Master Thesis Kick-off Presentation

“Improving the Software Architecture Documentation Process for MediaWiki software”

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Administrative Matters

Time:

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Supervisor:

Prof. Dr. Florian Matthes

Advisor:

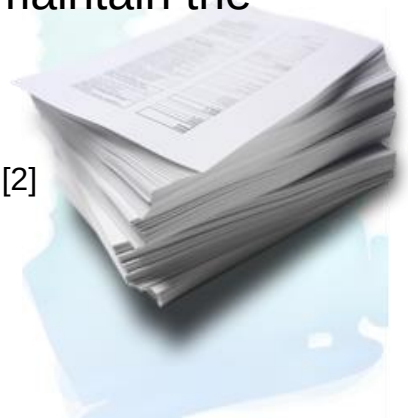
Klym Shumaiev

Agenda

1. Motivation
2. Research Questions
3. Methodology
4. Evaluation
5. Timeline
6. Reference

Motivation

- A good software architecture is the focal point of a good software
- “To make this software maintainable and extendable, a state-of-the-art SA documentation process is required.” - The Software Sustainability Institute
- “SA documentation needs to satisfy the needs of different stakeholders” - Documenting Software Architectures: Views and Beyond
- SA document needs to be up-to-date with changes
- “Software complexity grows with time and it becomes tedious to maintain the documentation” [1]
- Lack of documentation is the downside of open source Software [2]



Motivation

Current state-of-the-art :

- MediaWiki is a complex evolving OSS in recent times
- SA documentation of MediaWiki SA is available on “mediwiki.org” [3]

Available features:

- Commenting / Discussion (Talk)/ History
- Editing - CRUD features
- Access rights and permissions – based on “User Groups” [12]
- Responsibilities - Developers as Maintainers [4] , Gerrit reviewers

Motivation

sebis

Drawbacks of the current DSA process

(derived from interview and email communications with MediaWiki architecture committee members)

- Outdated parts / missing parts of documentation

- Limitations of open source software
  - Irresponsibility to maintain documentation
  - Informal process (Phabricator, IRC channel)

Goal

An improved process to create mid-level SA documentation on Mediawiki.org that automates the tracking and maintenance of documents

Research Questions

RQ1 : How software architecture documentation process can be improved for Wikimedia Software?

RQ2 : What state-of-the-art architecture documentation process (methodology, tools) are available in the industry that meet domain-specific requirements – e.g. Open Source S/W ?

RQ3 : What are the quality characteristics and metrics for evaluation of the software architecture documentation process?

RQ 4 : Which specific requirements of Wikimedia stakeholders should be met by documentation process for Mediawiki SAD ?

RQ 5 : What process can be followed to automate the quality assurance of SA documentation in OSS

Methodology

[Design Science Research in Information Systems]

Methodology

- Find stakeholders
- Interview stakeholders
- Derive new requirements

[Design Science Research in Information Systems]

Methodology

- Survey the available state-of-the-art
- Define metrics for evaluation
- Identify the current system's properties

[Design Science Research in Information Systems]

Methodology - Requirements

Requirements derived for SA documentation process

Maintainability – The process should allow code owners to CRUD the SA documentation.

Evolution and Process Maturity – The documentation process can handle the software architecture growth.

Tracking - An automated control to detect module-level changes in the code and notify code/module owners.

Access rights, roles – Maintain a role-based access to SA document corresponding to the code/module owners.

Accessibility – Provide features like index, glossary, etc. for easy navigation and search of related elements/modules/packages

Versioning and Consistency – Automated consistency resolution to maintain only one up-to-date version of the SA document.

Methodology

- Design an effective solution as per requirements
- Improve the documentation process

✓ Track changes at code level

✓ Send notification to Update/ Add documentation

✓ Analyze the history logs of changes made to the content

✓ Create a dashboard on mediawiki.org

[Design Science Research in Information Systems]

State of the art

Documentation process of MediaWiki Software

Developer

Code commits

GitHub

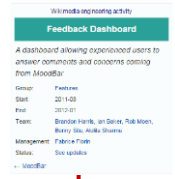
Automatic code documentation generation

Doxygen

Questions

Mails

Comments



#irc

Task creation/update

PHABRICATOR

MediaWiki-Documentation project

CRUD operations

MediaWiki
Because ideas want to be free.

History comparison

Talks

Review (?)

Next iteration

State of the art

Documentation process of MediaWiki Software

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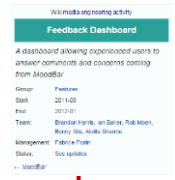

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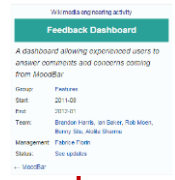

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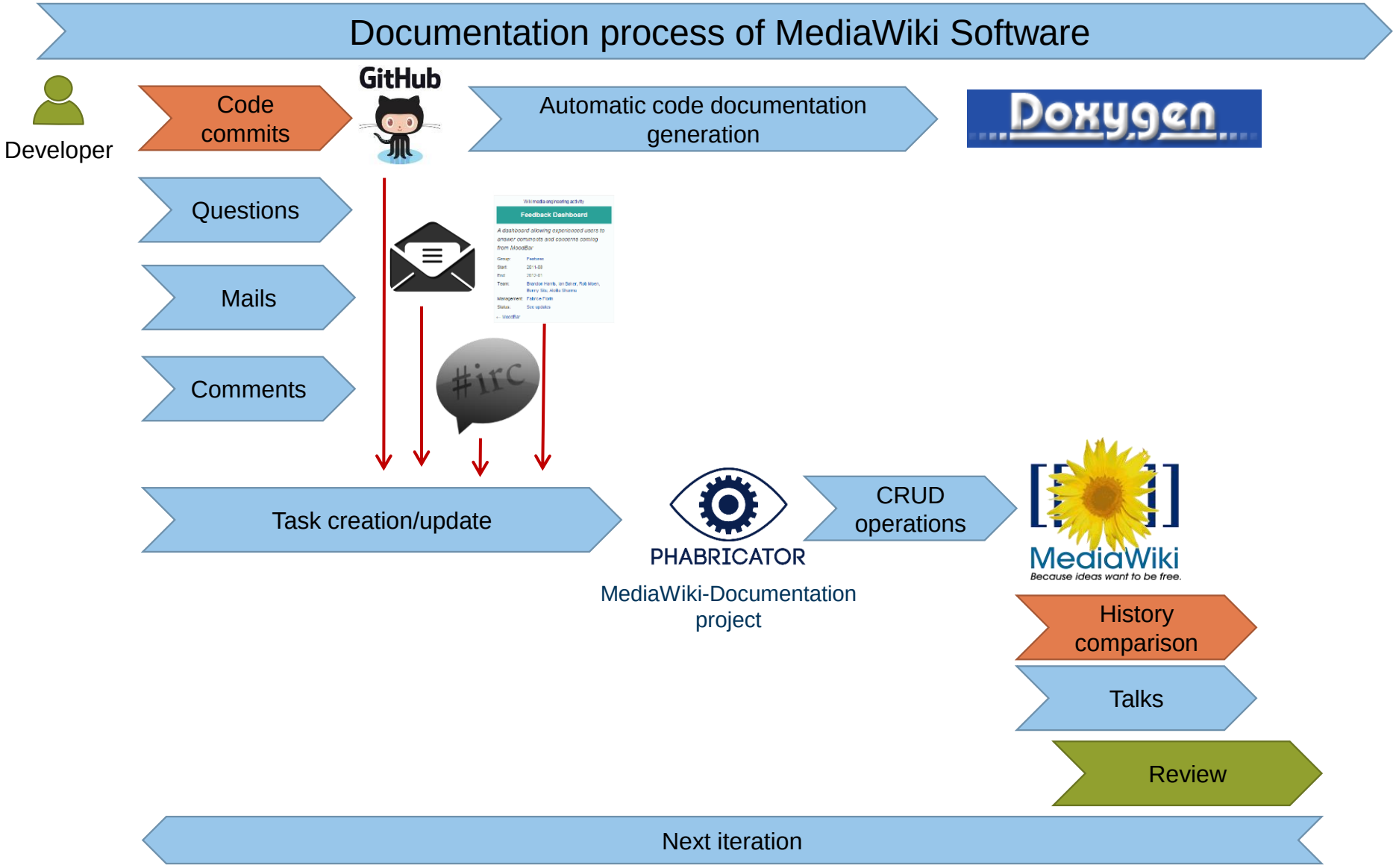
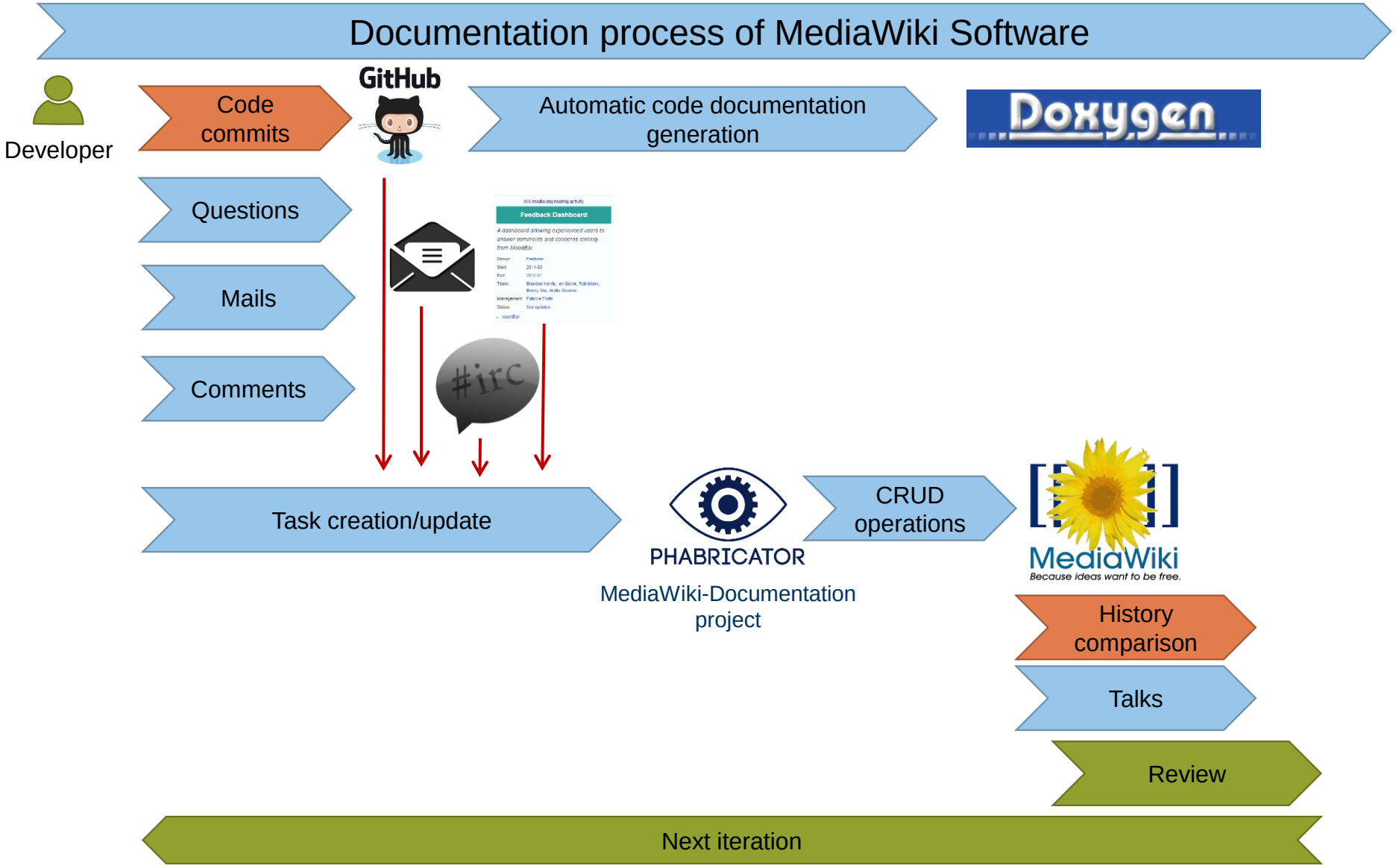


State of the art



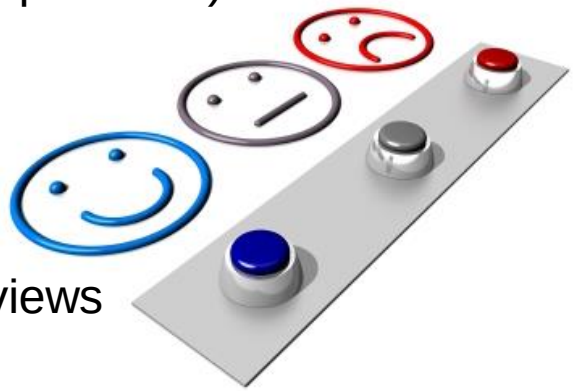
Methodology

- Integrate with the existing system and test.
- Conduct surveys
- Evaluate the improved process

[Design Science Research in Information Systems]

Evaluation

- Evaluate requirement satisfaction (answers to research questions)
  - Is the documentation process improved?
  - Does the process satisfy the expectation of OSS?



- Evaluate stakeholder satisfaction with Survey and Interviews
  - Quality assurance in the improved process - feedback of MediaWiki architecture committee
  - Process stability validation - feedback from MediaWiki developers
  - Ease of use / understandability of the documentation process - new developers
  - Acceptance in the wiki community – interviewing people from different roles and responsibilities (internal employees and external developers)

Metrics for process Evaluation

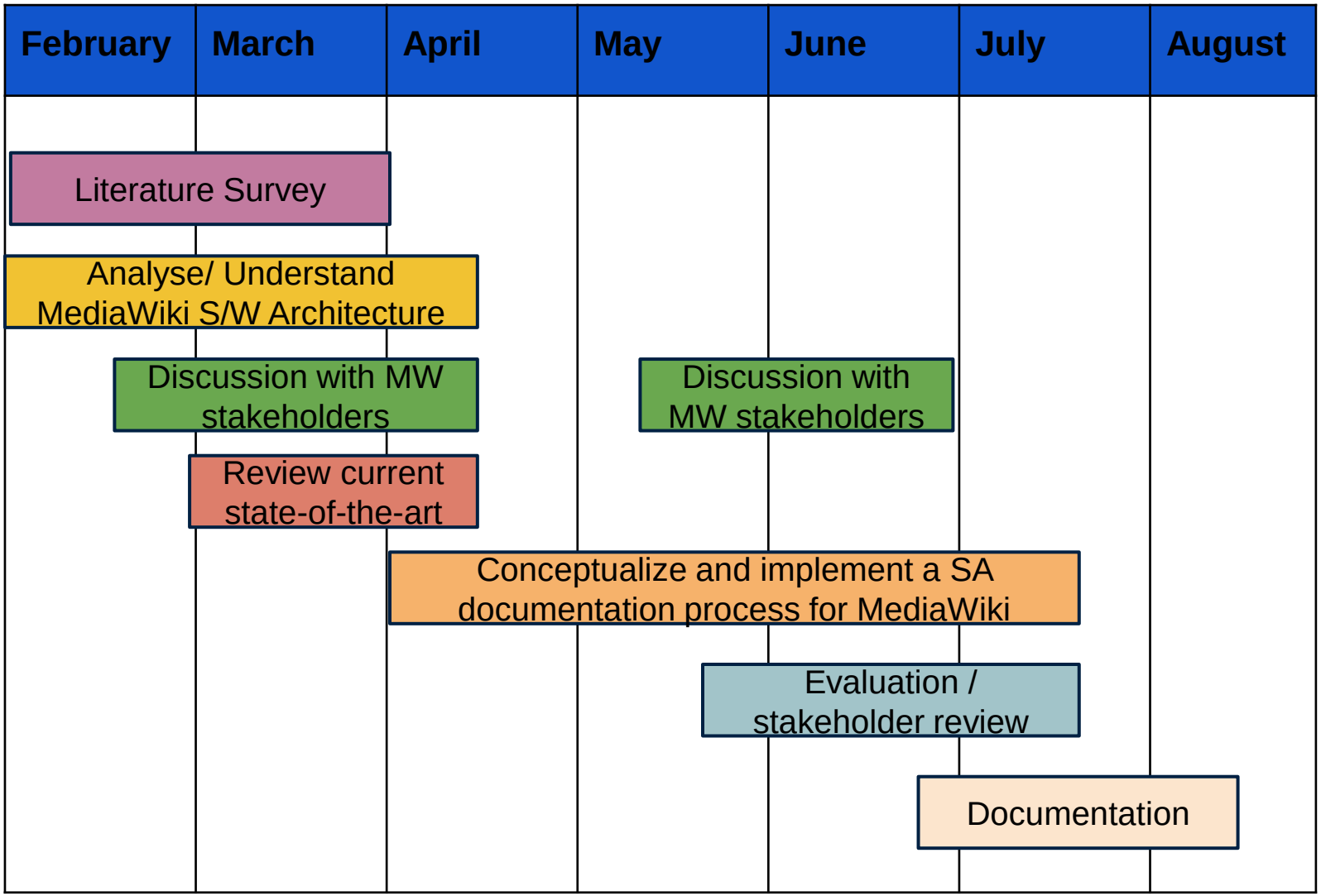
- Maintenance efforts and costs vs. capacity[11]. For example:
  - Personnel
  - Time
- Is the process adequate for its intended purpose?
- QualOSS standards for process evaluation[5]. For example:
  - Review process
- Process features also need to be evaluated[9]. For example:
  - Architecture tracking
  - Multiple user support
  - Capture and reason

Methodology

- Get feedback on the improvements
- Discuss stakeholder satisfaction

[Design Science Research in Information Systems]

Timeline


February
March
April
May
June
July
August
Literature Survey
Analyse/ Understand MediaWiki S/W Architecture
Discussion with MW stakeholders
Discussion with MW stakeholders
Review current state-of-the-art
Conceptualize and implement a SA documentation process for MediaWiki
Evaluation / stakeholder review
Documentation

References

1. http://oss-watch.ac.uk/resources/archived/documentation
2. Fundamental issues with open source software development - Michelle Levesque
3. http://www.mediawiki.org/wiki/Manual:MediaWiki_architecture
4. https://www.mediawiki.org/wiki/Developers/Maintainers
5. The QualOSS Open Source Assessment Model Measuring the Performance of Open Source Communities - Martín Soto and Marcus Ciolkowski
6. A comparative study of architecture knowledge management tools - Babar et.al
7. Documenting Software Architecture - Views and Beyond
8. How Do Open Source Communities Document Software Architecture: An Exploratory Survey – Ding et.al
9. Software Process: A Roadmap - Alfonso Fuggeffa
10. Design Science Research in Information Systems
11. A systematic review of software architecture visualization techniques – Babar et.al
12. http://www.mediawiki.org/wiki/Manual:User_rights#List_of_Groups

Thank you for your attention!
Questions?