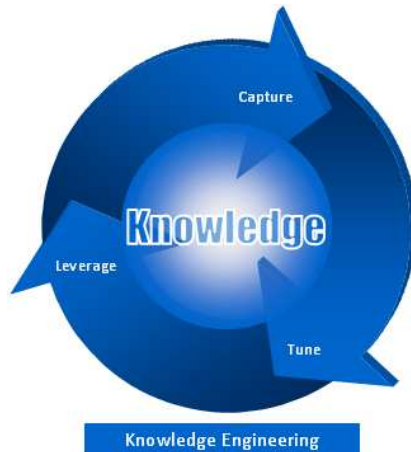


# Managing Knowledge Assets at LLE



Master's Project for a Master of Science degree in  
Information Architecture and Knowledge Management  
Presented by Timothy C. Wilson



<http://cranedge.files.wordpress.com/2009/08/knowledge-engineering1.png?w=370&h=380>

## Topics



- Findability
- Semantic Search
- Knowledge Management System
- A Closer Look at Ontology
- Knowledge Initiative

## Definition of Findability



- “Findability” refers to the ability to find pertinent information on the web quickly and easily by using a search engine.

### EXAMPLE:

*I want to know everything about a Quad Channel Delay Module. Where do I find it?*

## Internal Search Engines



The screenshot displays the Laboratory for Laser Energetics website interface. At the top right, there is a search bar labeled "Google Internet Search" with a "Search" button. Below this, the website header includes navigation links: Home, About, Omega Laser Facility, Engineering Services, Safety Zone, Publications, Resources, Site Map, and Phonebook. The main content area is divided into three search sections:

- Search by Document ID:** Includes a "NEW" notice for all users and a search box for Document ID.
- Released Documents:** Includes a search box for all users to search released documents, with a "Search Released Documents" button circled in red and labeled "PDM Search".
- OMEGA EP Library:** Includes a search box for authorized users to search the OMEGA EP Library, with a "Search OMEGA EP Library" button circled in red and labeled "Google Intranet Search".

Additional links for document management are provided: Document ID Assignment, Document ID Group Assignment, Document Administration, and Documents Requiring Approval.

## Google Internet Search

The screenshot shows a Google search interface with the search term "QCDM" entered in the search bar. The search bar is highlighted with a red circle, and below it, the text "2 results (0.08 seconds)" is also circled. The search results list two PDF documents from the University of Rochester. The first result is titled "OMEGA EP System Operations Manual Volume VII--System Description ..." and the second is titled "(-) hyphenate as a modifier". The Google logo is on the left, and navigation links like "Brighton, NY" and "Change location" are below it. The UR LLE logo is in the top right corner.

**NOTE: The Internet search engine only searches for documents accessible to the general public through the World Wide Web.**

Accessed 29 March 2011

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## Internal PDM Search

The screenshot shows an internal PDM search interface for the Laboratory for Laser Energetics. The search bar contains the term "QCDM" and is highlighted with a red circle. Below the search bar, the text "Searched for QCDM" and "Results 1 - 10 of about 62" are circled in red. The interface includes a "Google Search" button and a "Sort by: Date / Relevance" option. The search results list several PDF documents related to QCDM, including test procedures, HTS test programs, and PLD firmware. The UR LLE logo is in the top right corner.

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## Google Intranet Search (PDM and WBS using GSA)



**Laboratory for Laser Energetics**  
a unique national resource

Advanced Search Search Tips

QCDM Google Search

Searched for QCDM Results **1 - 10** of about 41 Search took 0.01 seconds.

Next: Sort by: Date / Relevance

**[PDF] Microsoft PowerPoint - QCDM Work**  
... March 26, 2004 QCDM Software Working Meeting 1 QCDM Software Working Meeting Agenda  
March 26, 2004 - Current HTS Hardware Architecture Overview - Current HTS ...  
[www.lle.rochester.edu/media/resources/engineering/ep/Controls/Timing/QCDM%20Work.pdf](http://www.lle.rochester.edu/media/resources/engineering/ep/Controls/Timing/QCDM%20Work.pdf) - Text Version

**[PDF] Microsoft PowerPoint - QCDM SW-CRR**  
... May 18, 2004 OMEGA HTS Software/Control Requirements Review 3 Summary: Integrate QCDM into the existing system - Re-use existing HTS software as much as ...  
[www.lle.rochester.edu/media/resources/engineering/ep/Controls/Timing/QCDM%20SW-CRR.pdf](http://www.lle.rochester.edu/media/resources/engineering/ep/Controls/Timing/QCDM%20SW-CRR.pdf) - Text Version  
[ More results from [www.lle.rochester.edu/media/resources/engineering/ep/Controls/Timing/](http://www.lle.rochester.edu/media/resources/engineering/ep/Controls/Timing/) ]

**[PDF] Weekly Omega EP Controls Meeting**  
... should be presented and show how we selected the design in the Spec - QCDM:  
The final design of the QCDM needs to be completed. After discussions, two ...  
[www.lle.rochester.edu/media/resources/engineering/ep/Controls/MeetingMinutes/EP\\_CNTRL\\_M3M.pdf](http://www.lle.rochester.edu/media/resources/engineering/ep/Controls/MeetingMinutes/EP_CNTRL_M3M.pdf) - Text Version

**[PDF] Weekly Omega EP Controls Meeting**  
... manufactures measurement (cal documentation) of the PSPL for jitter is 1.2 picoseconds.  
- QCDM Cost: Dave presented the cost of the QCDM as the basically the ...  
[www.lle.rochester.edu/media/resources/engineering/ep/Controls/MeetingMinutes/EP\\_CNTRL\\_M2M.pdf](http://www.lle.rochester.edu/media/resources/engineering/ep/Controls/MeetingMinutes/EP_CNTRL_M2M.pdf) - Text Version  
[ More results from [www.lle.rochester.edu/media/resources/engineering/ep/Controls/MeetingMinutes/](http://www.lle.rochester.edu/media/resources/engineering/ep/Controls/MeetingMinutes/) ]

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## Is Findability Achieved?



The answer is maybe, if:

- You search by a word in the document title,  
or
- You know the document number,  
and
- You know that a document exists that actually  
contains the information that you are looking for.

There were a lot of hits that do not necessarily apply.

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## Real-Life Scenario



*It is 0600 on a Cryo shot day and your target diagnostic trigger pulses suddenly disappear during setup. Who do you call for HTS support?*

- *HTS problem report?*
- *LLE phone book?*
- *Google it?*

## Google doesn't know because it isn't intuitive!!!



Google

who is the QCDM expert at LLE?

1 result (0.19 seconds)

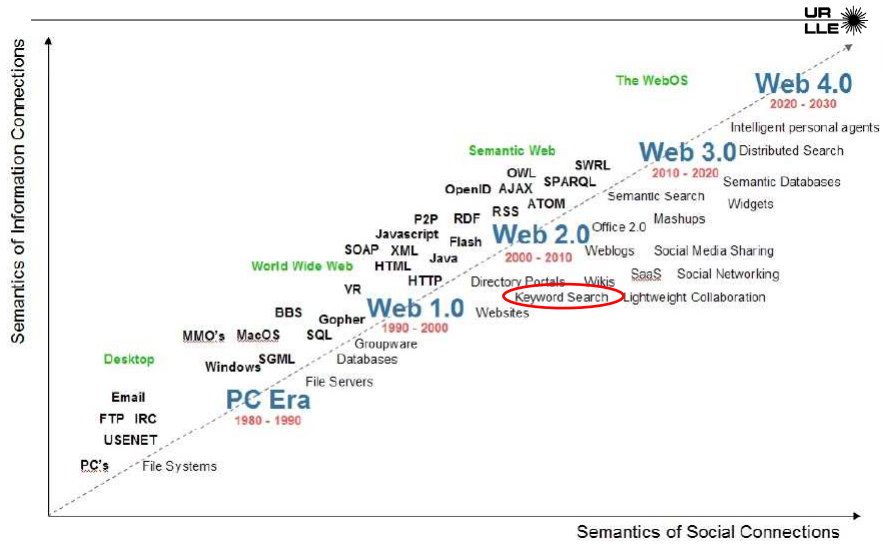
Everything  
Images  
Videos  
News  
Shopping  
More

[\[PDF\] \(-\) hyphenate as a modifier](#)  
File Format: PDF/Adobe Acrobat - Quick View  
\*This guide is specific to LLE and LLE-related publications. Please check a dictionary or other ..... JPEG (Joint Photographics Experts Group) ..... QCDM (quad-channel delay module). QED (quantum electrodynamics) ...  
[www.lle.rochester.edu/media/resources/documents/spelling\\_list.pdf](http://www.lle.rochester.edu/media/resources/documents/spelling_list.pdf)

Tip: These results include the word "experts". [Show results that include only "expert"](#).

- Search engines are dependent on keyword selection by user.
- “Hits” are based on word matches in titles or other metadata.
- Some documents may be parsed for keywords but could lead to misleading results, such as in this example.
- Search results are rarely in context to the user's intent.

# You Are Here



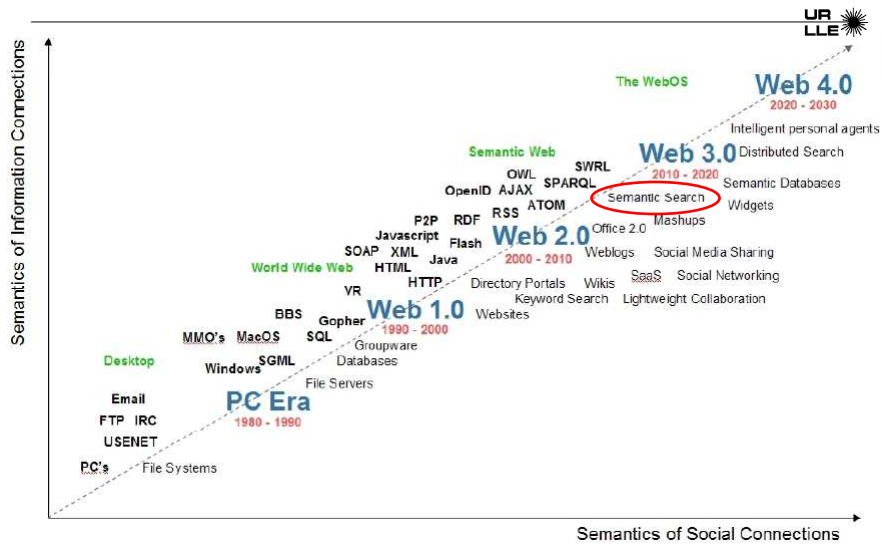
[http://mc-ca.academia.edu/BradleyShoebottom/Papers/358330/Getting\\_Started\\_with\\_Semantics\\_in\\_the\\_Enterprise](http://mc-ca.academia.edu/BradleyShoebottom/Papers/358330/Getting_Started_with_Semantics_in_the_Enterprise)

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# Where We Need To Be



[http://mc-ca.academia.edu/BradleyShoebottom/Papers/358330/Getting\\_Started\\_with\\_Semantics\\_in\\_the\\_Enterprise](http://mc-ca.academia.edu/BradleyShoebottom/Papers/358330/Getting_Started_with_Semantics_in_the_Enterprise)

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## Semantic Search



- **Semantic search is a set of techniques for retrieving knowledge from richly structured data sources like ontologies. Such technologies enable the formal articulation of domain knowledge at a high level of expressiveness and could enable the user to specify his intent in more detail at query time.**
- **Semantic search uses disambiguation to determine the meaning of words. For example, the word "shot" can be understood as "a directed discharge," "a medical injection," or "one ounce of undiluted liquor."**
- **Semantic search seeks to improve search accuracy by understanding searcher intent and the contextual meaning of terms as they appear in the searchable data-space, whether on the Web or within a closed system, to generate more relevant results.**

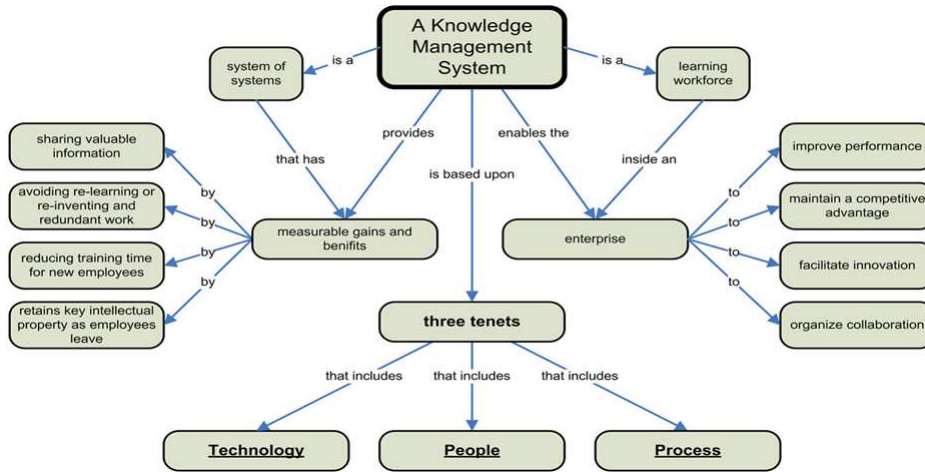
## Knowledge Engineering



- **Knowledge engineering (KE) was defined in 1983 as an engineering discipline that involves integrating knowledge into computer systems in order to solve complex problems normally requiring a high level of human expertise, e.g. Artificial Intelligence, Data Mining and Expert Systems.**
- **In 2011, it refers to the building, maintaining and development of knowledge-based systems.**

[http://en.wikipedia.org/wiki/Knowledge\\_engineering](http://en.wikipedia.org/wiki/Knowledge_engineering)

# The NASA/JPL Knowledge Management System

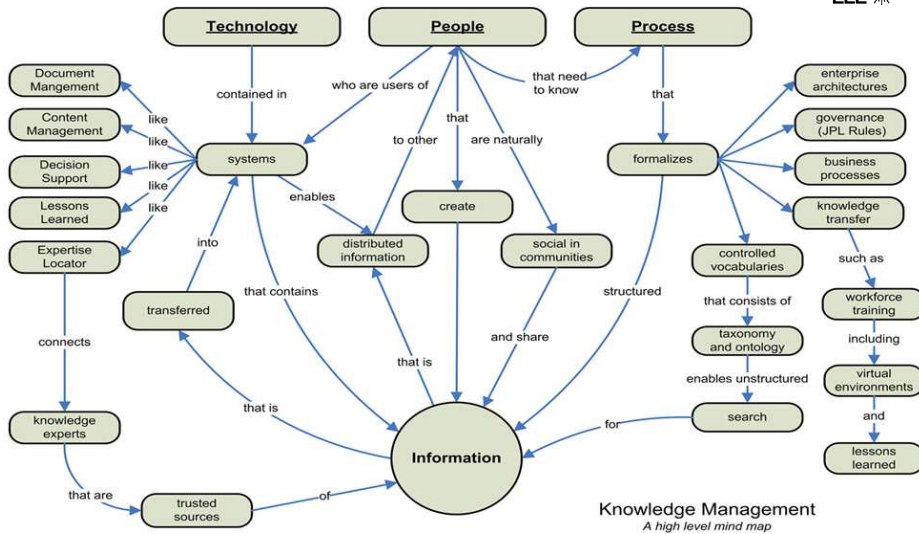


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# The NASA/JPL Knowledge Management System



Knowledge Management  
A high level mind map

Source: <http://wiki.TheNationalAcademies.gov/cm/wiki/?id=27464>

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## Knowledge Assets



**Knowledge assets includes the value of what people know, both individually and collectively, as well as the embedded intelligence in an organization's computer systems.**

- **Tacit Knowledge – Experiential or intuitive knowledge that is difficult to capture, however it can be effectively shared in a collaborative effort.**
- **Explicit knowledge – Knowledge that can be easily written, coded, or otherwise captured in various media for asynchronous transfer to others.**
- **Implicit knowledge – Tacit knowledge that can and should be converted to explicit knowledge.**

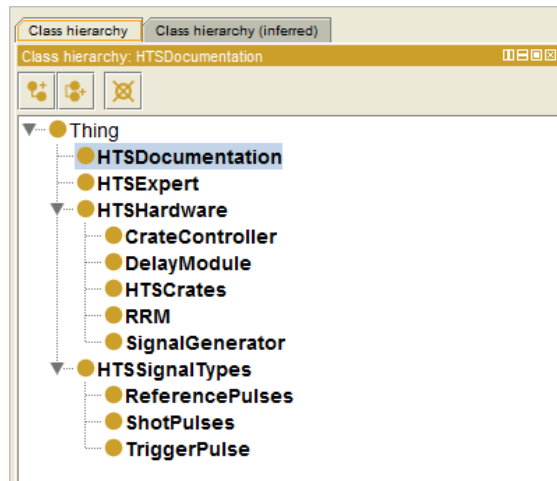
## Ontology



**An ontology is a formal representation of knowledge assets as a set of concepts within a domain, and the relationships between those concepts. It is used to reason about the entities within that domain, and may be used to describe the domain.**

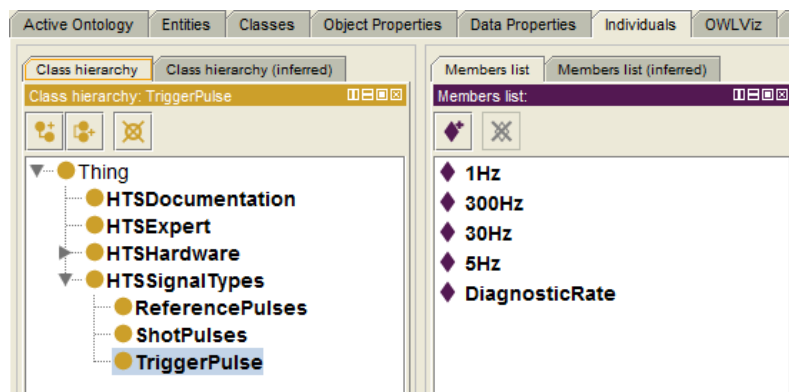
**NOTE: For this presentation, I have chosen to use Protégé 4.1 Beta using the OntoGraf ontology graphic display add-on.**

## Ontology Starts with Classification and Categorization



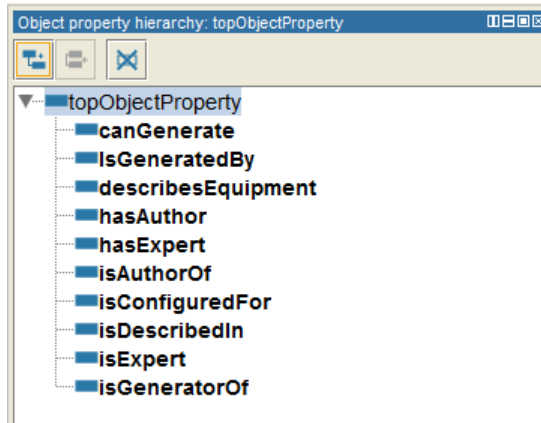
- Each class and subclass is to be unique and disambiguous.
- Multiple subclass levels are allowed.

## Add Individuals to the Classes



Individuals (Members) must belong to only one class or subclass, but can be linked to Individuals in other classes or subclasses.

## Add Properties to Connect the Individuals



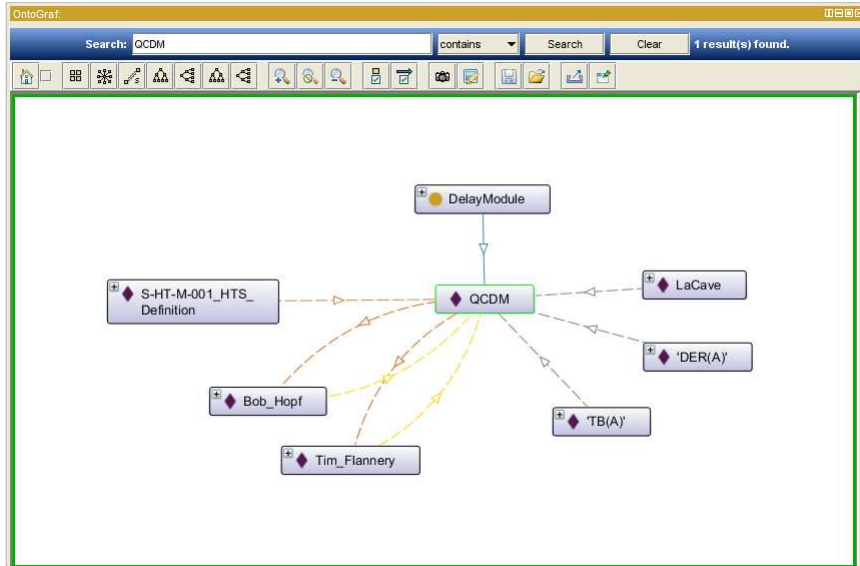
Individuals link to Properties that connect them to other Individuals.

- MTG isGeneratorOf 0.1Hz
- 0.1Hz isGeneratedBy MTG

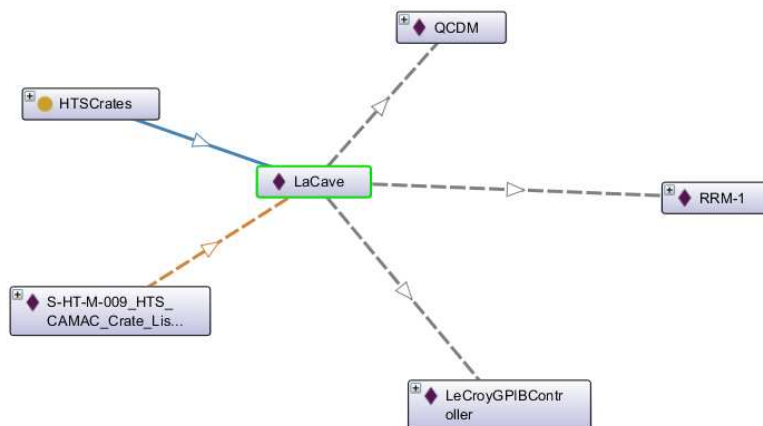
## Remember our first real-life scenario?

*It is 0600 on a Cryo shot day and your target diagnostic trigger pulses suddenly disappear during setup. Who do you call for HTS support?*

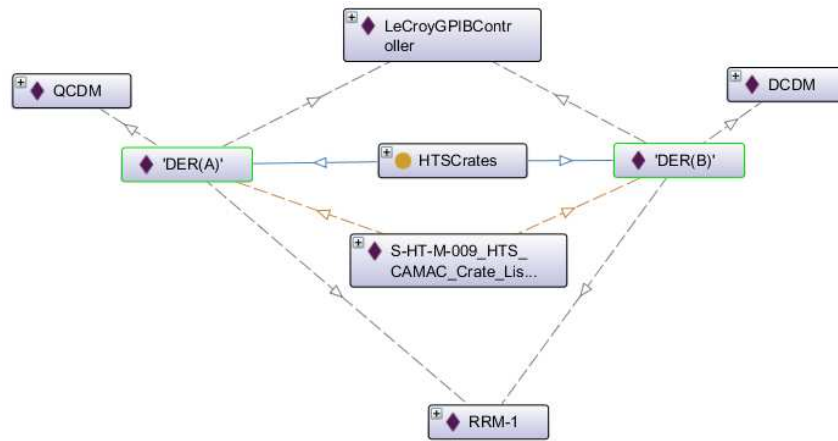
# Ontology Puts Search Into Context = Knowledge



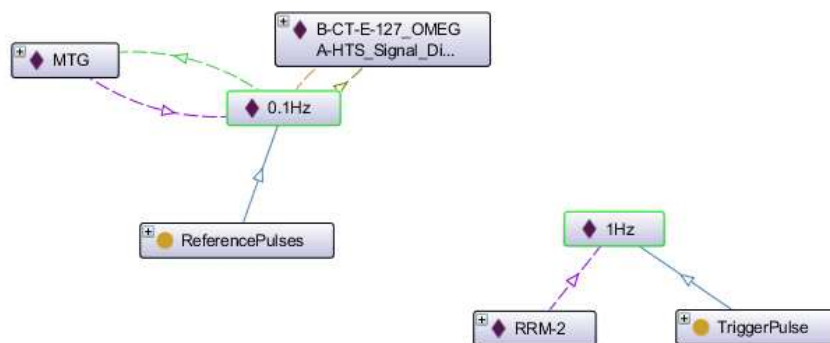
# Search on "LaCave" Timing Crate in context of HTS



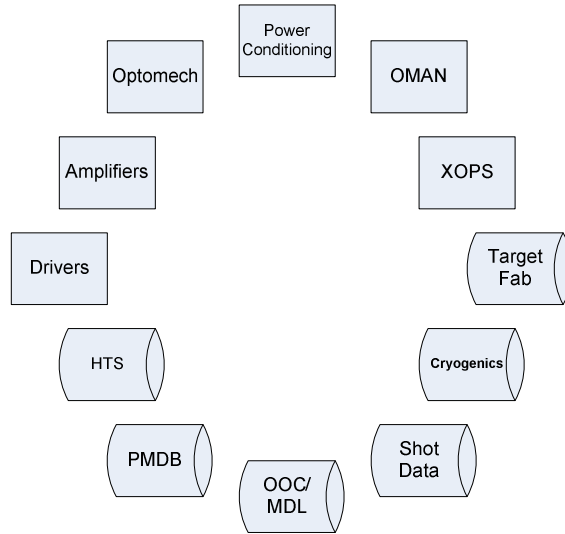
## Search on "DER" in context of HTS



## Search on "1Hz" in context of HTS



## Scenario 2: Shot Analysis

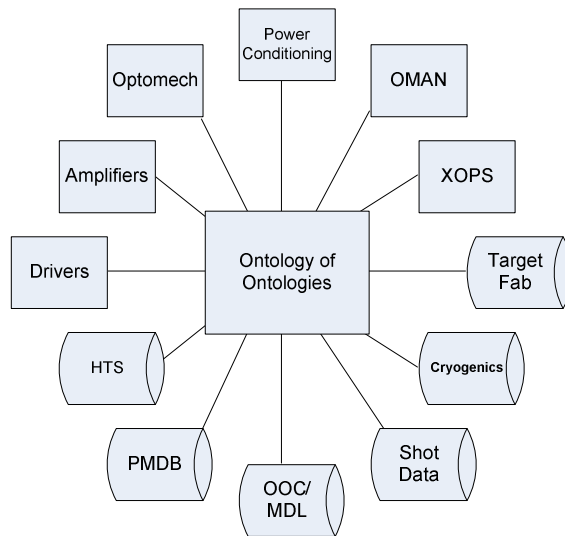


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## Ontology of Ontologies

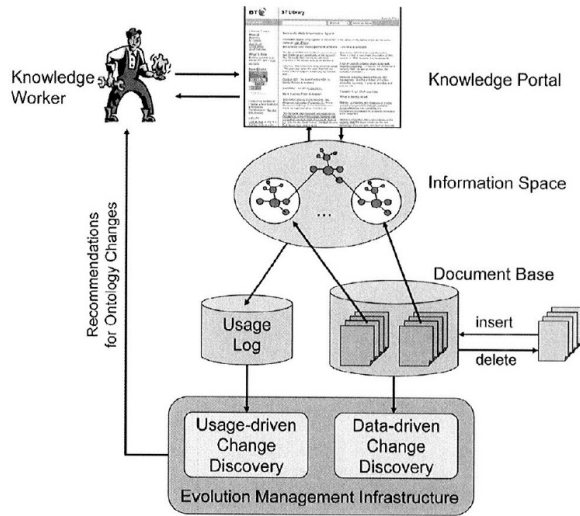


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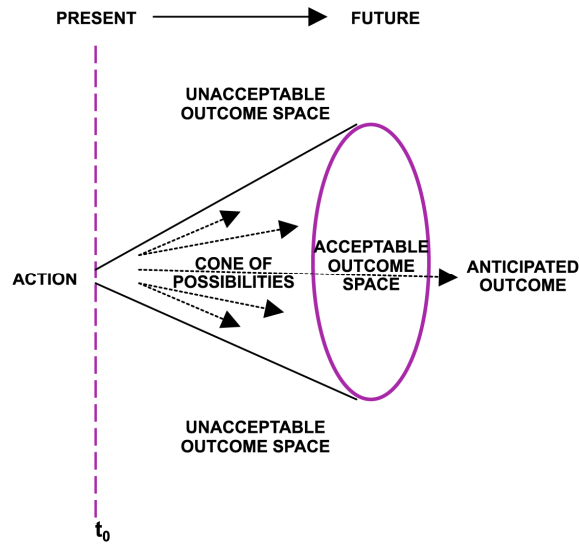
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# Leverage Knowledge By Process



Source: Peter Haase, Johanna Völker, & York Sure. (2005). Management of dynamic knowledge. Journal of Knowledge Management, 9(5), 97-107. Retrieved March 18, 2011, from ABI/INFORM Global. (Document ID: 923453701).

# Planning for the Future



[http://www.emeraldinsight.com/content\\_images/fig/2300120503001.png](http://www.emeraldinsight.com/content_images/fig/2300120503001.png)

## Framework for developing a Knowledge Initiative

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- **Cultural Assessment**
- **Strategic KM Plan**
- **Knowledge Audit**
- **Knowledge Map**
- **Stakeholder Buy-in**
- **System Design & Pilot Testing**
- **Training**
- **Deployment**
- **Performance Metrics**
- **Lessons Learned**
- **Continuous Improvement**

## Potential Initiatives

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- **Updating to semantic search**
- **Eliminate the knowledge bottlenecks**
- **Create an Expertise Directory**
- **Foster the sharing of tacit knowledge by sponsoring Communities of Practice**
- **Enable effective knowledge reuse with tools like Teamcenter**
- **Utilize workflow tools to manage repeatable tasks**
- **Use Adaptive Case Management (ACM) principles to tailor project workflow**
- **Encourage the use of social media, such as wiki and blogs, to capture and share lessons learned**



## Acknowledgements

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School of Library and Information Science



**Please fill in a questionnaire and return to me.**

**Thank you!**