

Nuclear Knowledge Bases and Portals

D. Beraha



IAEA

International Atomic Energy Agency

Objectives and Methods

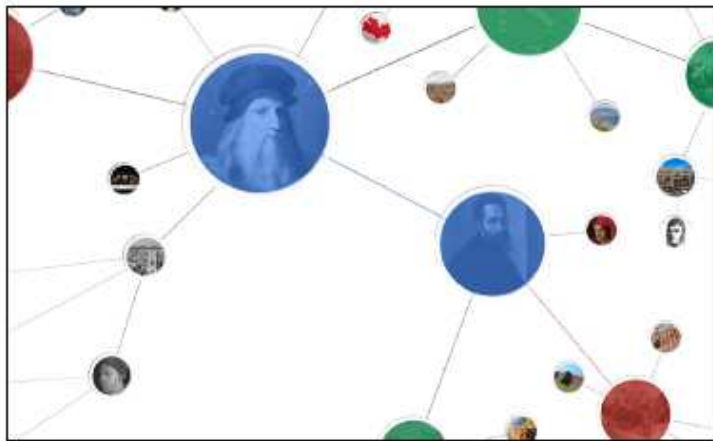
- Objectives
 - Knowledge Sharing
 - Knowledge Preservation
 - Knowledge Development
 - Search and Discovery
 - Collaboration and Communication
- Knowledge bases user interfaces
 - Portal, Wikis, Web Sites, Applications ...
- **Method:** Knowledge Representation and Knowledge Modeling (KR)

Knowledge Organization Systems

- KR based on **Knowledge Organization Systems (KOS's)**
 - Lists (e.g. Glossaries, Dictionaries, Authority Files); Taxonomies; Thesauri; Ontologies
- ... and on **Semantic Technologies**
 - Intelligible by machines
 - “Entities” uniquely referred to by URI's (<http://...>)
 - **Queries** and **Reasoning** (SPARQL)

Semantic Web and Linked Data (1)

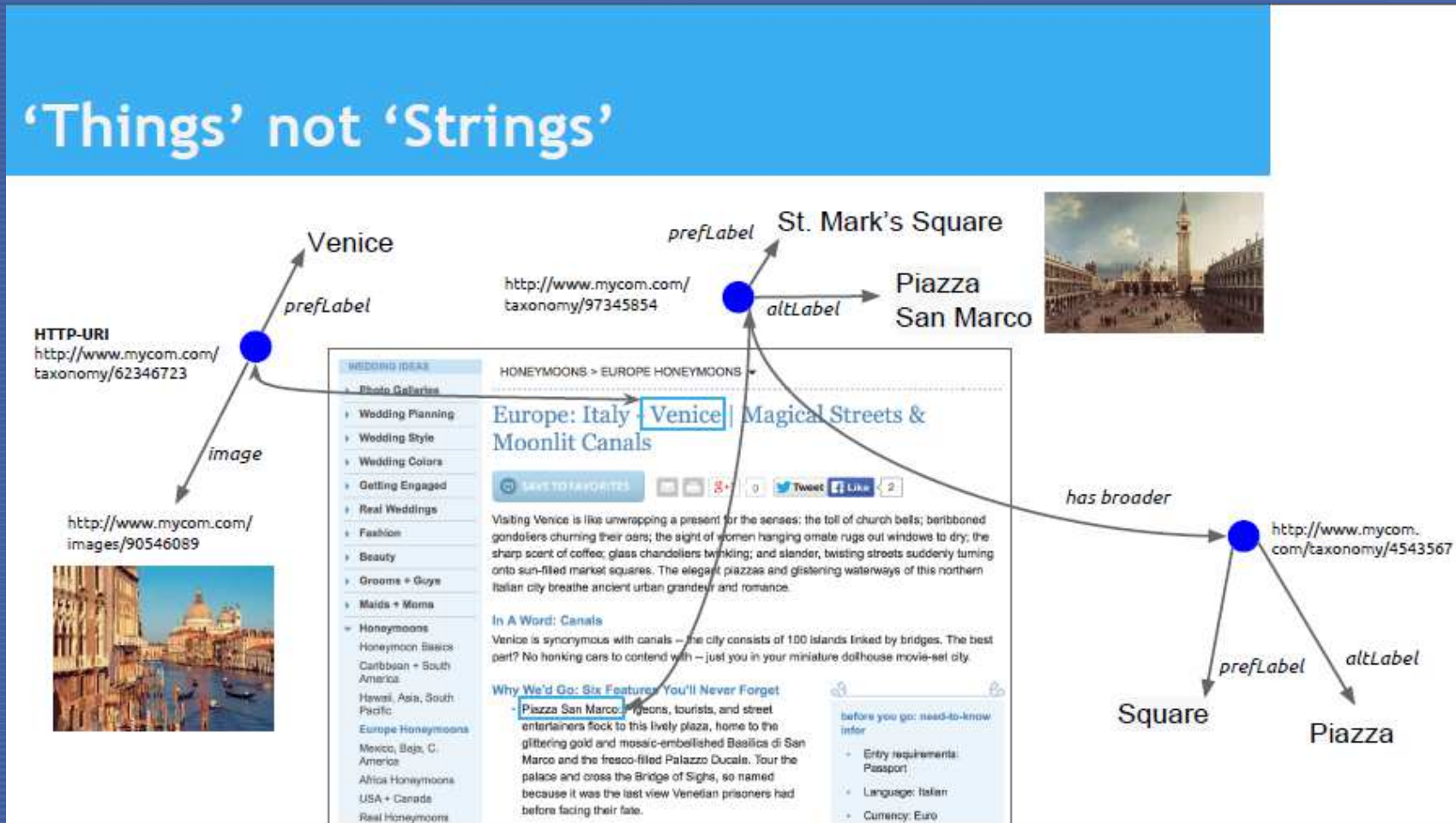
The Essence of the DataWeb



- **Entities**, not documents!
- **Things**, not strings!

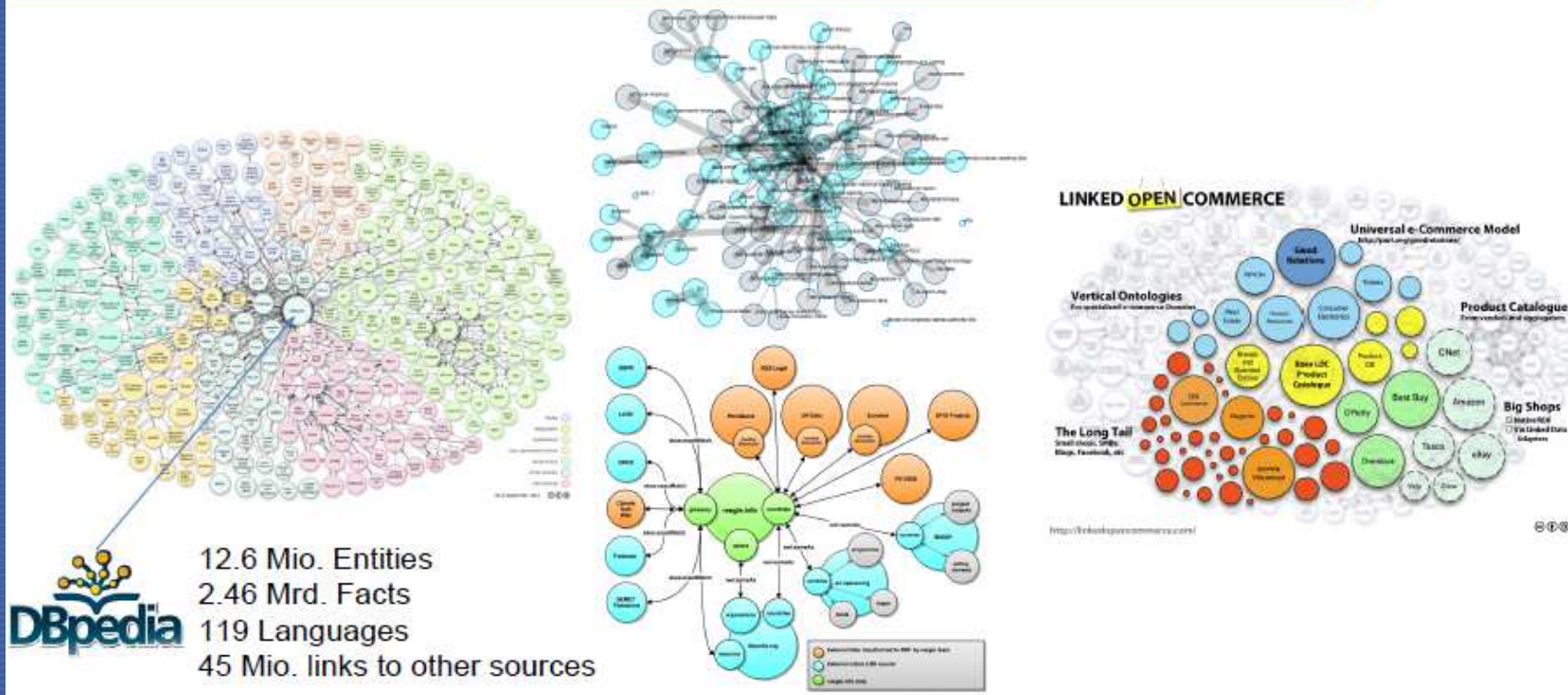
Semantic Web and Linked Data (2)

'Things' not 'Strings'



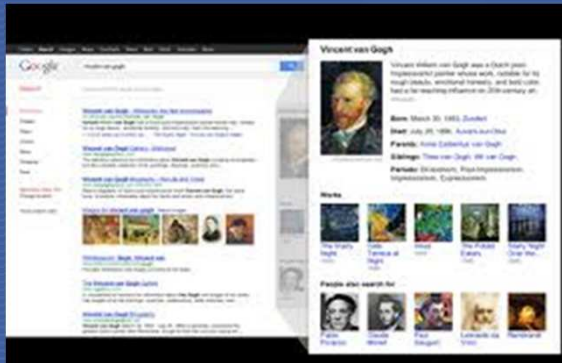
Semantic Web and Linked Data (3)

Giant Global Graphs

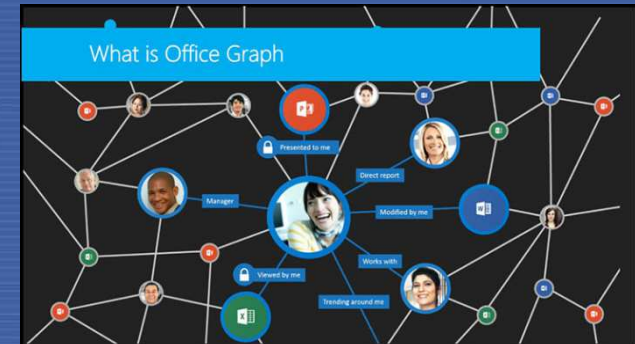


Knowledge Graphs

Google's Knowledge Graph



Microsoft Office Graph



IBM's Watson beating "Jeopardy" - Champions



Facebook Social Graph



KOS's in Nuclear

- Glossaries and Taxonomies in the Nuclear Domain
 - IAEA: joint development of NKM-Section and Member States (MS):
 - Taxonomies for Fast Reactors, Nuclear Accidents, VVER
 - Many more **KOS's available** in other IAEA-Sections (INIS-Thesaurus, NE-Glossary, NS-Glossary ...)
 - KOS developments in Member States
 - **Applications** based on KOS, e.g. search enhancement, querying KB's, combining information from many sources, ...



Knowledge Base Challenges

- Scope:
 - Rapidly increasing number of documents
 - free text search has limits
 - improving search by metadata, but manual markup very limited
 - Internal and external repositories (e.g. INIS, NuArch, ...)
 - Document **silos**
- **Structuring and navigation**
 - Complex domain areas
 - **Querying** (complex) knowledge bases
 - **Enrichment** of knowledge bases by external data (in other institutions, on the Web) → Linked Data

KOS Challenges

- **Proliferation** of Taxonomies and other KOS
- Maintaining KOS's, and following history (change management)
- Ownership, managing approval
- **Interchanging** and **linking** taxonomies
- **Homogenization** (avoid contradictions, but allow different views)

→ Use **Standards**

NKM KOS initiative

- Relevant aspects for the NKM KOS initiative
 - **Standards-based** KOS management
 - Based on SKOS (Simple KOS) – W3C Standard: Easy linking of different KOS's, use outside schemes (e.g. Dublin Core), develop own ontology schemes
 - Recent significant progress in **automatic tagging** (mostly based on KOS)
 - **Complex queries** over inhomogenous, structured and unstructured data sources possible
 - SharePoint will be further developed as basic IAEA platform → autotagging to be possible in Sharepoint

- Develop a **rich, expandable Knowledge Base** with advanced query, discovery and navigation abilities

Developing Knowledge Portals (1)

- Outline of solutions and ongoing activities:
 - Installing a SharePoint development platform for NKMS
 - Installing Poolparty Server and Power Tagging
 - Management of KOS's based on W3C Standard SKOS (Simple Knowledge Organization System)
 - Multilingual
 - Linking of KOS (batch linking, single concept linking)
 - Approval workflows
 - Publish on the web (and on paper)
 - Export to SharePoint
 - KB enrichment: Linking of external schemes and data (e.g. Wikipedia in RDF, Member States repositories)

Developing Knowledge Portals (2)

- Enhancement of taxonomies and thesauri with ontology features (classes, relations, attributes)
- Automatic tagging (manual intervention possible)
- **Semantic Search** (enhance search with synonyms, relations, facets, ...): Webpart in SharePoint
- Knowledge Base **navigation** and **discovery**: Webpart in SharePoint
- External applications (API available)
- Development of several Knowledge Portals
 - In cooperation with IAEA sections: Nuclear Accidents, Fast Reactors, ...
 - Development of a Nuclear Knowledge Management Portal
 - Internal and external use
 - Integration of the **E-Catalogue**: a collection of Case Studies from Member States
 - Integration of the NKM Wiki

- **Fast Reactor Portal**
 - Pilot search implementation on SharePoint 2010
 - Taxonomy to improve choice search terms
 - Searching INIS
 - Connection to SharePoint Search
 - Principle for Rights Management
 - Documents provided by MS will be in control of MS (definition of rights for other parties)
 - Next steps
 - Pilot portal in SharePoint 2013
 - Designing the portal pages
 - Uploading and autotagging documents from IAEA and MS

Example of SKOS properties

en

testmat

- Safety Standards (3)
 - 01- Governmental, Legal and Regulatory Infrastructure (18)
 - 02- Leadership and Management for Safety (11)
 - Assessment and continual improvement of safety culture (0)
 - Documentation of the management system (0)
 - Goals, strategies, plans and objectives (0)
 - Integrated management system (0)
 - Leadership (0)
 - Management of suppliers (0)
 - Management system, Graded approach (0)
 - Management system, Management of processes and activities (0)
 - Management system, Measurement, assessment, evaluation and improvement (0)
 - Management system, Resources (0)
 - responsibility to safety (1)
- 03- Radiation Protection and safety of radiation sources (36)

Lists

SKOS-XL Label

Collections

Goals, strategies, plans and object...

<http://rockefeller.poolparty.biz/testmat/66>

Details Notes Documents Linked Data Triples Visualization Quality Report History

SKOS SKOS-XL

Relations

Broader Concepts
[02- Leadership and Management for Safety](#)

Narrower Concepts

Related Concepts

Preferred Label
 Goals, strategies, plans and objectives

Alternative Labels
+

Hidden Labels
+

Scope Notes
 GSR Part 2
+

Definitions
+

Entity extraction example

corpus:3a33b7d7-0d7d-46c6-afb5-ebb08d93f905

Metadata & Statistics Corpus Documents DECOMMISSIONING OF FACILITIES

Title: DECOMMISSIONING OF FACILITIES Highlight Concepts Show Concepts

Concept Schemes Safety Standards

Safety through international standards

"Governments, **regulatory bodies** and operators everywhere must ensure that nuclear material and radiation sources are used beneficially, safely and ethically. The IAEA safety standards are designed to facilitate this, and I encourage all Member States to make use of them."

Yukiya Amano Director **General**

IAEA Safety Standards for protecting people and the environment

General Safety Requirements Part 6

INTERNATIONAL ATOMIC ENERGY AGENCY VIENNA

ISBN 978-92-0-102614-9 ISSN 1020-525X

No. GSR Part 6

Decommissioning of Facilities

14-15821_PUB1652_cover.indd 1-2 2014-07-03 10:40:26

IAEA SAFETY STANDARDS AND RELATED PUBLICATIONS

IAEA SAFETY STANDARDS

Competence building **decommissioning** **Decommissioning** ☆ decommissioning actions (19) ☆ decommissioning plan (21) **Dose limits** **Emergency preparedness and response** **Enforcement**

☆ final decommissioning (20) ☆ final decommissioning plan (21) **general** **general** **general** ☆ IAEA (26) ☆ iaea safety standards (23) ☆ iaea safety standards series (24) **Inspection**

Integrated management system **Leadership** ☆ management of radioactive waste (20) ☆ nuclear (16) **Regulatory Body** ☆ requirements (17) ☆ safety (35) ☆ safety standards (31) ☆ safety standards series (17)

☆ standards (25) ☆ THE IAEA SAFETY STANDARDS (17) **Waste management** **waste management**