing the Sampo-UI model [13] suggest empirically good usability and scalability of the model and tool [4]. From a software developer point of view, the Sampo-UI framework was deemed very useful by the portal main developer who was not involved in developing the tool and had never used it before [3].

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