# PLEIADES
Smarter Plant Decommissioning

# An international approach to a nuclear decommissioning ontology

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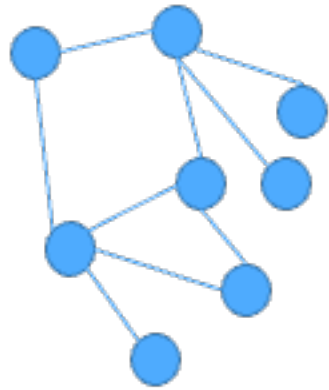[6]IRSN, Institut de radioprotection et de sûreté nucléaire, Fontenay-aux-Roses, France

# Overview

- Introduction

- Development of the Decom Core Ontology
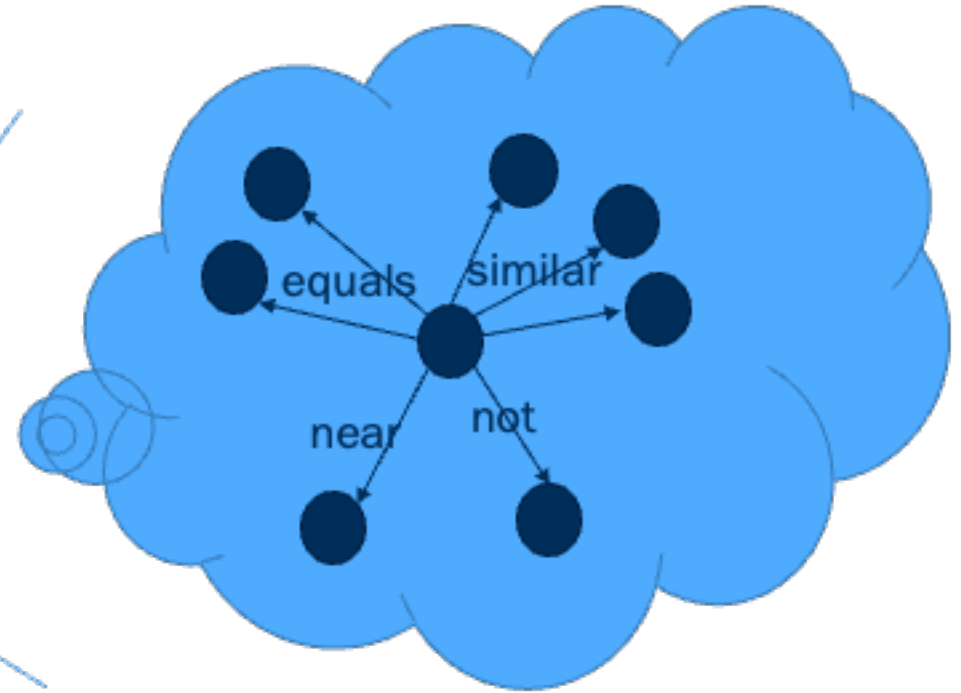
- Benefits of an ontological approach

# Ontologies, Taxonomies, Thesauri
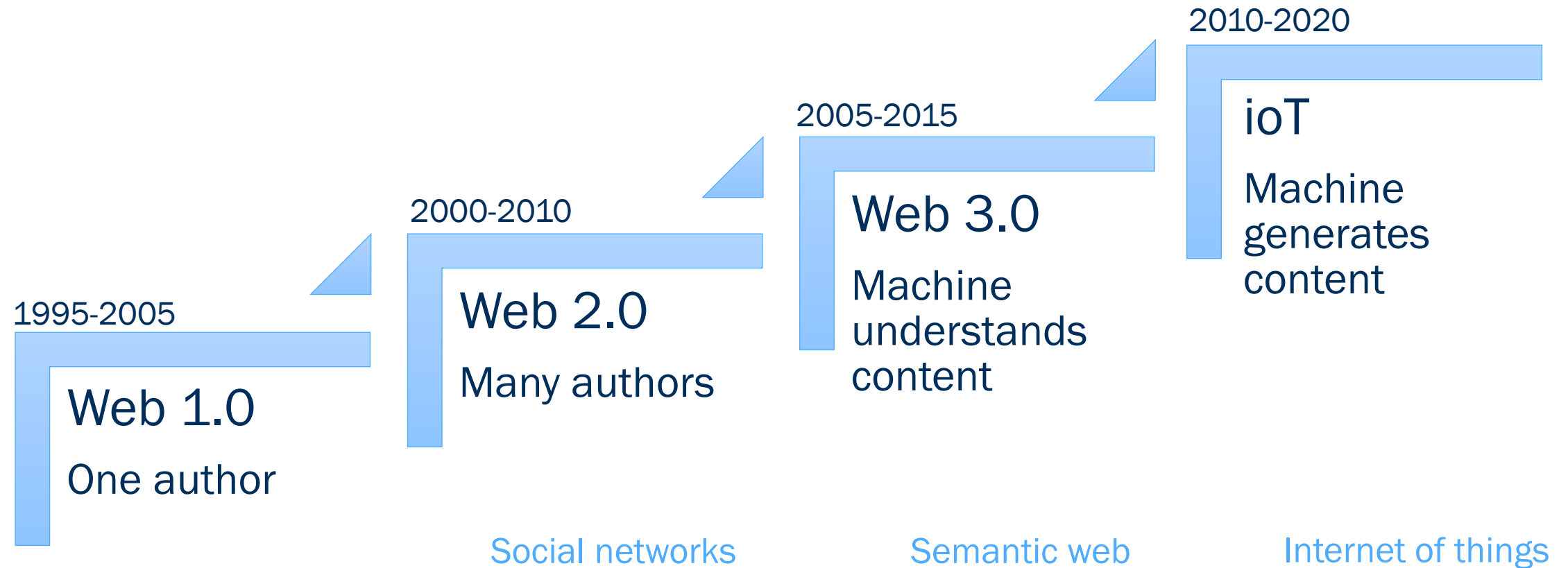


Ontology
linking
concepts

Taxonomy
sorting terms inside
concepts

Thesaurus/SKOS
describing terms and their
environment

# Progression of web technologies

2010-2020

ioT

Machine
generates
content

2005-2015

Web 3.0

Machine
understands
content

2000-2010

Web 2.0

Many authors

1995-2005

Web 1.0

One author

Social networks

Semantic web

Internet of things

# Why an ontology for PLEIADES?

- The task is to achieve a common platform for existing software for 3D and BIM in decommissioning

- Each software has it's own history, terms and concepts

- Direct interfaces would be very difficult to generate and maintain

- A common understanding of the decommissioning process is necessary
  - Between subject matter experts
  - Between subject matter experts and data scientists

# The development approach
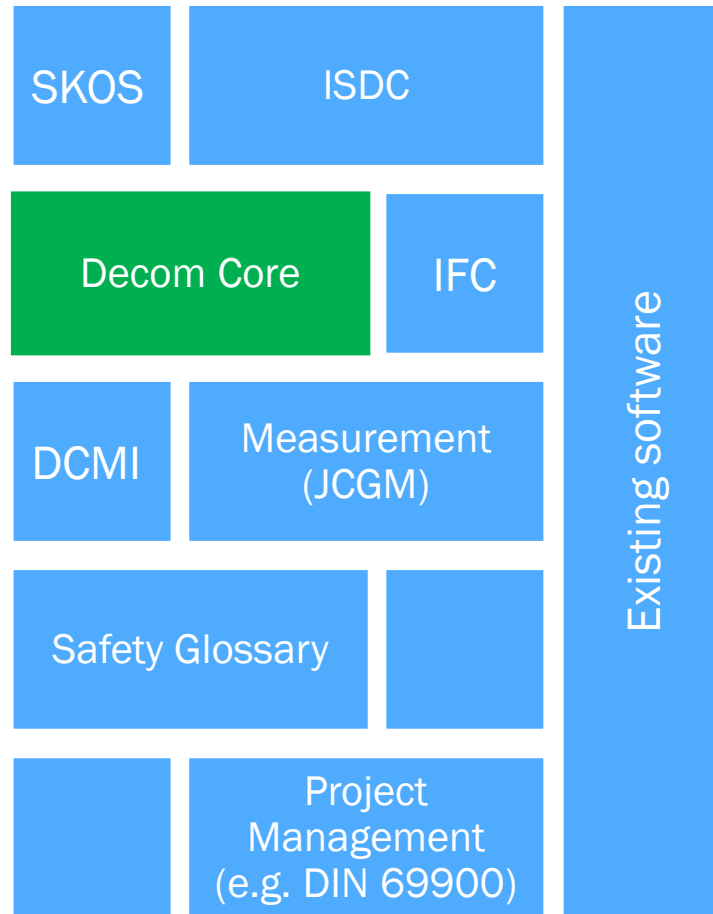


- No intention to reinvent the wheel, use what is available, established and suitable

- Simultaneous top-down and bottom-up approach

- Decom core covers specific parts

# Development steps

- Definition of boundaries

- Informal capture of concepts from subject matter experts
  - Series of discussions captured on mindmaps
  - Several topical workshops
  - Final review workshop with external participants
  - Integration of workshop outcomes

- Connection of concepts by core properties

- Reality check – can we describe a real project?

- Formalization (SKOS, definitions, translations, OWL-format)

# Feedback collection in review workshop



Workshop was attended by 25 persons from

operators,
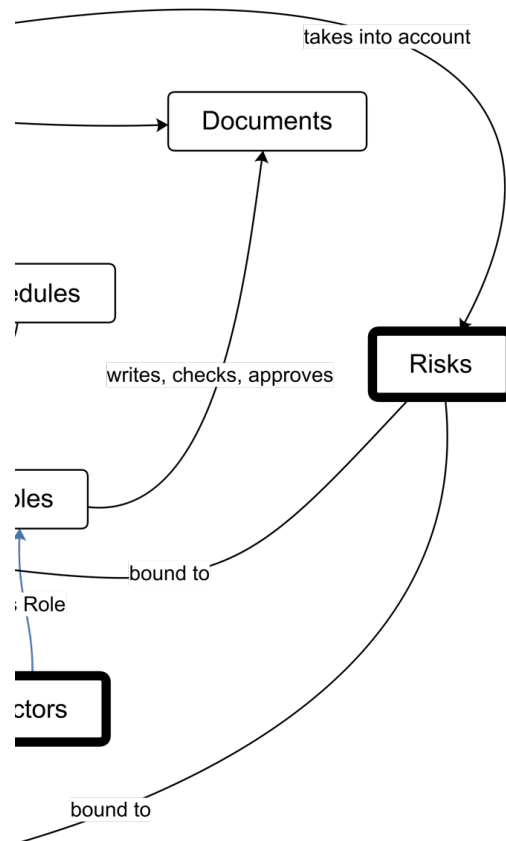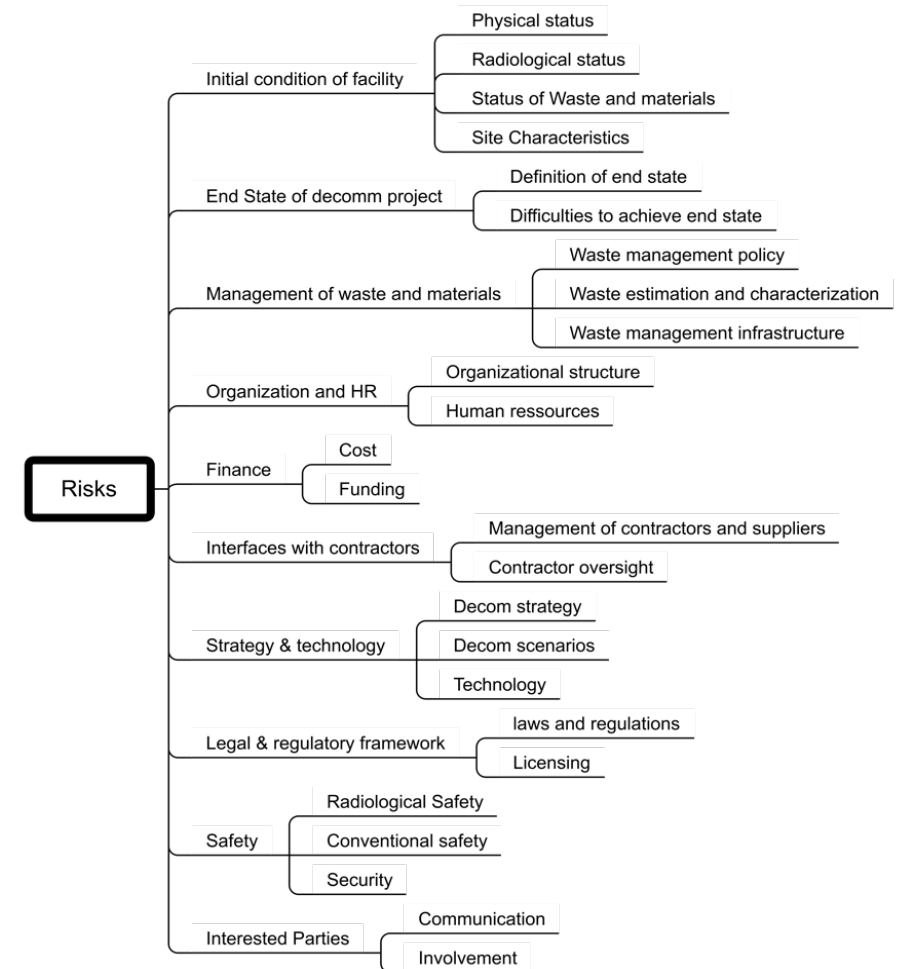service providers
regulators
int. organizations

# The Decom Core Ontology

# Example – Decommissioning Risks



Definition:

Effect of uncertainty on objectives [ISO 31000]

# Formalization - VocBench



SKOS content

- Labels / Translations
- Definitions
- Relations

Concepts

# The Conclusions

- Ontology will be the basis of PLEIADES
- Provision of an interface will only work if all participants have a common understanding of the content
- Development follows
  - A top-down approach ensuring compatibility i.a. to IAEA approach for the top layer
  - A bottom-up approach from the participants existing solutions to ensure a common understanding
- Alignment of approaches highly recommended and beneficial for all sides
- Time window is rather narrow (ends Mid 2021)
- Clear limits of cooperation possibilities by funding scheme and financial capablities

# Ontologies foster interoperability
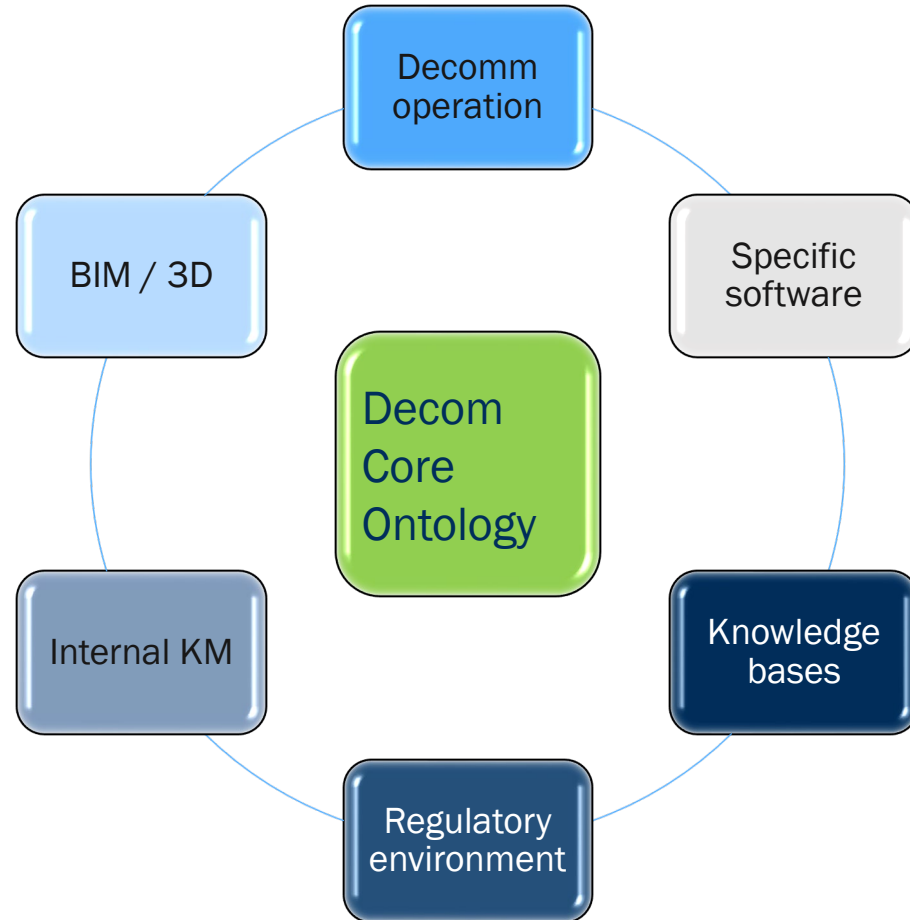


Through the decom core ontology,
it will be much easier to connect different
applications and knowledge bases

In PLEIADES it will allow access
also to other knowledge resources

It will be feasible to deploy knowledge
content packages for multiple
applications and frameworks

This will also allow to reuse the
vast decommissioning knowledge

# Beyond PLEIADES

- In parallel, a Working Group of IAEA, OECD-NEA and EU-JRC has formed and worked out an ontology for managing the knowledge on decommissioning

- Different scope, PLEIADES aims for managing decommissioning projects

- The interaction between the Working Group and PLEIADES allowed both sides to come to an aligned approach

- The ontology forms a basis for the further digitalization of decommissioning, for example AI

# Questions? Ideas?

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