

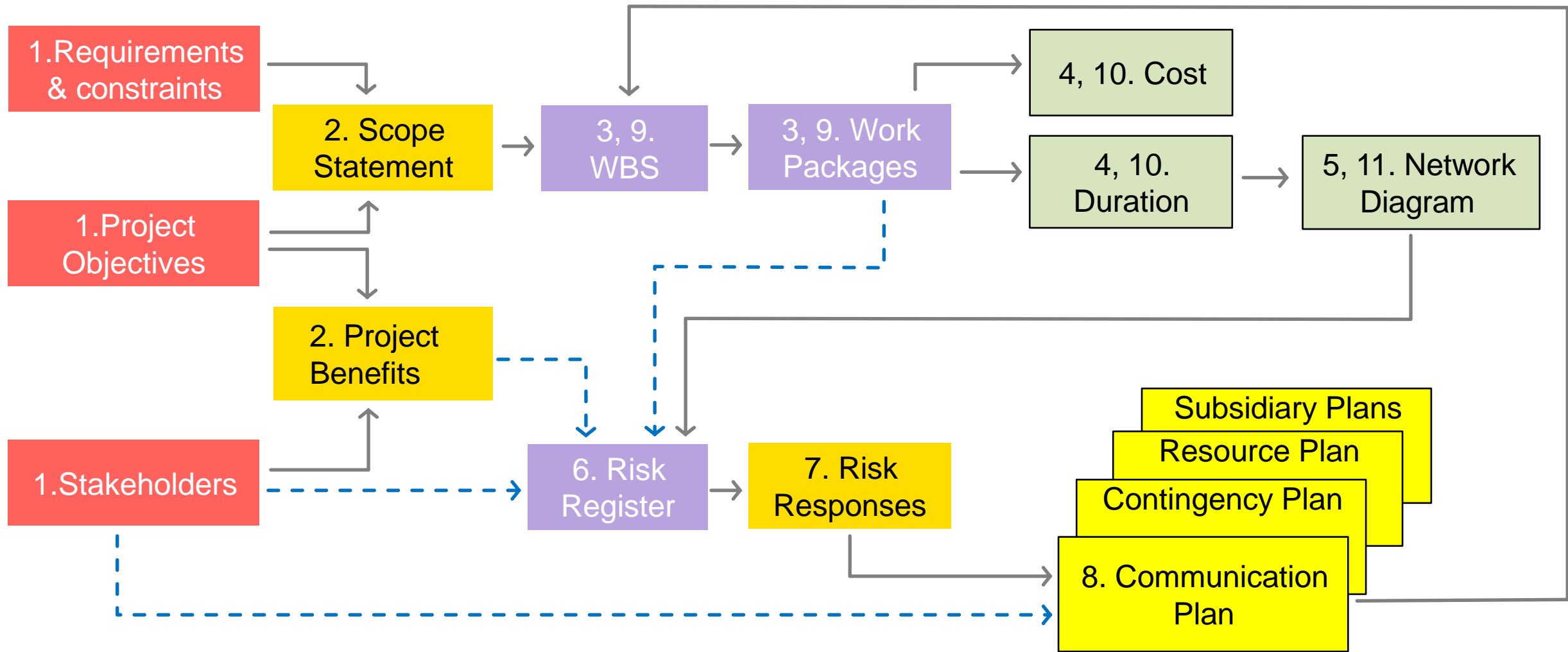


Week 1

GSOE9820 Engineering Project Management
Term 3 2021

Project Scope

C3PE Methodology



Collect requirements

“A requirement is a condition or capability that should be present in a product, service, or result to satisfy its specifications”

PMBOK

Project failure surveys

- No. 1**: “The project was not adequately defined at the beginning.”
- No. 3**: “a lack of clearly defined project goals and objectives.”
- No. 5**: “project planning was done with insufficient data.”
- Also: “poor work definition.”

[Black, K. \(1996\). Causes of project failure: a survey of professional engineers. *PM Network*, 10\(11\), 21–24.](#)



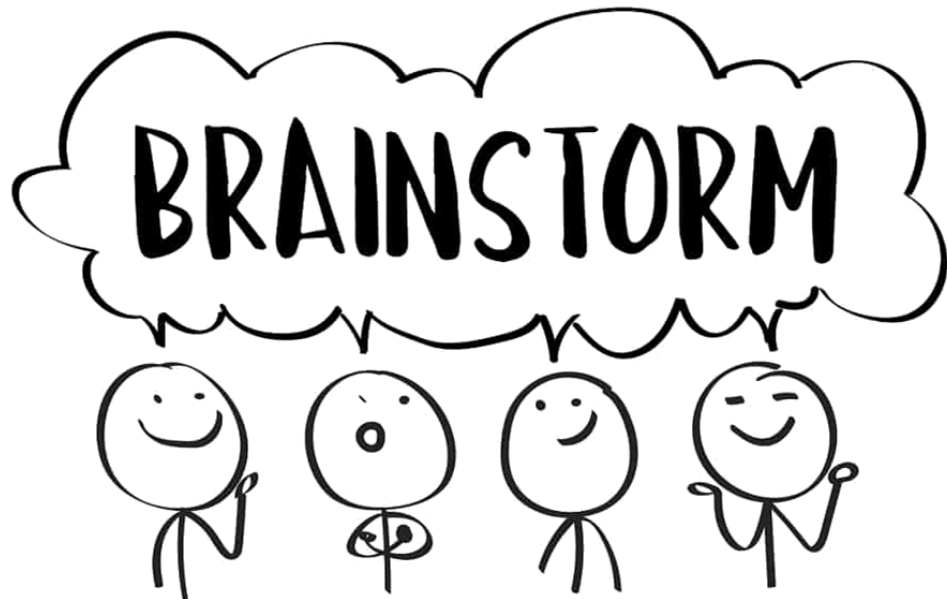
“35–50% of failed projects are due to poorly defined scope”

Collecting Requirements (PM Methods)

- Brainstorming
- Interviews
- Focus Groups
- Questionnaires and surveys
- Benchmarking
- Document analysis:
 - Specifications, RFPs
 - Standards
 - Regulations
- Affinity diagramming
- Mind mapping
- Nominal group technique (Delphi methods - [wikipedia](https://en.wikipedia.org/wiki/Delphi_method))
- Observation

[Dwivedi, N. "Elicitation Techniques" video in course Software Design: Developing effective requirements, accessed 23/02/2021, LinkedIn Learning accessed through UNSW](#)

PMBOK Guide (6th Ed) Part 1, Sec. 5.2



Writing requirements

When you are writing a functional specification:

- Say “**shall**” for **mandatory** requirements.
- Say “**should**” for **optional** requirements.
- Be SMART (Specific, Measurable, Achievable, Realistic, Time-bound)

Try to write **measurable or observable** requirements that give maximum **design freedom** (and accountability) to your engineers:

An OK requirement for radiation shielding:

“The shielding shall be 20 cm thick at the front of the hot cell.”

A better one:

“The radiation dose rate anywhere outside the hot cell shall not exceed 10 uSv/hr.”



Define scope

Defining Scope

Project Scope

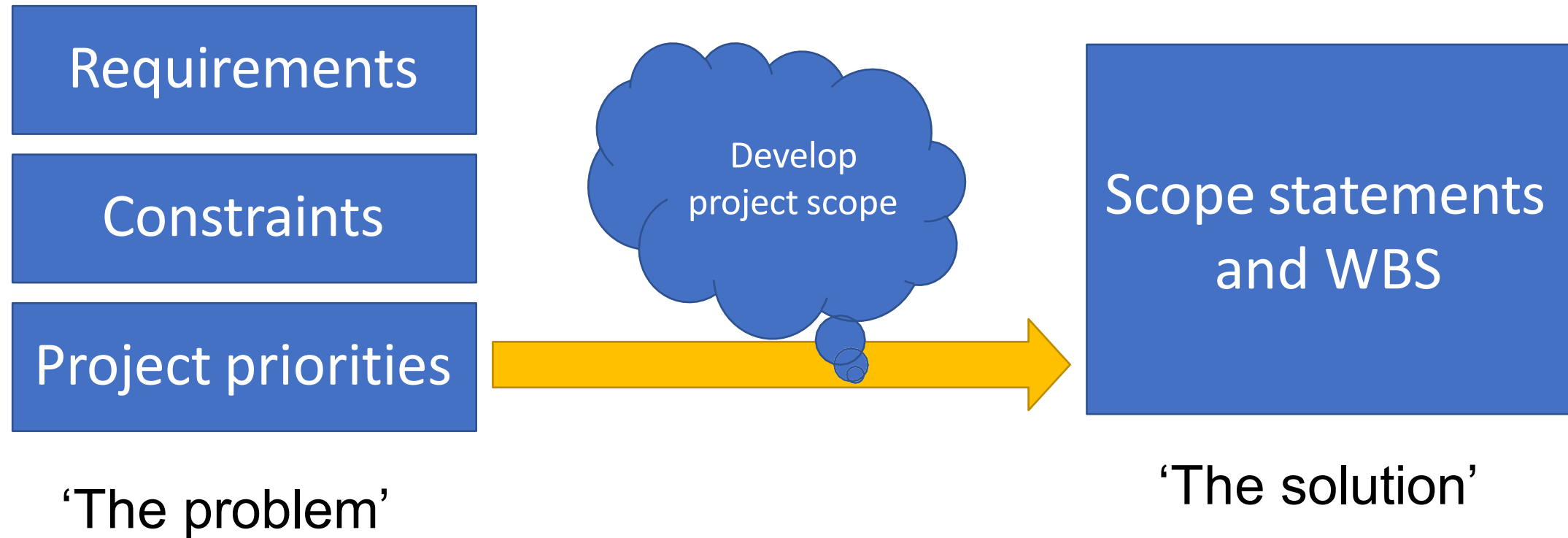
- A definition of the end result or mission of the project. This is often in the form of a product or service for a customer.
- The work that needs to be accomplished to deliver a product, service, or result with the specified features and functions.

Purpose of the Scope Statement

- To clearly define the deliverable(s) for the end user.
- To focus the project on successful completion of its goals.
- To be used by the project owner and participants as a planning tool and for measuring project success.

The challenge in scope definition

Scope definition is the creative center of project management



What does this mean for me?

The bad 😞

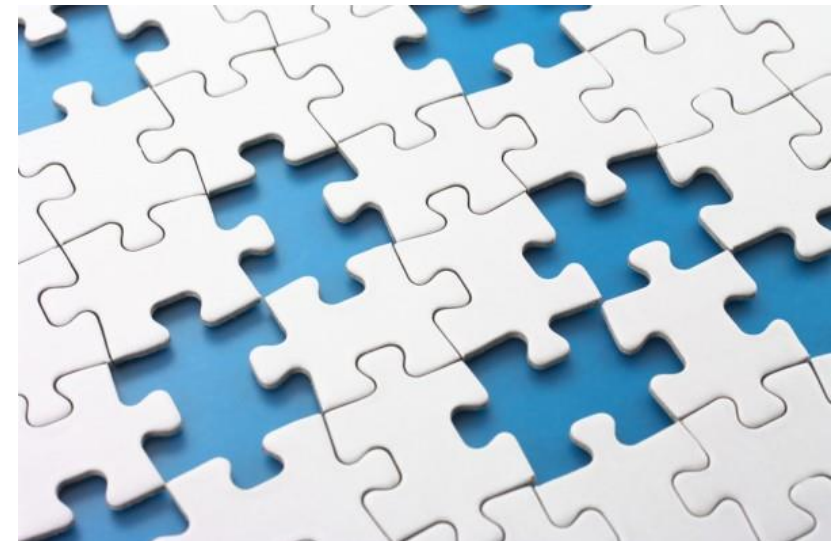
- Scope definition is only deceptively simple.
- You will need your own (or you will need to access) **domain-specific knowledge** to be effective.
- You can't assume that scope definition will be procedural or routine or even particularly 'easy'.
- In planning complex projects, it will involve a high degree of **negotiation, compromise** and **hard work**.

What does this mean for me?

The good 😊

- Scope definition and the WBS is not a forgone conclusion.
- As PM, scope definition is where you leave your **creative mark** on the project.

But, what if you **only partly know** all the requirements and the scope at the beginning? (surprisingly, common situation)



Scope statement

End result & Constraint

Example 1:

This project is to build the MM laboratory under AUD 2,000,000 within 12 months. To do this, an integrated software system must be developed for generating toolpaths, data collection and analysis, and precise robot control and decision making. Equipment to be installed in the MM lab includes a sensor system, electronic control system, robotic arm, forging tools, and a furnace without violating building requirements and codes. Finally, we help UNSW transition to full lab ownership through an introduction exhibition, course integration possibilities, and workshop usage.

Deliverables

Example 2:

The project will deliver the necessary groundwork at the facility, the robotic hardware and ancillaries, embedded control software and the induction heater, in addition to the human resources and supporting PM activities required for successful completion. It will also deliver project staff and end-user training, documentation of safety procedures and online training videos, as well as communication of results with the wider community. This project will not include the convening of a technical advisory body associated with the MM cell, nor deliver a set of standards intended for wider use.

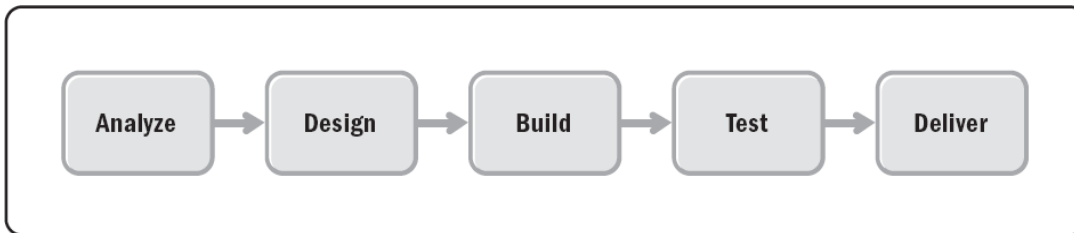
Limitations

Development life cycle

“One or more phases that are associated with the development of the product, service, or result.”

Predictive lifecycle

Concept



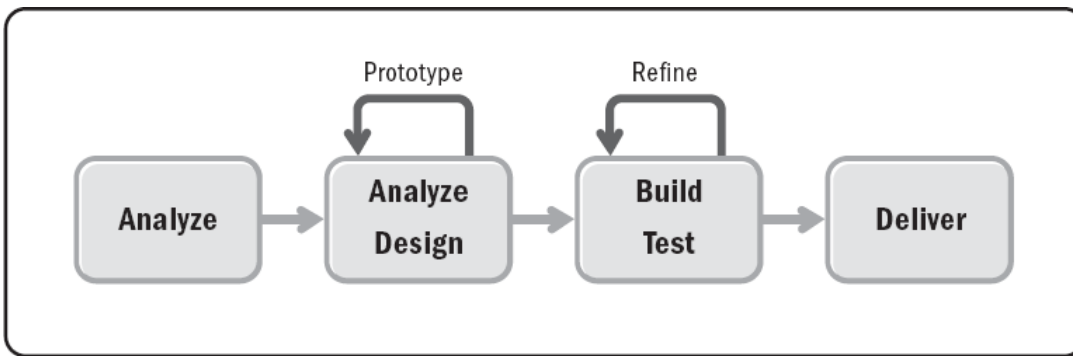
Sydney Light Rail

Characteristics

- Take advantage of **prior knowledge** and **experience**
- Useful for project with **extensive design**, e.g. safety requirements, regulatory constraints
- Reduced uncertainty in deliverables
- Should **reduce complexity** in projects and **minimise cost** (but change needs to be carefully controlled, if not can become overwhelming)

Iterative lifecycle

Concept

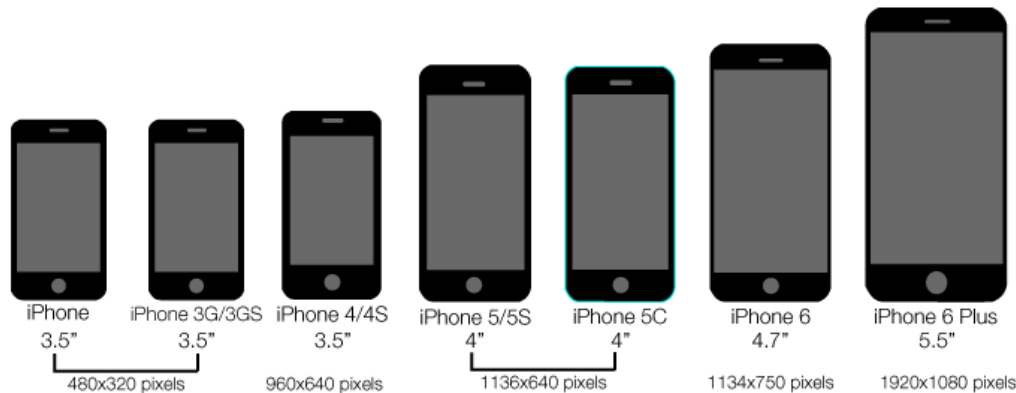
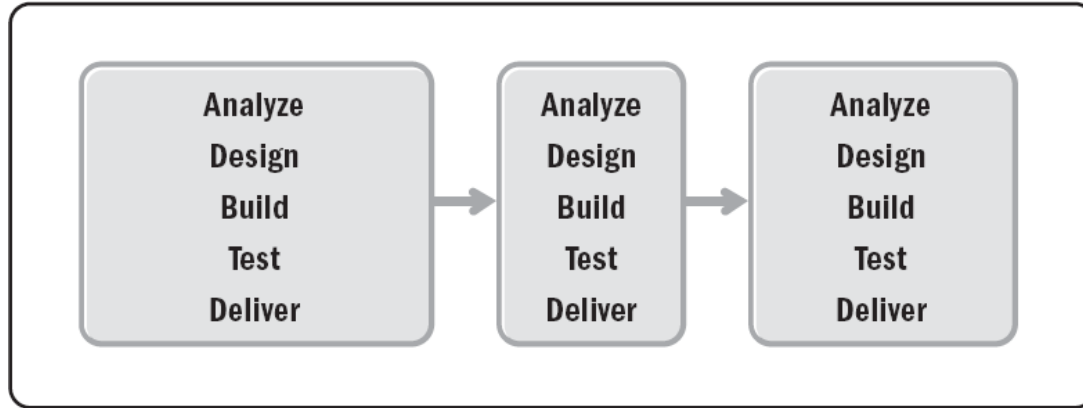


Characteristics

- **Implicit in prototyping:** improve the product or result through successive prototypes or proofs of concept.
- Useful for high complexity, frequent changes
- Sometimes prototypes are the only way to elicit comprehensive requirements
- Projects take longer because they prioritise learning rather than speed of delivery

Incremental lifecycle

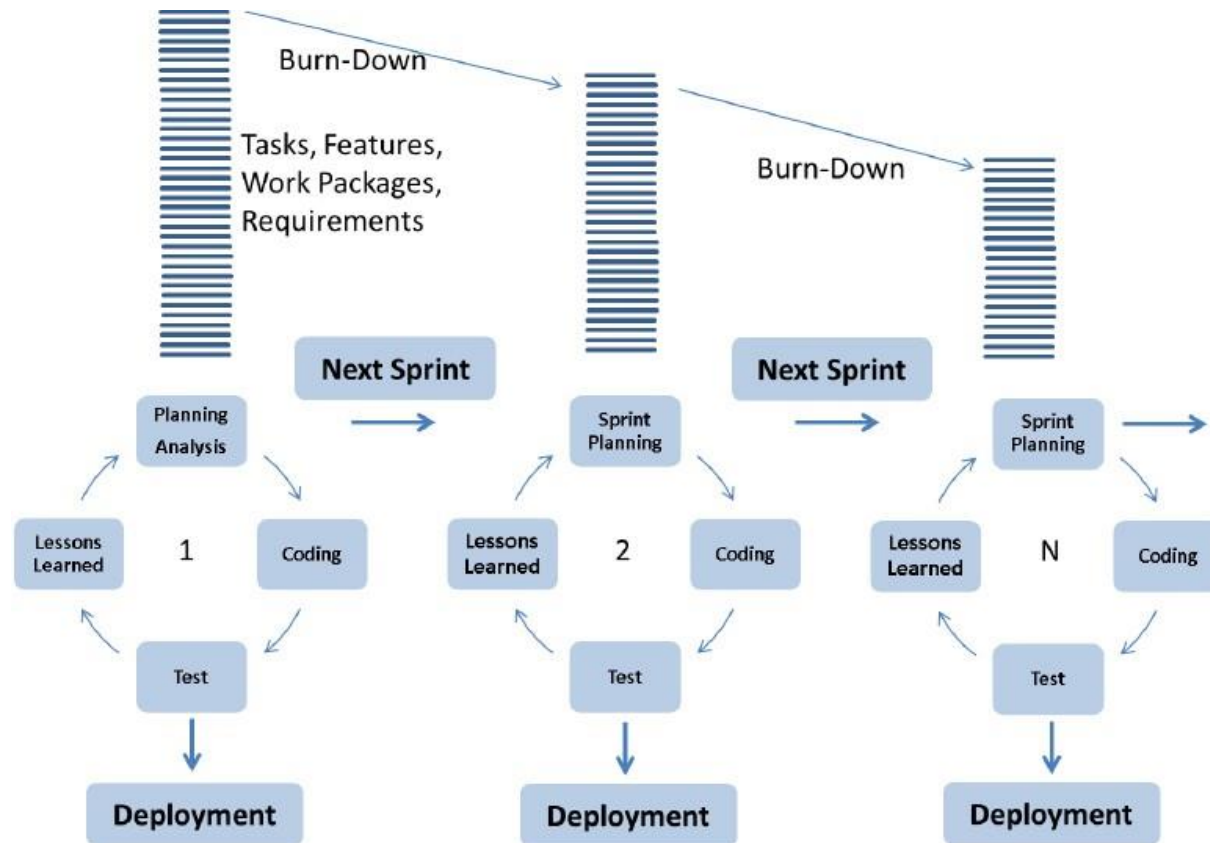
Concept



Characteristics

- Delivering value to sponsors or customers more often than a single, final product.
- The delivery team may deviate from the original plan, but can manage this change because they keep on delivering value to customer very soon after.
- Example: Developing a **fully functional website**. There's a new functionality being added to the website for each iteration.

Agile lifecycle



The 100% 'Agile' PM model **works best** when there are so **few interdependencies** between most of the work packages that they become one long list, or Product Backlog.

Development life cycle summary

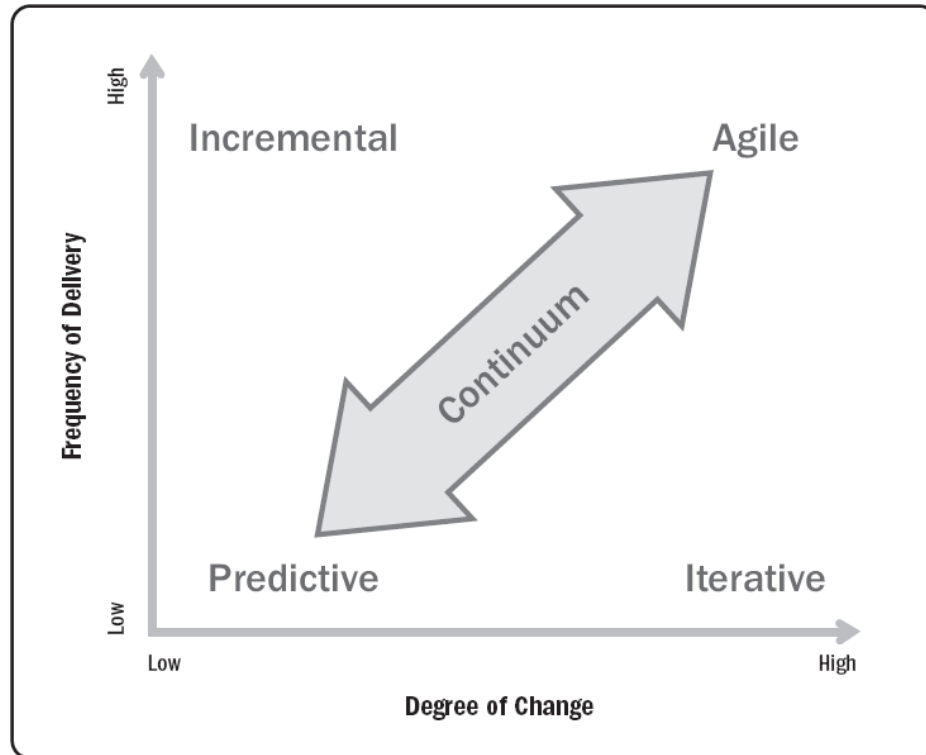


Figure 3-1. The Continuum of Life Cycles

Table 3-1. Characteristics of Four Categories of Life Cycles

Characteristics				
Approach	Requirements	Activities	Delivery	Goal
Predictive	Fixed	Performed once for the entire project	Single delivery	Manage cost
Iterative	Dynamic	Repeated until correct	Single delivery	Correctness of solution
Incremental	Dynamic	Performed once for a given increment	Frequent smaller deliveries	Speed
Agile	Dynamic	Repeated until correct	Frequent small deliveries	Customer value via frequent deliveries and feedback