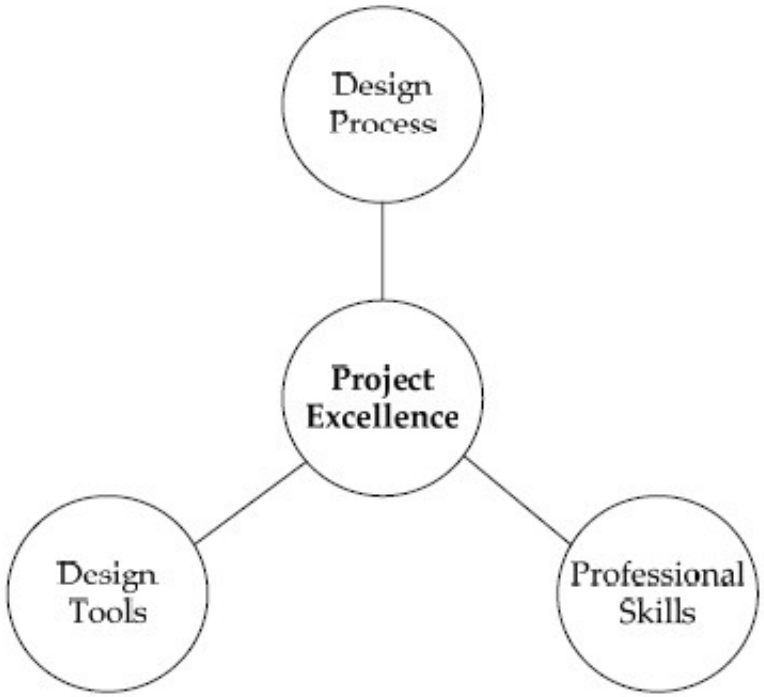
Project Management

Motivation

- Projects are king in the career of engineers!
- Middle management continues to shrink
- Industry now organizes more around projects than functions.



Engineers have led the way on project management!

The Basic Idea

To complete the project

- On-time
- Within budget
- So that it meets the **requirements**

The Work Breakdown Structure

- *A WBS displays and defines the product, or products, to be developed and/or produced. It* ***relates the elements of work to be accomplished to each other*** *and to the end product.*
- A WBS can be expressed down to any level of interest

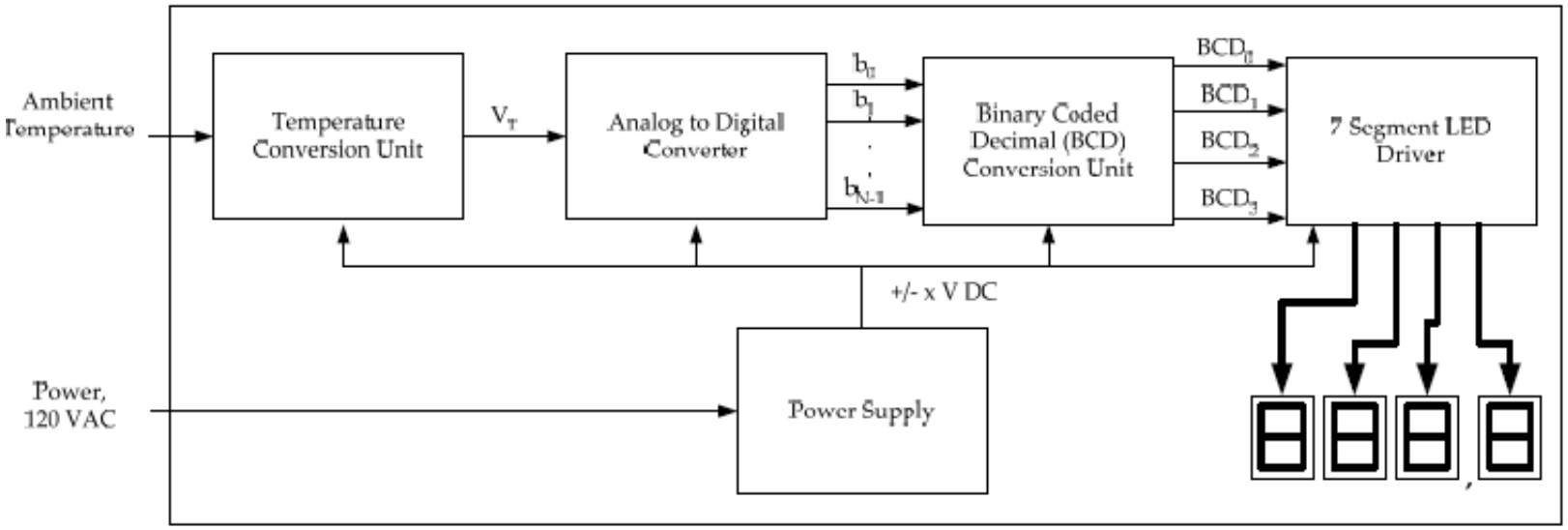
Elements of the Project Plan

- Activities
- Responsibilities
- Timeline
- Dependencies
- Costs

HINT: THESE THINGS OUGHT TO BE IN YOUR PLAN!

Example – Thermometer Design

Problem: Create the WBS for a temperature monitoring system design



Example

There are three main tasks

1. The analog interface circuitry.
2. The LED & digital circuitry.
3. Integrate & Test.
4. Documentation

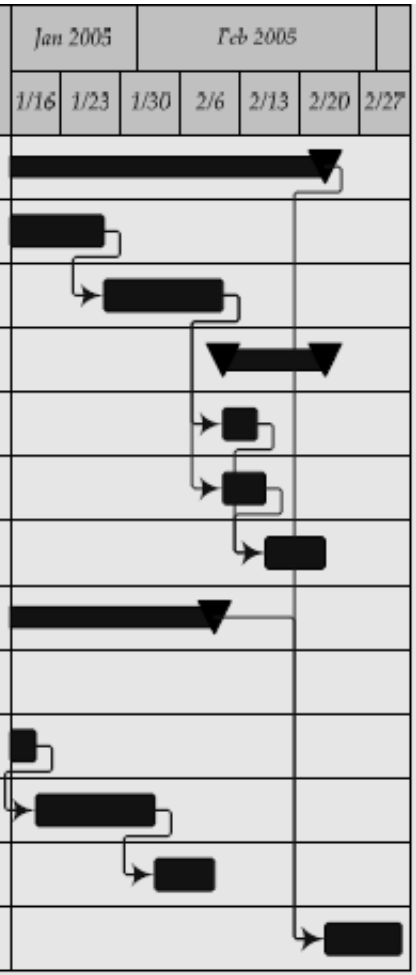
1- PCB Design
2- Packaging
3- Consult with customer
…..

Activities

ID	Activity	Description	Deliverables / Checkpoints	Duration (days)	People	Resources	Predecessors
1	Interface Circuitry						
1.1	Design Circuitry	Complete the detailed design and verify it in simulation.	• Circuit schematic • Simulation verification	14	Rob (1) Jana (1)	• PC • SPICE simulator	
1.2	Purchase Components		• Identify parts • Place order • Receive parts	10	Rob		1.1
1.3	Construct & Test Circuits	Build and test.					
1.3.1	Current Driver Circuitry	Test of circuit with sensing device.	• Test data • Measurement of linearity	2	Jana (1) Rob (2)	• Test bench • Thermo-meter	1.2

Gantt Charts

Task Name	Start	Finish	Duration
1: Interface Circuitry	**1/10/2005**	**2/22/2005**	**32d**
1.1: Design Circuitry	1/10/2005	1/27/2005	14d
1.2: Purchase Components	1/28/2005	2/10/2005	10d
1.3: Construct & Test Circuits	**2/11/2005**	**2/22/2005**	**8d**
1.3.1: Current Driver Circuitry	2/11/2005	2/14/2005	2d
1.3.2: Level Offset & Gain Circuitry	2/11/2005	2/15/2005	3d
1.3.3: Integrate Components	2/16/2005	2/22/2005	5d
2: LED & Driver Circuitry	**1/10/2005**	**2/9/2005**	**23d**
2.1 Research A/D Converters	1/10/2005	1/10/2005	1d
2.2 Complete Hardware Design	1/11/2005	1/19/2005	7d
2.3 Purchase LED & Driver Components	1/20/2005	2/2/2005	10d
2.4: Construct & Test	2/3/2005	2/9/2005	5d
3: System Integration & Test	2/23/2005	3/3/2005	7d



- *Gantt Chart and/or Network Diagram.* Provide a graphical representation of the project plan.

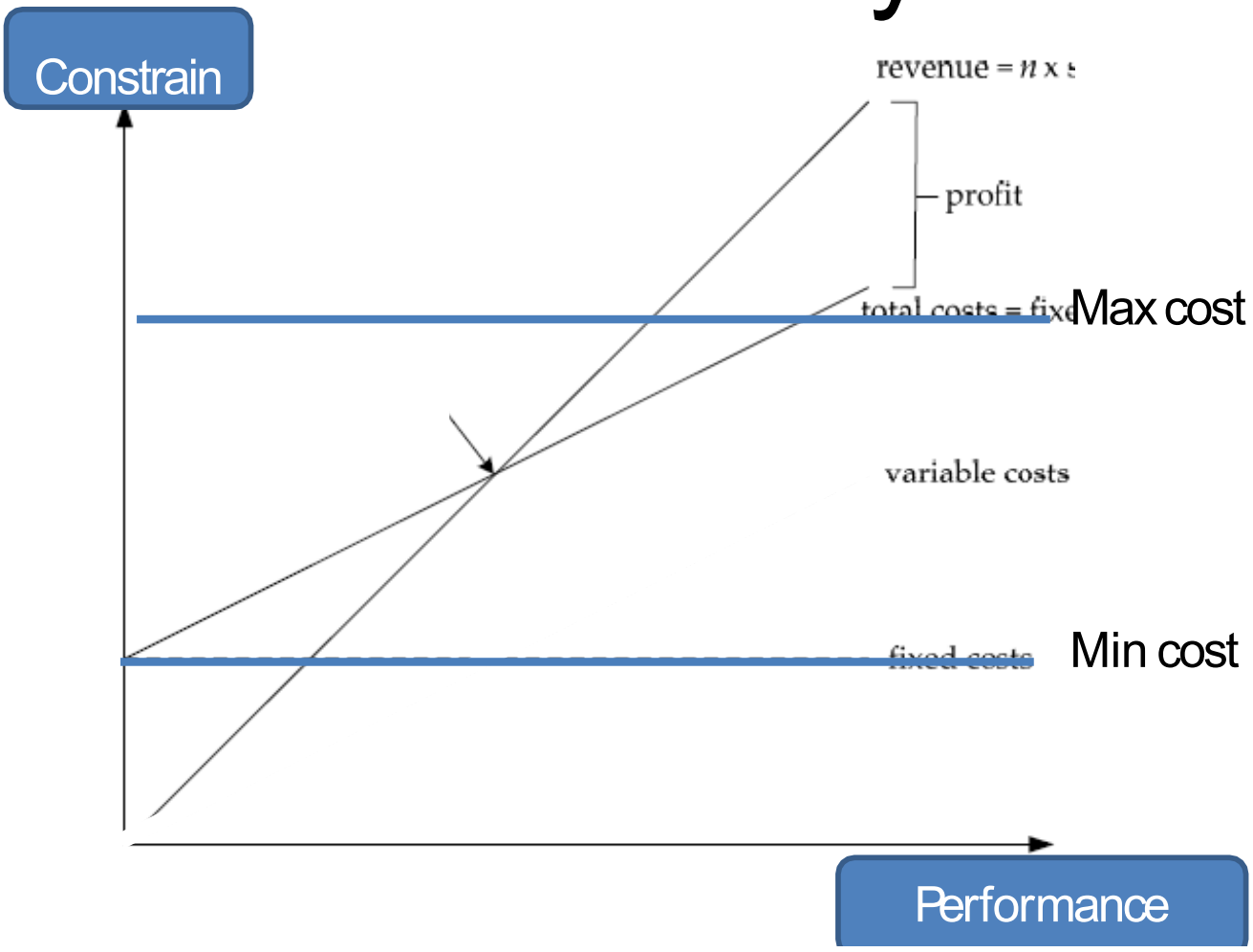
Creating a Gantt Chart

- First step is defining your project plan structure. I suggest you to use this basic structure:
  - Column A: *Task ID (WBS)* (an unique ID which identifies each task with a progressive number).
  - Column B: *Task description* (a short description of the activity).
  - Column C: *Percentage of completion* (0%-100%).
  - Column D: *Predecessor* (finish-start relationships between tasks).
  - Column E: *Start date* (task start date).
  - Column F: *Finis date* (task finish date).

http://www.editgrid.com/

Or Google Gant Chart

Constrain Analysis



- COSTS: Develop a tabulated list of costs for individual component, Equipment (HW & SW), material, etc.

Consider Alternative Designs

- Decision Matrix

	Cost	Size	Complexity		
Alternative	x3	x1	x2		Total
A	5	1	3		22
B	3	1	5		20
C	2	5	3		17

You need to be able to justify your choices:

Why are you using RPi?

Why are you using XCD Camera?

Why do you need a PIC processor?

Important Steps In Project Management

Step 1: **What is your project all about?**

Step 2: **Does your project make sense?**

Step 3: **Who will determine your success... or failure?**

Step 4: **How will you deliver your project?**

Step 5: **Engage your project team**

Step 6: **Shift happens! Prepare for it**

Step 7: **Stay in control during implementation**

Step 8: **Close your project in an orderly way**

Important Steps In Project Management

1- What are you doing?
Define it - what is / what is not your goal
Set the goals and scopes
Assumption

2- Does it make sense / commercial sense
Cost-risk analysis
Your values and your project

3- How do you tell if the project is successful
Are your stakeholders happy
Are they engaged? Do you learn from them

4- How do you deliver the project
Identify the task and duration
Responsibilities / resources / the time lines / budget

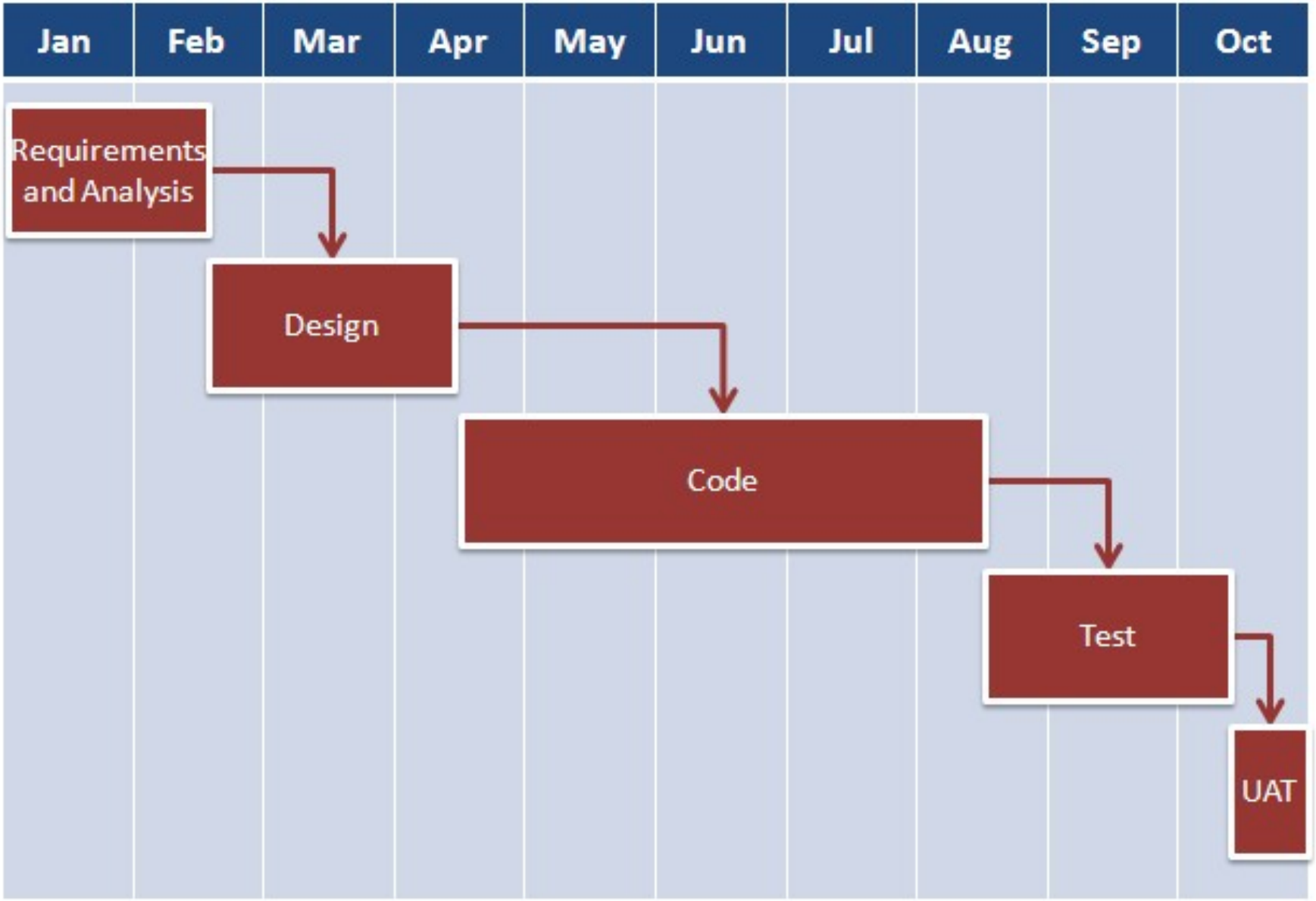
5- Engage the team

6 - Be prepared / have plan B - identify the risk
What is your plan if something did not work

7- During implementation monitor your performance - don't get stuck
Test everything

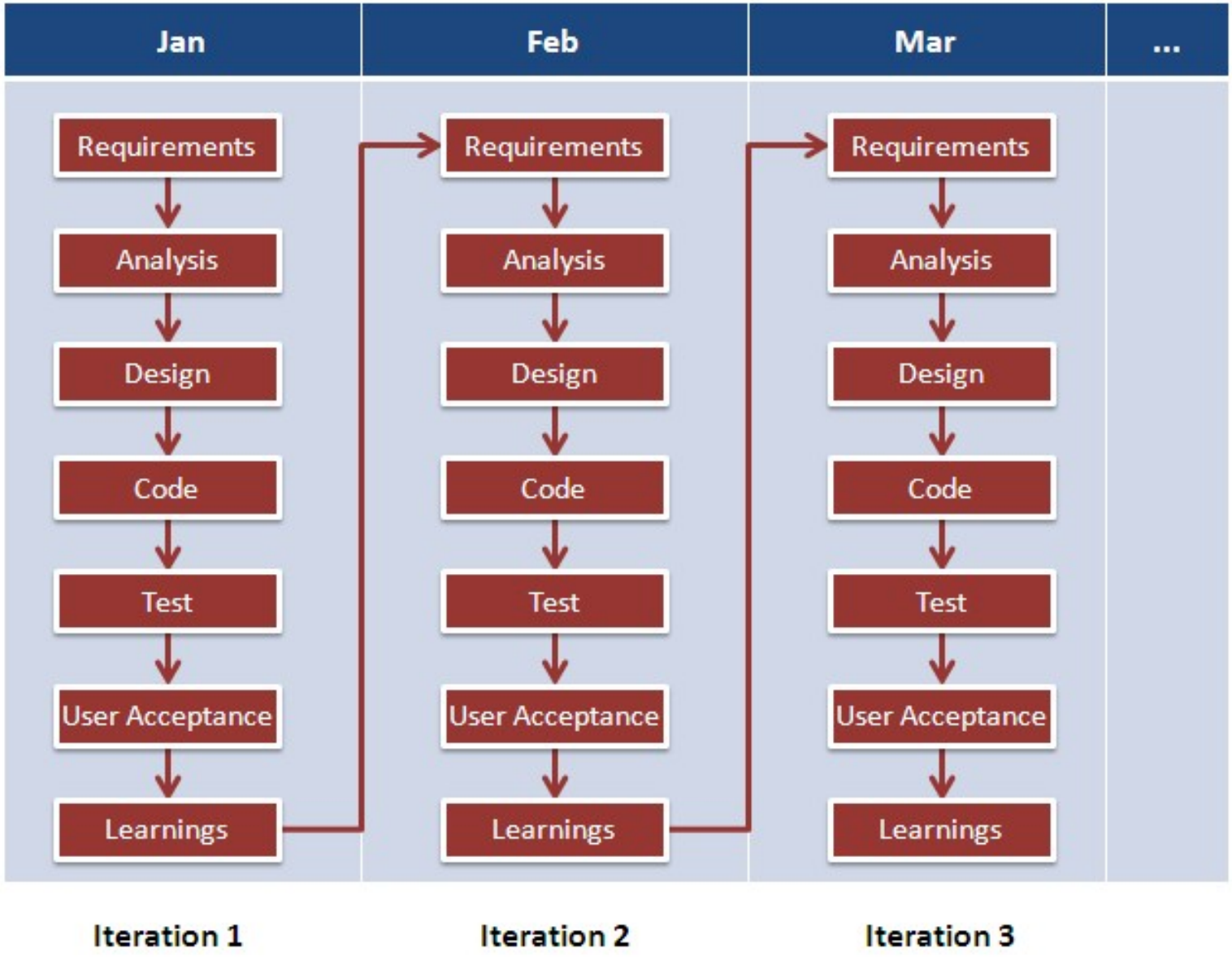
8- Close the project in orderly way
Deliver / handover all the documents
Make sure you document everything

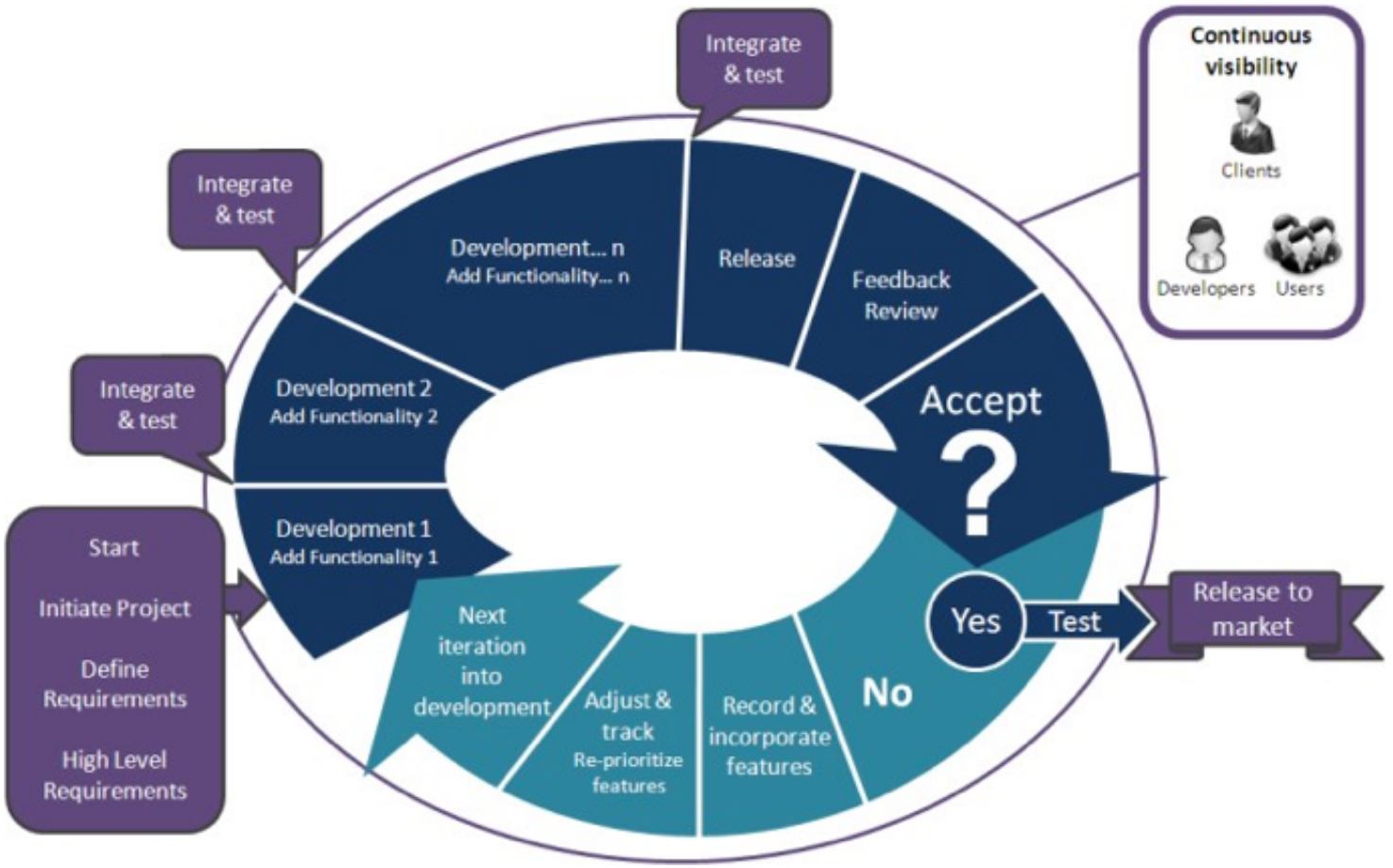
Traditional Waterfall model



http://istqbexamcertification.com/what-is-agile-methodology-examples-when-to-use-it-advantages-and-disadvantages/

Agile development methodology

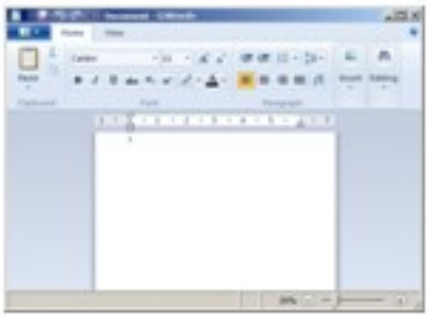




Iteration 1

Iteration 2

Iteration 3



Homework

- *Include a high-level schematic for your project*
- *Do* a Gantt Chart for your project
- Describe 3 alternative designs (do the decision matrix for each case)
- Design test plans for 5 different functionalities – assign responsibilities to each test
- Have a web page link to your project
- Identify 5-10 risks and describe your contingency plan for each
- Identify 5-10 major technical issues and describe how each can impact the design