

This document is intended to provide a basis for Midterm Senior Project Evaluations and is intended for use by the Faculty Coach, the Project Team, and any stakeholders, including the Project Sponsor. The evaluation criteria below are divided into two main areas: Process/Project, and Product. As it is early in the project, primary focus is placed on the Process/Project areas; later evaluations will focus much more heavily on product. Because each area is expansive and often includes entire classes covering them, a sample rubric, some questions, and general evaluation categories have been provided to increase understanding of what is expected throughout the project.

To use this document, go through each area and facilitate discussion. It is not necessary to complete each rubric or to fill in each question, but students should be encouraged to individually do so, meet as a group for comparison, and report back to the faculty coach and sponsor any results or conclusions they reach.

# **Process and Project**

The tendency to focus on the product often leaves the process and the project out in the cold, especially in projects with set or compressed schedules. A well developed Software Engineering team knows that the returns paid within the Process and Project domains far outweigh the time and expenses that occur. Although the list below is not exhaustive, it includes some of the primary areas of importance.

# **Meetings and Communications Management**

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	Sample Rubric: Meetings and Communications Management						
Meetings were held	Meetings included	Meetings included	Meetings included	Meetings were pre-			
only at regular	standing agendas	predetermined	predetermined	organized, included			
intervals or as a result	which were	agendas, but the	agendas and were	prepared agendas,			
of a crisis and did not	occasionally followed	agenda was not used	somewhat organized,	followed expected			
include agendas or		within the meeting or	but were occasionally	format, and did not			
pre-planning		evaluated afterward.	allowed to stray from	include content that			
		Included some items	format. Content	did not necessitate a			
		which did not	necessitated a	meeting			
		necessitate a meeting	meeting				
Communication with	Communication was	Communication was	Communications with	Communications with			
stakeholders was	conducted out of	scheduled and	stakeholders were	stakeholders were			
reactive or crisis-	necessity but was	typically took place.	regular and generally	regular, proactive,			
driven, did not occur	rarely proactive and	Expectation	proactive.	and purpose-driven.			
when expected, and	did not account for	management was	<b>Expectation</b>	Language was clear			
did not clearly	stakeholder	rarely contemplated	management was	and included			
communicate	expectation		occasionally used.	expectation			
expectations	management			management			
In terms of customer	Team blindly accepted	Team missed some	Team provided	Team made sure at			
education, team had a	customer inputs, did	occasions when	technical inputs to	every stage to			
negative attitude	not convey own	customers needed	customer when	educate customer and			
towards the customer	knowledge	education or	needed or asked for	provide/seek			
and did not bother to	adequately	clarifications were		clarifications			
assist them		needed					



#### **Comments:**

Meetings were regular but sometimes went longer than necessary. Everyone would show up.

- 1. Is the team conducting effective meetings? What can be changed to make the team meetings more productive?
  - The team has been meeting at regular times throughout the week. At first, meetings agendas were on-the-fly and meeting were not too effective, but soon, meeting agendas and purposes became more defined and the productivity increased. Meetings could become more productive with sub-team agendas and objectives so all bases of the project are covered.
- 2. How well has the team been communicating project progress to the sponsor? What regular communication does the team have with the sponsor? Has the team been maintaining this communication to the satisfaction of the sponsor? Were any adjustments needed in the communication over time? Were these changes initiated by the team or the sponsor?
  - Communication with the project sponsor/coach has been going well. It the beginning, the communication was difficult because the scope kept expanding beyond what the team thought was achievable. This communication issue was resolved with the making of an "idea soup" document, where all potential future ideas for the project are stored and tracked, separate of the current features being developed. Meetings with the project sponsor/coach have been regularly occurring on Tuesdays, where ideas are added to or removed from "idea soup" and project updates are presented.
- 3. Did the team need to provide technical input to the sponsor? How well did the team educate the customer in these areas? What mechanism did the team use?
  - The only example of technical input to the sponsor/coach was correction of the capabilities of the AI tracking algorithm. Other than that, the project sponsor/coach is heavily invested, interested, and knowledgeable about the capabilities of the robotic arms and their interfaces.
- 4. What mechanism does the team use to communicate with the faculty coach? Has communication with the coach been effective? Are there any trouble spots with the faculty coach communications? What can the team change for next term to make their communication to the faculty coach more effective? What can the faculty coach change to make his or her interaction with the team more effective?
  - Given that the project sponsor and the coach are the same person, it is sometimes hard to draw the line between if the advice is coming from the role of "coach" or "sponsor". Sometimes, it



seems like the advice that comes from the coach is biased towards a greater scope from the excitement given by the sponsor's point of view. This led to some scope creep that was difficult to resolve prior to the creation of "idea soup".

### **Sponsor/Stakeholder Communications**

#### **Comments:**

Communication was only during meetings with the exception of a few detailing emails. Sponsor always attended Tuesday meetings and usually showed up to check in on Thursdays as well.

#### **Faculty Coach Communications**

- wowy
Comments:
See above

SE Department Personnel Communications and Coordination with Other Teams					
Comments:					
N/A					

### Time and Effort

Sample Rubric: Time and Effort						
Student effort was	Students effort only	Student effort was	Student effort was	Students consistently		
minimal, not meeting	met minimum	adequate to meet	consistently better	put in full effort, even		
minimum	standards, and	project requirements,	than average, even	when internal or		
requirements and	excuses or blame was	but was frequently	with negative internal	external factors have		
putting the success of	often used to explain	hampered by both	factors. External	hampered progress		
the project in crisis	the effect of internal	internal and external	factors occasionally			
	or external hampering	factors	affected effort levels			
	factors					

#### Comments:

At the beginning of the project, team efforts were slow to start technical implementation. However, not long after, efforts were productive and consistent.

1. Has the level of effort of individual team members been reflected in the output of the team as a whole?

Individual team members have been putting in consistent effort to complete the objectives of the project. For the most part, no effort put in by team members has been irrelevant or failed to push some kind of objective.



2. To what extent has thrashing (unproductive work) become a factor?

A bit of trashing on the initial interfacing with the robotic arm directly and in sending it specific commands. Other than that, there has not been much trashing in terms of development since coding only started a few weeks ago.

### **Conformance to Schedule**

Sample Rubric: Conformance to Schedule							
Did not demonstrate	Met minimal schedule	Met most schedule	Met most or all	Actively managed and			
any schedule	requirements but	requirements with	<mark>schedule</mark>	met all schedule			
management and did	showed no schedule	little or no active	requirements with	requirements			
not meet schedule	management	schedule	some active schedule				
requirements		management	management management management				

#### Comments:

There is a team-managed schedule that we have stuck to, but the first sprint was extended to allow time to reach a more complete feature set.

1. Has the team met all project milestones to date? Which milestones, if any, were missed or were met ahead of schedule? What contributed to this schedule changes? What will the team do differently to ensure that future milestones are met?

The first sprint when over schedule. Varying factors affected the lack of forward progress including the thrashing with robotic arm interfacing, which blocked a lot of the development in other avenues of the project.

# **Change and Scope Management**

Sample Rubric: Change and Scope Management					
Did not demonstrate	Occasionally	Addressed change	Addressed change	Actively managed	
awareness of issues as	identified change or	and scope when	and scope regularly	change and scope,	
change or scope	scope issues as such	issues were presented	but not always	seeking out and	
issues but rather as	but often addressed	with little or no root	actively addressing	addressing issues	
individual problems	them reactively as			before they affected	
	individual problems		issues before they	the project. Used	
			<mark>occurred</mark>	root cause analysis	

#### Comments:

Project scope was managed regularly, and changes were considered. Overall, scope stayed on-track very well especially given its research project nature.



1. Has the scope of the project been considered at each milestone?

The scope of the project is a constant topic of discussion. "Idea soup" is appended to with new ideas and old ones are purged out, creating a realistic pool of features to consider for future iterations. We have not reached our first milestone yet, but there are plans to revise the scope for the next iteration after the first prototype.

#### **Risk Management**

#### **Comments:**

There was a lack of risk management, but several risks were consistently considered as issues that could affect the development of the project.

# **Deliverables**

Sample Rubric: Deliverables					
Deliverable was not	Deliverable was	Deliverable met	Deliverable was	Deliverable	
present and not	delivered with	standards and was	better than average	performed as	
substituted with other	minimal effort and did	useful at introduction,	and was used or	expected, was	
efforts or deliverables	not contribute	but was not updated	enhanced irregularly,	reviewed and	
	significantly to the	or useful further along	performing its desired	enhanced at regular	
	success of the project.	in the project. Few	function within the	intervals, and would	
	Some obvious	obvious problems or	project. No obvious	have consistently	
	problems or	inconsistencies were	problems or	allowed someone not	
	inconsistencies were	present	inconsistencies were	familiar with the	
	present,		present	project to become	
	demonstrating little			informed	
	QA occurred				

#### **Comments:**

Class diagrams and domain models were created as tools for the team to formalize the scope and features of the project, but were not updated past their initial submission.

1. How often do these artifacts get updated on the department project website?

Artifacts for this project are not on the department website. They are hosted in a public GitHub repository where they are updated at least twice weekly.

2. Has the team had any issues with configuration management? How were these problems solved? What percentage of project artifacts is under configuration control?

There have been no issues with configuration management. Project artifacts are version



controlled through Git and the source code has clear requirements in order for it to run properly.

# **Project Website**

#### Comments:

The project website has been actively managed on the GitHub.

### **Time Tracking**

### Comments:

The team created a spreadsheet to track hours, but entries have been inconsistent.

#### **Project Plan, Similar Project Deliverables**

#### **Comments:**

Project plan was created initially, and discussed informally among the team, but updates to the documentation have not been formally made.

### **Risk Management Table**

#### **Comments:**

There was a lack of risk management, but several risks were consistently considered as issues that could affect the development of the project.

# Quality

Sample Rubric: Qual	Sample Rubric: Quality						
Little attention was	Requirements were	Requirements	Conformance to	Conformance to			
paid to initial	created and used as a	management and	functional	functional and non-			
requirements and the	guideline for initial	quality control were	requirements was a	functional			
final product related	efforts, but were	performed irregularly,	priority, but non-	requirements was			
only loosely to them	rarely addressed later	but there was an	functional	clearly a priority and			
	in the project	understanding of the	requirements often	actively prevented			
		link between quality	took a back seat,	scope creep and			
		and conformance to	relating to quality	<mark>similar issues</mark>			



		requirements	control	
A customer-view of	Customer satisfaction	The group understood	Customer satisfaction	Customer satisfaction
quality was not	was implied as a	that customer	was a priority, and	and a long-term scope
considered	requirement but not	satisfaction was	some attention was	as a priority was
throughout the	effectively	important, and	placed to areas such	demonstrated in each
project	understood by the	occasionally	as maintainability,	project step and
	team. Treated as a	addressed it, but	but some imbalance	properly balanced
	requirement rather	focused primarily on	occurred	with conformance to
	than a separate	requirements <b>requirements</b>		requirements and
	quality factor			scope

#### Comments:

Quality of software was acceptable by team standards, but scope creep via sponsor recommendations and loose requirements occasionally hindered progress.

1. How well has the team maintained quality control over the project artifacts? Have all artifacts been reviewed for adherence to quality standards? What is the review process used by the team?

The team has been doing pull requests for all code that is merged into the main branch. PRs must be approved by at least 1 member from each sub-team before it is merged.

2. Was there a large requirement to learn the problem domain? What approach was used to gain domain expertise? What forms of support did you receive?

There was no large requirement to learn the problem domain given that that project will mostly exist in a school setting, and we are students. Team members needed to think about the solution the project offers from the lecturer's professors.

3. Has the work accomplished to date satisfied the project sponsor? Team's opinion? Sponsor's opinion? Were there any weak spots in this regard?

In the beginning of the project, the team was hesitant to start on potentially risky aspects of the project, but the sponsor/coach pushed for *any* progress to be made. Currently, progress is being made towards a milestone next week.



# **Process Creation and Improvement**

Sample Rubric: Process Creation and Improvement					
Process is only used	Processes have been	Processes have been	Processes are always	Active process	
when clear best-	created and are	created and are	followed and	improvement is	
practice standards	usually followed, but	consistently followed,	occasionally	addressed regularly	
exist or an external	are rarely improved.	but are rarely	improved. Root	and processes are	
process must be		improved. Crisis	cause analysis may be	evaluated/root cause	
followed		situations occasionally	a byproduct but is not	analysis is used	
		trigger process	actively pursued	regularly	
		improvement			
Metrics were not	Metrics were used	Metrics were regularly	Metrics were	Metrics were properly	
planned or used	only as required by	collected, but	regularly collected	planned,	
throughout the	faculty coach or	inconsistently used,	and evaluated/used	implemented, proved	
<mark>project</mark>	project guidelines, but	especially relating to	as intended in	useful to	
	were rarely used and	process	process and product	stakeholders, and	
	only tracked by		domains.	were used for process	
	necessity			improvement	

**Comments:** 

Process improvement is an active effort by the team, but metrics are not yet collected.

1. What is your process methodology? Has this been clearly outlined to your sponsor and received the sponsor's approval? How is the process documented?

We are implementing our own process methodology based off of the spiral development model. We go through 4 phases to develop working prototype iterations: planning, risk analysis & research, engineering & testing, and finally evaluation. The goal of each complete iteration is to produce a working prototype with demo-able features for the project sponsor. Some of the phase names have changes over from the Spiral Model, but the goal of generating working prototypes that continuously take risks into account remains the same. The methodology generates a document that outlines the results for each iteration. It specifies the planned features, which of those features were completed and which were not, and notes on what worked and what didn't.

This custom process methodology has been outlined to the project sponsor and received approval.

2. What mechanisms is the team using to track project progress? How well has the team tracked its project progress?

The team uses GitHub issues to track the progress of individual tasks. The tracking of these tasks is easy since it is on a website and it is updates often, with tasks attached to PR's where code is relevant.



3. What is the set of metrics that the team is tracking? Has the team gathered these metrics on a consistent basis? What has the team learned from the review of these metrics?

The team is tracking velocity, bug-resolution time, and defect density as the most prominent process metrics. However, none of these metrics are fully utilized and acted upon. Velocity has not been fully tracked since the team has not finished a complete sprint yet. Bug-resolution time cannot be tracked since we haven't finished the thinnest vertical yet. Defect density cannot be tracked since unit testing has not been set up to track project defects.

### **Team Effectiveness**

Sample Rubric: Team Effectiveness						
Team fractured,	Team had some	Team had some	Team worked	Team has achieved		
unable to work	significant frictions	significant disconnects	reasonably well	synergy, allocated		
together	and lack of mutual	and frictions, but	together, no	work well, and		
constructively.	cooperation.	worked through	problems visible.	worked together as a		
		them.		cohesive whole.		

#### **Comments:**

Team members kept to their own sub-teams, leading to a few integration issues, but there are no visible social problems among the team.

1. Was the team required to adopt new technologies? What were these technologies? What approach did the team use for selecting the appropriate technology for the project? Did the sponsor provide any support for learning these technologies? How well did the team ramp up on the new technologies and begin to apply them effectively?

ActiveMQ is used as a message bus between the high-level software and the low-level software. This software was used since it is opensource and free to use with integrations for both Python and C++ (which our system will use all 3). The team is still struggling to completely implement the message bus system, given a combination of conflicting versions of languages, environments, and network settings.

2. Is this an effective team? What has been contributing to and detracting from the team's effectiveness? What are the team's weak points? What are the team's strong points? What changes can the team make for next term that will make it more effective?

The team is quite effective is most regards. The biggest advantage is the level of expertise that each of the members has in each of their respective fields. However, the team's weak point is the struggle against blockers for other sub-teams. There have been a few cases where a blocker on one sub-team blocks the progress of the entire team, and those blockers can slow down the entire team. It is difficult to overcome these situations, since it is better to put more people on an issue to get it done sooner, but a "too many cooks in the kitchen" situation is equally



unproductive.

A change that the team can make for next term is to assigned members to their sub-teams and then also assign them to secondary sub-teams when their sub-team's tasks are complete, in order to keep progress moving forward on all fronts.

# **Product**

Although Process and Project are important, the product is ultimately why projects are initiated and followed through to completion. An effective Software Engineer maintains a steady focus on the product, and understands the scope of what it entails. Although the list below is not exhaustive, and remains short for the first evaluation, it includes some of the primary areas of importance.

# Requirements

Sample Rubric: Requirements						
not been collected	Requirements were collected somewhat effectively, but some key requirements were overlooked initially	Requirements were collected exhaustively, but some were not clarified adequately	Requirements were actively elicited, documented, and understood. Some traceability issues may be present	All functional requirements have been proactively collected and managed. Documentation and traceability is clear and defined		

#### Comments:

Requirement are documented both in sprint plans and ticket descriptions, but the effective requirements changed often over the course of the sprint and were not often updated on the documentation side.

- 1. Did the team prepare all the documentation artifacts requested by your faculty coach and sponsor? Were these documents carefully inspected prior to delivery? How would you assess the quality of the document artifacts?
  - The team prepared all of the documentation artifacts requested. There were peer-reviewed prior to delivery during team meetings and checked for accuracy and correctness.
- 2. How well did the team elicit the requirements? Are the requirements fully specified at this point? What approaches were used to elicit the requirements? Were key requirements missed? What methodology was used to document and validate the project requirements?
  - The team has fully elicited the requirements for the first prototype phase, and has collected some loose requirements for future phases, but has not defined in detail future requirements until they are defined specifically and added to the prototype document for a planning phase. The team meets together to choose the next features and define their requirements for the next



iteration, adding all of these details to the prototype document for that iteration.

- 3. Products need to be designed within guidelines and constraints appropriate for each project. It is also important to consider the impacts of the products that are designed. In the following categories discuss the constraints and impacts that have a bearing on your project. Note that there may be one or two categories that have no bearing on your project but your project is probably affected by almost all of these.
  - a. Economic issues

    Ideally, extra components needed beyond the robotic arm can be as cheap as possible.

    This means that the software must utilize open-source options for utilities and the
  - This means that the software must utilize open-source options for utilities and the whole system must be able to run effectively on low-quality hardware.

    b. Environmental issues
    - Since the goal of the project is to give new life to old hardware, the extra components that are added in addition to the robotic arm should be interchangeable with other repurposeable components. I.e. repurposed laptops and webcams could be used as the machine that runs the software system to control the robot and the tracking camera.
  - c. Social issues The social implications of this project lie in its open-sourced nature. We must design this system so it is usable by anyone that wants to use it. Additionally, it must also adhere to open-source copyright laws.
  - d. Political issues
     There are no significant political issues associated with this project.
  - Ethical issues
     The computer-vision tracking algorithm will track people's faces and body shapes but most not keep any of this information for security and ethical reasons.
  - f. Health and safety
    The robotic arm must be controlled in a safe manner so that no one who uses the software injures themselves.
  - g. Manufacturability
    Similar to economic and environmental issues, aside from the requirement of the robotic arm itself, the whole system should be designed to be made cheaply as well as high-quality.
  - h. Sustainability
    Similar to environmental issues, aside from the requirement of the robotic arm itself,
    the whole system should be designed to function with repurposed components in mind.
- 4. What industry and engineering standards must your project adhere to? Were these new standards that the team had to learn? Did your sponsor provide you support for understanding these standards? Did you have to educate your sponsor about these standards?

Our project must meet the industry and engineering standards of an open-source project

#### SWEN 561/562 - Software Engineering Senior Project

### First Midterm Self-Evaluation



including unit testing, documentation, GitHub as version control, and conducting regular code reviews. Our sponsor/coach clearly outlined these requirements and helped us curate our scope around them, as well as decide on version control and

#### **Future Considerations:**

Future evaluations will include heavier evaluation in the areas of Design, Implementation and Testing. What are the implications of these at the present point in the project?

After the thinnest vertical of features is complete (where development is kind of all over the place), the team will have to work carefully and diligently to ensure that future features of the product continue to work. Testing will have to be thorough and potentially involve representatives from each of the sub-teams to be present during testing of features.