

# Observing trajectories in Science

## Building the DANS KOS Observatory (KOSo)

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## Project Team



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DANS - Data Archiving and Networked Services



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DANS is an institute of KNAW (Dutch Royal Academy of Arts & Sciences) and NWO (Netherlands Organisation for Scientific Research)

## The need for a KOS Observatory

KO & SW scholars

The KOS universe

Data archives & the future

A resource for KO scholars



Open Science and Research  
**DANS**

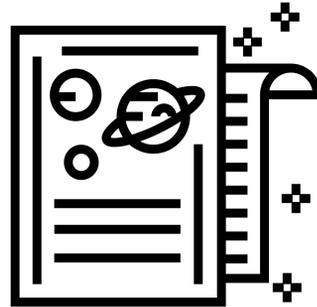
Scholars in the Knowledge Organization and Semantic Web communities have frequently recognized the fact that we lack the possibility to step back and perceive the vastness of the KOS universe. For data archives, that means that data they are curating might not be interpretable in the future.

For Knowledge Organization scholars it means, appropriate empirical evidence is missing to explore the knowledge domain specificity, depth, age, and complexity of KOSs.

# The idea of a KOS Observatory

Inside the KOS observatory

Space, time, and phenomena in cultural settings



Open Philology and Bibliography Services  
**DANS**

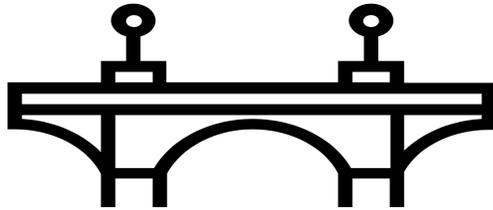
A KOS observatory would be a place where one might find:

- All KOSs side by side;
- All instantiations of each such KOS side by side;
- Access to the classified worlds populated by instantiated KOSs (e.g., all UDC strings in WorldCat; all ICONCLASS terms in [some place]; etc.) side by side;

*To use the metaphor of observatory literally*, a KOS Observatory would allow us to see the physical forces of specific designations of phenomena in cultural settings across time and across KOSs.

In other words, allow us to make observations, and capture observations, at once at many points in space-time.

# Cultural Synergy



Cultural synergy is the idea that information institutions (KOSs) can provide synergistic action through cultural interplay.

This is based on the idea that institutions are disseminators of the cultures from which they spring.

DANS  
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Cultural synergy is the idea that information institutions can provide synergistic action through cultural interplay. This is based on the idea that institutions are disseminators of the cultures from which they spring.

It tells us that each point in a KOS captures not just past knowledge, but also its cultural and social epistemology. Just as the same concept can be characterized in different ways, depending on the KOS in which it appears...the same concept at different times appears to be different, because it is different.

In that sense a KOS which disappears, even a lost version, is a lost 'bridge' to the meaning behind a term in a given context, place or moment in time.

# The DANS KOS Observatory

Change over time

Archival

Versioning, identification and control

The 'FAIR' Data Principles (Wilkinson et al., 2016).

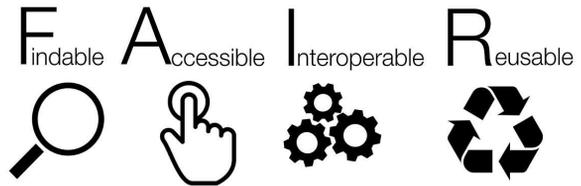


Image Author [SangyaPundir](#) CC-SA 4.0



In 2017, Professor Richard P. Smiraglia joined DANS as a Visiting Professor with the aim of developing more insight into the history, evolution and mutual dependencies of the different domain-specific KOSs DANS sees itself confronted with. Furthermore to learn about the handling of these resources and their associated metadata from an archival standpoint.

The project also aims to understand:

- How KOSs change over time.
- How they can be archived.
- How version identification and control can be addressed.
- How KOSs can be aligned to the 'FAIR' Data Principles (Findable, Accessible, Interoperable, Reusable) (Wilkinson et al., 2016).

## How to Observe a KOS

Metadata terms



Formal classification symbols

...and other schemas



The project employed a variety of techniques for using both metadata terms and formal classification symbols to enrich our data. However using Dublin Core metadata terms, or other schemas for the attributes and describing KOS using existing controlled vocabularies was largely avoided.

The main benefit of this was that the KOSs could be described in a way which was not limited by viewing them through a pre-existing lens designed for another data type. The main disadvantage of this is that the data produced (true to the KOSs themselves) are quite heterogeneous.

# KOSo and the ICC

'Classifying the classifiers'

International Coding Classification (ICC)

NARCIS Classification

Integrative levels & synthetic format

**Annex 2: Information Coding Classification (ICC)**

**SURVEY OF THE FIRST LEVEL SUBDIVISIONS**

11	FORM AND STRUCTURE AREA	51	Psychology
12	Mathematics	52	Education, Labour, Leisure
13	Statistics	53	Professional Codes
14	Cybernetics	59	Household and Home Life
15	Information Sci. & Technol.	6	SOCIO AREA
16	Cybernetics (Control, Automat.)	61	Sociology
18	Standardization	62	Public Administration
19	Testing and Checking	63	State and Politics
2	ENERGY AND MATTER AREA	64	Law
21	Mechanics	65	Law Planning and Urbanism
22	Physics of Matter	66	History
23	Gen. & Techn. Physics	67	History
24	Electronics	7	ECON. & TECHN. PROG. AREA
25	Physical Chemistry	71	Constitution and Nat. Economy
26	Pure Chemistry	72	Management of Enterprises
27	Chem. Technol. & Technol.	73	Technol., Engng. in general
28	Scientific Engng.	74	Mechanical Engineering
3	COMED AND GEO AREA	75	Building
31	Astronomy & Astrophysics	76	Urbanism & Technol.
32	Astronautics & Space Res.	77	Transport Technol. & Serv.
33	Basic Cosmology	78	Service Economics
34	Astronautics Sci., Meteorology	8	SCIENCE & INFORM. AREA
35	Hydrology & Oceanol. Sci.	81	Science of Science
36	Geological Sciences	82	Information Sciences
37	Hydrology	83	Computer Sci. & Technol.
38	Metereology	84	Communication Sci. Techn.
39	Geography	85	Printing and Publishing
4	BIO AREA	86	Communication Engng.
41	Basic Biological Sciences	87	Science
42	Microbiology and Cultivation	9	HUMANITIES & CULTURE AREA
43	Plant Biology and Cultivation	91	Linguistics
44	Animal Biology and Breeding	92	Literature and Philology
45	Vegetology	93	Philosophy
46	Agriculture and Horticulture	94	Philosophy
47	Forestry & Wood Sci. & Techn.	95	Philosophy
48	Food Sciences & Technol.	96	Philosophy
49	Ecology and Environment Sci. & T.	97	Philosophy
5	HUMAN AREA	98	Philosophy
51	Human Biology	99	Christian Religion & Theology
52	Human & Therap. Medicine		
53	Pathol. & Para. Medicine		
54	General Res. & Nature Cure		

In order to 'classify the classifiers' we used both the International Coding Classification (ICC) and the NARCIS Classification.

The ICC is a classification of knowledge fields, instead of disciplines, organized according to the theory of integrative levels (Dahlberg 1982 and Dahlberg 2008).

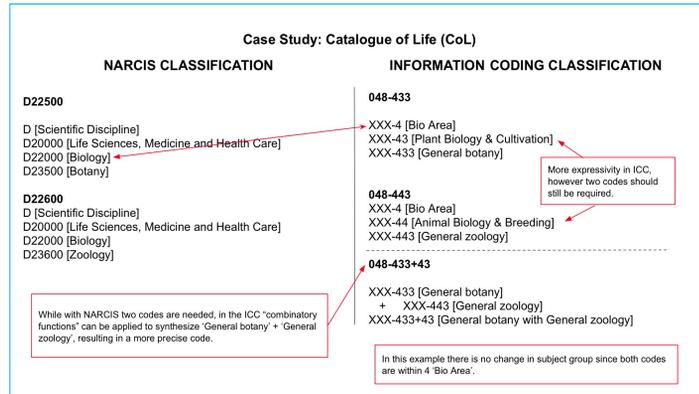
The richness of its structure suggests the richness of knowledge itself, thus making it prima facie the best choice for classifying KOSs themselves.

The ICC is used in a synthetic format together with Dahlberg's (1999) KO Literature Classification (KOLC), thus rendering for each KOS a domain-centric term faceted with a KOS-form term.

# Classifying the Classifiers

Ontological coverage

A comparative resource



In order to begin to position the KOSo data among DANS existing resources we employed the NARCIS Classification. The NARCIS Classification is designed as a framework to represent the research foci of the Dutch national research infrastructure.

The two classifications overlap at the level of disciplines but provide distinctly different ontological coverage at a more granular level (see Coen and Smiraglia 2019 and Coen, Smiraglia, Scharnhorst and Doorn 2019). Combined with the richness of natural language terms derived from the KOSs themselves, we have been able to overlay the KOSo with a rich ontological matrix. This gives opportunities for comparative resource discovery that can provide Wilsonian exploitative power (Wilson 1968) for KOS research.

## Contents of the KOSo (1)

Awareness  
& engagement



Other registries  
and classifications



Digitally Enabled Research  
**DANS**

The KOSo does not stand alone in its attempts to create a registry and classification of KOSs. Efforts have been made to link to, collaborate with and incorporate aspects of other relevant initiatives.

The Dublin Core NKOS group 'KOS Types Vocabulary' has been included as an attribute. When a KOS appears in both the KOSo and the Basel Register of Thesauri, Ontologies and Classifications (BARTOC) a URL is provided.

## Contents of KOSo (2)

Attribute Name	Attribute description
<b>Identifier</b>	A unique identifier given to each instantiation of a KOS.
<b>Schema Name/Title</b>	The name of the KOS including any aliases
<b>Creator(s)/Curator(s)</b>	The name of the original creator and the names of subsequent curators responsible for its maintenance.
<b>Maintenance organization</b>	The name of the institution responsible for publishing/maintaining the KOS.
<b>Place: Publisher, date.</b>	Where the KOS was published, the publisher and publication date.
<b>Summary / Abstract</b>	A description of the purpose of the KOS.
<b>Format(s)</b>	A list of the formats the KOS is published in.
<b>Language</b>	A list of the languages the KOS is published in.
<b>Physical Location</b>	Where a physical copy of the KOS can be found within the Netherlands i.e. a library address.
<b>Online Location</b>	Where the KOS can be found online i.e. a URL.
<b>Earlier versions (editions) ...</b>	The previous version to this instance of the KOS.
<b>History of versioning:</b>	The version number/edition of the KOS.
<b>Version Notes:</b>	What has been changed, deleted or added since the previous version. Is there something else noteworthy about this version.
<b>Last Updated:</b>	The date of the last update of the KOS.
<b>Number of terms in system</b>	The number of terms the KOS includes.
<b>Phenomena included</b>	The <i>things</i> the KOS aims to organize/manage.
<b>Disciplines included</b>	The scientific disciplines covered by the KOS.
<b>Direct domains included</b>	The research domains, fields or themes covered by the KOS.
<b>Related to:</b>	Does the KOS reference any other KOS? It is branched from, merged with or structured in the form of another KOS.
<b>BARTOC link</b>	Does this KOS appear in the Basel Register of Thesauri, Ontologies and Classifications? If so, a URL is provided.
<b>International Coding Classification (ICC)</b>	The relevant ICC code for the KOS.
<b>NARCIS Classification</b>	The relevant NARCIS class for the KOS.
<b>KOS Types Vocabulary</b>	The appropriate Dublin Core NKOS group 'KOS Types Vocabulary'



Currently the KOSo collects information about KOSs from the Social Sciences and Humanities and Life Sciences covering twenty-three attributes.

An explanation for each of these attributes is provided in the paper. Specific emphasis is placed on data related to versioning and time.

# Contents of KOSo (2)

Identifier	Schema Name/Title	Phenomena Included
KOS.HSB.35	MDA archaeological objects Thesaurus	For the recording of portable archaeological objects.
KOS.HSB.35.1	Archaeological Objects Thesaurus	For the recording of portable archaeological objects.
KOS.HSB.36	Archaeological Sciences Thesaurus	Terminology used for recording the techniques, recovery methods and materials associated with archaeological sciences (e.g. fire-ring analysis, modification state, petrology)
KOS.HSB.37	Thesaurus of building materials - a standard for use in architectural and archaeological records	Includes natural/animal and man-made material (e.g. cement mix, fossil, fire-glass).
KOS.HSB.37.1	Building Materials Thesaurus	Includes natural/animal and man-made material (e.g. cement mix, fossil, fire-glass).
KOS.HSB.38	Cargo Thesaurus	Thesaurus for types of cargo carried by vessels and aircraft on their final voyage (e.g. animal fodder, sugar, salt).
KOS.HSB.39	Components Thesaurus	Terminology covering divisions and structural elements of a building or monument. Includes terms that describe areas and spaces, decorative features, fixtures and fittings, machinery and related features (e.g. post hole, carbouche, truss).
KOS.HSB.40	Defence of Britain Thesaurus	Terminology relating to the Second World War defence of Britain.
KOS.HSB.41	Event Thesaurus	Use for recording archaeological events, e.g. architectural investigative, data collection exercises, from intrusive interventions into the resource to non-damaging survey events (e.g. grab sampling, auger survey, remote sensing).
KOS.HSB.42	Evidence Thesaurus	Terminology covering the existing physical remains of a monument, or the means by which a monument has been identified where no physical remains exist (e.g. phosphate evidence, soilmark, surface deposit).
KOS.HSB.43	Farmstead Thesaurus	Thesaurus for indexing different types of farmsteads, related buildings, areas and layouts.
KOS.HSB.44	First World War Thesaurus	For the recording of monuments related to the First World War in the UK.
KOS.HSB.45	Heritage Crime Thesaurus	Thesaurus for indexing types of crime and incidents against heritage assets (e.g. graffiti, theft, unauthorised digging).
KOS.HSB.46	Historic Aircraft Thesaurus	Indexing terminology for the recording of aircraft remains and crash sites, listing aircraft types by form, function and manufacturer (e.g. Albat, Tiger, Westland).
KOS.HSB.47	Historic Characterisation Thesaurus	Thesaurus combining Historic Landscape and Historic Seascape Characterisation terminology (e.g. reclaimed land, vineyard, dunes).
KOS.HSB.48	Manner of Loss List	A small authority that assists for indexing types of loss of vessels or aircraft (e.g. beached, lost, enemy action).
KOS.HSB.49	Maritime Craft Thesaurus	Draft types which survive as wrecks for Historic England's maritime record and can be used to describe types of ship (e.g. block ship, rescue vessel, net layer).



Here you can see a colourful extract taken from the KOSo showing examples of data which fits under the headings: Identifier, Schema Name/Title and Phenomena included.

# Contents of KOSo (2)

Identifier	Schema Name/Title	Phenomena Included	Earlier versions (difficult)	History of versioning	Version Notes
KOS.HSS.35	MDA archaeological objects	For the recording of portable archaeological objects.	na	Version 3.0 B	
KOS.HSS.35.1	Reisaura	For the recording of portable archaeological objects.	na	Version 3.0 B	"This beta release is a draft for your review and evaluation before its final release in February 1999" - p. 10 (of Quick reference card)
KOS.HSS.36	Archaeological Sciences Thesaurus	Terminology used for recording the techniques, recovery methods and materials associated with archaeological sciences (e.g. free-ring analysis, modification state, petrology)	na	Version 3.0 B	Accompanies special issue of Visual Resources, v. 11, no. 3-4, 1995.
KOS.HSS.37	Archaeological Sciences Thesaurus	Thesaurus of building materials - a standard for use in architectural and archaeological records	Version 1.0	1st Edition	na
KOS.HSS.37.1	Building Materials Thesaurus	Includes natural/animal and man-made material (e.g. cement mix, fossil fire-clay)	1st Edition	Online Version	"Reviewed March 2014 by Patricia Herpigny" Earlier versions access in print
KOS.HSS.38	Cargo Thesaurus	Thesaurus for types of cargo carried by vessels and aircraft on their first voyage (e.g. animal fodder, sugar, salt)	Online Version	Revised 2016	Revised 2016 by Patricia Herpigny Marine Base and Port of Interest Survey
KOS.HSS.39	Components Thesaurus	Terminology covering divisions and structural elements of a building or monument. Includes terms that describe areas and spaces, decorative features, fixtures and fittings, machinery and related features (e.g. post hole, charcoche, truss).	na	Version 1.0	Originally published as Weiss, Dieter J., "Core Categories for Visual Resources: A Draft Proposed by the VRA Data Standards Committee," VRA Bulletin 23, 3 (Fall 1985), pp. 57-63.
KOS.HSS.40	Defence of Britain Thesaurus	Terminology relating to the Second World War defence of Britain.	Version 3.0	Version 4.0 Core Schema, Unrestricted Version	This current version (4.0) that was released in 2021, is incorporated as an XML schema in order to support the interoperability and exchange of VRA Core records. The unrestricted version increases its requirements on the values entered (in any of the elements, sub-elements, or attributes, and may be useful for those who want to exchange legacy data.
KOS.HSS.41	Event Thesaurus	Use for recording archaeological events, e.g. architectural investigative, data collection exercises, from intrusive interventions into the resource / non-damaging survey events (e.g. grab sampling, auger survey, remote sensing)	na	Version 1	<a href="https://beta.tdms.com.au/keywords/detail/new/builders.htm">https://beta.tdms.com.au/keywords/detail/new/builders.htm</a>
KOS.HSS.42	Evidence Thesaurus	Terminology covering the existing physical remains of a monument, or the means by which a monument has been identified where no physical remains exist (e.g. phosphate evidence, soilmark, surface deposit)	Version 6.2.1	Version 6.2.2	Editorial Status: Open In Progress
KOS.HSS.43	Farmstead Thesaurus	Thesaurus for indexing different types of farmsteads, related buildings, sites and layouts.	na	Version 1.0	A TDWG task group was created to revise the Darwin Core, and a revised metadata standard
KOS.HSS.44	First World War Thesaurus	For the recording of monuments related to the First World War in the UK	na	Version 1.0	Before becoming a TDWG standard, the Darwin Core was instantiated and deployed in 2003
KOS.HSS.45	Heritage Crime Thesaurus	Thesaurus for indexing types of crime and incidents against heritage assets (e.g. graffiti, theft, unauthorised digging)	na	2010-11-08 version 1.0	<a href="https://beta.tdms.com.au/keywords/detail/new/builders.htm">https://beta.tdms.com.au/keywords/detail/new/builders.htm</a>
KOS.HSS.46	Historic Aircraft Thesaurus	Indexing terminology for the recording of aircraft remains and crash site listing aircraft types by form, function and manufacturer (e.g. Albat, Target, Westland)	na	2010-11-08 version 1.0	WPS working group "Identifying standards and developing recommendations"
KOS.HSS.47	Historic Characterisation Thesaurus	Thesaurus covering Historic Landscape and Historic Seascage Characterisation terminology (e.g. reclaimed land, vineyard, dunes)	Version 1.0	1st Edition (1984)	na
KOS.HSS.48	Manner of Loss List	A small authority that essential for indexing types of loss of vessels or aircraft (e.g. beached, lost, enemy action)	na	2nd Edition (1997)	na
KOS.HSS.49	Maritime Craft Thesaurus	Draft types which survive as wrecks for Historic England's maritime record and can be used to describe types of ship (e.g. block ship, wrecked vessel, net layer)	na	Version 5.0	na



A similar view of the type of information captured under Earlier versions, History of versioning and Version Notes.

# Contents of KOSo (2)

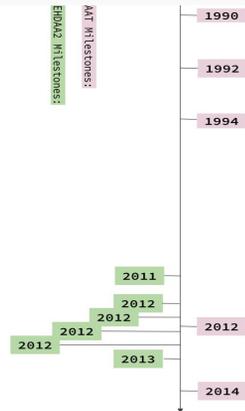
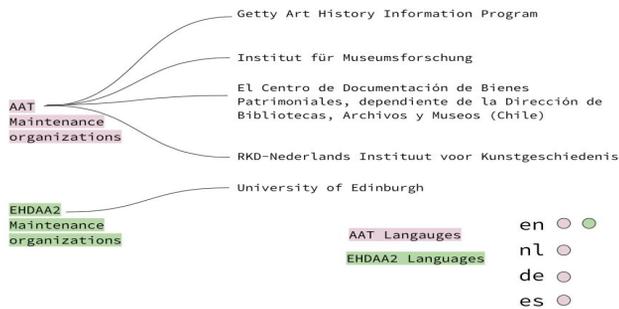
Identifier	Schema Name/Title	Phenomena Included	Earlier versions (different)	History of revisioning	Version Notes	Creator(s)/Center(s)	Maintenance organization	Place	Publisher, date
KOS.HSS.35	MDA archaeological objects	For the recording of portable archaeological objects.	no	Version 0.0 B					
KOS.HSS.35.1	Reisaurus	For the recording of portable archaeological objects.	no	Version 0.0 B					
KOS.HSS.35.1	Archaeological Objects Thesaurus	Terminology used for recording the techniques, recovery methods and materials associated with archaeological sciences (e.g. site-dig analysis modification table, petrology)	no	Version 1.0	This beta release is a draft for your review and evaluation before its final release February 1999" (p. 11) of Quik reference card.	Paul Prof. Heugens/Seuren	Maintenance organization		
KOS.HSS.36	Archaeological Sciences Thesaurus	Terminology used for recording the techniques, recovery methods and materials associated with archaeological sciences (e.g. site-dig analysis modification table, petrology)	no	Version 1.0	Accompanies special issue of Visual resources, v. 11, no. 3-4, 1998.	Paul Prof. Heugens/Seuren	instituut voor Monumentenzorg		
KOS.HSS.36	Archaeological Sciences Thesaurus	Terminology used for recording the techniques, recovery methods and materials associated with archaeological sciences (e.g. site-dig analysis modification table, petrology)	no	Version 1.0	Accompanies special issue of Visual resources, v. 11, no. 3-4, 1998.	Paul Prof. Heugens/Seuren	instituut voor Monumentenzorg		
KOS.HSS.37	Building Materials Thesaurus	Includes natural/mineral and man-made material (e.g. cement mix, fossil fire-glass).	no	1st Edition		Henri van de Waal, Rudi Faals, Leonard Couste	St. Dierckx de Documentatie- en Bibliotheek voor Monumentenzorg		
KOS.HSS.37.1	Building Materials Thesaurus	Includes natural/mineral and man-made material (e.g. cement mix, fossil fire-glass).	no	1st Edition		Henri van de Waal, Rudi Faals, Leonard Couste	Koninklijke Nederlandse Akademie van Wetenschappen - North-Holland, 1973-1981.		
KOS.HSS.37.1	Building Materials Thesaurus	Includes natural/mineral and man-made material (e.g. cement mix, fossil fire-glass).	no	1st Edition		Henri van de Waal, Rudi Faals, Leonard Couste	Koninklijke Nederlandse Akademie van Wetenschappen - North-Holland, 1973-1981.		
KOS.HSS.38	Cargo Thesaurus	Thesaurus for types of cargo carried by vessels and aircraft on their first voyage (e.g. animal fodder, sugar, salt).	no	Revised 2016	Originally published as Waas, Dierckx, J., "Core Categories for Visual Resource Project" by the VRA Data Standards Committee, 1998, Bulletin 23, 3, p. 18-19.	Simon Chellett, Marco Lattanzi, Simon Thomas	Utrecht University		
KOS.HSS.38	Cargo Thesaurus	Thesaurus for types of cargo carried by vessels and aircraft on their first voyage (e.g. animal fodder, sugar, salt).	no	Version 1.0	The current version (1.0) that was released in 2007, is incorporated as an XML file in order to support the interoperability and exchange of VRA Core results. The unmodified external resources to requirements on the related external file the elements, sub-elements, or attributes, and may be useful for those who wish to exchange legacy data.	Simon Chellett, Marco Lattanzi, Simon Thomas	RKD-Nederlands Instituut voor Kunstgeschiedenis		
KOS.HSS.39	Components Thesaurus	Terminology covering decisions and structural elements of a building or monument. Includes terms that describe areas and spaces, decorative features, fixtures and fittings, machinery and related features (e.g. post hole, chiroche, brass).	no	Version 1.0		Robert G. Chennell	no		
KOS.HSS.40	Defence of Britain Thesaurus	Terminology relating to the Second World War defence of Britain. Use for recording archaeological events, e.g. architectural investigations, data collection exercises, from intrusive interventions into the resource? non-damaging survey events (e.g. grab sampling, auger survey, remote sensing).	no	Version 3.0		Robert G. Chennell, James H. Bouckley, Patricia Chennell, James H. Bouckley, Patricia Chennell, Robert G. Chennell	no		
KOS.HSS.41	Event Thesaurus	Terminology covering the existing physical remains of a monument, or the means by which a monument has been identified where no physical remains exist (e.g. pipeline evidence, soilmark, surface deposit).	no	Version 1		Paul Bourner, Ruby Rogers	no		
KOS.HSS.41	Event Thesaurus	Terminology covering the existing physical remains of a monument, or the means by which a monument has been identified where no physical remains exist (e.g. pipeline evidence, soilmark, surface deposit).	no	Version 1		Paul Bourner, Ruby Rogers	no		
KOS.HSS.42	Evidence Thesaurus	Terminology covering the existing physical remains of a monument, or the means by which a monument has been identified where no physical remains exist (e.g. pipeline evidence, soilmark, surface deposit).	no	Version 6.2.1		Paul Bourner, Heather Dunn	Nomenclature Task Force		
KOS.HSS.43	Farmstead Thesaurus	Thesaurus for indexing different types of farmsteads, related buildings, sites and layouts.	no	Version 6.2.2	Editorial Status: Open in progress	College Art Association (U.S.)	Getty Art History Information Program		
KOS.HSS.43	Farmstead Thesaurus	Thesaurus for indexing different types of farmsteads, related buildings, sites and layouts.	no	Version 6.2.2	Editorial Status: Open in progress	College Art Association (U.S.)	Getty Art History Information Program		
KOS.HSS.44	First World War Thesaurus	For the recording of monuments related to the First World War in the UK	no	2010-11-08: version 1.0	A TDWG task group was created to revise the Darwin Core, and a related file	Murtha Bice, Patricia Heppner	The J. Paul Getty Trust		
KOS.HSS.44	First World War Thesaurus	For the recording of monuments related to the First World War in the UK	no	2010-11-08: version 1.0	A TDWG task group was created to revise the Darwin Core, and a related file	Murtha Bice, Patricia Heppner	The J. Paul Getty Trust		
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KOS.HSS.46	Historic Aircraft Thesaurus	Indexing terminology for the recording of aircraft remains and crash site listing aircraft types by form, function and manufacturer (e.g. Albatross, Tiger, Westland).	no	Printed Book Version		J. D. Bates	Library of Congress		
KOS.HSS.46	Historic Aircraft Thesaurus	Indexing terminology for the recording of aircraft remains and crash site listing aircraft types by form, function and manufacturer (e.g. Albatross, Tiger, Westland).	no	Printed Book Version		J. D. Bates	Library of Congress		
KOS.HSS.47	Historic Characterisation Thesaurus	Thesaurus covering Historic Landscapes and Historic Seascapes Characterisation terminology (e.g. reclaimed land, vineyard, dunes).	no	2nd Edition (1997)		Alisa Gaur, Jacqueline Newnham, Tom Peckover	International Committee for Documentation/Paris, CIDOC, 1996.		
KOS.HSS.47	Historic Characterisation Thesaurus	Thesaurus covering Historic Landscapes and Historic Seascapes Characterisation terminology (e.g. reclaimed land, vineyard, dunes).	no	2nd Edition (1997)		Alisa Gaur, Jacqueline Newnham, Tom Peckover	International Committee for Documentation/Paris, CIDOC, 1996.		
KOS.HSS.48	Manner of Loss List	A small authority file essential for indexing types of loss of vessels or aircraft (e.g. beached, lost, enemy action).	no	Version 5.0					
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And again for the headings Creator/Curator, Maintenance Organization and Place, Publisher and Date.

# Comparing KOSs

Comparing attributes of Art & Architecture Thesaurus (AAT)  
& Human Developmental Anatomy Ontology (EHDA2)



While not all data allow for a very meaningful visual comparison, some insights can still be gained by placing certain attributes side-by-side (in this case manually). Viewing this small case study, we can already imagine with more data which types of insights and inferences could be made which would be of interest to scholars of KO. The work is also relevant for the emerging field of Science of Science (SciSci) (Scharnhorst et al., 2012). SciSci “explores patterns characterizing the structure and evolution of science” (Fortunato et al., 2018, p.2)

# FAIR

Making KOS FAIR

FAIRsFAIR & FAIR Semantics

Recent output:

<https://doi.org/10.5281/zenodo.4314321>



Data Policy and Best Practices  
**DANS**

Making KOSs *themselves* FAIR involves their classification and description using appropriate rich metadata, also ensuring that the data are published in a sustainable environment. This involves, defining the metadata needed to make KOSs FAIR and also establishing or uncovering the best practices for the citation of KOSs as well with other technical considerations impacting type and format.

DANS is the coordination of the H2020 INFRAEOSC FAIRsFAIR project. The end goal for the Task on FAIR Semantics is to co-create both recommendations for making semantic artefacts FAIR, and a set of agreed best practices to follow together with the Semantics community at large. KOSs fit within the description of Semantic Artefacts, which is a term employed by the project to accommodate multiple perspectives on these phenomena.

# Endangered KOSs: 404 Errors & other issues



Reference Rot =  
Link Rot + Content Drift  
Semantic Change  
Subject Ontogeny



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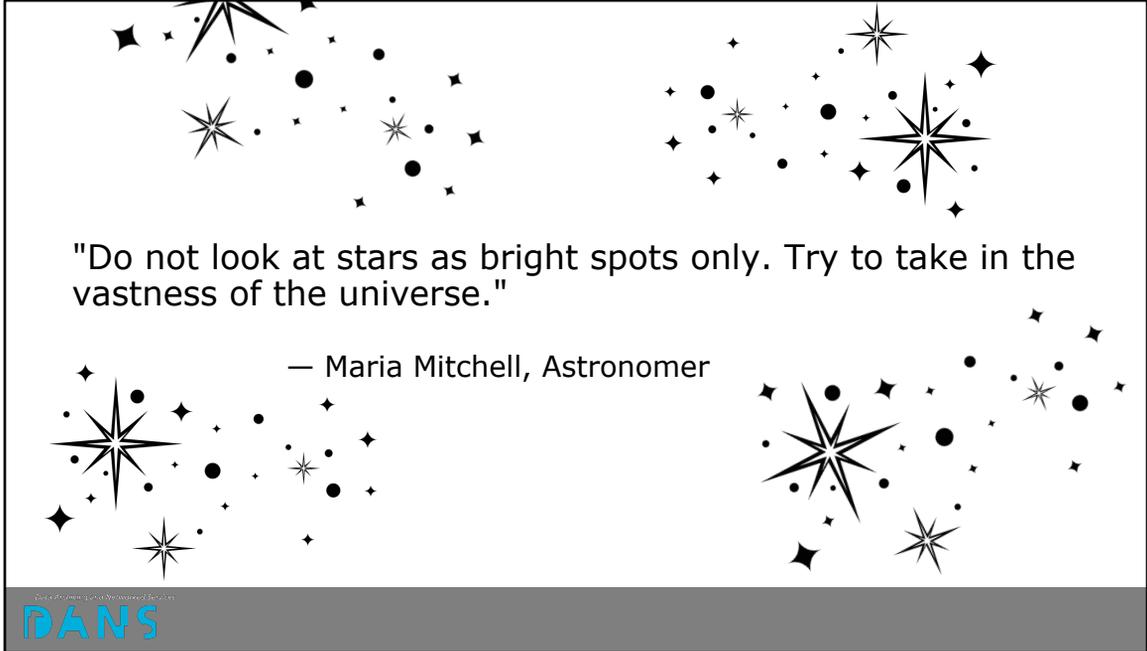
KOS which are not available in digital format have their potential blocked by being stuck on shelves far from the things that they are developed to organize. Digital KOSs also face distinct challenges. During the Observatory project, the '404 Error' became a familiar sight, highlighting the fragility and lack of stability of these systems. As with other web resources used by scholars, KOSs published online - and especially those published in HTML - are at risk of "reference rot" - the combination of link rot (resulting in the infamous 404 Not Found), and Content Drift, where content which has been linked to, changes, after the link has been sent.

Since KOSs are built using terminology they are also at risk of Semantic Change. Meaning can be added or lost from the semantic system while the form remains constant. Think of the word "Manufacture" which once meant something made by hand but now means 'to produce on a large scale using machinery'. Knowledge changes through time and therefore KOSs as tools for accessing knowledge are also constantly evolving.

DANS tries to address questions related to KOS Sustainability, such as:

- Is it clear how a KOS can be used and re-used?
- Is version control built into the KOS? Is there a way to distinguish between versions which have been used.
- Has it been updated according to new developments from the field? Is it a remnant from a past project, or does it have dedicated resource?
- How often is it being updated? Are changes well documented? Are previous versions of the KOS stored or archived in a manner that ensures the possibility for long-term access?
- What does a FAIR KOS look like? - Does it come with sufficient metadata? Is it searchable in a registry such as BARTOC? Does it work easily with applications and workflows?

- Also considering Ethics - In their role as classifiers, KOS impose a particular view of the world on the phenomena they include. The power to decide which things **are** and which things **are not** comes with responsibility. Raising awareness of these issues, but also of the great benefits of using KOS is an ongoing mission.



To leave you with a relevant quote - "Do not look at stars as bright spots only. Try to take in the vastness of the universe."

— Maria Mitchell, Astronomer

Thank you for your attention

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Thank you for your attention. Are there any questions?

## Additional Information

You can find the link to the KOSo (data) and all of the related outputs on the Institute for Knowledge Organisation and Structure website:

<https://knoworg.org/the-dans-koso-observatory/>

On June 4th the FAIRsFAIR project will hold a workshop looking at defining 'Common minimum metadata for Semantic Artefacts' (which includes KOS):

<https://fairsfair.eu/events/common-minimum-metadata-semantic-artefact>