Massachusetts Institute of Technology

Quantitative Methods in Systems Engineering
Project Scoring Rubric

WEEK 2: VALUE-ORIENTED DECISION MAKING

The highlighted steps within this week's project are those that are explicitly graded. The other steps will need to be done in order to progress in the project, but do not need to be graded.

Step 1: Review the problem / opportunity to be solved
- Write a short summary of the problem/opportunity and nature of the decision to be made
- List potential stakeholders who might care about the decision
- Create a name for the project (e.g. Satellite Imager)

Step 2: Describe the decision maker and value proposition
- Pick one of the stakeholders as the key decision maker (DM)
- Write a single sentence value proposition of what the DM wants

Step 3: Develop a value model
- Decompose value proposition into objectives and attributes
- Create a simple value hierarchy, ensuring no more than 3-5 attributes as siblings on a given branch (click on hierarchy to edit)
- Pick the most important attributes (3, plus cost) and describe their units, acceptance range, and definition
- Using the utility value model, fill in the single attribute utility (SAU) curves for each of the chosen attributes
- Assign numbers to the weights (i.e. SAU weights for MAU function)

Step 4: Check face validity of value model
- Test average attribute scores to determine if value model matches mental model
- Test extreme attribute scores to determine value model behavior
- Comment on observations; do the SAU and MAU scores make sense? If not, what might be the cause?

Step 5: Summarize
- Write up a short summary of activities performed this week, highlighting assumptions made, difficulties encountered, and how you might do this differently given more time, data, or other resources

Criterion	Peer Assessment Feedback
Prompt	Please provide feedback (300 characters or less) for this project.
Points	
1	**Project submitted:** An answer has been submitted for this assignment. Feedback is mandatory for this step.

Criterion	Step 1: Review the problem / opportunity to be solved
Prompt	Write a short summary of the problem/opportunity and nature of the decision to be made
Points	
3	**Complete:** The write up clearly describes an answerable question regarding a system design decision, and includes who will derive value from the system.
2	**Partially Complete:** The write up describes an answerable question regarding a system design decision, but does not include mention of who will derive value from the system.
1	**Incomplete:** The write up describes a question that may not be answerable or does not relate to a system design decision.
0	**Not Attempted:** No answer is provided. Sample project is copied for submission.

Criterion	Step 1: Review the problem / opportunity to be solved
Prompt	Create a name for the project (e.g. Satellite Imager)
Points	
2	**Complete:** Name provided and clearly relates to the problem and nature of decision to be made.
1	**Incomplete:** Name provided, but does not clearly relate to the problem.

0	**Not Attempted:** No answer is provided. Sample project is copied for submission.

Criterion	**Step 2: Describe the decision maker and value proposition**
Prompt	Pick one of the stakeholders as the key decision maker (DM)
Points	
1	**Complete:** Name provided.
0	**Not Attempted:** No answer is provided. Sample project is copied for submission.

Criterion	**Step 2: Describe the decision maker and value proposition**
Prompt	Write a single sentence value proposition of what the DM wants
Points	
3	**Complete:** The write up is a single sentence and clearly describes a proposition that makes sense given the name of the decision maker and the problem description.
2	**Partially Complete:** The write up describes a proposition that makes sense for the named decision maker but is not clearly related to the problem description.
1	**Incomplete:** The write up does not make sense for the named decision maker or problem described.
0	**Not Attempted:** No answer is provided. Sample project is copied for submission.

Criterion	Step 3: Develop a value model
Prompt	Decompose value proposition into objectives and attributes
Points	
3	**Complete:** The set of stated objectives cover all elements of the value proposition. The attributes appear to be traceable to one or more objectives.
2	**Partially Complete:** The set of stated objectives cover most elements of the value proposition. The attributes appear to be traceable to one or more objectives.
1	**Incomplete:** The set of stated objectives do not make sense or do not cover the value proposition. The attributes do not seem to relate to the objectives.
0	**Not Attempted:** No answer is provided. Sample project is copied for submission.

Criterion	Step 3: Develop a value model
Prompt	Pick the most important attributes (3, plus cost) and describe their units, acceptance range, and definition
Points	
3	**Complete:** There are 3 attributes listed, and each have units in parentheses after each attribute name, they have numeric min and max acceptable levels, and a preferred direction of better. The cost attribute also has a name and associated units.
2	**Partially Complete:** There are fewer than 3 attributes, but otherwise have units, min and max acceptable levels, and preferred direction of better. The cost attribute has a name and associated units.
1	**Incomplete:** If any attributes are missing min or max acceptable levels, or units.
0	**Not Attempted:** No answer is provided. Sample project is copied for submission.

Criterion	Step 3: Develop a value model
Prompt	Using the utility value model, fill in the single attribute utility (SAU) curves for each of the chosen attributes
Points	
2	**Complete:** All listed attributes have monotonic curves (i.e. only increasing or only decreasing in single attribute utility across the attribute range), and these curves increase if attribute is indicated as bigger is better, or decrease if indicated as smaller is better.
1	**Incomplete:** One or more attributes are missing curves, or curves are not all monotonic.
0	**Not Attempted:** No answer is provided. Sample project is copied for submission.

Criterion	Step 3: Develop a value model
Prompt	Assign numbers to the weights (i.e. SAU weights for MAU function)
Points	
3	**Complete:** All listed attributes have nonzero weights that add to 1.
2	**Partially Complete:** All listed attributes have nonzero weights that do not add to 1.
1	**Incomplete:** All listed attributes do not have nonzero weights.
0	**Not Attempted:** No answer is provided. Sample project is copied for submission.

Criterion	Step 4: Check face validity of value model
Prompt	Test extreme attribute scores to determine value model behavior
Points	
1	**Complete:** At least one test case is provided that covers the extreme condition.
0	**Not Attempted:** No test cases provided. Sample project is copied for submission.

Criterion	Step 4: Check face validity of value model
Prompt	Comment on observations; do the SAU and MAU scores make sense? If not, what might be the cause?
Points	
2	**Complete:** The write up addresses the value model and provides an explanation, about whether the SAU and MAU scores make sense.
1	**Incomplete:** The write up does not provide an explanation, whether the SAU and MAU scores make sense.
0	**Not Attempted:** No answer is provided. Sample project is copied for submission.

Criterion	Step 5: Summarize
Prompt	Write up a short summary of activities performed this week, highlighting assumptions made, difficulties encountered, and how you might do this differently given more time, data, or other resources
Points	
3	**Complete:** The write up clearly summarizes the project activities this week, and addresses assumptions, difficulties, and ideas on how they might do things differently given more time, data, or other resources.
2	**Partially Complete:** The write up is missing one or more elements from a complete answer (e.g. assumptions).
1	**Incomplete:** The write up is only a summary of activities.
0	**Not Attempted:** No answer is provided. Sample project is copied for submission.