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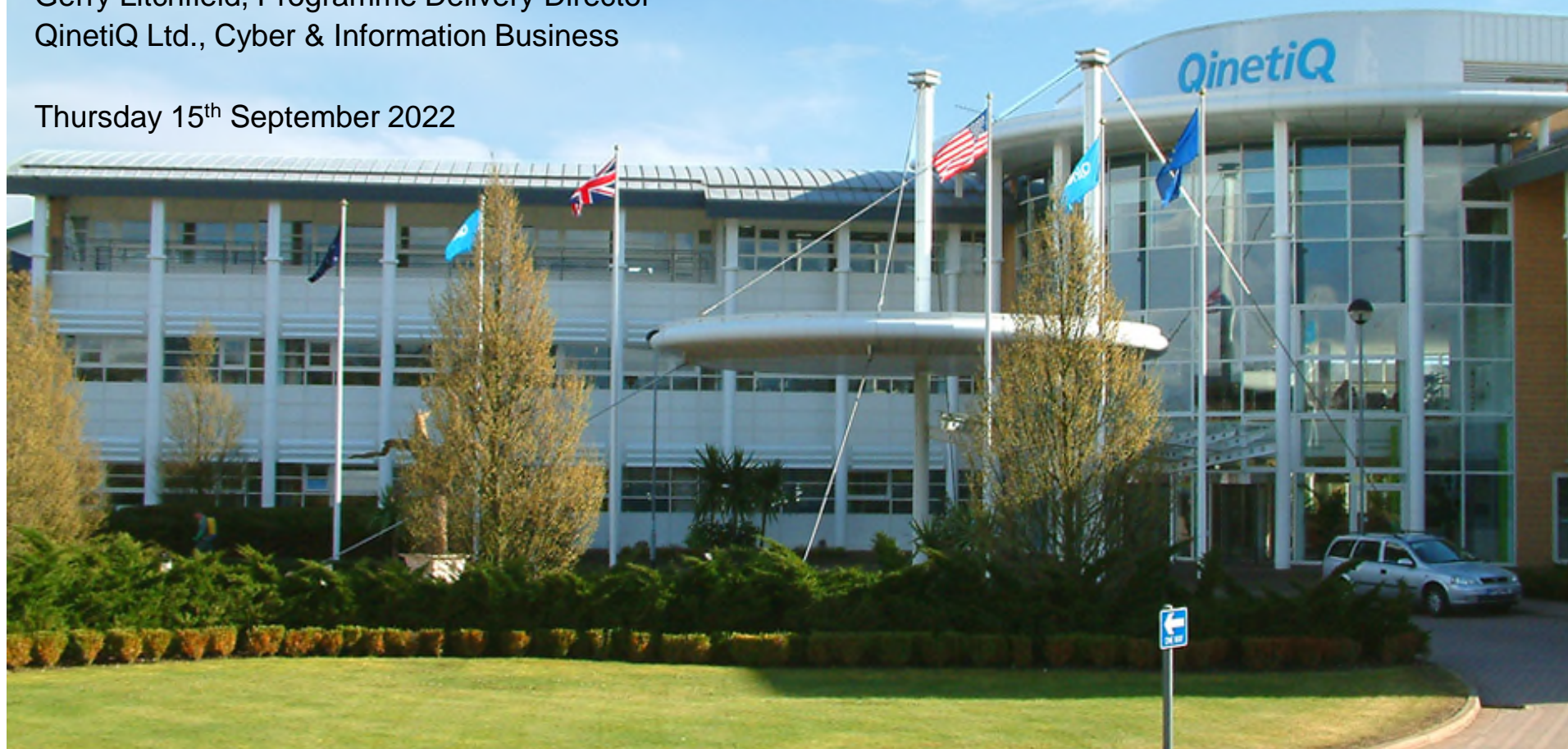
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An Introduction to Project Management

A workshop presentation to the University of Oxford
Material Science Part II Induction Course

Gerry Litchfield, Programme Delivery Director
QinetiQ Ltd., Cyber & Information Business

Thursday 15th September 2022



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BIRTH OF RADAR MEMORIAL
ON 26th FEBRUARY 1935, IN THE FIELD OPPOSITE
**ROBERT WATSON WATT AND
ARNOLD WILKINS**
SHOWED FOR THE FIRST TIME IN BRITAIN THAT
AIRCRAFT COULD BE DETECTED BY BOUNCING
RADIO WAVES OFF THEM. BY 1939 THERE WERE
20 STATIONS TRACKING AIRCRAFT AT DISTANCES
UP TO MORE THAN 100 MILES. LATER KNOWN
AS RADAR, IT WAS THIS INVENTION, MORE
THAN ANY OTHER, THAT SAVED THE RAF
FROM DEFEAT IN THE 1940 BATTLE OF BRITAIN.

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01 Sep 02 Feb 03 May 04 Sep 05 Feb 06 May 07 Sep 08 Apr 09 Nov 10 Jul 11 May

...a future providing innovative global solutions

Agenda

1 Introductions

2 Principles of Project Management

- The Need for Project Management
- What is a Project?
- What is Project Management
- The process of project management

3 Year 4 Research Project

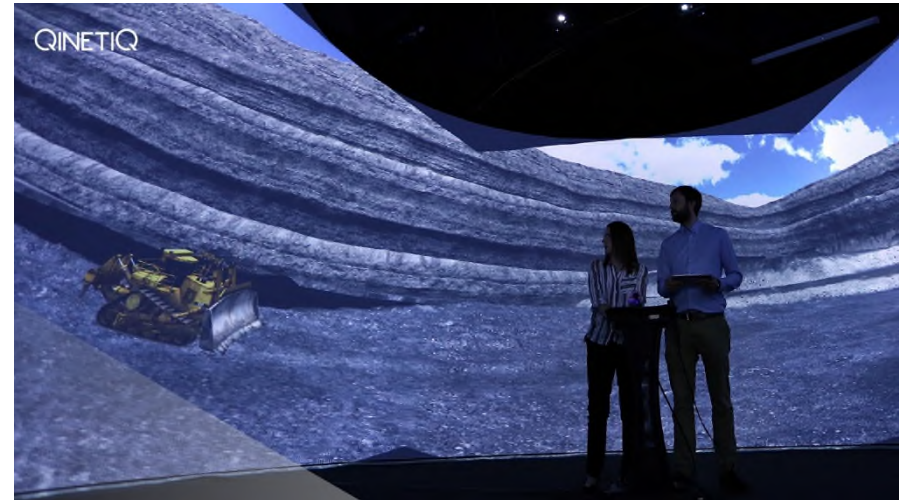
- Approach to Project Management

4 Departmental Project Management Forms

5 Project Exercise:

6 Other important things to focus on

- Record keeping and traceability of records
- Safeguarding Intellectual Property (IP)
- Quality Assurance in Research
- Health and Safety



1 Introductions



Unparalleled scientific and technological expertise

QINETIQ



1 Introductions

Jan Czernuszka

- Part II Project Organiser

Gerry Litchfield

- C&I Business, QinetiQ Ltd.
- <http://www.QinetiQ.com/>

Part II Students

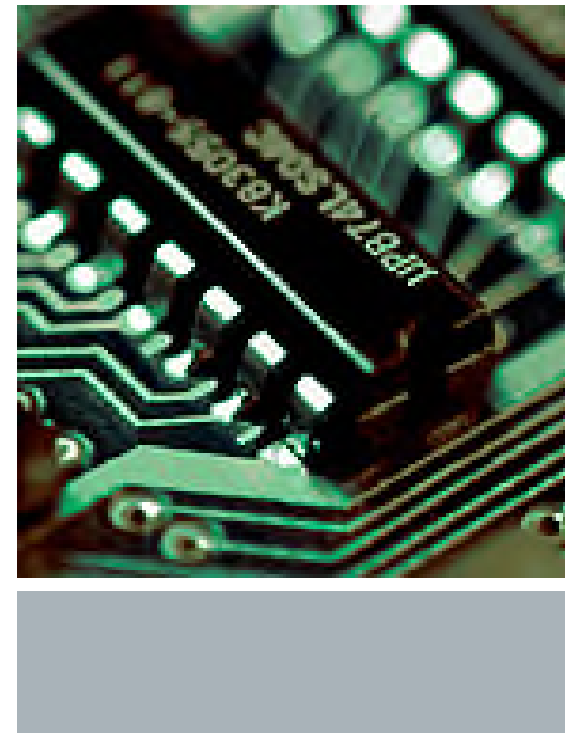
- What are the key Objectives for your project; and why

Association for Project Management (APM)

- <http://www.apm.org.uk/>



2 The Principles of Project Management



The Need for Project Management

“Planning is an unnatural process; it is much more fun to just do something!

The nice thing about not planning is that failure comes as a complete surprise, rather than being preceded by a period of worry and depression.”

Sir John Harvey-Jones

“Projects don’t go wrong;
They *start* wrong”



Project Management – What is a Project?

Project Management – What is a Project?

A project is any series of activities and tasks that together achieve pre-defined objectives, & deliverables. A project has:

- Defined start and end dates
- Planned and scheduled activities
- Funding limits
- A quality definition
- Milestones
- Utilisation of resources such as equipment, materials, people



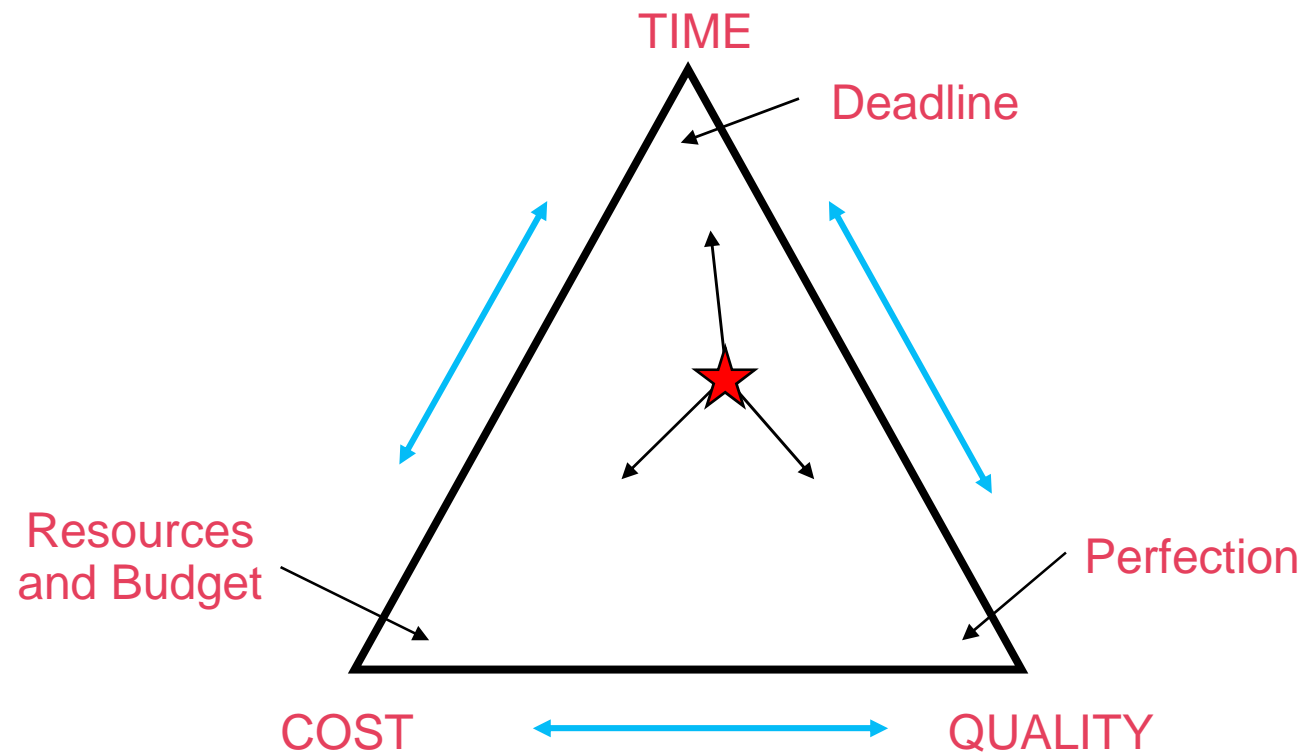
Project Management – What is Project Management?

The Project Management TRIANGLE
Balance the conflicting requirements of

Time

Cost

Quality



Project Management – The Process of Project Management

There are 5 basic Project Management processes:

- Initiation
- Planning
- Execution
- Monitoring & Control
- Closure



Project Initiation

Project initiation requires the following activities to be addressed and communicated:

- Confirm customers and stakeholders
- Confirm customers' **needs**
- State / Describe the **project requirements**
 - **List the project objectives**
 - **Identifying the project goals**
- Identification of assumptions and **risks**
- Preliminary determination of constraints
- Inform stakeholders & task all contributors

The output of this activity is a Statement of Requirements (SOR). This informs the Project Planning



“I keep six honest serving-men (They taught me all I knew);
Their names are **What** and **Why** and **When** and **How** and **Where** and **Who**.”

Rudyard Kipling

Project Planning

Project Planning requires the following activities to be addressed:

- Identification of project activities
- Identification of the critical activities
- Determination of the sequence of activities & defined milestones
- Estimation of the time duration of each activity
- Schedule the activities to achieve the project objectives
- Estimation of the cost of each activity
- Allocation of the resources required to achieve the objectives

The output from this activity is the Project Management Plan (PMP)



“A goal without a plan is just a wish.”

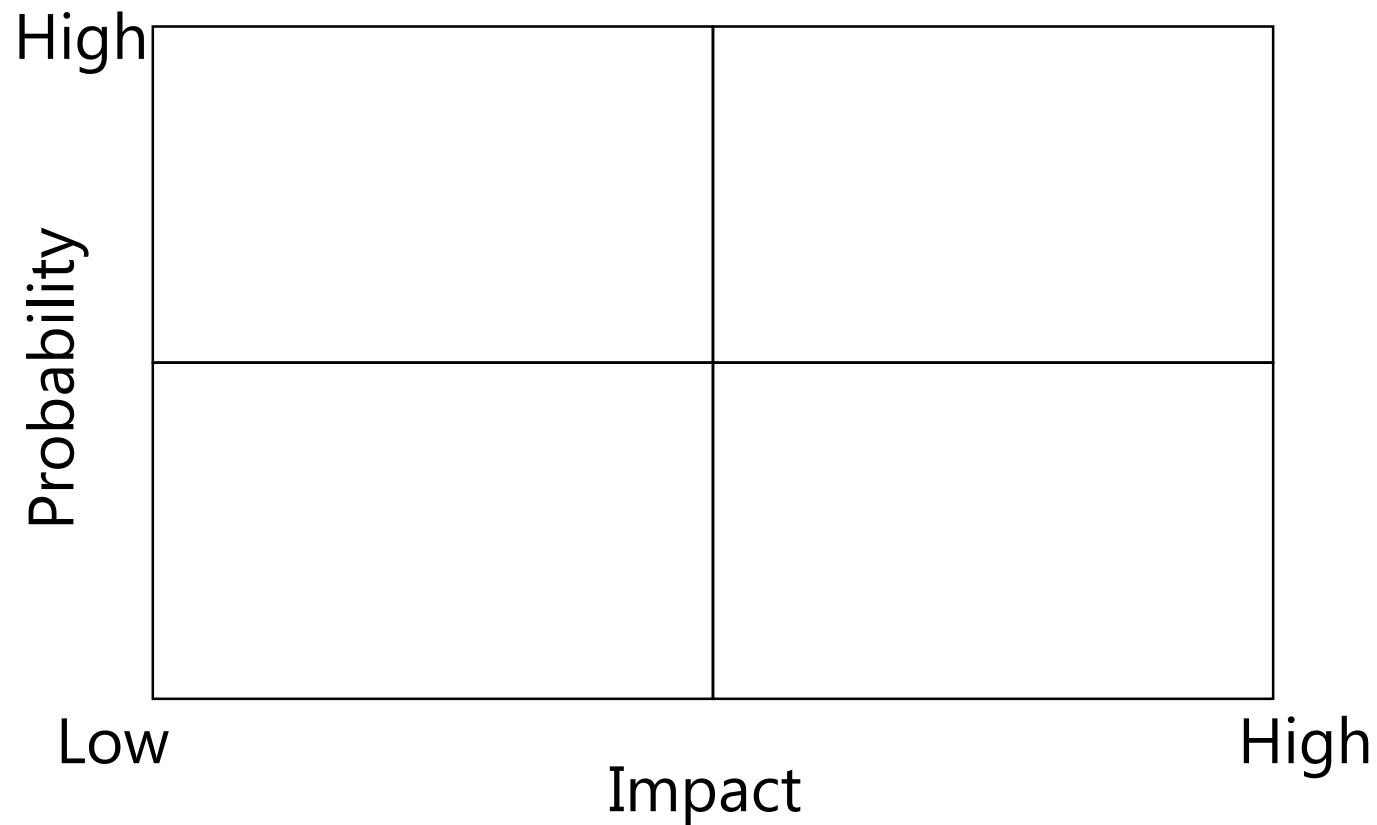
Antoine de Saint-Exupery, French writer (1900 - 1944)

The Project Management Plan (PMP)

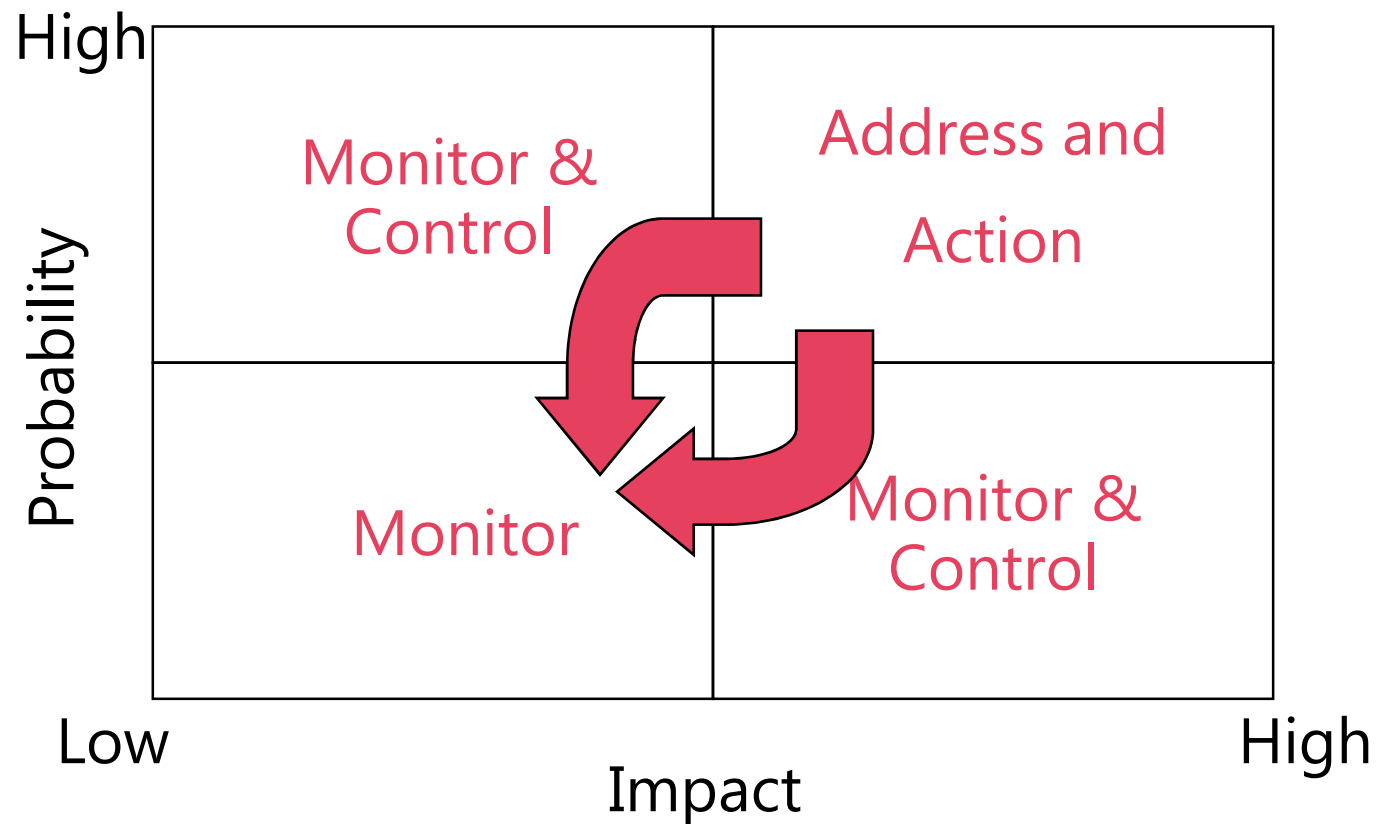
The PMP should contain:

- **Background.** Covering the needs of the Customer and the SOR
- **Objectives.** Overview of scope, assumptions, constraints, time/cost/quality, deliverables and other success criteria
- **Project Execution Strategy and Plans.** How will we deliver the project; Work Breakdown Structure; and schedule, resource, product, quality, purchase, risk management and safety & environment plans
- **Project Organisation.** Structure; Roles, Responsibilities & Accountabilities; Control Groups/meetings (internal & external); and external contractor requirements. Motivational leadership, facilitation, & ownership
- **Project Control System.** The control cycle, progress reporting, change control, sign-off.
- **Risk Management – Risk Identification & Assessment.** Identify risks to the successful completion of the project. Evaluate the Risks, including probability and impacts on project, e.g. time, cost and performance. Consider appropriate responses to control risk (avoidance, mitigation planning)

Risk Assessment



Risk Assessment, Evaluation and Control



Project Execution & periodic review

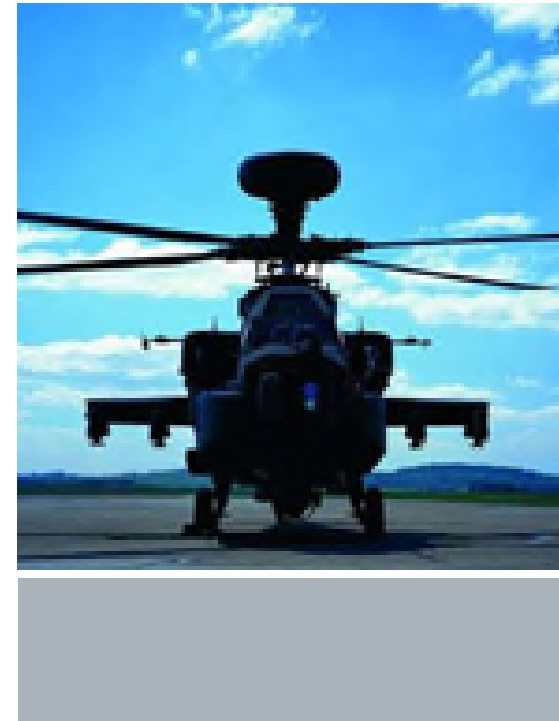
Project execution is carried out in accordance with the Project Management Plan (PMP) and the agreed schedule

Project execution covers the period of doing the work to achieve all the project objectives and project deliverables, in order to satisfy the customer needs, and the contract requirements

During this stage of the project regular project performance (progress) reviews should be carried out

Concise project monitoring & control is required

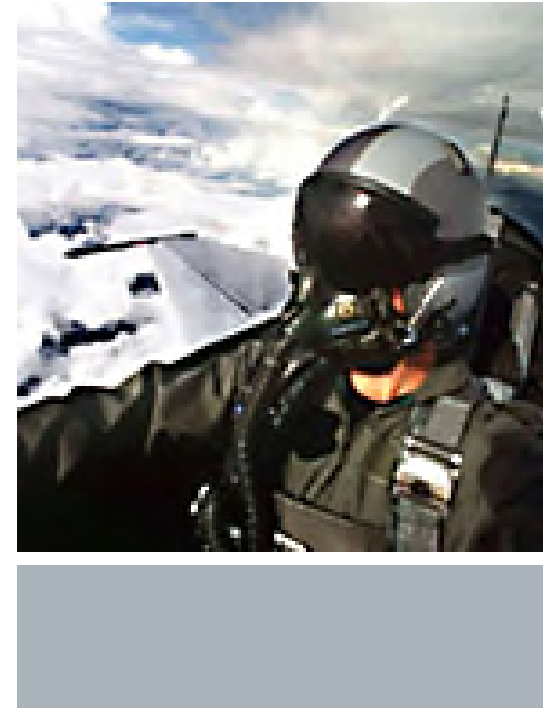
All in accordance with the PMP.



Project Monitoring & Control

All projects of any reasonable size experience problems.

The Project Monitoring & Control Cycle of activities enables problems to be identified and solved at an early stage so that the project can be maintained on track.



“How does a project get to be a year behind schedule? One day at a time.”

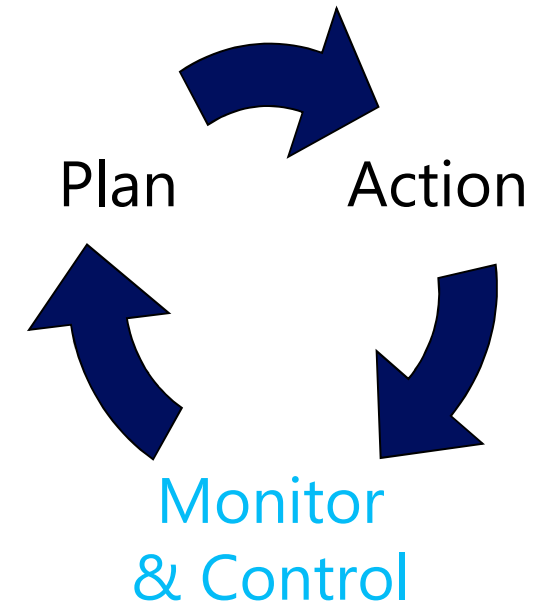
Fred Brooks, author of “The Mythical Man-Month”

The Monitoring & Control Cycle

The monitoring & control cycle consists of:

- Reviewing and measuring progress
- Comparing actual progress against the plans and objectives, e.g. schedule, risk, resources, achieved performance
- Identifying any variances; Taking action to correct variances
- Forecasting events that may cause deviation from the plan
- Re-planning if necessary

Deliverables will be subjected to interim review during the project and extensive review against the relevant requirement before final delivery.



Project Closure

The main objective of project closure is to confirm that all project objectives have been **achieved** and ensure that all elements of the project are **completed**

To close down the project in a controlled manner.

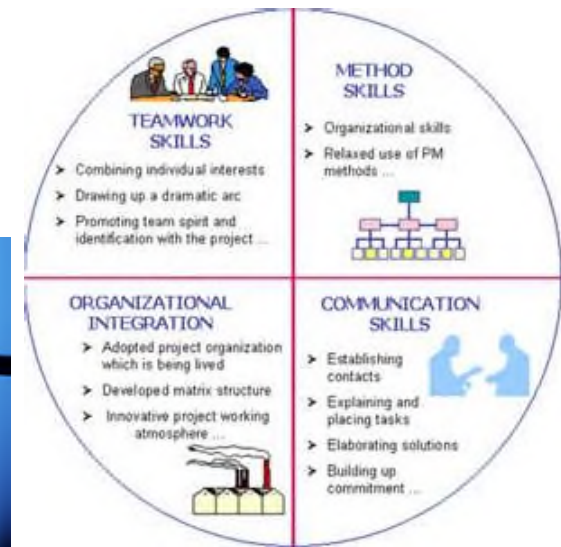
Record all lessons learned and make these available for the benefit of others.

'Lessons Learned' can be evaluated during & throughout the project.

Use this approach to improve your current project.



3 Year 4 Research Project



Approach to Project Management

Establish the objectives and scope of your project to enable the production of a Statement of Requirements (SOR).

Review and agree the SOR with your Supervisor (**PM Form 1**)

Establish the Project Plan:

Define an organisation structure for the project,

Agree the resources you need, including:

- You - the Project Manager (are part of the resources!)
- The Customer: the Examiner; the Supervisor; your Industry sponsor
- Other stakeholders?
- members of the relevant research groups (acting as technical advisors, reviewers, auditors)
- laboratory technicians (for support in the laboratory)
- facility managers (to enable the scheduling of facilities required throughout the project)

Approach to Project Management

Produce a work breakdown structure. The work should include task activities to:

- review what has to be achieved to determine what information/facilities are required to enable the research;
- conduct literature searches;
- communicate with owners of facilities;
- develop ideas/methodologies and potential solution options to be researched;
- undertake experimental research and analysis;
- assess the results of the analysis for each option and determine the preferred solution to be recommended in the final report;
- write the final report;
- undertake reviews of the report within the research group, other peer groups and the Supervisor (Customer) prior to project summary (**Thesis**) and final delivery and acceptance.

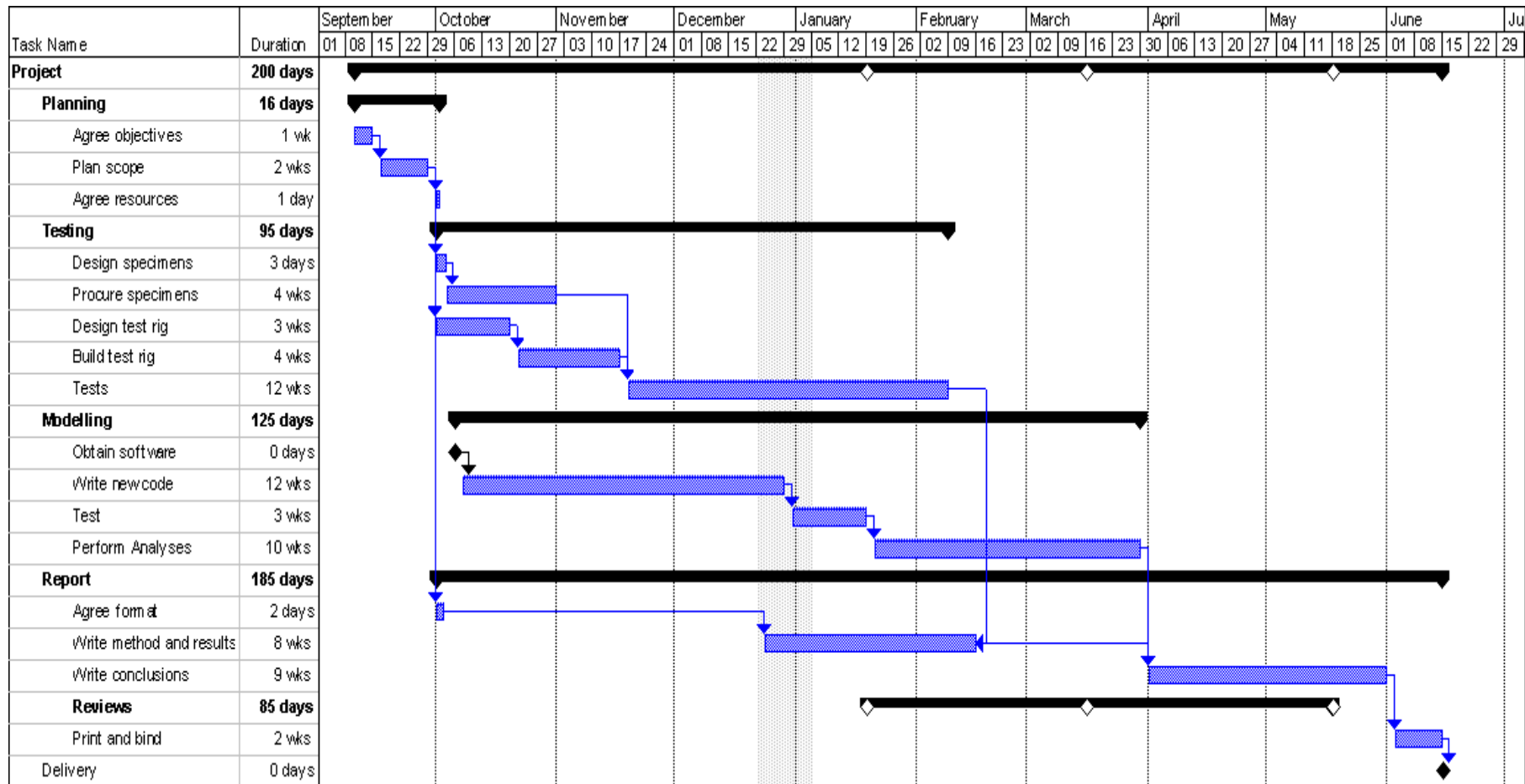
Approach to Project Management

Produce a risk register and assess any risk contingency that may need to be built into the project schedule plan

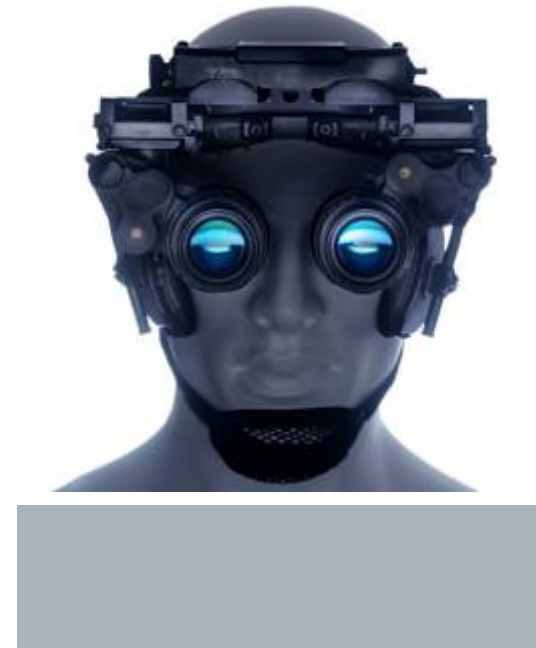
Produce a project schedule plan (Gantt Chart) including:

- the work activities including estimates of the amount of time to be spent on each activity in the plan and its start and finish time etc
- dependencies between activities;
- identified project review points (for assessing how well work is progressing against the plan and to resolve any issues/problems – (PM Forms 2-3));
- milestones;
- deliverables;
- risk contingency

Typical Project Schedule Plan – Gantt Chart



4 Departmental Project Management (PM) Forms



Departmental Project Management (PM) Form 1

PM Form 1 – PART II Project Description Form (Agreed by when?)

- Title of Project
- What are the objectives of the project in order of priority?
- List the major milestones that must be accomplished in order to meet the objectives of the project
- What resources (equipment, materials, technician support etc) will you need?
- Complete the following plan for your entire project. List each major task down the left hand column, and for each one draw a horizontal line to indicate the period you expect to allocate to it.

| No. | Major Task | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
|-----|------------|-----|-----|-----|-----|-----|-----|------|------|------|
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | Write up | | | | | | | XXXX | XXXX | XXXX |

Departmental Project Management (PM) Form 2 & 3

PM Form 2 – First PART II Project Analysis Form

This is used to conduct a project review (and self assessment) after about 2 months

Provides formal opportunity to update the Project Plan

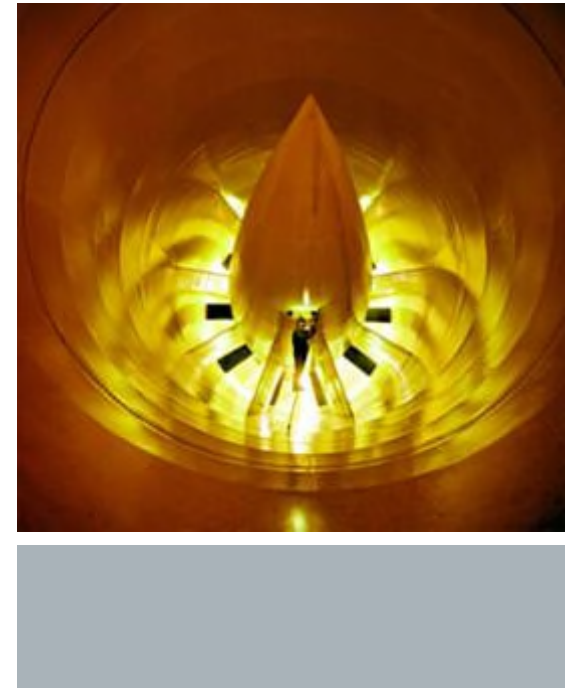
PM Form 3 – Second PART II Project Analysis Form

This is used to conduct a 2nd project review (and self assessment) further into the project

Thesis

The Part II thesis should include a section on the project management aspects of the work

5 Project Exercise – ‘workshop’



Project Exercise – Describe your project; Draft PM Form 1

Identify your Customer(s)

Examiner; Supervisor; Industry sponsors': confirm their needs

Complete PM Form 1

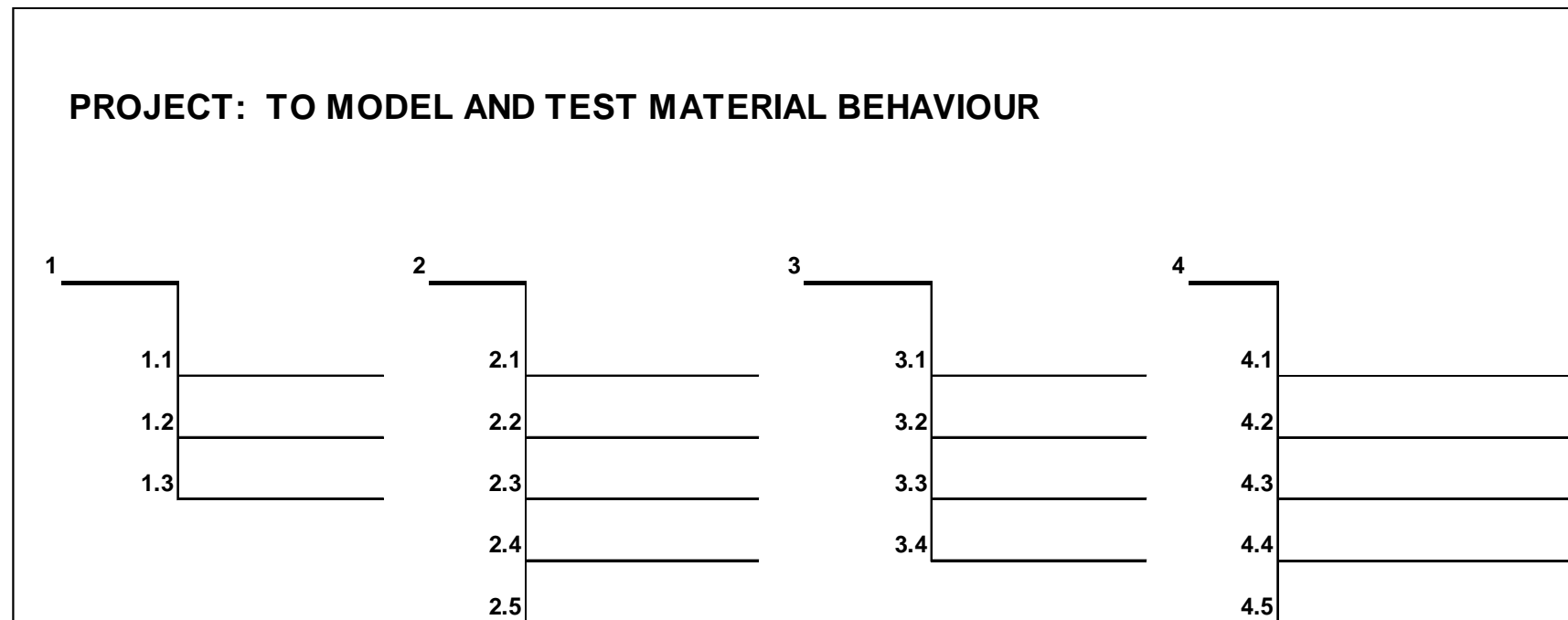
- Project Objectives - prioritised
- Produce a typical Work Breakdown Structure (WBS)
- Produce an outline Project Schedule Plan; Produce a schedule (Gantt Chart?)
- Produce a Risk Assessment – evaluate the risks
- Resources required to execute the project
- Identify Milestones & Deliverables –
 - Planning the tasks, 'key events' and outputs from tasks
 - Identify Milestones, Deliverables
 - Delivery of Thesis

Risk Assessment Table

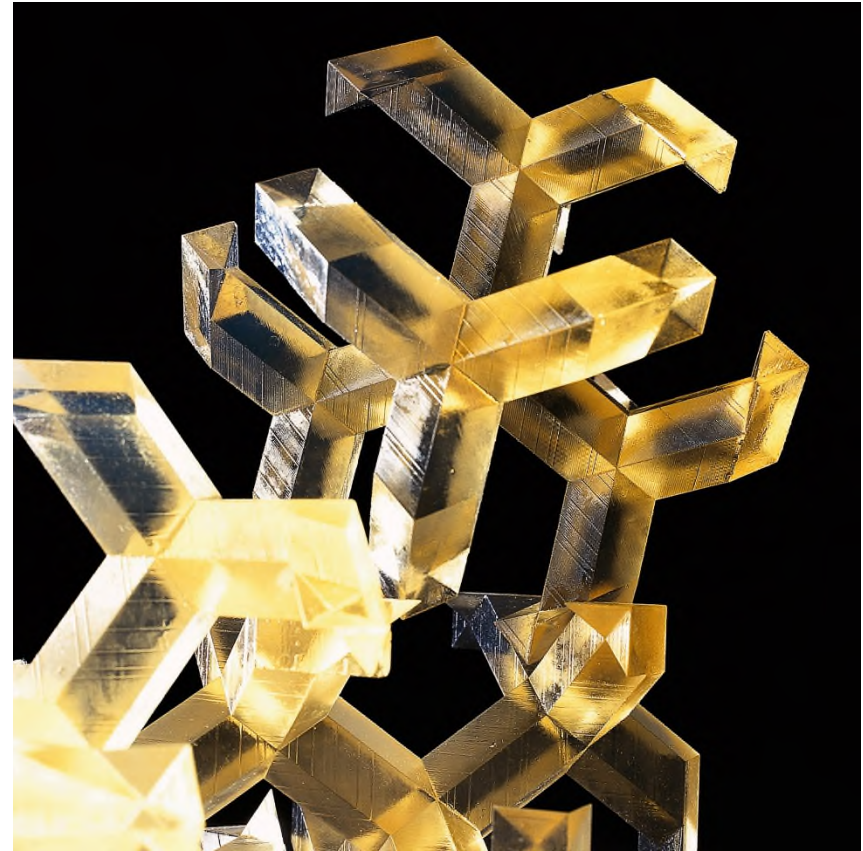
RISK ASSESSMENT

| Risk No. | Identified Risk | Probability of occurrence (Low, Med, High) | Impact | Mitigation | Cost |
|----------|-----------------|--|--------|------------|------|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |

Typical Work Breakdown Structure – 2 levels

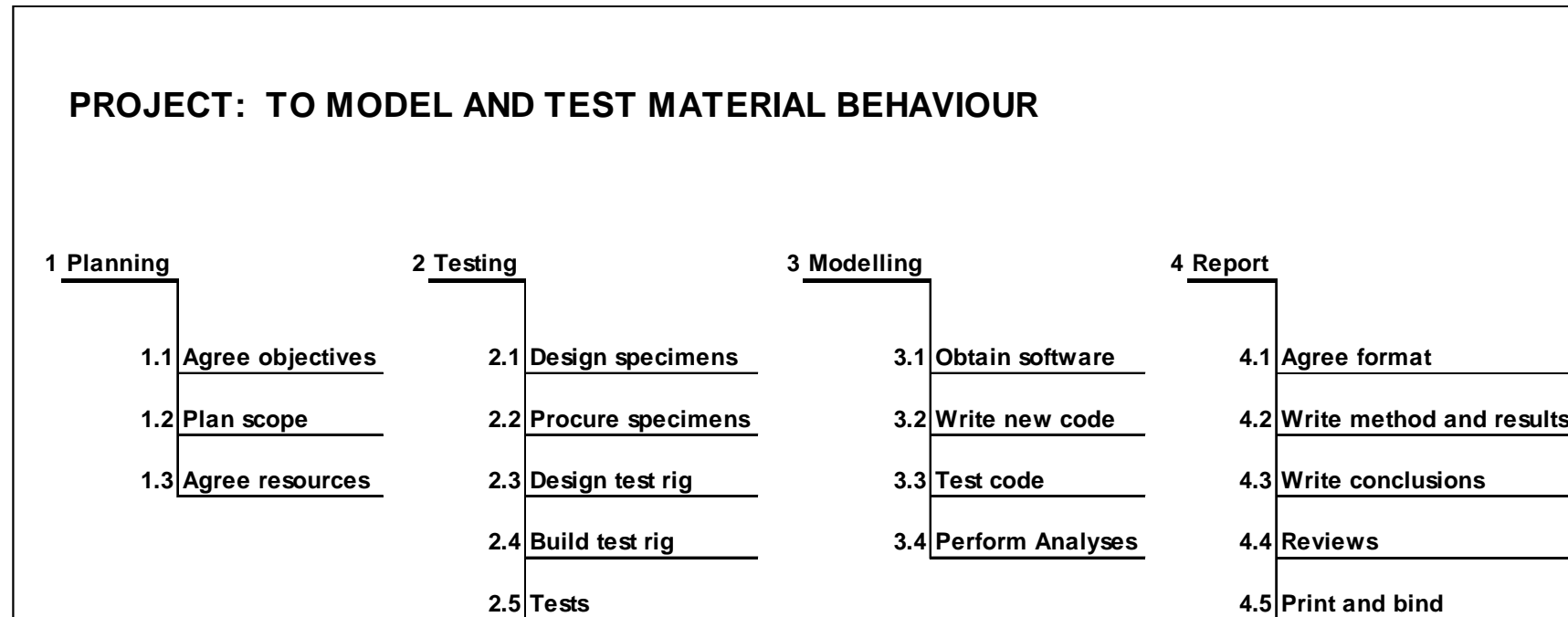


5 Project Exercise example: To model and test material behaviour



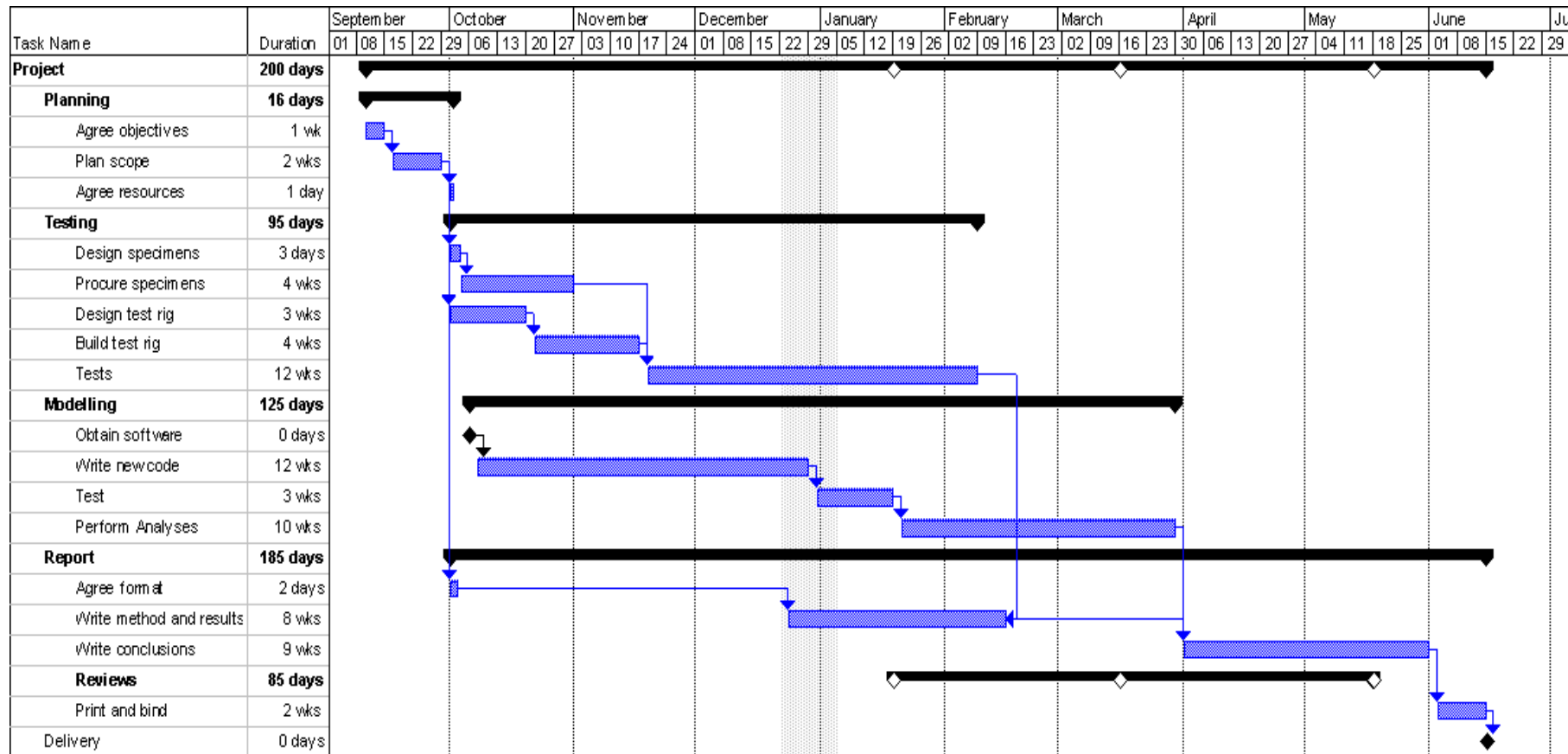
Project Exercise :

To model and test material behaviour Work Breakdown Structure (WBS)



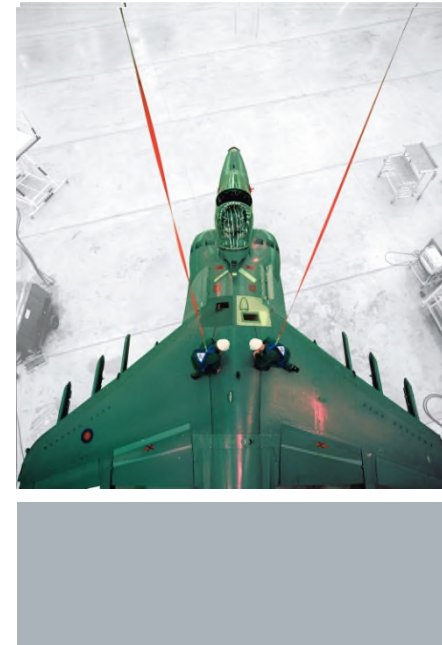
Project Exercise :

To model and test material behaviour Gantt Chart



6 Other important things to focus on

- Record keeping and traceability of records
- Safeguarding Intellectual Property (IP)
- Quality Assurance in Research
- Health, Safety & Environment

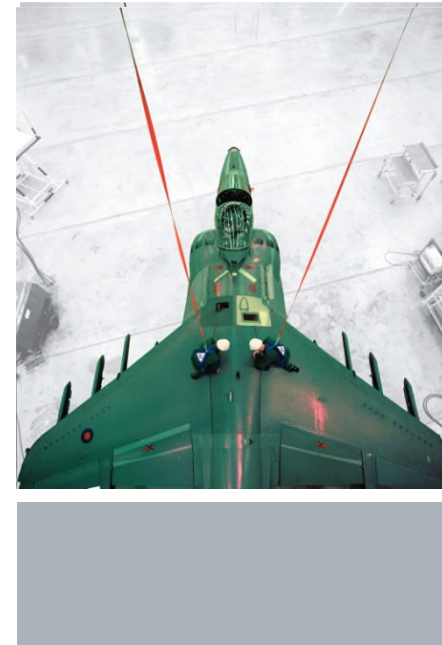


Record keeping and traceability of records

- Often you don't know exactly what you are going to do at the beginning of a research project.
- You need to be able to revise your approach, or even your objectives, if things don't go the way you expected.
- You need to allow enough time to be able to do this.
- Whatever course your project follows, you can be sure that you will need to write it up. You can therefore **plan to do so from the start**.
- **It is important for you to keep sufficient records to provide an audit trail**
 - **from the initial baseline plan;**
 - **through the key decision points that brought about any changes;**
 - **to the final write up of what has been achieved.**
- **Records include:**
 - **Lab Books; baseline documents associated with the project (e.g. PM Form 1);**
 - **Scheduled review records (e.g. PM Forms 2-3) and technical reviews/meetings contributing to any changes to the project scope.**

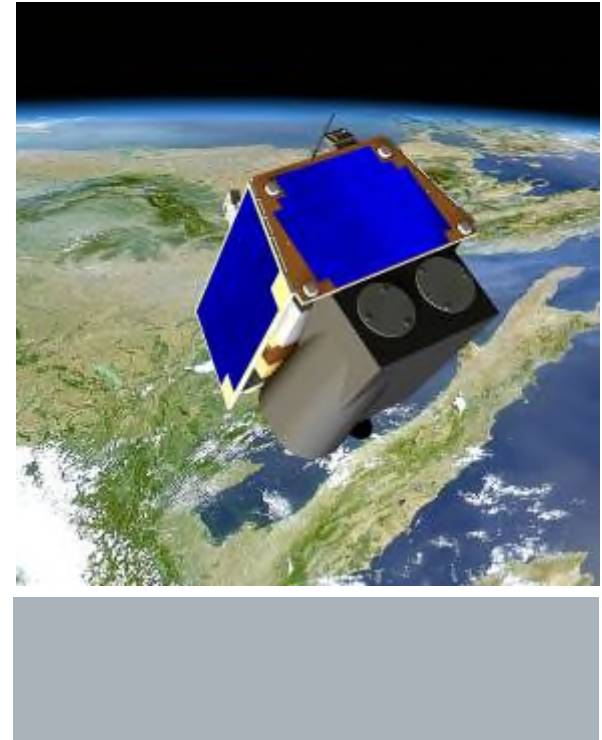
6 Other important things to focus on

- Record keeping and traceability of records
- **Safeguarding Intellectual Property (IP)**
- Quality Assurance in Research
- Health, Safety & Environment



Safeguarding intellectual property (IP) – Product of Research

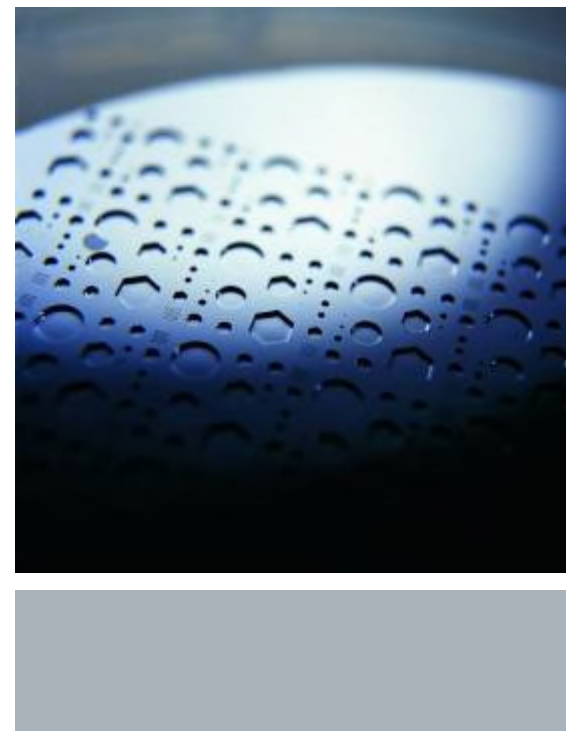
- Intangible asset
- “Virtual” capital
- Can be exploited or traded



Safeguarding intellectual property (IP) - Types of IP

- Patents
- Copyright
- Design Rights
- Trade Marks
- Database Rights
- Secrets

The University Policy on IP Rights are set out in the University's Statutes 2000 and govern the ownership of certain forms of IP, which students may create.



Safeguarding intellectual property (IP) - Patents

Purpose is to PREVENT unauthorised use

They must be:

- Novel
- Inventive
- Applicable / practical

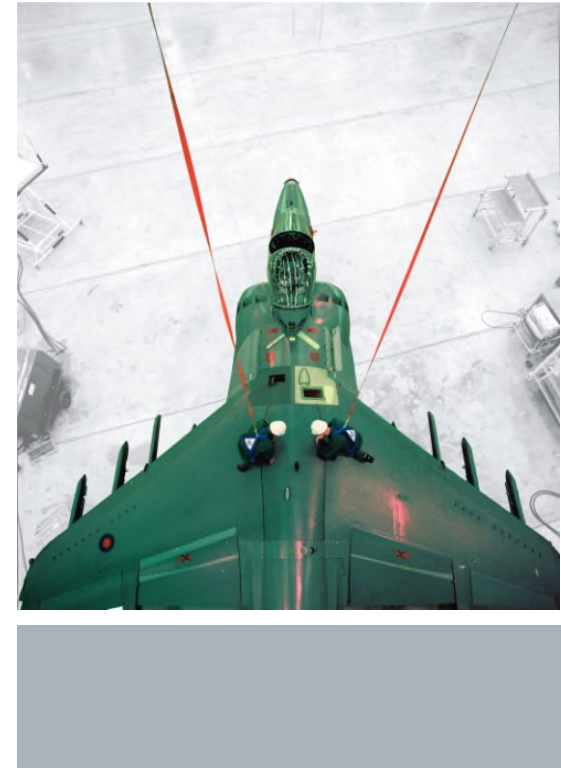
Registered in 5 steps

- Filing
- Novelty search
- 'A' Publication
- Substantive examination
- Granting and 'B' Publication



6 Other important things to focus on

- Record keeping and traceability of records
- Safeguarding Intellectual Property (IP)
- **Quality Assurance in Research**
- Health, Safety & Environment



Quality Assurance in Research

International standard

- e.g. ISO9000/9001
- Registration implies competence

Quality management system

- Organisation
- Procedures
- Assurance
- Audit
- Problem identification & Corrective action

Industry standards may also apply



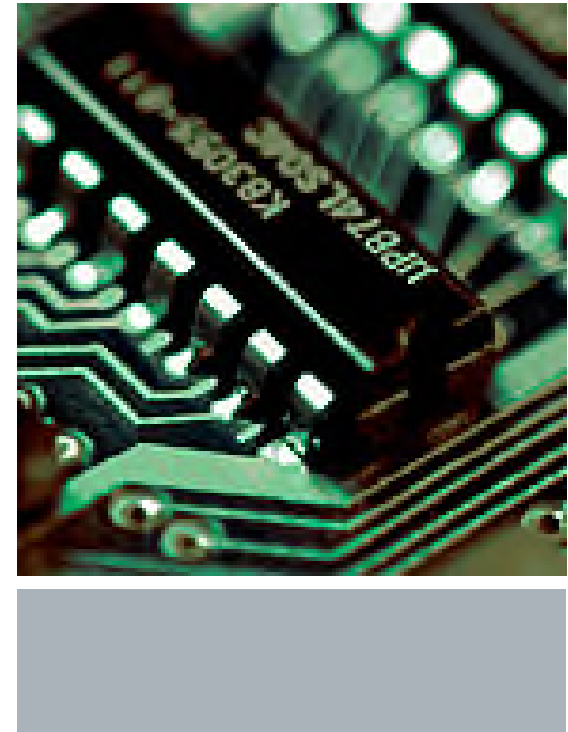
Quality Assurance in Research – Essential Issues in Research

Calibration of equipment

Record keeping and traceability

Consistency of method

Adherence to standards if appropriate



6 Other important things to focus on

- Record keeping and traceability of records
- Safeguarding Intellectual Property (IP)
- Quality Assurance in Research
- Health, Safety & Environment



Health, Safety & Environment (HSE)

It is essential that Health, Safety & Environmental (HSE) aspects are dealt with at the project planning stage

Advice on specific HSE concerns will be provided by the Department as required and introduced during the induction and workshop practice courses

You are advised to follow the 'do-s and don't-s'

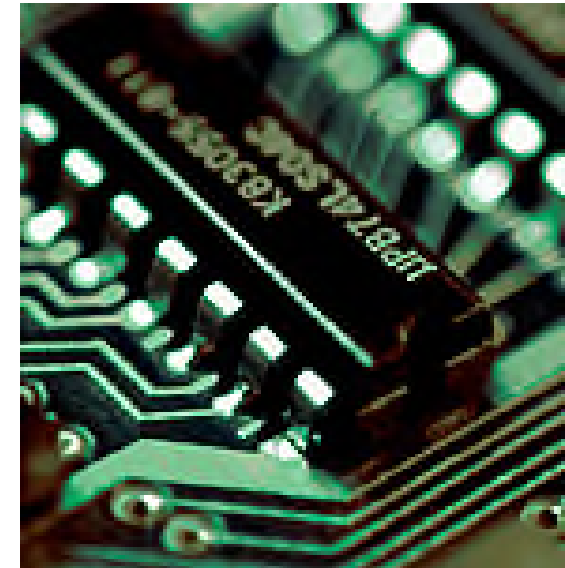


Summary – You & Project Management

Project Management applies common sense and forward thinking

As a minimum, make sure you have the PMP:

- SOR – **What** am I going to do; **Why** am I doing it
 - Customers and Stakeholders – **Who**
 - Project Description
 - Project Objectives
- WBS – **How** am I going to do it (task activities and task 'breakdown')
- List of milestones / deliverables – Project outputs & outcomes; to **Who**
- Risks & appropriate mitigation plans – What could 'go wrong' and how can I avoid it or prevent it; and reduce its impact
- GANTT (Schedule) – **When** do I need to do it (by);
- Resources - **Who** and **What** do I need to achieve the plan & schedule



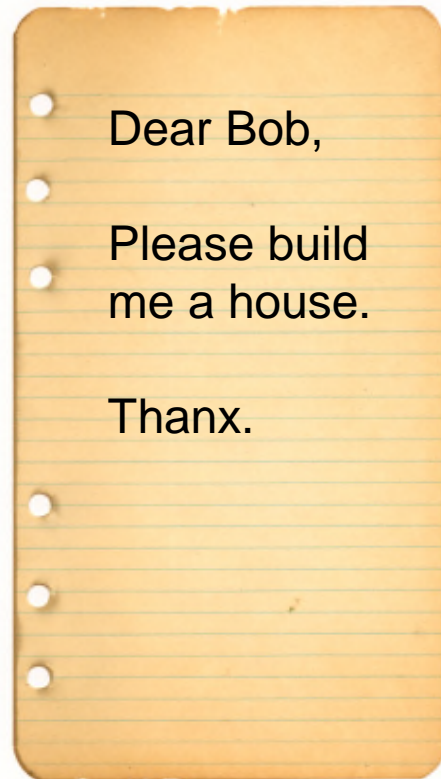
Things happen! Don't be afraid to change the plan;

But record the change; and why

The Need for Project Planning



The Need for Project Planning

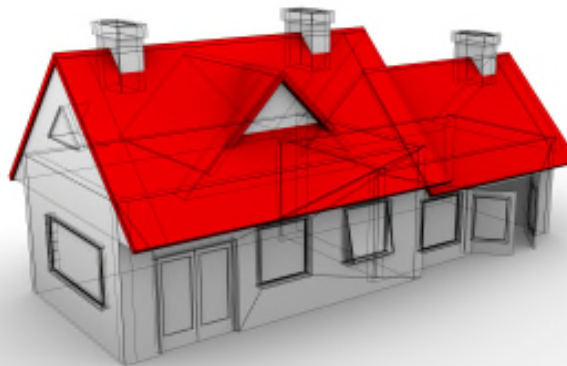


The Need for Project Planning

Dear Bob,

Please build
me a house.

Thanx.



The Need for Project Planning

Dear Bob,

Please build
me a house.

Thanx.





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