

EduSource Vision

Version 3

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1. Overall Definition of Project Goals and Elements

1.1 Overview

The general vision of the eduSource project is focused on the creation of a network of linked and interoperable learning object repositories across Canada. The initial part of this project will be an inventory of ongoing development of the tools, systems, protocols and practices. Consequent to this initial exercise the project will look at defining the components of interoperable framework, the web services that will tie them all together and the protocols necessary to allow other institutions to enter into that framework.

The impetus behind the project was a recognition of a number of exemplary projects that had already created on-line, distributed portals for the education community. The initial research into the creation use of educational object repositories made some useful contributions to the understanding of this new paradigm in educational technology. Although previous projects had informally created a distributed network that allowed the search and retrieval of educational objects between projects and organizations there was no formal discussion of any best practice for the future. A substantial part of the project will be the creation of communication protocols for sharing information as well as publishing the web services so anyone can tap their components into that pool of educational material and services.

This project will also present opportunities for the creation of tools and services directed at the community that is dedicated to the use of educational technology. The ability to connect to ongoing projects and tools will provide a opportunity for dissemination and collaboration among those groups.

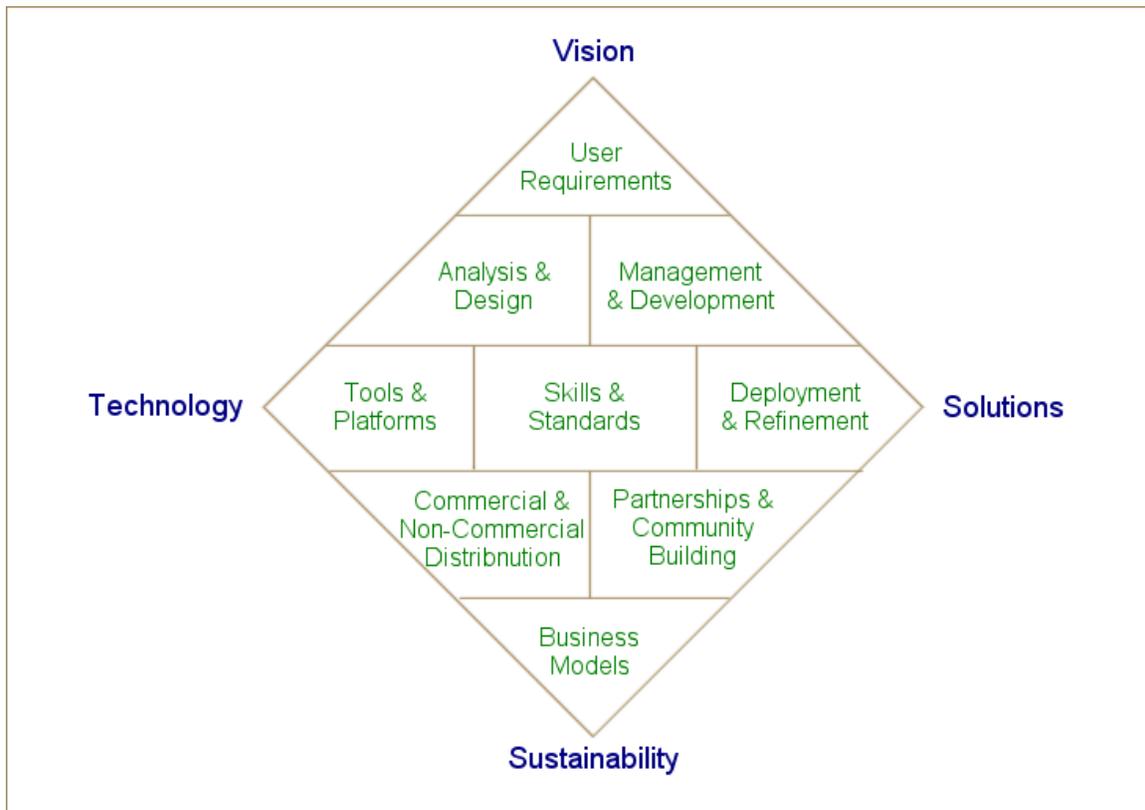
1.2 Framework Introduction

The goal of any framework is to define related concepts and coordinate them in such a way that they work harmoniously. The eduSource project will use a development framework which is generally accepted and current in application development. Many of the precepts within the framework are common sense but by stating them explicitly they will not be overlooked during the development process. The relationship of the elements within the framework is the results of several years of evolutionary development from several real world projects. Creating such a framework for eduSource will maximize the

resources of the project by emphasizing standardization, communication and planning in the development process.

1.3 Framework Elements

The framework is based on a structure that places the elements of vision, technology, solutions and sustainability at different ends of a diamond structure. The structure is broken down into different segments that connect to one another. Each of the segments is referred to as an element. One element is a collection of concepts that are related to one another. All of these concepts are related to one another and are considered essential to the development of a project.



The diamond layout of the framework is designed to emphasize that all elements are related but some elements are more strongly related than others are. It also places four primary factors or factors around the framework. Vision is the users concept of the ultimate solution to a particular problem. Vision must relate to the mission statement of a project. Technology refers to an overall force within an organization. At the tools and platforms level it looks at software tools, networks and servers within an organization. It also includes all other technology such as the Internet. Solutions refer to the ultimate outcome of the project. And Sustainability refers to strategies to ensure the long-term viability of the project.

1.4 Project Groups

This section describes the tasks of the functional groups of the eduSource project. Additionally, a Steering Committee is responsible for overall project management.

Vision group - Vision

- Do a continuous technology watch on norms and standards
- Forward general orientation principles to the steering committee
- Define use case requirements for the development group
- Define the functional architecture taking in account implementation specifications from the development group
- Do first usability tests and propose evaluation process to the communication group (evaluation)
- Propose requirements on business model to communication group
- Insure proper user documentation in relation to communication group

Development group - Technology

- Define the system's architecture taking in account use case requirements and functional architecture
- Select the technologies, protocols, development tools
- Define implementation and deployment specifications
- Develop the DILORN (Distributed Infrastructure for LOR Network)
- Provide functional testing before release
- Write developers' documentation

Communications Group - Solutions

- Coordinate project communications, including conferences and seminars
- Organize deployment strategy
- Obtain feedback and recommendations from potential users
- Develop partnership frameworks for content providers, specialized service providers
- Organized product evaluation

Business Models Group – Sustainability

- Develop frameworks for commercialization of project components
- Development framework for sustainability of open source components, including both software and protocols
- Coordinate the integration of digital rights and other business tools

2. Project Vision (User Requirements)

2.1 National and International Context

The eduSource project falls within the scope of a broader national vision for learning in Canada need to strengthen Canada's capacity for innovation and to improve the level of skills within the Canadian population.

E-learning is an essential element in meeting these challenges, through:

- Improved learning opportunities for all Canadians;
- More effective use of learning resources; and,
- Increased opportunities for reaching new export markets.

This strategy includes the need to achieve the following:

- Ubiquitous broadband networks that provide access to rich e-learning opportunities for all Canadians;
- High-quality e-learning content that is universally available through shared repositories;
- Anytime, anyplace, lifelong learning is facilitated by widely accessible e-learning that supports a civil society;
- International recognition of Canada's excellence in e-learning technologies, expertise and standards-based content.

Central to this is the coordinated effort of various projects and groups. They include many that have been funded and supported by CANARIE. Rather than have multiple projects working, and possibly diverging, the need to synchronize and when necessary harmonize, the activities of these projects is marked as fundamentally important to achieve these goals

The goal is, effectively, access to e-learning for all Canadians and to emerge as an e-learning leader internationally.

The steps to achieve these goals are to include developing a national strategy, researching and writing reports on issues such as DRM, demonstration projects, encourage the use of CA*net4 and the development of content. Specifically, these steps are:

- 1) Develop a pan-Canadian e-learning strategy
- 2) Research and reports on key issues to inform the development of such a strategy
- 3) Portal and repository development
- 4) Encourage and facilitate the use of CA*net 4
- 5) Broad development of learning content for markets

2.2 EduSource Vision

2.2.1 Overview

These design principles are intended to govern the development of an architecture for a distributed learning object repository network. 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.

These principles are in one sense descriptive and in another sense prescriptive. They are descriptive in the sense that they attempt to capture the essential elements of what is likely to be the most successful system for the distribution and use of learning materials on the internet. They are prescriptive in the sense that they are intended to inform the development of such a network.

The model envisioned by these principles, a network model, may be contrasted with what may be called the silo model for the distribution of learning resources. In the silo model, separate repositories – one for each corporation, school district, college system or university – is envisioned. These silos are fed by publishers who, often on the basis of separate licensing agreements, distribute bundles of learning content to be stored in the silo for later use.

While the silo model is suitable for large institutions and clearly defined vertical markets, it creates barriers to the access to learning materials by individuals and small or medium sized enterprises. The silo model also poses a barrier to new or small content vendors, who must negotiate separate contracts with each silo, often against the provisions of previously signed contracts. The silo model therefore increases the cost and restricts the choice of learning materials for all users and especially for small users.

2.2.2 Standards and Standards Compliance

The protocols used by member repositories to communicate with each other and with external systems are described, documented, and freely available to the public at large. The purpose of this principle is to encourage the development of complimentary systems that may interact with and support the functionality of eduSource.

EduSource repositories will use royalty free standards and protocols. The purpose of this is to ensure that there is no *a priori* overhead cost incurred by agencies wishing to offer services compatible with eduSource. Imposing an *a priori* cost immediately poses a barrier to small and medium sized enterprises that may wish to participate and it biases the network toward the provision of commercial content only.

eduSource will, whenever practical, implement and support emerging specifications such as Cancore and support the use of defined and controlled vocabularies so as to increase interoperability and functionality provided to end users searching and retrieving learning objects. All such specifications will however be interpreted by eduSource tools in such a way as to be capable of evolving with changes in specifications. In addition eduSource will support its own and external developers in the deployment of mapping and

translations tools that allow interoperability with legacy and new specifications that are not specifically supported by EduSource tools.

Participation in eduSource and use of eduSource repositories is also based on the principle that the greater the level of consensus that can be achieved, especially concerning semantics, the higher the level of (seamless) interoperability end-users will be able to enjoy. eduSource will strive to achieve a higher level of consensus among core participants where possible, but will not impose it as a condition for entry among all participants.

2.2.3 Infrastructure Layer and Service Layer

The infrastructure layer is the set of software tools that provides end-to-end functionality for eduSource. It is described in the paper *Distributed Learning Object Repository Network Infrastructure Layer* (forthcoming). The set of software tools comprising the infrastructure layer will be developed and distributed as royalty-free open source software. The purpose of this principle is to demonstrate functionality without requiring financial advances, and to provide a base of functional components on which other services and applications may be developed.

Over and above the infrastructure layer it is hoped and anticipated that third parties will develop components with increased functionality, offering an improvement in design or services over and above the functionality provided by the infrastructure layer. Such components may be developed as free and open applications, or they may embody commercial and proprietary components. The purpose of this principle is to enable the development of commercial applications that generate a revenue stream for software developers and service providers.

2.2.4 Distributed Architecture

eduSource is to be designed not as a single software application, but rather, as a set of related components, each of which fulfills a specific function in the network as a whole. This enables users of eduSource to employ only those tools or services that suit their need, without requiring that they invest in the entire system. It also allows for distributed functionality; an eduSource user may rely on a third party to provide services to users. The purpose of this principle is to allow for specialization. Additionally, it allows eduSource users to exercise choice in any of a variety of models and configurations.

Any given software tool provided by eduSource may be replicated and offered as an independent service. Thus, it is anticipated that there will be multiple instances of each type of repository in the network. The purpose of this principle is to provide robustness. Additionally, it is to ensure that no single service provider or software developer may exercise control over the network by creating a bottleneck through which all activities must pass.

2.2.5 An Open Marketplace

Any provider of learning materials may prepare and distribute learning materials through the eduSource repository network. eduSource will support the registration and indexing of various providers, this registration will be free and optional. The purpose of this principle is to ensure that providers are not faced with *a priori* ‘membership fees’ or similar tariffs in order to gain access to potential purchasers. This does not preclude restrictions, tariffs or controls on specific instances of an eduSource-compliant repository. However, in any case where a restricted component, such as a for-profit metadata repository, exists, an equivalent unrestricted component, such as a public metadata repository, will also exist.

There will be no prior restraint imposed on the distribution model selected by participants in eduSource. Specifically, eduSource will accommodate free content distribution, co-op or shared content distribution, and commercial fee-based content distribution. The purpose of this principle is to ensure fair and open competition between different types of business models, to ensure that users are not ‘locked in’ to the offerings provided by certain vendors, to provide the widest possible range of content options, and to ensure that prices charged for learning content most accurately reflect the true market value of that content.

Multiple parties may provide metadata describing a given learning resource. There is no prior restraint exercised by providers of learning materials on evaluations, appraisals, comments and other descriptions of their learning material. The purpose of third party metadata may be to provide alternative classification schemes, to indicate certification compliance, or to provide independent assessments and evaluations of learning resources. The purpose of this principle is to ensure that potential users of learning resources can obtain and input multiple descriptions of that material. It is also to create an environment for the creation of optional but value-added third party services for which fees or other costs may be charged.

eduSource should be considered as an implementation of and an extension of the semantic web. This means that metadata and services provided by eduSource repositories should be available to the semantic web as a whole. It also means that eduSource repositories and tools can and should incorporate elements of the semantic web, such as sector-specific ontologies, into its own design. The purpose of this principle is to ensure that eduSource is capable of the widest reach possible. It is also to reduce the duplication of effort between developers working in specific domains and educators working in the same domain.

2.2.6 Open Rights Management

The principle behind fee-based and subscription-based transactions is that it should be easier to buy material than to steal it. Thus where possible, the acquisition of rights and

the exchange of funds will be automated. The purpose of this principle is to reduce transaction and clearance costs for purchasers of learning materials.

In addition, the structure of DRM within the network should be such as to allow for multiple digital rights models. For example, it should be possible for a government or agency to distribute free materials, for a college association to establish a cooperative system for sharing, and for a commercial provider to sell content on a per-view or subscription based model. Individual learners should have the option to access and, if necessary, purchase materials directly, or they should be able to obtain access to materials through their school board, provincial learning ministry, or employer.

Thus there is no single rights agency governing all transactions. A given provider of learning materials will work with one of many brokers who sell to multiple purchasers, and a given user may use one of many agents who conduct transactions with multiple vendors. Vendors and users may select from any number of brokering services, so that no single transaction agent controls the network. Vendors and purchasers may act as their own brokers. A vendor or purchaser may elect to employ multiple brokers. Brokers acting on behalf of, say, a provincial department of education, may represent a given population, such as the students of that province. The purpose of this provision is to eliminate the need for the creation of multiple accounts, to allow users to use resources from multiple vendors, and to provide a choice of brokers, and therefore a greater likelihood of trust.

In addition to describing digital rights on behalf of content providers, the network should assert individual rights and preferences on behalf of users. Users of the system own their own personal data. Brokers within the network may operate on behalf of the user, and release information or money only with the user's explicit consent. The purpose of this principle is to engender trust in the system and to ensure privacy when dealing with multiple agencies.

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