Web Services and Semantic Web for the Next Generation of Learning Repositories

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0. Overview

1. Discussion of Problems and Issues in E-Learning

2. Description of the eduSourceCanada Project

3. Some Thoughts Toward an Infrastructure

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1. Problems and Issues

- In general the issues have to do with system architecture and resource based on what I call the "**silo model**."

- On this model, resources are not designed or intended for wide distribution. Rather, they are located in a particular location, or a particular format, are intended for one sort of use only.

- The silo model is dysfunctional because it prevents, in some essential way, the location and sharing of learning resources.

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1.1 Proprietary Standards

- A standard is proprietary when it is secret or when patents, copyrights or other restrictions prohibit its use.

- The use of a proprietary standard divides a distribution network

- Risks of proprietary standards:
  - Lack of support in new software
  - Licensing terms may change
  - Standards holder enjoys technological advantage
  - Choice of viewing software may be limited

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1.2 Strict Standards

- It may be the case that the standard is too limiting for widespread use. (e.g. Criticisms of SCORM)

- In a similar manner, transport protocols may also be too strict.

- If the standard is too complex, use of the standard requires an involved process or development tool.

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1.3 Monolithic Solutions

- Learning content management systems have become tightly integrated monolithic software bundles
- Purchasers of such systems are as a consequence committed to a single solution for all aspects of learning management – 3rd party solutions cannot be 'plugged in'.
- Issues:
  - Purchasers buy more than is desired
  - No means to outsource services

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1.4 Closed Marketplace

- Exists when an owner of a learning content management system has only a limited selection of content to choose from.

- Usually established *via* exclusive licensing deals

- Issues:
  - It is difficult to access content from different libraries
  - It is difficult for new content providers to distribute their material
  - The system tends to favour large distributors, large institutions

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1.5 Disintermediation

- A system is disintermediated when there is no form of assessment or review guiding the selection of learning resources.

- Some efforts to provide intermediation. Eg. Merlot's peer review process – but these are limited to a single repository and select body of reviewers

- Review often used as a 'gate-keeping' process, causing significant backlog

- In many system, no review available at all

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1.6 Selective Semantics

- The tendency to view the network of learning objects and repositories as a stand-alone service on the world wide web, not integrated with or compatible with many other resources and services available

- An issue mostly of perception rather than implementation

- A network, for example, that standardized on SCORM would preclude from consideration resources which are useful to course designers but which may not be described as learning objects *per se*.

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1.7 Digital Rights Mismanagement

- Major issues:
  - No simple DRM solution has been widely implemented.
  - In many implementations, digital rights management has been conflated with the idea of digital rights enforcement
  - Often a requirement to use specialized technology, software
  - Typically necessary to negotiate access with each separate supplier
  - No trusted fiduciary agents

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2.0 eduSourceCanada

2.1 eduSourceCanada will…

- Create a testbed of linked and interoperable learning object repositories across Canada

- Provide a forum for the ongoing development of the associated tools, systems, protocols and practices that will support such an infrastructure

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2.2 Facts About eduSourceCanada

- Start Date: July 1, 2002
- Completion Date: March 31,2004
- Total Budget: $9.4 million
- CANARIE Contribution: $4.25 million

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2.3 What eduSource Will Be

- Be based on national and international standards
- Be fully bilingual
- Be accessible to all Canadian including those with disabilities through its work with the TILE (The Inclusive Learning Exchange) project
- Share and disseminate its findings with all of Canada
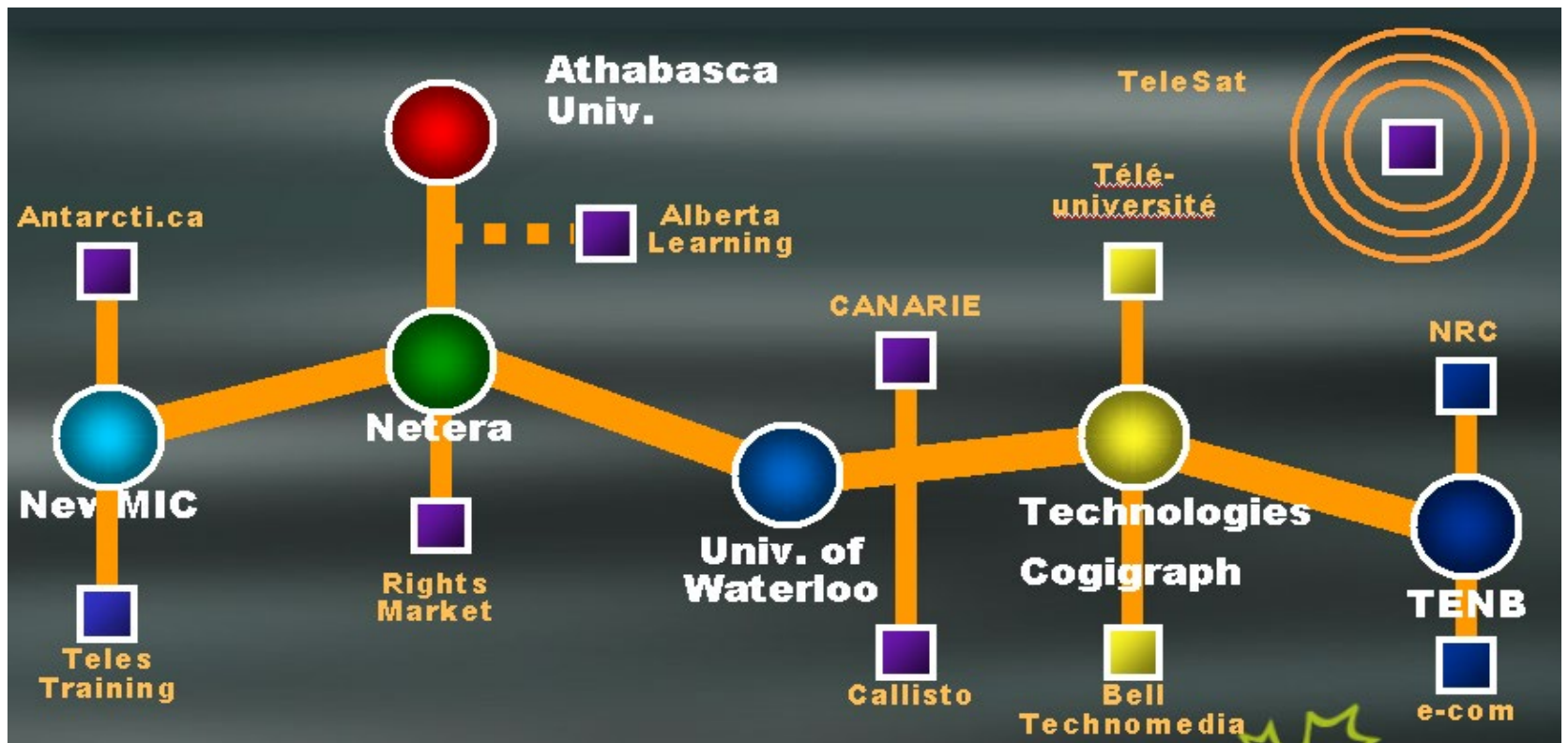
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2.4 Primary Partners
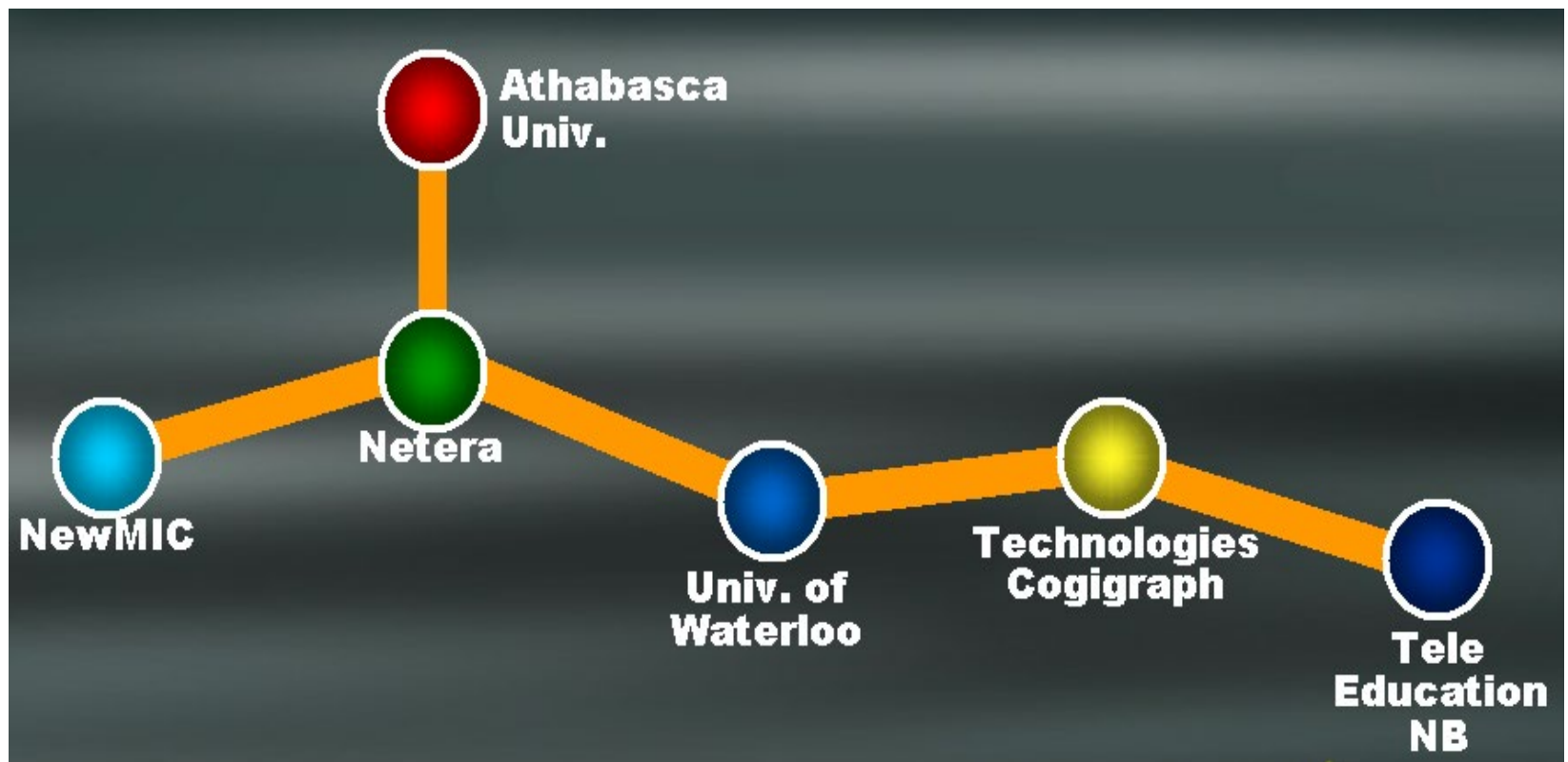
2.5 Academic Partners
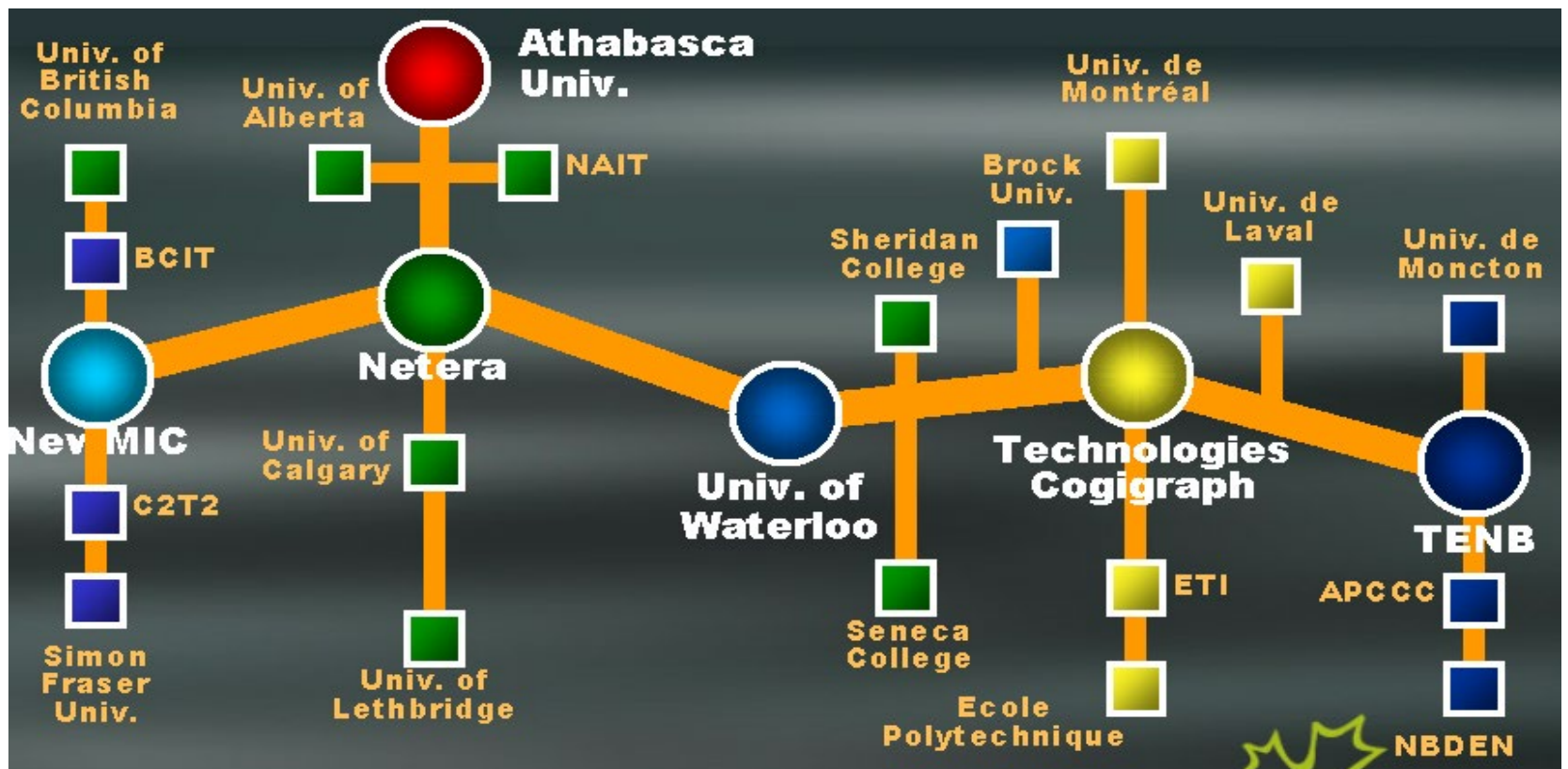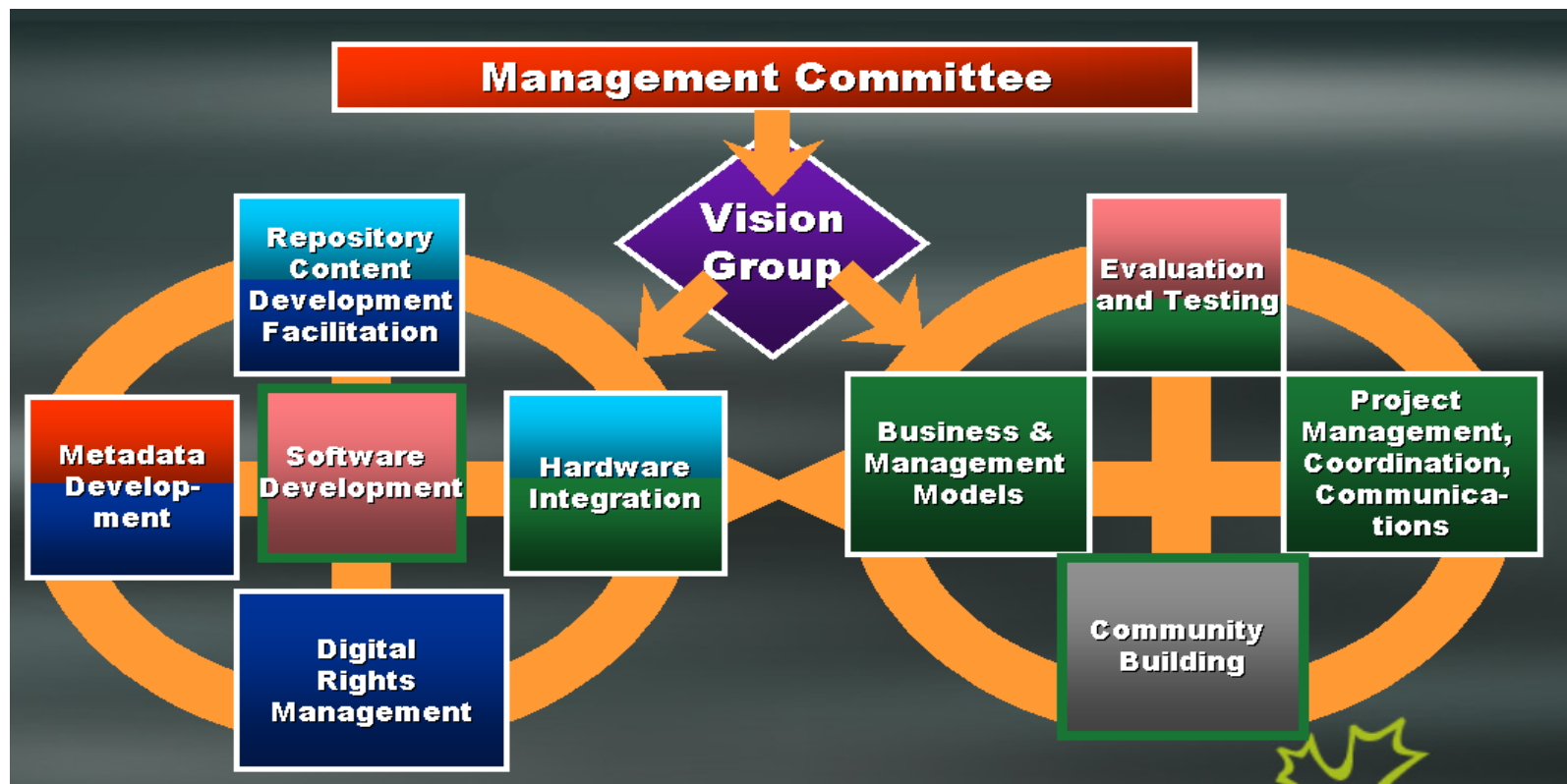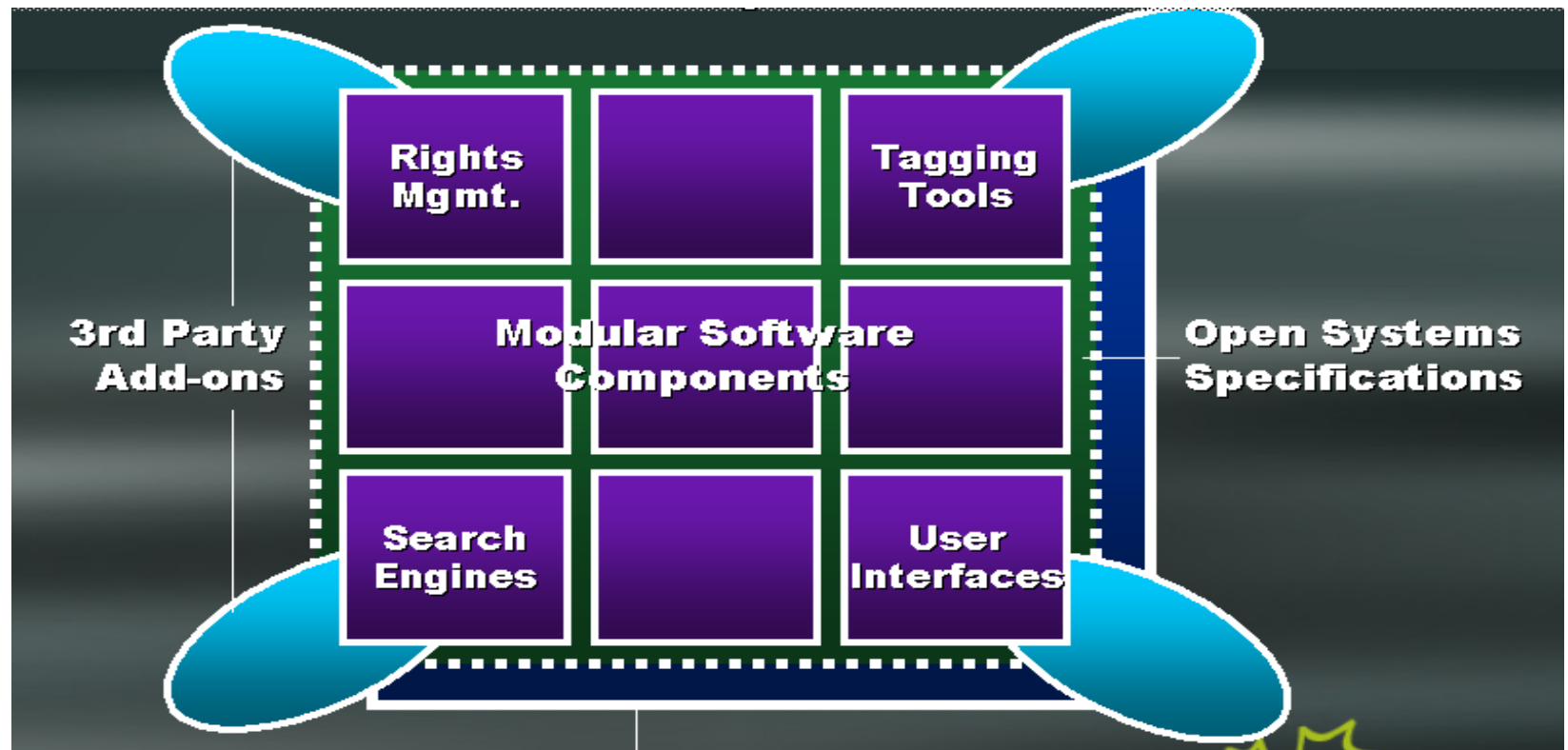
2.6 Industrial and Government Partners

2.7 Overall Structure

2.8 Repository in a Box

3. Some Thoughts Toward an Infrastructure

- The Vision Committee is establishing design principles to govern the development of an architecture

- The purpose of the principles is to guide the description of the components employed, the standards followed, and the principles governing the operation of the network.

- These principles are considered essential to the development of a national network of learning objects within the parameters described in the previous section.

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3.1 Standards and Standards Compliance

- The protocols used are described, documented, and freely available to the public at large

- The protocols developed or used shall be royalty-free

- The project will strive to achieve a higher level consensus regarding protocols among core participants where possible, but will not impose it as a condition for entry among all participants.

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3.2 Infrastructure Layer, Service Layer

- *Infrastructure layer:* the set of components that provides end-to-end functionality

- Will be developed and distributed as royalty-free open source software

- *Service layer:* a set of components with increased functionality over and above the the infrastructure layer.

- May be developed as free and open applications, or may embody commercial and proprietary components

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3.3 Distributed Architecture

- Not as a single software application, but rather, as a set of related components
- Any component may be replicated and offered as an independent service, allowing multiple instances of each component
  – This allows users to select only those components they need to use
  – It also allows for choice in the selection of instances of any given component

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3.4 Open Marketplace

- Any provider of learning materials may prepare and distribute learning materials through the network

- No prior restraint imposed on the distribution model selected by participants
  - Free content
  - Fee-based or licensed content
  - Co-op network content

- Multiple parties may provide metadata describing a given learning resource
  - Evaluations, annotations, certifications

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3.5 Open Rights Management

- Where possible, the acquisition of rights and the exchange of funds will be automated

- Multiple digital rights models

- No single rights agency governing all transactions
  - Distributors, users will be able to select *agents*

- Should assert individual rights and preferences on behalf of users
  - For example, to express technology choices, content choices, privacy choices

3.5 Creating the Network

- Three major steps:
  1. Separating the functionality of an LCMS / LMS architecture into distinct, stand-alone components that communicate over TCP/IP
  2. Allowing (encouraging) the development of multiple instances of these components
  3. Providing indexing or registries of these instances

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3.6 Core Components

- *Learning Object Repository* – hosted by vendors on vendor sites, provides vendor metadata and learning object servers

- *Metadata Repository* - hosted elsewhere, harvests metadata from vendors and amalgamates, allows queries from eLearning systems.

- *eLearning system* - queries metadata repository, user selects resource, retrieves resource from learning object repository, displays

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Core Components (2)
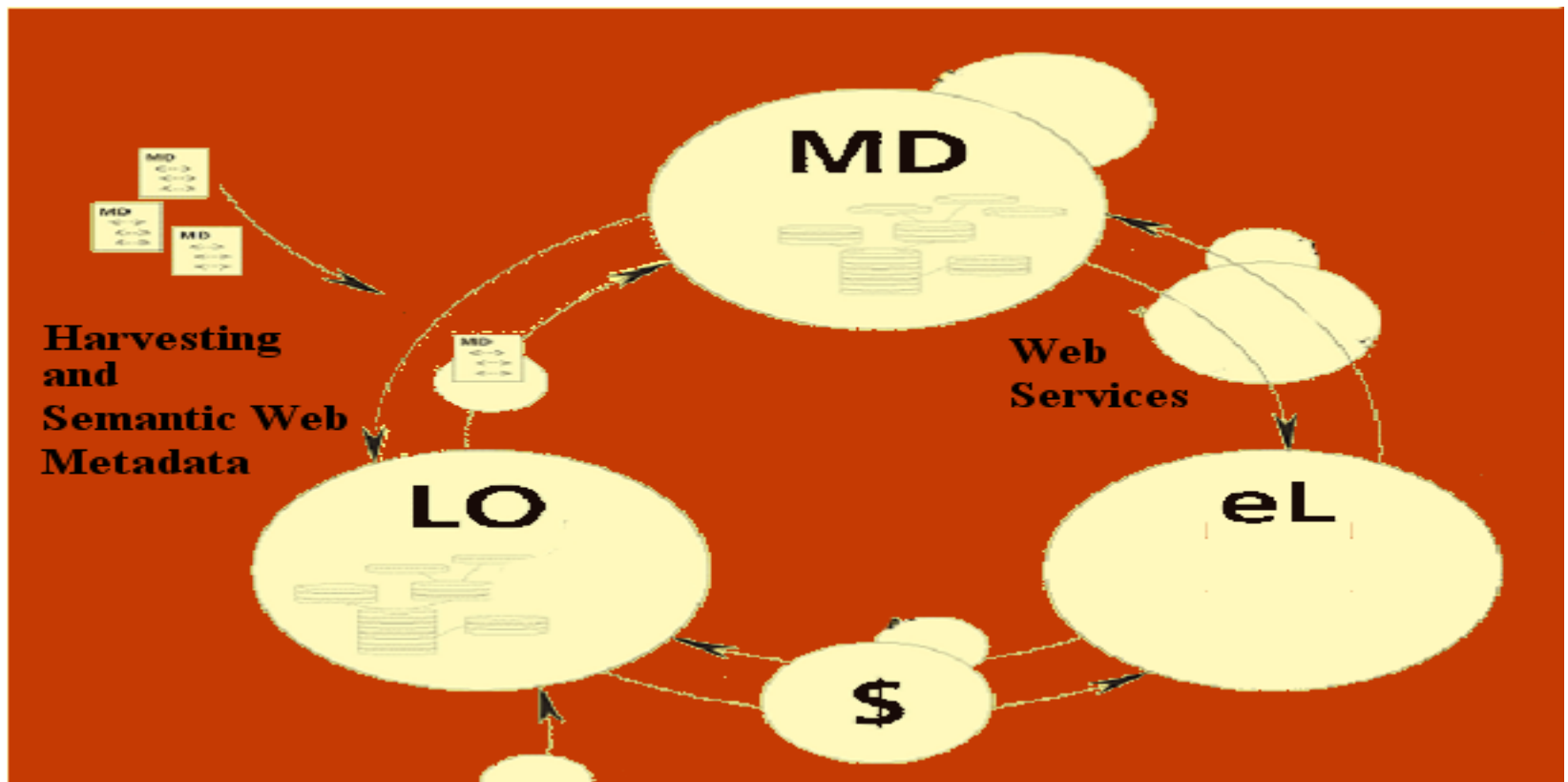
3.7 Contrast to Library Model

- Most implementations view learning objects as though they were books in a library that are acquired, indexed and deployed

- This implementation views learning objects as online services and includes:
    - Learning objects, properly so-called
    - Other academic work, such as journal articles
    - In-person classes and seminars
    - Access to instructors, coaches and tutors

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3.8 Secondary Components

- These include:
  - A system of third-party metadata
  - A digital rights system
  - A learner (user) information system
  - A reporting or tracking system

- Major features:
  - The components are optional: you develop (or buy) them and use them only if you need them
  - For any given component, select one of many instances
  - These components may reside outside your own system

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Resources

- This Paper: http://www.downes.ca/files/canarie.ppt
- The Learning Object Economy – http://www.downes.ca/files/Learning_Object_Economy.htm
- Design and Reusability of Learning Objects in an Academic Context - http://www.downes.ca/files/milan.doc
- EduSource – http://www.edusource.ca/
- Stephen Downes – http://ww.downes.ca

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