

Wiki Scaffolding: Helping Organizations to Set Up Wikis

Oscar Díaz
oscar.diaz@ehu.es
ONEKIN Research Group
University of the Basque Country
San Sebastián, Spain
www.onekin.org

Gorka Puente
gorka.puente@ehu.es
ONEKIN Research Group
University of the Basque Country
San Sebastián, Spain
www.onekin.org

ABSTRACT

Organizational wikis are framed by an existing organization. This makes these wikis be especially vigilant upon (1) facilitating the alignment of the wiki with organizational practices, (2) engaging management or (3), promoting employees' participation. To this end, we advocate for the use of "wiki scaffoldings". A wiki scaffolding is a wiki installation that is provided at the onset, before any contribution is made. It aims to frame wiki contribution along the concerns already known in the hosting organization in terms of glossaries, schedules, organigrams and the like. Thus, wiki contributions do not start from scratch but within a known setting. This paper introduces a language to capture wiki scaffolding in terms of *FreeMind's* mind maps. These maps can later be mapped into wiki installations in *MediaWiki*. The paper seeks to validate the approach in a twofold manner. Firstly, by providing literature quotes that suggest the need for scaffolding. Secondly, by providing scaffolding examples for wikis reported in the literature. The findings suggest that wiki scaffolding can be useful to smoothly align wiki activity along the practices of the hosting organization from the onset.

Categories and Subject Descriptors

D.2.2 [Software Engineering]: Design Tools and Techniques;
D.2.11 [Software Engineering]: Software Architectures—
Domain-specific architectures; H.5.3 [Information Interfaces and
Presentation]: Group and Organization Interfaces—*Collaborative
computing*

General Terms

Human Factors, Management, Design

Keywords

Wiki scaffolding, wikis, collaboration, DSL

1. INTRODUCTION

What. We term "Wiki Scaffolding" the wiki installation that is available from the wiki's onset, before any contribution is made.

Such infrastructure might include structural concerns (e.g., how are wiki pages arranged along which categories), communication means (e.g., who is going to be notified of what), permission requirements (e.g., who is allowed to do what), etc. This initial infrastructure provides a first skeleton to frame wiki contributions. Implementation wise, a Wiki Scaffolding is a wiki installation (e.g., using a wiki engine such as *MediaWiki* [2]) plus some possible extensions (i.e., plugins) based on the selected scaffolding features (e.g., the email extension for *MediaWiki*).

Why. The fact that wikis facilitate knowledge creation does not imply that such knowledge comes out of the blue. The scaffolding provides the setting for knowledge construction within the organization. Grudin reports that "*although wikis are a valuable instrument to support collaboration, they are not a lightweight means of collaboration, they require some upfront design (in terms of the initial structure) and oversight*" [7]. This is specially so in organizational wikis. Unlike *Wikipedia*-like examples where the community is created around the wiki, corporate wikis [12] or academic wikis [19] illustrate organizational wikis where the communities exist before the wiki is created. As any other Information System resource, wiki success highly depends on the interplay of technology, work practice and the organization. Therefore, the peculiarities of the organization will certainly percolate the wiki itself: users, roles, permissions, terminology, documents, templates or project milestones are already there before the wiki is created. Indeed, the wiki might be initialized with the accounts for the employees eligible to contribute and their access control permissions; schedulings and calendars of the organization might impact the pace at which wiki articles are provided; products, services, customers or established terminology of the organization might become categories to classify wiki articles. In short, Wiki Scaffolding aims at facilitating the integration of wikis into the information ecosystem of the hosting organization.

How. Wiki scaffolding faces two main obstacles. First, it implies an upfront investment before any content is provided. Second, scaffolding implies not only being knowledgeable about the wiki engine (e.g., *MediaWiki*) but might also require installing third-party extensions. This will make wiki scaffolding yet another burden for the organization's computing department since most users will lack the required skills [17]. Akin to the wiki spirit, wiki scaffolding should be put in the users' hand. Therefore, both cost-effectiveness and end-user affordability are key enablers of this approach. This advocates for the use of Domain-Specific Languages (DSLs). DSLs are reckoned to enhance the quality, productivity, maintainability and portability while permitting domain experts understand, validate and develop the DSL programs themselves [11]. Furthermore, collaboration and easy sharing can be promoted by using *graphical DSLs* (as

WikiSym '11 October 03 - October 05 2011, Mountain View, CA, USA
(c) 2011 Association for Computing Machinery. ACM acknowledges that this contribution was authored or co-authored by an employee, contractor or affiliate of the Spain national government. As such, the government of Spain retains a nonexclusive, royalty-free right to publish or reproduce this article, or to allow others to do so, for Government purposes only.










WSL	FREEMIND	MEDIAWIKI
Scaffolding	root node	main page ¹
Organigram	“Organigram” bubble node	n.a.
Role	child of “Organigram” node	wiki group
Employee	grandson of “Organigram” node	wiki user & user page
Presentation	“Presentation” bubble node	wiki skin ²
logo	logo node	wiki logo
wikiSize	wikiSize node	wiki skin
wikiEditFreq	wikiEditFreq node	wiki skin
	with “traffic light” icons 	
navigationPane	“list” icon 	navigation in sidebar
searchPane	“magnifier” icon 	search in sidebar
toolboxPane	“refine” icon 	toolbox in sidebar
indexPane entry	“look here” icon  at <i>Item</i>	element in the navigation bar
Restriction	“Restriction” bubble node and “priority” icons 	blacklisted pages for groups ³
denial	child of “Restriction” node	wiki permission.
Item		
title	node text	page title
category Item	fork node	category page
article Item	bubble node	article page
template Item	child of “Template” node	template page
event Item	child of “Event” node	calendar extension ⁴
discussion	“stop-sign” icon 	talk page for that page
RSSfeed	“flag” icons 	RSS generator for that page ⁵
text	child with “info” icon  or linked files	page content
Link		
relatedWith Link	arrowLink connector	inter-page hyperlink <code>[[page]]</code> <code>[[[:Category:parentCat]]</code>
belongsTo Link	edge connector	page-category hyperlink <code>[[Category:parentCat]]</code>
templatedBy Link	arrowLink connector	template-page hyperlink <code>{{template}}</code>
scheduledFor Link	edge connector	event-to-page link in the calendar widget

Table 1: WikiScaffolding-to-FreeMind mapping & FreeMind-to-MediaWiki mapping.

opposed to *textual DSLs*). Rather than coming up with our own graphical notation, we strive to re-use an existing framework, popular enough to be easily embraced by most organizations. At this respect, we select “mind maps”: diagrams used to express ideas around a central topic. Now, this central topic is “Wiki Scaffolding”, and mind maps constructs are reinterpreted to denote scaffolding concerns. In a previous work [6], we introduced the *Wiki Scaffolding Language (WSL)* (pronounced “whistle”). WSL is built on top of *FreeMind* [1], a popular, open source tool to create mind maps. Users can collaboratively create *WSL maps* that can next be saved as *MediaWiki* installations. Through a single click, the *WSL* plugin for *FreeMind* generates a wiki along the lines of the scaffolding specification.

Where. This is the main contribution of this paper. A first validation of these ideas is to find examples in the literature that suggest the need for scaffolding (section 3), and even more, to describe the Wiki Scaffolding for some wikis reported in the literature (section 4). Specifically, examples of *WSL maps* are provided for academic wikis described in [4] and [3], video gaming

(e.g., *www.eveonline.com*) and software projects [13]. For each *WSL map*, a wiki installation is generated which can be accessed online. The *WSL* engine itself as well as the examples presented are available at *www.onekin.org/wsl*. The paper begins by introducing *WSL*.

2. WIKI SCAFFOLDING SPECIFICATION THROUGH DSLS

¹CategoryTree extension: www.mediawiki.org/wiki/Extension:CategoryTree

²MediaWiki skins include monobook (default), vector (e.g., used by Wikipedia), etc. WSL completes the offer with cavendish, rilpoint, guMax, guMaxDD and guMaxv.

³Blacklist extension at www.mediawiki.org/wiki/Extension:Blacklist

⁴Barrylb extension at [www.mediawiki.org/wiki/Extension:Calendar_\(Barrylb\)](http://www.mediawiki.org/wiki/Extension:Calendar_(Barrylb))

⁵WikiArticleFeeds extension at www.mediawiki.org/wiki/Extension:WikiArticleFeeds

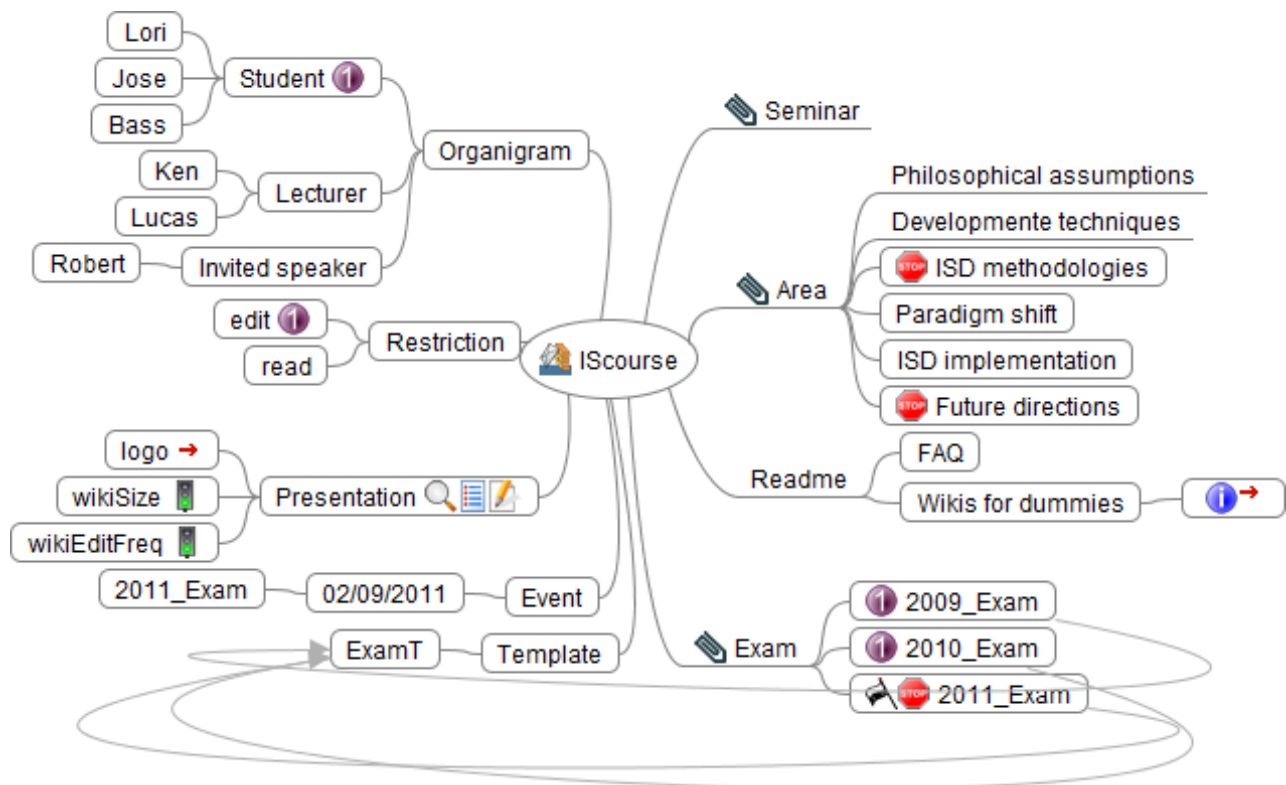


Figure 1: WSL scaffolding for a wiki to support student engagement. Output available at www.onekin.org/wsl/IScourse. Username: Lori, Password: 12345

Although scaffolding implies for the wiki to be framed within an organization, and should this organization provide computing personnel to assist with the technicalities, the flexibility and promptness that wiki projects require advices for a do-it-yourself approach. This is the very aim of the **Wiki Scaffolding Language (WSL)**, a graphical Domain-Specific Language (DSL) that specifies scaffolding through mind maps. The WSL engine is realized as a plugin for *FreeMind* [1]. The rationales are three-fold:

1. Effectiveness. Wiki scaffolding initializes the wiki with some matters from the hosting organization. This might require some previous discussion about which matters to include. Mind maps are reckoned to be a valuable, visual approach for people to collaborate and share ideas.
2. Popularity. *FreeMind* has over 6000 daily downloads. This evidences the popularity of this tool and eases WSL adoption among end users.
3. Cost-effectiveness. Capitalizing on the *FreeMind* editor avoids the implementation of a graphical front-end from scratch (a.k.a “concrete syntax” in the DSL terminology).

This section outlines WSL along different organization matters that might need to be reflected in the wiki. Next paragraphs introduce these matters which are illustrated through figure 1. Table 1 summarizes the mappings from WSL abstract concepts to *FreeMind* graphical notation, and outlines how the WSL engine maps *FreeMind* maps into *MediaWiki* constructs. A detailed description of WSL mappings can be found at [6].

Glossary. A common problem for open communities is that of fixing a common terminology and understanding. This is easier



in the case of organizational wikis where glossaries might already exist. In addition, the organization’s services or products, or even the customers themselves can become keywords to classify and easy locate wiki content. These key terms are depicted as “fork nodes” in *FreeMind* (e.g., *Seminars* node). The WSL engine maps such nodes into wiki categories.


Documents. Organizational documents might need to be migrated as wiki articles. This is denoted as a “bubble node” in *FreeMind* (e.g., “2010_Exam” node in fig. 1). By default, WSL generates an empty article. You can initialize the article’s content by pointing to an external resource. *FreeMind* allows for map nodes to hold hyperlinks that point to external resources (e.g., URL of web pages, desktop local documents). The “*Wikis for dummies*” node provides an example: the red arrow denotes a hyperlink to a local file. At generation time, the WSL engine retrieves this hyperlink, loads the associated file, and fills the wiki article with the file content. So far, only Word documents are supported. Alternatively, the designer can provide the article’s content directly as part of the node content (e.g., see “*Purchase entry Test*”).

Guidelines & boilerplate text. Minutes, reports, deliverables and the like tend to be normalized within organizations. Boilerplate text finds its way as wiki templates. This is captured as a keyword-labeled node: “*Template*”. Any node hanging from “*Template*” accounts for a template. Similar to the document case, template nodes (e.g., “*ExamT*”) point to external files but in this case, the structure of the external document is semantically meaningful: Word headlines are mapped into template parameters. For instance, a guideline for exam preparation can be arranged along the following headlines: *grade*, *subject*, *questionForTheme1*, *questionForTheme2*, etc. In this case, the WSL engine turns the



linked document into a template where headlines become template parameters. Next, article nodes can be associated with these template nodes through *FreeMind*'s arrow link (e.g., “2010_Exam” article follows the “ExamT” template). The wiki counterpart will be for the “2010_Exam” article to follow the “ExamT” template where “ExamT” parameters should be provided once the wiki is deployed.

Events. Organizational wikis frequently support living projects where project milestones might need to be accounted for. Milestones are not so common in other kind of wikis where content is the result of free-willing participation and hence, contribution is not tight to pressing schedules. Schedules imply events. Wiki wise, events are semantically meaningful pieces of data, and so should it be markuped and rendered. To this end, a keyword-labeled node is introduced: “Event”. Any node hanging from “Event” accounts for a worth-recording happening (e.g., “02/09/2011” node). The *WSL* engine transforms so-depicted events into wiki events that can be indexed through a calendar widget.

Awareness. Tracking modifications of wiki content is a most valuable feature in organizational wikis which might be subject to tight agendas, and hence, quick feedback might be required. The use of RSS feeds or, more traditional, email extensions to directly e-mail wiki content can facilitate awareness. On the other hand, articles/categories of interest might depend on the employee role, and hence, it can be known at the onset. That is, awareness policies can also be part of Wiki Scaffolding. To this end, *WSL* denotes RSS-aware wiki pages through the *FreeMind*'s “flag” icon  (e.g., “2011_Exam” node). Likewise, the “email” icon  enables e-mail ready sending for the wiki articles (e.g., “IScourse” node).






Discussions. Discussion pages (a.k.a. “talk” pages in *MediaWiki*) serve to keep discussions aside from the content of the associated page. The “stop-sign” icon  denotes the need for such discussion page for a given wiki page (e.g., “Future directions” node).

Organigram. Corporate wikis are framed by the organization's organigram. Employees, their roles and status might impact their operations at the wiki. *WSL* introduces a keyword-labeled node: “Organigram”. Nodes having “Organigram” as parent denote roles. Likewise, nodes having “Organigram” as grandparent are interpreted as employees (e.g., “Lori” belongs to the “Student” role). The *WSL* engine turns “Organigram” descendants into wiki contributors. So far, all contributors are given the same password: 12345

Access restrictions. Permissions are counterintuitive in a wiki setting where openness is a hallmark. Indeed, *MediaWiki* natively supports a basic mechanism where the scope of permissions is the whole wiki: you can either edit the whole set of wiki pages or not (e.g., anonymous users cannot read pages). However, organizational wikis might require a finer-grained access permissions based on the employees' role. *WSL* permits to capture these requirements through a keyword-labeled node: “Restriction”. A restriction is a triple, namely, a subject (i.e., an *Item* node), a grantee (a *Role* node), and a denial type (i.e., *read* or *edit*). We resort to *priority* icons to denote those elements that conform to a restriction unit. That is, nodes decorated with the same *priority* icon belong to the same *restriction*. Due to icon availability, *permissions* are limited to ten (“*priority*” icon  .. ).

Presentation. Most companies project a unified image in terms of rendering and presentation. Wikis resort to “skins”⁶ for rendering. These skins are engine specific. However, we do

not expect our target audience to know about skins. We should strive to capture presentation concerns in abstract terms, better said, through domain criteria that could later be used by the *WSL* engine to determine the most appropriate skin. Specifically, we consider “*wikiSize*” and “*wikiEditFreq*”. Based on the expected size and edit frequency of the wiki, heuristics can make an educated guess about the wiki skin. In this way, the *WSL* engine frees stakeholders from being knowledgeable about presentation issues, offering good-enough outputs. Notice that the wiki administrator can latter change this automatically-selected skin.

The expected size and editing frequency are indicated through different “*traffic light*” icons : green light, yellow light and red light for small, medium and large expected sized wikis, respectively. Furthermore, a logo can be linked to an image (e.g., the “*logo*” holds the URL of an image file); sidebar panes, toolbox, navigation and search pane, are indicated through the “*refine*” icon , “*list*” icon  and “*magnifier*” icon , respectively. Elements of an index pane are marked with a “*look here*” icon  (e.g., *Seminars* node). These elements result into an index in the home page of the generated wiki.

DSL success highly depends on two facts. First, maturity, i.e., the existence of a state of practice that evidences the need for a *DSL* as an alternative to the traditional approach (i.e., for users to install and configure wiki engines on their own). In our setting, this means to evaluate the feeling of the wiki community about the need of scaffolding in different scenarios. Section 3 provides quotes from the literature that sustain the scaffolding case.

A second success factor is for the *DSL* to offer an appropriate compromise between expressivity and generality. The more accurately a *DSL* matches its domain, the easier and more precisely users can specify their solutions through the *DSL*. On the other hand, accurateness might hinder the expressivity of the *DSL* so that the *DSL* falls short to capture some requirements (too narrow focus). To this end, Section 4 confronts *WSL* to different wiki scenarios.

3. VINDICATING WIKI SCAFFOLDING THROUGH QUOTATIONS

This section revises different case studies reported in the literature, looking for hints that suggest the need for wiki scaffolding. The aim is to provide vivid examples outside our own experience that vindicate the interest of wiki scaffolding.

“Using Wiki Technology to Support Student Engagement: Lessons from the Trenches” [4]. This paper reports on a failed experiment to use wiki technology to support student engagement. 37% of the students cited difficulties with using the technology. They conclude that “had greater instructional scaffolding be provided, in the form of lab-based exercises and the creation of an accompanying instruction handout, then maybe some of those students that experienced technical difficulties, or self-confidence issues, would have posted to the class Wiki.... Fault lay not with the technology but with an unattractive course design”. The latter seems to suggest that such course design should somehow percolate to the wiki design. Subject classification might need to be accommodated in the wiki as categories or even, wiki templates that guide students along their expected contributions. In this scenario, wiki scaffolding can help to readily provide (1) wiki templates that guide and advice student contributions, or (2) wiki categories along the terminology set at the classroom.

“Designing Knowledge Management Systems for Teaching and Learning with Wiki Technology” [15]. This case study reports on the use of wikis to support collaborative activities in

⁶A skin is “a preset package containing graphical appearance details”, used to customise the look and feel of wiki pages.

Scaffolding	Academic wiki	Gaming Community wiki	Veterinary Education wiki	Software Project wiki
Glossary	Keywords of the taught subject	Game jargon characters, worlds, weapons	Clinical taxonomies pathology, drugs, viruses	Software development keywords: use cases, validity tests
Content	Syllabuses, exams, FAQ	Story line, tricks	Patents, terms of service, sponsors	Technical manuals, README manuals
Events	Exam dates, assignment deadlines	Game releases	—	Planned meetings, project milestones
Guidelines	Exam patterns, assignment guidelines	Weapon explanation, character features	Animal features, treatment steps, student's page	Use case template, deliverable template
RssFeed	Doubts	Patch release, announcements, online news	—	Requirement updates
Discussions	FAQ, tough themes	New features, support	Drugs in trial, innovative treatments	Requirements, test results
Email	Teamwork	Bug communication	teamwork	Meeting with customer
Restrictions	Certain students edit assignments, only lecturers edit exams	Developers' pages	Discussions only by qualified people	Requirements set only by stakeholders and analysts
Roles	Student, lecturer	Developer, player, tester, resellers	Student, nurse, veterinarian	Stakeholder, analyst, designer, coder
Presentation	University logo	Game "look&feel"	—	Organizational image

Table 2: Setting matters that could impact wiki deployment.

a knowledge management class at a graduate-level information systems course. The authors indicate that “Wiki technology can be used as a collaborative learning technology, but a lot of design needs to be done before bringing it into the classroom”. The paper indicates that “the initial findings suggest that effective implementation and use of a wiki to support knowledge management for effective teaching and learning is contingent upon familiarity of both students and instructors with the technology, level of planning involved prior to system implementation and use in class, class size, and the ability to motivate students to learn from one another based on the principles of discovery learning”. This ending is particularly insightful for our purpose: the need of planning prior to system implementation is regarded as a success criterion. Wiki scaffolding can precisely help in enforcing some wiki design before the wiki being release for usage.

“Using Wiki to Support Constructivist Learning: A Case Study in University Education Settings” [18]. This paper addresses the assessment of learning, the monitoring of student participation, and the need for communication support in the learning process using wikis. For the purpose of our work, we notice the importance given to communication and how basic wiki mechanisms seems to fall short: “communication problems seemed to be a hinder to the writing of the wiki” while “groups which communicated more actively achieved better results, both in terms of quantity and quality”. According to the students, it was at times difficult to know who was supposed to do what. Some anxiety about the end result was also a concern for many students. The authors finally resort to create “an external discussion forum and encouraged students to use it to discuss and coordinate the development of the wiki”. This seems to suggest that communication design should be included as part of the wiki scaffolding.

“Did You Put It on the Wiki? Information Sharing through Wikis in Interdisciplinary Design Collaboration” [14]. This paper explores the use of wikis in software development projects. The author states that “The project wiki was created by the project manager a few weeks after the project started. At the

beginning of the project, the project manager created a project definition page, which contained important information about the project such as goal, project team members, stakeholders, project description, success criteria, high-level schedule, deliverables, and communication plan. The document was reviewed and accepted by all team members.”. This seems to suggest the existence of a blueprint for the wiki.

“A Wiki Instance in the Enterprise: Opportunities, Concerns and Reality” [5]. The authors discuss the design and deployment of a wiki-based application (*ResearchWiki*) that supports yearly planning work by members of a globally distributed, research organization (referred to as “project descriptions” (PD)). In the discussion, the authors point out that “PD owners preferred to use their project-specific repositories for recording progress in their projects rather than using the *ResearchWiki*. In many cases these repositories pre-dated the *ResearchWiki* and had evolved to support the operational needs of particular projects. This included access control as in many cases their project partners were from outside the research division and had not been given access to the *ResearchWiki*”. This highlights the role of the wiki as part of the information ecosystem, and the fact that companies tend to have stringent access control policies that those of *Wikipedia*.

“Enterprise Wikis – Types of Use, Benefits and Obstacles: A Multiple-Case Study” [17]. The paper reports the use of three enterprise wikis. A success factor explicitly named by the organizational experts is that “a sufficient number of wiki-articles must exist right from start. Only then will employees perceive and accept the wiki as a useful knowledge base”. This statement strengthens the fact of wikis as part of the information ecosystem of the hosting organization. In addition, the authors indicate that “first wiki properties and wiki structures had been eagerly discussed within internal group meetings, but no strict definitions arose”. This hints the notion of a prior design. Finally, another interesting quote: “the ‘built-in’ simplicity of the wiki-software is rather a minimum requirement than a success factor”. Besides content editing, simplicity should also be sought in setting up an environment (i.e., the Wiki Scaffolding) that helps in matters other

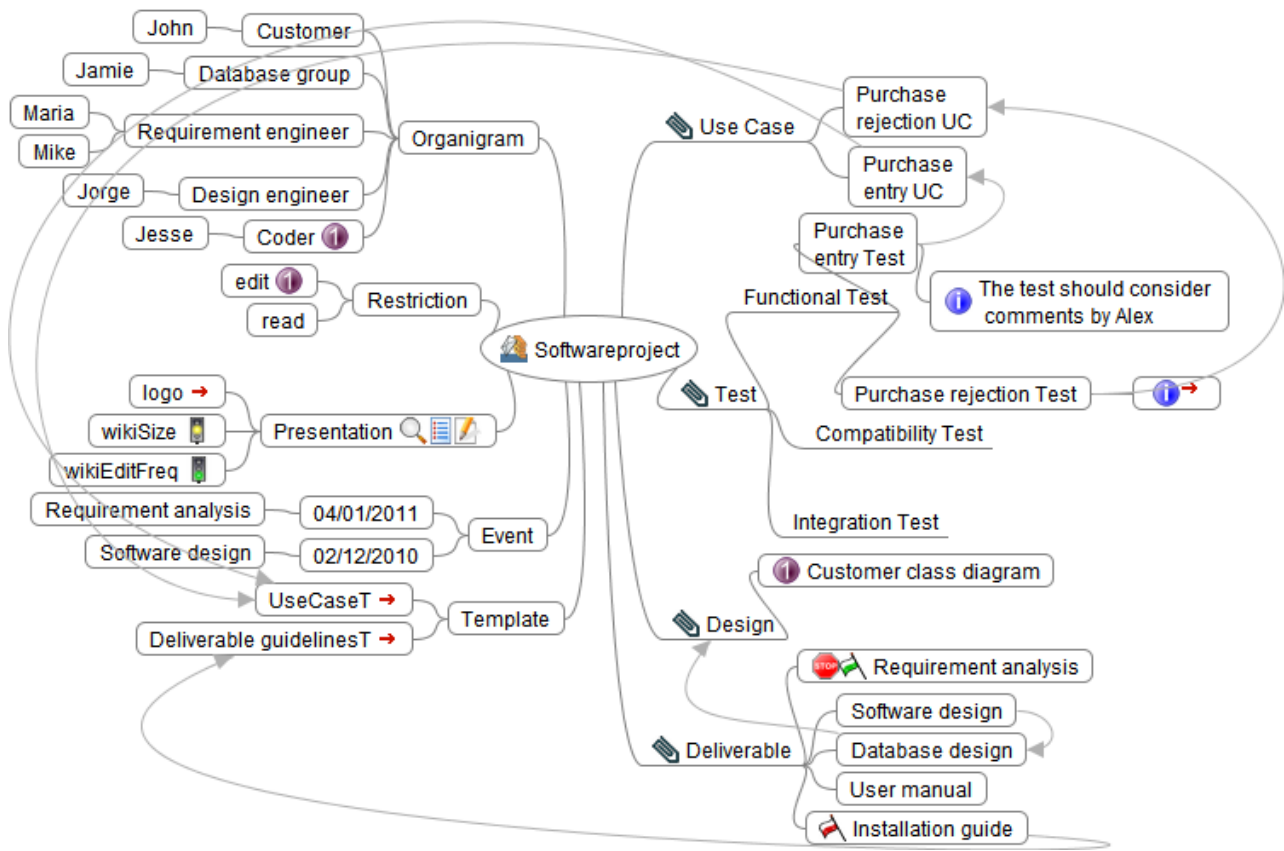


Figure 2: WSL scaffolding for a software project. Output available at www.onekin.org/wsl/Softwareproject Username: Jesse, Password: 12345

than editing (e.g., awareness policy, category setting or permission restrictions)

4. VINDICATING WIKI SCAFFOLDING THROUGH EXAMPLES


This section takes some wiki examples from the literature, identifies scaffolding matters from these cases, depicts the corresponding WSL maps and, finally, refers to the generated MediaWiki installations which are available on line for inspection. Besides illustrating WSL, each example highlights a scaffolding advantage (in bold). Table 2 outlines how different scaffolding matters are realized in the distinct scenarios.

4.1 Scaffolding to Promote User Engagement

Prompt user engagement has been identified as a main success factor for wikis [4]. Scaffolding can help to quickly facilitate an initial setting where some basic mechanisms (e.g. categories, templates, RSS feeds) are available from the start. Collaborative problem solving scenarios have also identified early scaffolding as a main contribution enabler. Judge states that there is a basic need for scaffolding “to hold the conceptual and organizational elements in place, especially during the early phases of “imaginative, interdisciplinary” interconnection. It may be argued that it is the lack of this scaffolding feature which

prevents many potentially useful initiatives from “getting off the ground” – and staying up. And the more complex the psych-social structure, and the more communication space it spans, the greater the need for more complex scaffolding” [10]. This is perfectly valid for wikis.

This need has been so identified in wikis to support student engagement. Figure 1 depicts a WSL map along the experiences reported in [4]. Cole mentions six areas that are known from the start. They could be represented as either articles (e.g., “Paradigm shift”) or categories (e.g., “Development techniques”). Regarding the comment of a student “there aren’t any useful guidelines or tips that could be used”, content about wiki usage (e.g., a “wikis for dummies” internal report, or URLs to appropriate places) might be included as page text just by linking that file to the WSL node. Furthermore, FAQ collected in the classroom might be made readily available at the onset. In addition, communication mechanisms (e.g., email, rss feed and discussion pages) can be added to promote all, student collaboration (e.g., do you know an answer to a common doubt?), encourage participation (e.g., do you agree with the present year assessment method?) and incite the work group (e.g., could we improve our individual grade by working together?).

Based on previous teaching experiences, those articles expected to raise a debate can be created with either a companion discussion page (i.e., “stop-sign” icon ) or a RSS feed (i.e., “flag” icon

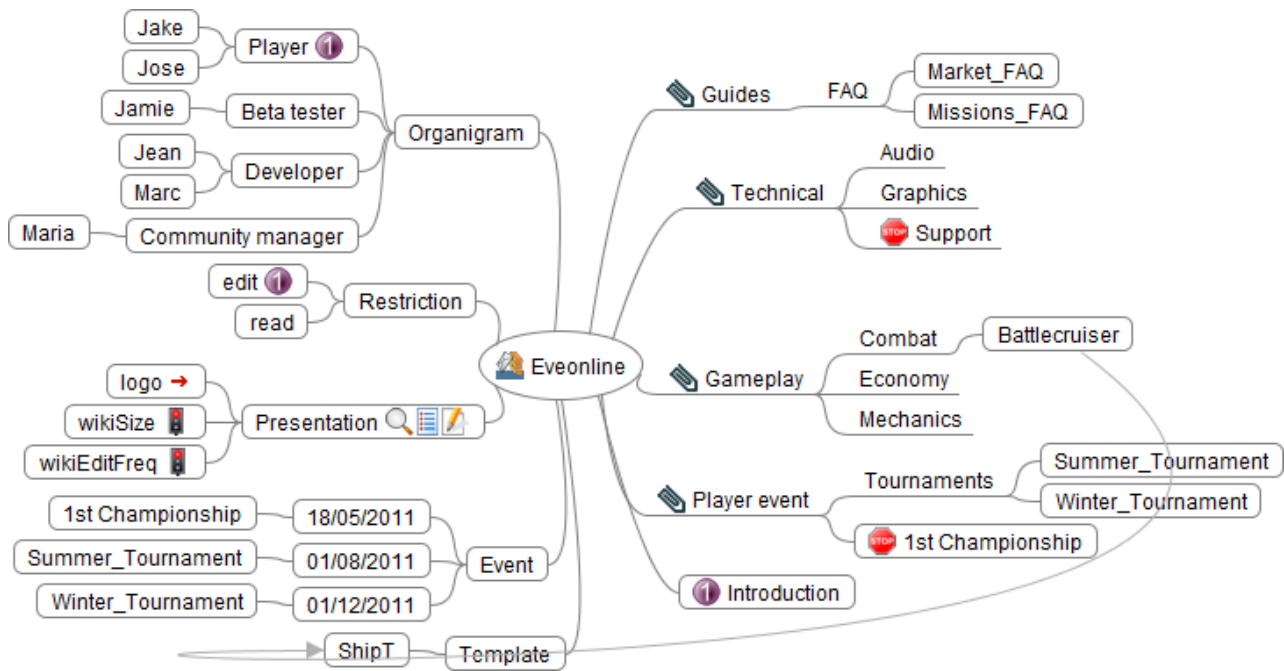


Figure 3: WSL scaffolding for a video-gaming wiki. Output available at www.onekin.org/wsl/Eveonline Username: *Jake*, Password: *12345*

⚠). This is the case of the “*ISD methodologies*” and “*future directions*” articles. Though, the articles are empty, the scaffolding already provides the infrastructure to initiate the discussion. In addition, some articles might need to follow some guidelines. An obvious example is that of exams. Templates can be used to guide template-aware articles. The example shows an arrow link from exam articles to the *ExamT* template. Access rights are defined that prevents contributors, belonging to the “*Student*” role, from editing the “*2010_Exam*” and “*2009_Exam*” articles. Exam articles can be qualified by an event. Finally, the expected size and editing frequency are both low as denoted by the green “*traffic lights*” icons 🟢.

4.2 Scaffolding to Mirror Existing Organizational Practices

Organizational wikis frequently need to mirror (and follow) existing organizational practices. Wiki introduction in organizations is not easy. Employees might lack the motivation to learn yet another new technology [8]. After all, there might already exist other collaborative tools in the organization including email, distribution lists, intranets, etc. Wiki scaffolding forces to ponder on those practices and resources which might need to be migrated to /integrated into the wiki.

This situation is illustrated by wikis supporting software projects [13]. From a scaffolding perspective, characteristics of relevance include (see figure 2): distinct stakeholders work together to organize, track and publish project documentation; wikis acts as a version control system to keep track of changes; wikis are useful as *discussion* means (e.g., “*Requirements analysis*”); they also provide *rssfeeds* to advise changes (e.g., “*Installation guide*”), *email* capabilities for notifications, project milestones as *events* (e.g., a meeting for the “*Software design*”), scheduling capabilities, etc. This collaborative management of the project documentation does not occur in a vacuum, but normally adheres to some “work of

practice” existing in the company. This includes a role organigram (e.g., “*Requirement Engineer*”, “*Design Engineer*”, etc) where contributions and permissions might depend on the user role (e.g., “*Coders*” are not allowed to “*edit*” the “*Customer class diagram*” as denoted by the “*priority*” icon 🟡), glossaries (e.g., terms such as “*Use Case*”, “*Functional Test*”, “*Compatibility Test*” and so on, might be used to categorize wiki content) or company guidelines for artefact production (e.g., a common example is that of use cases).

4.3 Scaffolding as a Way to Engage Management

In order for wikis to provide value to the organization, wikis have to solve a clearly specified problem and be aligned with the organizational strategy [16]. Unfortunately, organizational wikis are in many cases a grass root phenomenon whereby the wiki is introduced by an individual employee or a small group within the organization without the support of management. This bottom up approach frequently fails in having a strategic intent. More to the point, a lack of strategy might result in no clear guidelines about what to contribute, how to contribute and who should made the contribution. An example is reported in [9] where wiki failure was due to an ambiguity in the wiki’s aim: some users see the wiki as a project documentation repository whereas others use it for glossary entries. This led to confusion and dissensions on the wiki’s intent.

From this perspective, Wiki Scaffolding forces to have a blueprint before releasing the wiki for contribution. Thinking about how the wiki will fit into the existing information ecosystem, helps to devise the aim of the wiki in advance. In addition, management support would be facilitated if scaffolding is captured through intuitive means that ease self-edition, sharing or discussion. This favours the use of mind maps.

This situation is illustrated by the video-game community (e.g. www.eveonline.com) (see figure 3). The wiki intent is to

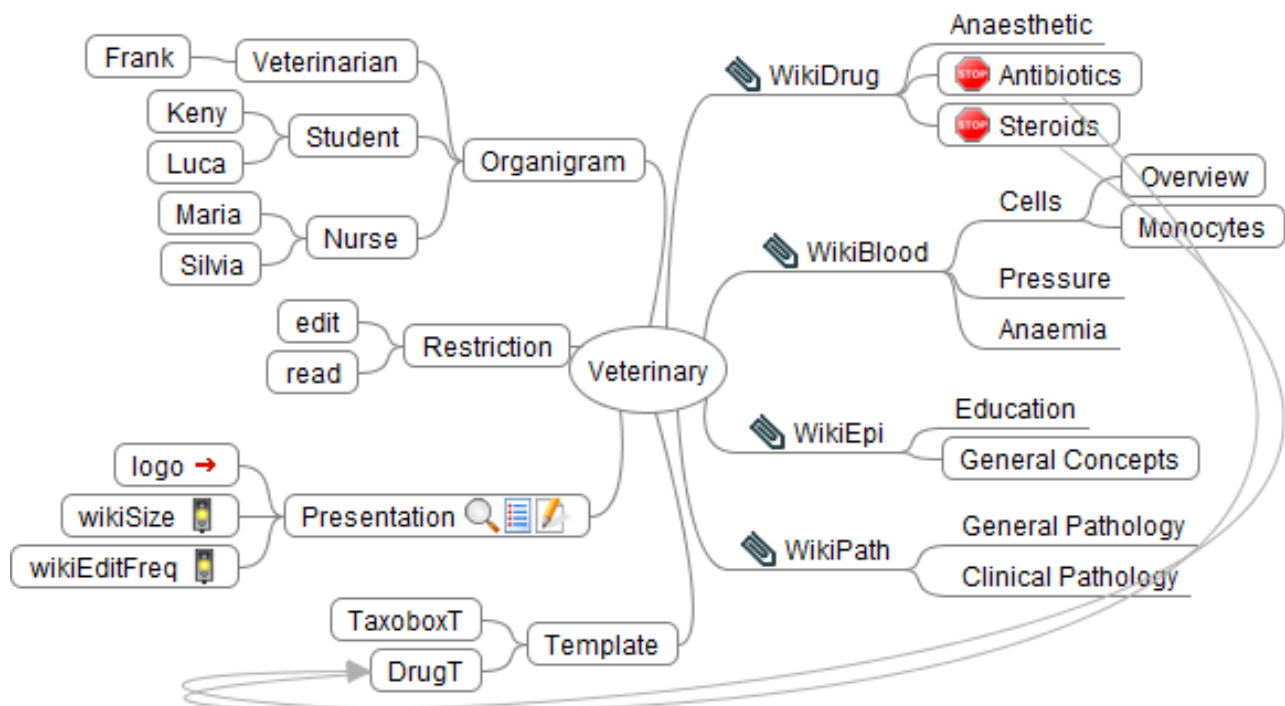



Figure 4: WSL scaffolding for a wiki to support veterinary education. Output available at www.onekin.org/wsl/Veterinary Username: Keny, Password: 12345

offer a share space for both consumers and providers of video games to communicate new insights about potential enhancements and new game releases. Contributors are players (i.e., gamers) who discuss, share and edit *content*, *guidelines*, documentation, background and resources (i.e., *glossary*) about their favourite video games⁷. Besides players, developers and testers (i.e., *roles*) also participate to gain insights from the players about how to improve their products⁸. There exist some *restrictions* to both avoid misunderstandings and keep organizational policies untouched (e.g., “Players” are not allowed to “edit” the “Introduction” node as denoted by the “priority” icon ). Direct communication (through *discussions*, *email* notifications or *rss* subscriptions) permits developers to know first-hand the players’ opinion about new features, bugs, ideas, etc. Common *guidelines* about how to explain game items are represented as templates (e.g., a “Battlecruiser” is a kind of “ship”, so the namesake template is used).


4.4 Scaffolding as a Wiki Map

The “rules of practice” which govern a site (i.e., roles, access rights, templates, etc) should be easily accessible to new comers. So far, this information is scattered around the wiki, and frequently hidden in administrative pages. At best, a *README* page can provide some textual description of these practices. From this perspective, a wiki scaffolding can play the role of an initial “practice sitemap”. Traditional site maps provide a kind of interactive table of contents, in which each listed item links directly to its counterpart sections on the website. Some wiki engines (e.g., *MediaWiki*) readily provided such map for categories. One step in the same direction would be the use of “scaffolding maps”: an

⁷www.wikia.com/Gaming

⁸wiki.eveonline.com

HTML representation of a Wiki Scaffolding that permits to readily access the wiki’s practices. Notice however, that this will require to keep the scaffolding in sync with the evolving wiki practices (i.e., new roles, terms, rights, etc), and to conceive “scaffolding” as a supporting infrastructure for collaborative content production whose usefulness goes far beyond wiki initialization. This could be useful for communities where different roles intertwine and the implications of belonging to a certain role (e.g., in terms of contribution obligations or access rights) should be clearly stated.

This scenario can be illustrated by the online wiki en.wikivet.net/Veterinary_Education_Online [3] (see figure 4). Contributors include veterinarians, veterinary students and nurses (i.e., *roles*), where anonymous users might not be allowed to edit and, sometimes, even read, pages. This restriction increases the trustworthiness of the peer reviewed material since all the editors are knowledgeable about veterinary. Main categories (i.e., “WikiDrug”, “WikiBlood”, “WikiEpi” and “WikiPath”) pertain to the main index pane (i.e., “look here” icon ). *WikiVet* aims to create a veterinary curriculum, e.g., viruses, drugs (i.e., *glossary*), patents, sponsors (i.e., *content*). Some content has a common structure (i.e., *guidelines*) e.g. both “Antibiotics” and “Steroids” follow the “DrugT” template.

5. CONCLUSIONS

This paper aims to provide an initial validation of both the usefulness of Wiki Scaffolding and its realization through *WSL*. *WSL* expressiveness is contrasted through different examples taken from the literature. Benefits of Wiki Scaffolding include facilitating the alignment of the wiki with organizational practices, promoting management engagement, enhancing the visibility of the wiki’s practices, or promoting employee participation. The next logical step is to collect evidences of the achievements of these benefits by

putting WSL at work in different organization. We are looking for organization interested in checking out WSL.

Acknowledgments

This work is co-supported by the Spanish Ministry of Education, and the European Social Fund under contract TIN2008-06507-C02-01/TIN (MODELINE), and Conserjería de Educación y Ciencia of Castilla-La Mancha under contract PAC08-0160-6141 (IDONEO). Puente has a doctoral grant from the Spanish Ministry of Science & Education.

6. REFERENCES

- [1] Freemind. Online; freemind.sourceforge.net [accessed 25-Nov-10].
- [2] Mediawiki. Online; www.mediawiki.org [accessed 28-Mar-11].
- [3] Gillian Brown, Megan Quentin-Baxter, and Zoe Belshaw. WikiVet: Building a Community of Practice to Support a Self-sustaining Wiki for Veterinary Education. *International Journal of Web Based Communities (IJWBC)*, 6(2):183–196, 2010.
- [4] Melissa Cole. Using Wiki Technology to Support Student Engagement: Lessons from the Trenches. *Computers & Education*, 52(1):141–146, 2009.
- [5] Catalina Danis and David Singer. A Wiki Instance in the Enterprise: Opportunities, Concerns and Reality. In *Computer Supported Cooperative Work (CSCW)*, 2008.
- [6] Oscar Díaz and Gorka Puente. A DSL for Corporate Wiki Initialization. In *Advanced Information Systems Engineering (CAiSE)*, pages 237–251, 2011.
- [7] Jonathan Grudin. Enterprise knowledge management and emerging technologies. In *Hawaii International International Conference on Systems Science (HICSS)*, 2006.
- [8] Jonathan Grudin and Erika Shehan Poole. Wikis at Work: Success Factors and Challenges for Sustainability of Enterprise Wikis. In *Int. Sym. Wikis*, 2010.
- [9] Lester J. Holtzblatt, Laurie E. Damianos, and Daniel Weiss. Factors Impeding Wiki Use in the Enterprise: a Case Study. In *CHI Extended Abstracts*, pages 4661–4676, 2010.
- [10] Anthony Judge. Visualization: Structural Outliners and Conceptual Scaffolding. Online; www.un-intelligible.org/projects/transfor/45outlin.php [accessed 25-Nov-10].
- [11] Steven Kelly and Juha-Pekka Tolvanen. *Domain-Specific Modeling: Enabling Full Code Generation*. Wiley-IEEE Computer Society, 2008.
- [12] Hyunkyung Lee and Curtis Bonk. The Use of Wikis for Collaboration in Corporations: Perceptions and Implications for Future Research. In *World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*, 2010.
- [13] Panagiotis Louridas. Using wikis in software development. *IEEE Software*, 23(2):88–91, 2006.
- [14] Ammy Jiranida Phuwannartnurak. Did You Put it on the Wiki?: Information Sharing Through Wikis in Interdisciplinary Design Collaboration. In *SIGDOC*, 2009.
- [15] Murali Raman, Terry Ryan, and Lorne Olfman. Designing Knowledge Management Systems for Teaching and Learning with Wiki Technology. *Journal of Information Systems Education*, 16(3):311–321, 2005.
- [16] Alexander Stocker and Klaus Tochtermann. Exploring the Value of Enterprise Wikis - A Multiple-Case Study. In *International Conference on Knowledge Management and Information Sharing (KMIS)*, pages 5–12, 2009.
- [17] Alexander Stocker and Klaus Tochtermann. Enterprise Wikis Types of Use, Benefits and Obstacles: A Multiple Case Study. In Ana Fred, Jan L. G. Dietz, Kecheng Liu, and Joaquim Filipe, editors, *Knowledge Discovery, Knowledge Engineering and Knowledge Management*, volume 128 of *Communications in Computer and Information Science*, pages 297–309. Springer Berlin Heidelberg, 2011.
- [18] Franck Tétard, Erkki Patokorpi, and Kristian Packalén. Using Wikis to Support Constructivist Learning: A Case Study in University Education Settings. In *Hawaii International International Conference on Systems Science (HICSS)*, pages 1–10, 2009.
- [19] Sacip Toker, James L. Moseley, and Ann T. Chow. Is There a Wiki in Your Future?: Applications for Education, Instructional Design, and General Use. *Educational Technology Magazine*, page 6, 2008.