



# Avancier Reference Model

## Migration Planning (ESA 10)

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### Migration planning

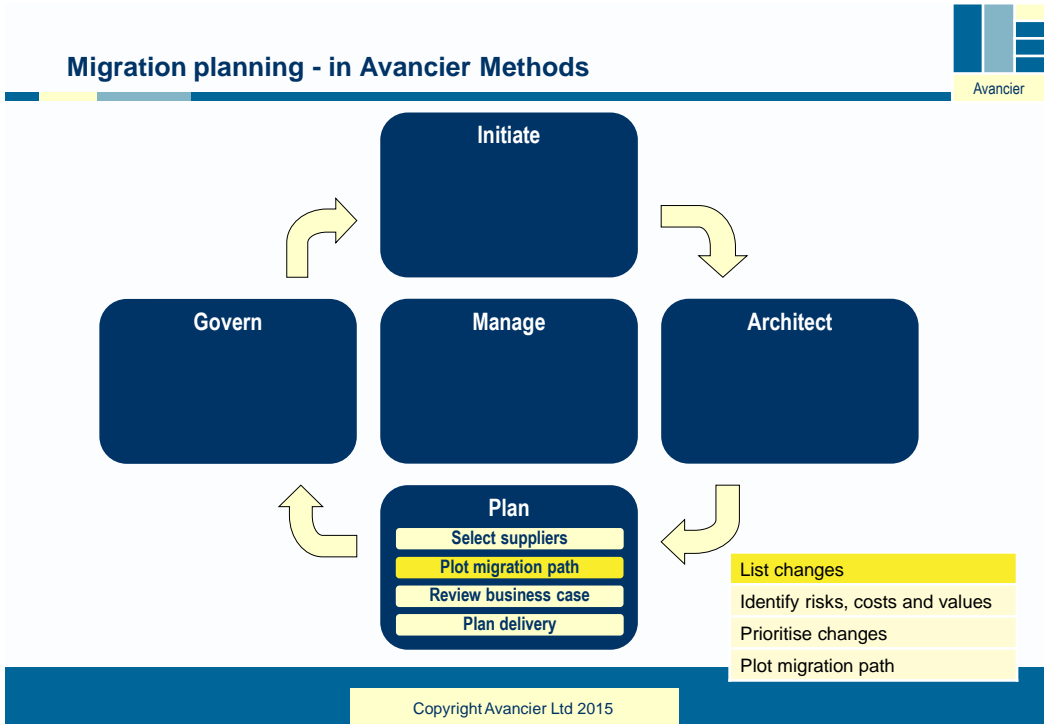


**Migration planning**

[a work process] for turning baseline and target architecture descriptions into a plan for a programme or project.

Architects should integrate the process into local programme/project management approaches such as MSP, PRINCE2 or PMI.

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### Use gap analysis to find the changes

<b>Gap analysis (baseline-target)</b>	<p>[a technique] for comparing two similar structures, to find items in one that are not in another.</p> <p>It is used in architecture frameworks to compare the elements of a baseline system with those of a target system, where each gap implies work to be done.</p>
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List changes



- ▶ List business changes
- ▶ List IS changes
- ▶ List IT changes
  
- ▶ Consider the big picture, over the long term.
- ▶ List changes / deliverables of the whole business and IT change programme
- ▶ Think broadly across the POLDAT spectrum.

Migration	Baseline State	Target State
<b>System Domain</b>	<b>Changes</b> →	
<b>Business</b>	Processes Organisation Locations	Processes Organisation Locations
<b>Information Systems</b>	Data Applications	Data Applications
<b>Technology</b>	Infrastructure Technologies	Infrastructure Technologies

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List business changes



- ▶ Staff job descriptions and procedures
- ▶ Hiring, firing and retraining staff
- ▶ Buying and selling equipment
- ▶ Opening and closing buildings.

State	Baseline	Target
<b>Business to IT</b>		
<b>Business</b>	Process Organisation Locations	→ Process Organisation Locations
<b>Information Systems</b>		
<b>Technology</b>		

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List IS changes



- ▶ Data migration from old database(s) to new one(s)
  - source(s)
  - target(s) and
  - volume(s) of data to be migrated
- ▶ Options include
  - Big bang migration (ETL)
  - Continuing transformers (EAI)
  - On the fly migration
- ▶ Data cleansing to enable data migration
- ▶ Replacement of interfaces to related systems by new ones
- ▶ Rewriting of code to different architectural standards
- ▶ Retraining of users

State	Baseline	Target
Business to IT		
Business		
Information Systems	Data Applications	Data Applications
Technology		

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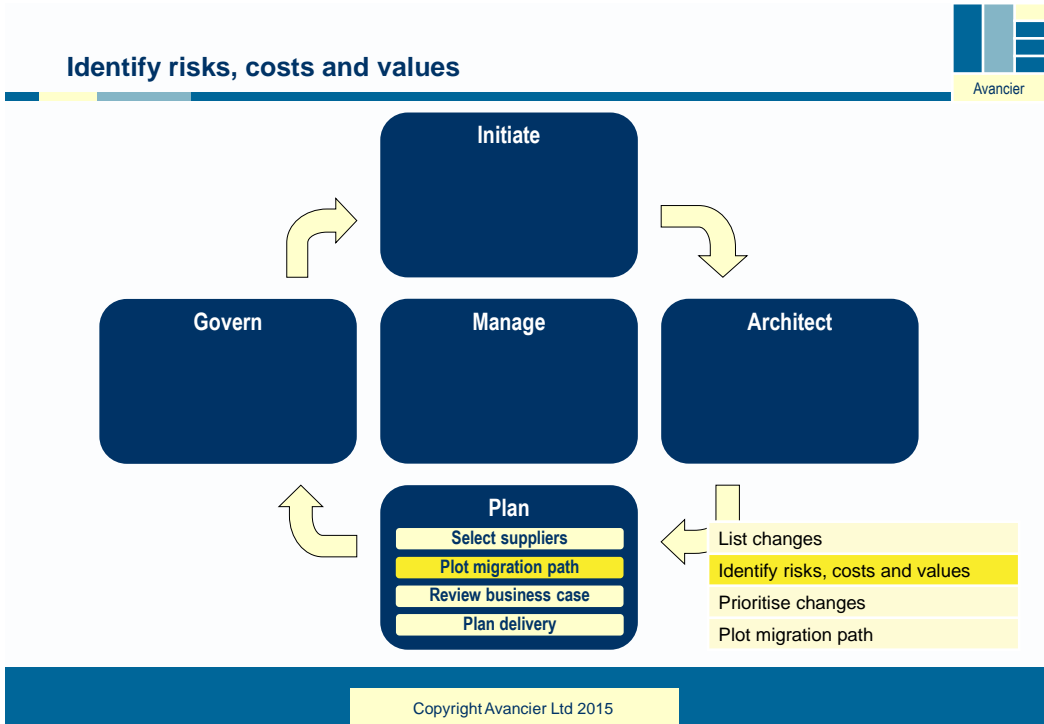
List IT changes



- ▶ Installation or upgrading of
  - Client-side devices and software
  - Server-side devices, OS and platform software
  - Networks and security measures

State	Baseline	Target
Business to IT		
Business		
Information Systems		
Technology	Infrastructure Technologies	Infrastructure Technologies


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- Identify risks, costs and values**
- See risk management technique in AM
- 
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- ▶ Identify risks
  - ▶ Record risks
  - ▶ Assess risks
  - ▶ Identify costs and values
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**Identify risks**

Extract from risk management technique in AM




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- ▶ Predict likely issues, in order to anticipate them
- ▶ (Every issue you have ever experienced on a project could in theory have been logged as a risk at the start.)
- ▶ Start with the 'iron triangle' of
  - Scope: requirements, qualities...
  - Cost: human and material resources...
  - Time: duration, deadline...

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**Identify risks**


Extract from risk management technique in AM



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- ▶ Different businesses – different risks
  - A stock trading system moving £100M/day.
  - A SME dealing with auto-parts.
  - A government department logging claims for grants from farmers.
- ▶ Consider security especially.
  - Security requirements need to be stated and analyzed just as much as any other functional requirement.
  - Security functionality should be tested.

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Extract from risk management technique in AM


### Record risks

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<b>RAID catalogue</b>	A catalogue of risks, assumptions, issues and dependencies, which may be cross-referred to elements in requirements and/or solution documentation. Cf. Risk Register in PRINCE2.
<b>Risk</b>	A potential problem; an event that will cause an issue if it occurs.
<b>Assumption</b>	Statement that, if not true, could turn into a risk or issue that threatens the success of a project.
<b>Issue</b>	A problem that needs resolution. Sometimes the realisation of a pre-identified risk, or an assumption that proved false.
<b>Dependency (risk sense)</b>	A dependency of a project upon an external actor or deliverable, not under the management of the project manager.

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Extract from risk management technique in AM


### Assess risks

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- ▶ Classify risks and prioritise them.
- ▶ A matrix of 9, 16 or 25 cells is commonly used
- ▶ Risk quantification may be to imprecise for more than 9 cells.

Likelihood	Low	Medium	High
Impact			
High	3 + 1	3 + 2	3 + 3
Medium	2 + 1	2 + 2	2 + 3
Low	1 + 1	1 + 2	1 + 3

- ▶ A 100% likely risk is an issue - to be dealt with now. The management question is: How much time and money to invest in addressing it?

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**Assess risks**

Extract from risk management technique in AM

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<b>Risk analysis</b>	<p>Analysis of vulnerabilities that threaten the ability of a target system to meet requirements, especially non-functional requirements, including security.</p> <p>Risk analysis is needed before architecture definition starts in earnest, and then several times later in the process, and at several levels of design.</p>
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**Identify costs and values**

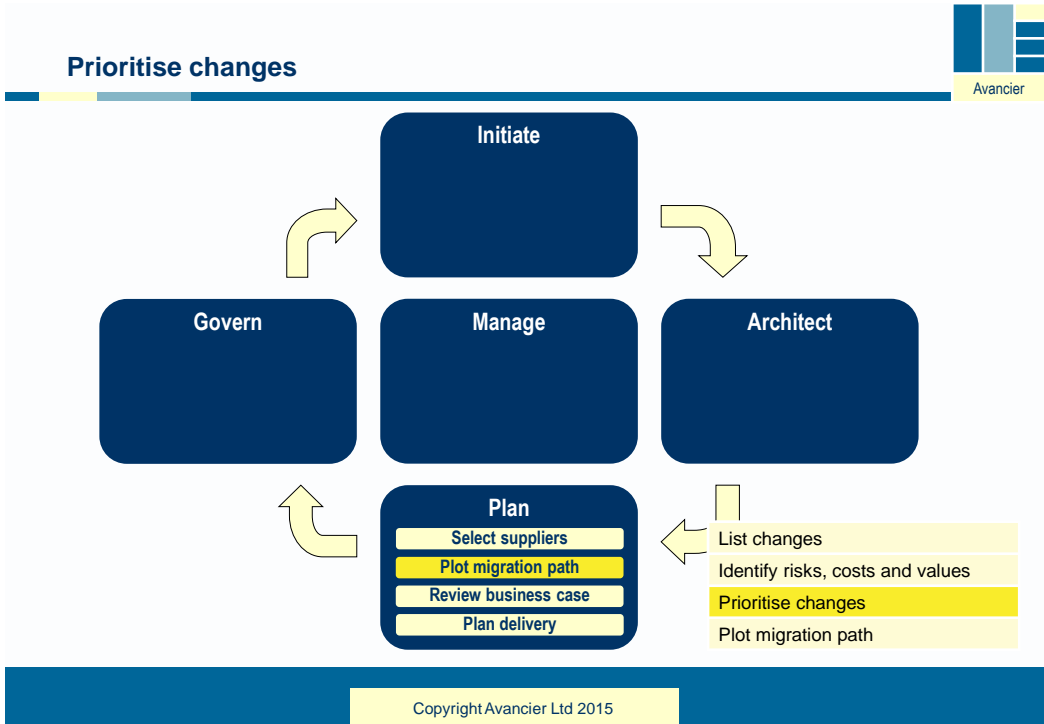
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ROI = benefits – costs over a time period

We'll return to business cases later

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- ### Prioritise changes
- ▶ Define target scope: hard or soft
  - ▶ Define change characteristics
  - ▶ Prioritise changes
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### Define target scope: soft or hard



- ▶ The further away the target in time, and the less certainty or control the customer has,
- ▶ the more likely
  - things will change
  - the target scope is soft and
  - the migration path will be defined incrementally.
  
- ▶ A service provider may prefer a hard scope
  - since it yields a large and long term programme of work.
  - will want to demonstrate some quick wins
  - to establish the credibility of a longer term plan.

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### Identify relative strategic value



- ▶ “Given a stack of potential projects, compare accounting for their business value as well as cost and risk.
- ▶ Many IT shops develop their own evaluation and ranking tools, which help them focus on the factors that matter most to their organization.”

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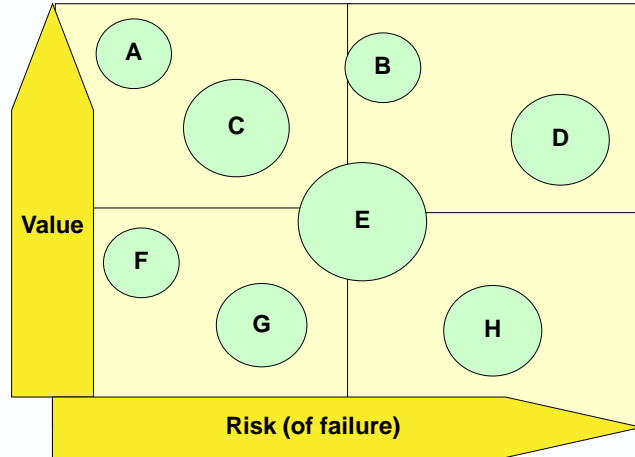
Define change characteristics: Value, Cost and Risk



- ▶ Put projects in order
- ▶ E.g. Quick wins (LHF)?

▶ Circle size = change cost

Consultant speak



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Define change characteristics



1. Value
2. Cost
3. Risk
4. Dependencies
5. Scope
  - Hard scope: High risk first?
  - Soft scope: High risk last?
6. Time – duration
7. Time – urgency
8. Resources
9. Minimise waste

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### Prioritise changes



- ▶ Prioritise changes
  - H/M/L or MoSCoW
  
- ▶ Data
  - Kick off a data migration project as early as possible.
  - Do data clean up before data migration
  - Do data migration before replacement applications
  - Follow CURD: Data entry apps before read/report-only apps
  
- ▶ Applications
  - Use the application portfolio classification (MURDeR)
  - Implement depended on apps before dependent apps
  - Use the sequence of the business process or value stream?

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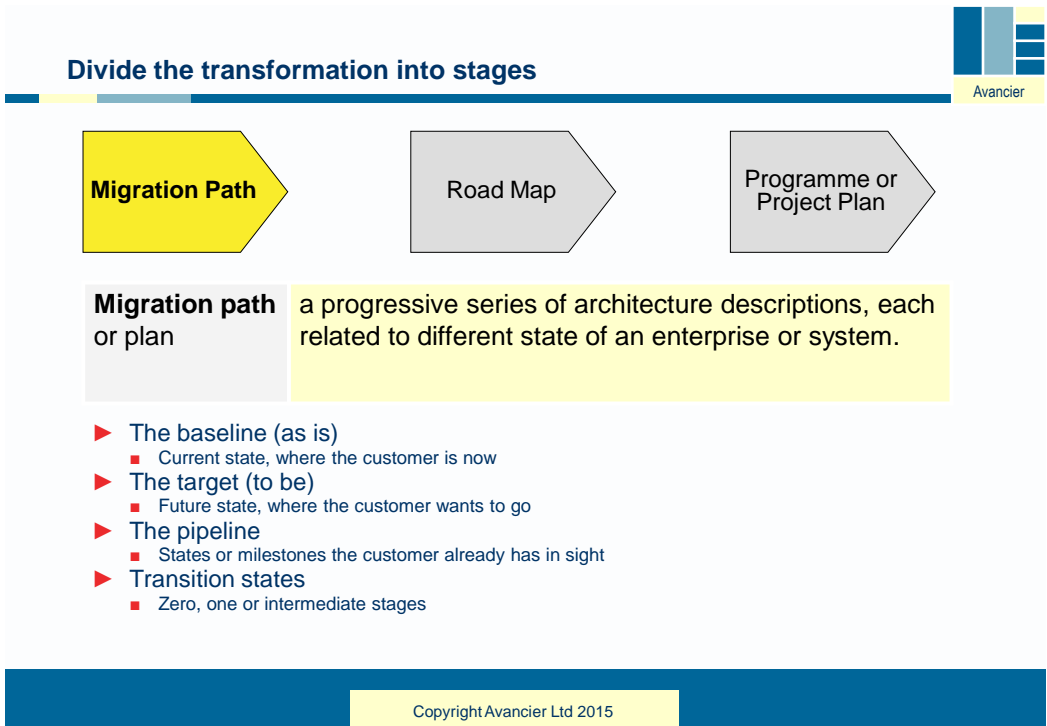
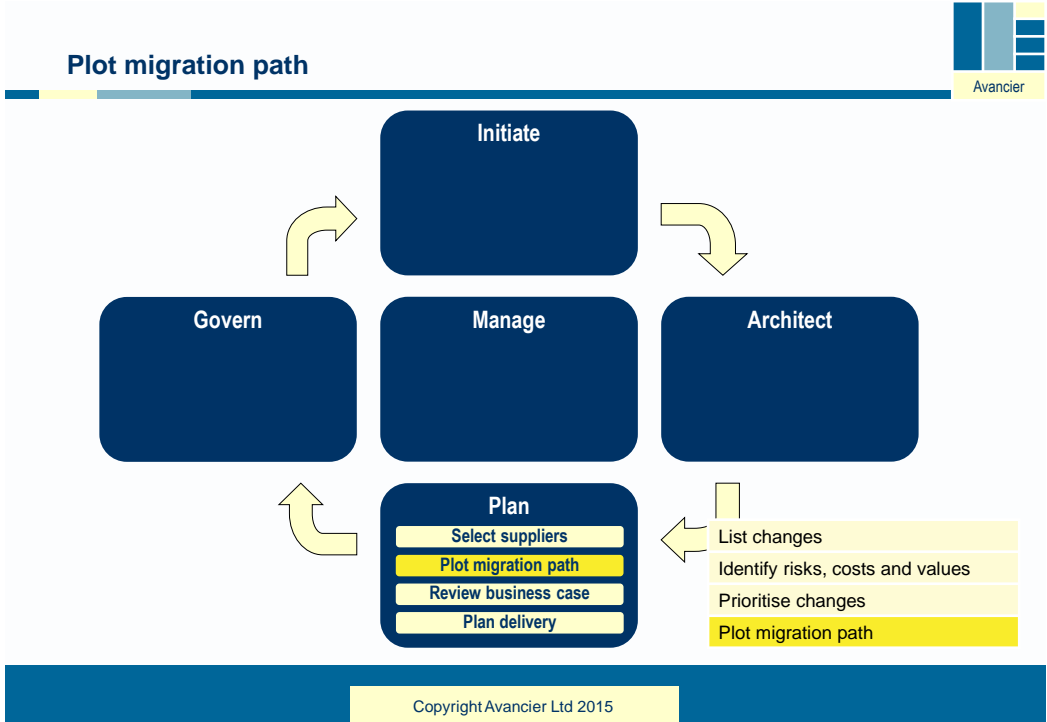
### Communicate priorities and progress clearly



- ▶ “Once IT and business unit leaders have established priorities, they must communicate them clearly to the rank and file.
- ▶ Good communication sets the proper tone and ensures that people understand how your governance processes work.”

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**Architecture evolution table**



- ▶ [an artefact] a table that shows when architectural entities are created, changed and removed through a series of transition states.

Migration path				
Architecture entity Or Solution element	Phase 1	Phase 2	Phase 3	Phase 4
A	V. 1	V. 2		
B	V. 1			
C		V. 1	V. 2	V. 3
D (temporary)		V. 1	Retire	
E			V. 1	
F			V. 1	V. 2
G				V. 1
H				V. 1

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**Work or product evolution table**



- ▶ [an artefact] a table that shows when work units start and stop through a series of transition states.

Work or product evolution table				
Work or product element	Version	Description	Phase created	Phase retired
A	V. 1		Phase 1	Phase 2
	V. 2		Phase 2	
B	V. 1		Phase 1	
C	V. 1		Phase 1	Phase 2
	V. 2		Phase 2	Phase 3
	V. 3		Phase 3	
D	V. 1		Phase 2	Phase
E	V. 1		Phase 3	
F	V. 1		Phase 3	Phase 4
	V. 2		Phase 4	
G	V. 1		Phase 4	
H	V. 1		Phase 4	

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**Plot the migration path**



- ▶ Divide the transformation into stages
- ▶ Assign deliverables and dates to each stage
  - Include any temporary deliverables
- ▶ Define interfaces for each transition state
  - Temporary interfaces to baseline systems
  - Permanent interfaces to baseline systems
  - Interfaces to temporary system in scope of state
- ▶ *Convince your stakeholders it is workable*

Stages	Deliverables and changes	Temporary deliverables?
Stage 1: date A	Deliverable/change Deliverable/change Deliverable/change	
Stage 2: date B	Deliverable/change Deliverable/change Deliverable/change	
Stage 3: date C	Deliverable/change Deliverable/change Deliverable/change	

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**Assign deliverables and dates to each stage**



Stages	Deliverables and changes	Temporary deliverables?
Stage 1: date A	Deliverable/change Deliverable/change Deliverable/change	
Stage 2: date B	Deliverable/change Deliverable/change Deliverable/change	
Stage 3: date C	Deliverable/change Deliverable/change Deliverable/change	

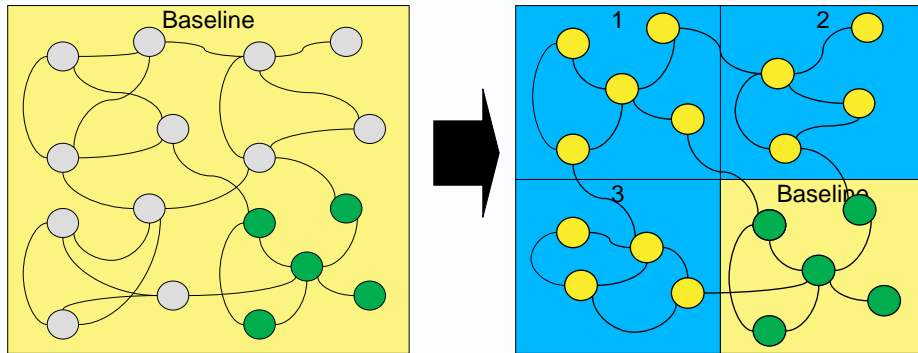
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Transition states add complexity



▶ Baseline

▶ Target – with 3 transition states and retaining some baseline



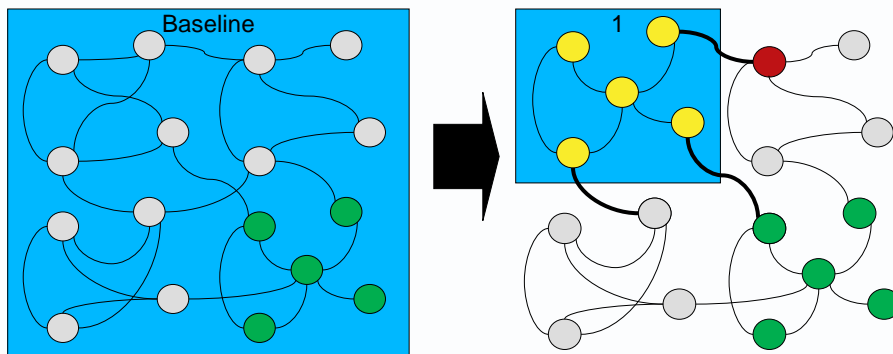
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Include any intermediate or transition deliverables



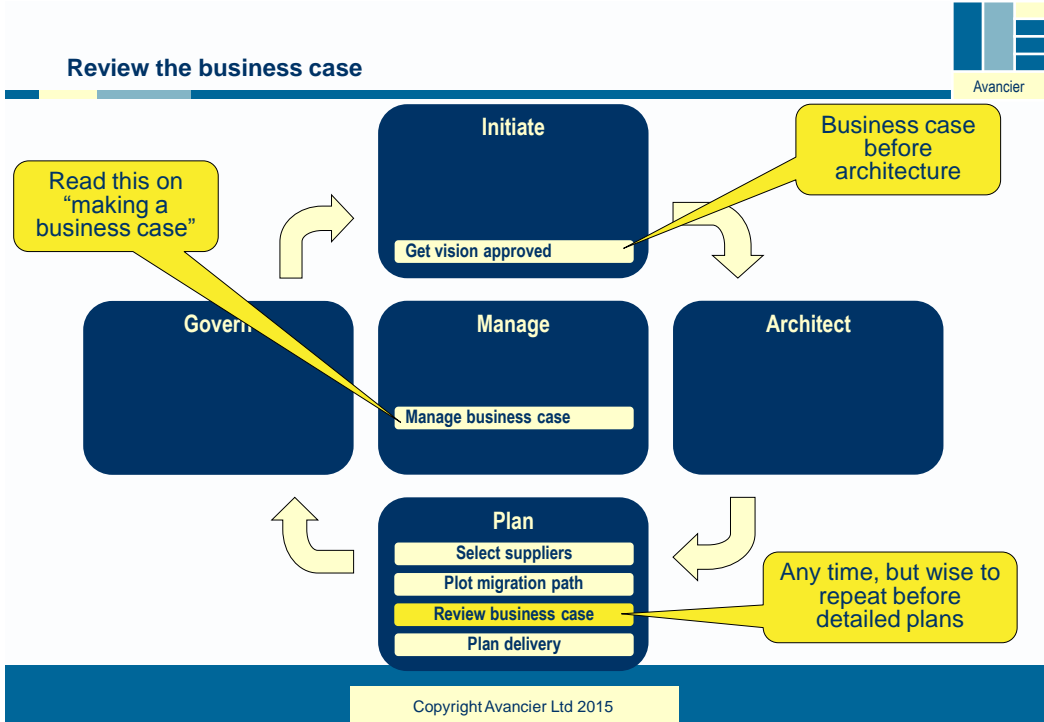
▶ Baseline

- ▶ Transition state 1 will need
  - Temporary interface to baseline system
  - Permanent interface to baseline system
  - Interface to temporary system in scope of state 2



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### Overview of a business case

<b>Business case</b>	<p>A rationale and business justification for spending time and money.</p> <p>Generally speaking, the essential elements are</p> <ul style="list-style-type: none"> <li>ROI (benefits – costs),</li> <li>Options (business or technical),</li> <li>Impacts (work to be done and changes to be made)</li> <li>Risks.</li> </ul> <p>These terms are defined separately.</p>
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► See “Manage business case” for detailed discussion of business cases

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### Business case



**Business case (before architecture)**

Should be outlined at the start and updated as need be.  
It will be reviewed and refined several times while architecture work is done.  
It may decomposed into business cases for specific options, stages or projects within the overall solution.

See section 10 for definition of this term and the supporting terms below.

- Return on Investment (ROI)
- Solution options
- Cost-benefit analysis
- Risk analysis
- Gap analysis (options)
- Trade-off analysis

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### Numbers managers care about



▶ ROI

- Benefits – Costs (over a time period), or
- Date when benefits > costs, or
- Profit / Investment

▶ Other

- Margin = Price – Cost
- Profit = Sales Volume \* Margin
- P/E ratio = Share price / Earning per share (EPS)

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## Financial structure (From the pyramid principle, by Barbara Minto)



- ▶ **Assets**
  - **Fixed**
    - Plant & equipment
    - Buildings and land
  - **Net Current**
    - Stock
    - Debtors
    - Cash
    - Current liabilities

- ▶ **Trading profit**
  - **Sales**
    - **Prices**
      - Estimating accuracy
      - Competitive prices
      - Product costs
    - **Product**
      - Quality
      - Design
      - Range
    - **Services**
      - Tech support
      - Representative effectiveness
      - Delivery
    - **Market conditions**
  - **Variable costs**
    - **Labor**
      - Cost per hour (rates, overtime)
      - Productivity (methods, turnover)
      - Efficiency (work methods)
    - **Services**
      - Fuel
      - Power
    - **Materials**
      - Purchase price
      - Quality
      - Wastage
  - **Fixed costs**
    - Research
    - Selling
    - Maintenance
    - Works

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## In practice



- ▶ Making a business case is as much art as science
- ▶ (See Avancier Methods for further discussion)

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**Business case: ROI**

**Return on Investment (ROI)**

A statement of benefits gained minus costs spent [over a period of time].

Costs must cover

- development,
- implementation,
- operation and maintenance.

Benefits may include

- money made,
- money saved,
- regulations complied and
- the resolution of specific problems.

E.g. the benefit of data integrity is to save the cost of data disintegrity.

Or, how soon do we get the money back?

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**Business case: option comparison**

**Solution Options**

Alternative designs. It is usual, at least at the solution vision stage, to describe two or more alternatives.

They may be compared at several stages and at several levels of design.

The choice can be guided by:

- **cost-benefit analysis,**
- **risk analysis,**
- **gap analysis and**
- **trade-off analysis.**

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### Business case: option comparison by cost benefit analysis



#### Cost-benefit analysis

An assessment of the costs and the benefits of a course of action and/or a proposed system.

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### Business case: option comparison by risk analysis



#### Risk analysis

Analysis of vulnerabilities that threaten the ability of a target system to meet requirements, especially non-functional requirements, including security.  
Risk analysis is needed before architecture definition starts in earnest, and then several times later in the process, and at several levels of design.

- ▶ Different businesses – different risks
  - A stock trading system moving £100M/day.
  - A SME dealing with auto-parts.
  - A government department logging claims for grants from farmers.
  
- ▶ Consider security especially.
  - Security requirements need to be stated and analyzed just as much as any other functional requirement.
  - Security functionality should be tested.
  - See *template for security risk analysis in the training manual chapter 102*

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**Business case:** option comparison by gap analysis



**Gap analysis (options)**

Generally, a technique for comparing two similar lists or structures, to find potentially missing items.

It can be used to compare two optional solutions, and identify gaps in one or both.

It helps if the two options are presented under the same structure as each other, or a more general structure.

Solution 1 (buy)	Solution 2 (build)
A	A
B	B
C	Gap
Gap	D

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**The Pugh Matrix (after Six Sigma)**



1 List criteria that the options must meet	2 Attach a weight to each criteria (say 1/3/5/7/9)	3 List the options and rate how well (say 1/3/5/7/9) each option meets each criterion.	
Criterion	Weight	Option 1	Option 2
Criterion 1	5	3	3
Criterion 2	5	3	5
Criterion 3	3	5	1
Criterion 4	3	1	1
Criterion 5	1	3	7
4 For each option, multiply the weights by the ratings	<b>Total</b>	<b>51</b>	<b>53</b>

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## Business case: option comparison by trade-off analysis



<b>Architecture</b>	A process in which a consultant leads analysis of target system options and the trade offs between them.
<b>Trade-off</b>	
<b>Analysis</b>	
<b>Method</b>	Published and promoted by the Software Engineering Institute of Carnegie Mellon University.

### Architecture Trade-off Analysis Method (ATAM)

1. Presentation
2. Investigation and Analysis
3. Testing
4. Reporting

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## Business case: trade-off analysis

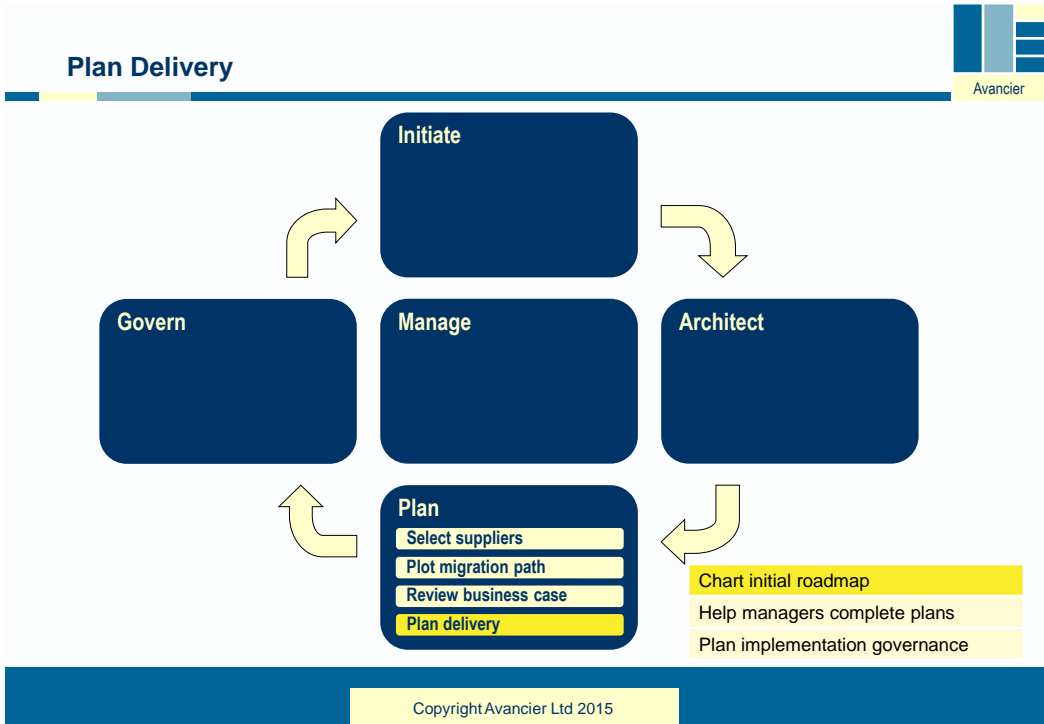


<b>Architecture</b>	A process in which a consultant leads analysis of target system options and the trade offs between them.
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### Architecture Trade-off Analysis Method (ATAM)

1. Presentation
2. Investigation and Analysis
3. Testing
4. Reporting

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- ### Chart initial roadmap
- ▶ Convert the migration path into a road map
    - Decompose changes into tasks
    - Define dependencies between tasks
  - ▶ Complete the initial road map
    - Estimate and schedule each work package well enough to inform the more detailed management plan
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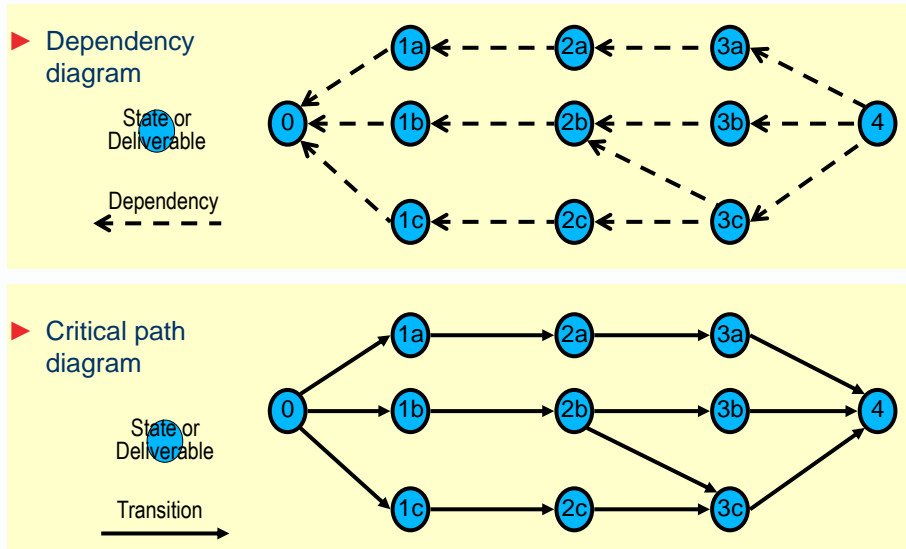
## Convert the migration path into a road map



**Roadmap** A migration path/plan with timescales, and perhaps some idea of costs and resources.  
Half-way between a migration path and a project plan.

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## Decompose changes into tasks



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### Define dependencies between tasks

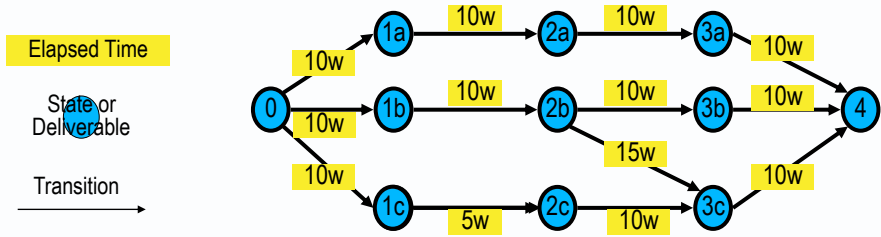


**Critical path analysis**

A technique to construct a model of the project that includes (i) a list of all **tasks** required to complete the project (also known as work breakdown structure) (ii) the duration of each **tasks**, and (iii) the dependencies between the **tasks**.

**Program Evaluation and Review Technique (PERT)**

A method to analyze the tasks involved in completing a given project, especially the time needed to complete each task, and identifying the minimum time needed to complete the total project.



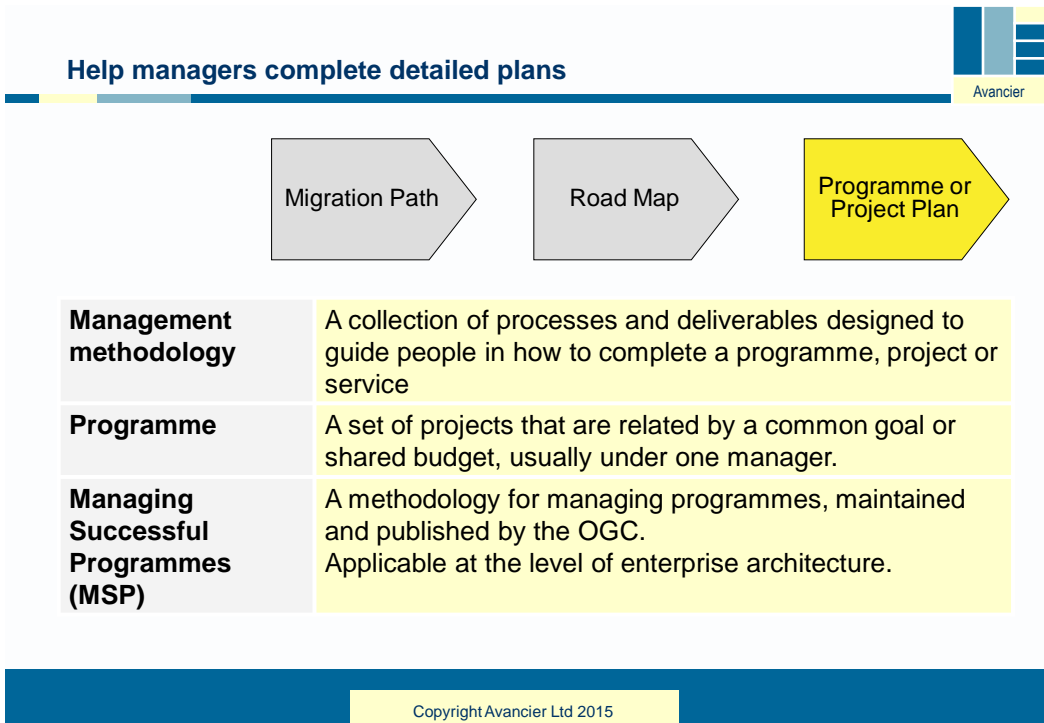
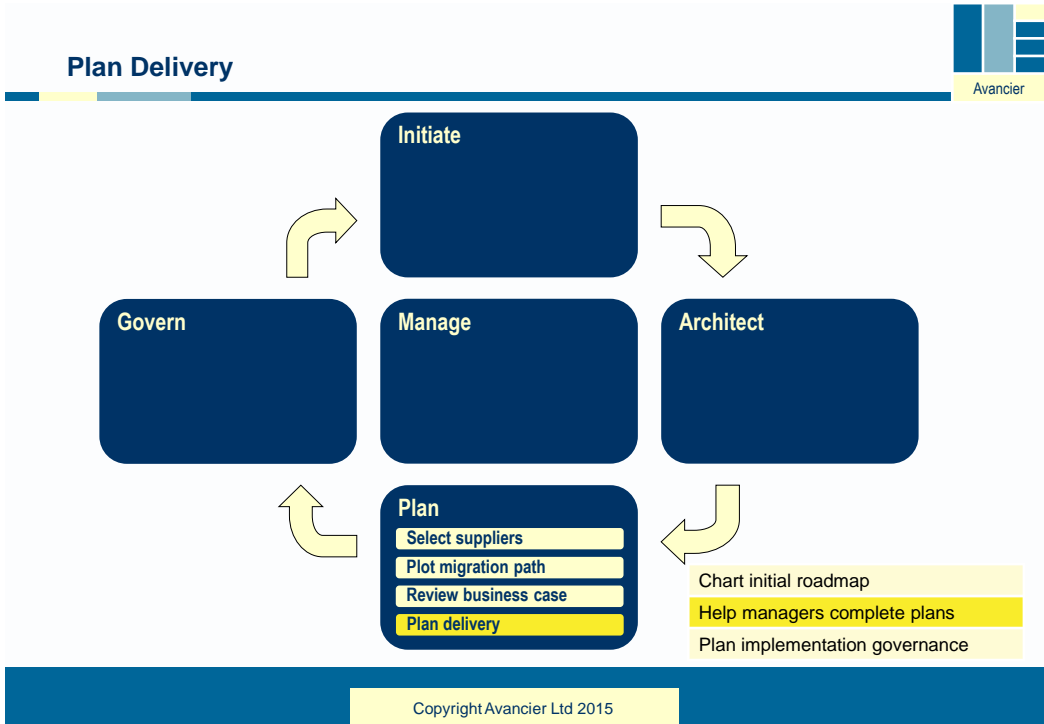
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### Complete the initial road map



- ▶ Estimate and schedule each work package well enough to inform the more detailed management plan

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Programme Management <- -> Enterprise Architecture



MSP	Avancier Methods
Identify programme: vision	INITIATE
Define programme	ARCHITECT
	PLAN
Manage programme	GOVERN delivery
Tranches	
Delivery	
Benefits management	GOVERN operations
Close programme	

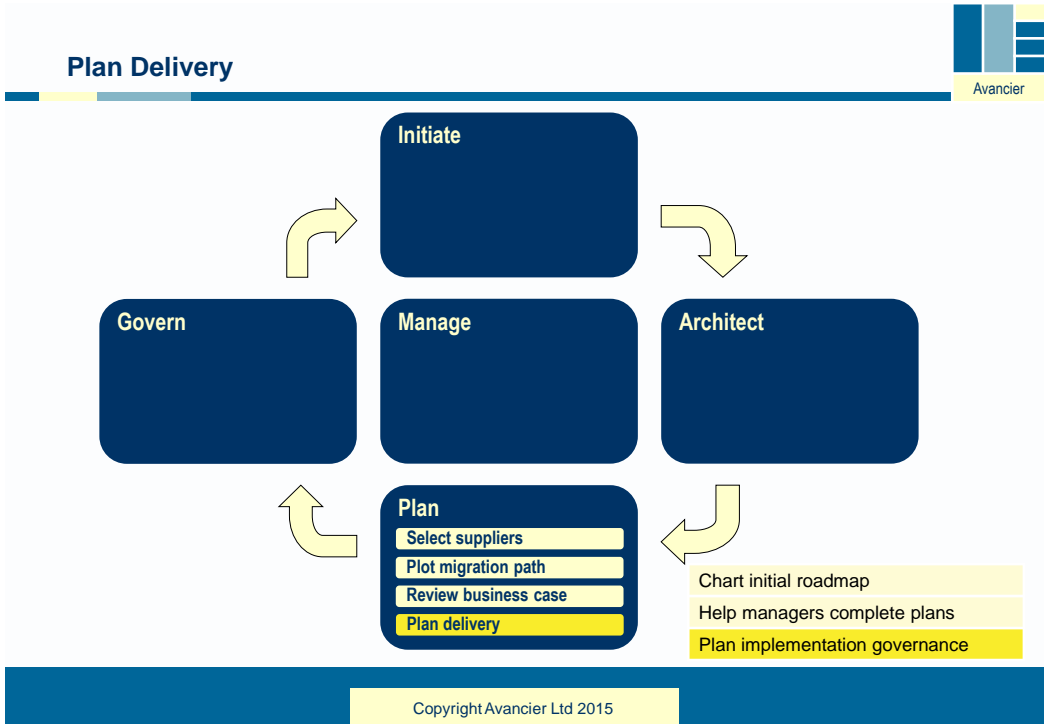
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Help managers complete detailed plans



<b>Project</b>	A process that consumes time and resources to deliver a required outcome, usually under one manager.
<b>PRINCE2</b>	A project management method. A well-known methodology maintained and published by the OGC. (>Axelos) Applicable at the level of an application development project.

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- ### Plan implementation governance
- ▶ For each project
  - ▶ Determine how the implementation will be governed
  - ▶ Define
    - **architecture contracts**
    - **project compliance plan**
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### Architecture contract (rules of engagement)



- ▶ A document agreed by a programme, project or business manager
- ▶ Perhaps an appendix to a Project Initiation Document
  
- ▶ Used by a governing architect to test the compliance of
  - Solution description (vision, outline or build-ready)
  - Operational system under construction
  - Operational system change request
  
- ▶ Against (for example)
  - Goals, objectives , requirements, **especially NFRs**
  - Architecture principles, reference models and standards
  - Earlier and higher level architecture descriptions
  - Factors listed in more general compliance review checklists

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### Project compliance plan



A plan that schedules

- ▶ When reviews will take place
  - Regular intervals and/or
  - Define milestones
- ▶ Kinds of review to be carried out
- ▶ What each kind of review will test compliance against
  - Compliance review checklists
  - Architecture contracts
  - Other defined inputs

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