

Developing open & distributed tools for Fablab project documentation

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Abstract. Fablab project / HOWTO documentation sharing has not had a major focus on Fablab network development so far. To this end, a series of “platform” workshops and calls have been taking place as of August 2010, covering topics from (online) community development in general to formalizing project descriptions in order to accommodate different web platforms used in the distributed Fablab network (initial proposal for open hardware information interchange format – FabML)

The goal of the proposed talk is threefold:

- 1) To demonstrate the checking in & checking out concept for documenting Fablab projects on Drupal platform as part of the lab visit developed at ProtoSpace (Fablab Utrecht, NL) and use of Wordpress as documentation tool
- 2) To demonstrate project documentation aggregation from Fablabs using different open source content management systems used within the network (Drupal, Wordpress, Mediawiki being main ones currently in use), and first practical experiments with aggregation and FabML.
- 3) in the context of the Open Knowledge conference, opening a discussion on open documentation formats for open source hardware documentation.

1 Content

Fablabs are an international network of open access high-end workshops for personal digital fabrication. Equipped with standard machinery they foster peer-to-peer learning on manufacturing, design and technology. Fablabs were created with open design in mind - machines are available to use for free (gratis) with the understanding that users would share their knowledge of how to work with the laboratory machines and document the physical objects that they made in the labs.

While sharing is relatively easy at a local level and on a synchronous, face-to-face basis, mediating technology is needed to share experience over time and across geographical distances. In practice corresponding tools for project documentation have lagged behind the needs of knowledge sharing. This is becoming a key issue as the Fablab network is at the dawn of an exponential growth phase, with currently around fifty labs in operation and another fifty due to open within a year or so.

Even if open source hardware project online repositories do exist (e.g. instructables.com, thingiverse.com), for various reasons these may not cater well enough for the needs of the Fablab network:

- they are run by external, often commercial entities (which despite best intentions might become an issue in the longer run)
- they are not offered as open source platforms that can be installed and configured on independent servers: full customization to Fablab needs is not possible (e.g. localization and “business process” needs (such as visitor logging) cannot be addressed)
- they would cover an aspect so central to the outreach and education agenda of the Fablab network – the sharing of knowledge on how to build things – that it is questionable if such a task really should be outsourced to a third party, potentially hampering the future of Fablab community development

To tackle the issue, a series of “platform” workshops and calls including people from various Fablabs globally have been taking place as of August 2010, covering topics from (online) community development in general to crafting decentralized models for documentation sharing.

One of the key outcomes of these discussions and prototypes in the works was the initial proposal to define an information interchange format enabling different Fablabs sharing their documentation regardless documentation system used at an individual lab. “FabML” would be an XML definition tailored for Fablab / open source hardware project documentation needs – including things such as controlled vocabularies for machines and materials needed to complete a project in order to allow global search and to specify and formalize other aspects of manufacturing as the need arises.

Simultaneously to these talks, prototyping various aspects of the documentation platform took place:

- at ProtoSpace (Utrecht, The Netherlands), documentation station integrated with the website of the lab running on Drupal platform was conceptualized to make project documentation a natural part of lab visit
- at the Swiss Fablab (Lucerne), a Wordpress solution for documenting and sharing (syndicating) Fablab documentation is under development
- An aggregator prototype was started at fabfolk.com (Fablab community tools website) to gather documentation from these initial sources

At ProtoSpace, development of a dedicated documentation station was deemed necessary due to the lab being very popular at times, which gives little possibility for lab personnel to assist lab visitors in much else than questions directly related to machine usage.

As part of the lab management procedures, ProtoSpace has been collecting some information from the users for the purpose of keeping record who’s been there doing what – important for providing overviews for the lab supporting parties. To this end, a “kiosk” has been used – a computer next to lab door to record some demographic data along with people’s intentions of lab use (browser window + simple Google Docs form).

Combining this information gathering need, the kiosk and the needs of documenting resulted in conceptualizing a check in / check out system and completing the circle by designing another kiosk for documenting the lab creations (design and prototype creation at ProtoSpace by Evert Veldhuis for his diploma in Product Design - the design is to be made available under open source license).

As Drupal is the web platform of choice at ProtoSpace, it was natural to use that as the software platform although writing custom desktop software for the kiosk stand was also considered. As a thriving open source software project, Drupal offers a fairly modular way to develop new functionality based on existing building blocks, often even without any custom development. For this prototype most of the needed functionality was provided by Drupal contributed modules providing solutions of issues such as content manipulation workflows, triggerable system events, content type definitions and summary views, which were configured to serve the requirements (in fact no small task either). Only the need to log visitor demographic information and lab usage patterns in a consistent and customizable enough manner required a custom module being developed.

Content type for the actual project description has been in flux until now - the initial version included project name, description, picture of the product (made with Wifi-enabled camera to bypass laborious manual transfer of photographs from camera to computer), machine used and file used to control the manufacturing machine (e.g. STL file to be 3D-printed).

With the most recent version it is also possible to provide step-by-step illustrated instructions as part of the documentation and the content is being handled in a more modular fashion in order to be able to accommodate flexibly enough for future needs.

As the software prototype is being completed, the challenges of this approach are only starting to arise. Even if the intention was to be able to tie documentation process tighter with the lab visit, the feasibility of documentation on the spot is in some cases premature and users have expressed wishes to be able to finish off their documentation upon project completion and in more detail later at home. User interface issues have been prevalent in the earlier prototypes, as the technical solutions for managing the documentation content input have been in flux, even if the existence of physical station otherwise has managed to lessen the documentation helpdesk burden on the lab personnel. It also seems more general education on open source hardware philosophy and creative commons -type licensing might be necessary for those visitors who are new to these paradigms.

The first Swiss Fab Lab at Lucerne uses the Wordpress blogging script to capture documentation. The documentation is currently primarily visual, adding photos of the making process to a flat (textual) step-by-step description of the process. The steps are not marked specifically in some machine readable form, and there is no extra metadata captured beyond what Wordpress logs in its standard set-up.

Wordpress is able to generate almost any RSS feed from whatever is required – whole blog, single categories, tags, comments etc. (for details see http://codex.wordpress.org/WordPress_Feeds) Those feeds normally also include all images that are placed into the post content. However, when there are a number of images (or other media) in the post’s gallery, i.e. attached to the post but not actually placed into the post data, those images are not part of the regular wordpress feed. A specific template was created to generate an RSS feed that includes all attached images, not only the ones placed into the post content. This template uses the Media RSS Module 2.0 specification that supports the `enclosure` element capabilities of RSS 2.0 to allow for more robust media syndication. Additionally a function was added to announce this specific feed to aggregators. This feed could then be read by the aggregator at fabfolk.com.

The two main challenges for capturing and syndicating documentation with Wordpress are adding other media than pictures and adding metadata. Media files could be any IANA media type (see <http://www.iana.org/assignments/media-types/application/index.html>), particularly production files such as CAD drawings, but also machine settings files and similar that might not conform to a IANA media type. For adding meaningful metadata, standard vocabularies specific to open source hardware and personal digital manufacturing and methods for syndicating this metadata would have to be agreed upon.

First prototype aggregator was constructed to gather and parse feeds from these initial sources. It is also based on Drupal due to existing modules able to process incoming data in a meaningful way and knowledge of the platform by project collaborators, although the platform has not been set in stone. Development has so far been focused on mapping out existing Drupal resources for RSS and XML feed parsing, with some thought given to issues arising from distributed content management in general, such as how to handle user feedback to an aggregated content item and how to deal with derivative projects.

The challenges arising from trying to parse initially mostly unformatted RSS feeds for meaningful and searchable project information directly gave us the idea of XML-based documentation sharing format, considering the methods used by content management systems used in individual labs to create RSS feed customized to any extent could also be used to deliver XML feeds without much extra effort. The initial concept of “FabML” proposed to define minimal requirements for open hardware project information sharing, including clearly defining purpose of attached/linked media file(s) and controlled vocabularies to describe machines and materials needed to complete a project.

It is early days yet to formalize all aspects of production, as platforms for documentation at a local level are still partially under development - but the need for defining at least some aspects of production to enable cross-lab shareability of projects clearly exists in an environment as heterogenous as the Fablab network.

Questions we hope to gather input for in the context of open knowledge conference:

- Enquire the need for open source hardware documentation formats and formalization of different aspects of hardware production.

- Use of existing content definition frameworks such as XML, RDF, RDFa and in particular, initial proposal for FabML
- Views and solutions based on experience on issues that may arise from collaboration within a distributed network

2 About the Author

Anu Määttä (M.Sc. Computer Science / University of Helsinki) has deep interest in community building, is currently employed at ProtoSpace (FabLab Utrecht, NL) and contributor to Fablab community and platform development

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