Interactions with Domain Experts

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The purpose of the document is to describe the interactions with the domain experts. For each domain that is measured, a domain expert is a member of the assessment team. Their role is to provide their expertise on the domain and the existing software. The domain expert will typically be a faculty member. Ideally their graduate students will also assist with the measurement process.

The interactions with the domain experts are divided into 3 stages:

- Stage 1 - Introductory Meeting in Section **??**. In this meeting, we will be focusing on introducing the background and objectives of the project and vetting some details and plans.

- Stage 2 - Measuring in Section **??**. Vetting the Domain Analysis, usability experiments, modifiability experiments, and developer interviews are included in this step.

- Stage 3 - Concluding Meeting in Section **??**. Our second and the last meeting, aiming to be one hour in duration. Results of ranking will be discussed.

1 Introductory Meeting

1.1 Prerequisites

This section contains the tasks of preparing for the introductory meeting. These tasks need to be finished before the meeting.

1.1.1 Top 10 Software List

The domain experts need to prepare the top 10 software packages of their choice. Feedback can be provided in Task **??**.

1.2 About this Meeting

Presenter: [TBD —AD]

The meeting will be roughly one hour. We will go through all the steps in Section **??**.

In the interest of time, some topics will only be discussed briefly during this meeting, and tasks will be assigned to domain experts to finish later. For example, Task **??** in Section **??**.

We will create issues on GitHub to track the progress of the tasks. Details can be found in Appendix **??**. The tasks can also be found in Appendix **??**.

1.3   Overall Objective

Presenter: Dr. Spencer Smith and Dr. Jacques Carette [TBD —AD]

As described in the document Objectives And Research Questions, the overall objective asks "What is needed to produce {software + artifacts} sustainably?" The definitions of *software*, *artifacts* and *sustainably* can be found in the same document. The term *softifacts* will be used to refer the combination of software and artifacts.

According to the above document, to answer the above question, we will need to find answers for these two questions,

1. "What softifacts, in addition to the code, are needed?"

2. "What software engineering principles, processes and methodologies should be employed?"

1.4   Research Proposal

Presenter: Dr. Spencer Smith [TBD —AD]

The research proposal is documented in Research Proposal.

1.4.1   State of the Practice

MEng students will perform assessments to the state of the practice in several Scientific Computing Software (SCS) domains. Domain analysis will be conducted (related to Section **??**). About 20 to 30 software projects will be chosen for the measurements, and the software list is in Section **??**. The questions and metrics (including empirical measurements) to assess the projects are documented in the Section **??**.

Additionally, we will also perform Usability Tests (Section **??**) and Modifiability Experiment (Section **??**)

To compare each software quality and the overall quality, we will use the Analytic Hierarchy Process (AHP) to rank software projects in each domain. The first ranking will be for all projects, and the final ranking will be for the short list projects (more details in Section **??**). The ranking results will be the topic for our last meeting - the concluding meeting in Section **??**.

1.4.2   Impact of MDE on the Sustainability of SCS

1.5   Research Questions

Presenter: Dr. Spencer Smith [TBD —AD]

The research questions are documented in the section Current State of the Practice Research Questions of Objectives And Research Questions. Guided by overall objective in Section **??**, these questions focus on researching on "i) knowledge, ii) principles, processes and methodologies, iii) software qualities and iv) the necessary investment of time and energy".

Do you have any thoughts on one of the questions - What are the "pain points" for developers working on SCS projects? What aspects of the existing processes, methodologies and tools do they consider could potentially be improved?

1.6 Vetting the List of Candidate Software

The software list is Medical Imaging Software List or Lattice Boltzmann Solver List. [TBD —AD]

What do you think of the list of the selected software?

Is there any software you would like to remove from or add to the list?

Feedback can be provided later in Task **??**.

1.7 Publication

Presenter: Dr. Spencer Smith and Dr. Jacques Carette [TBD —AD]

- Where should we publish this paper?

- Who are our targeted readers?

1.8 Schedule & Team

Presenter: [TBD —AD]

- We propose to start this project from ... and finish it before ... . What do you think?

- Our meeting schedule is ... does it fit your plan?

- We need ... extra members from your team, each working ... hours per week for ... weeks. What do you think?

- Are there any other experts you think we should keep them involved?

1.9 Introducing the Next Steps

2 Qualities & Measurements

2.1 Vetting the Domain Analysis

Task leader: Ao and Peter

The domain analysis can be found in Section 3.2 of SRS for Medical Imaging Software or CA of Lattice Boltzmann Solvers.

Please review the Figure 1 in SRS for Medical Imaging Software or Figure/Table ? [TBD. It can be a summary of the commonalities, variabilities and parameters of variation in tables, or possibly graphs. —AD] in CA of Lattice Boltzmann Solvers. What do you think of our analysis for the scope of the family, commonalities, and variabilities for this domain?

Our preference is to have feedback from several graduate students. Feedback can be provided in Task **??**.

2.2 Measurement Template

Task leader: Ao or Peter

The template for software quality measurements can be found at Measurement Template.

As described in Task **??**, domain experts are expected to take a look at this template. Feedback are welcome but not required.

2.3 Survey for Short List Projects

Task leader: Ao or Peter

After the first round of measurement, we would like to select a short list of projects (about 5 to 10 of them for each domain) and directly ask questions to the developers.

Considering the fact that some development teams may ignore our requests for this interview, We would like to send invitations to all of the teams developing the software packages in the list. We estimate that there will be a smaller proportion of them accepting our request. What do you think of this process? Feedback can be provided in Task **??**.

The survey questions to the developers can be found at Questions to Developers.

We also would like to ask the domain experts a modified version of the above questions. The purpose will be to learn how our domain experts and their students create software. If we time it right, the interview with the domain experts is also a chance to do a dry run with our questions. We can use Task **??** to manage the progress of the survey with domain experts.

2.4 Usability Tests

Task leader: Olu

A brief introduction. [To be written —AD]

The usability test can be found at ... [TBD —AD]

Feedback can be provided later in Task **??**. We can also use the same task to manage the progress of the tests.

2.5 Modifiability Experiment

Task leader: [TBD —AD]

A brief introduction. [To be written —AD]

The modifiability experiment can be found at.. [TBD —AD]

Feedback can be provided later in Task **??**. We can also use the same task to manage the progress of the tests.

3 Concluding Meeting

3.1 First AHP Ranking

Presenter: [TBD —AD]

A brief introduction about the ranking results.

Do you have any feedback? Feedback can be provided in Task **??**.

3.2 Final AHP Ranking

Presenter: [TBD —AD]

A brief introduction about the ranking results for the short list software packages.

Do you have any feedback? Feedback can be provided in Task **??**.

A Project Management Tools

We would like to use GitHub for task tracking and document version control. The repository for this project is https://github.com/smiths/AIMSS.

Tasks will be created as issues on the repository and assigned to individual stakeholders. An open issue usually means a task to be fulfilled, and it can be closed once it is finished. Here is an example of an issue https://github.com/smiths/AIMSS/issues/19.

B Tasks for Domain Experts

B.1 Create a Top 10 List

GitHub Issue: https://github.com/smiths/AIMSS/issues [To be created —AD]
Refer to Section ??

B.2 Vet the Software List

GitHub Issue: https://github.com/smiths/AIMSS/issues [To be created —AD]
Refer to Section ??

B.3 Vet the Domain Analysis

GitHub Issue: https://github.com/smiths/AIMSS/issues [To be created —PM]
Refer to Section ??

B.4 Read the Measurement Template

GitHub Issue: https://github.com/smiths/AIMSS/issues [To be created —AD]
Refer to Section ??

B.5 Review the Process of Creating a Short List

GitHub Issue: https://github.com/smiths/AIMSS/issues [To be created —AD]
Refer to Section ??

B.6 Take the Survey for the Short List Projects

GitHub Issue: https://github.com/smiths/AIMSS/issues [To be created —AD]
Refer to Section ??

B.7 Participate in the Usability Tests

GitHub Issue: https://github.com/smiths/AIMSS/issues [To be created —AD]
Refer to Section ??

B.8 Participate in the Modifiability Experiment

GitHub Issue: https://github.com/smiths/AIMSS/issues [To be created —AD]
Refer to Section ??

B.9　Review the First AHP Ranking

GitHub Issue: https://github.com/smiths/AIMSS/issues [To be created —PM]
Refer to Section **??**

B.10　Review the Final Short List Ranking

GitHub Issue: https://github.com/smiths/AIMSS/issues [To be created —PM]
Refer to Section **??**