PM101: Lecture 13
Resourcing, contingencies and organisation

The project planning process

Business case, project brief, spec

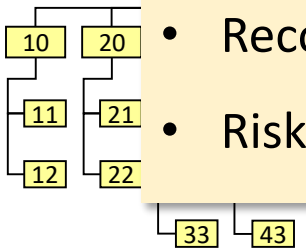
WHO

Resources (human and physical) are not infinite

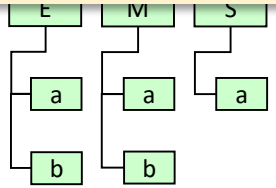
- We need to either find extra resources to meet the plan, *or*
- Flex timings to optimise use of available resources

Estimates cannot be guaranteed to be correct

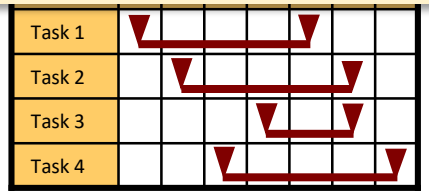
- Trying to accurately predict the future
- Recognise the potential variation in time and cost for any task
- Risks may occur which consume extra time and cost to deal with



Work breakdown structure



Organisation



Work schedule

MUCH?

plan

Morris, P. (1997) *The management of projects* London: Thomas Telford, p262

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Thinking about who does what?

	Project sponsor	Project manager	Team manager	Car designer	Workshop manager	Design lecturer
Produce project plan and budget	C	**X** P	C			
Confirm entry	D	**X** P	d			
Design car			C	**X** P	C	T
Build car		P		I	**X**	T
Select team	C	P d	**X**			
Train team	D	**X** P	d			

People spend time:

- Planning work
- Doing and checking work
- Advising others
- Making decisions
- Communicating with team colleagues and stakeholders
- Getting trained and giving training
- Managing staff and controlling progress
- Monitoring and reporting

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Staff requirements

Task	Days	Project manager	Car designer	Team manager	Workshop manager
Get rules	5	5	2	2	
Prepare plans & estimates	5	5			
Devise car concepts	10	2	10	5	
Produce final design	15	2	15	5	2
Build car	30	5	5	5	30
Test car	10	5	10	10	5
Advertise for team	10	5	2	10	
Run trials	3	3	3	1	3
Select test driver	1	1	1	1	
Run training programme	15	5	5	15	
Submit entry	2	1		1	
Develop race plans	10	10			
Book accommodation	5	5			
Transport car and team	2	2	1	2	
Set up in pits	1	1		1	
Take part in race	1	1		1	

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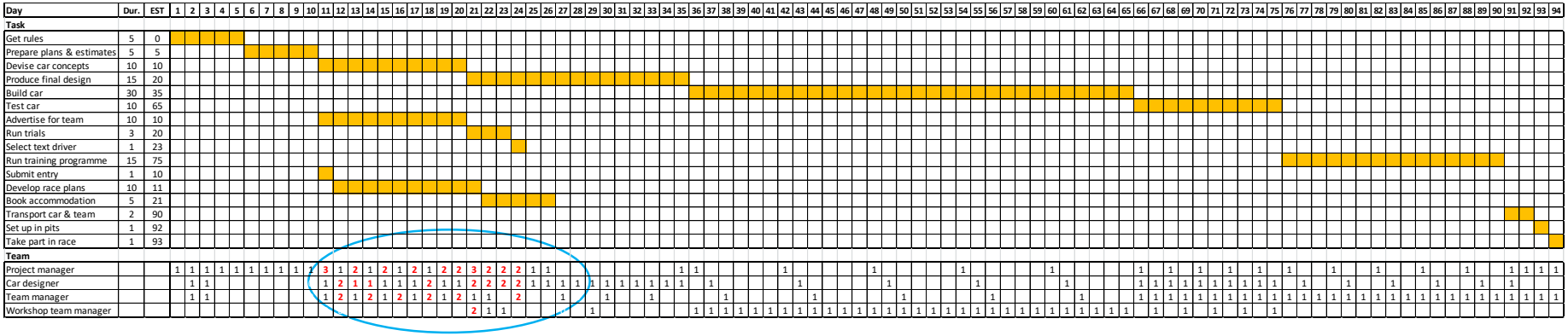
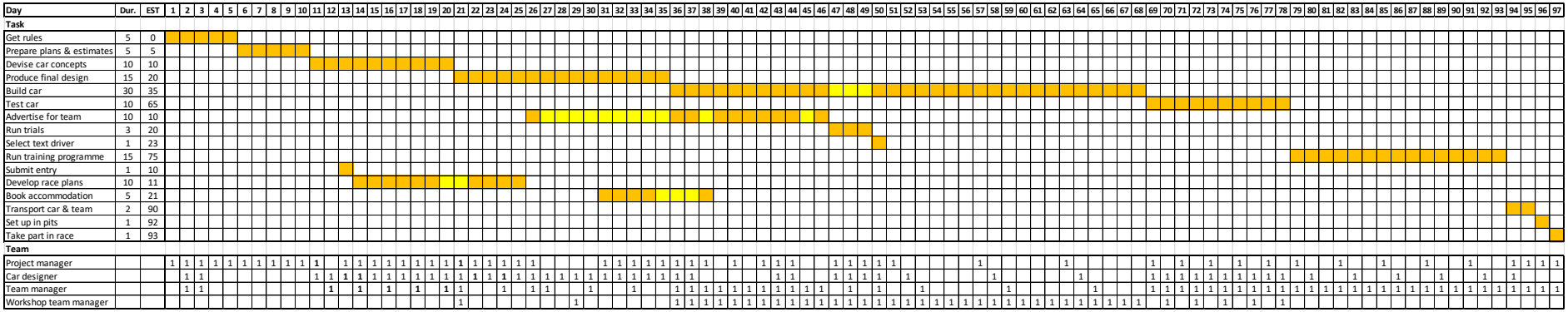
Resourcing conflicts



Day	Dur.	EST
Task		
Get rules	5	0
Prepare plans & estimates	5	5
Devise car concepts	10	10
Produce final design	15	20
Build car	30	35
Test car	10	65
Advertise for team	10	10
Run trials	3	20
Select text driver	1	23
Run training programme	15	75
Submit entry	1	10
Develop race plans	10	11
Book accommodation	5	21
Transport car & team	2	90
Set up in pits	1	92
Take part in race	1	93
Team		
Project manager		
Car designer		
Team manager		
Workshop team manager		

- Three activities running in parallel means project manager, car designer and team manager are overstretched
- Look for ways to re-schedule tasks to avoid resource conflicts



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Team		
Project manager		
Car designer		
Team manager		
Workshop team manager		

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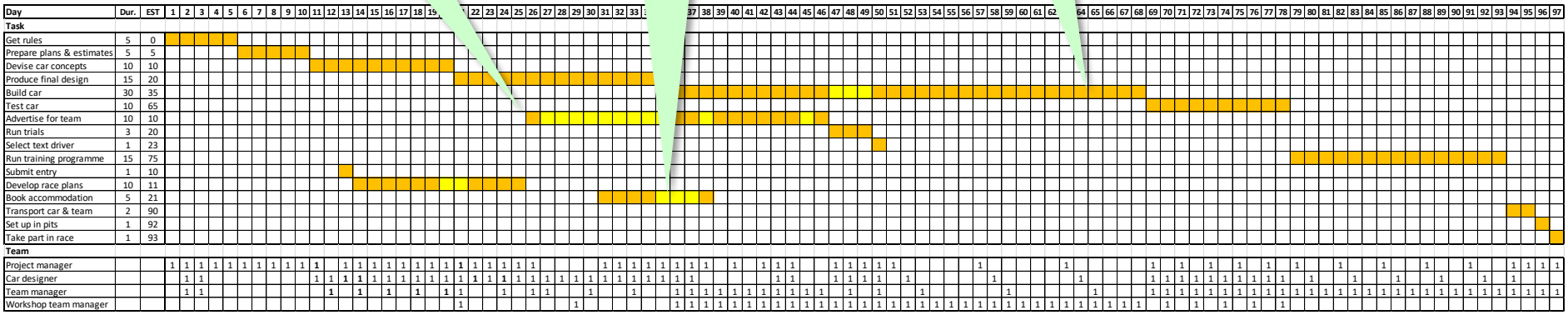
Options to smooth resourcing

Delay tasks which are not on the critical path

Stop and start work on tasks to release people for more urgent work

Protect the critical path as far as possible

Overall stretch is 3 days. Look for ways to shorten some tasks (e.g. through overtime or cutting down scope)



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Team		
Project manager		
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Workshop team manager		

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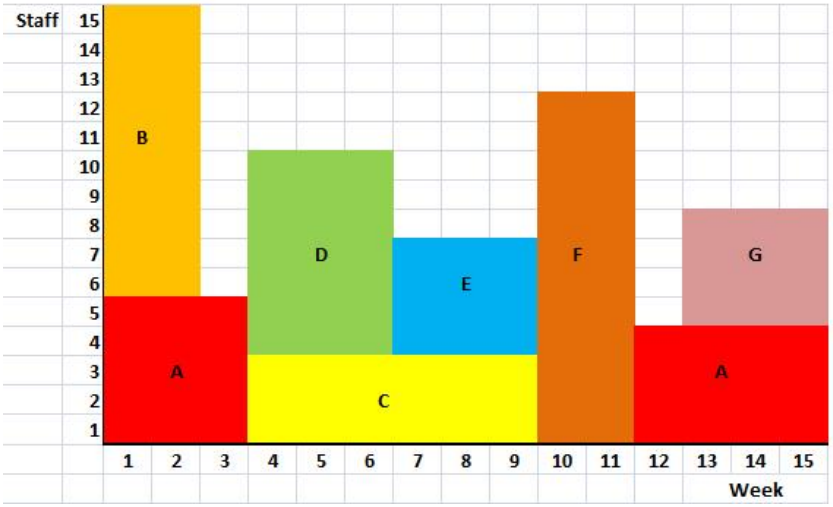
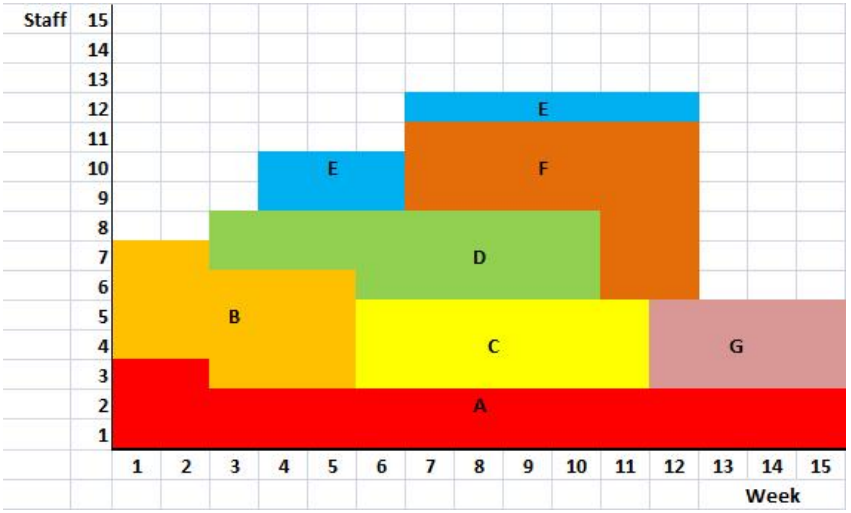
Resource levelling



- The initial plan may imply very inefficient use of labour
- Functions do not interact – poor sharing of ideas
- Makes large and disruptive demands of functional managers who loan staff to the project

- Aim for smooth growth and fall in team size
- More interaction between functions
- Tasks are redesigned (e.g. A's work) and retimed



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Applying contingency

Estimates cannot be guaranteed to be correct

- Trying to accurately predict the future
- Recognise the potential variation in time and cost for any task
- Risks may occur which consume extra time and cost to deal with

BUT

- Clients expect a firm promise on time and cost to complete the project
- The contract will enforce that promise

SO

- We need to have ‘buckets’ of time and money we can dip into
- The client will expect these to be realistic and reasonable

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Do not apply contingency at task level

	Estimate	Contingency	Total	Contingency	Total	Contingency	Total
Sub-task	5.0	10%	5.5				
Sub-task	3.0	10%	3.3				
Sub-task	5.0	10%	5.5				
Task			**14.3**	**10%**	**15.7**		
Sub-task	11.0	10%	12.1				
Sub-task	7.0	10%	7.7				
Sub-task	5.0	10%	5.5				
Task			**25.3**	**10%**	**27.8**		
Sub-task	7.0	10%	7.7				
Sub-task	9.0	10%	9.9				
Sub-task	8.0	10%	8.8				
Task			**26.4**	**10%**	**29.0**		
Project	**60.0**				**72.6**	**10%**	**79.9**

Durations in days

- Contingencies need to be added at the project level (or at least at major component level)
- If people add contingencies to every part of the project then the contingency will become unrealistically large

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Linking risks with contingencies

		Probability	Cost	Delay (days)
Task:	**Move crane to site**		**£20,000**	
Risk:	**Movement permit not received on time**	**0.3**		
	Delay move by one week		£10,000	7
	Contingency allowance		£3,000	2.1
Risk:	**Transport route blocked by flood**	**0.1**		
	Delay move by one day		£5,000	1
	Contingency allowance		£500	0.1
Risk:	**Crane falls off transporter**	**0.01**		
	Recover crane		£30,000	4.5
	Contingency allowance		£300	0.05
	Total contingency allowances		**£3,800**	**2.25**

This activity needs judgement:

- Which risks to consider?
- How much of the contingency cost and delay to add to the 'buckets'?
- What would be covered by insurance or be reclaimable?

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London Heathrow Terminal 5

Sponsor and project manager: BAA (now part of Ferrovial)

Sole tenant: British Airways

Construction start: September 2002. **Opening deadline:** 27 March 2008

Major partners: Mace, AMEC, Laing O'Rourke, Morgan Vinci

Overall budget: £4.2 billion

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A new approach to managing risk

Construction budget

£3.1 billion

Estimated cost

£2.5 billion

Allowance for changes

£600 million

Spent resolving issues

Shared among partners

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Getting organised

Q. What's the best way to organise the project effort to get the best result?

A. It depends on the project.

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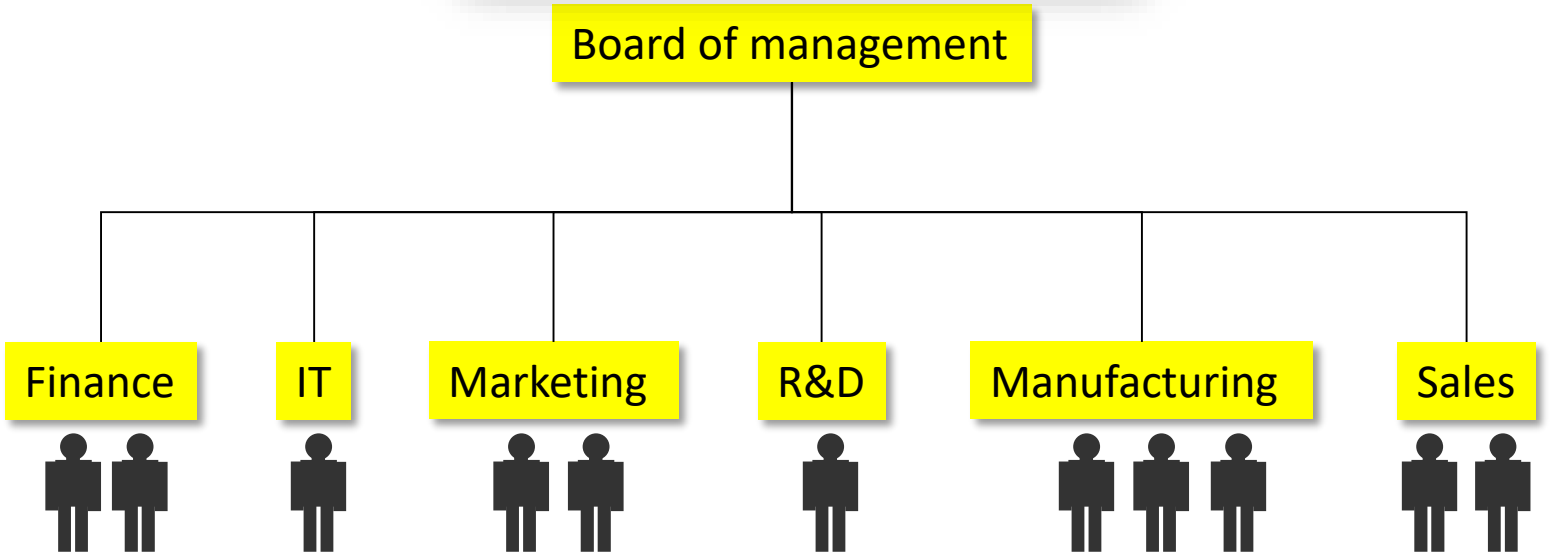
The functional organisation



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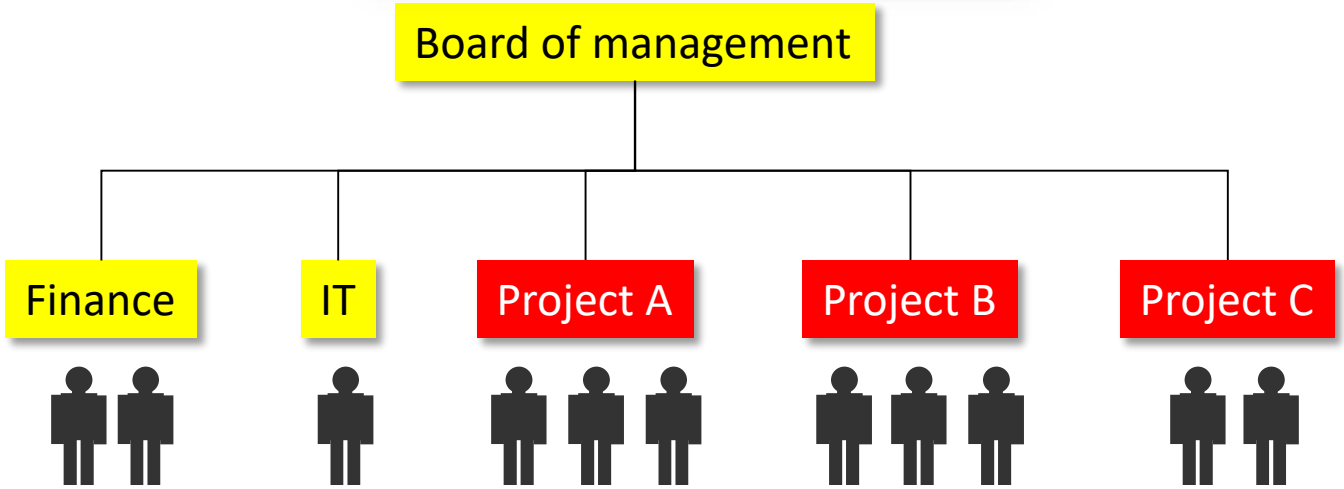
The project organisation



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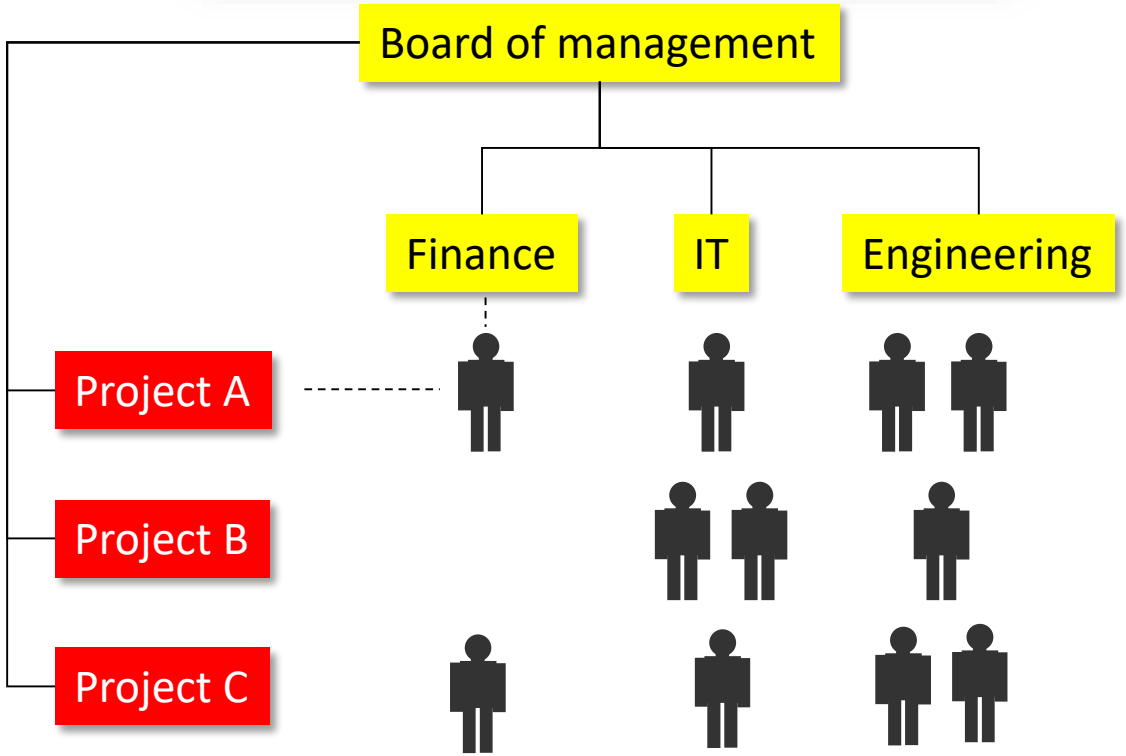
The matrix organisation



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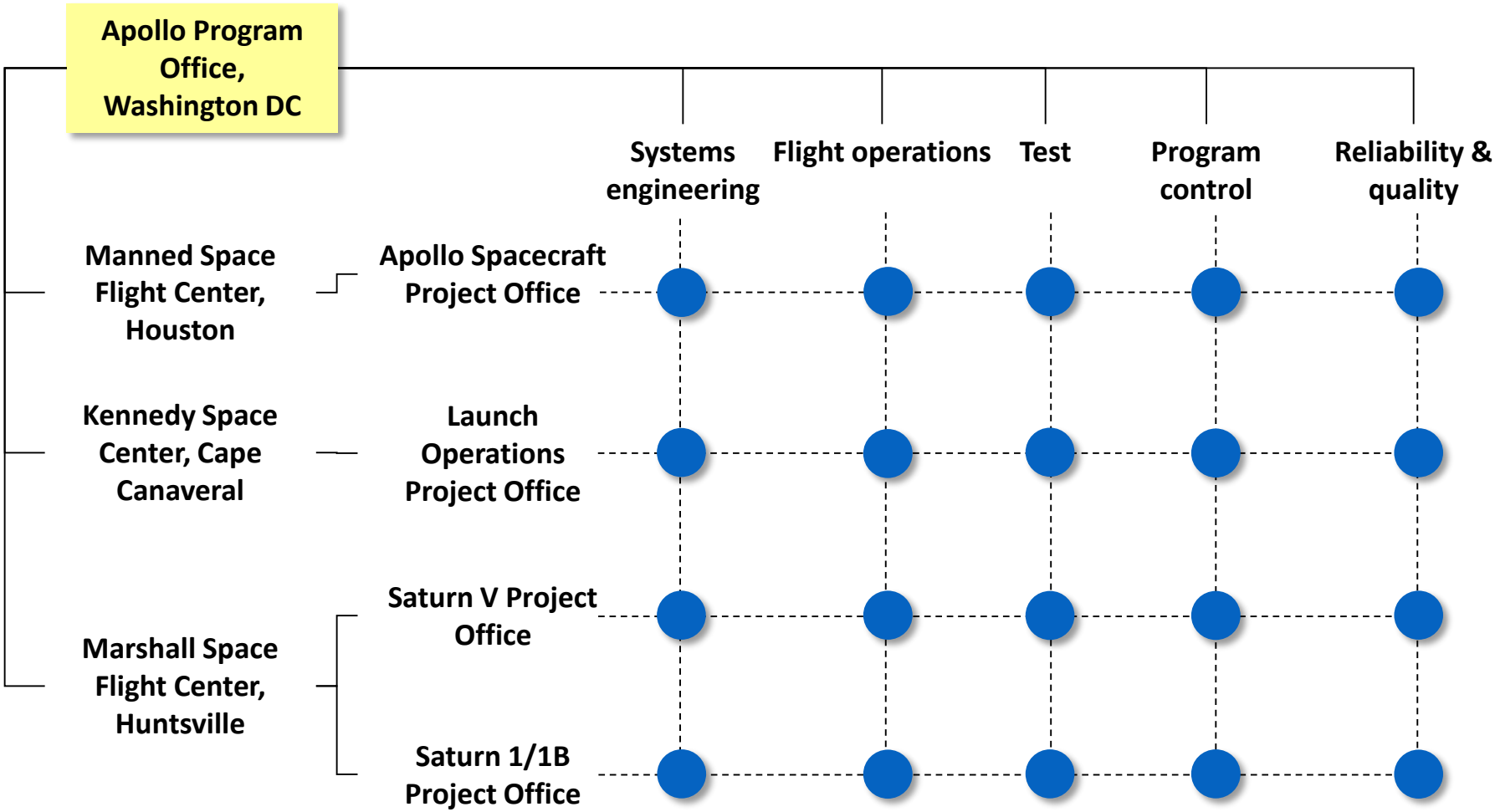
The matrix organisation on Apollo



Morris, P (1997), *Management of projects,* London: Thomas Telford, p55

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Resourcing, contingencies and organisation: core ideas

The basic task network analysis assumes the project has infinite resources.

The plan needs to be adjusted in various ways so that no-one is working full time on more than one task at any time. This adjustment generally increases the duration of the project.

The formal project plan should include time and cost contingencies to reflect the uncertainty of estimates.

The probability of major risks can be used as a way to help calculate what the time and cost contingency allowances should be.

An organisation may organise its projects on a discrete project basis or a matrix basis. Conducting projects within a strict functional organisation is difficult.

See Zavanak page *Project structure and approach*.

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