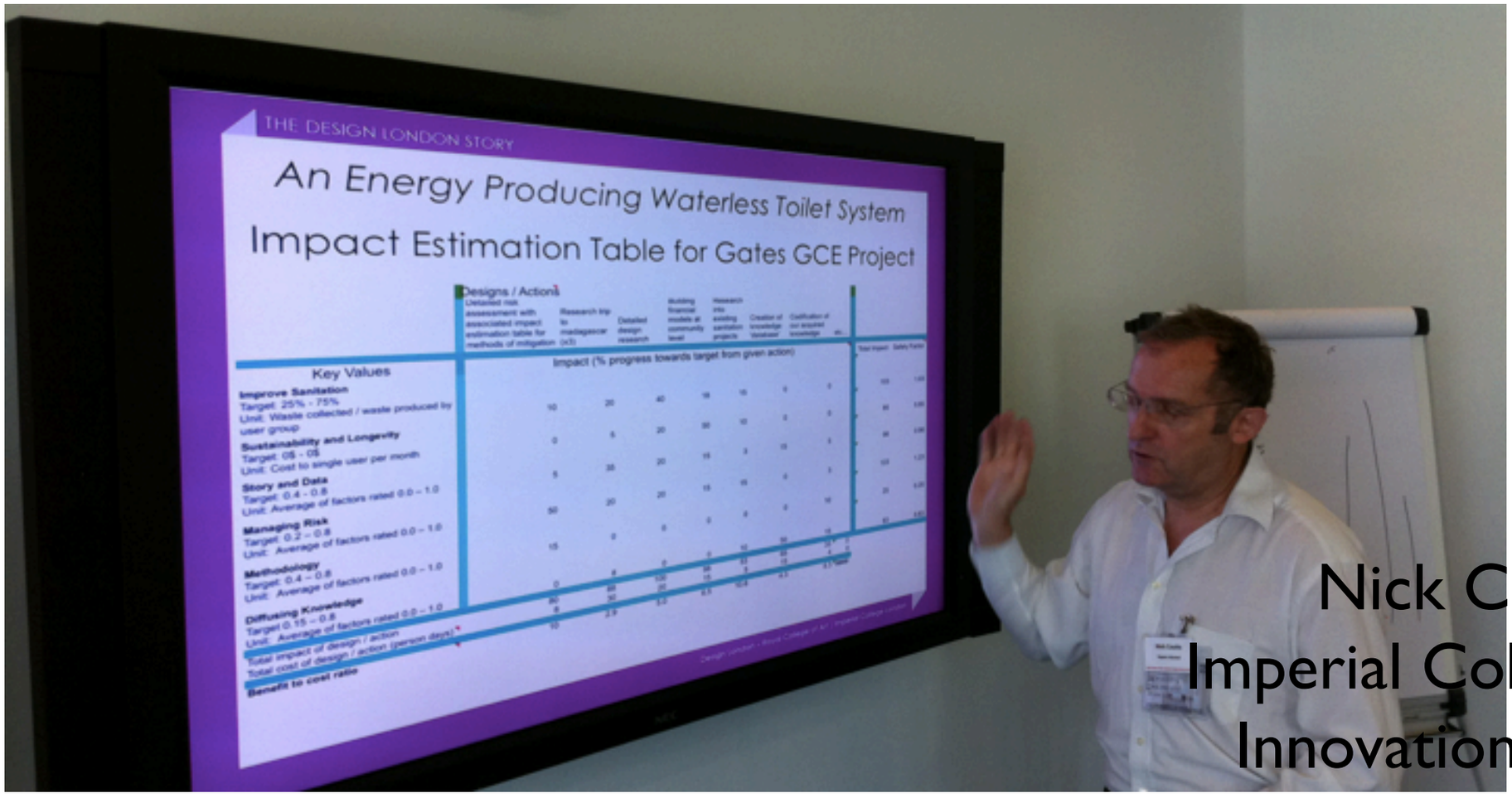
Impact Estimation Table Principles

- by Tom Gilb (Honorary Fellow British Computer Society, 2012)
  - See Gilb.com for more detail and papers
- for Unicom, Business Analysis Forum,
- 5 July 2012 , 15:30 to 14:00



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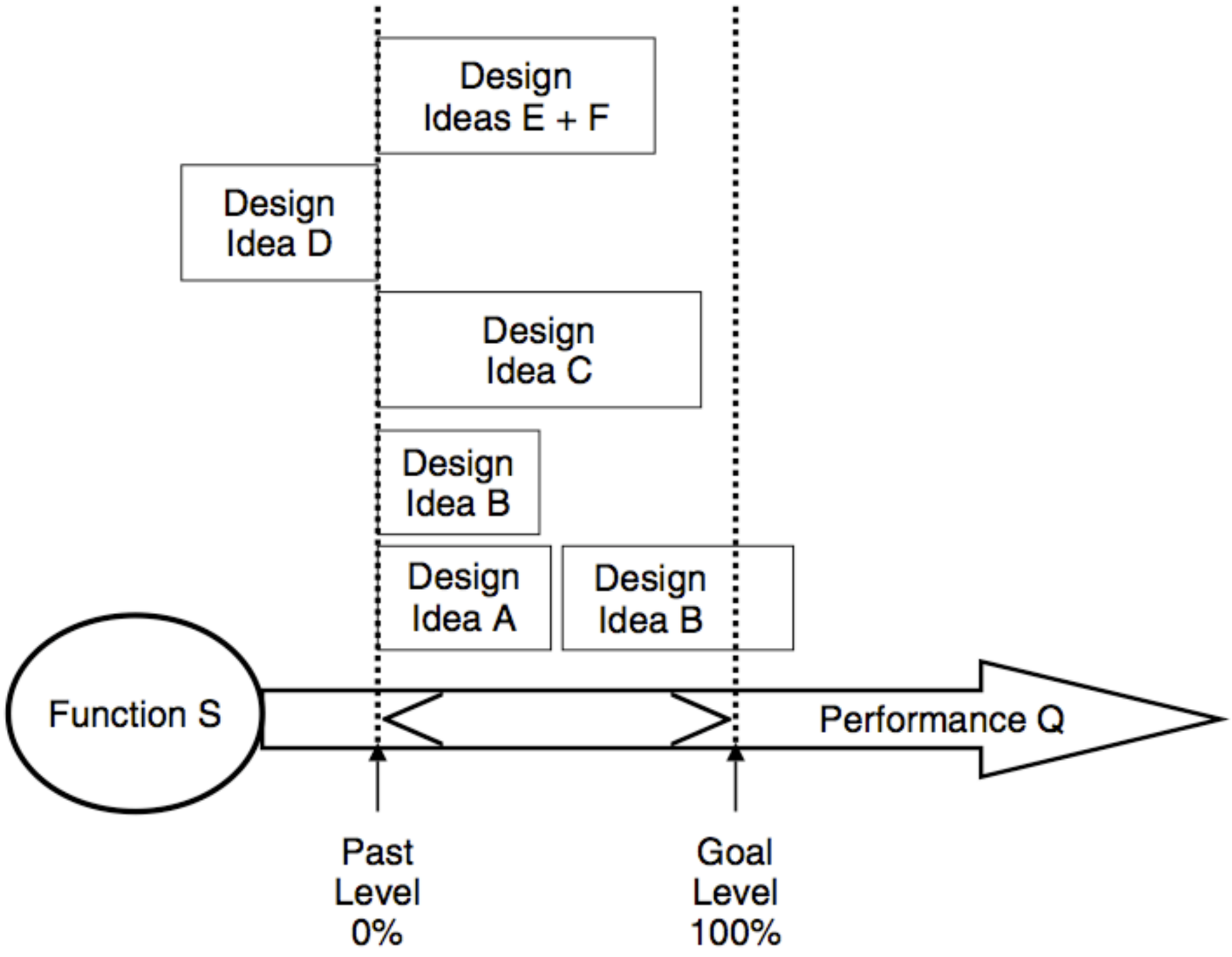
Impact Estimation Tables

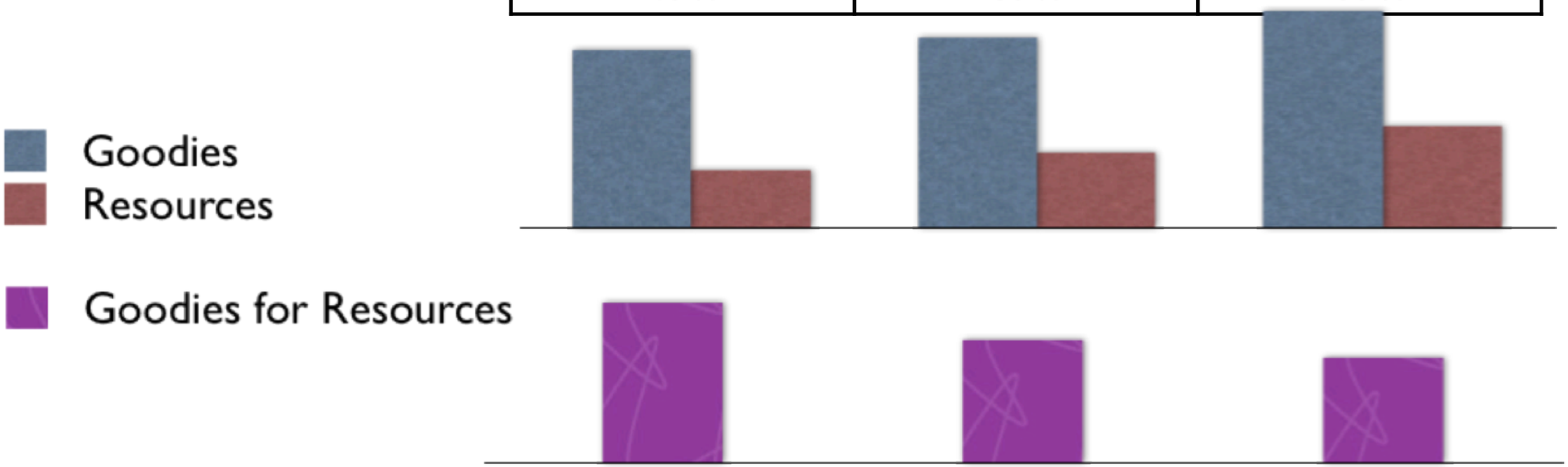
- A tool, within 'Planguage'
  - ('Competitive Engineering' book)
- For Analysing *any* set of Ends and Means
- At any level
  - Or set of levels
- In any class of system
  - Including Business Analysis, and Architecture

Impact Estimation Concepts



Value Decision Tables:
a type of Impact Estimation Table

Product Values			
Taste	20 %	50 %	90 %
Nutrition	30 %	70 %	90 %
Shelf Life	80 %	30 %	-10 %
Sum Goodies	130 %	150 %	170 %
Resources	40 %	60 %	80 %



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An Energy Producing Waterless Toilet System

Impact Estimation Table for Gates GCE Project

Key Values	Designs / Actions: Detailed risk assessment with associated impact estimation table for methods of mitigation	Research trip to madagascar (x3)	Detailed design research	Building financial models at community level	Research into existing sanitation projects	Creation of knowledge 'database'	Codification of our acquired knowledge	etc....	Total Impact	Safety Factor
	Impact (% progress towards target from given action)									
Improve Sanitation Target: 25% - 75% Unit: Waste collected / waste produced by user group	10	20	40	18	15	0	0		103	1.03
Sustainability and Longevity Target: 0$ - 0$ Unit: Cost to single user per month	0	5	20	50	10	0	0		85	0.85
Story and Data Target: 0.4 - 0.8 Unit: Average of factors rated 0.0 – 1.0	5	35	20	15	3	15	5		98	0.98
Managing Risk Target: 0.2 – 0.8 Unit: Average of factors rated 0.0 – 1.0	50	20	20	15	15	0	3		123	1.23
Methodology Target: 0.4 – 0.8 Unit: Average of factors rated 0.0 – 1.0	15	0	0	0	0	0	10		25	0.25
Diffusing Knowledge Target 0.15 – 0.8 Unit: Average of factors rated 0.0 – 1.0	0	8	0	0	10	50	15		83	0.83
Total impact of design / action	80	88	100	98	53	65	33	0		
Total cost of design / action (person days)	8	30	20	15	5	15	4	0		
Benefit to cost ratio	10	2.9	5.0	6.5	10.6	4.3	8.3	####		

The Principles of Impact Estimation

- 1. The Principle of ‘Words being difficult to weigh’
  Non-numeric estimates of impact are difficult to analyze and improve upon. A design idea described as ‘excellent’ could actually be worse than another merely described as ‘good.’

2. The Principle of ‘Doubtful digits are better than none’
A bad numeric estimate, and its definition, can still be systematically criticized and improved. In fact, a random number is a better starting estimate than flowery, descriptive words.

3. The ‘Evident’ Principle
Estimates without sources, evidence and credibility are not evident.

4. The Principle of ‘Uncertainty in no uncertain terms’
The uncertainty estimate is at least as important as the main estimate.

5. The Principle of the ‘Seat Belt’
A safety margin is as necessary with uncertain estimates, as a seat belt is with uncertain traffic.

•6. The Principle of ‘Profitable Proposals’
The value of an idea is how well it meets objectives. The net value considers the costs too.

7. The Principle of ‘the Swiss Army Knife’
Impact Estimation is a multi-purpose method. It can help you in many situations: to evaluate, to compare, to present, to argue, to destroy, to find weaknesses, to cut fat, to see risk, to prioritize, to sequence and more.

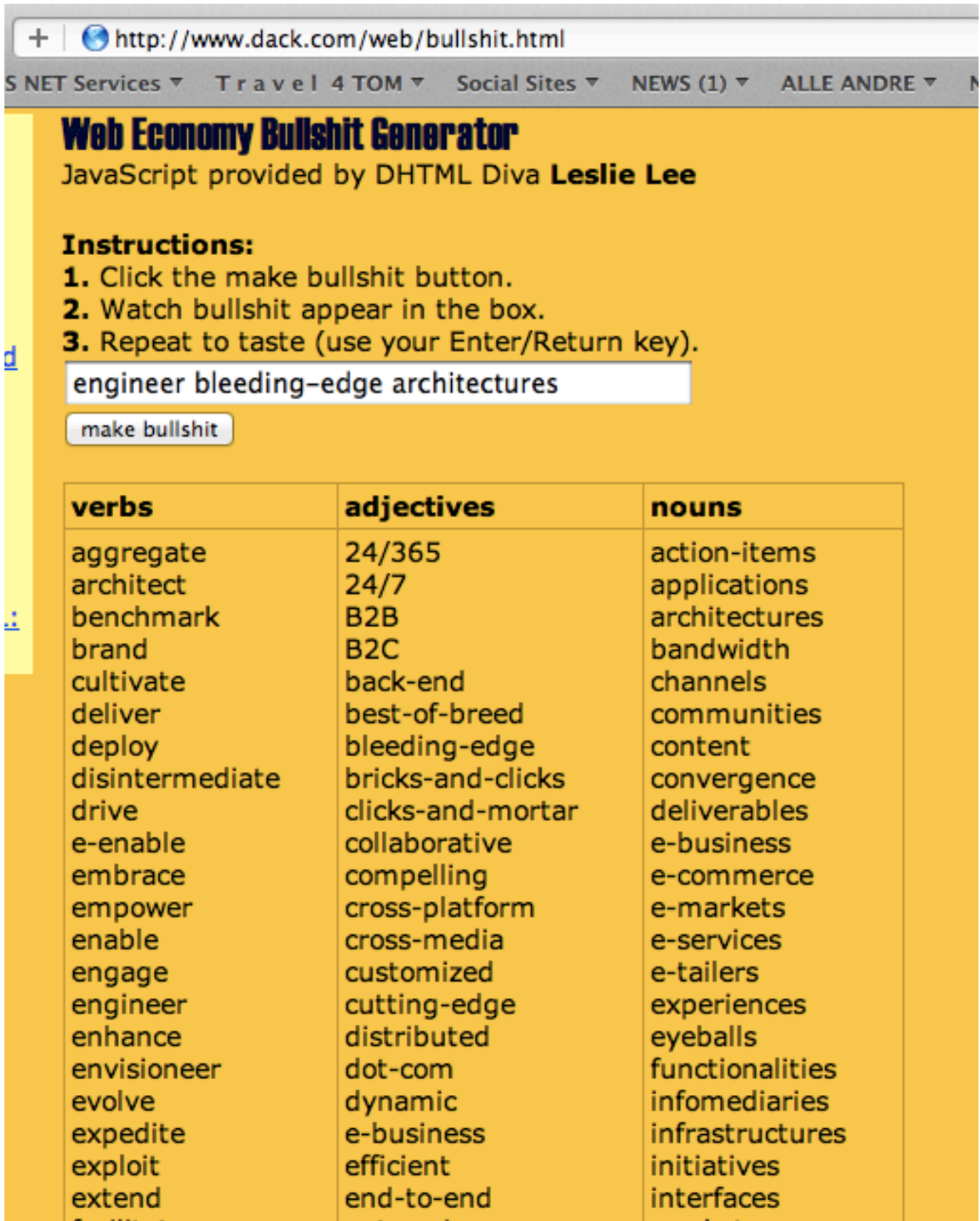
8. The Principle of ‘Always Useful’
Impact Estimation can assist a project throughout its lifecycle – from identifying requirements to assessing feedback data from implemented systems.

9. The Principle of ‘Multiplicity’
When stakeholders have multiple requirements, then we need to evaluate multiple design options against all those requirements including considerations of value, in order to make a reasonable choice.

10. The Efficiency Principle
When real life has many stakeholder values, and many cost constraints, then evaluation of designs (strategies) must be done with respect to both the values and the costs.

- 1. The Principle of ‘Words being difficult to weigh’

- Non-numeric estimates of impact
  - –are difficult to analyze and improve upon.
  - –A design idea described as ‘excellent’
  - –could actually be *worse* than another
  - –merely described as ‘good.’



- 2. The Principle of ‘Doubtful digits are better than none’

- A bad numeric estimate, and its definition,
  - –can still be systematically criticized and improved.
- In fact, a random number is a better starting estimate
  - –than flowery, descriptive words.

I think it is 60% ±20%

We have 3 data points
58% 65% and 85%

5 Data points in OUR industry are
65%, 68% and 72%

Our initial measures of early project value delivery cycles are 80% to 82%

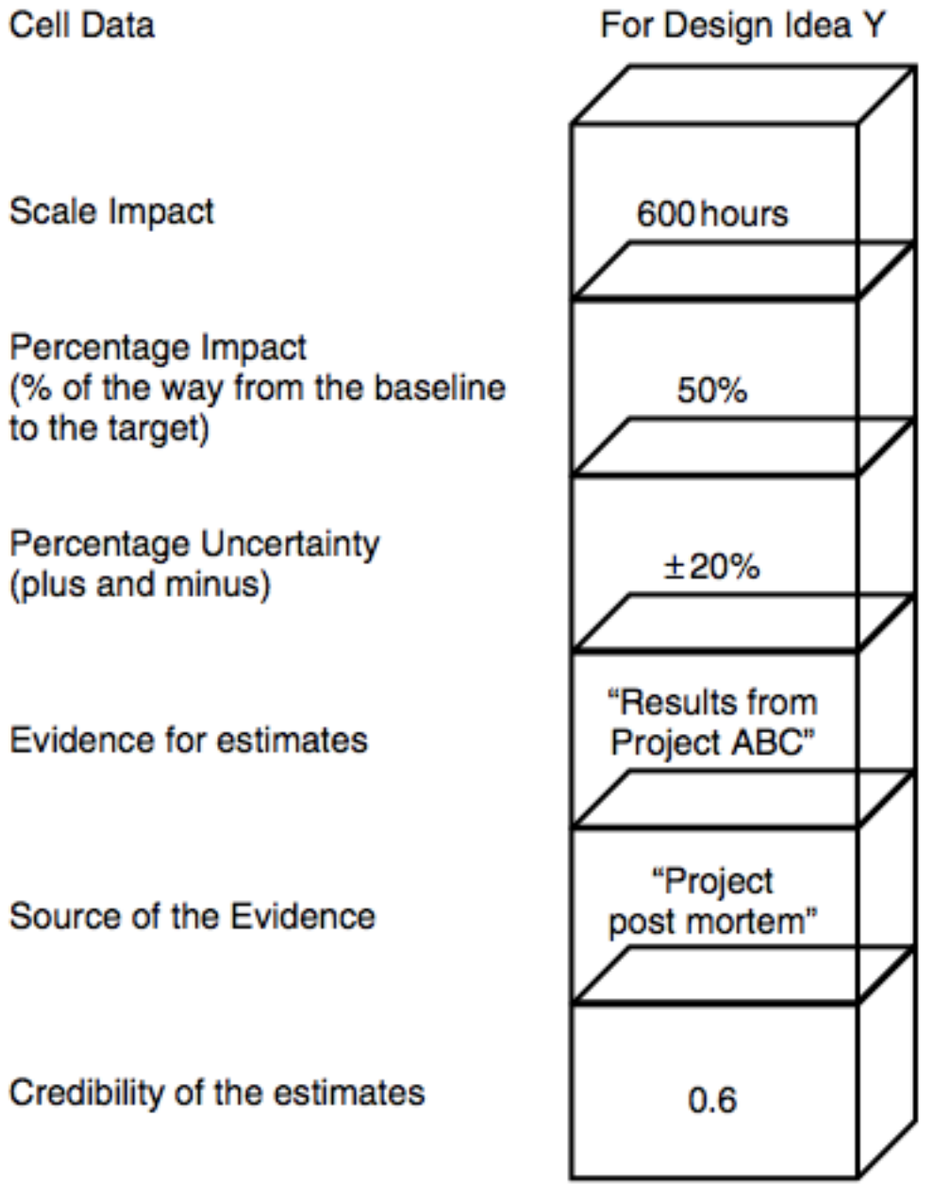
- 3. The ‘Evident’ Principle

- Estimates without –sources, evidence and credibility
  - are not evident.

"Facts are stubborn things; and whatever may be our wishes, our inclinations, or the dictates of our passions, they cannot alter the state of facts and evidence." -- John Adams

The Data Elements for one IE Cell

- <u>Design X:</u>
- Description: x....x
- Impacts: Usability
- Impact: 20 minutes
- Impact %: 50%
- Uncertainty: ±40%
- Evidence: Saves 12 to 28 m.
- Source: Report XYZ, pp 33-35
- Credibility: 0.7 (we measured))



Credibility (of Evidence and Source!)
Rating Scale (CE p.274, fig. 93.)

Credibility Rating	Meaning
0.0	Wild guess, no credibility
0.1	We know it has been done somewhere
0.2	We have one measurement somewhere
0.3	There are several measurements in the estimated range
0.4	The measurements are relevant to our case
0.5	The method of measurement is considered reliable
0.6	We have used the method in-house
0.7	We have reliable measurements in-house
0.8	Reliable in-house measurements correlate to independent external measureme
0.9	We have used the idea on this project and measured it
1.0	Perfect credibility, we have rock solid, contract-guaranteed, long-term, credible experience with this idea on this project and, the results are unlikely to disappear

Acer Project (Bank Security)
Impact Estimation Table

Strategies / Goals	Identify Binding Compliance Requirements Strategy	System Control Strategy	System Implementation Strategy	Find Services That Meet Our Goals Strategy	Use The Lowest Cost Provider Strategy
Security Administration Compliance 25% ➔ 90%	100%	100%	100%	50%	0%
Security Administration Performance 24 hrs ➔ 4 hrs	75%	100%	100%	100%	0%
Security Administration Availability 10 hrs ➔ 24 hrs	0%	0%	0%	100%	0%
Security Administration Cost 100% ➔ 60%	50%	100%	100%	100%	100%
Total Percentage Impact	225%	300%	300%	350%	100%
Evidence	ISAG Gap Analysis Oct-03	John Collins	John Collins	John Collins	John Collins
Cost to Implement Strategy	15 man days (US$ 5,550)	15 man days (US$ 5,550)	15 man days (US$ 5,550)	15 man days (US$ 5,550)	1man day (US$ 1,110)
Credibility	0.9	0.6	0.6	0.75	0.9
Cost Adjusted Percentage Impact	202.5%	180%	180%	262.5%	90%

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Evidence

- It has been said that man is a rational animal.
- All my life I have been searching for evidence which could support this.

- Bertrand Russell

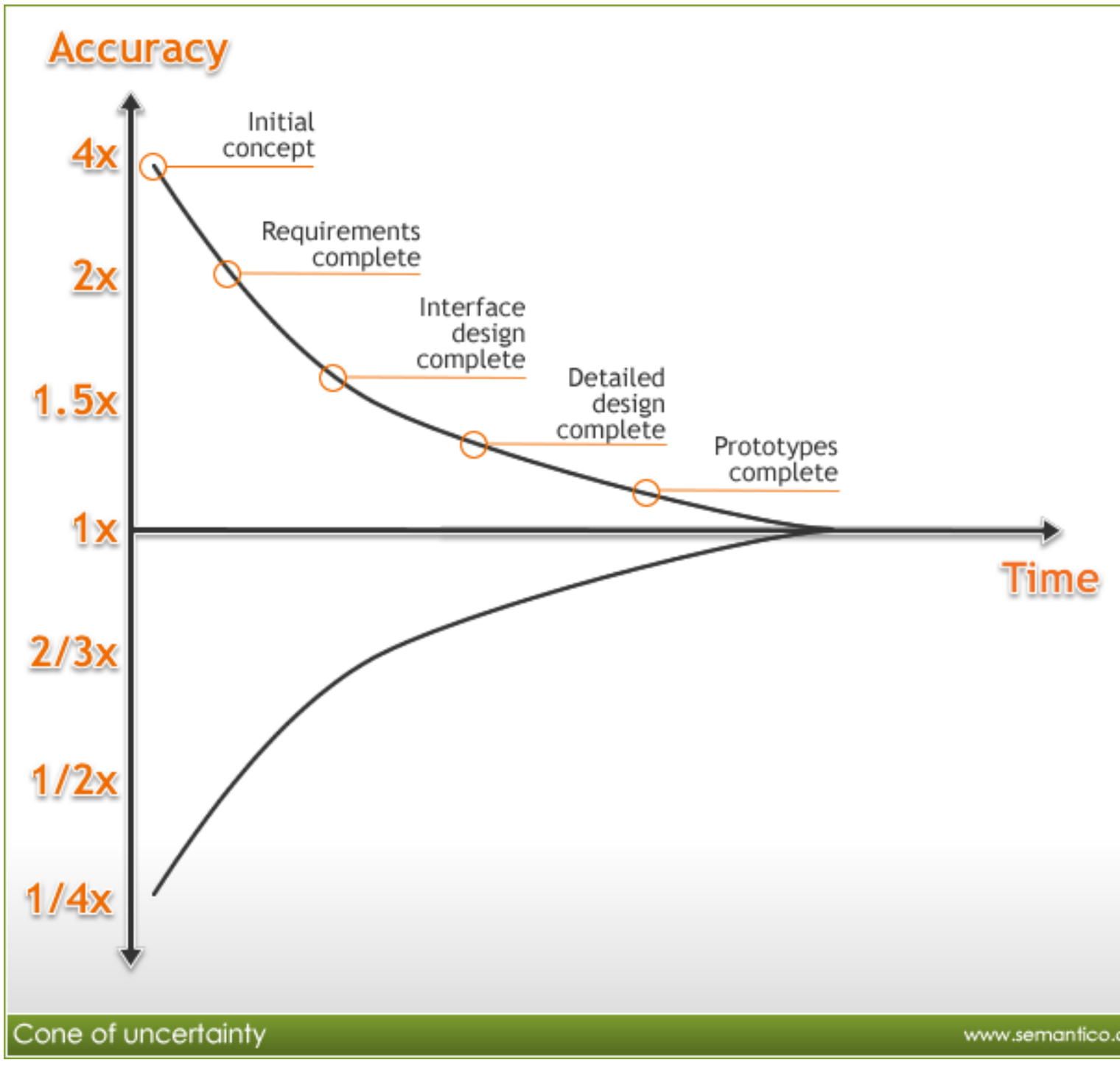
Evidence

- The most savage controversies are those about matters as to which there is no good evidence either way.

  —Bertrand Russell

- 4. The Principle of ‘Uncertainty in no uncertain terms’

- The uncertainty estimate is
  - –at least as important
  - –as the main estimate.



IE Calculations Example: Uncertainty Spread ± ?

Attribute Tag	**0%** Ref-erence Point	**100%** PLAN or MUST	**IDEA-1**	**IDEA-2**	± Sum **(10.)**	Impact Sum **(9.)**	Safety Factor 'Two' Difference **(11.)**
RELIABILITY	300 hrs.	3000 hrs.	50%±0	20%±80	±80	70%	-130% *
USABILITY	20 mins.	10 mins.	10%±40	60%±90	±130	70%	-130% *
= Sum Qualities			60	80			** 200% minus column (9.)*
CAPITAL	0	1 mill.	50%±20	10%±20	±40	60%	-10% **
MAINTENANCE	1 mill/year	100,000 per yr.	0±20	100%±80	±100	100%	-50% **
= Sum Costs			50	110			*** 50% minus column (9.)*
Quality/cost ratio			1.2 (60/50)	0.73 (80/110)			

5. The Principle of the ‘Seat Belt’

- A safety margin
  - –is as necessary with uncertain estimates,
  - –as a seat belt is with uncertain traffic.

Designs / Actions	Detailed risk assessment with associated impact estimation table for methods of mitigation	Research trip to madagascar (x3)	Detailed design research	Building financial models at community level	Research into existing sanitation projects	Creation of knowledge 'database'	Codification of our acquired knowledge	etc....	Total Impact	Safety Factor
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- 6. The Principle of ‘Profitable Proposals’

  - The value of an idea is how well it meets objectives.
  - The net value considers the costs too.

Which are the key requirements? What are the current levels and what are the target levels?

Which designs? When? What is their estimated or actual impact on the requirements?

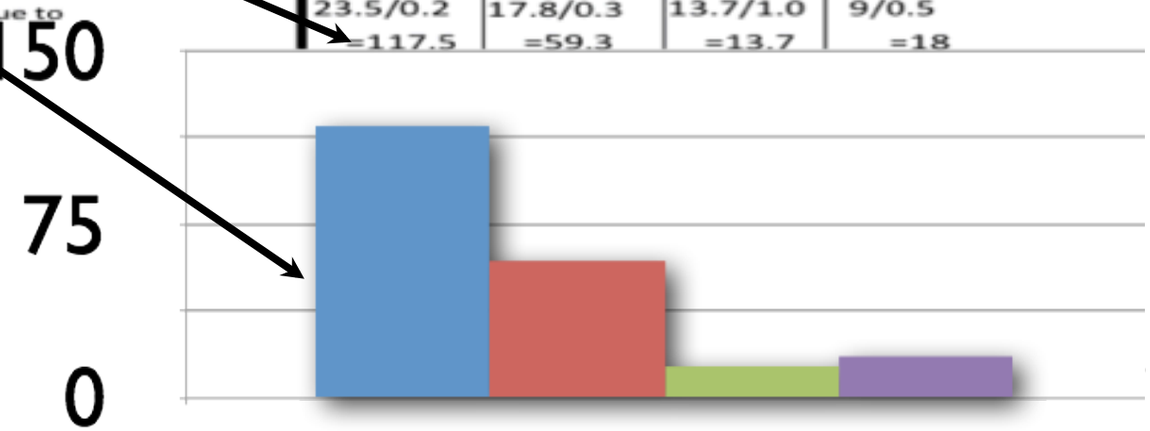
Are the current designs sufficient to meet each of the requirements?

d = days
w = week

Bank Syst
By End Date dd/mm/yyyy

Designs by expected Increment with design dependencies

Requirements	1 D1: Automate Rules + Manual Testing	2 D2: Back Office Loan Decisioning	3 D3: Web Self-Service	
R1: Time for customer to submit request 30 min <-> 10 min	-	-	10 m 100%	
R2: Time for Back Office to enter request 30 min <-> 10 min	-	-	0 m 150%	-
R3: Time to respond to customer request 5 days <-> 20 seconds	-	1 d 80%	20 s 100%	-
R4: No of Back Office complaints 10 per week <-> 0	5 50%	<1 90%	0 100%	(2) (80%)
R5: No of customer complaints 25 per week <-> 5	-	15 50%	5 100%	-
R6: Time to update business rules 1 month <-> 1 day	2 w 50%	-	-	1 d 100%
R7: Time to distribute business rules 2 weeks <-> 1 day	1 d 100%	-	20 s 103%	-
Cumulative Total for Performance Requirements	200%	170%	280%	50%
Development Budget 2.5M <-> 300K	2.3	2.0	1.0	0.5
Development Cost for Design	0.2	0.3	1.0	0.5
Cumulative Performance to Devt. Cost Ratio	1000	567	280	100
Cumulative Stakeholder Value to Development Cost Ratio	23.5/0.2 =117.5	17.8/0.3 =59.3	13.7/1.0 =13.7	9/0.5 =18



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- It can help you in many situations:
  - to evaluate,
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  - to destroy,
  - to find weaknesses,
  - to cut fat,
  - to see risk,
  - to prioritize,
  - to sequence
  - and more.

Product Values			
Taste	20 %	50 %	90 %
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Shelf Life	80 %	30 %	-10 %
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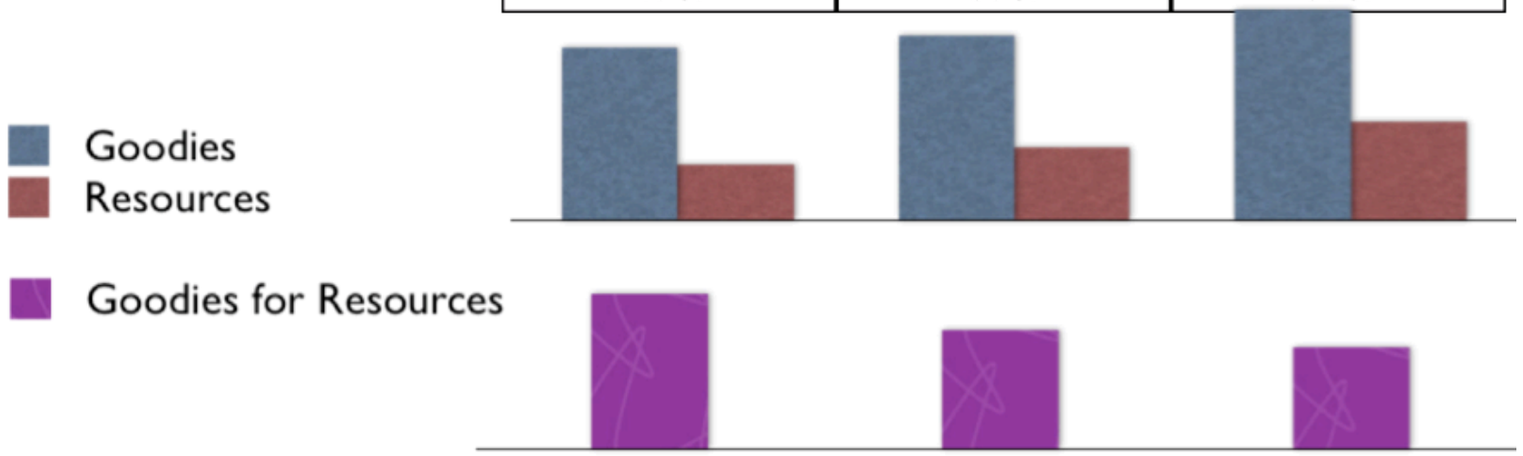


SEQUENCE
by risk or value

EVALUATE
all critical
attributes

COMPARE
alternatives

SEE RISK
by documenting
uncertainty

DESTROY
false beliefs
with facts

PRESENT
facts & basis

Design Ideas-> Requirements: Goals and Budgets	Idea 1 Impact Estimates	Idea 2 Impact Estimates	Sum for Requirement/ (Sum of Percentage Impacts)	Sum of Percentage Uncertainty Values	Safety Deviation
Reliability 300 <-> 3000 hours MTBF	1650 hr ± 0	840 hr ± 240	92%	±8%	−108%
	61% ± 0	31% ± 9%			
Usability 20 <-> 10 minutes	1 min. ± 4	6 min. ± 9	70%	±130%	−130%
	10% ± 40%	60% ± 90%			
Sum of Performance	71%	91%			
Capital 0 <-> 1 million US$	500 K ± 200 K	100 K ± 200 K	60%	±40%	−10%
	50% ± 20	10% ± 20			
Maintenance 1.1 M <-> 100 K/Year US$	0 K$/Y ± 180 K	1 M$/Y ± 720 K	100%	±90%	−50%
	0% ± 18%	100% ± 72%			
Sum of Cost	50%	110%			
Performance to Cost Ratio	1.42 (71/50)	0.83 (91/110)			

FIND WEAKNESS
in useful quality
or excessive costs

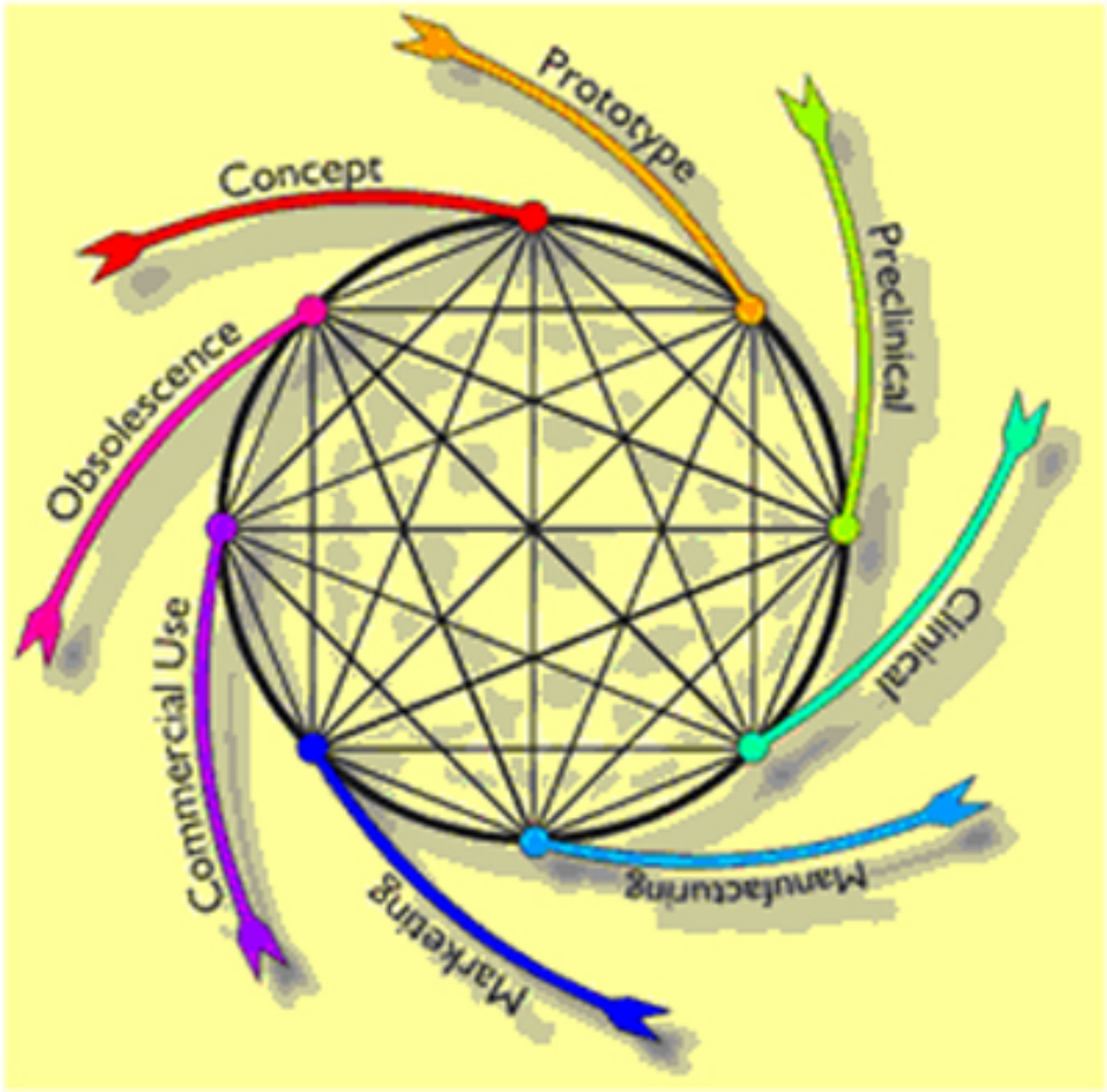
ARGUE
for or against
alternatives

PRIORITIZE
using performance to
cost ratio

CUT FAT
by understanding
performance
to cost ratio

- 8. The Principle of ‘Always Useful’

- Impact Estimation can assist a project throughout its lifecycle
  - –from ‘identifying requirements’
  - –to ‘assessing feedback data from implemented systems’.



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  - –then we need to evaluate
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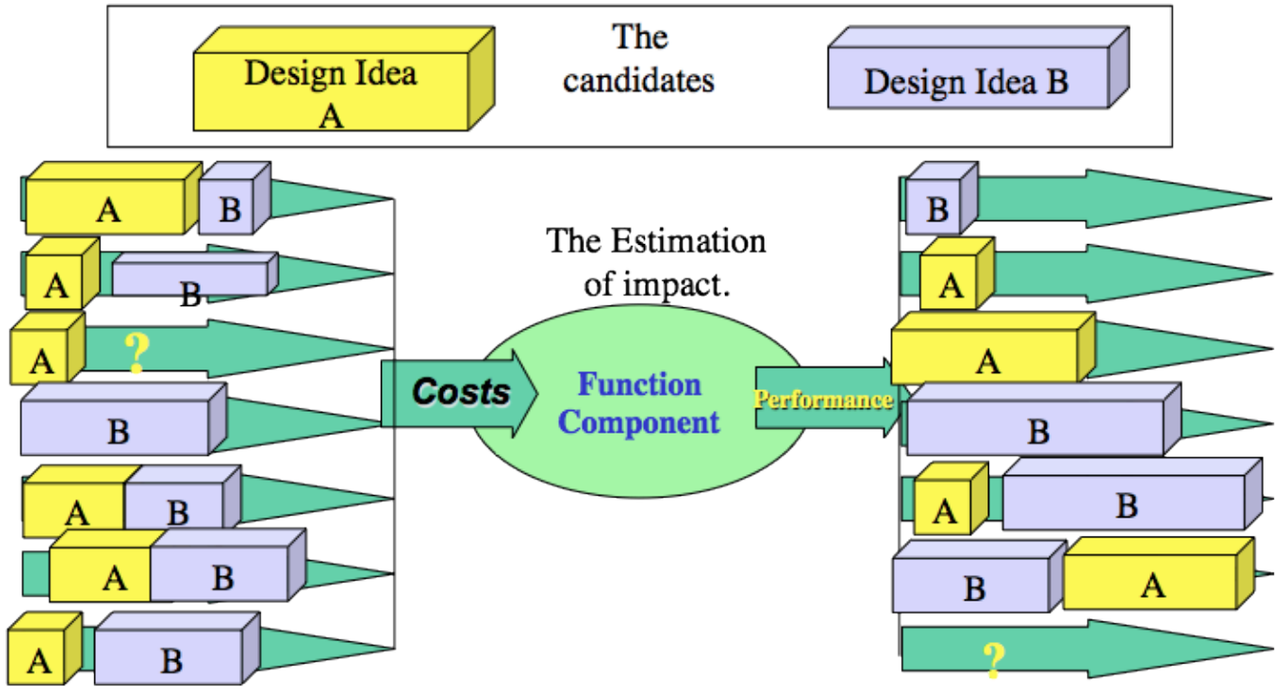
  - –including considerations of value, (not just cost)
  - –in order to make a reasonable choice.



Strategy Impact Estimation:
for a $100,000,000 Organizational Improvement Investment

Technical Strategies

Objectives

Business Objective	hardware adaptation	Telephony	Reference designs	IFace	Modularity	Defend vs Technology 66	Tools	User Experience	GUI & Graphics	Security	Defend vs OCD	Enterprise
	Viking Deliverables											
Time to market	20%	10%	30%	5%	10%	5%	15%	0%	0%	0%	5%	5%
Mid-range	15%	0%	[illegible]	[illegible]	[illegible]	5%	5%	10%	5%	5%	0%	0%
Platformisation Technology	25%	10%	30%	0%	0%	[illegible]	0%	5%	0%	10%	0%	5%
Interface	5%	15%	15%	0%	5%	0%	5%	0%	0%	10%	0%	10%
Operator preference	0%	10%	[illegible]	[illegible]	[illegible]	[illegible]	5%	10%	10%	20%	5%	10%
Get Torden	25%	10%	10%	10%	0%	20%	0%	10%	-20%	10%	10%	5%
Commoditisation	20%	10%	20%	10%	-20%	25%	15%	0%	0%	5%	10%	5%
Duplication	15%	10%	10%	[illegible]	0%	40%	0%	0%	0%	5%	20%	5%
Competitiveness	10%	15%	20%	0%	10%	20%	10%	10%	20%	10%	10%	10%
User experience	5%	[illegible]	[illegible]	0%	[illegible]	0%	0%	30%	10%	0%	0%	0%
Downstream cost saving	15%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10%	0%	0%	10%	5%
Platformisation IFace	10%	10%	20%	[illegible]	0%	20%	5%	0%	0%	0%	0%	5%
Japan	10%	5%	20%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0%
Contribution to overall result	15%	9%	17%	4%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5%
Cost (£M)	£ 2.85	£ 0.49	£ 3.21	£ 2.54	£ 1.92	£ 2.31	£ 0.81	£ 1.21	£ 2.68	£ 0.79	£ 0.02	£ 0.60
ROI Index (100=average)	106	358	109	33	78	137	[illegible]	[illegible]	10	152	202	174

Strategy Impacts "Benefits" on Objectives

Benefit/Cost ratio

Cost

358!

www.Gilb.c

- 10. The ***Efficiency*** Principle
- When real life has
  - –many stakeholder values,
  - –and many cost constraints,
  - –then
  - –evaluation of designs (strategies)
  - –must be done
  - –with respect to both the **values** and the **costs**.

Team	Home points during 09/10 Premier League Season	Highest Season Ticket Price 10/11 Premier League Season	£/point
Blackburn	36	£393	£11
Wigan Athletic	25	£295	£12
Manchester City	40	£515	£13
Everton	39	£631	£16
Bolton	24	£399	£17
Aston Villa	32	£550	£17
Birmingham City	33	£580	£18
Liverpool	42	£785	£19
Manchester Utd	49	£931	£19
Stoke City	27	£599	£22
Chelsea	52	£1,210	£23
Sunderland	34	£845	£25
Fulham	36	£899	£25
Tottenham	44	£1,175	£27
Wolverhampton	21	£630	£30
West Ham Utd	26	£830	£32
Arsenal	47	£1,825	£39
produced by www.moneytothemasses.com			

Value Decision Tables

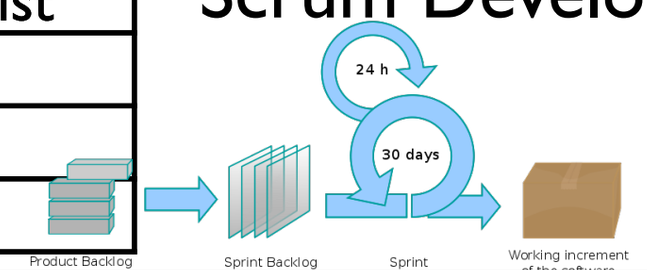
Business Goals	Stakeholder Value 1	Stakeholder Value 2
Business Value 1	-10%	40%
Business Value 2	50%	10%
Resources	20%	10%

Stakeholder Val.	Product Value 1	Product Value 2
Stakeholder Value 1	-10%	50 %
Stakeholder Value 2	10 %	10%
Resources	2 %	5 %

Product Values	Solution 1	Solution 2
Product Value 1	-10%	40%
Product Value 2	50%	80 %
Resources	1 %	2 %

Prioritized List
1. Solution 2
2. Solution 9
3. Solution 7

Scrum Develops



We measure improvements
Learn and Repeat

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Running 4 parallel development teams in Evo (Agile) Weekly cycles

9

8

3

3

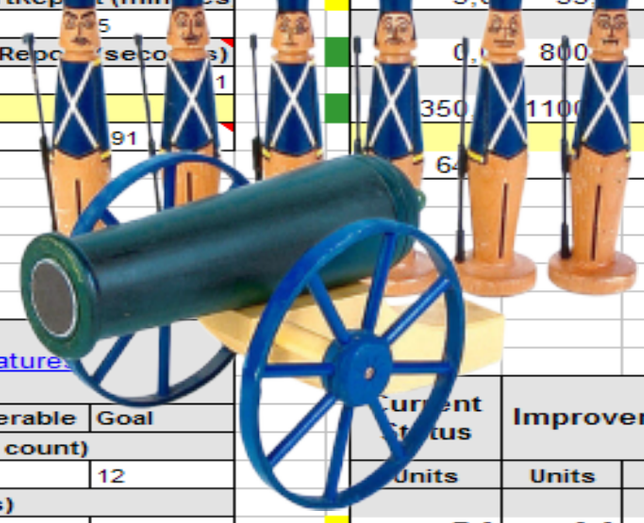
Impact Estimation Table: Reportal codename "Hyggen"

Current Status	Improvements		Reportal - E-SAT features		
Units	Units	%	Past	Tolerable	Goal
			Usability.Intuitivness (%)		
75,0	25,0	62,5	50	75	90
			Usability.Consistency.Visual (Elements)		
14,0	14,0	100,0	0	11	14
			Usability.Consistency.Interaction (Components)		
15,0	15,0	107,1	0	11	14
			Usability.Productivity (minutes)		
5,0	75,0	96,2	80	5	2
5,0	45,0	95,7	50	5	1
			Usability.Flexibility.OfflineReport.ExportFormats		
3,0	2,0	66,7	1	3	4
			Usability.Robustness (errors)		
1,0	22,0	95,7	7	1	0
			Usability.Replacability (nr of features)		
4,0	5,0	100,0	8	5	3
			Usability.ResponseTime.ExportRep t (min es		
1,0	12,0	150,0	13	13	5
			Usability.ResponseTime.ViewRepo (seco s)		
1,0	14,0	100,0	15		1
			Development resources		
203,0			0		91

Current Status	Improvements		Survey Engine .NET		
Units	Units	%	Past	Tolerable	Goal
			Backwards.Compatibility (%)		
83,0	48,0	80,0	40	85	95
0,0	67,0	100,0	67	0	0
			Generate.WI.Time (small/medium/large seconds)		
4,0	59,0	100,0	63	8	4
10,0	397,0	100,0	407	100	10
94,0	2290,0	103,9	2384	500	180
			Testability (%)		
10,0	10,0	13,3	0	100	100
			Usability.Speed (seconds/user rating 1-10)		
774,0	507,0	51,7	1281	600	300
5,0	3,0	60,0	2	5	7
			Runtime.ResourceUsage.Memory		
0,0	0,0	0,0		?	?
			Runtime.ResourceUsage.CPU		
3,0	35	97,2	38	3	2
			Runtime.ResourceUsage.MemoryLeak		
0,	800	100,0	800	0	0
			Runtime.Concurrency (number of users)		
350	1100	146,7	150	500	1000
			Development resources		
64			0		84

Current Status	Improvements		Reportal - MR Feature		
Units	Units	%	Past	Tolerable	Goal
			Usability.Replacability (feature count)		
1,0	1,0	50,0	14	13	12
			Usability.Productivity (minutes)		
20,0	45,0	112,5	65	35	25
			Usability.ClientAcceptance (features count)		
4,4	4,4	36,7	0	4	12
			Development resources		
101,0			0		86

Current Status	Improvements		XML Web Services		
Units	Units	%	Past	Tolerable	Goal
			TransferDefinition.Usability.Efficiency		
7,0	9,0	81,8	16	10	5
17,0	8,0	53,3	25	15	10
			TransferDefinition.Usability.Response		
943,0	-186,0	######	170	60	30
			TransferDefinition.Usability.Intuitiveness		
5,0	10,0	95,2	15	7,5	4,5
			Development resources		
2,0			0		48



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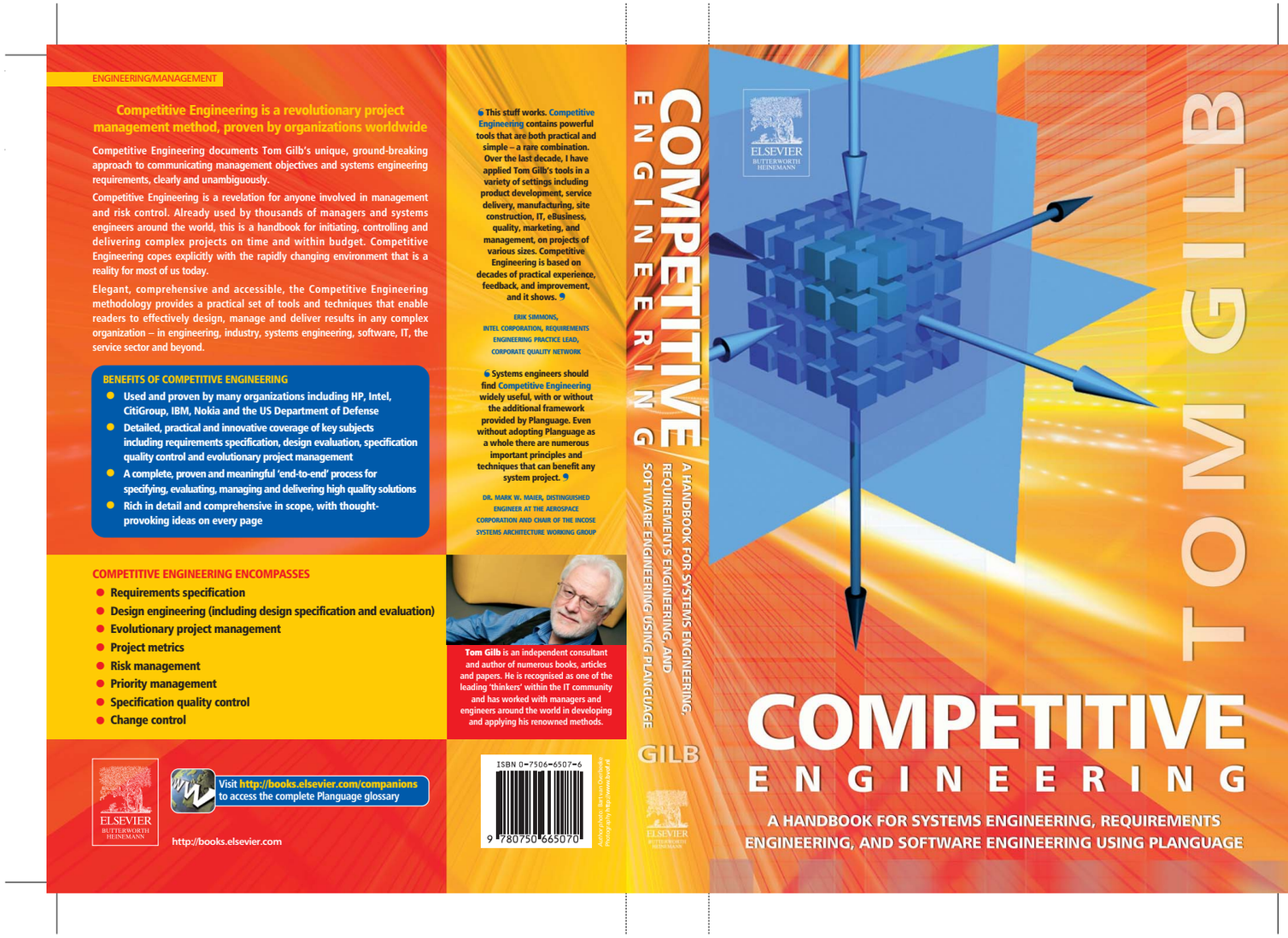
End of Presentation

- If you want some documentation for this lecture (IE Table
- Email me
- Tom@Gilb.com
- Subject ‘IET’
- I will *also* send link
- to Free Digital copy of CE Book