Building competence for knowledge organisation

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Knowledge organisation includes work with controlled vocabularies, theasauri, taxonomies and ontologies. It has been the site of much change as a domain with new technologies, practices and user needs emerging. This article outlines a draft competency framework for practitioners to make sense of the field and their own skills sets. It begins by outlining the five domains of the framework (knowledge organisation systems, technology, knowledge, users, context) and providing an overview of existing professional tribes in the domain. It discusses organisational issues and concludes with suggestions for developing knowledge organisation competencies.

INTRODUCTION

As software eats the world and the internet transforms vast swathes of human activity, the field of knowledge organisation has not been immune. Traditional tools such as thesauri and controlled vocabularies are being augmented and disrupted by ontologies, auto-classification, graph databases, data storage, analytics, and visualisation. These changes present information professionals with a challenge – what skills do we need to survive in this brave new world and how do we acquire them?

This question came into focus for us when we were asked to create and present a draft knowledge organisation competency framework as part of the inaugural "Innovations in Knowledge Organisation" conference held in Singapore in June 2015.[1] This article outlines the results of this work and explores four areas:

1. An explanation of the construction of the framework and how it could be used.
2. An assessment of the different professional tribes associated with knowledge organisation and the advantages and disadvantages of their respective positions.
3. A brief discussion of the organisational attributes that lead to the success or failure of knowledge organisation projects.
4. Some indicators on how those interested in building their competencies can do so.

The article will close with directions for future research on this topic.

MODEL OF FIVE KNOWLEDGE ORGANISATION DOMAINS

A discussion of knowledge organisation obviously begins with Knowledge Organisation Systems (KOS) such as thesauri. A competency framework has to elaborate on the skills needed to create and manage different forms of KOS. However to focus only on KOS would be a mistake. KOS do not exist for their own sake, rather they are tools that enable individuals and collectives to achieve their goals.

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[1] M Moore, "Competence and Knowledge Organisation" (Innovations in Knowledge Organisation Conference, Singapore, 8-9 June 2015).

Slides: <http://www.greenchameleon.com/uploads/IKO_Keynote3_Moore_Competencies.pdf>.

Video: <https://vimeo.com/132165318>.

Outline Article: <http://www.greenchameleon.com/uploads/Matt_Moore_v1.pdf>.

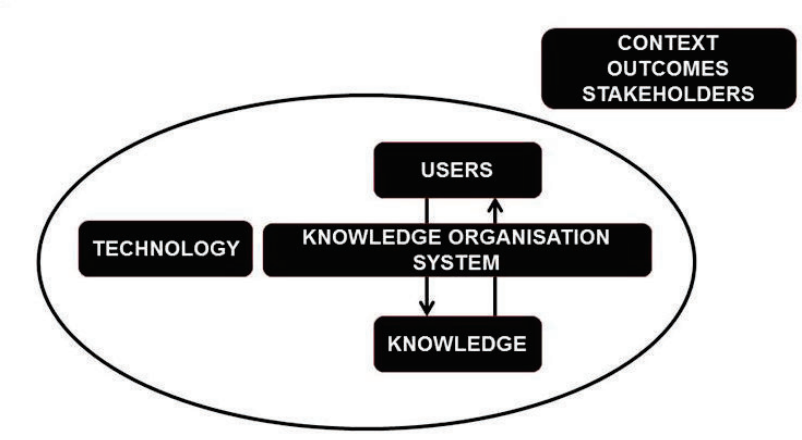
The next domain that comes to mind is technology – especially because it is the main engine of change in the KOS design. The cost of data storage and analysis has dropped significantly while the range of tools has proliferated. It would be tempting to say that KOS work is now the selection and implementation of specific technologies. While the role of technology should be properly appreciated, it would be dangerous to limit the work that needs to be done purely to technology deployment.

This brings us to what sits within the technology platforms – which here we will call "knowledge". While that term is problematic, there are no unproblematic terms in this domain so we might as well stick with that one for now. Knowledge here can include books, articles, text fragments (eg 140 character tweets) and numbers. It might also be called information or data. Traditionally data has been managed in relational databases queried through SQL, and "unstructured data" (ie documents) have been managed in content management systems with search indexing tools – and never the twain shall meet. However there is a growing focus on managing this information holistically. Tools for parsing and structuring free text are proliferating and the management of unstructured text is becoming part of "big data" management strategies.

Users themselves (our fourth domain) are changing. The relationship between humans and technology is dialectical – we change our tools as we are changed by our tools. We talk about technology as being "intuitive" but we are not born with the instincts to query a mobile interface. We learn technological patterns of behaviour. The uptake of mobile technologies in the last 10 years has been phenomenal and the Internet of Things promises a similar level of change. People interact with information in places and ways that they did not in the past. These new interactions require new types of structure to enable them. However users are changing in other ways besides the technological. Many populations are aging – with implications for their needs and their cognitive abilities and preferences. And online populations are decreasingly anglophone. This article originates in a presentation delivered in Singapore – which has four widely used languages that can require linking together. Different languages not only bring different terminology but different mental models that KOS need to reconcile.

As noted earlier, KOS are not ends in their own right but exist in a broader context and serve a set of outcomes for users. KOS require investment to construct and maintain and typically this investment will have to be provided by stakeholders (who may be a different group from end users). If context, outcomes and stakeholders are not served then the KOS will certainly not be sustainable – it may not even get started. The ability to translate the value that a KOS provides into a form understandable by stakeholders is a key skill and one well worth cultivating. This is our fifth domain.

FIGURE 1 A model of knowledge organisation domains



BUILDING THE COMPETENCY FRAMEWORK WITH NOUNS AND VERBS

The next stage in developing a competency framework was to consider nouns and verbs. Nouns are important because they outline the people and things that we must work with. Verbs are important because they indicate the activities that we must undertake to both serve and improve those things. The table below outlines some of our thinking.

TABLE 1 Understanding the activities of knowledge organisation as nouns and verbs

Entities	Nouns	Verbs
Context	Business case Project Benefits realisation	Influencing Modelling Sensemaking Understanding Managing
Users	Interviews Observation Prototype Facilitation Personas and segments	Interacting (with) Modelling Influencing
Knowledge	Content Documents Data Semantics Statistics	Modelling Mapping Analysing
Technology	Content management systems Databases SQL NoSQL Hadoop Search Visualisation	Coding Building Designing Testing Assessing
KOS	Taxonomies Ontologies Graphs	Building Assessing Testing

TABLE 1 *continued*

Entities	Nouns	Verbs
	Metadata standards	Instantiating

The two words that stand out most from the table are the verbs "model" and "build". So much of KOS work is focussed on understanding human thinking through the construction of models. As the truism goes "All models are wrong, but some are useful". This means that the models must then be tested and refined – the KOS process creation process is ultimately iterative.

ESTABLISHING LEVELS OF COMPETENCE

Many competency frameworks and maturity models have five levels and this one is no exception. In defining the five levels, we wanted to make them as concrete as possible to avoid ambiguity and therefore make it easier for those using the framework. This may have made our lives harder because it gives us less room to manoeuvre if challenged.

The rationale behind each level is as follows:

- No experience. This means exactly what is says. You are starting from scratch.
- Basic understanding. The key here is that KOS work is primarily a practical activity rather than an academic subject. Basic understanding implies that you articulate some of the principles but you have yet to get your hands dirty.
- Undertaken successfully. The gap between the previous level and this one is perhaps the hardest of all in the framework. You have moved from theoretical knowledge to actual practice. It was probably messier than you were expecting but congratulations!
- Undertaken repeatedly. The problem with only having undertaken an activity once is that it can give you a false sense of how easy or hard an activity is. A second attempt gives you a different set of experiences. However it is not until your third attempt that you are able to get a proper sense of some of the commonalities and differences between different efforts. At this point you can begin to triangulate your experiences.
- Developing and innovating. Depending on the maturity and dynamism of the particular element you are looking at, it may take weeks or decades to move from the previous stage to this one. At this stage you really are pushing back the boundaries of understanding in an area and you are also likely a go-to person on this topic for others.

TABLE 2 Competency levels and their definitions

Level	Definition
No experience	I have no prior knowledge of this activity.
Basic understanding	I have an understanding of the concepts at work here (eg academic study or peripheral involvement in a project) but I have not successfully undertaken this activity.
Undertaken successfully	I have successfully undertaken this activity at least once.
Undertaken repeatedly	I have successfully undertaken this activity multiple (more than three) times. I may coach others in how to undertake this activity.
Developing and innovating	I regularly undertake this activity and have developed new tools and techniques to improve its efficacy.

TRIBES OF KNOWLEDGE ORGANISATION

The competency framework as presented above might imply that the world consists of atomistic individuals who somehow, by chance, develop skills in particular domains. This is not true.

Individuals often belong to practitioner communities with shared educational histories, terminologies, practices and networks. Each community has strengths and blindspots that are worth exploring.

Information managers and librarians have been using KOS for a long time (decades, if not centuries), however longevity does not equate to dominance. Many information managers use KOS that have been created by others, eg Dewey Decimal Classification (DDC), Library of Congress Subject Headings (LCSH), State Records Authority NSW thesaurus (Keyword AAA), Medical Subject Headings (MeSH), but only a minority are skilled at creating and adapting these systems. Information managers often possess a desire to understand user behaviour and also some familiarity with the processes and systems of information management. However they may not have either a deep understanding of the underlying technology nor the ability to frame the importance of KOS in stakeholder language. The prime opportunity for them is to draw on their KOS roots and to act as connection points between the other tribes.

Technologists are the source of much innovation, however it may be optimistic to class them as one single category. Start-ups (and open source communities) develop new tools with a focus on results now rather than long-term stability. Corporate IT teams try to provide basic services in ever more cost-constrained environments. Large vendors try to carve out monopolistic positions through acquisitions, competing standards and customer lock-in. Open source developments such as Lucene, Solr, ElasticSearch, OpenNLP, UIMA and Mahout (and that's just in the Apache family) have proliferated at the same time as companies such as Google and Microsoft have developed extensive knowledge graph systems that are kept out of the public domain. Perhaps the biggest challenge for technologists is one of hubris. The developments have been so powerful that it is tempting to think that all that is required to solve knowledge organisation problems is just the technology – rather than a full consideration of other factors such as human behaviour and organisational context.

User experience (UX) professionals and information architects (IA) have emerged as a distinct professional identity over the last 20 years. These professionals have drawn on other disciplines such as design or cognitive science and have either acquired or developed a wide range of methods for understanding human behaviour. The challenge for this group is that their work is implemented (and often controlled) by technologists who are far less interested in human behaviour. Often, UX is considered a cosmetic discipline to be applied after the hard work of system creation has been undertaken rather than a core part of solution development all the way through the lifecycle.

The term "data scientist" as a popular job description is relatively new. A fusion of data engineer, statistician and business person, this role has been subject to a lot of hype in the last few years. Data scientists have a greater interest in unstructured data (ie text such as formal documents or informal captured interactions) than their data manager predecessors who were mainly working with relational database systems. Data scientists are moving beyond analytical reporting to designing data-derived products and services (eg contact recommendation features on LinkedIn, predictive maintenance services based on machine sensor data for GE). Their involvement with KOS is likely to be crucial over the longer term.

Content strategists are also a relatively recent group. Where information architects have focussed on the structures to manage content, content strategists focus on the content itself. The origins of this group can be found in technical writing, copywriting and editorial professions that have been given both a significant threat and a new lease of life by the web. The threat comes first from the syndication and now the automation of content creation in the media space. The opportunity comes as the new forms of content creation (web, email, SMS) emerge. Content strategy is sometimes reduced down to content marketing – however it is broader than the tactical use of content by the marketing function.

TABLE 3 Assessing the advantages and disadvantages of the tribes of knowledge organisation

Tribe	Advantages	Disadvantages
Information managers	Lengthy historical experience with KOS. Some forward-thinking practitioners reaching out to other tribes.	Not deep enough in the technology to understand both its potential or its limitations. Not always business savvy.
Technologists	Technological change is a key driver of change in the KOS domain. Tech is hot right now.	Many fractious sub-tribes (corporate IT, start-ups, big vendors). Currently going through a boom that could blow into a bubble. Hubris.
User experience (UX/IA)	Focus on human beings and outcomes for users. Input from cognitive science, psychology and design thinking. So hot right now.	Many other groups, especially technologists, do not value their work.
Data scientists	Take an empirical approach to knowledge organisation. Growing interest in moving from numbers to text.	Still forming their identity as a group. Struggling to articulate their insights to non-data scientists.
Content strategists	Concerned with the meaning and use of the content itself.	New to the scene and struggling to forge their identity as separate from information architects, marketers and editorial staff.

The professional groups influencing the KOS field are not the only collective structures that we need to think about – we must also consider the organisations in which KOS projects take place.

ATTRIBUTES FOR SUCCESS IN ORGANISATIONS

If we have mastered our competencies then how can we fail? In psychology there is a concept called "locus of control". A person with a strong internal locus of control will explain events in their life in terms of their own decisions, actions etc. A person with a strong external locus of control will explain events in terms of external forces (eg other people, fate). From a personal development perspective, there is much to be said for focussing on the things that you can control and the competency framework discussed here provides a tool for mapping out and focussing your efforts. However we rarely have absolute control of our working environments. Stakeholders and context intrude again. We want to spend some time discussing some of these contextual factors and the attributes necessary to cope with them. These do not fit neatly into the framework but they are well worth discussing.

Recognised business imperative: If a KOS project is not driven by a compelling business imperative that is recognised by senior stakeholders (especially those who control the funding) then it will fail. This means that even if you are not skilled at developing business cases, you need to know what a good one looks like. If a potential project does not have a business imperative behind it then think very carefully before getting involved.

Pragmatism: As professionals, we often want to expand our own skills by tackling more complex tasks or create logically rigorous models that demonstrate our intelligence. However an intricate ontology may not be what the users actually need. This may be compounded by shifting budgets and competing interests that may require us to get more pragmatic rather than less as a project continues. The aim is not the most technologically advanced solution nor a pristine and perfect KOS but rather an outcome that helps users and stakeholders to achieve their goals. Therefore it is important to ground our efforts in a solid knowledge of users and stakeholders.

Cross-disciplinary approach: The fundamental lesson of the competency framework is that any one individual is unlikely to be excellent at everything that is required for a KOS project. As the available tools and techniques multiply, this is likely to become ever more true. A cross-disciplinary approach requires confidence and humility on the part of all participants and an organisational context that supports collaboration rather than viewing it as "inefficient" or "time-wasting". You can build a cross-disciplinary mindset by reaching out to those beyond your tribe and learning what they have to offer.

Persistence: A KOS is a model and, as stated above, "all models are wrong, some are useful". Ideally we want our models to become less wrong and more useful over time. One lesson of pragmatism is that our first models will not be perfect and that we will need to continually refine them. A KOS will go through a continuous series of development iterations to deliver value and to improve. An additional need for persistence may be in waxing and waning of stakeholder interest – and a project will require a recognised business imperative to be sustained through these cycles. Persistence (which is not the same as sheer pigheadedness but may resemble it) is a very valuable trait that can be developed over time.

Learning: Persistence only pays off if lessons are learned (ie not just identified but applied) through this process. A learning mindset requires that changes to a KOS are made systematically and tested rigorously. Much like being cross-disciplinary, this requires both confidence and humility. The confidence to try new things and the humility to admit some of those new things did not work.

BUILDING YOUR COMPETENCIES

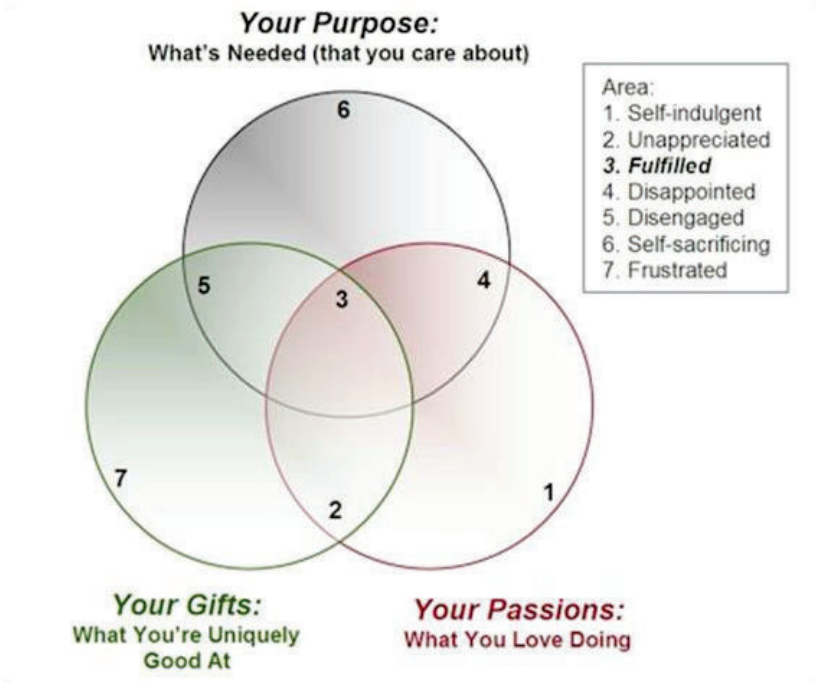
It can help to consider competency building through different lenses. David Pollard[2] has developed a simple model for identifying your "sweet spot" – the intersection of your gifts, your passions and your purpose.

- Gifts are what you are uniquely good at. Insight into your gifts can come from both yourself and others. What do people go to you for? What do you feel competent at? What positive feedback do you get from people with genuine expertise in the field? Typically you will be gifted at a number of things and you will have to decide where your focus is – but the following two areas can help you.
- Passions are what you love doing. Insight into your passions comes from yourself. When do you feel most energised and engaged? What activities do you find yourself drawn to? Typically you will also be passionate about a number of things.
- Purpose is what others need. Insight into your purpose has to come from others. What do people say they want? What do their actions show that they need?

In terms of building your competence, you ideally want to be operating at the intersection of your gifts, passion and purpose. Not everything you need to do will hit all these spots but what you do will be more personally sustainable if you can link them all together.

[2] D Pollard, *Six Steps to Natural Enterprise: A Synopsis of "Finding the Sweet Spot"* (2008) http://howtosavetheworld.ca/2008/10/09/six-steps-to-natural-enterprise-a-synopsis-of-finding-the-sweet-spot.

FIGURE 2 The Sweet Spot Model



Source: David Pollard (2008)

There are many resources to build your competence. Materials such as books, articles and presents are a good place to start. The last 10 years has seen a number of useful books emerge in this space (Lambe,[3] Hedden,[4] Hlava[5]) and an explosion of blogs, articles and webcasts (eg Earley Associates[6]). If you want face-to-face interaction then there are conferences such as:

- The Taxonomy Bootcamp in the US;[7]
- Special Libraries Association (SLA) Taxonomy Division sessions at the SLA conference;[8]
- International Society for Knowledge Organisation (ISKO) UK chapter biennial conference;[9]
- Innovations in Knowledge Organisation (IKO) conference in Asia.[10]

A key element of any kind of practical learning is doing. You may have the opportunity to undertake pilot projects as part of your day job. If you are lucky, there may be experienced people on hand to guide you. If that is not the case then conferences and organisations such as the ones mentioned above will allow you to network with people that can help as coaches or mentors.

[3] P Lambe, *Organising Knowledge: Taxonomies, Knowledge and Organisation Effectiveness* (Chandos, 2007).

[4] H Hedden, *The Accidental Taxonomist* (Information Today, 2010).

[5] M Hlava, *The Taxobook* (Morgan and Claypool Publishers, 2015) Vol 3.

[6] Earley Webinars: <http://www.earley.com/resource-center/?f[0]=bundle%3Awebinar>.

[7] Information Today Taxonomy Boot Camp 2015 <http://www.taxonomybootcamp.com>.

[8] Special Library Association (SLA) Taxonomy Division 2015 <http://taxonomy.sla.org>.

[9] ISKO UK 2015 <http://www.iskouk.org>.

[10] IKO 2015 <http://www.ikoconference.org>.

CONCLUSION AND NEXT STEPS

The competency framework proposed here is a first effort rather than a final product. Given the dynamic nature of the field, it is unlikely ever to be "finished". We welcome comments and suggestions for its improvement. Currently we are surveying knowledge organisation professionals to get a sense of their current strength and priorities for growth. The survey can be found here: https://www.surveymonkey.com/r/kocompetencies. If this area interests you, please do take the survey. We will send a summary of the findings to all participants who request it.

Appendix 1: The Knowledge Organisation Competency Framework – Version 1.0

	No experience	**Basic understanding**	**Undertaken successfully**	**Undertaken repeatedly**	**Innovating**
1. Strategy and context					
1.1. KOS business case creation					
1.2. KOS project management					
1.3. KOS stakeholder engagement					
2. Users					
2.1. Developing user segments and personas					
2.2. Conducting user observation and interviews					
2.3. Facilitating user workshops and focus groups					
2.4. Developing and testing prototypes					
3. Knowledge					
3.1. Conducting content inventories					
3.2. Conducting knowledge audits					
3.3. Modelling data structures					
3.4. Analysing content semantics					

TABLE *continued*

	No experience	Basic understanding	Undertaken successfully	Undertaken repeatedly	Innovating
3.5. Running statistical tests					
4. Technology					
4.1. Managing content management systems (CMS)					
4.2. Managing relational database management systems (RDBMS)					
4.3. Creating SQL queries					
4.4. Working with graph databases					
4.5. Managing Hadoop installations					
4.6. Using data visualisation tools					
5. KOS					
5.1. Developing and implementing taxonomies, thesauri or controlled vocabularies					
5.2. Developing and implementing ontologies					
5.3. Developing and implementing metadata standards					
5.4. Working with text analytics and autoclassification tools					
5.5. Working with enterprise taxonomy management systems					
5.6. Working with linked data					

TABLE *continued*

	No experience	**Basic understanding**	**Undertaken successfully**	**Undertaken repeatedly**	**Innovating**
5.7. Integrating taxonomies and metadata with search tools					
5.8. Building search based applications					