Requirement Analysis Document - Yellow Project

William Diedrichsen Marstrand, Dennis Thinh Tan Nguyen,
Jacob Mullit Miniche, Thor Valentin Olesen

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1 Introduction

1.1 Purpose of the System

Today, the amount of data has grown to a level where it is starting to challenge researchers who need to extract the best available research on a specific question. As a result, researchers apply systematic studies on big data sets where they exploit meta data to classify subsets with useful data. This requires smart data processing tools that can use meta data to narrow down relevant research data. The purpose of such a systematic review is to sum up the best available research on a specific question. This can be achieved by combining the results of several studies. In this regard, the system in this project is comprised of two parts, client and server side. Our system scope is restricted to the server side and shall support the configuration of summarized research data relevant to a given research question.

1.2 Scope of the System

The server shall provide teams with tools to conduct secondary studies (SMS or SLR). It should support activities of planning and conducting a review distributed in a research team. The server shall make sure that all data is stored for use in setting up a study configuration requested by the client. The system should support .bibtex files as a minimum. Security matters (e.g. user authentication) are not taken into primary account due to the scope of the project. In order for the system to fulfill the previously described purpose, it has to support the tasks described in the "Proposed System" section **??**. Among these, the system shall support management of distributed research systems to work on a study. The reviewers should be able to export data sets and filter them with inclusion and exclusion criteria. Finally, the system should allow specific sets of data to be reviewed and screened by specific members of a research team.

1.3 Objectives and Success Criteria of the Project

The system should be easy to deploy and install. It should include an installation and user manual used to describe how to configure and prepare research papers for screening. It should be easy and quick to distribute relevant data and the overview should outcompete the one achieved in other third-party programs such as e.g. Excel. The system should define rules for which data goes to whom to achieve a succesful screening of paper and efficient data extraction. The yellow system has to provide a user interface from which the blue team can extract data based on user roles and rules. The system has succeeded if users in the blue team can query the yellow system for relevant studies and tasks based on a given study configuration. Specifically, the yellow system should collect research and aggregate stacks of research material based on a research question. The blue system should then efficiently be able to extract a subset of primary studies provided from the screening of the search hits in the yellow system. The configured data may then be used by reviewers in the blue system (visualize, sort, export and categorize). Finally, the system should be able to replicate an existing study.

1.4 Definitions, Acronyms, and Abbreviations

- Systematic Studies: methodology used to sum up the best available research on a specific research question or topic.
- Yellow system: server side also referred as "server"
- Blue system: client side also referred as "client"

1.5 References

Tell, Paolo, and Steven Jeuris. Autosys: Supporting Distributed Teams Performing Systematic Studies. 1st ed. Copenhagen: ITU, 2015. Print.

1.6 Overview

The rest of the document will describe the current systems available and the proposed system in our project along with the requirements collected from users, customers and stakeholders. The system requirements are used to generate system models such as potential scenarios and use cases.

2 Current System

The current is a Excel based application which facilitates searches on academic topic. The system does not contain the articles, but data regarding the articles content. The system support multiple users to contribute data and makes it possible to identify if another user is contributing data on the same article. The Data contributed is mostly keywords, which makes it easier to search and compare articles. To search for articles, a user must submit keywords, which the articles will be ranked after. Articles are also ranked after the amount of keywords they have in common with other articles.

The current system can work, but become increasingly hard to manage. Therefor a new system which solves the negatives while keeping all of the functionality the system already support is recommended. This can be done with a separation of the data and the user interface, by creating a dedicated database and a dedicated user interface. This will ensure that new functionality will not be limited by the database structure.

The negatives and pros of the current system are described below:

2.1 Pros of current system

The systems pros are as following:

1. Excel licenses are cheap and is widely used by customer base
2. Its simple and easy to augment and implement changes.
3. If the excel files are Read Only, then data the is safe from hostile users.
4. It's easy to implement version control via systems Git or other systems.

2.2 Negatives of current system

And the systems Negatives are as following:

1. The data structures can be hard to manage, especially as the system grows in scope and content.
2. The system does not support multiple users editing the same files at the same time.

3. The system interface leaves a lot to be desired.
4. New features becomes hard to implement as the systems grow.

3 Proposed System

3.1 Overview

The system must be able to handle big amounts of data in the form of research papers and support tools for conducting Systematic Literature Reviews (SLR) to answer one ore more focused research questions and Systematic Mapping Studies(SMS) which uses key-wording to find relevant data.

3.2 Functional Requirements

The system must support the following functional requirements:

- Use of an external database for storing the data
- Defining the phases of a study
- Allowing creation and management of classification criteria for different studies
- Allowing creation and management of inclusion and exclusion criteria
- Configuration of future phases in a study
- Storing of information about delivered tasks
- Storing data about Users and Teams
- Filtering of research papers based on demographic information specified in a user request
- Screening of imported research papers resulting in an export of papers consisting of primary studies (set of relevant papers)
- A role engine which identifies user rights
- A viewer role
- A validator role
- Handling multiple client requests concurrently
- Storing quality ratings of research papers based on coverage according to specific research criteria
- Indexing of the research papers in the database for faster look up times
- Use of prepare statements on database queries to secure against malicious user input
- Storing common queries to speed up response time
- Extraction of data samples from specific studies for further validation by a validator role
- Generation of a research protocol
- Being able to export studies as plain data sets in different formats at the least the comma separated values(cvs) format
- Automatic system restart upon system failure
- The system must be complemented with an installation manual and a user manual

3.3 Nonfunctional Requirements

The system must support the following nonfunctional requirements:

3.4 Usability

- The Users must be able to configure a study through the use of at most 3 application windows
- Users with no background in IT must be able to figure out and use the complete set of tools which the system provides
- The user manual must provide knowledge about the interfaces provided by the system

3.5 Reliability

- System restart upon system failure should be done within 30 seconds
- The system must always be available
- The system must only accept tasks send from the same user who received them in the first place
- The latest version of the system should always be available through a back up

3.6 Performance

- The system should identify the role of a user and load the appropriate studies within 15 seconds
- A user request for specific data should be acknowledged no more than 10 seconds after it is received
- The time before a response is send should be no more than 30 seconds after the request is received
- The system should support at least 200 users

3.7 Supportability

- The server is maintained by the supplier of the system
- The system must be fully functional independent of the other subpart of the complete system (the blue component)
- The type of server used to store the data should be a MySQL server

3.8 Implementation

- Be developed in C# and WPF
- Data fields in the database should support the types: String, Boolean, Enumeration,Tags, Resource
- The system should run flawlessly on any Windows operating system newer than Windows XP

3.9 Interface

- The system user interface for study configuration must at any time be replaceable by a newer version

3.10 Packaging

- The set up and installation of the server is done by the provider of the system independent of the client
- An employee with no prior knowledge about the system must be able to install and set up the server within a period of 15 min

3.11 Legal

- The system should be publishable as Open Source Software in accordance to the GNU General Public License v2.0
- The system should store data on a MySQL server provided by the IT University of Copenhagen following the rules issued by the institution

4 Scenarios

This section containts various scenarios regarding operations between the user and the system.

Scenario name	bobStartsNewStudyConfiguration
Participating actor instances	bob:`Researcher` System:`AutoSys System` Configuration UI:`StudyConfigurationUI`
Flow of events	1. Bob the `Researcher` has to start a new research and opens the client from `StudyConfigurationUI`. 2. Bob logs into the client and navigates to the "Study Configuration" page. 3. Bob specify two reviewer and one validator and defines a research question based on some inclusion- and exclusion criteria to specify what papers should be returned. 4. Bob confirms his study configuration and sends the request to the server by pressing "ok". 5. The `AutoSys System` returns an overview of the study configuration to the client.

Table 1: Scenario when a user creates a new study configuration

5 Use Case

6 Glossary

- Systematic Review Client: Is the client part of the system which broadly provides the User Interface for requesting data about papers, reviewing papers, and validating papers.
- Study Configuration Server: Is the server (including the database) where all data is stored, and user requests regarding papers are handled.
- Study Configuration UI: Is the User Interface supporting only work tasks regarding the configuration of studies e.g. study tasks, study phases etc.

Scenario name	ClientFilteringOperation
Participating actor instances	server:`Study Configuration Server` client:`Study Review UI`
Flow of events	1. `Study Configuration Server` is receiving a request from `Study Review UI`: Filtering keywords Design pattern, 2005, A gang of four 2. `Study Configuration Server` validates clients authentication. User credential is accepted. 3. `Study Configuration Server` measures all studies based on the given keywords. 4. `Study Configuration Server` finds 20 studies and a list is formed. Each study element in the list contains data about it. 5. `Study Configuration Server` replies to the clients request by sending the article list of found articles. 6. `Study Configuration Server` returns an overview of the `Study Configuration` to the `Study Review UI`,

Table 2: Scenario when a user sends a request with given filtering keywords trough the `Study Review UI`.

Scenario name	ClientGetsToManyRelevantPapers
Participating actor instances	server:`Study Configuration Server` client:`Study Review UI`
Flow of events	1. `Study Configuration Server` is receiving a request from `Study Review UI`: Search keywords 2001,2002,2003,2003,2004,2005,2005,2006,,2007 2. `Study Configuration Server` validates `User` authentication. `User` credential is accepted 3. `Study Configuration Server` measures all articles based on the keywords. 4. The list containing papears exceeds 10.000 papers, and the exception ToManyHitsException was thrown. 5. A response is sent to the `Study Review UI` that there in fact was too many papers returned.

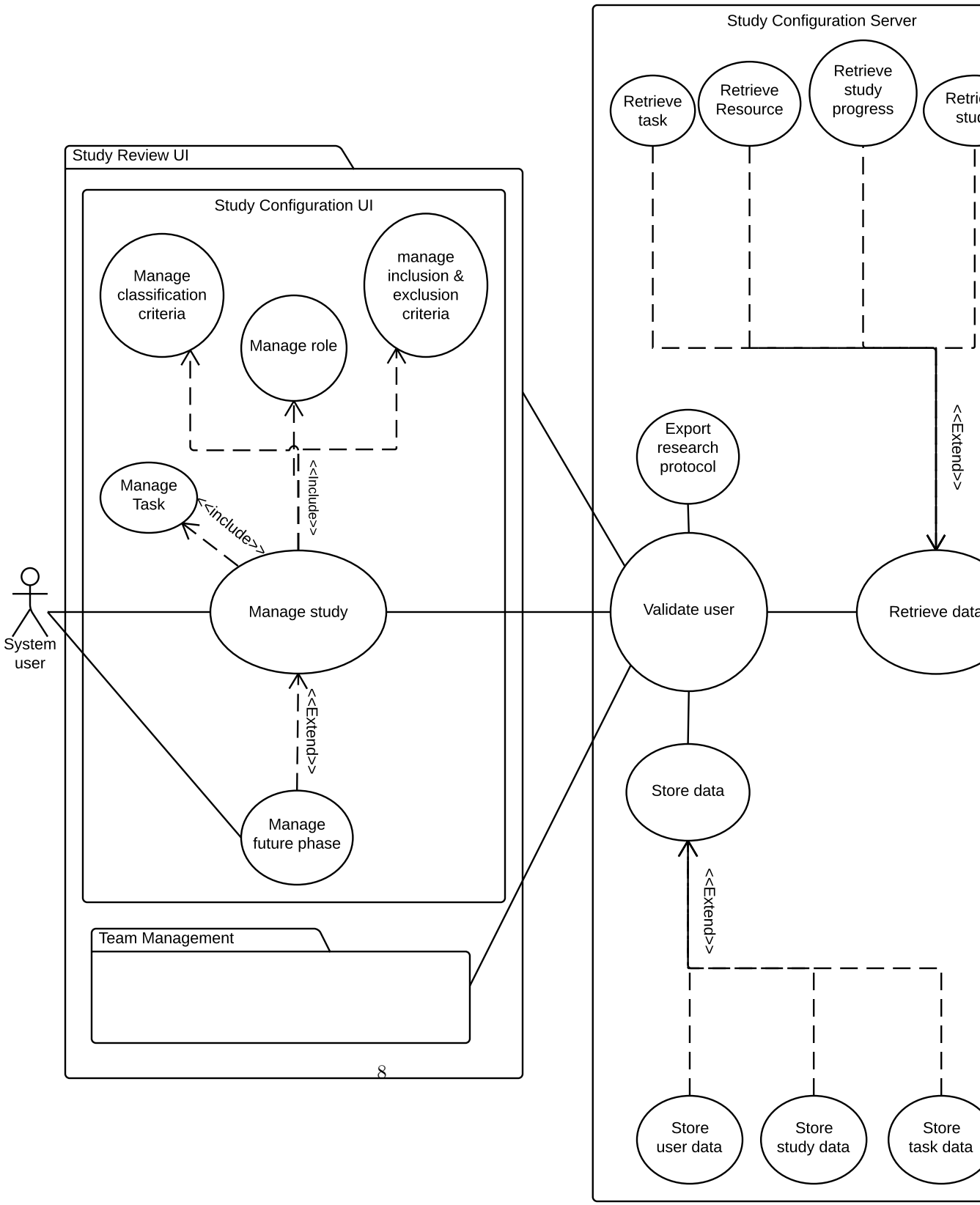
Table 3: Scenario when a user has requested to many papers during one request.

Scenario name	ExcludingPapersAboutDesignPatterns
Participating actor instances	server:`Study Configuration Server` client:`Study Review UI`
Flow of events	1. `Study Configuration Server` is receiving a request from `Study Review UI`: Search keywords Design pattern, 2005, A gang of four, ExcludingAllNonAssignedArticles. 2. `Study Configuration Server` validates `User` authentication. `User` credential is accepted. 3. `Study Configuration Server` measures all articles based on the keywords. 4. 10 relevant articles was found but 5 was excluded because of the exclusion criteria. 5. A list with the remaining 5 articles is returned from `Study Configuration Server` to the `Study Review UI`

Table 4: Scenario when a user wants to exclude some papers.

Scenario name	ClientRequestWithInvalidUser
Participating actor instances	server:`Study Configuration Server` client:`Study Review UI`
Flow of events	1. `Study Configuration Server` is receiving a request from `Study Review UI` on task retrieval for a `User` named "bob" which is an invalid `User`. 2. `Study Configuration Server` validates `User` authentication. 3. The given `User` is not valid because it does not exist in the database. 4. A response is sent to the `Study Review UI` detailing why bob does not have access to the `AutoSys System`.

Table 5: Scenario when a invalid user is trying to get access to the server.


Study Configuration Server
Retrieve task
Retrieve Resource
Retrieve study progress
Retri stud
Study Review UI
Study Configuration UI
Manage classification criteria
Manage role
manage inclusion & exclusion criteria
Manage Task
<<include>>
<<include>>
Manage study
Manage future phase
<<Extend>>
<<Extend>>
Export research protocol
Validate user
Retrieve data
Store data
<<Extend>>
Team Management
System user
Store user data
Store study data
Store task data