From process to solution: Some lessons I have learned

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A series of lessons and observations

- Conditioned by >30 years consultancy in Information Management
  - With clients large and small, local, national and multi-national
  - In public, private and not-for-profit sectors
  - In many countries
- The lessons are a subjective selection of potentially interesting and significant issues

DP requirements vary enormously - so:

- Everything I say will not apply to all of you
- Some of what I say will apply to some of you

The Consultant General has determined that some of the advice in this presentation originates from IM domains other than digital preservation. Uncritical application of this advice may damage your procurement.

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Agenda

1. Specifying requirements for an ITT
   1. How to elicit and document?
   2. How to use standards?
   3. What about cloud services?
2. Evaluation of bids
   1. References
   2. Weighting
3. Solution delivery
   1. How to deliver?

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Requirements elicitation techniques were originally developed for "structured data" applications

Latent requirements

- In "structured data" applications, requirements were (fairly) clear

- In digital preservation, many requirements are latent, uncertain, flexible; some are unknown

- As a result, requirements elicitation is difficult and the results can be dubious

So: how to elicit requirements?

- Traditional methods – interviews, workshops etc.
- Recognise the problem of latent requirements
- Look elsewhere
  - "good practice"
  - "experience elsewhere…

Reqs. spec.

" The more precise you can be about exactly what you want, the better.

" Your statement of requirements will be the basis of the agreement between you and the service provider. It needs to be complete and detailed – what it doesn't include, you will have no legal right to expect, so may have to pay extra for.

" It does not **have** to be technical. You are describing what you want. You need to set out as clearly as you can, in plain English, what that is. The potential suppliers have then to interpret what you want, and tell you how, and at what cost, they can supply it. **"**

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A problem: the English Language

- The English language, when used in specifications, is
  - Ambiguous
  - Unclear
  - Imprecise/incomplete
  - (Tortuous)

Z

15.2.3.3 Generic axiomatic description paragraph

The generic axiomatic description paragraph $\mathtt{GENAX}\ [i_1, ..., i_n]\ e\ \mathtt{END}$ introduces global names and constraints on their values, with generic parameters that have to be instantiated (by sets) whenever those names are referenced.

$$
\llbracket\ \mathtt{GENAX}\ [i_1, ..., i_n]\ (e\ \mathbin{\raise0.5ex\hbox{\tiny$\circ$}\kern-0.5em\lower0.5ex\hbox{\tiny$\circ$}}\ \mathbb{P}[j_1 : \tau_1;\ ...;\ j_m : \tau_m])\ \mathtt{END}\ \rrbracket^{\mathcal{D}} =
$$

$$
\{M : Model;\ u : \mathbb{W} \uparrow n \to \mathbb{W}
$$

$$
\mid \forall\ w_1, ..., w_n : \mathbb{W} \bullet \exists\ w : \mathbb{W} \bullet
$$

$$
u\ (w_1, ..., w_n) \in w
$$

$$
\wedge\ (M \oplus \{i_1 \mapsto w_1, ..., i_n \mapsto w_n\} \cup \{i_1\ decor\ \spadesuit \mapsto w_1, ..., i_n\ decor\ \spadesuit \mapsto w_n\}) \mapsto w \in \llbracket\ e\ \rrbracket^{\mathcal{E}}
$$

$$
\bullet\ M \mapsto M \cup \lambda\ y : \{j_1, ..., j_m\} \bullet \lambda\ x : \mathbb{W} \uparrow n \bullet u\ x\ y\}
$$

ASL

```
BAGcount =
  reachable
    enrich NAT by
      sorts  Bag
      opns   empty : Bag
             cons: Nat, Bag -> Bag
             count: Nat, Bag -> Nat
      axioms cons(x, cons(y, b)) = cons(y, cons(x, b))
             count(x,empty) = zero
             count(x, cons(x,b)) = succ(count(x, b))
             x≠y ⇒ count(x, cons(y,b)) = count(x, b)
  on {Bag}
```

So: how to document the requirements (1)?

- Use English language, but…
- Expect, accept, and revel in your specification's
    - Ambiguity
    - Lack of clarity
    - Lack of precision/completeness
    - Tortuousness
- Adopt a delivery approach that recognises this (see later)

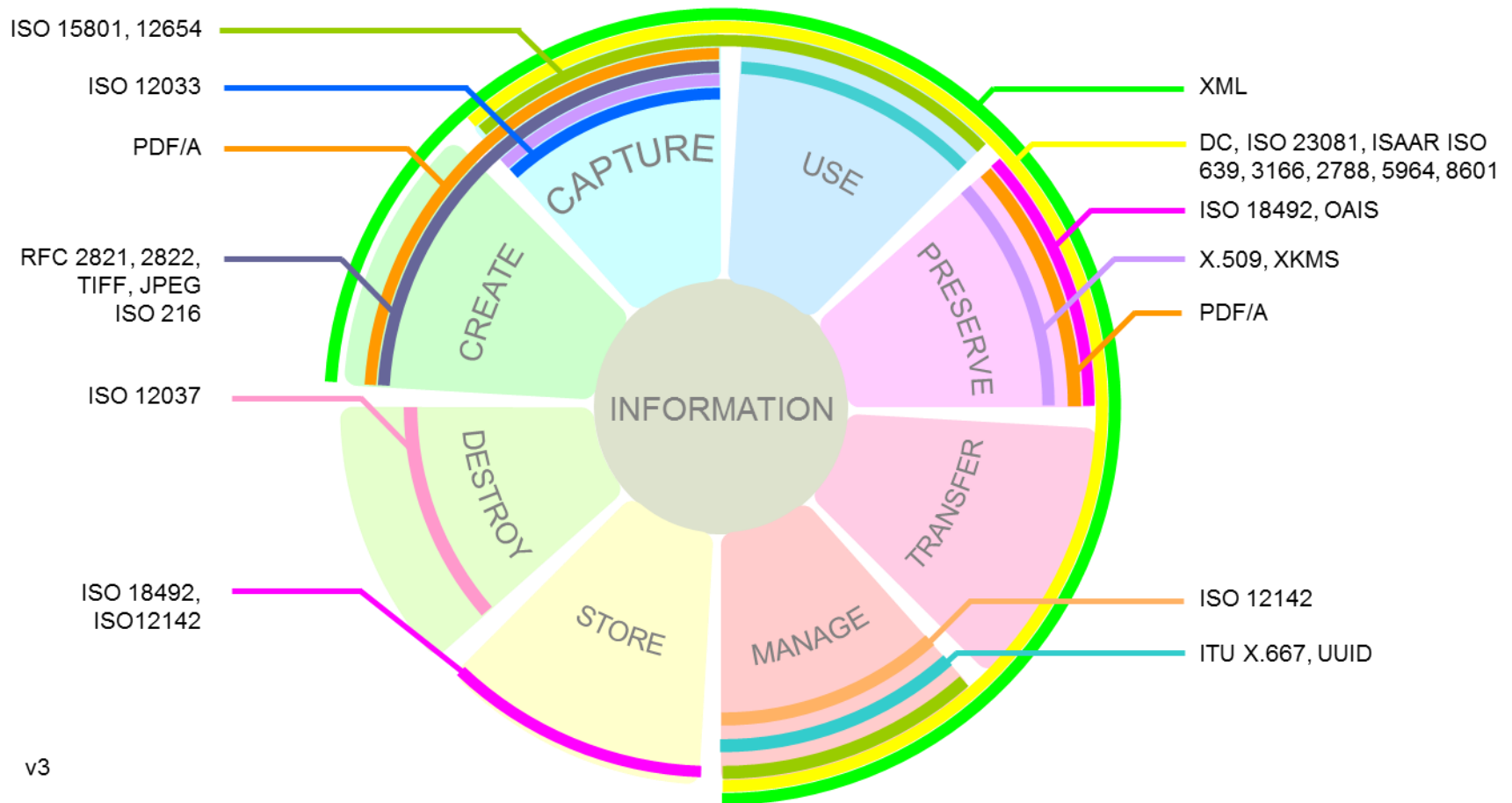# So: how to document the requirements (2)?

- For packages, refer to suppliers
- Prefer **outcome-based** requirements over functional or procedural requirements

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Standards… up to our armpits

ISO 15801, 12654

ISO 12033

PDF/A

RFC 2821, 2822, TIFF, JPEG ISO 216

ISO 12037

ISO 18492, ISO12142

v3

CAPTURE

USE

CREATE

PRESERVE

INFORMATION

DESTROY

TRANSFER

STORE

MANAGE

XML

DC, ISO 23081, ISAAR ISO 639, 3166, 2788, 5964, 8601

ISO 18492, OAIS

X.509, XKMS

PDF/A

ISO 12142

ITU X.667, UUID

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17

ISO, BSI and other standards

- How are they developed? Who develops them?
- Why?
- What does this imply?
- Why do organisations rely on them?

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Inappropriate compliance

1.9   Customising this Specification

[. . .]   this specification must be customised before use for procurement purposes. The customisation for procurement should:

- add or remove requirements as specifically required by the organisation;

- adjust requirements that can be made more specific. For example:

◢ … compliance with standards is sometimes demanded in ITTs - inappropriately

Inappropriate rigour
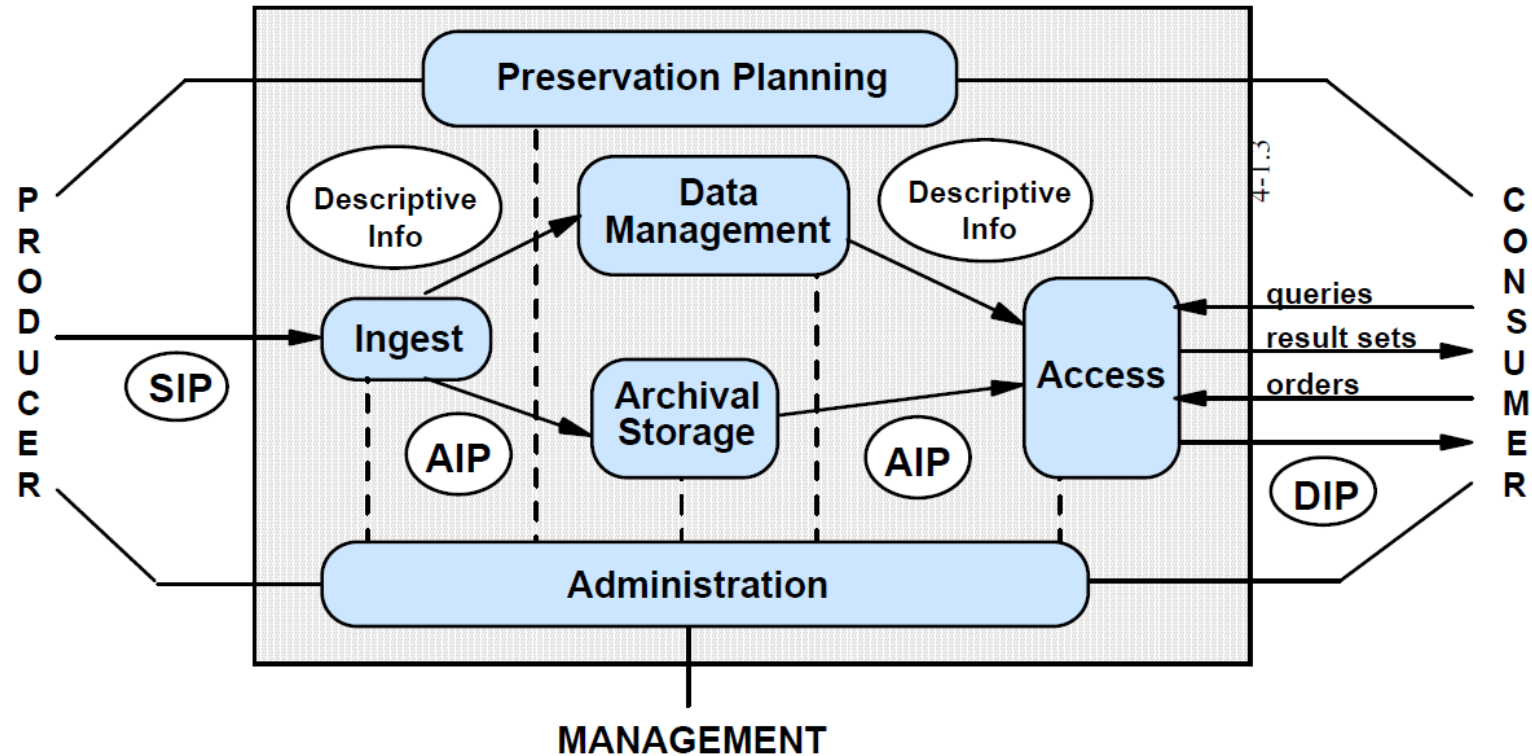
Functionally inappropriate

Figure 4-1: OAIS Functional Entities

No mention of migration to next generation DP solution

So: how to use standards?

- Carefully!
- Do not assume they are magical
- Do not assume they are mandated in full
- Do consider their content critically in the light of your application

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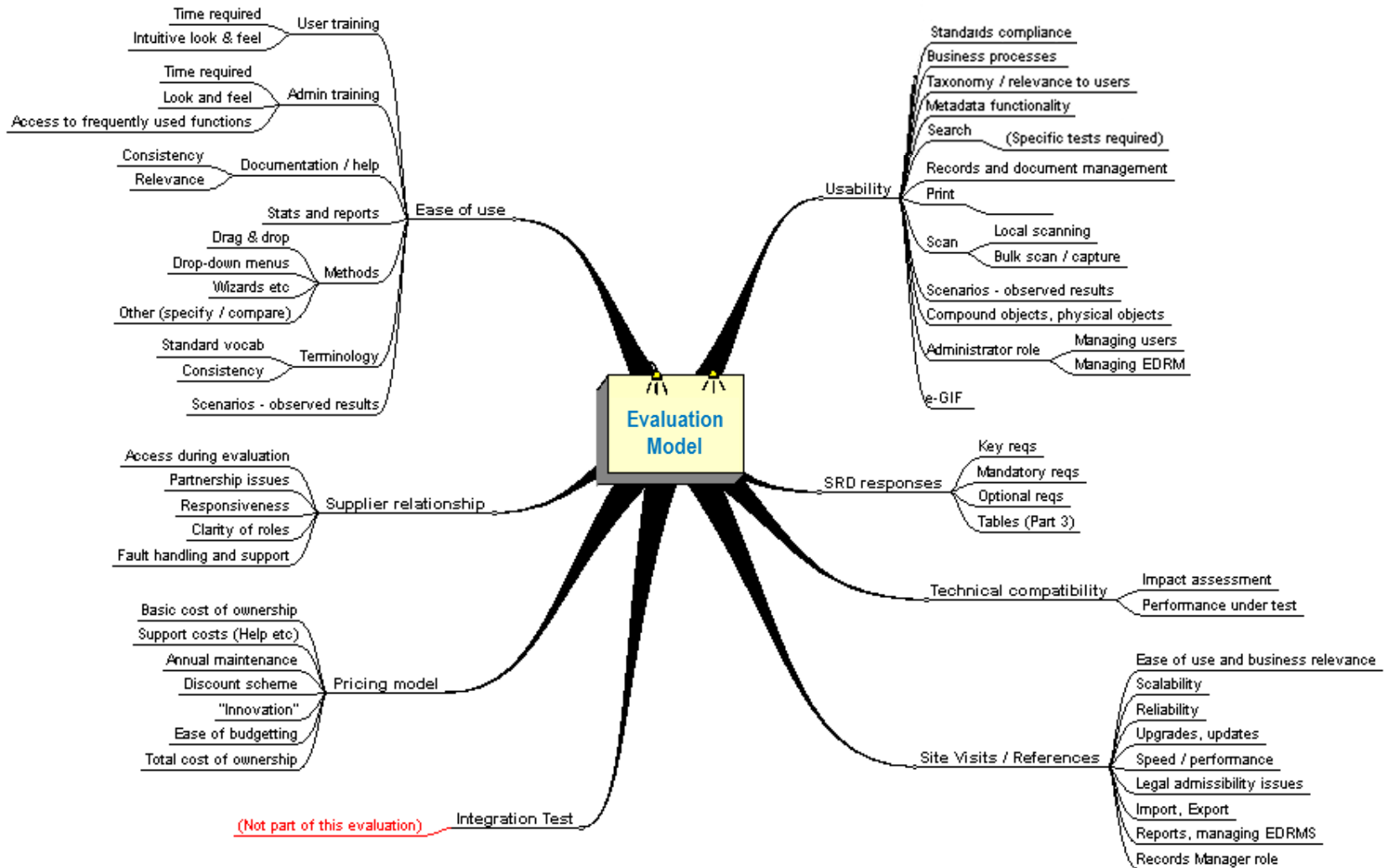3. Solution delivery
    1. How to deliver?

Cloud service procurement/contract points

1. Setup
2. Customisation
3. Training
4. Integration
5. Data import
6. Data export
7. Geographic location of data
8. Disclosure to 3rd parties
9. Data and metadata export format
10. Development sand boxes
11. Test sandbox availability, number
12. License conversion from one model to another
13. Discounts for incremental spending
14. Non-corporate use
15. Storage
16. Maintenance and support
17. Uptime guarantee
18. Penalties
19. Audits of SLA compliance
20. Issue resolution
21. Escalation path
22. Data ownership
23. Source code ownership
24. Upgrades
    a. Infrastructure
    b. 3rd party software
    c. Custom development
25. Business continuity
26. Data security
27. Privacy
28. Suspension of services
29. Disaster recovery
30. Liability limits
31. Software license fee
32. Termination Fee
33. Pricing Model
    a. Per user
    b. Traffic based
    c. Time based
    d. Processor cycles used
    e. Storage used
34. Control over audit trail
35. Access to audit trail
36. Version control
37. Deployment strategy
38. Free Pilot Period

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Many possible evaluation criteria…

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References

- Taking up references can be extremely valuable
- But:
  who can find a reference site that has proved that its long-term digital preservation solution successfully preserves resources over the long term?

So: what to do about references?

- Take them up anyway
- Major on vendor attributes as much as on solution

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Public sector evaluation criteria: example 1

FIRM (i.e. non-revisable) price submitted in accordance with the DEF FORM 47. In support of your offer you are required to supply a breakdown of the price. Pricing guidance is detailed in Annex F.

NB: Price will be of great significance in making the final selection.

3.   SELECTION PROCESS

It has been decided that in order to reduce risk a DRAFT Invitation to Negotiate (ITN) will be issued

- Source: public sector IM ITT

Public sector evaluation criteria: example 2

2.2 Selection

Final Selection will be based on **seventy percent to thirty percent split on cost to functionality**.

The cost score will be based on price with the lowest price over the expected 10-year life of the solution.

The lowest total cost will score 100% of the Cost score with other proposals achieving a score of 100 minus the price difference as a percentage of the lowest cost (i.e. a proposal costing 10% more than the lowest proposal would score 90% on cost and a proposal costing twice that of the lowest proposal would score 0%).

Source: public sector IM ITT

Example 2 - continued

- 70% on price, 30% on everything else
- Say the price difference between the low bid (A) and the next lowest (B) is 10%
- Then (A) scores 70 points (out of a possible 70) and (B) scores 10% less – so 63 points. Differential: 7 points.

Example 2 - continued

- The differential, 7 points, is nearly a quarter of the remaining 30 points available.

- In practice, there is no way (B) can score 25% more points than (A) for everything else

- Actually the real life situation is worse, because price differentials are often much more than the 10% in this example

What is the result of this?

- The lowest bid wins.
- **This is bad for the organisation.**
- **This is bad for the taxpayer or shareholder.**
- **This is bad for the suppliers.**
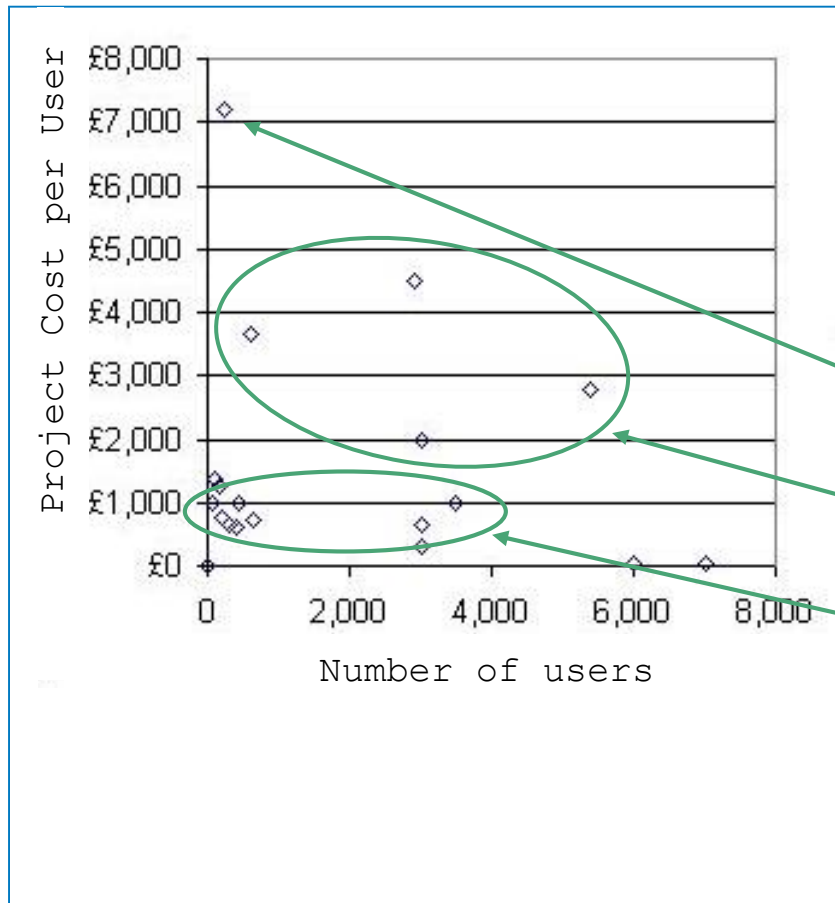
Actual IM bids – example 1

- 3 bids against same specification
    - (A) £147,000
    - (B) £185,000
    - (C) £386,000
- Variation (A) to (B):26%
    - So with the 70/30 split in the example, (A) would inevitably win
- Total variation, low to high: 162%

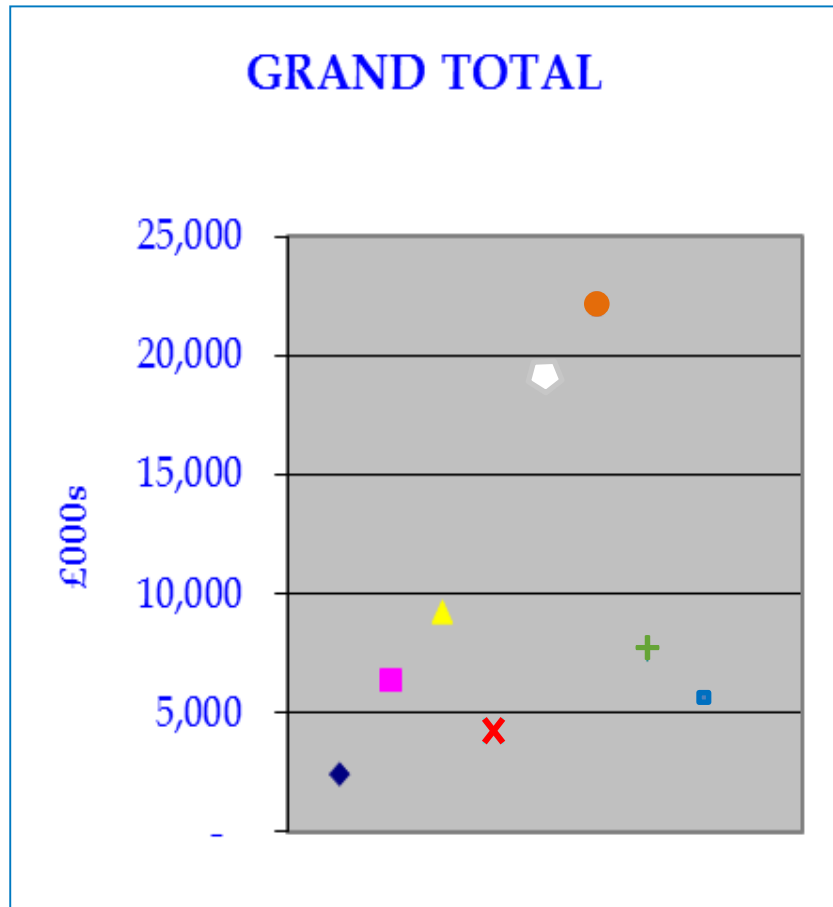# Actual IM bids – example 2
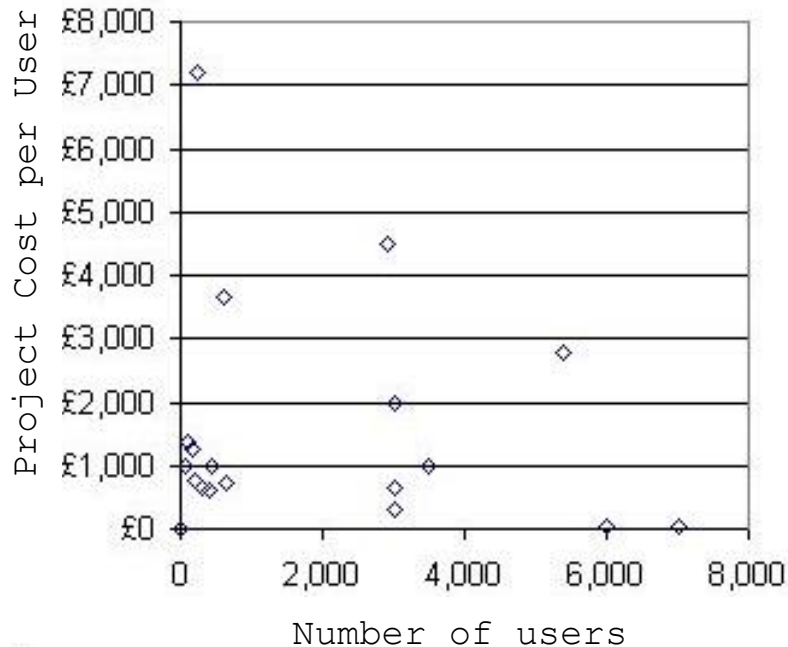
- Survey of IM projects
- Comparable functionality
- Project cost per user

Actual IM bids – example 2

- Survey of IM projects
- Comparable functionality
- Project cost per user
- One >£7k/user
- Some £2k - £5k/user
- Most approx. £1k/user
- Variation, low to high: about 700%

Actual IM bids – example 3

GRAND TOTAL

- 8 bids against same spec.
- Highest: £22M
- Lowest: £2.5M
- Variation (A) to (B): 44%
- Variation, low to high: 880%

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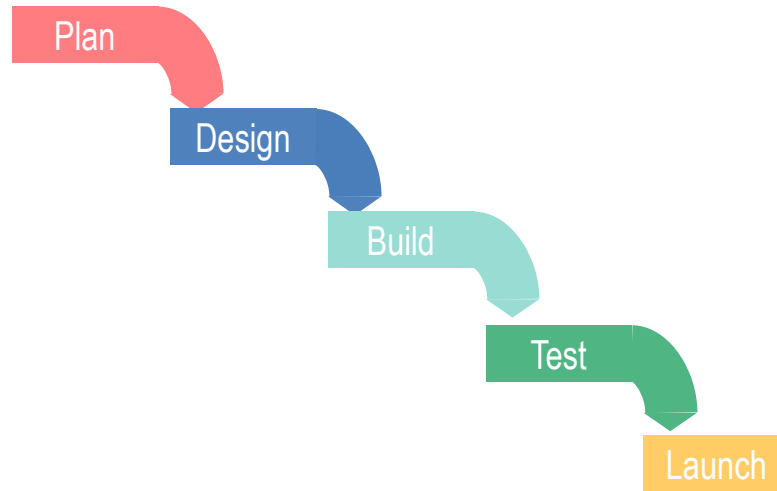
So: what to do about weighting?

- Avoid, resist, eschew, aggressively weighting price
- Model possible outcomes carefully
  - May require a highly numerate analysis

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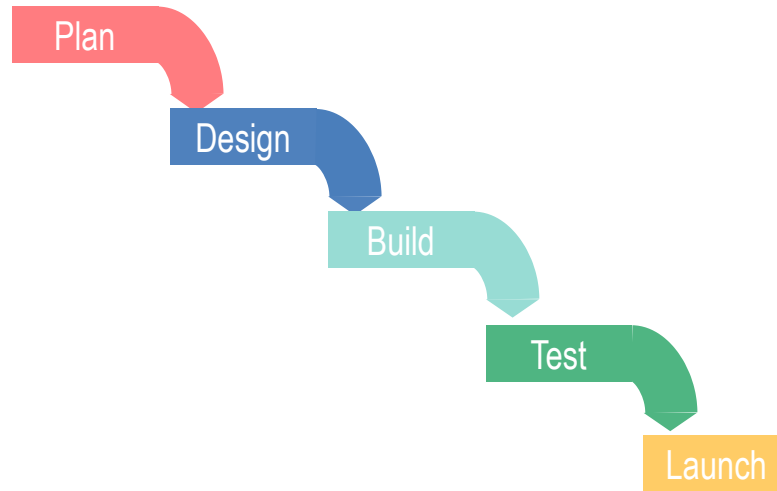   1. How to deliver?

Delivery approaches

Traditional "waterfall" delivery approach

- This will not work well, because of the limitations on the specification described earlier

https://crowdsourcedtesting.com/resources/continuously-improve-agile-development-process/

Delivery approaches
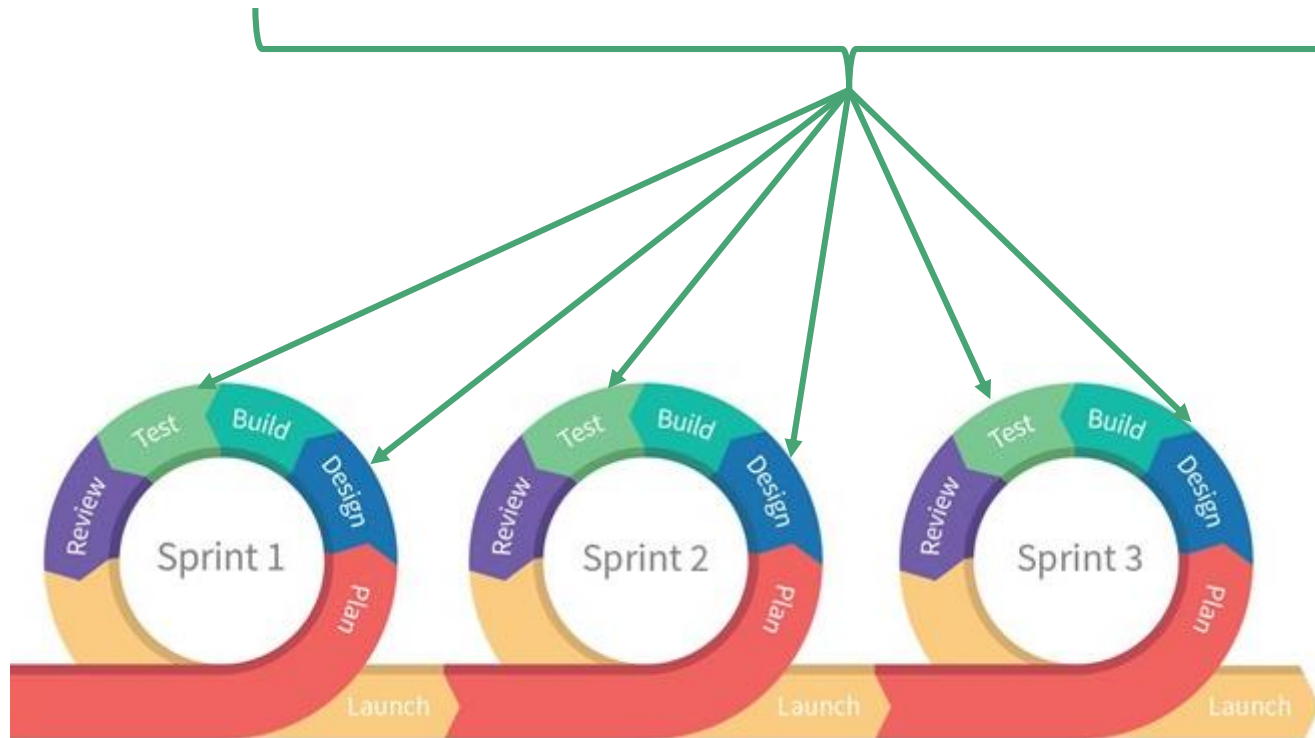
Traditional "waterfall" delivery approach

Iterative "agile" delivery approach

Iterative, or evolutionary, or agile

- Requires heavy commitment from user representatives

So: what delivery model to choose?

- Choose an iterative, or evolutionary, or agile, model
  - Discuss with bidders before specifying it
  - Be realistic about internal resource requirements

Finally

- The "rough guide" of allocating 10% of solution cost to procurement will be too low in many cases, especially for smaller solutions

You can do it…

- Future generations look forward to seeing the results of your efforts!

Questions?

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