Project Evaluation and Project Planning

Lecture 2 by Professor Vladimir Geroimenko

Module “Software Project Management“

09 October 2016 - Teaching Week 3

Textbook reference: Chapter 2 and 3

Before we start – News and Updates

- A Sample Exam Paper is available on the E-Learning
- Please note: last week “Lecture 1” was a normal lecture, i.e. its material can be included in the exam questions
- Teaching Assistants have been assigned to the module:
  - Ahmed Hussein
  - Maha Alaa
  - Amira
- Weekly Teaching Plan is now available on the E-Learning

Part 1: Project Evaluation and Programme Management

Part 1 - Lecture Outline

- The business case for a project
- Project portfolios
- Project evaluation
  - Cost benefit analysis
  - Cash flow forecasting
- Programme management
- Benefits management

The Business Case

- Feasibility studies can also act as a ‘business case’
- Provides a justification for starting the project
- Should show that the benefits of the project will exceed development, implementation and operational costs
- Needs to take account of business risks

Contents of a Business Case - 1

1. Introduction/ background
2. The proposed project
3. The market
4. Organizational and operational infrastructure
5. The benefits
6. Outline implementation plan
7. Costs
8. The financial case
9. Risks
10. Management plan

Contents of a Business Case - 2

- **Introduction/background:** describes a problem to be solved or an opportunity to be exploited
- **The proposed project:** a brief outline of the project scope
- **The market:** the project could be to develop a new product (e.g. a new computer game). The likely demand for the product would need to be assessed.

Contents of a Business Case - 3

- **Outline implementation plan:** how the project is going to be implemented. This should consider the disruption to an organization that a project might cause.
- **Costs:** the implementation plan will supply information to establish these
- **Financial analysis:** combines costs and benefit data to establish value of project

Project Portfolio Management - 1

The concerns of project portfolio management include:

- Evaluating proposals for projects
- Assessing the risk involved with projects
- Deciding how to share resources between projects
- Taking account of dependencies between projects
- Removing duplication between projects
- Checking for gaps

Project Portfolio Management - 2

There are three elements to PPM:

(1) Project portfolio definition

- Create a central record of all projects within an organization
- Must decide whether to have ALL projects in the repository or, say, only ICT projects
- Note difference between new product development (NPD) projects and renewal projects e.g. for process improvement

Project Portfolio Management - 3

Project portfolio management

- Actual costing and performance of projects can be recorded and assessed

Project portfolio optimization

- Information gathered above can be used achieve better balance of projects e.g. some that are risky but potentially very valuable balanced by less risky but less valuable projects

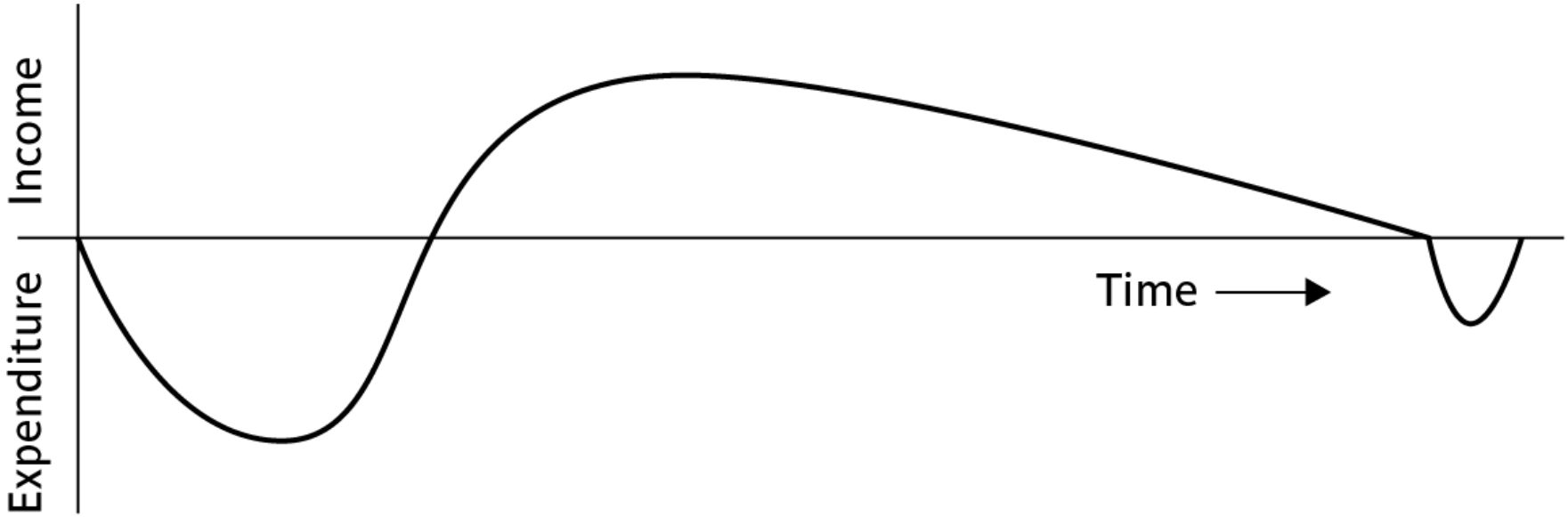
Please note: You may want to allow some work to be done outside the portfolio e.g. quick fixes

Cost Benefit Analysis (CBA)

This relates to an individual project. You need to:

- Identify all the costs which could be:
  - Development costs
  - Set-up
  - Operational costs
- Identify the value of benefits
- Check benefits are greater than costs

Product/System Life Cycle Cash Flows



- The timing of costs and income for a product of system needs to be estimated.
- The development of the project will incur costs.
- When the system or product is released it will generate income that gradually pays off costs.

Net Profit

Year	Cash Flow
0	-100,000
1	10,000
2	10,000
3	10,000
4	20,000
5	100,000
Net profit	*50,000*

- ‘Year 0’ represents all the costs before system is operational
- ‘Cash-flow’ is value of income less outgoing
- Net profit value of all the cash-flows for the lifetime of the application

Pay Back Period

Year	Cash Flow	Accumulated
0	-100,000	-100,000
1	10,000	-90,000
2	10,000	-80,000
3	10,000	-70,000
4	20,000	-50,000
5	100,000	50,00

This is the time it takes to start generating a surplus of income over outgoings.

Return On Investment (ROI)

$$ROI = \frac{\text{Average annual profit}}{\text{Total investment}} \times 100$$

In the previous example:

Average annual profit = 50,000/5 (years) = **10,000**

ROI = 10,000/100,000 X 100 = **10%**

Net Present Value (NPV)

Would you rather I gave you £100 today or in 12 months time?

If I gave you £100 now you *could* put it in savings account and get interest on it.

If the interest rate was 10% how much would I have to invest now to get £100 in a year's time?

This figure is the *net present value* of £100 in one year's time

Discount Factor

Discount factor = $1/(1+r)^t$

r is the interest rate (e.g. 10% is 0.10)

t is the number of years

In the case of 10% rate and one year:

- Discount factor = 1/(1+0.10) = 0.9091

In the case of 10% rate and two years

- Discount factor = 1/(1.10 x 1.10) =0.8294

Applying Discount Factors

Year	Cash flow	Discount factor	Discounted cash flow
0	-100,000	1.0000	-100,000
1	10,000	0.9091	9,091
2	10,000	0.8264	8,264
3	10,000	0.7513	7,513
4	20,000	0.6830	13,660
5	100,000	0.6209	62,090
		NPV	618

Note to the previous slide

- NPV (Net Present Value) is the sum of the discounted cash flows for all the years of the ‘project’ (note that in NPV terms the lifetime of the completed application is included in the ‘project’)
- The figure of £618 means that £618 more would be made than if the money were simply invested at 10%.
- An NPV of £0 would be the same amount of profit as would be generated by investing at 10%.

Internal Rate of Return (IRR)

- Internal Rate of Return is the discount rate that would produce an NPV of 0 for the project
- Can be used to compare different investment opportunities
- There is a Microsoft Excel function which can be used to calculate (=IRR)

Dealing with Uncertainty: Risk evaluation

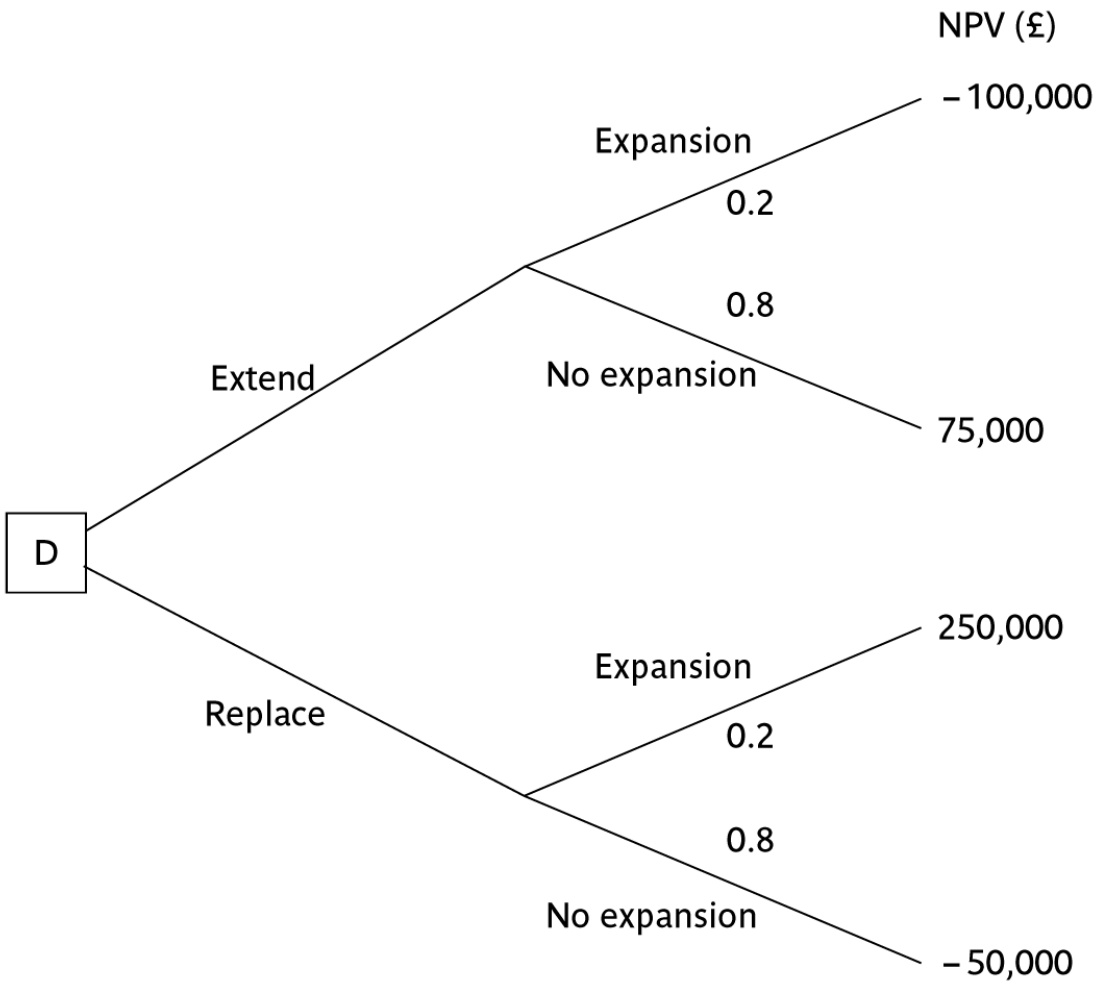
- Project A might appear to give a better return than Project B but could be riskier.
- You could draw up a project risk matrix for each project to assess risks – see next slide.
- For riskier projects could use higher discount rates.

Example of a Project Risk Matrix

Risk	Importance	Likelihood
Client rejects proposed look and feel of site	H	—
Competitors undercut prices	H	M
Warehouse unable to deal with increased demand	M	L
Online payment has security problems	M	M
Maintenance costs higher than estimated	L	L
Response times deter purchasers	M	M

TABLE 2.5 A fragment of a basic project/business risk matrix for an e-commerce application

Decision Trees



Programme Management

A definition:

‘a group of projects that are managed in a co-ordinated way to gain benefits that would not be possible were the projects to be managed independently’

Ferns, the *International Journal of Project Management,* August 1991

Possible Types of Programmes

- **Strategic:** Several projects together implement a single strategy.
- **Business cycle programmes:** A portfolio of project that are to take place within a certain time frame e.g. the next financial year.
- **Infrastructure programmes:** In an organization there may be many different applications which share the same hardware/software infrastructure.
- **Research and development programmes:** In a very innovative environment where new products are being developed.
- **Innovative partnerships:** e.g. pre-competitive co-operation to develop new technologies that could be exploited by a whole range of companies.

Programme Managers vs Project Managers

Programme manager

- Many simultaneous projects
- Personal relationship with skilled resources
- Optimization of resource use
- Projects tend to be seen as similar

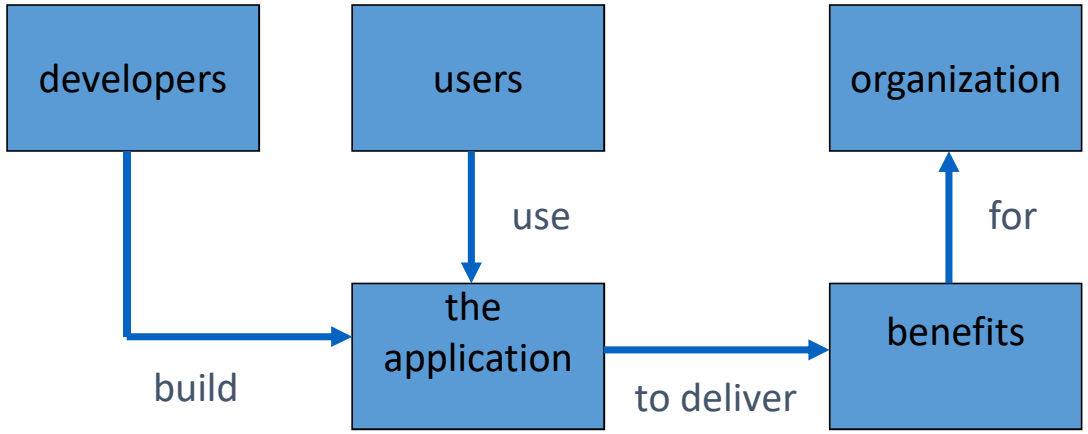
Project manager

- One project at a time
- Impersonal relationship with resources
- Minimization of demand for resources
- Projects tend to be seen as unique

Next Stages/Documents

- **The programme brief** – equivalent of a feasibility study: emphasis on costs and benefits (= is it worth it?)
- **The vision statement** – explains the new capability that the organization will have (= the 'what')
- **The blueprint** – explains the changes to be made to obtain the new capability (= the 'how')

Benefits Management



- Providing an organization with a capability does not guarantee that this will provide benefits envisaged – need for *benefits management*
- This has to be outside the project – project will have been completed
- Therefore done at *programme level*

Benefits Management

To carry this out, you must:

- Define expected benefits
- Analyse balance between costs and benefits
- Plan how benefits will be achieved
- Allocate responsibilities for their achievement
- Monitor achievement of benefits

Benefits

Benefits might include:

- Mandatory requirement
- Improved quality of service
- Increased productivity
- More motivated workforce
- Internal management benefits
- Risk reduction
- Economies
- Revenue enhancement/acceleration
- Strategic fit

Quantifying Benefits

Benefits can be:

- Quantified and valued e.g. a reduction of *x* staff saving *£y*
- Quantified but not valued e.g. a decrease in customer complaints by *x%*
- Identified but not easily quantified – e.g. public approval for a organization in the locality where it is based

Please Remember

- A project may fail not through poor management but because it should never have been started
- A project may make a profit, but it may be possible to do something else that makes even more profit
- A real problem is that it is often not possible to express benefits in accurate financial terms
- Projects with the highest potential returns are often the most risky

End of Part 1
Thank you for your attention

Any questions, please?

Part 2: Project Planning

‘Step Wise’:
An approach to planning software projects

This lecture provides an overview of the basic steps needed to produce a project plan, including:

Practicality

- tries to answer the question ‘what do I do now?’

Scalability

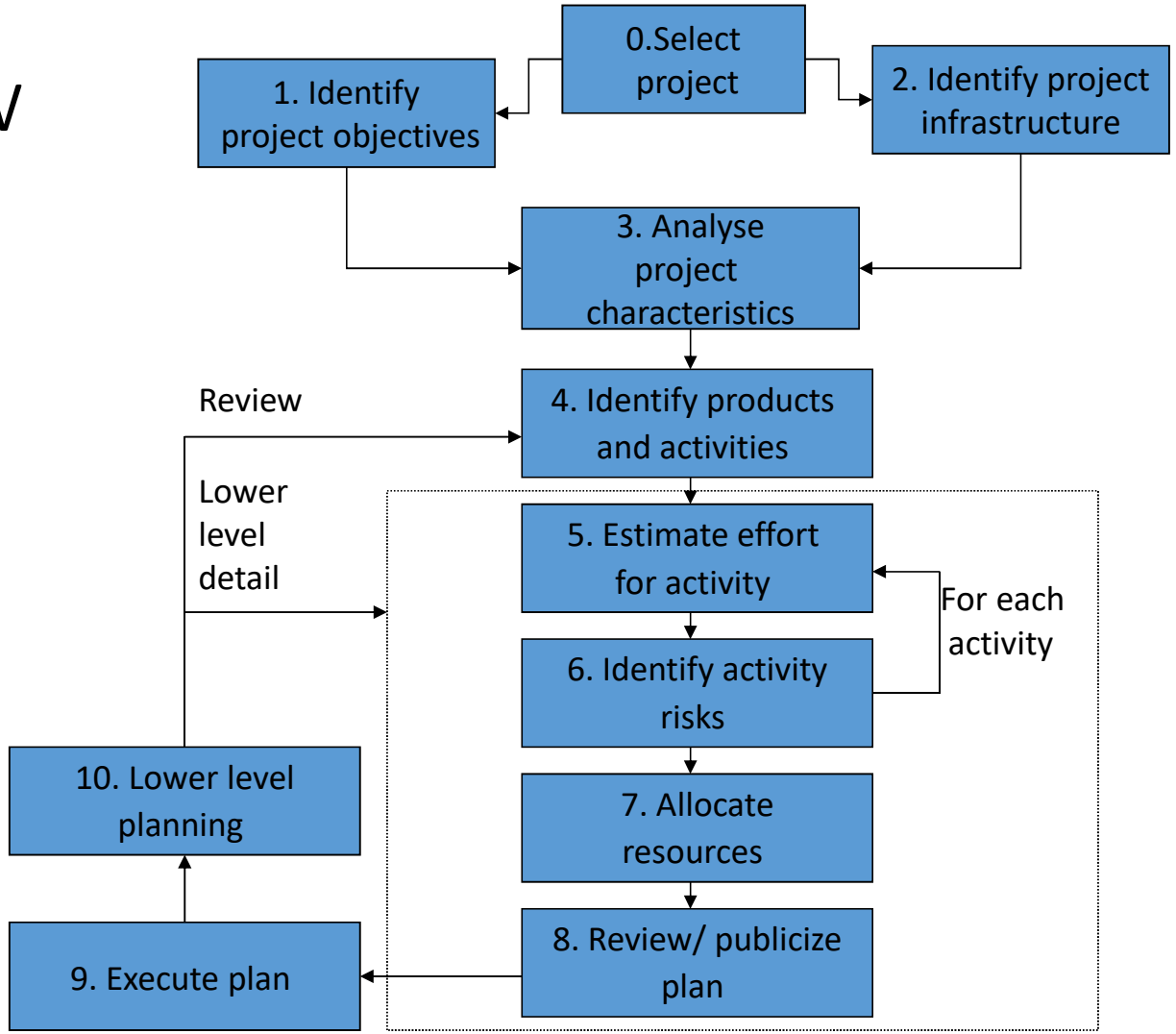
- useful for small project as well as large

Range of application

Accepted techniques

- e.g. borrowed from PRINCE etc

‘Step Wise’: An Overview



A project scenario - 1

Brightmouth College Payroll

- College currently has payroll processing carried out by a services company
- This is very expensive and does not allow detailed analysis of personnel data to be carried out
- Decision made to bring payroll ‘in-house’ by acquiring an ‘off-the-shelf’ application

A project scenario - 2

- The use of the off-the-shelf system will require a new, internal, payroll office to be set up
- There will be a need to develop some software ‘add-ons’: one will take payroll data and combine it with time-table data to calculate the staff costs for each course run in the college
- The project manager is Brigette

Step 1: Establish project scope and objectives

- 1.1 Identify objectives and measures of effectiveness
  - ‘how do we know if we have succeeded?’
- 1.2 Establish a project authority
  - ‘who is the boss?’
- 1.3 Identify all stakeholders in the project and their interests
  - ‘who will be affected/involved in the project?’

Step 1: Establish project scope and objectives

- 1.4 Modify objectives in the light of stakeholder analysis
  - ‘do we need to do things to win over stakeholders?’
- 1.5 Establish methods of communication with all parties
  - ‘how do we keep in contact?’

Back to the scenario - 1

Project authority

- Brigette finds she has two different clients for the new system: the finance department and the personnel office. A vice principal agrees to be official client, and monthly meetings are chaired by the VP and attended by Brigette and the heads of finance and personnel
- These meetings would also help overcome communication barriers

Back to the scenario - 2

Stakeholders

- For example, personnel office would supply details of new staff, leavers and changes (e.g. promotions)
- To motivate co-operation Brigette might ensure new payroll system produces reports that are useful to personnel staff

Step 2: Establish project infrastructure

- 2.1 Establish link between project and any strategic plan
  - ‘why did they want the project?’
- 2.2 Identify installation standards and procedures
  - ‘what standards do we have to follow?’
- 2.3. Identify project team organization
  - ‘where do I fit in?’

Step 3: Analysis of project characteristics

- 3.1 Distinguish the project as either objective or product-based.
  - Is there more than one way of achieving success?
- 3.2 Analyse other project characteristics (including quality based ones)
  - what is different about this project?

Step 3: Analysis of project characteristics

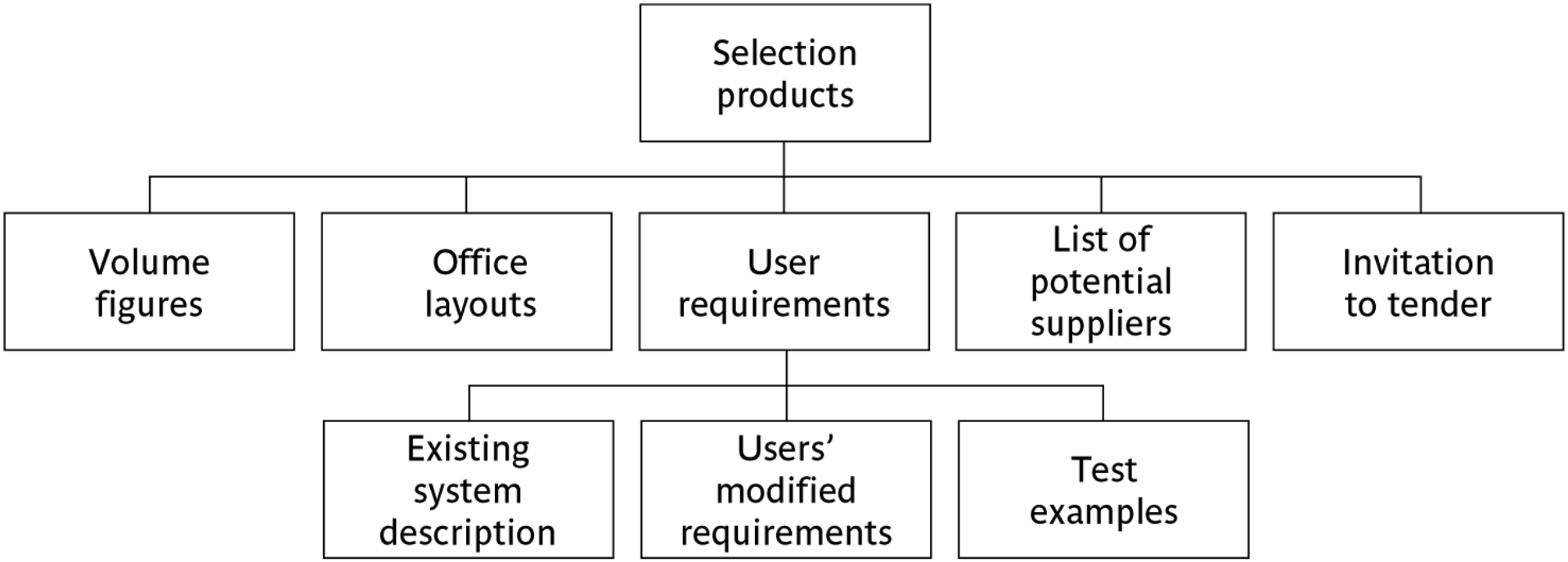
- 3.3 Identify high level project risks
  - ‘what could go wrong?’
  - ‘what can we do to stop it?’
- 3.4 Take into account user requirements concerning implementation
- 3.5 Select general life cycle approach
  - waterfall? Increments? Prototypes?
- 3.6 Review overall resource estimates
  - ‘does all this increase the cost?’

Back to the scenario

- Objectives vs. products
  - An objective-based approach has been adopted
- Some risks
  - There may not be an off-the-shelf package that caters for the way payroll is processed at Brightmouth College
- Answer?
  - Brigette decides to obtain details of how main candidate packages work as soon as possible; also agreement that if necessary processes will be changed to fit in with new system.

Step 4.1: Identify project products and activities

- 4.1 Identify and describe project products - ‘what do we have to produce?’



Products - 1

- The result of an activity
- Could be (among other things)
  - physical thing (‘installed pc’),
  - a document (‘logical data structure’)
  - a person (‘trained user’)
  - a new version of an old product (‘updated software’)

Products - 2

- The following are NOT normally products:
  - activities (e.g. ‘training’)
  - events (e.g. ‘interviews completed’)
  - resources and actors (e.g. ‘software developer’) - may be exceptions to this
- Products CAN BE *deliverable* or *intermediate*

Product Description (PD)

- Product identity
- Description - what is it?
- Derivation - what is it based on?
- Composition - what does it contain?
- Format
- Relevant standards
- Quality criteria

Step 4.2

- 4.2 document generic product flows

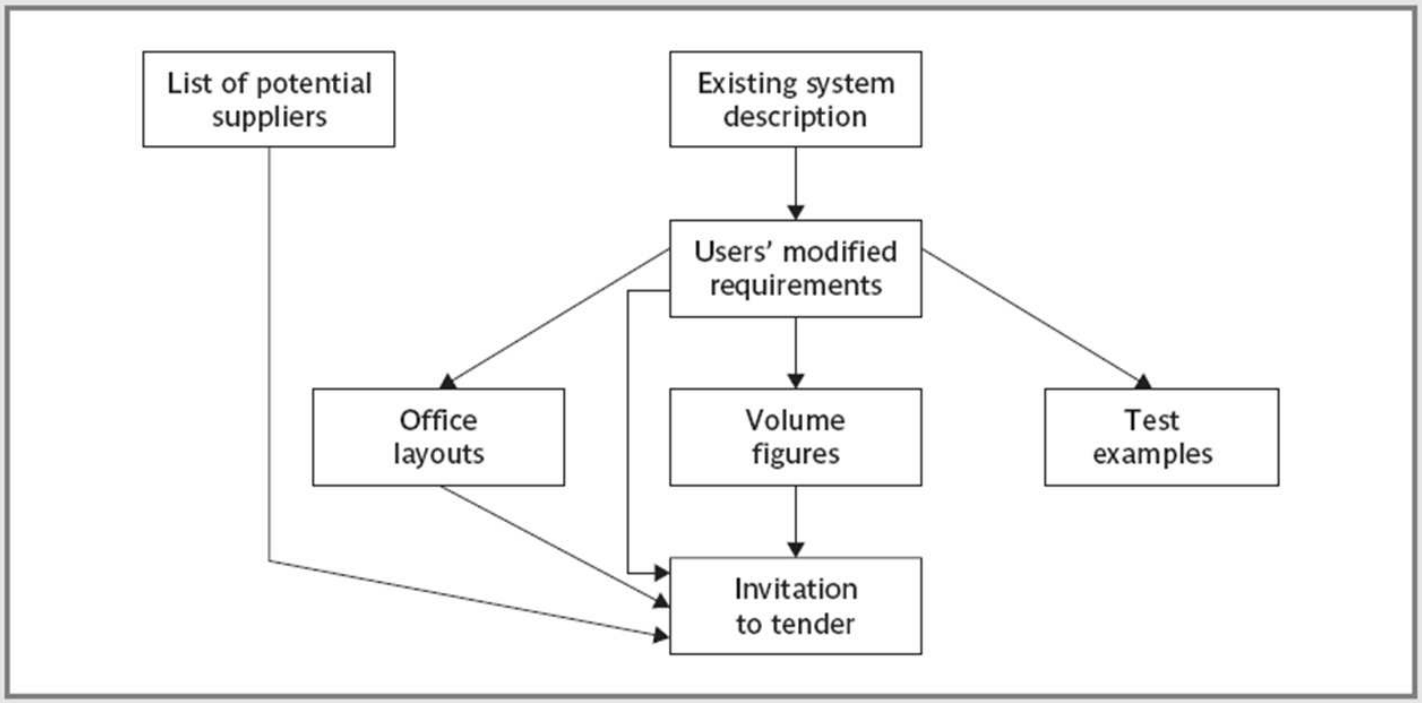


FIGURE B.1 Product Flow Diagram for the creation of an 'invitation to tender'

Step 4.3: Recognize product instances

- The PBS and PFD will probably have identified generic products e.g. ‘software modules’
- It might be possible to identify specific instances e.g. ‘module A’, ‘module B’ …
- But in many cases this will have to be left to later, more detailed, planning

4.4: Produce ideal activity network

- The activity network is the basis of the data that is input to planning software tools like MS Project.
- Identify the activities needed to create each product in the PFD
- More than one activity might be needed to create a single product
- Hint: Identify activities by verb + noun but avoid ‘produce…’ (too vague)
- Draw up activity network

An ‘ideal’ activity

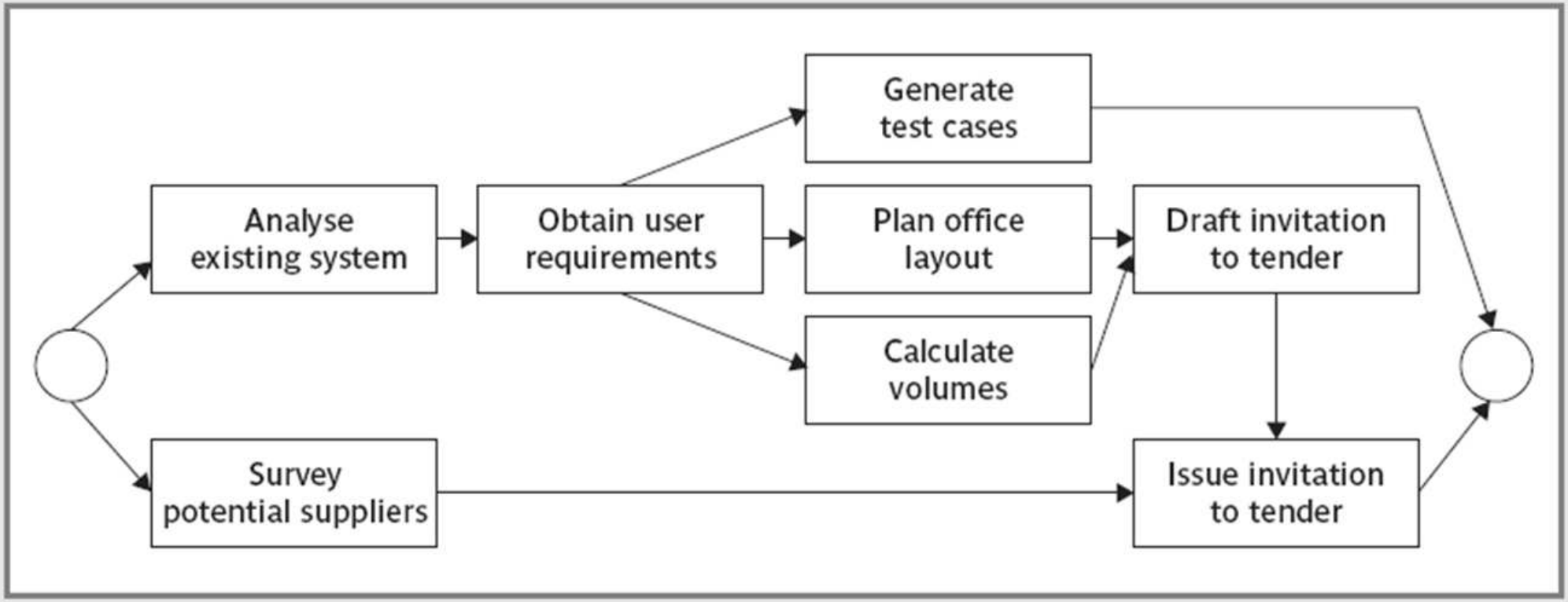
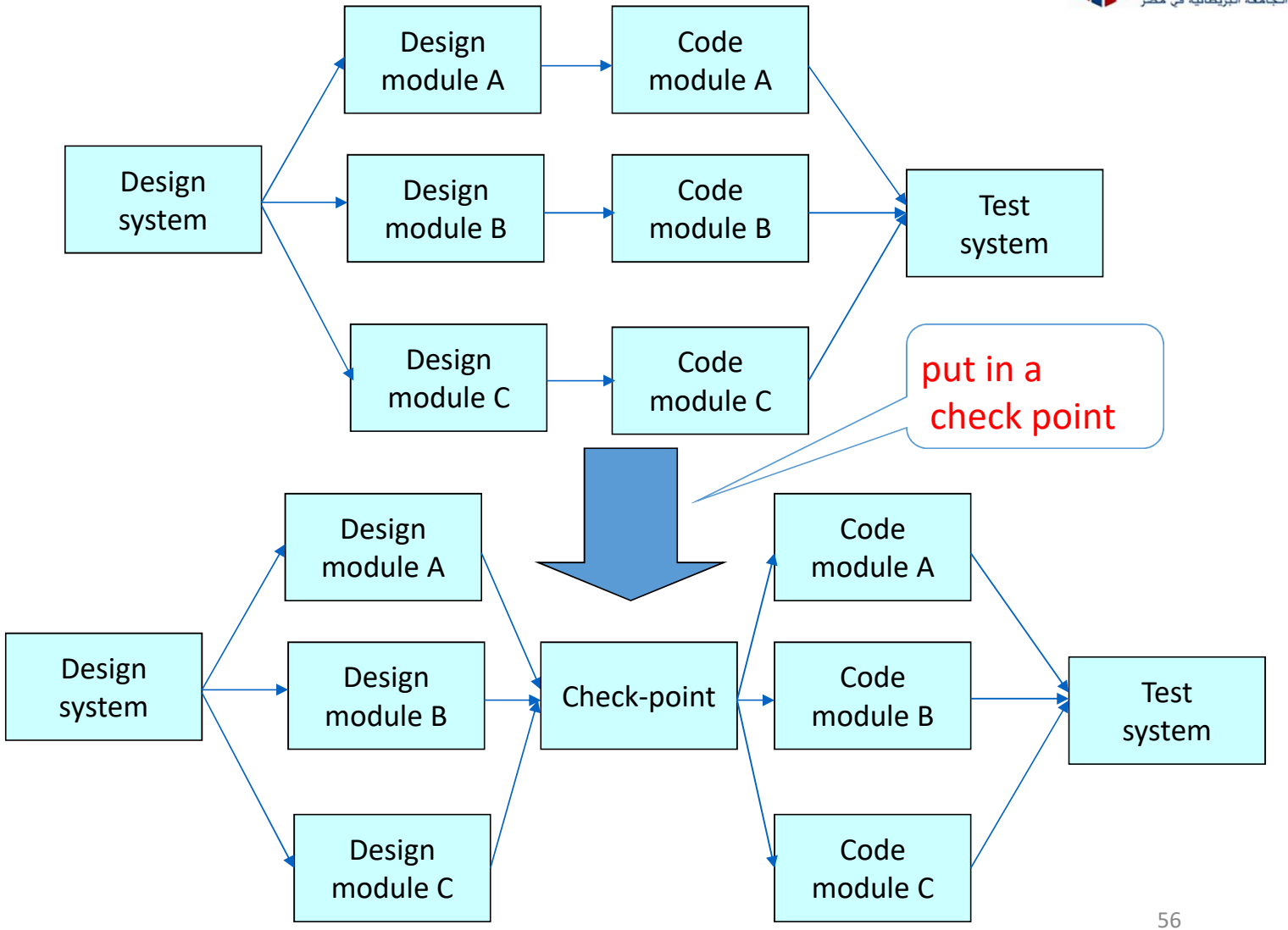


FIGURE B.2 Brightmouth College payroll project activity network fragment

Step 4.5: Add check-points if needed



Step 5: Estimate effort for each activity

- 5.1 Carry out bottom-up estimates
  - distinguish carefully between *effort* and *elapsed* time
- 5.2. Revise plan to create controllable activities
  - break up very long activities into a series of smaller ones
  - bundle up very short activities (create check lists?)

Step 6: Identify activity risks

- 6.1 Identify and quantify risks for activities
  - damage if risk occurs (measure in time lost or money)
  - likelihood if risk occurring
- 6.2 Plan risk reduction and contingency measures
  - risk reduction: activity to stop risk occurring
  - contingency: action if risk does occur
- 6.3 Adjust overall plans and estimates to take account of risks
  - e.g. add new activities which reduce risks associated with other activities e.g. training, pilot trials, information gathering

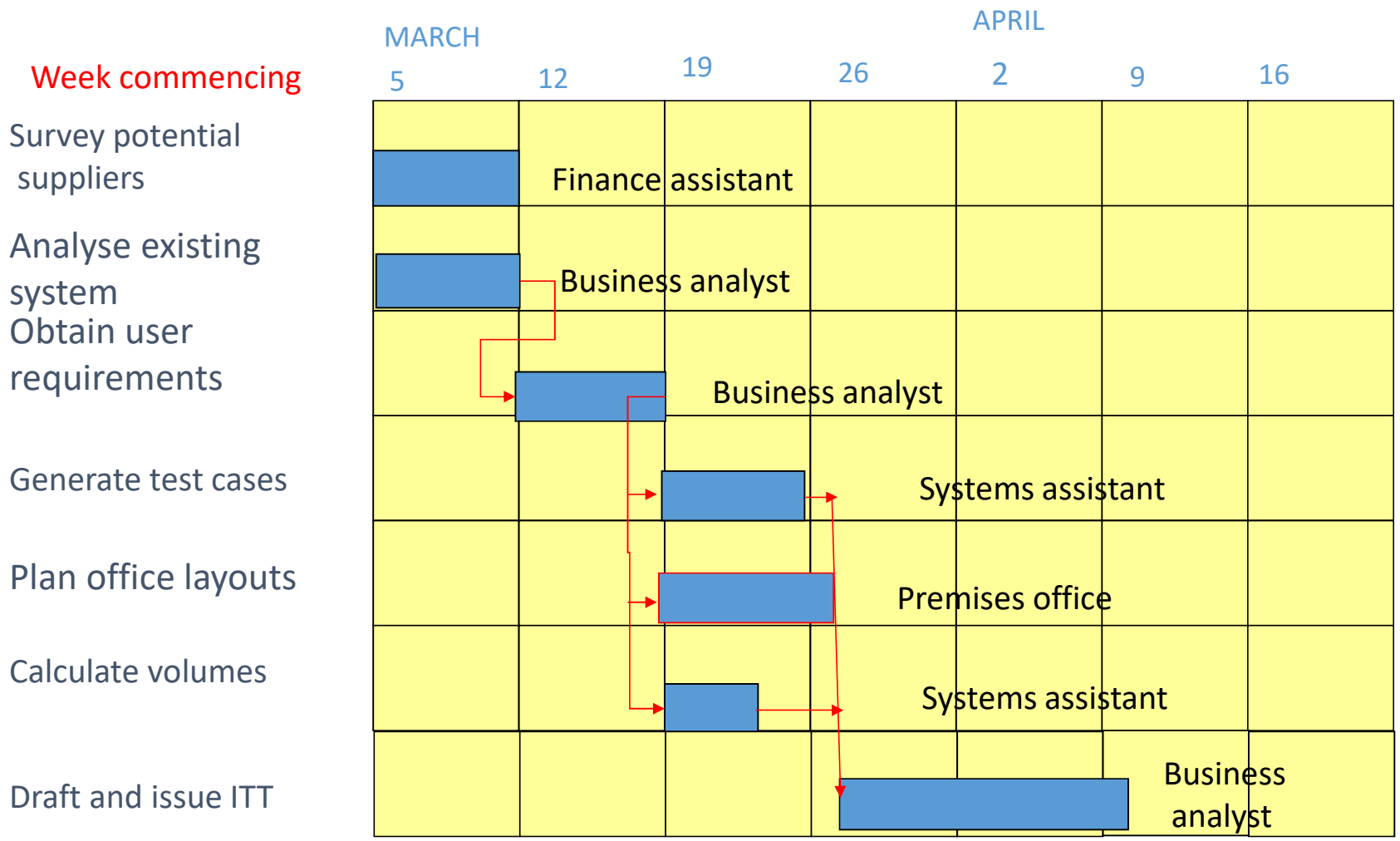
Step 7: Allocate resources

- 7.1 Identify and allocate resources to activities
- 7.2 Revise plans and estimates to take into account resource constraints
  - e.g. staff not being available until a later date
  - non-project activities

Gantt charts

LT = lead tester

TA = testing assistant



Step 8: Review/Publicise plan

- 8.1 Review quality aspects of project plan
- 8.2 Document plan and obtain agreement

Step 9 and 10

- Execute plan and create lower level plans

Key points

- Establish your objectives
- Think about the characteristics of the project
- Discover/set up the infrastructure to support the project (including standards)
- Identify **products** to be created and the **activities** that will create them
- Allocate resources
- Set up quality processes

Thank you for your attention

Any questions, please?