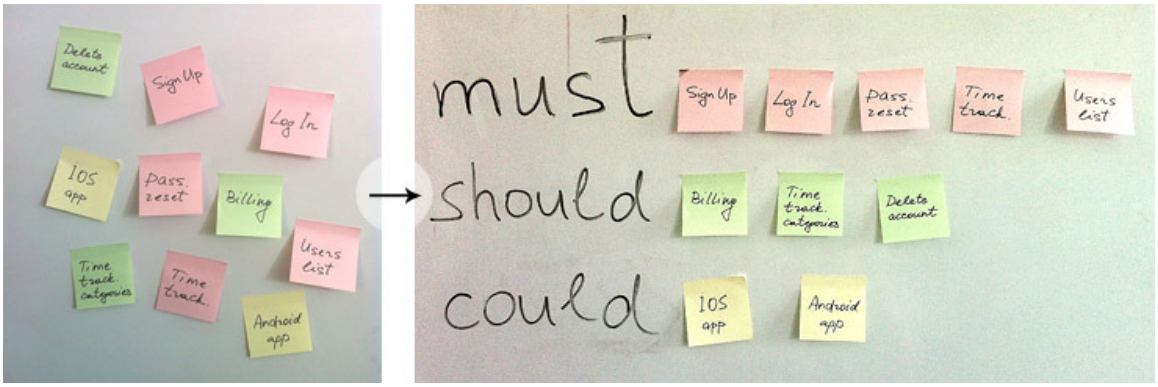
# Ranking Requirements and Selecting Projects




Project, program[1] and portfolio[2] managers are frequently required to rank requirements[3], features or projects with quite different characteristics. This type of comparison is called multiple-criteria decision analysis (MCDA). Multi-Criteria Decision Analysis, or MCDA, is a valuable tool that we can apply to many complex decisions. It is most applicable to solving problems that are characterized as a choice among alternatives and functions as a decision support tool by helping focus on what is important, is logical and consistent. At its core MCDA is useful for:

- Dividing the decision into smaller, more understandable parts
- Analyzing each part
- Integrating the parts to produce a meaningful solution.

When used for group decision making, MCDA helps groups talk about their decision opportunity (the problem to be solved) in a way that allows them to consider the values that each option offers. It also provides a unique ability for people to consider and talk about complex trade-offs among alternatives by helping people think, re-think, query, adjust, and finally decide the best option. MCDA problems are comprised of five components:

1. Goal (the decision to be made)
2. Decision maker or group of decision makers with opinions (preferences)
3. Decision alternatives
4. Evaluation criteria (interests)
5. Outcomes or consequences associated with alternative/interest combination.

There are a number of useful techniques that can be applied, this White Paper will outline a few.

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

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

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

## 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 four 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** | - | - | - | - |

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 Agile[4] 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.

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

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

- 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 |
| *Weight* | *2.0* | *3.0* | *1.5* | *3.0* | *2.0* | |
| 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 only on either Mac or PC. There are problems with the operation of some files and the project is not cross-platform. | The stack, presentation, or web page plays best on either Mac or PC. There are problems with the operation of some files and the project is not cross-platform. | Most of the stack, presentation, or web page plays 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 | The stack, presentation, or web page plays 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. |

| | | | | |
|---|---|---|---|---|
| | | | 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. |

## Group Decision Making

Group Decision Making Techniques (or nominal group techniques[5]) involve people voting or deciding on an outcome:

- **Unanimity / consensus:** Full consensus is achieved with everyone in agreement.
- **No sustained opposition:** A softer form of consensus, where whilst everyone may not agree with the decision, those that disagree can 'live with the decision' - if there is sustained opposition, consensus is not reached and further discussion is needed.
- **Majority:** A majority of the deciding group approve the selected option. This may be a simple majority or a defined percentage (usually more than 66% or 75%) agree.
- **Plurality:** The option with the highest vote in a group. For example a committee of 15 my reach the following conclusions: 7 say option A; 5 say option B ;and 3 say option C, so A is chosen despite having more opposed than in favour.

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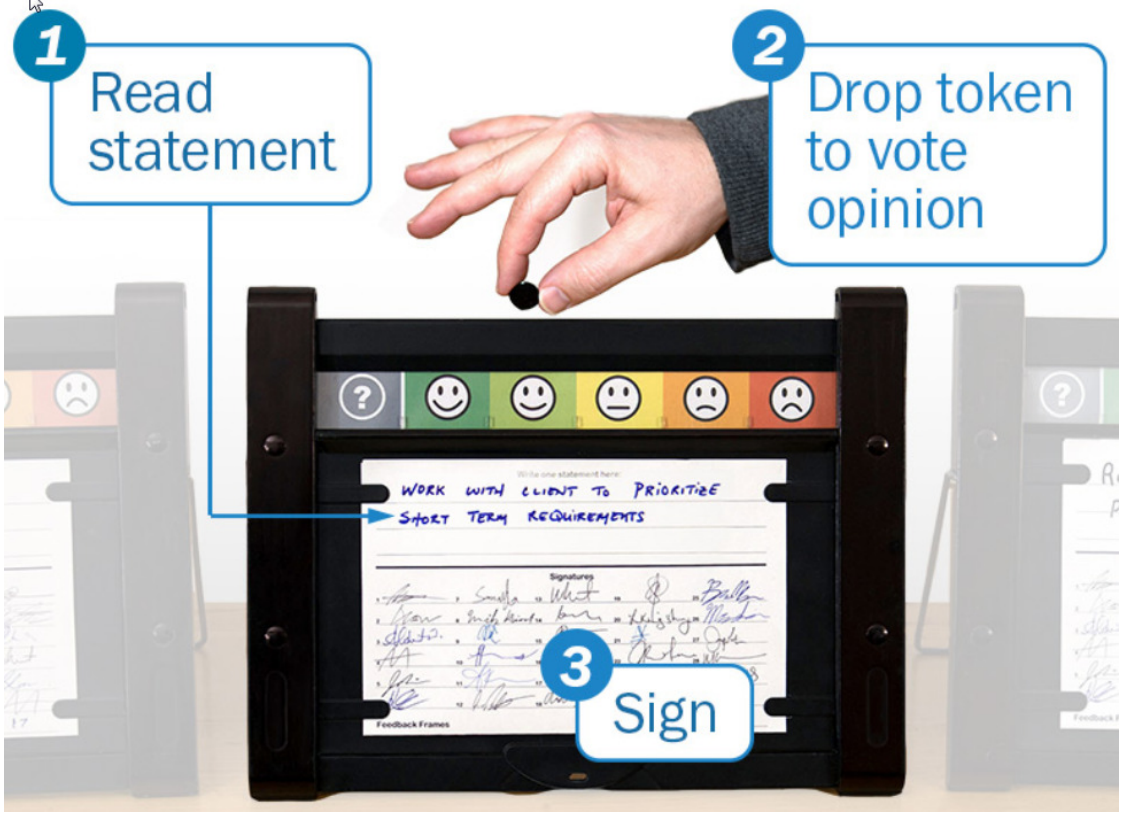
5 For more on ***nominal group techniques*** see: https://www.mosaicprojects.com.au/WhitePapers/WP1068_Data_Gathering.pdf

- **Complex voting / weighting systems:** People are asked to 'weight' options using processes such as allowing each person to vote for 5 options and picking the ones with the most votes, or giving each person 20 points to allocate as he/she wishes between ideas (they may allocate all 20 to one option, allocate one point to 20 options or anything in between) and selecting those with the highest number of points.

  For larger groups, processes similar to 'Feedback Frames' can be useful:




Reveal to ***see what we think!***

- **Dictatorship:** The responsible manager decides, either based on his/her views or after consultation.

### Sequential Screening

A prioritisation process based on a sequential series of criteria can be used for project selection. Failure on any one criterion is not necessarily fatal; failure on two or more usually is fatal.

- **Is it 'Mandatory'?** The only projects that are 'mandatory' are those required by legal or regulatory change. Many other projects may be 'necessary' but not mandatory. The key questions for mandatory projects are:
  - Can we use this mandatory requirement to create an opportunity for business improvement?
  - If not, what is the lowest possible investment required to be compliant?
- **Is it strategically relevant?** You should only be doing projects that deliver your strategy. If a project is strategically irrelevant (scoring an insufficient level of contribution) it may still be worthwhile if, say, the financial benefits are extraordinary and all other criteria are met. Common strategic relevance measurement processes are (from worst to best):
  - Tick one box - from a choice of six or so 'strategies' the project must tick one box (only) to identify the strategy it most aligns to (but what constitutes relevance?).
  - Tick more than one box - same principle as above but this time you can tick as many boxes as you can claim relevance to. At least this will differentiate between the vaguely relevant to one strategy and the relevant to several strategies options. Without a degree of impact the measure is next to useless.
  - Objective, measured strategic contribution score - the project's strategic contribution to the 25-to-40 'strategic imperatives' - weighted factors that drive and deliver the strategy - is scored in normalized, justified levels of impact.
- **Is it viable?** Do the financial benefits outweigh the costs of their delivery? Some projects will not be financially viable but are still worth pursuing as they fix a competitive disadvantage or are an operational imperative.
- **Are the risks acceptable?** Are the project's risks within your organization's risk appetite and ability to manage? High-risk projects can deliver high returns but require far higher levels of business management attention and focus to be successful; few organisations can take on more than one or two high-risk projects simultaneously.
- **Do we have the capability?** Your organisation's project delivery capability[6] (PDC) determines the types of projects it can successfully deliver. If you take on projects beyond your capability to deliver they will go over time, over budget, under deliver or just ultimately fail.
- **Do we have the capacity?** The results you get from a project are determined by the people you have on the project. You can buy in some capacity (consultants/contractors) but you can't buy-in internal knowledge and expertise.
- **Is it a priority now?** A project can 'pass' all of the above criteria but still not be a priority, now.

Projects that pass this assessment are relevant, worthwhile, doable and are required to be done now - the definition of high priority projects. The others can be:

- Rejected completely;
- Deferred until later;
- Returned for redesign or re-scoping.

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[6] For more on ***PDC*** see: https://www.mosaicprojects.com.au/WhitePapers/WP1079_PDC.pdf

## MOSCOW

***Moscow*** is a simpler method of prioritisation which requires the 'team' to rank their preferences into a series of categories based on the acronym MoSCoW: '**M**ust have', '**S**hould have', '**C**ould have' or '**W**on't have'.


The definition of each category is:

- **Must have** contains all requirements that must be satisfied in the final delivery for the solution to be considered a success. Short of a disaster, these features should be able to be delivered based on 'safe' estimates of the time and effort involved.
- **Should have** represents high-priority items that should be included in the solution if possible. These features should have a fair chance of being delivered if normal circumstances prevail.
- **Could have** are those requirements which are considered desirable but not necessary. They will be included if there is any time or budget left after developing the previous two categories (ie, the work goes reasonably well).
- **Won't have** is used to designate requirements that will not be implemented at this time, but may be considered for the future.

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