Semantic Web Metadata for e-Learning

- Some Architectural Guidelines

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Metadata everywhere

- Rapid increase in popularity of e-learning standards (within IEEE, IMS, ADL, etc.)
- Metadata forms the basis of all efforts, but:
  - Still much confusion about how metadata should be implemented.
  - The W3C standard for metadata (RDF) is not widely supported.
  - Very little of the potential in the metadata concept has been realized.

The KMR group and metadata

- Initiated and lead development of RDF bindings for IEEE LOM and IMS CP
- Implemented metadata-based systems include:
  - SCAM: RDF-based content archive & digital portfolio
  - Edutella: RDF-based P2P network (within WGLN)
  - Conzilla: RDF-based concept browser

Guiding principles for a metadata architecture

- The Knowledge Manifold is our philosophical and pedagogical framework. Metadata needs to support:
  - Human to human via machine
  - Subjective expression
  - Connecting distributed knowledge patches
  - Building knowledge communities
- The following slides will discuss problems with current meta-data standards/implementations

Subjectivity of metadata

- Most current metadata is authoritative
- No room for interpretations / annotations
- No real support for meta-metadata
- No support for trust and the consensus building process

⇒ We need to support non-authoritative metadata!

Evolving descriptions

- Authoritative metadata is designed for "produce once – use everywhere"
- Does not allow for adaption to changing needs and uses
- Does not allow for context-dependence

⇒ We need an architecture supporting a metadata eco-system!

Extensions – syntax and semantics

- Current metadata standards extremely monolithic
- Extensions, while allowed, must be crafted with minute syntactic care
- Semantic interoperability is a mess (e.g. DC & LOM)
- Still, most deployments need to mix vocabularies, syntactically and semantically

⇒ We need a common model & syntax supporting semantic/syntactic extensions!

Combining descriptions

- Metadata standards build on the metadata instance metaphor
- In a metadata eco-system, metadata will be distributed
- Metadata must be processable even if combined from several sources

$\Rightarrow$ We need to support distributed metadata descriptions!

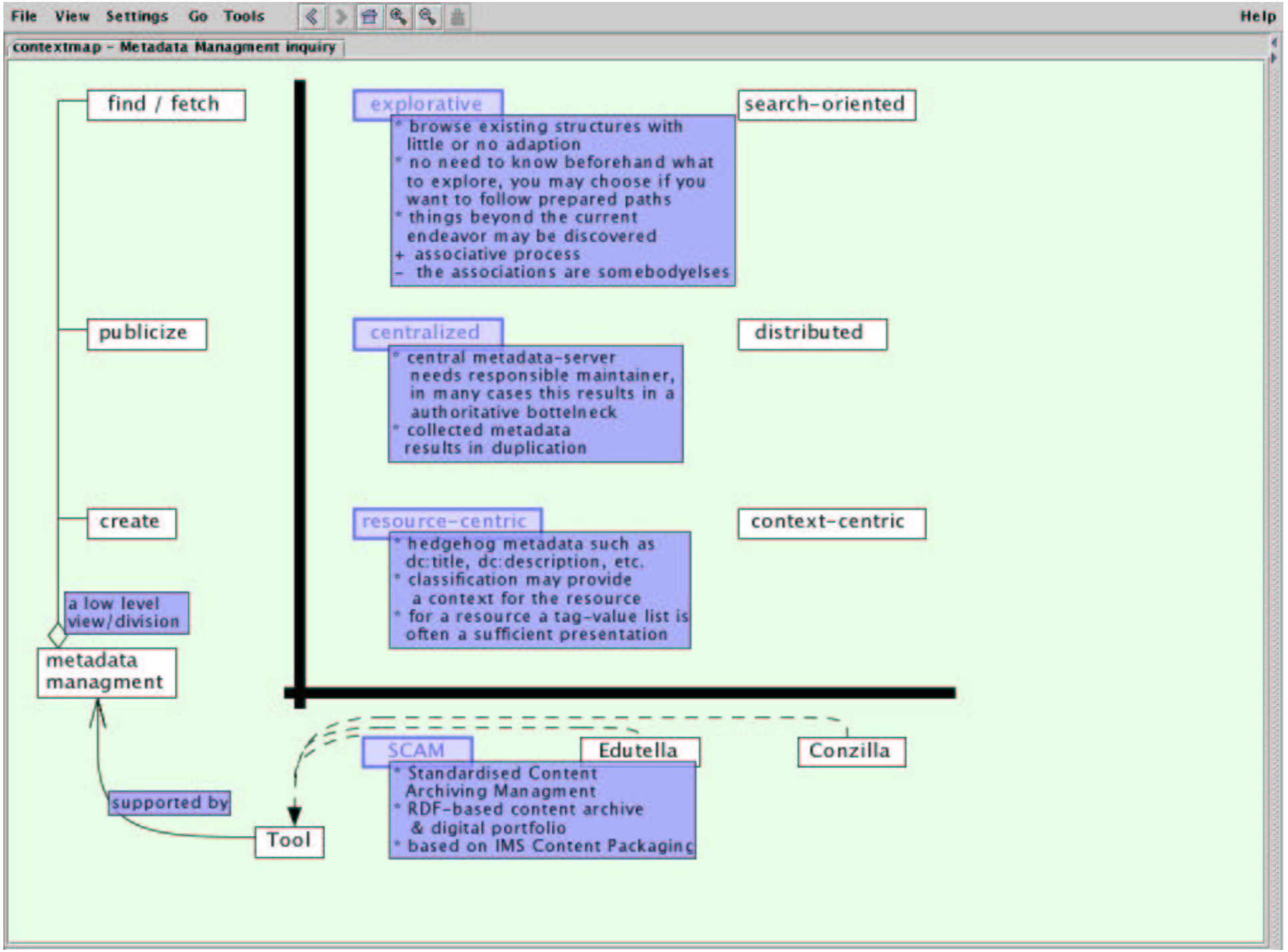
Beyond resources

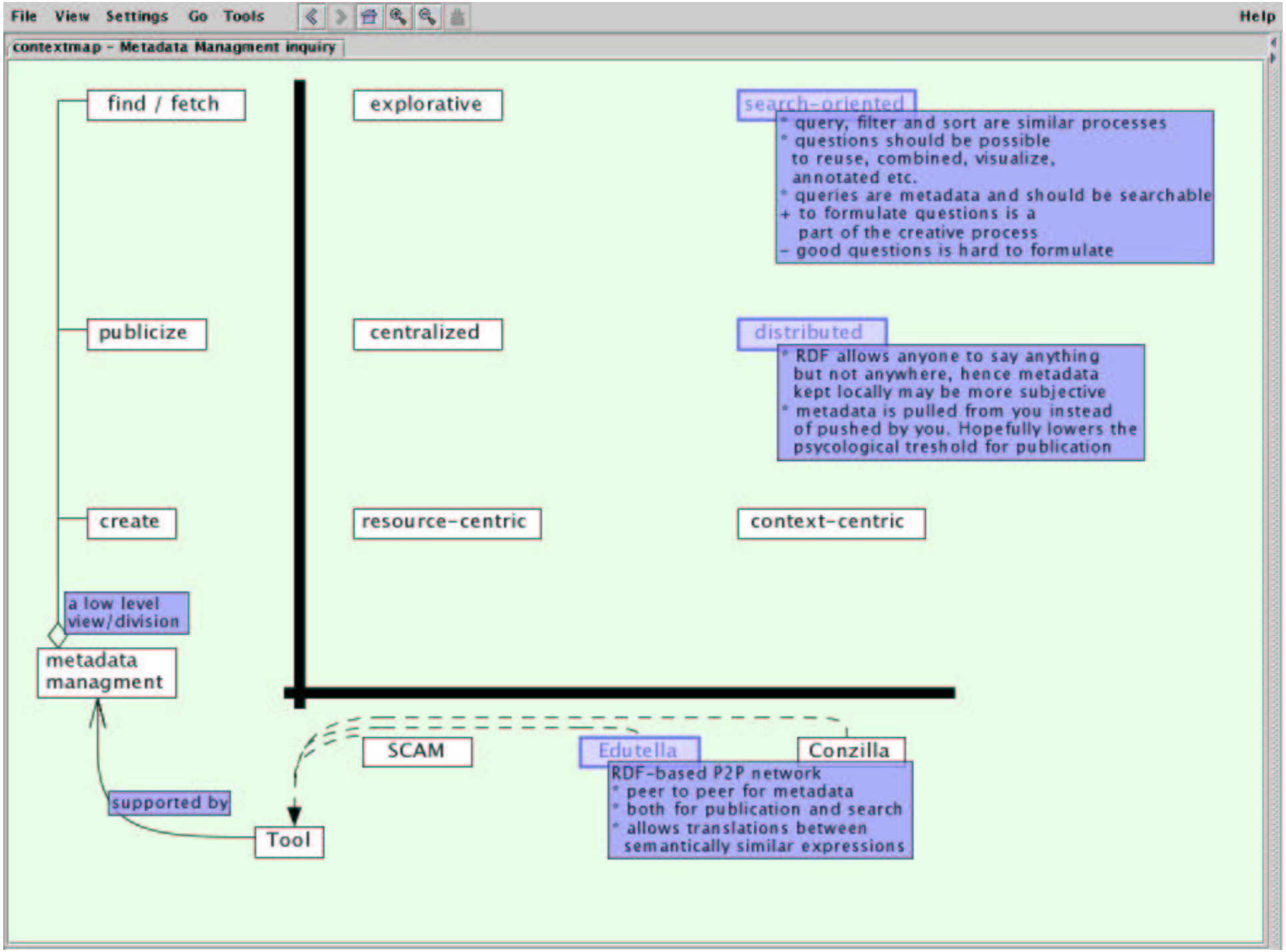
- Most metadata implementations focus on resources
- Resources without a conceptual context lack meaning
- Contextual information will provide a key to handling information overflow

⇒ We need to use conceptual metadata, focusing on contextual information!

Summary

- We need metadata that is:
  - subjective and non-authoritarian
  - evolving
  - extensible in syntax and meaning
  - distributed
  - conceptual
- RDF is the key
  - Combined with P2P technology...


File View Settings Go Tools
Help
contextmap - Metadata Managment inquiry
find / fetch
explorative
search-oriented
* browse existing structures with little or no adaption
* no need to know beforehand what to explore, you may choose if you want to follow prepared paths
* things beyond the current endeavor may be discovered
+ associative process
- the associations are somebodyelses
publicize
centralized
distributed
* central metadata-server needs responsible maintainer, in many cases this results in a authoritative bottelneck
* collected metadata results in duplication
create
resource-centric
context-centric
* hedgehog metadata such as dc:title, dc:description, etc.
* classification may provide a context for the resource
* for a resource a tag-value list is often a sufficient presentation
a low level view/division
metadata managment
SCAM
Edutella
Conzilla
* Standardised Content Archiving Managment
* RDF-based content archive & digital portfolio
* based on IMS Content Packaging
supported by
Tool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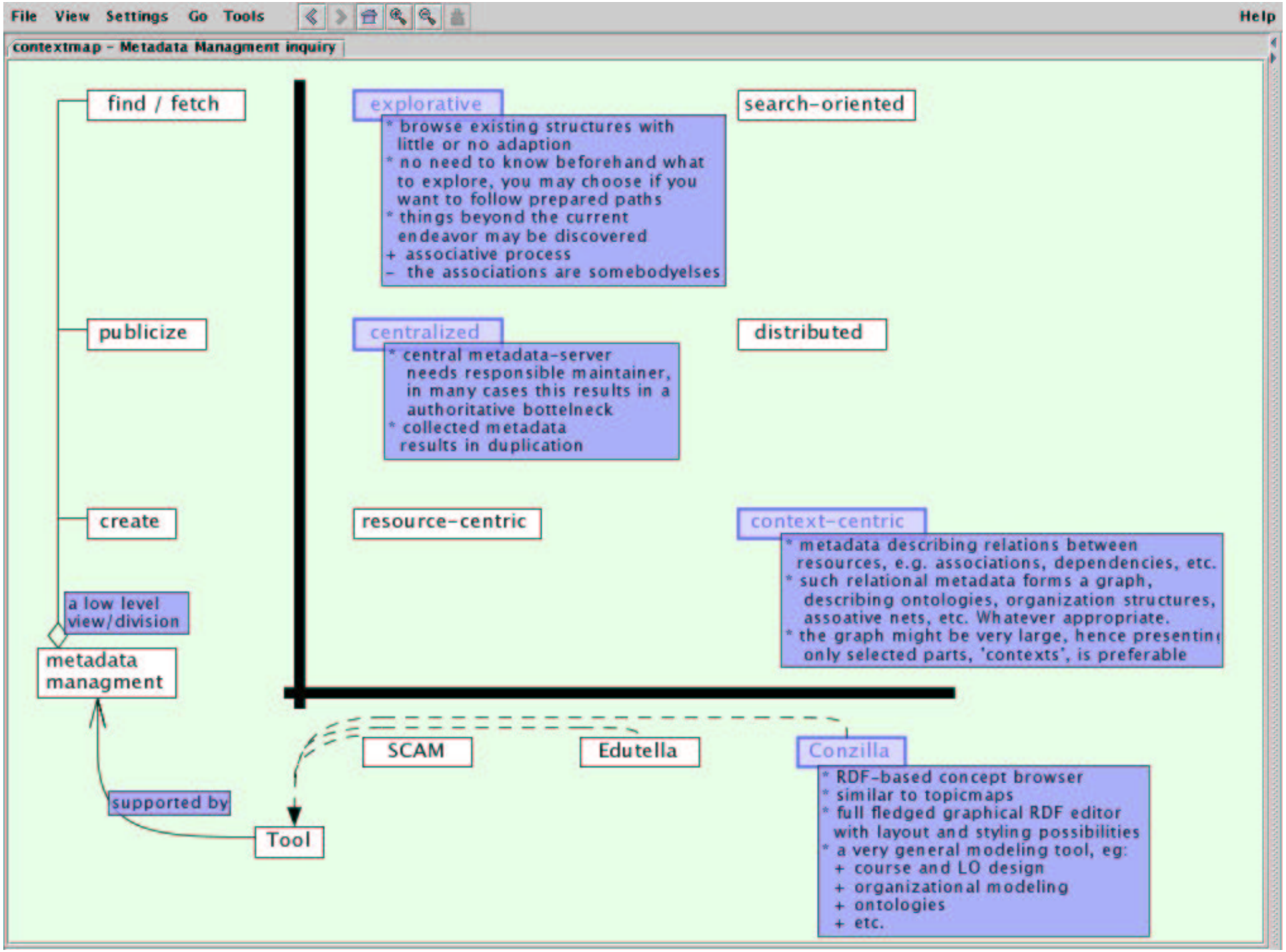
find / fetch
explorative
search-oriented
* query, filter and sort are similar processes
* questions should be possible to reuse, combined, visualize, annotated etc.
* queries are metadata and should be searchable
+ to formulate questions is a part of the creative process
- good questions is hard to formulate
publicize
centralized
distributed
* RDF allows anyone to say anything but not anywhere, hence metadata kept locally may be more subjective
* metadata is pulled from you instead of pushed by you. Hopefully lowers the psycological treshold for publication
create
resource-centric
context-centric
a low level view/division
metadata managment
SCAM
Edutella
Conzilla
RDF-based P2P network
* peer to peer for metadata
* both for publication and search
* allows translations between semantically similar expressions
supported by
Tool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resource-centric
context-centric
* metadata describing relations between resources, e.g. associations, dependencies, etc.
* such relational metadata forms a graph, describing ontologies, organization structures, assoative nets, etc. Whatever appropriate.
* the graph might be very large, hence presentin only selected parts, 'contexts', is preferable
SCAM
Edutella
Conzilla
* RDF-based concept browser
* similar to topicmaps
* full fledged graphical RDF editor with layout and styling possibilities
* a very general modeling tool, eg:
+ course and LO design
+ organizational modeling
+ ontologies
+ etc.