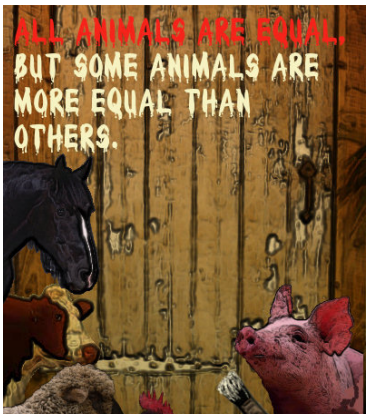
Project Size and Categorisation



"***All projects are equal, but some are more equal than others***!" (or was that animals?[1])

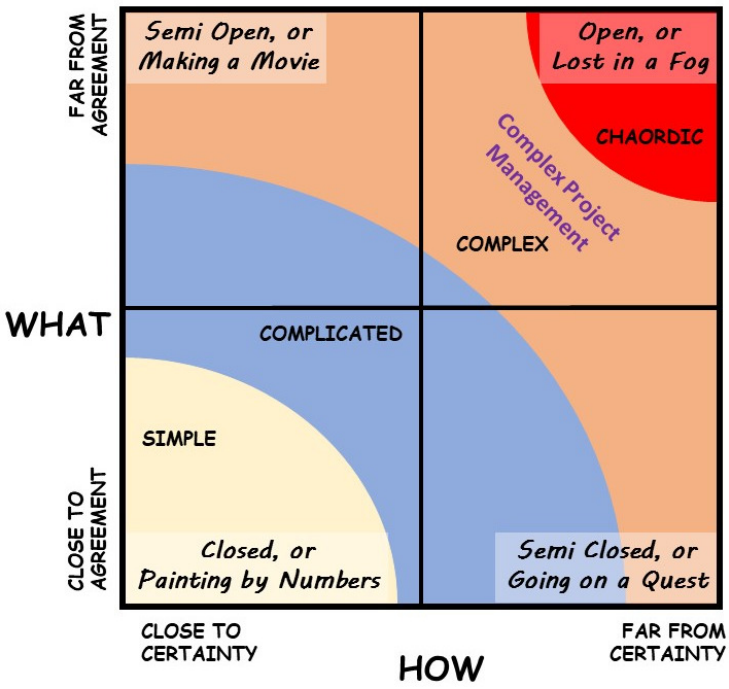
Because every project is different the management approach needed to deliver a successful outcome cannot be a one-size-fits-all process or discipline. The ability to efficiently manage new projects is directly affected by an organization's ability to remember past successes and learn from past challenges[2], then use this information effectively to help manage its current set of projects and programs. This process is helped by a categorisation system to group similar types of project or program[3].

The categorisation system should consider both the type of project and the degree of difficulty involved in its execution:

- Grouping the projects by type may be by industry, purpose, technology, or any other useful characteristic.
- The degree of difficulty can be measured along a number of dimensions including size, technical difficulty, uncertainty, stakeholder support, and complexity.

These elements can be combined as shown[4]:

This White Paper focused on the concepts and ideas associated with project classification. A separate White Paper focused on the practical application of these ideas within an organization with a supporting spreadsheet to assess difficulty can be downloaded free of charge from: https://mosaicprojects.com.au/PMKI-ORG-035.php#Class



1 George Orwell: Animal Farm, 1945.

2 For more on ***Lessons Learned*** see: https://www.mosaicprojects.com.au/WhitePapers/WP1004_Lessons_Learned.pdf

3 For more on ***program typology*** see: https://www.mosaicprojects.com.au/WhitePapers/WP1022_Program_Typology.pdf

4 **Note**: This diagram is derived from a combination of the Stacey Matrix and the work of Eddie Obeng, see: https://mosaicprojects.wordpress.com/2024/06/15/classifying-projects-2/

The Four Dimensions of Project Difficulty

There are four basic dimensions that affect the difficulty of managing every project:

- Its inherent size usually measured in terms of cost
- The degree of technical difficulty involved in creating the output (complication) caused by the characteristics of the project's work and its deliverables, the timeframe the deliverables are required within, and often a combination of both
- The degree of uncertainty involved in the project, and
- The degree of complexity associated with the work. Complexity has two interlinked elements, people and technology; the management of the project is affected by:
    - The relationships between various stakeholders ('small p' politics), both within the project team and surrounding the project, and
    - The interaction of various technical systems and systems-of-systems that enable the project to function, while the product is being created, within the product to allow it to function, and at the interface between the product and its surrounding environment.

The difference between how *complicated* the work is and *complexity* is that managing complicated work (ie, work with a high level of technical difficulty) is achieved by implementing appropriate systems such as quality management and configuration management. With the right people and adequate knowledge, the consequences of technical difficulty are largely definable, predictable, and manageable. However, the essence of complexity is that the future of any complex set of personal or technical relationships within a system is inherently unpredictable, unexpected outcomes emerge from the interactions of the people, the technology, or both.

Whilst all these factors impact on the degree of difficulty associated with successfully managing the delivery of the project, the Project Manager can only significantly influence two elements. Reducing the degree of uncertainty and enhancing the relationships with and between project stakeholders (including the project team)[5] to reduce complexity. The other elements are innate factors of the project that simply have to be managed, for example, the project manager has limited ability to change the size of a project.

One should also note there is a significant difference between a program and a project, and the associated skill set required by their respective managers. These issues are discussed in *Understanding Programs and Projects - There is a difference!*[6]

Project Size

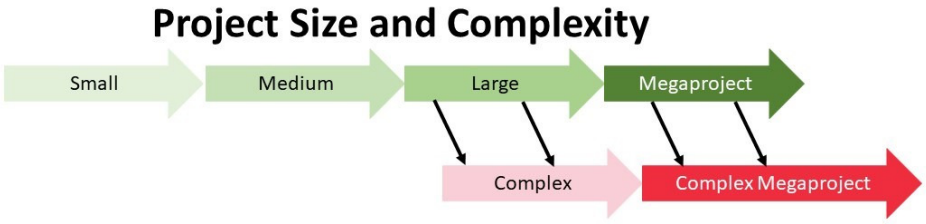
The size of the project or program will impact the degree of difficulty in achieving its objectives, but large projects are not necessarily complicated or complex. There are projects in Australia to shift millions of cubic meters of overburden from mine sites with expenditures rising to several $million per day but the work is inherently simple (excavating, trucking, and dumping dirt), and the relationships in and around the project are relatively straight forward; the challenges are in the management of the logistics needed to maintain the required rate of production. Contrast this type of major project with the difficulties of successfully delivering a small culture change within an established bureaucracy (say a new timesheet system) to

---

[5] For more on ***Stakeholder Management*** see: https://mosaicprojects.com.au/PMKI-TPI-075.php

[6] See: ***Understanding Programs and Projects*** - https://www.mosaicprojects.com.au/PDF_Papers/P078_Programs_Projects_Full_Paper.pdf and ***Differentiating Programs from Projects***: https://www.mosaicprojects.com.au/WhitePapers/WP1002_Programs.pdf

appreciate size is only one dimension of a project. But size does feed into complexity, and becomes the defining factor in mega projects.



Mega projects are not big projects, they are major, complex programs of work usually with a special purpose 'financial vehicle' at its core[7]. Managing this scale of project is in a different league to simply managing a 'big project'. Managing the complexity (politics and stakeholder engagement) is central to success, as is breaking the overall program down into a series of smaller elements run in parallel. Managing mega projects successfully is a specialist area of study[8].

Technical Difficulty (degree of complication)

The technology, and consequently the technical difficulty associated with any project is a combination of the characteristics of the output (product, service, or result) being produced, the work needed to accomplish the project's objectives, and the time available to complete the work. Complicated *high-tech* projects are inherently more difficult to manage than simple projects.

The degree of technical difficulty involved in accomplishing the work of the project is compounded by time pressures; a technically difficult project with adequate time allowed for research and prototyping can be easier to manage than a relatively simple project required in an unusually short timeframe. An accelerated completion target will usually increase costs and has the potential to reduce quality unless a highly competent management team are in place, and even then, project risk is increased.

The technology also dictates the type of people engaged in the work which in turn has a significant effect on how the work is managed, the management approach that will work best, and consequently the best person to manage the work. The best way to motivate and direct rocket scientists engaged in a research project differs from that needed for white collar workers engaged in an IT development and both differ substantially from the procurement focus of a heavy engineering project.

Technical difficulty can and does feed into both uncertainty and complexity:

- As the number of different systems interacting within the project deliverable increase, so does complexity[9], there is no clear dividing line between technically complicated and complex
- Uncertainty also increases, the nature of the technical difficulties and the associated degree of certainty/uncertainty largely depend on how well the work is understood. This is in part a factor of experience:

---

[7] For more on ***program typology*** see: https://www.mosaicprojects.com.au/WhitePapers/WP1022_Program_Typology.pdf

[8] For more on ***managing mega projects*** see: https://mosaicprojects.wordpress.com/2017/06/09/differentiating-normal-complex-and-megaprojects/

[9] A project consisting of a number of interlinked systems of systems will be complex – the way all of the systems interact and affect each other cannot be completely understood. Hopefully the unexpected responses will emerge during testing but even this cannot be guaranteed.

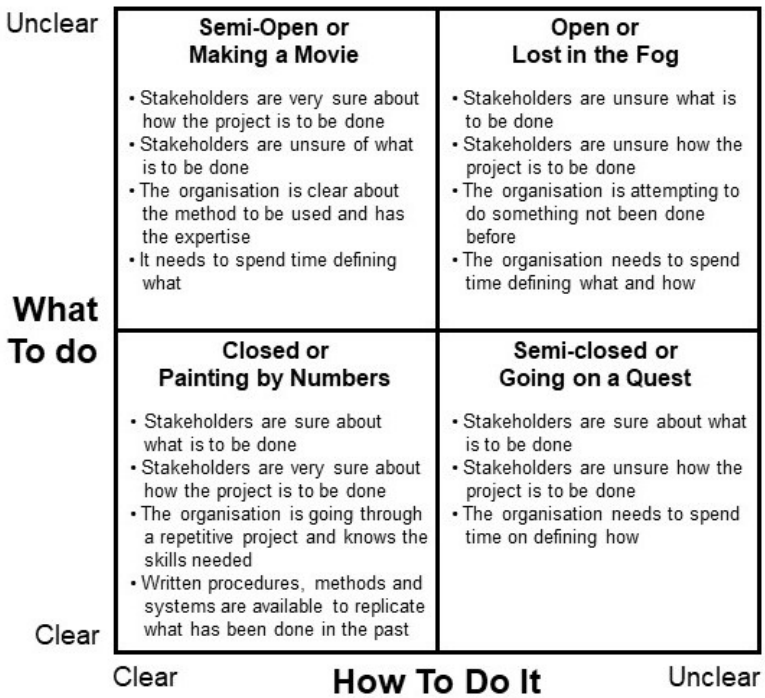
- Similar projects have been done before (by the people involved in this one) are going to be less uncertain even if they are technically complicated
- Where components of the work have been done before but are being used in new ways uncertainty increases
- Completely new technical systems are by nature uncertain – there is no basis for precise estimates but there may be similarities with some earlier work
- A new theory to be developed and implemented, is at the *bleeding edge* of technology, everything is uncertain.

This means *bleeding edge* research has a far higher level of uncertainty associated with every aspect of its management than a project of similar technical difficulty that has been undertaken several times before.

Uncertainty

The degree of uncertainty associated with both the project's work (how to do the work), and the deliverable (what has to be achieved) has a major impact on the management of the project. There is always a degree of uncertainty associated with every project, what matters is understanding the degree of uncertainty, ensuring most key stakeholders appreciate this and its consequences, and then choosing an appropriate project delivery strategy[10] to either minimise unnecessary uncertainty or to embrace the uncertainty and seek to exploit the opportunities it offers by using an agile/adaptive approach[11].

One measure of uncertainty developed by Eddie Obeng looks at how much is known about what has to be achieved and how much is known about the methods of achieving the outcomes. The four options are detailed below (this diagram forms part of the categorisation framework on page 1 of this paper):



Source: Obeng E (1994) *The Project Leader's Secret Handbook*. Financial Times Prentice Hall

[10] For more see: ***Project Strategy*** - https://mosaicprojects.com.au/WhitePapers/WP1038_Strategy.pdf

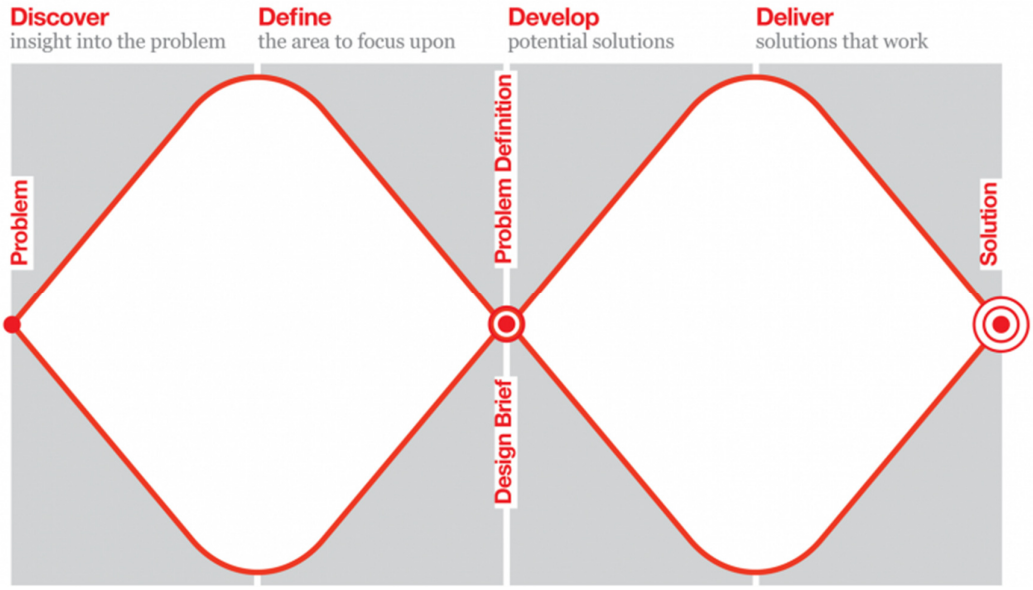
[11] For more on ***Agile*** see: https://www.mosaicprojects.com.au/PDF_Papers/P109_Thoughts_on_Agile.pdf

Painting by Numbers: Traditional project management works well when both *what is to be done* and *how to do it* are understood by the project's key stakeholders, including the client and the project team. Closed projects (panting by numbers) can be fully defined, estimated, planned, etc. There are low levels of uncertainty and ambiguity; risks are largely predictable and manageable. Value is largely achieved by delivering the required outcome on time and on budget. A typical software project of this type would be installing an upgrade into an office where the same upgrade had been previously installed in several other locations. This type of project is ideally suited to traditional project management approaches defined in the *PMBOK® Guide* and/or PRINCE2.

Going on a Quest: In these projects, the objective is clear but the way to achieve the objective is uncertain. At the end of the day, success or failure is clear cut; the objective has been achieved (or not). The challenge is optimizing the way forward. Process and system improvement projects tend to fall into this category. For example, a project where the objective is to reduce processing time by 20% allows success or failure to be easily measured on the completion. The difficulty is determining the best way to achieve the objective. Some of the options include improving the user interface, simplifying the workflow, speeding up network traffic and processing times or a combination of two or more of these elements.

Ambiguity is low - we know what is needed, uncertainty is high - we are not sure how to achieve it. Therefore, before committing major resources to the main work of the project adequate time has to be allowed to prototype solutions and test options before a final design solution can be determined and then implemented. The project needs to be developed in phases implementing iterative or incremental development, with go/no go gateways as the design is firmed up. There are risks associated with any creative design process and most software projects are 'quests' requiring creative solutions to identified problems to achieve the desired objective. One way to achieve this is to set up a deep-dive hackathon where teams, or individuals, work in parallel to first define and then solve the problem with frequent review and consolidation breaks.

Making a Movie: In these projects the tools and techniques are well known but achieving success is uncertain. Only after the project is complete can its results be measured, and the success or failure of the project determined. Most culture change projects and marketing projects (and making movies) are in this category. The tools to be used are well known and include training, communicating, advertising, etc. The traditional (if not optimal) mix of techniques is understood for most situations. What no one can predict is if the 'public' will acclaim the final result, merely accept the final result, or dump the final result.



One innovative approach that can be used in this type of project is the 'double diamond' developed by the UK Design council. The approach is divided into four distinct phases – Discover, Define, Develop and Deliver – the Double Diamond is a simple visual map of the design process.

Traditional project management is not enough in these projects; there is a continual need to measure results, feedback information and adapt the mix of activities to optimize the likelihood of success. The key value measurement is attempting to answer the question is it worth spending more or should we cut and run? Efficient stakeholder communication and relationship management is crucial. Whilst there will be some outstanding successes (block busters) and some total flops most projects in this category finish somewhere in the middle. The art is spending just enough effort to achieve an acceptable outcome – dealing with shades of grey.

Lost in the Fog: (*I prefer Prof. Rodney Turner's version '**a walk in the fog**'*). This type project is a journey towards a desired new state, usually in response to a recently identified problem. For example, *"we are losing market share and profits are down"*. We know the problem, potential solutions range from closing the business unit, to re-pricing, to changing the offering, to increasing the marketing budget, or a combination of these and many dozens of other possible solutions.

No one is sure of the optimum outcome, or how best to achieve it. Management needs to proceed carefully, stop at regular intervals to check exactly where they are, and re-plan the way forward to build on successes and mitigate failures. Exactly the way you navigate through a thick fog. Both ambiguity and uncertainty are high.

Project management is about making sure at each 'stop point' the value achieved to date is locked in and then refocus on the next increment. Agile methods are ideal for this type of project[12]. Each iteration builds new capability and value, and the learning provides a platform for the next iteration of development.

Management is both easy and difficult. It is easy because there is no point in setting fixed plans (you have no idea what to plan). It is difficult because decisions on value and whether to stop or continue are subjective and need to be made in a collaborative environment of trust.

Traditional measures of success such as on-time and on-budget are largely meaningless; typically, there are no statistics to base this type of measure on. Consequently, these projects are the realm of cost reimbursable contracts and partnerships. Stakeholder relationship management, and a clear understanding of value are the only effective tools for building to a successful outcome. An adaptive approach to management is essential

Client knowledge matters! - Some final thoughts on uncertainty

The degree of understanding of both the project's characteristics and the way they will be accomplished on the part of the project's client is as important to the success of the project as the understanding of the project team. The lower the levels of knowledge, the more difficult it is to achieve a successful project outcome that delivers the benefits expected by the client. This lack of knowledge will lead to:

- Less accurate estimates of activity duration, sequence, and resource requirements,
- Less certainty the project scope contains 100% of the required work, and
- Greater needs for updates and modifications to the overall project plan to maintain relevance.

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

Paradoxically, the less that is known about the overall work of the project, with the associated reduction in accuracy, the more important project control tools such as ***Project Controls 3.0***[13] with the schedule becoming a means for guiding the execution of the work and managing change.

The difficulty is in aligning peoples' understanding and managing the works appropriately, this is heavily influenced by prior experience. Both the client/sponsor and the project team need a common understanding of the type of project and agree to configure the project management processes appropriately. The more uncertainty and ambiguity, the more important the project's client is to achieving project success! If expectations are not aligned disaster awaits.

The less certain the client is of its requirements, the greater the uncertainty associated with delivering a successful project and the greater the effort required from the project team to work with the client to evolve a clear understanding of what is required for success. Budgets and timeframes are expected to change to achieve the optimum benefits for the client, and the project is set up with an appropriately high level of contingencies to deal with the uncertainty. Problems occur if the expectations around the project are couched in terms of achieving an 'on time, on budget' delivery when the output is not defined, and the expected benefits are unclear[14].

When a *bleeding edge* project has a clearly defined end point you are on a *quest* the challenge is finding the optimum route to the end. When the end point is unclear you are either *making a movie* – the process are well known but the outcome is uncertain or on a *walk in the fog* where neither the route nor the outcome are defined. Again, this is not an issue as long as all of the project stakeholders appreciate they are on a journey, initially to determine what success looks like, and then deliver the required outputs.

In the presence of uncertainty, the skills required of a project manager change from largely technical if the project is 'painting by numbers' to almost completely relational for managing a 'walk in the fog'. Selecting the right person to lead the project and relate to the client and stakeholders is crucial.

Managing uncertainty is closely associated with and influences the complexity of the relationships discussed below. The key difference is much of the unnecessary uncertainty can be removed by effective stakeholder consultation and proper project planning – this is a sensible risk minimisation process. The challenges are identifying what parts of the uncertainty can be reduced and what parts of the uncertainty are intrinsic to the project; then determining a sensible level of investment to reduce the manageable elements of uncertainty. The residual uncertainty becomes a key consideration in the project's risk management processes[15]. These are manageable and to a degree predictable processes.

Note: There are several similar models to the one discussed above including:

- The project typology continuum by Brinner (1990)
- The goals and methods matrix by Turner & Cochrane (1993), and more recently
- The novelty, complexity, technology, uncertainty, and pace, (NCTP) by Shenhar & Divr (2004).

---

[13] For more on ***Project Controls 3.0*** see: https://mosaicprojects.com.au/PC-3-00-Overview.php#PC-3-Overview

[14] For more see: ***Avoiding the Successful Failure*** - https://www.mosaicprojects.com.au/PDF_Papers/P046_Successful_Failure.pdf

[15] For more on ***effective risk management*** see: https://mosaicprojects.com.au/PMKI-PBK-045.php#Overview

The Complexity Dimension

Complexity comes from two factors:

1. The relationships between people (stakeholders) including:
    a. Those involved in the work of the project,
    b. Those who are affected by, or perceive themselves to be affected by the work, or outcomes of the project, and
    c. Those with the power to influence the project.
2. The number of interactions between systems and subcomponents:
    a. Within the product being created
    b. Within the processes needed to create the product, and
    c. Between the project and its product, and the environment they are, or will operate within.

The degree of complexity is influenced by the size of the project, the technical difficulties associated with the work, and how much is understood (uncertainty) about the work[16].

Sources of complexity suggested by Stretton include:

- Environmental complexities
- Socio-political complexities
- Strategic Business Outcomes (incl. temporal and goals uncertainties)
- Technological and methods uncertainties
- Structural complexities
- Execution complexities
- Organizational and people complexities.

Complexity Theory

Complexity Theory[17] is a broad platform for the investigation of complex interdisciplinary situations and helps understand the social behaviours of teams and the networks of people involved in and around a project, as well as the interaction between systems and systems-of-systems and the people working within the systems to create the project's output, and within the functioning of the output.

People and Complexity

This aspect of a complexity is unpredictable and centres on the effectiveness of the relationships within the project team, with the external stakeholder community, and between the team and its external stakeholders. This aspect is compounded if the project work involves people operating as part of a complex 'system of systems' that embeds innate complexity within the work.

Complex systems involving people (eg, your stakeholder community), technology, or both, react in unpredictable ways to stresses and stimuli – dealing with emergent issues and opportunities needs an adaptive, agile approach supported by a resilient management system. Planning and preventative

[16] For more on ***complexity*** see: https://mosaicprojects.com.au/PMKI-ORG-040.php

[17] For more on ***Complexity Theory*** see: https://www.mosaicprojects.com.au/WhitePapers/WP1058_Complexity_Theory.pdf

processes are still important, but they cannot be relied on to eliminate unexpected outcomes from a complex system[18]. These ideas apply equally to small in-house projects as to large, complicated, programs. In this regard, complexity is not a synonym for complicated or large.

Effective stakeholder management[19] is the key to obtaining the commitment needed to effectively deliver the project both from within the project team and from the key stakeholders, but the pattern of relationships is always unstable and likely to change without warning.

Complex mega projects are in a different category; they cannot be fully planned because the scope and requirements evolve over time as stakeholder attitudes and knowledge evolve (requiring iterative planning); but political and commercial pressures require as much certainty as possible upfront. The successful management of this type of complex projects is an emerging area of study in its own right; developments to date include the creation of a set of competencies required by a person charged with managing a complex project[20] which augment, reframe, and extend those needed by a successful project manager running a more normal project.

Systems and Complexity

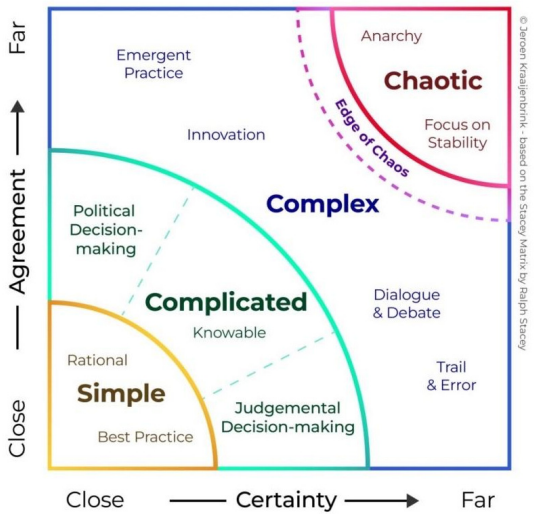
Most projects embed systems at several levels that interact with other systems and managing a project will benefit from systems thinking. As a minimum there are likely to be:

- The project's production system which enables the creation of the product, this is likely to interact with various external logistic and supply systems
- The project's management and controls system that directs and controls the production system and interacts with the both the client's and performing organization's management systems, and
- The systems embedded in the product that allow it to perform its intended functions.

In simple projects, the systems are reasonably easy to observe and understand, consequently the effect of an action or change is largely predictable. However, the difficulty in predicting the outcomes from the project increase exponentially as the number and sophistication of the interconnected systems increase[21].

Complexity is a Continuum

Complexity exists on a continuum from simple to chaotic. This adaptation of the Stacey Matrix looks at strategic decision making in the face of complexity. However, the type of decision and approach documented map closely to those required from the project management team. An



[18] For further discussion see: ***A Simple View of 'Complexity' in Project Management***: https://mosaicprojects.com.au/PDF_Papers/P070_A_Simple_View_of_Complexity.pdf

[19] For more on ***stakeholder management*** see: https://www.mosaicprojects.com.au/WhitePapers/WP1007_Stakeholder_Cycle.pdf

[20] For more on ***complex project management*** see: https://mosaicprojects.com.au/PMKI-ORG-040.php

[21] For more on systems thinking and systems-of-systems see: https://en.wikipedia.org/wiki/Systems_thinking

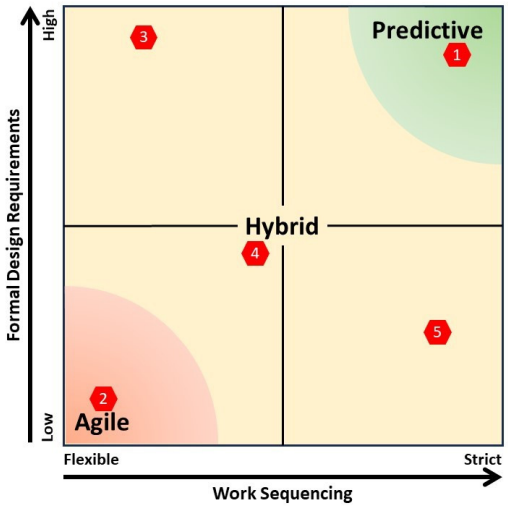
adapted version of this model forms part of the categorisation framework on page 1 of this paper.

In the model on Page 1 we have changed *chaotic* to ***chaordic***. Chaordic systems combine elements of both chaos and order which is more typical of most projects and programs.

Project Management Methods

The way a project is managed should be decided based on the nature of the project and the preferences of the project team, the performing organization, and the client. PMI have developed a concept that divides project management approaches into predictive, hybrid and agile, while useful the PMI approach does not work as a classification system:

- Traditional project management theory was developed for projects in the simple classification shown in the model on page 1, and can be applied to some in the complicated space
- Agile and adaptive concepts work for projects ranging from simple through to the simpler end of the complex spectrum, and
- Complex project management is useful from the more difficult end of the complicated spectrum through to chaotic.



The PMI framework[22] include three specific variants of hybrid, none of which have much relevance outside of in-house IT projects. But if you consider hybrid to mean managing a project effectively requires a degree of planning supported by the ability to adapt to changing circumstances, almost all projects are hybrid. Agile projects have a road map predicting the overall flow of work through to completion and predictive projects need agility and adaptation to overcome unplanned occurrences.

Categorisation by Type of Project

Project ***types*** seen as particularly important in the broader context of project management categorisation. The way project types are described can include the purpose of the project[23] such as: Organizational change, Engineering/construction, Information technology, Research and development, etc.

These basic 'types' can be further subdivided by application sector, for example, Aerospace, Events, or International Developments (this list can be very extensive) [24]; as well as by geographic location.

Other characteristics of a project that may be used for classification include the contractual arrangements being used and the intended delivery methodology, these may be combined to provide nine classifications:

---

[22] For more on the PMI approach, see ***How should the different types of project management be described?***: https://mosaicprojects.com.au/Mag_Articles/AA026_How_should_different_types_of_PM_be_described.pdf

[23] Source: Series on *Categorizing Projects and Programs*, PM World Journal Vol. III. Alan Stretton.

[24] For some options on standard industry classifications see:
- USA: https://en.wikipedia.org/wiki/Standard_Industrial_Classification
- Australia: http://www.abs.gov.au/ausstats/abs@.nsf/mf/1292.0

Sample Classification by Contract Type and Delivery Method

Type of Contract	Plan Driven	Incremental Rolling Wave Hybrid	Agile / Iterative
Internal / Flexible	Plant Shutdown / Upgrade	IT System Development	Business Improvement
Various Alliances & Partnerships	PPP New Facilities		Service Provision
Hard $ Fixed Time	Traditional Hard-Hat	Wind Farms Infrastructure Upgrades	External IT Contract

Type of Delivery

Other factors that may be used to define the type of project include (either individually or in combination) size, risk, and/or the client. For a more detailed discussion on categorisation and its uses in knowledge management, training and other aspects of managing an organization that 'does projects', see *Investigation of potential classification systems for projects*[25]:
https://www.pmi.org/learning/library/investigation-potential-classification-systems-projects-8967

Conclusion

The primary conclusion to be drawn from the above discussion is there is unlikely to ever be a single, generally accepted classification system for projects. Different organisations will have different needs and approaches to classifying their projects.

What is important is the categorisation system adopted by an organization should provide a useful insight into the differences between its projects. Clearly separating projects in one category from projects in every other category, and be readily translatable and comprehensible across the organization. A pragmatic classification framework would consider the ***type*** of project based on the project's the organization typically undertakes and then the degree of ***difficulty*** of each project within its type.

We have developed a matrix defining ***type*** and ***difficulty***, discussed in ***Designing a Project Categorisation System***, supported by a spreadsheet to assess relative difficulty. See more at:
https://mosaicprojects.com.au/WhitePapers/WP1072_Project_Categorisation.pdf

---

[25] Crawford, L., Hobbs, J. B., & Turner, J. R. (2002). ***Investigation of potential classification systems for projects***. Paper presented at PMI® Research Conference 2002: Frontiers of Project Management Research and Applications, Seattle, Washington. Newtown Square, PA: Project Management Institute.

First Published 1st January 2016 – Augmented and Updated