

Ranking Requirements and Selecting Projects

Project, program¹ and portfolio² managers are frequently required to rank requirements³, features or projects with quite different characteristics. There are a number of useful techniques; this White Paper will outline a few.

Pairwise Comparison

Pairwise comparison is a useful technique to determine the most useful or desirable item through to the least valuable.

Ranking criteria is straightforward if there are only two options, there is only one decision. The decision becomes increasingly more complex as the number of items to be compared increases because every item must be weighted with respect to every other item; this is a problem that grows exponentially, given 5 criteria, there are 4+3+2+1=10 relationships to consider, for 10 criteria there are 45 relationships to consider! *Pairwise comparison* is one way to evaluate alternatives by providing an easy and reliable means to rate and rank the items to assist decision making.

The first step is to define the items or criteria to be ranked and to understand the various aspects to be considered in determining which option is more preferable compared to another. A list of projects related to an intranet system may be:

Server upgrade,
 Network upgrade,
 Storage upgrade, and
 Improved backup and recovery.

The comparative criteria may include improved speed, improved security and more space for each user. The relative importance of these needs to be agreed and the assessment is best done by a small team.

The next phase is to construct an assessment matrix (a NxM matrix).

Projects		A	B	C	D
Server	A	-			
Network	B	-	-		
Storage	C	-	-	-	
Backup	D	-	-	-	-

¹ For more on Programs see: www.mosaicprojects.com.au/WhitePapers/WP1022_Program_Typology.pdf

² For more on Portfolios see: www.mosaicprojects.com.au/WhitePapers/WP1017_Portfolios.pdf

³ For more on defining requirements see: http://www.mosaicprojects.com.au/WhitePapers/WP1071_Requirements.pdf

We only need one comparison for each relationship, comparing A with B is the same as comparing B with A, and there is no point in comparing a project with itself. Therefore we are left with 6 project to project comparisons. The first pairwise comparison is choosing which is more beneficial (based on the criteria), upgrading the server or upgrading the network? Similar decisions are made for each of the other pairs and the preferred option included in the cell..... Where there is no preference, enter both options, eg, A/C.

Projects		A	B	C	D
Server	A	-	A	C	D
Network	B	-	-	C	D
Storage	C	-	-	-	C
Backup	D	-	-	-	-

In this example, the team have selected C three times, D twice, A once and B nil times. This does not mean B has no value; merely it is assessed as having less value than the other three items. The ranked projects are now:

1. Storage upgrade
2. Improved backup and recovery
3. Server upgrade
4. Network upgrade

This is not the final answer to selection but provides a framework for allocating funding and resources. Technical issues may change the priorities (eg, if the network upgrade is essential to support the improved backup and recovery facility, the project may be prioritised to allow the second most valuable option to proceed. Similarly, other constraints and decisions may influence the final decision; but these changes are now being made based on a prioritised list of the most desirable elements.

A similar process can be used to determine the least needed features in a software development for de-scoping a release or to prioritise features to be included in the early iterations of an Agile⁴ project.

The results are subjective and should be generated by a small team rather than an individual to normalise the outcomes and minimise anomalies. For example it is possible to get a situation where given three criteria, A, B, and C, we find that A is more important than B, that B is more important than C, and that C is more important than A. This is a paradoxical situation (known as Arrow's Paradox) in that it makes no sense and is more common if only one person is creating the matrix.

Numeric weightings – Decision or Selection Matrix

Numeric weightings provide an air of calculated certainty to a comparison but in fact are still subjective (people make all of the assessments). The value is range of criteria can be weighted to identify the best option. There are many different ways to construct a matrix and develop the weighting for each of the criteria.

⁴ For more on Agile see: www.mosaicprojects.com.au/PDF_Papers/P109_Thoughts_on_Agile.pdf

The selection matrix (or decision matrix) is a tool that lets you objectively compare each option’s actual criteria with the desired criteria, as well as compare each one with the others based on the established criteria. It is a valuable tool for complex decisions such as awarding tenders, because it provides equal opportunities to all tenderers and upholds the integrity of the organisation.

Developing a Selection Matrix

To develop a selection matrix, you and/or your selection panel will need to thoroughly analyse the requirements and as you analyse them, take the following steps to develop a selection matrix:

- Decide which technical and performance requirements to evaluate through the selection matrix
- Organise the requirements into general categories on the matrix
- Determine which requirements must be observed in an interview, discerned from responses to interview questions, or are inherent in the response and organise these into categories
- Develop interview questions about the requirements that you can’t assess from the submitted documentation - this will let you structure the interview in a way that helps you fill in these gaps of information on the selection matrix
- Create a numeric rating system for the matrix and assign a range of rating points (normally 1-3 or 1-5) to each criteria and interview question
- You may also give a numeric "weight factor" to each criteria and interview question based on their importance to the functions or outcomes to be achieved.

Using a Selection Matrix

Start by screening each application/response to determine if they meet the minimum requirements and eliminate any that don’t meet all of the mandated requirements. After eliminating unqualified applicants, you can either proceed to interview the entire pool or you can use the matrix to help you select the top, most-competitive options for interview.

Project scoring matrix						
Selection criteria	Alignment with core competencies	Alignment with strategic goals	Internal rate of return in excess of 15%	Improve customer service	Urgency	Total score
<i>Weight</i>	<i>2.0</i>	<i>3.0</i>	<i>1.5</i>	<i>3.0</i>	<i>2.0</i>	
Proposal 1	2	7	3	5	3	50.5
Proposal 2	3	4	1	5	3	40.5
Proposal 3	9	6	3	3	3	55.5
Proposal 4	5	0	9	7	8	56.5
Proposal 5	3	8	4	9	4	69.5

Whether you start using the matrix before or after the initial interview process the selection matrix is used in the following way:

- Calculate the total points for each requirement and interview question by multiplying the rating points by the weight factor (i.e., if the rating points = 3 and the weight factor = 10, the total points for that item = 30)
- Add the total points together, and calculate a total point score for each option
- If there are any discrepancies or large deviations in scoring identify the reason and if necessary adjust the matrix
- Based on the total point score, decide the best option to move forward with (eg, enter contract negotiations).

Rubrics

Rubrics are similar to numeric weightings but can indicate ‘unacceptable’ levels as well as poor, good excellent. Values can be ascribed to acceptable grades to determine rankings (this type of assessment is common in education and examination situations). An example for assessing a series of web pages is:

Rubric to assess Web Pages

	Reject	Poor	Desired	Exemplary
Story Board or Planning Sheet	Story board is incomplete and lacks necessary URL's, formats, and resources to complete project.	Story board is not complete. Includes few assigned elements or planned formats, necessary URL's, and resources.	Story board is somewhat complete. Includes many assigned elements, in addition to most planned formats, necessary URL's, and resources.	Story board is complete. Includes all assigned elements, in addition to planned formats, necessary URL's, and resources.
Organization of Content	No logical sequence of information; menus and paths to information are not evident.	Some logical sequence of information, but menus and paths are confusing or flawed.	Logical sequence of information. Menus and paths to more information are clear and direct.	Logical, intuitive sequence of information. Menus and paths to all information are clear and direct.
Copyright and Documentation	Sources have not been properly cited and permissions have not been received.	Some sources have not been properly cited and all permissions have not been received.	Most sources and property cited according to MLA style; Permissions to use any graphics from web pages or other sources have been received, printed, and saved for future reference.	All sources are properly cited according to MLA style; Permissions to use any graphics from commercial web pages on other sources have been received, printed, and saved for future reference.
Format and Platform Transferability	The stack, presentation, or web page plays	The stack, presentation, or web page plays	Most of the stack, presentation, or web page plays	The stack, presentation, or web page plays

	only on either Mac or PC. There are problems with the operation of some files and the project is not cross-platform.	best on either Mac or PC. There are problems with the operation of some files and the project is not cross-platform.	easily on both Mac and PC. Although there are minor problems with a few files, care has been taken in naming files, selecting technologies, or creating enhancements to produce a final product that is cross-platform.	easily on both Mac and PC. Care has been taken in naming files, selecting technologies, or creating enhancements to produce a final product that is cross-platform.
Graphical Design	Exaggerated emphasis upon graphics and special effects weakens the message and interferes with the communication of content and ideas.	Graphical and multimedia elements accompany content but there is little sign of mutual reinforcement. There's no attention paid to visual design criteria such as proportion, balance, and harmony restraint. There is some tendency toward random use of graphics.	Design elements and content combine effectively to deliver a high impact message with the graphics and the words reinforcing each other.	The combination of multimedia elements with words and ideas takes communication and persuasion to a very high level, superior to what could be accomplished with either alone. The mixture brings about synergy and dramatic effects which reach the intended audience.
Screen Design	Screens are either confusing and cluttered or barren and stark. Buttons or navigational tools are absent or confusing	Screens are difficult to navigate, but some buttons and navigational tools work. Users can navigate a few screens.	Screens contain adequate navigational tools and buttons. Users can progress through screens in a logical path to find information.	Screens contain all necessary navigational tools and buttons. Users can progress intuitively through screens in a logical path to find information.