The iJournal

iVal: An Information Evaluation Framework for Knowledge Workers

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Abstract

An exploratory review of the literature on information auditing methods revealed that the information audit literature offered little guidance for scoping an audit project, using context-appropriate tools, or measuring information quality. Following that review, iVal was developed as an adaptable information audit framework which can be easily used for information auditing and quality control by not only information professionals, but also by a broader audience of all knowledge workers. This paper describes the research and practical background of iVal's development, then outlines usage instructions for each of the framework's five modules. The paper stresses the need for a combination of consultation, cataloguing, modelling, quality measurement, and analysis tools in modern information audit practice. The paper suggests that the iVal and other audit frameworks may benefit from future research into quality dimensions, the creation of contingency and maturity models, and the adoption of advanced measurement techniques.

Keywords

Information Audit, Information Management, Information Quality, Evaluation Framework, Literature Review

1. Introduction

Any knowledge worker should be able to easily leverage a simple set of tools to help them manage, evaluate, and make quality judgments about the information they work with on a daily basis. The Information Evaluation (iVal) Framework aims to provide knowledge workers with that set of essential evaluation tools, empowering every knowledge worker to act as an evaluator. The iVal Framework draws methods and theories from academic and trade literature in the domains of information management, information systems analysis, information architecture, and knowledge organization, then adapts and synthesizes those methods and theories into a unified, generalizable framework.

The iVal Framework consists of five modules and seven tools, illustrated in Figure 1.1. When the iVal Framework's modules and tools are used together in a specific sequence, the framework enables a holistic evaluation of an organization's information assets. However, the iVal Framework is highly customizable, and different modules and tools can be adopted inter-

changeably to fit the specific needs of a given evaluation project.

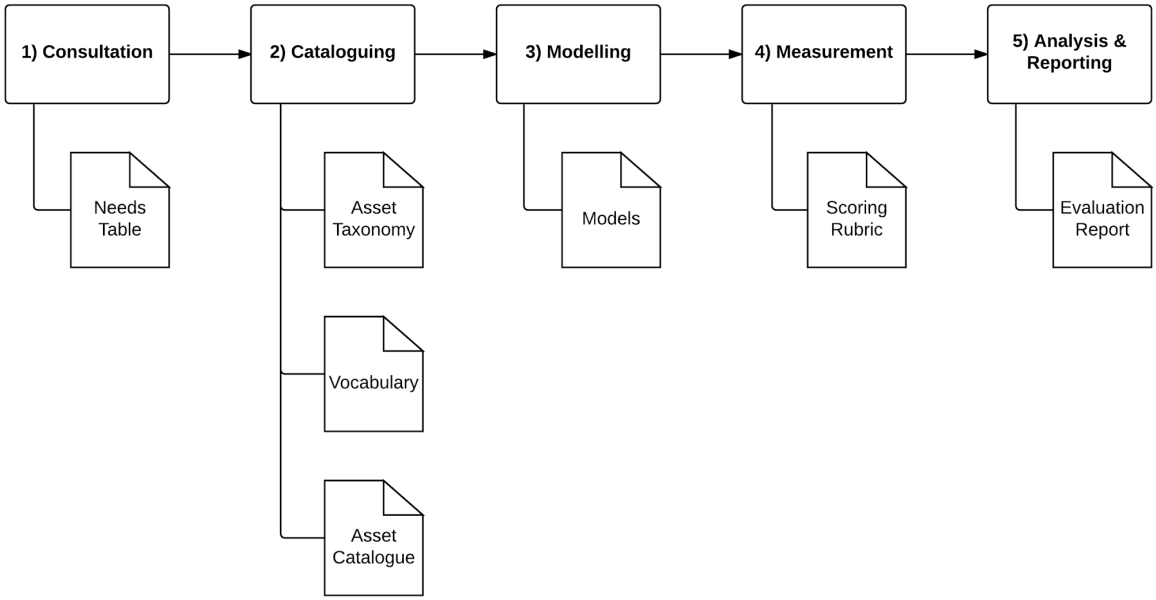

Figure 1.1: The five modules and seven tools of the iVal Framework. Each module is associated with one tool other than the cataloguing module, which is associated with three tools.

This paper will first discuss the research and development process backing the iVal Framework. The nature of each of the five modules and seven tools will then be described, and instructions for using each of the modules and tools will be outlined with reference to a real-world pilot test of the iVal Framework that took place from January to April 2016 at the Legislative Assembly of Ontario. Finally, future directions for the development of the iVal Framework will be discussed.

2. Background

Development Goals

The iVal Framework was developed on two fronts: through a reading course involving a systematic literature review, and through a pilot testing and refinement of the framework performed at the Legislative Assembly of Ontario as part of a practicum project. There were four goals in developing the iVal Framework which were accomplished through the reading course and practicum: 1) Review and synthesize methods of information auditing, 2) Review and synthesize methods of evaluating information quality and information management, 3) Design a simple, generalizable, and modular evaluation framework that any knowledge worker can easily use, and 4) Pilot test the framework.

Literature Review

Literature on the concept and practice of information auditing formed the methodological foundation of the iVal Framework. Buchanan and Gibb (2007) define the information audit as a "holistic approach to identifying and evaluating an organization's information resources and information flow" (p. 171). Observing this definition, the iVal Framework can be described essentially as an information audit framework. However, as Griffiths (2012) notes, the word "audit" is often suggestive of a process of "witch-hunting to reveal offences and offenders in information handling and management" (p. 44). Although iVal was envisioned as a tool that could potentially be used to enforce compliance and accountability, the language of evaluation has a more constructive connotation of analyzing and improving information use, rather than seeking to weed out bad information handlers. It was therefore decided that although the iVal Framework should be an extension of the information audit literature, it should seek to reframe the practice of information auditing in a more broadly applicable and positive light.

The initial review of the information audit literature covered foundational works on the information audit such as Burk and Horton (1998), Buchanan and Gibb (1998), Orna (1999), Henczel (2001), and Orna (2004). The initial review quickly revealed four major

shortcomings in the literature:

1)There was minimal guidance for scoping an audit project and sampling a set of assets to be evaluated.

2)There was minimal guidance for using mod elling techniques to map out information flows and improve the quality of analysis.

3)There were few applications or case of information audit methods.

4)There was minimal guidance for quality mea surement, evaluation, maturity modelling, benchmarking techniques in the domain of formation auditing.

The first two shortcomings could be corrected in the iVal Framework by applying knowledge acquired from previous MI research to the development of the iVal Framework, but the latter two shortcomings required a more systematic review of the literature in order to investigate further.

To that end, a systematic literature review methodology was created by adapting and merging the literature review guidelines of vom Brocke et al. (2009), the concept matrix tool of Webster and Watson (2002), and the literature search process of Kowalczyk, Buxmann, and Besier (2013). Two structured queries were then created and entered into the search engines of Scopus and ProQuest in an attempt to answer three research questions:

RQ1: What recent research (from 2011-2016) has been done on IA?

RQ2: What recent research (from 2011-2016) has been done on quality, evaluation, measure ment, and maturity in the context of informa tion management?

RQ3: In the future, how might IA researchers and practitioners synthesize the recent re search on IA with the recent research on infor mation management quality, evaluation, mea surement, and maturity?

Using a set of inclusion criteria, the results of the literature search were filtered first based on an analysis of their titles and abstracts, then based on an analysis of their full text. This phased approach to filtering ensured that only the articles best suited to answer the research questions were analyzed and discussed in detail. Each of the articles remaining after the full text analysis then had their research and conceptual foci recorded in a concept matrix (a sample of which can found in Figure 2.1) to facilitate analysis and synthesis of the literature. A data flow diagram of the full literature search process can be found in Figure 2.2.

Year	Author(s)	Focus	Information Audit	IM Quality	Information Quality	Measurement/Evaluation	Maturity/Benchmarking
2016	Carvalho & Esteban-Navarro	Outcomes, Methods	x				
2015	Ayyash	Theories			x		
2014	Fraser-Arnott	Theories	x	x			
2014	Ariffin et al.	Methods, Application	x				
2014	Shamel	Theories, Methods, Application	x			x	
2014	Sheriff et al.	Outcomes, Theories		x		x	x
2014	Chuah	Theories			x		x
2014	Hunawan & Suhardi	Theories, Methods			x	x	x
2014	Bastos et al.	Theories, Methods, Application			x	x	

Figure 2.1: Sample selection of entries from the concept matrix used in the literature review.

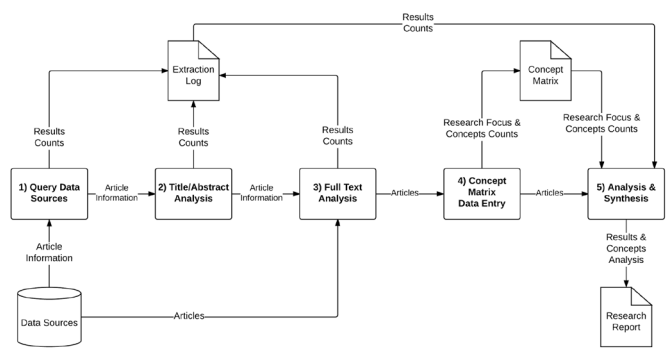

Figure 2.2: The literature search process that was used to conduct the literature review.

The initial literature search resulted in 997 results being returned. Of those, 40 remained after title/abstract analysis, and 22 remained after full text analysis. After analyzing the final 22 articles in detail, four future directions for future IA research were proposed:

Direction 1: Pursue contingency models with different sets of IA methods and tools for different use scenarios, rather than pursuing a single standardized IA methodology.

Direction 2: Explore the relationship between IA and quality dimensions in more detail.

Direction 3: Apply more foundational IA methodologies in full to case studies.

Direction 4: Develop theories of IA maturity and IA maturity models.

In addition, three recommendations for IA practitioners were proposed:

Recommendation 1: Measurement and evaluation of information management quality and information quality are necessary parts of an information audit and should usually be included in audit frameworks.

Recommendation 2: Use more mapping and modelling techniques as part of an information audit to visually represent information resources and information flows.

Recommendation 3: Document and publish more applications of IA methods.

Direction 2 had an immediate influence on the current state of the iVal Framework—by prescribing a measurement module and quantitative tools for quality control, the iVal Framework exceeds the capabilities of other existing IA methodologies. Recommendations 1 and 2 also had an immediate influence on the current state of the iVal Framework and the framework's pilot test. Directions 1, 2, and 4 will influence the iVal Framework in the future as it continues to be developed through further research and testing.

Pilot Test

As the literature review was being performed, a pilot test of the iVal Framework's consultation, cataloguing, modelling, and analysis and reporting modules was also carried out by evaluating the Legislative Assembly of Ontario's intranet site. Through the knowledge gained between the literature review and pilot test, the overall structure of the iVal Framework and the functionality of most of its individual modules and tools were validated and refined. Because of the pilot test, the nature of each of the modules and tools could be formally defined, and generalized instructions for their use could be reverse engineered based on the manner in which the modules and tools were used in the pilot test.

3. The Consultation Module

Needs Assessment

Generally, the first step in an evaluation project should be gathering needs from the stakeholders who stand to benefit from the evaluation. Two kinds of needs should be assessed: the day-to-day information needs that stakeholders require in order to perform their jobs, and the evaluation needs that stakeholders would like to see the evaluator satisfy so that they can improve the information they work with. The central tool of the consultation process is the needs table, the template of which can be found in Figure 3.1.

Stakeholder	Information Needs	Evaluation Needs
Stakeholder 1		
Stakeholder 2		
Stakeholder 3		
...		

Figure 3.1: Template of the needs table.

Once the information and evaluation needs of each stakeholders have been defined, it should be possible to determine the goals of the evaluation, the timeline for the evaluation project, and a broad scope of which information assets will be included in the evaluation.

Information Assets

The basic unit of analysis in the iVal Framework is an information asset. The iVal Framework prescribes three core information asset classes:

1)Information Resources: This class of information asset has a specific purpose and ends an information seeking journey when it is successfully used, fulfilling its purpose. Examples include physical or digital documents, reports, books, and webpages.

2)Information Repositories: This class of information asset is navigated through in order to locate an information resource—the reposito-

ries contain resources or sub-repositories, and are not ends to an information seeking journey in themselves. Examples include databases, filing cabinets, and web portals.

3)Information Systems: This class of information asset is an interconnected collection of repositories which together serve a purpose that could not be fulfilled by any one repository alone. Examples include websites, intranet sites, and filing systems.

The distinction between information repositories and systems can sometimes be ambiguous. For example, a shared drive could be understood as either a repository or a system depending on the size and scale of the shared drive, and the classification preference of the evaluator. It is important to delineate a boundary between each asset class with reference to examples before the evaluation project begins. The evaluator can do this on their own, or in consultation with evaluation stakeholders.

4. The Cataloguing Module

Taxonomy

With the goals, needs, and broad scope of the evaluation identified, the scope of the evaluation can be defined in greater detail. The easiest way to comprehensively outline the scope of the evaluation is by creating a taxonomy of all of the information assets that were initially identified as within-scope in the consultation phase. As an organizational tool, the taxonomy paves the way for the use of a vocabulary and an asset catalogue, the cataloguing module's two other tools.

A good taxonomy will list all of the information assets which will be evaluated, assign a unique identifier to each asset, and position each asset within a hierarchy according to a classification scheme. For an example of such a taxonomy, see Figure 4.1, the taxonomy which was created as part of the pilot test of the iVal Framework at the Legislative Assembly of Ontario. Although the taxonomy only contains assets contained within one system (the Assembly's intranet system), the hierarchy of information repositories, sub-repositories, and resources is clearly visible. In this taxonomy's classification scheme, RP and RE are used to identify repositories and resources, and a forward slash (\) is used to divide repository and resource identifiers so that each resource identifier is anchored to its parent repository's identifier. The classification scheme can be changed to fit the needs of any evaluation project.

RP5 Policy Portal
RE5\1 Policy Pages

RP6 Clerk's Office Portal
RE6\1 Description of Clerk's Office
RE6\2 Clerk's Office Contact Information
RE6\3 Clerk's Office News
RE6\4 Links to Clerk's Office Staff Profiles
RE6\5 Links to Records Management Documents

RP7 Administrative Services Portal
RE7\1 Description of Administrative Services Office
RE7\2 Administrative Services Office Contact Information
RE7\3 Administrative Services Office News
RE7\4 Links to Records Management Documents

RP7.1 Financial Services Portal
RE7.1\1 Description of Financial Services Office
RE7.1\2 Financial Services Office Contact Information
RE7.1\3 Financial Services Office News
RE7.1\4 Link to Policy Portal
RE7.1\5 Financial Services Quicklinks
RE7.1\6 Links to Records Management Documents
RE7.1\10 Financial Services Staff List

RP7.2 Human Resources Portal
RE7.2\1 Description of Human Resources Office
RE7.2\2 Human Resources Office Contact Information

Figure 4.1: A sample group of repositories and resources from the taxonomy which was constructed as part of the iVal Framework's pilot test.

When completed, the taxonomy should function as a list of all of the information assets which will be analyzed in more detail as part of the evaluation project. Any assets not documented in the taxonomy should be considered outside of the project's initial scope.

Vocabulary

The iVal Framework's vocabulary tool has four functions: 1) It explains the taxonomy's classification scheme, 2) It profiles the asset properties to be catalogued, 3) It profiles asset typologies, and 4) It defines key abbreviations. Figure 4.2 illustrates an example of a classification scheme explanation, taken from the pilot test's vocabulary.

Classification Scheme

Term	Explanation
RP1.1	The ID of a repository (e.g. RP1) or sub-repository (e.g. RP1.1)
RE1.1\1	The ID repository or sub-repository (e.g. 1.1\) that a resource is contained within (e.g. RE1.1\1 is the first resource in RP1.1)
Resource	A document, record, file, or other physical or digital object which, when accessed by a user seeking it, completes their information seeking journey and fulfills the resource's purpose.
Repository	A database, directory, portal, or other collection of information resources which users must navigate through in order to find the specific information resource they are seeking.
Asset	Any information resource, repository, or system which has a specific purpose and enables users to move through an information seeking journey.

Figure 4.2: An example of a classification scheme explanation from the pilot test.

The properties profile should define and explain every property that will be catalogued once the assets listed in the taxonomy are analyzed in more detail. An example of a properties profile from the iVal Framework's pilot test can be seen in Figure 4.3. The pilot test was focused on issues of information ownership and stewardship, as well as the successful use factors and criticality of information, and so the properties appearing in the profile reflect the goals of the pilot test.

Property	Explanation
ID	A unique identifier for the asset
Resource / Repository /Stakeholder Name	A descriptive name for the asset
Resource / Repository Type	The characterizing feature of the resource or repository, in accordance with the "Resource Types" and "Repository Types" sections of this vocabulary
Creator(s)	The stakeholder(s) who initially created the asset
Owner(s)	The stakeholder(s) with the authority to maintain, destroy, or delegate stewardship responsibility for an asset
Steward(s)	The stakeholder(s) responsible for maintaining the asset, often under the authority of a different Owner
Intended User(s)	The end user(s) of the asset, as intended by the creator(s) and/or owner(s)
Successful Use Factor(s)	The condition(s) under which a user will have successfully used the asset, fulfilling the intended purpose of the asset
Criticality	The importance of the asset to overall intranet use, judged by the uniqueness, volume, and use frequency of the asset's content
Accessibility Compliance	Whether or not the asset is AODA-compliant

Figure 4.3: An example of a properties profile from the pilot test.

The vocabulary should also propose typologies wherever a particular asset property can be one or more of multiple types. The example in Figure 4.4 depicts a resource typology for the "Resource / Repository Type" property found in Figure 4.3's properties profile. The resource and repository typologies in Figure 4.4 define and explain all of the potential values that the "Resource Type" or "Repository Type" property of a resource/repository could potentially have once catalogued. Controlling the catalogue's vocabulary by using asset typologies such as this will lead to a more focused analysis in later stages of the evaluation.

Resource Types

Term	Explanation
Webpage(s)	A unique page or set of pages on the intranet site.
Page Element(s)	A part of a unique page or set of pages on the intranet site.
Internal Link(s)	A link or set of links which lead to other pages or documents on the intranet site.
External Link(s)	A link or set of links which lead to pages or documents on another system's site or on the Internet.
Document(s)	A unique and usually downloadable document or set of documents in a specific file format.
Interactive Webpage(s)	A unique page or set of pages with unconventional navigation schemes.

Repository Types

Term	Explanation
Directory	A repository which links to unique information resources, but does not contain any information resources of its own.
Collection	A repository which contains unique information resources.
Portal	A repository which both contains unique information resources and links to information resources which it does not contain.

Figure 4.4: An example of a resource typology and a repository typology from the pilot test.

If abbreviations will frequently be used in the catalogue (e.g. for department names, people's names, system names), the vocabulary should also provide a guide outlining what each abbreviation stands for.

Asset Catalogue

The asset catalogue is a structured inventory of the evaluation project's within-scope information assets and the properties of those assets. The catalogue is a large table of information assets which is sorted in accordance with the taxonomy's classification scheme and with columns corresponding to the profiled properties. Each information asset is listed in the catalogue, and each asset has its properties analyzed and recorded. It is easiest to construct the catalogue in an Excel workbook with one sheet for each asset class and one sheet for the vocabulary, or as an Access database with one table for each asset class and one table for the vocabulary. Figure 4.5 shows a sample repositories table, taken from part of the asset catalogue that was constructed during the iVal Framework's pilot test.

ID	Repository Name	Repository Type	Owner(s)	Steward(s)	Intended User(s)
RP1	Home Portal	Portal	?	[redacted]	OLA
RP2	Phone Book	Collection	TS	[redacted]	OLA
RP3	Topics Index	Directory	?	[redacted]	OLA
RP4	Forms Index	Directory	?	[redacted]	OLA
RP5	Policy Portal	Portal	Clerk's Office	[redacted]	OLA
RP6	Clerk's Office Portal	Portal	Clerk's Office	[redacted]	OLA, Clerk's Office
RP7	Administrative Services Portal	Portal	AS	[redacted]	OLA, AS
RP7.1	Financial Services Portal	Portal	FS	[redacted]	OLA, FS
RP7.2	Human Resources Portal	Portal	HR	[redacted]	OLA, HR
RP7.2.1	Health Services Portal	Portal	HS	[redacted]	OLA, HS
RP7.2.2	LAO Management Centre Portal	Portal	HR	[redacted]	OLA Managers, HR
RP7.3	Purchasing & Operations Portal	Portal	P&O	[redacted]	OLA, P&O
RP8	iDivision Portal	Portal	DWC	[redacted]	OLA, iDivision
RP8.1	Information Services Portal	Portal	DWC	[redacted]	OLA, IS
RP8.1.1	Records & Document Management Portal	Portal	RDM	[redacted]	OLA, RDM
RP8.2	Legislative Library & Research Services Portal	Portal	LLRS	[redacted]	OLA, LLRS
RP8.2.1	Issue Binders & Research Papers Pages	Directory	LLRS	[redacted]	OLA, MPPs, MPP Offices, Caucuses
RP8.2.2	Research Tools Index	Directory	LLRS	[redacted]	OLA, MPPs, MPP Offices, Caucuses
RP8.2.3	Riding Profiles Portal	Portal	LLRS	[redacted]	OLA, MPPs, MPP Offices, Caucuses
RP8.2.4	Parliament & Politics Index	Directory	LLRS	[redacted]	OLA, MPPs, MPP Offices, Caucuses
RP8.2.5	Press Releases Index	Directory (Inactive)		[redacted]	OLA, MPPs, MPP Offices, Caucuses
RP8.3	Portfolio Management Office Portal	Portal	PMO	[redacted]	OLA, OLA Senior Managers

Figure 4.5: A sample group of repositories as they appear in the asset catalogue that was constructed as part of the pilot test. Note that properties from the properties table (Figure 4.3) appear as columns, and all of the values in the "Repository Type" column were predefined in the repository typology (Figure 4.4).

Once completed, the asset catalogue should offer users insights into any information asset at a glance. The ability to re-sort the catalogue based on property values also makes it easier to analyze specific subsets of the catalogue at later stages of evaluation.

5. The Modelling Module

Resource, Process, & Strategic Perspectives

In discussing methods and approaches to the information audit, Buchanan and Gibb (2007) propose that an information audit can be viewed from a resource

perspective, process perspective, or strategic perspective. In the resource perspective, information resources are catalogued and form the center of analysis. In the process perspective, information flows are mapped out and form the center of analysis. In the strategic perspective, the information strategy which connects the organizational mission, strategic objectives and operational goals to information resources and flows forms the center of analysis.

By representing each perspective with a particular modelling technique, the iVal Framework is capable of modelling information resources, flows, and strategies from across all three perspectives. Modelling techniques can be used as needed to fit the analysis goals of a given project, though the use of all of the techniques included in the modelling module will generate the most complete insights in any use scenario.

Resource Modelling

If the asset catalogue was previously constructed as part of the cataloguing module, then the catalogue itself already serves as a high-detail model of all of the information assets and asset hierarchies within the project's scope. Entity-relationship diagrams could also be used to visualize the logical links between different assets or subsets of assets.

Process Modelling

Information flows can be modelled using data flow diagramming techniques. Figure 5.1 is an example of an information flow model taken from the iVal Framework's pilot test. Figure 5.1 depicts a network of three work processes, three actors, one information repository, and nine information flows through which intranet content creation and use occurs. Rather than mapping out information resource or information flow, it is vital in process modelling to identify key assets, key actors, and key actor-asset relationships before beginning with modelling. Modelling can then be focused in on key areas of the information ecosystem.

Strategic Modelling

The linkages between key information assets, operational goals, strategic objectives, and organizational missions can be mapped out by using one or more goal alignment models. The goal alignment modelling technique used as part of the iVal Framework is adapted and simplified from Buchanan and Gibb's (2007, p. 169) conceptual breakdown of the information audit's strategic perspective. Figure 5.2 illustrates a prototypical goal alignment model with key repositories and resources nested under system goals, which are nested under system objectives, information strategies, and an organizational mission. Figure 5.3 depicts the goal alignment model that was created as part of the pilot test of the iVal Framework. If goals, objective, strategies, or missions are not explicitly stated (as was often the case in the pilot test), they should be inferred by the evaluator by analyzing patterns in the intended uses of information assets.

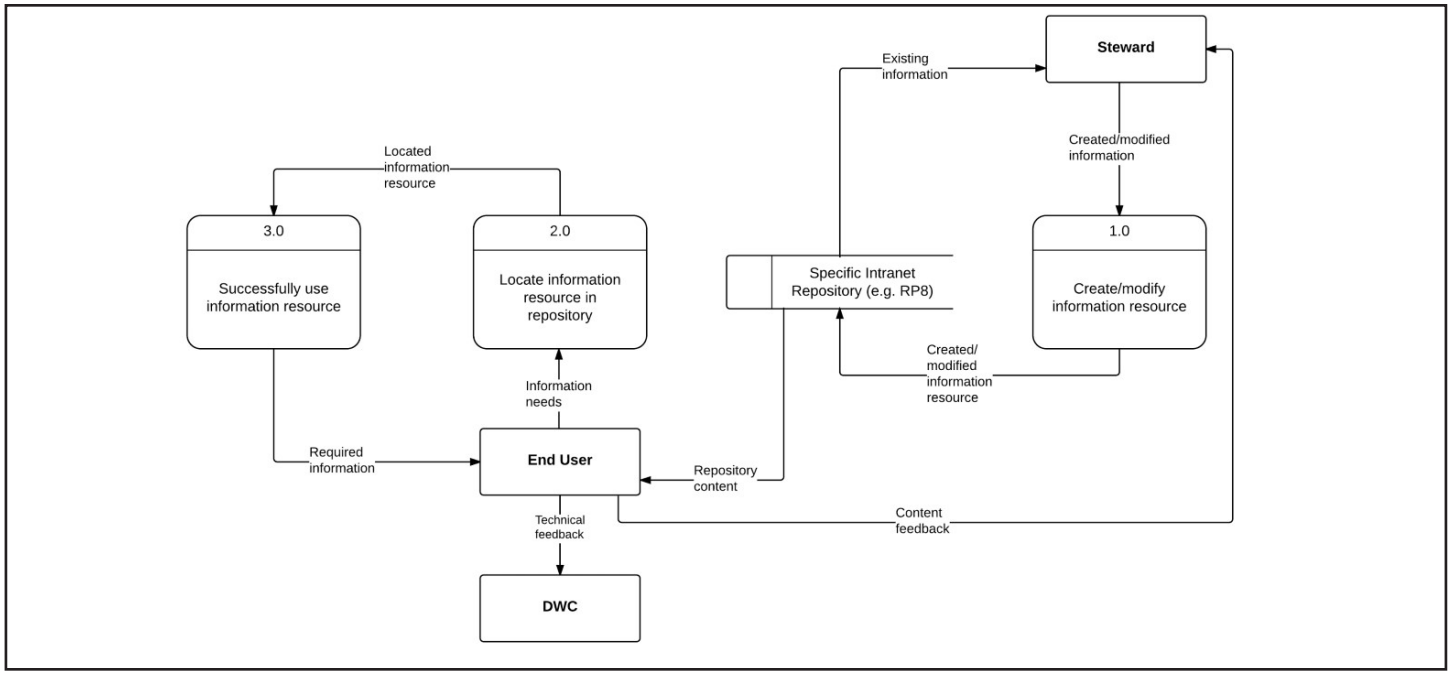

Figure 5.1: Information flow model of the intranet content creation process, created as part of the iVal Framework's pilot test.

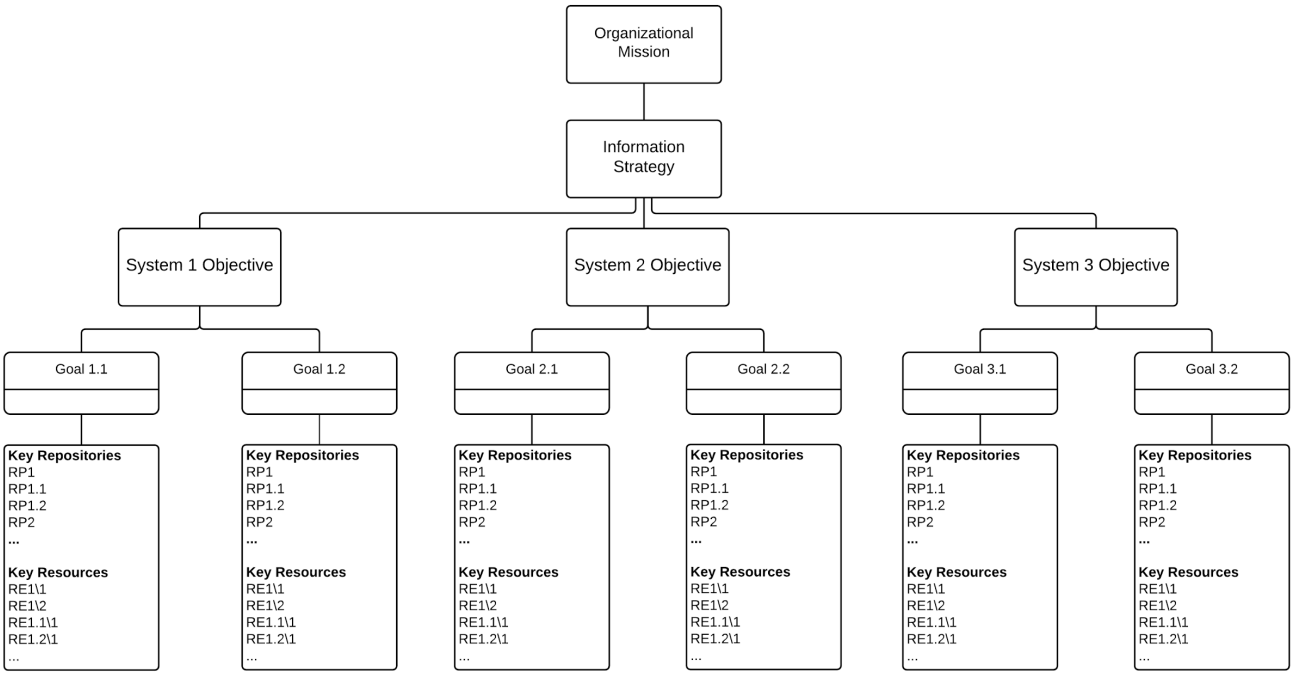

Figure 5.2: Prototypical goal alignment model.

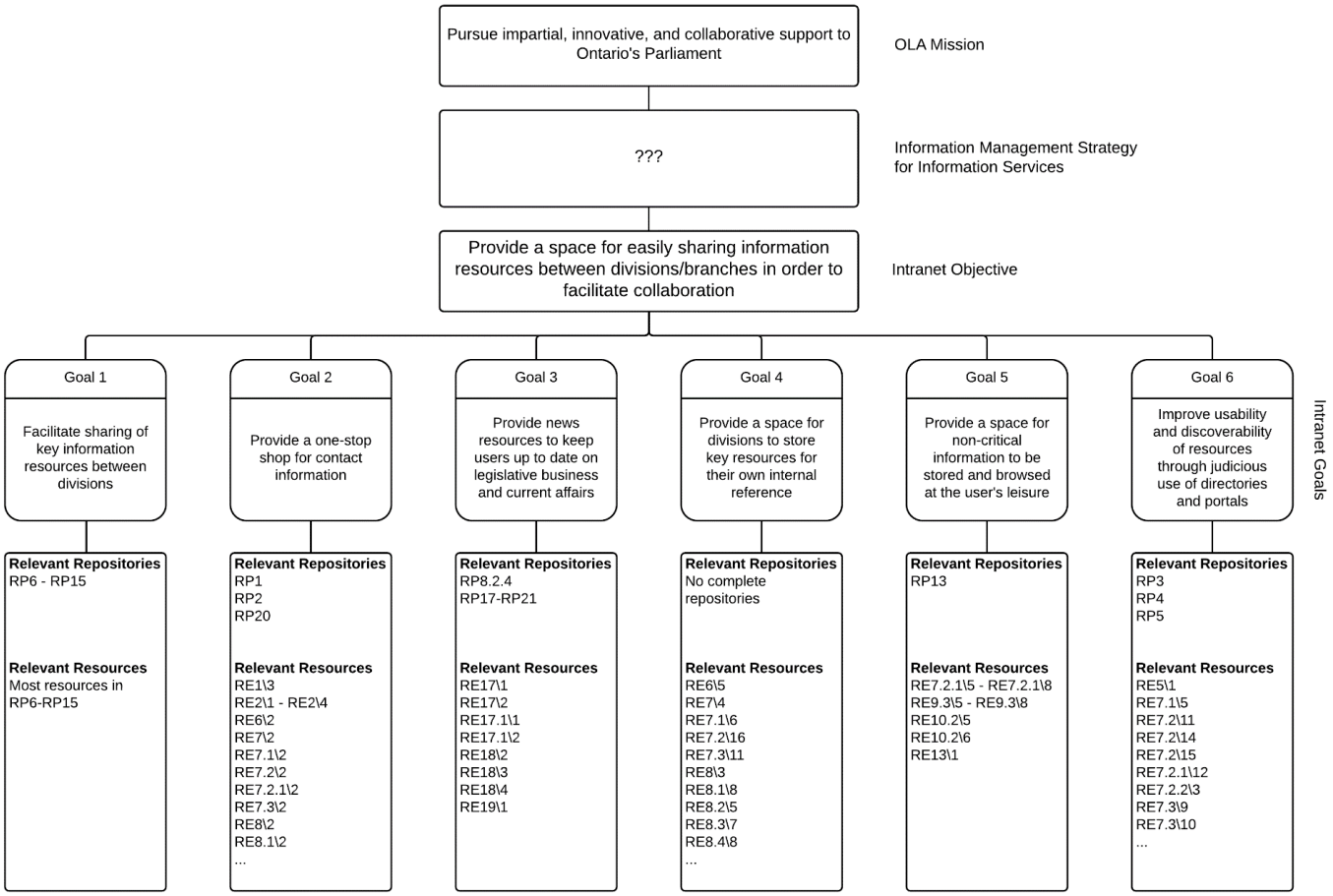

Figure 5.3: Goal alignment created as part of the iVal Framework's pilot test. Goals and the intranet objective were not formally stated, and were inferred through analysis instead

6. The Measurement Module

The iVal Quality Index

The basis of the iVal Framework's measurement module is a quantitative index called the iVal Quality Index (IVQ Index). At present, however, the measurement module and IVQ Index remain incomplete. The measurement module and the IVQ Index were not developed at the time of the iVal Framework's pilot test. A separate pilot test will need to be pursued in the future in order to validate and refine the IVQ Index and its measures once their theoretical basis has been matured through further research.

In its finished state, the IVQ Index will allow evaluators to exercise and ensure quality control over information use. The IVQ Index will be an aggregate of three sub-indices: the information quality (IQ) index, information architecture quality (IAQ) index, and information management quality (IMQ) index. Each sub-index will be composed of multiple quality composite measures which relate to specific asset classes and user-asset interaction processes identified in previous steps of the evaluation: IQ measures relate to the quality of information resources; IAQ measures relate to the quality of information repositories and information systems; IMQ measures relate to the quality of information flow in user-asset interaction processes.

The Scoring Rubric

The scoring rubric is the central tool of the measurement module. As shown in Figure 6.1, the scoring rubric template provides a high-level visualization of all of the sub-indices and composites which collectively form the IVQ Index, as well as the formulas used to calculate the value of composite measures and indices.

The scoring process used to measure the quality of each resource, repository, system, or interaction process can be approached in one of two ways: key assets and processes can be singled out for measurement in the scoring rubric, or if an asset catalogue was constructed earlier in the evaluation process, measurements for assets and processes can first be recorded in the catalogue, and then composite and index values can be recorded in the scoring rubric. Either way, the goal of scoring is to systematically record the quality of every asset and process or a subset of assets and processes. More specific guidance on how to interpret and measure the quality of an asset or process will be offered in the following sections.

The Information Quality Index

The IQ index is composed of five composite of quality measures, each representing a unique type of information quality as described by Floridi (2013). Each composite is the average of each of the individual metrics of every information resource with regard to one of the five quality measures, expressed as a percentage. Individual IQ metrics of an information resource are placed on a 1-5 scale, with 1 being extremely low quality and 5 being extremely high quality. To ensure consistency in measurement, the evaluator must determine what in their mind constitutes a score of 1, 2, 3, 4, or 5 for each type of quality measure before measurement begins.

The five quality measures of the IQ Index are:

1)Usability: How easy it is to use the resource in order to retrieve information from it.

2)Accuracy: How correct the information is, and how up-to-date it is in the case of resources that contain dynamic or time-sensitive facts.

3)Relevancy: How well-suited the resource is for the repository that contains it, in relation to the purpose of the repository and the nature of other resources in the repository.

4)Completeness: How fully the resource fulfills its purported or implicit purpose when used.

5)Security: How well protected the resource is from unauthorized or unnecessary access.

Figure 6.2 shows a hypothetical example in which each of the information quality metrics are recorded within an asset catalogue. Note that if desired, it is also possible to calculate an averaged information quality metric for every resource. The value of the IQ Index will always be equal to both the average information quality metric of every resource expressed as a percentage or the average of the five IQ composite measures, expressed as a percentage. At present, the IQ Index is complete, but requires practical testing in order to be validated and refined.

Index/Composite/Metric Name	*Value*
iVal Quality Index (IVQI)	**Average of IQI, IAQI, and IMQI**
Information Quality Index (IQI)	Average of UC, AC, RC, CC1, and SC1
Usability Composite (UC)	Average of all usability metrics, expressed as % of 100
Usability metric for resource 1	1-5
Usability metric for resource 2	1-5
...	1-5
Accuracy Composite (AC)	Average of all accuracy metrics, expressed as % of 100
Accuracy metrics for resources 1, 2, 3, etc.	1-5
Relevancy Composite (RC)	Average of all relevancy metrics, expressed as % of 100
Relevancy metrics for resources 1, 2, 3, etc.	1-5
Completeness Composite (CC1)	Average of all completeness metrics, expressed as % of 100
Completeness metrics for resources 1, 2, 3, etc.	1-5
Security Composite (SC1)	Average of all security metrics, expressed as % of 100
Security metrics for resources 1, 2, 3, etc.	1-5
Information Architecture Quality Index (IAQI)	Average of OC, SC2, and CC2
Organization Composite (OC)	Average of all organization metrics, expressed as % of 100
Organization metric for repository/system 1	1-5
Organization metric for repository/system 2	1-5
...	1-5
Searchability Composite (SC2)	Average of all searchability metrics, expressed as % of 100
Searchability metrics for repos/systems 1, 2, 3, etc.	1-5
Completeness Composite (CC2)	Average of all completeness metrics, expressed as % of 100
Completeness metrics for repos/systems 1, 2, 3, etc.	1-5
Information Management Quality Index (IMQI)	Average of ICC, IUC, and LMC
Information Culture Composite (ICC)	Still in development
Information Use Composite (IUC)	Still in development
Lifecycle Management Composite (LMC)	Still in development

Figure 6.1: Full scoring rubric template with formulas used to calculate the value of composite measures and indices included.

ID	Name	Usability	Accuracy	Relevancy	Completeness	Security	Information Quality
RE1\1	Resource 1\1	4	5	3	5	4	84%
RE1\2	Resource 1\2	5	5	5	5	5	100%
RE1\3	Resource 1\3	1	2	4	3	4	56%
RE1\4	Resource 1\4	5	5	5	5	4	96%
RE1\5	Resource 1\5	3	3	3	3	3	60%
	Composite Score	72%	80%	80%	84%	80%	79.20%

Figure 6.2: Recording of information quality metrics within an asset catalogue format.

The Information Architecture Quality Index

The IAQ Index is currently composed of three composites of quality measures, but is incomplete, requiring more research as well as practical testing in order to be validated and refined. The scoring processes and methods used to calculate IAQ composites and record IAQ metrics are the same as the processes and methods used in the IQ index.

At present, the three quality measures of the IAQ index are:

1)Organization: How easy it is to navigate through the repository or system's organization scheme for multiple purposes, and whether the repository/system exhibits contextually propriate breadth and depth dimensions as de fined by Morville and Rosenfeld (2007).

2)Searchability: How effectively search engines directories, menus, indexes, portals, or other navigation aids are used to expedite the user's information seeking process.

3)Completeness: How fully the repository or system fulfills its purported or implicit purpose when used.

The Information Management Quality Index

The IMQ Index is currently composed of three composites of quality measures, but is incomplete, requiring more research as well as practical testing in order to be validated and refined. In the case of the IMQ Index, the scoring processes and methods used to calculate IMQ composites and record IMQ metrics are at this point undeveloped.

One challenge in continuing to develop the IMQ index is that unlike information quality and information architecture quality, information management quality does not directly correspond to an asset class within the iVal Framework. Measuring the quality of user-asset interaction processes is problematic because it is difficult to reduce such processes to a quantitative measure without specialized knowledge of information management principles and best practices. This limitation may make the IMQ index less accessible to an audience of general knowledge workers unless a method of simplifying the IMQ measurement process can be incorporated into a future version of the the iVal Framework.

For the time being, the three quality measures of the IMQ index are:

1)Information Culture: How effectively the organization promotes information management practices and tools that are aligned to its information culture type, with reference to the information culture typology of Choo (2013).

2)Information Use: How effectively the organization uses information to make sense of their environment, create and transfer knowledge, make decisions, and support innovation, in accordance with Choo's (2006) knowing organization model.

3)Lifecycle Management: How well the organization plans and carries out information management processes and procedures related to the "Compliance and Quality" and "Records and Information Life Cycle" elements of Library and Archives Canada's (2015) IM Capacity Check Tool. Potential criteria include quality of business continuity planning, privacy assurance, compliance monitoring, information collection/creation/receipt/capture, maintenance, preservation, and disposition.

7. The Analysis & Reporting Module

Reporting

The evaluation process concludes with analysis and reporting of the evaluation results. Analysis and reporting should ideally be conducted in reverse of the recommended sequence of consultation, cataloguing, modelling, measurement. By conducting analysis and

reporting in reverse of the original evaluation process, it is possible to first use the IVQ Index measurements and historical IVQ Index data to target specific strength and weakness areas, then use what-if models to visually propose strategic and process improvements to the targeted areas, and finally, use what-if taxonomies and catalogues to show how individual information assets in the targeted areas could stand to be improved.

Index & Composite Tracking

If the measurement module is used and quality metrics are recorded at regular intervals, it is possible to track and visualize quality scores over time and even set quality targets for the future. Figure 7.1 shows a hypothetical example of an organization which has been measuring quality once a year by using the IVQ Index from 2011 up to the present (2016). The performance of each sub-index is plotted alongside the overall performance of the IVQ Index, and future annual targets from 2017-2020 are plotted as an extension of actual performance, with an ultimate goal of achieving a score of 90% on the IVQ Index by 2020. Similar visualization and analysis is possible for composite measures, as shown in Figure 7.2, where a different hypothetical organization has been tracking their IQ composite measures and has set future targets for the IQ index's performance.

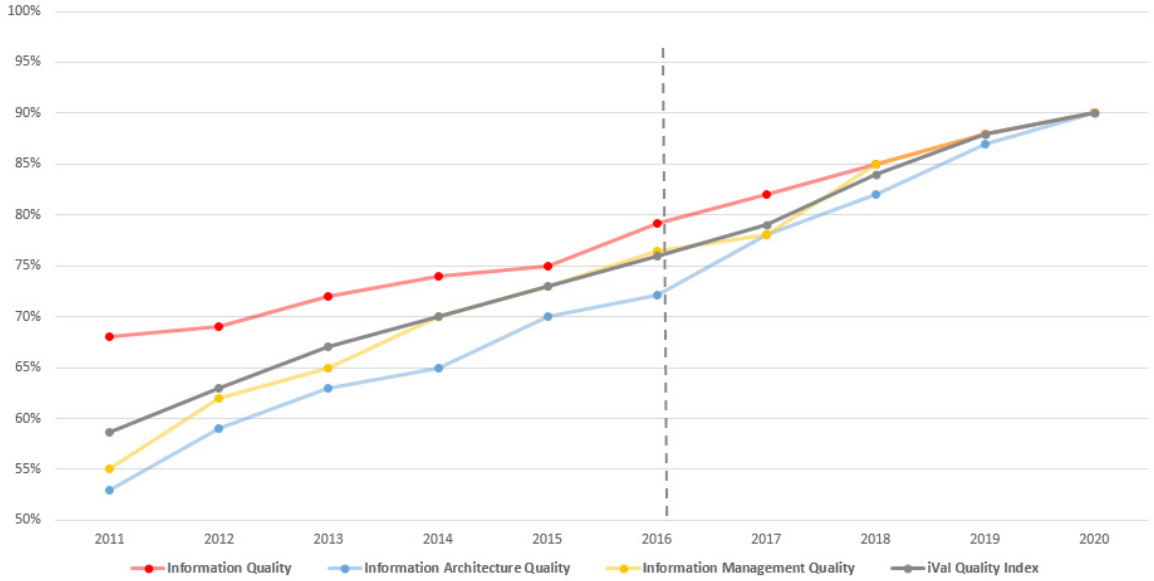

Figure 7.1: Example visualization of IVQ, IQ, IAQ, and IMQ index scores over time.

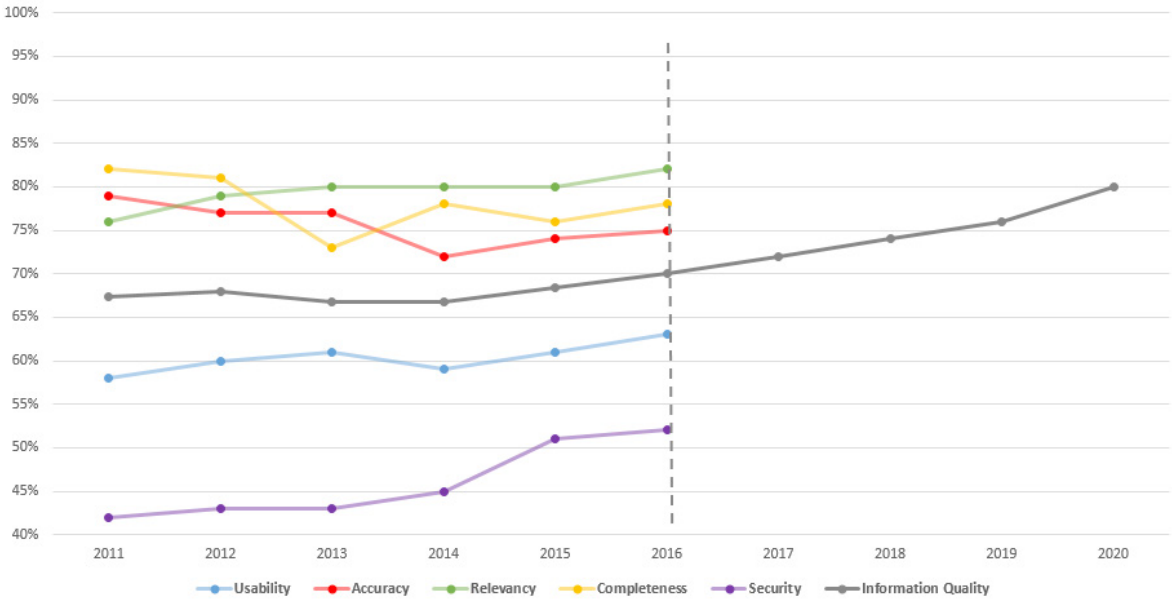

Figure 7.2: Example visualization of composite measure and IQ index scores over time.

The ability to analyze and report on quality trends by using data from the measurement module should be a strong motivation for users of the measurement module to undertake regular re-evaluations using the iVal Framework. However, in order to maintain the consistency of the measurements between separate evaluations, evaluators should use the same measurement methods and approach in each evaluation to ensure that analysis of historical trends in the indices and composites remains valid and reliable.

What-If Modelling

With strengths and weaknesses in quality identified, the evaluation report can proceed to propose what-if models which could potentially improve the organization's information flow and information strategy if implemented. Each what-if model should be a modification of an existing model, and all modifications in the what-if models should be clearly indicated with color coding or other visual differentiators. Figure 7.3 depicts an example of a what-if goal alignment model from the iVal Framework's pilot test; Figure 7.4 depicts an example of a what-if information flow model from the same pilot test.

What-If Taxonomy & Catalogue

While the what-if models show how information flow and information strategy could function in potential future states, the what-if taxonomy and asset catalogue show how information assets could be arranged in potential future states. Figure 7.5 depicts a sample from a what-if taxonomy which was constructed as part of the iVal Framework's pilot test; Figure 7.6 depicts a sample from a what-if catalogue from the same pilot test. In both the taxonomy and the catalogue, color coding or other visual differentiators should be use to indicate where changes have been made from the present state.

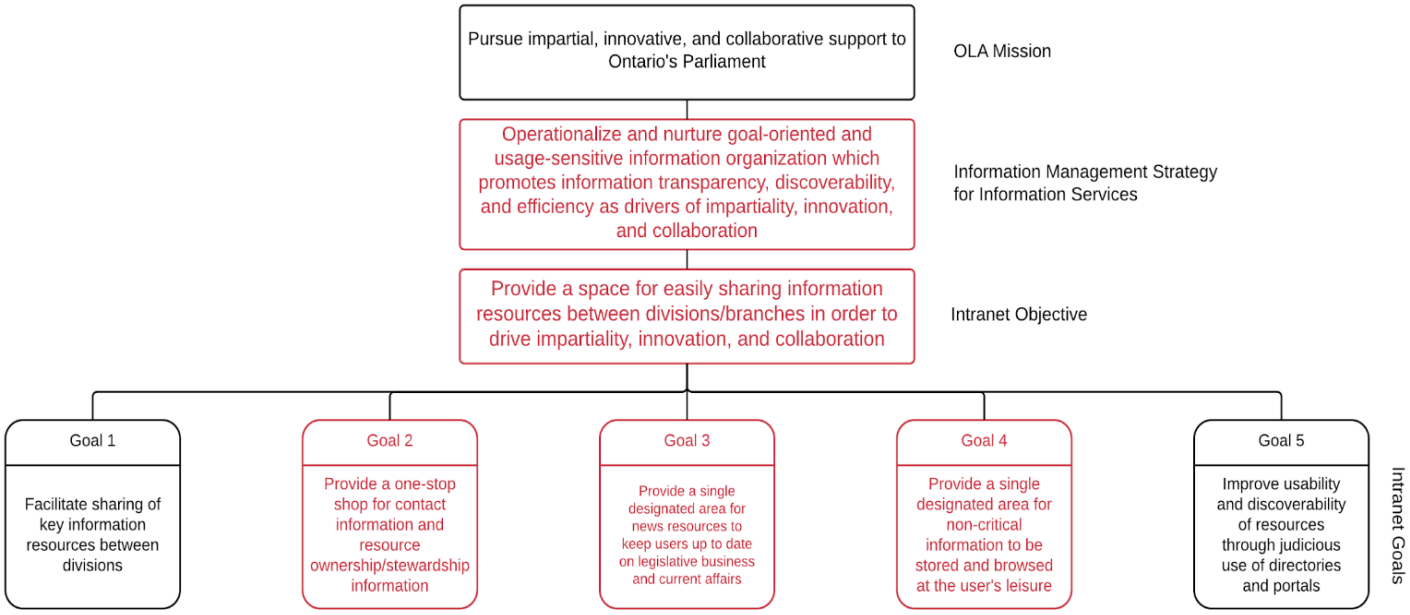

Figure 7.3: A what-if goal alignment model from the pilot test which modifies the original goal alignment model depicted in Figure 5.3. Modified elements are indicated in red.

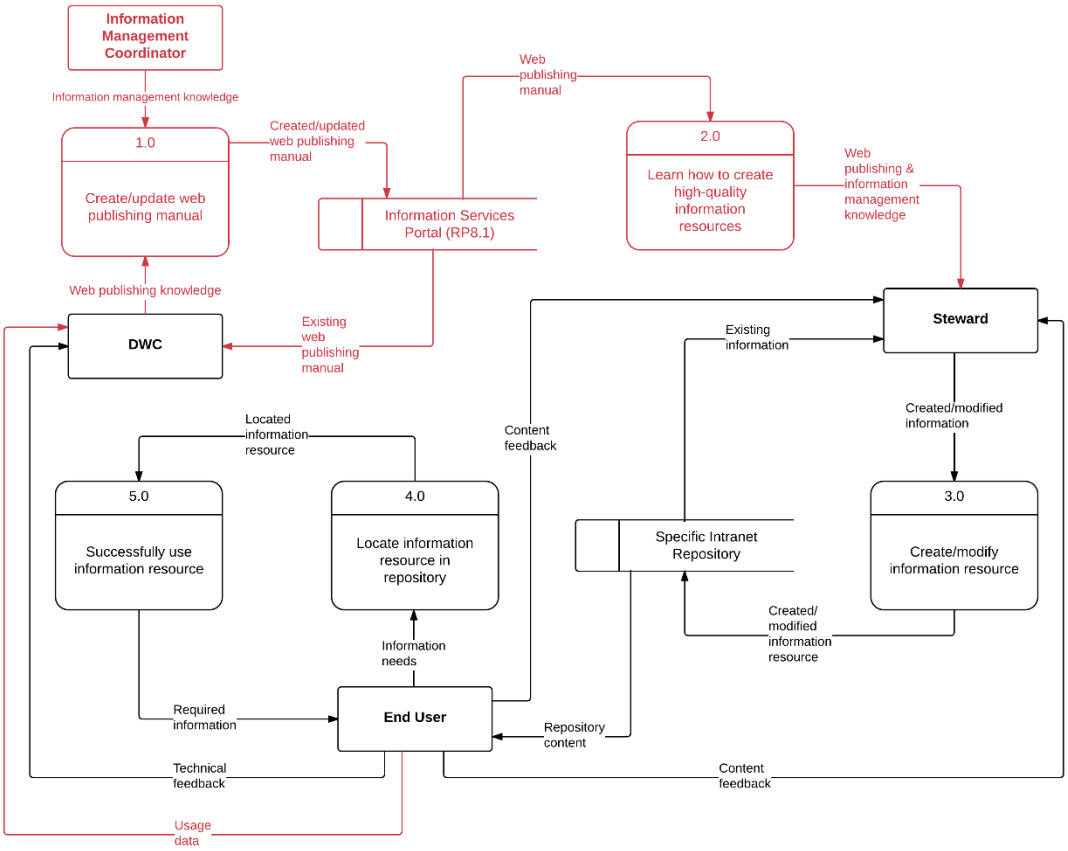

Figure 7.4: A what-if information flow model from the pilot test which modifies the original model depicted in Figure 5.1. Modified elements are indicated in red.

RP8 iDivision Portal
RE8\1 Description of iDivision
RE8\2 iDivision Contact Information
RE8\3 Links to Records Management Documents
RE\4 Links to iDivision Branches and Offices

RP8.1 Information Services Portal
RE8.1\1 Description of Information Services
RE8.1\2 Information Services Contact Information
RE8.1\3 Information Services News
RE8.1\4 Web Publishing Guides & Manuals
RE8.1\5 Link to Policy Portal
RE8.1\6 Information Services Quicklinks
RE8.1\7 Services for Members Booklet *(PDF)*
RE8.1\8 Links to Records Management Documents
RE8.1\9 Information Services Staff List

Figure 7.5: A what-if taxonomy sample from the pilot test, with a potential new addition to the taxonomy highlighted in red.

RE8.1\2	Information Services Contact Information	Page Element				OLA		
RE8.1\3	Information Services News	Webpages				OLA		
RE8.1\4	Web Publishing Guides & Manuals	Webpages / Documents				Divisional intranet stewards	User is quickly and easily take	High
RE8.1\5	Link to Policy Portal	Internal Link				OLA	User is taken to the policy por	Low
RE8.1\6	Information Services Quicklinks	Internal Links				OLA	User can be quickly taken to o	Medium

Figure 7.6: A what-if catalogue sample from the pilot test, with a potential new addition to the catalogue highlighted in red.

8. Future Directions for the iVal Framework

There are six short-term goals for the future development of the iVal Framework:

1)Further research into dimensions of information architecture quality and information management quality in order to strengthen the theoretical basis of the IAQ and IMQ indices.

2)Further development of the IMQ index to make its quality measures simpler and easier for non-specialists to measure.

3)Creation of core properties, core types, and/or context-sensitive property and type recommendations in the cataloguing module.

4)Creation of a contingency model for module and tool use based on Choo's (2013) typology of information cultures. The contingency model would prescribe iVal users with different evaluation approaches based on whether their organization exhibits a rule-following, result-oriented, relationship-based, or risk-taking information culture.

5)Creation of a maturity model which characterizes the different developmental levels of an organization's information evaluation capability.

6)Engage in more rounds of practical testing in different use scenarios to validate and refine the framework's modules and tools.

In addition, there are two long-term goals for the future development of the iVal Framework which are particularly focused on increasing the marketability of the measurement module:

1)Guidance for advanced measurement techniques for optional use, such as asset sampling and subsetting methods, adjusting quality measure weighting, creating custom composite measures and indices, and statistical integration of property value data from the catalogue into the IVQ Index. Providing such options to advanced iVal users would make the framework capable of offering deeper quantitative insights, more amenable to data analytics solutions, and more compatible with other performance measurement systems.

2)Creation of an anonymized, standardized, and quality-controlled benchmarking database for iVal users to submit their measurement results into. iVal users across different industries and sectors could then benchmark their IVQ Index, IQ/IAQ/IMQ index, and composite measure scores against one another.

The iVal Framework is still in its infancy and requires far more research, theoretical development, and practical testing before it becomes a robust, marketable framework. It is hoped that through further development, the iVal Framework will one day provide all knowledge workers with a powerful and diverse toolkit to manage and evaluate information.

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