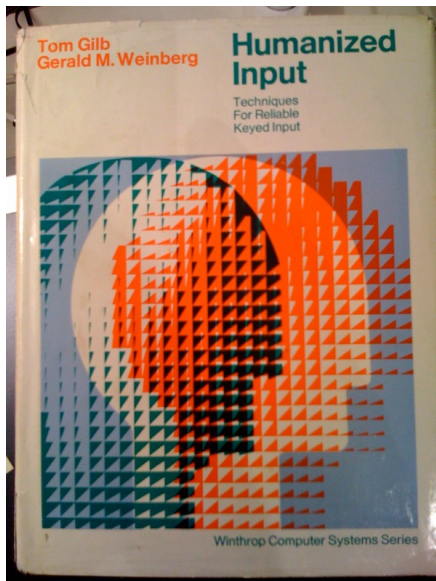


10 Suggested Principles for Human Factors SYSTEMS ENGINEERING

53 slides for 25 minutes



1976

May 19, 2009



KSSE
4-5 June 2009
Kongsberg
By *Tom Gilb*
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2005

1

Usability Engineering Principles

1. Usability can be 'engineered' into systems.
2. Usability can be quantified.
3. Usability requirements can be quantified
4. Usability design and architecture can be quantified, estimated and measured
5. Usability levels can be measured and tested
6. Usability can be delivered incrementally
7. Usability needs depend on *many* factors
8. Usability must be architected, not hacked
9. Usability must be led and driven by management as a top level requirement
10. Usability is a *systems* engineering discipline

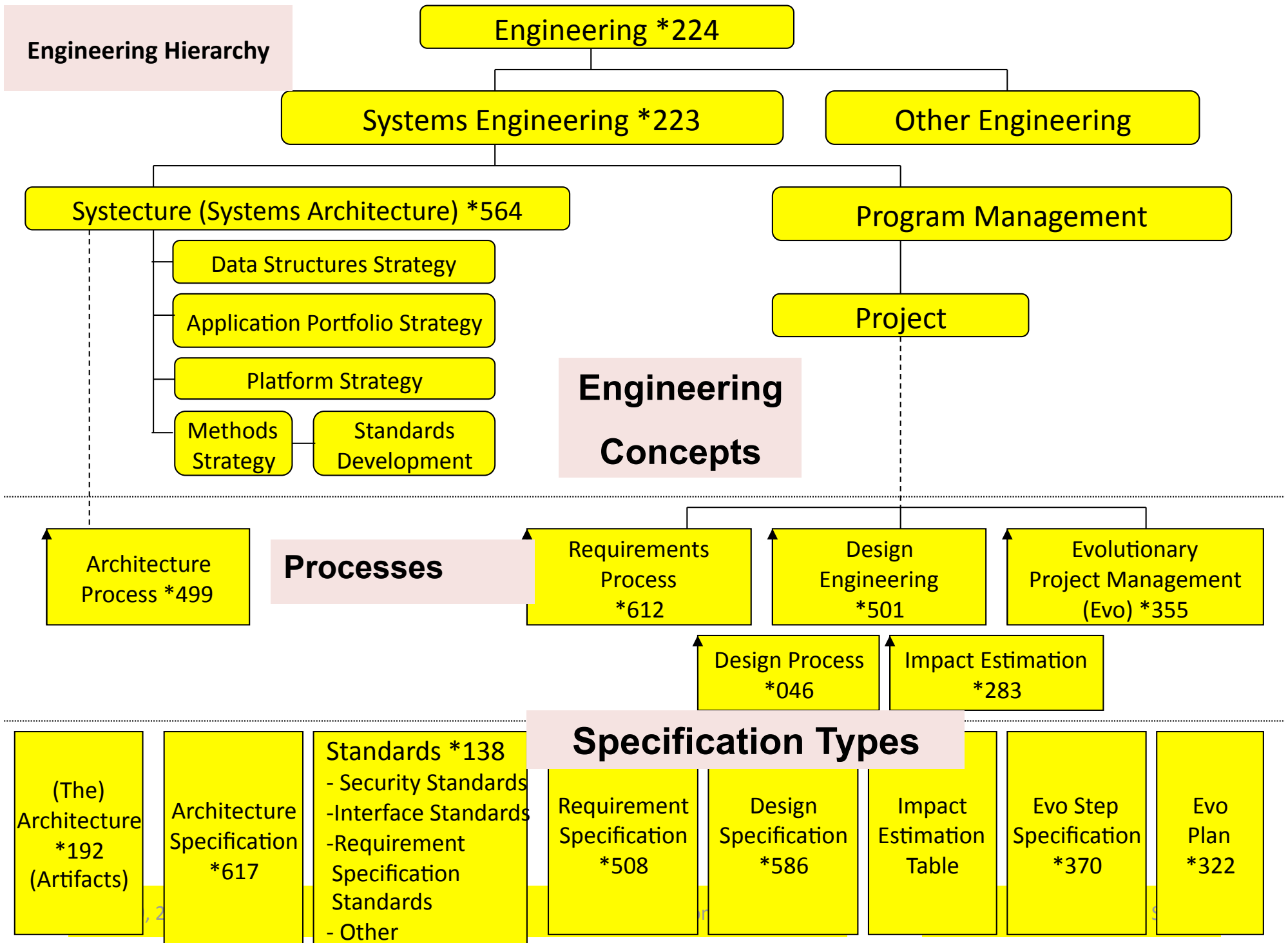
Usability Engineering Principles

- **Usability**
 - *all* aspects of human interaction with a system
- **Engineering** is
 - an Evolutionary Process,
 - using *practical* Principles,
 - in order to determine,
 - and identify the *Means* to deliver,
 - the best achievable *Performance and Cost* levels *balance*,
 - for optimal *Stakeholder* satisfaction,
 - in a *complex risk-filled* environment.
 - Source: Gilb, Planguage Concept *224
- **Principle**
 - A principle is a short basic statement,
 - which summarizes and teaches
 - basic philosophy
 - or the pragmatics
 - of a method.
 - Source: Gilb, Planguage Concept *208

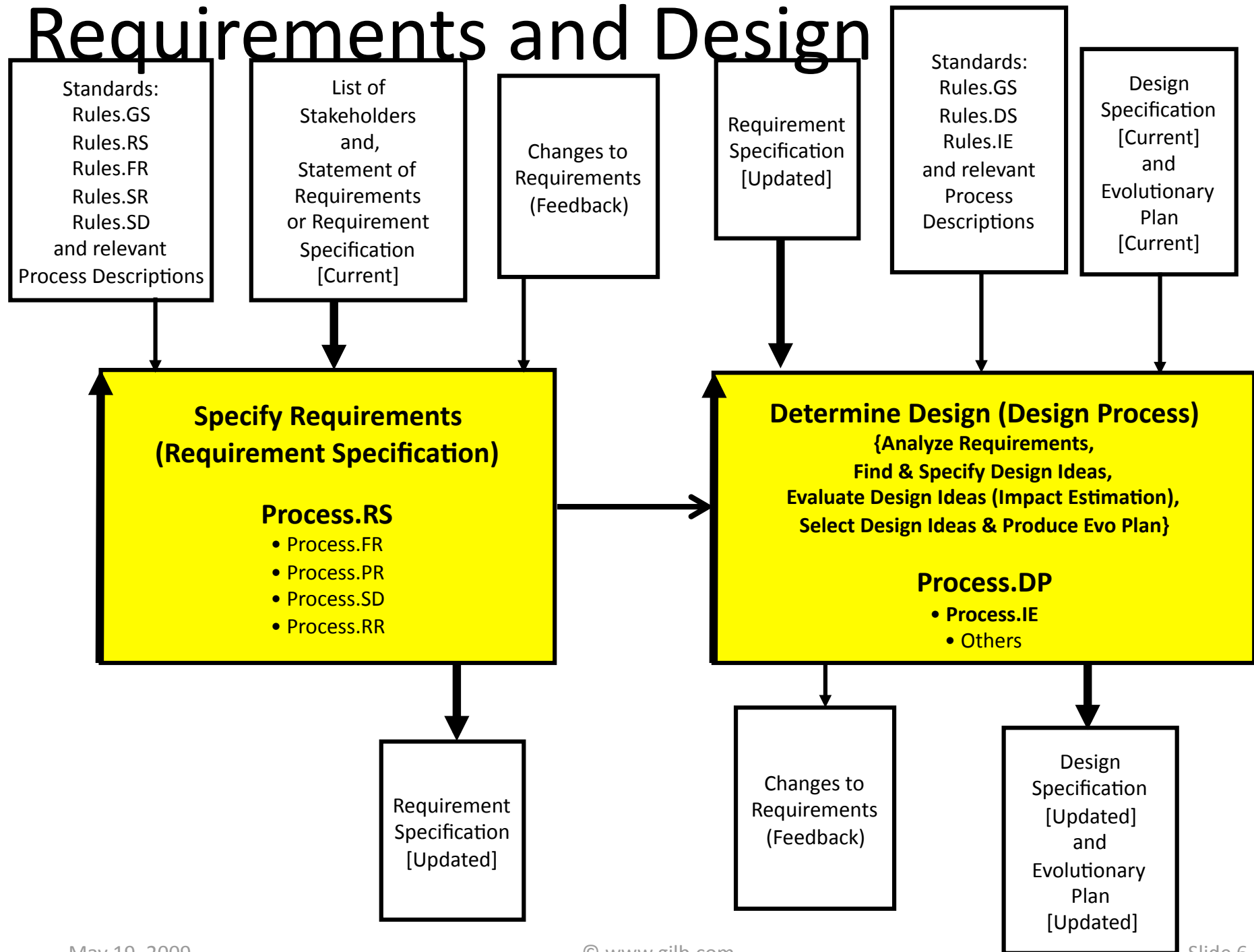
Principle 1.

Usability can be '**engineered**' into systems.

- Usability can be architected, engineered, designed, and planned
 - It should not be an accident
 - It should not be the result of randomly throwing popular design ideas at badly defined Usability requirements



Requirements and Design

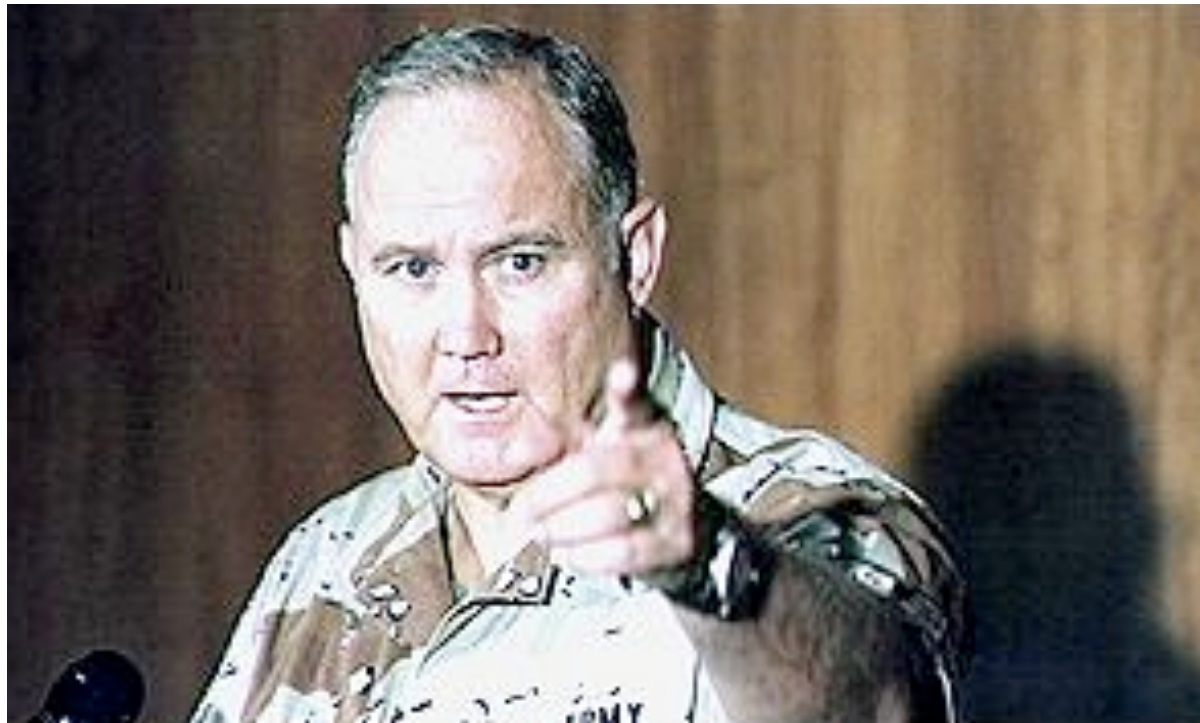


Principle 2. Usability can be quantified.

1. Usability can be expressed with numbers
2. Usability numbers allow engineering processes
3. Usability numbers allow logical evaluation of designs and of real systems
4. Usability numbers can be related to the value of given levels of usability
5. Numbers communicate usability clearly

What did the General say? :

*"Soldier-friendly
Mobile Telephone"*



General Norman Schwarzkopf

Soldier friendliness: a few of 50 initial interpretations from a supplier –REAL!

- Easy to use
- Not too heavy
- Always working
- Allows use in the field,
 - by people without (higher) technical education,
 - dressed in combat outfits, and
 - carrying lots of other equipment.



Soldier friendliness

- Average time for a “normal” soldier to learn how to use the 5 most important functions.
- Light weight, small size (pocket), shock-, water-, temp- resistant
- Ease of use
- Independent of light conditions



Soldier friendliness

- Covers the soldiers need for fast and correct actions.
- A reliable system that is easy to use in the dark.
- Easy to handle without looking
- Easy to carry (whatever that implies)
- Rugged



Soldier friendliness

- Could be carried by one soldier
- Allows use in the field, by people without (higher) technical education, dressed in combatand camping lot's of other equipment.
- Easy to transport and <use> in a <soldier environment>
- Usable in field



Soldier friendliness

- Light
- Comfortable
- Dependable
- Accurate
- ?
- Ergonomic
- Rugged
- ?
- Easy to use
- Light



Soldier friendliness

- System accessibility under any conditions, with environmentalist approval.



Soldier friendliness



- Speed to figure out *how to make a call* with the system
- Can be easy fixed, outside the clothes
- Not heavy
- Easy to handle, if with clothes on *
- Easy to hear, but should not be recognised by the enemy

* implication: if soldier is naked, it can be 'difficult to handle the phone'.

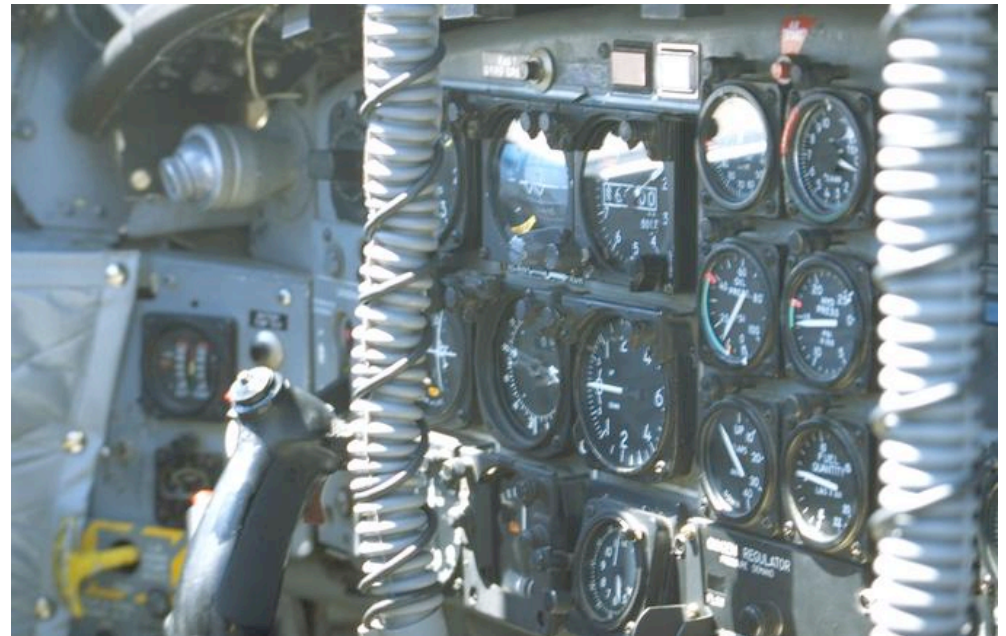
Soldier friendliness

- Robust
- Trustable
- Water-proofness
- Long time power supply
- Solid
- Camouflage colour
- Can take a beating



Soldier friendliness

- Ease of learning
- Ease of use
- Ease of maintaining
- Safety
- Extreme Availability
- Not traceable
- Not breakable
- Long standby-time
- Long Distance available



Soldier friendliness

- Easy to use in dark
- Water proof
- Impact proof
- Camouflage Coloured
- No “fancy” functions
i.e.. Just call button



Soldier friendliness

- Easy operable
- Idiot proof
- Easy cleanable / maintainable
- The soldiers can use the phone with *one hand in the dark*
- Equipment can be operated *with gloves on*
- Can be used under stress



Principle 3.

Usability **requirements** can be quantified

- Putting numbers on variable requirements is a major step in the engineering process
- If you don't use numbers, just nice PowerPoint words, call it 'Systems Poetry'
 - Not Systems **Engineering**" !

Simple Real Quantified Usability Requirement (Confermit Case, Oslo, 2003-9)

- **Usability.Productivity**
 - **Scale**: Time in minutes to set up a typical specified Market Research-report
 - **Past**: 65 mins.,
 - **Tolerable**: 35 mins.,
 - **Goal**: 25 mins. *

- **Meter**: Candidates with Reportal experience and with knowledge of MR-specific reporting features perform a set of predefined steps to produce a standard MR Report



Trond Johansen, R&D Mgr

* Reached 20 minutes on first attempt



May 19, 2009

Roots 2009 Slides

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http://www.gilb.com/tiki-download_file.php?fileId=278

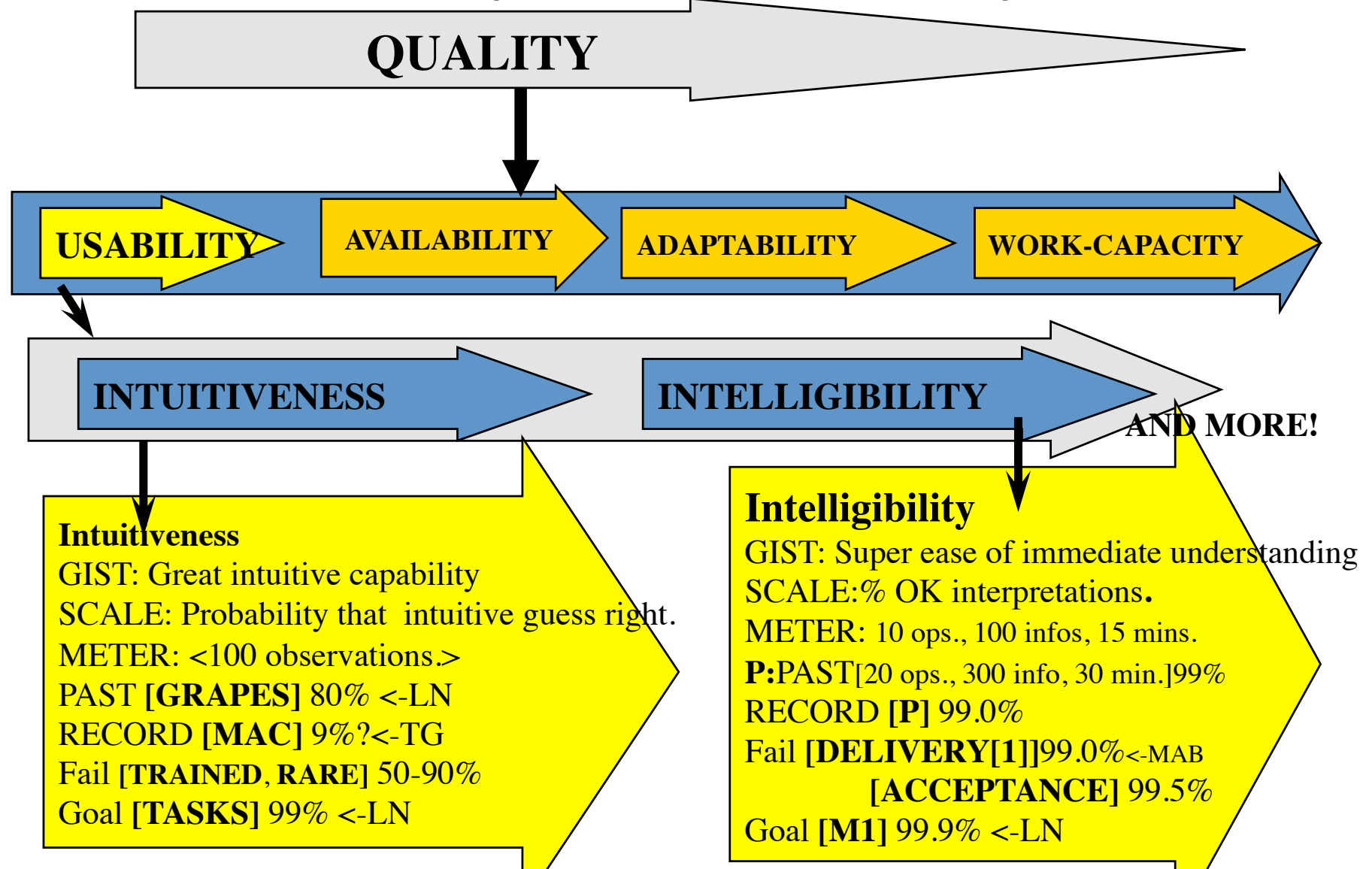
Case Erieye Software

A more-complex real example

- Ericsson Sweden
- Mini AWACS-type system
- Initiated about 1995 (TG Consultant)
- Step 30 of 50 done 1998
- Project Manager Leif Nyberg, Luleå, Sweden



Quantifying Usability (Erieye C&C System)



TRAINED: DEFINED: C&Ctl. operator, approved course, 200 hours duration.

RARE: DEFINED: types of tasks performed less than once a week per op.

TASKS: DEFINED: onboard operator distinct tasks carried out.

ACCEPTANCE: DEFINED: formal acceptance testing via customer contract.

DELIVERY: DEFINED: Evolutionary delivery cycle, integrated and useful.

Requirements Done on 1st day of Erieye 1 of 3

The top level view of about 7 elementary dimensions

USAB:USABILITY:

Ambition: Operator ease of learning & doing tasks under <all conditions> should be maximum possible ease & performance with minimum training & minimum <unchecked error> possibility.

TRAINED: DEFINED : Command and Control Operator onboard, who has been through approved training course of at least 200 hours duration.

RARETASKS: DEFINED: types of tasks performed by a single operator less than one a week average.

TASKS DONE: DEFINED: Onboard operator distinct tasks carried out.

ERICSSON 
TAKING YOU FORWARD



GREEK EriEye
Saab Argus 100H during its short service with HAF



<http://hafcphotos.cs.net/view/gp.cfm?photoid=141961&type=3>

Erieye 2 of 3, Intuitiveness Requirement, an elementary component of Usability

INTUITIVE: USAB.INTUITIVENESS

Ambition: High probability in % that operator will <immediately> within a specified time from deciding the need to perform the task (without reference to handbooks or help facility) find a way to accomplish their desired task.

Scale: Probability that an <intuitive>, **TRAINED** operator will find a way to do whatever they need to do, without reference to any written instructions (i.e. on paper or on-line in the system, other than help or guidance instructions offered by the system on the screen during operation of the system) within 1 second of deciding that there is a necessity to perform the task. <-- MAB "I'm not sure if 1 second is acceptable or realistic, it's just a guess"

Meter: To be defined. Not crucial this 1st draft ←- TG

Past [GRAPES] 80% ? ← LN

Record [MAC] 99%? ← TG

Fail [**TRAINED, RARETASKS** [{<1/week,<1/year}}] 50 - 90%? ← MAB

Goal [**TASKS DONE** [<1/week (but more than 1/Month)]] 99% ? ← LN

[**TASKS DONE** [<1/year]] 20% ? ←- JB

[Turbulence, **TASKS DONE** [<1/year]] 10% ? ←- TG



Erieye 3 of 3 Intelligibility Requirement

INTELL: USAB.**INTELLIGIBILITY:** "synonym tags, USAB is defined above"

Ambition :High ability to <correctly> interpret meaning of a [set] of <inputs> by the operator.

Scale: Probability in % of <objectively correct> interpretation(s) of a defined [set] of information within [defined time limits]

Meter [ACCEPTANCE] X (10) trained operators, Y (100) <representative> sets of information per operator within 15 minutes. ? ← MAB

"Not sure if the 15 minutes are realistic". "this is a client & contract determined detail"

M1: Past : [XXX, 20 trained operators, 300 data sets in 30 minutes] 99.0% <--
Acceptance test report from XXX. MAB

Record [XXX] 99.0% "None other than XXX known by me" ←MAB

Fail [DELIVERY CYCLE [1]] 99.0% ? ←MAB

Fail [ACCEPTANCE] 99.5% ? ←MAB

Goal [M1 "parameters as above"] 99.9% ←LN



ACCEPTANCE: DEFINED: formal acceptance test, as defined by our contract with a particular customer.

DELIVERY CYCLE: DEFINED: Evolutionary result delivery cycle. Integrated, useful.

May 19, 2009

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Leif Nyberg: Erieye Project Manager

- “We have worked a lot on getting better requirements
 - e.g. by educating the customer, educating project members etc. on how important the quality of these requirements are.

This has been possible to do by using results, and metrics, from earlier deliveries, and showing this to them”.



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Norwegian Post Office Case 2009 Kai Gilb

Navn: **Finn.Raskt**

Version: 07.01.09 15.00

Type: Produkt Verdi

Eier: Lin

Interessenter: Produkteiere, Brukere, Citymail, Kunder, kunders kunder(postmottagare), Jobbsökande, Journalister, Partners, Anställda, Brukere Citimail, Partners, Operativ-

Kvantifiseringsskala:

Gjennomsnittlig tid, i sekunder, en Bruker med def. [Bruker-Ekspertise, standardverdi Normal] bruker for å finne det de og vi ønsker at de skal finne.

fra: def. [Startposisjon, standardverdi er foran ett blankt ark i webleseren].

til: def. [Funnet] posisjon der informasjonen er tilstede på skjermen til Bruker, og det er registrert hos Bruker.

Før [14.12.08, Funnet=Ukjent-Produkt] **50 sek.** <- Lin/Terje "2 bruker tester"

Tolererbart [31.03.09, Funnet=Ukjent-Produkt] **40 sek.** <- Lin/Terje

Mål [31.03.09, Funnet=Ukjent-Produkt] **15 sek.** <- Lin/Terje

Ukjent-Produkt: def.som: korrekt Produkt, der brukeren vet hva de vil ha/gjøre, men ikke vet hvilket Produkt som kan gjøre jobben, eller ikke husker korrekt Produktnavn.



Principle 4. Usability design and architecture can be quantified, estimated and measured

- The ONLY point of any type of design is to help engineers reach defined objectives (within defined constraints)
- If you CANNOT make reasonable estimates, and reasonable measurements of the effects of designs – THEN YOU DON'T HAVE ANY IDEA WHAT YOU ARE DOING – and you should not do it in public – and call it 'engineering'
 - Call it 'Systems Poetry' , and become an artist!

DoDef. Persinscom Impact Estimation Table:

Designs

<i>Design Ideas -></i>	<i>Technology Investment</i>	<i>Business Practices</i>	<i>People</i>	<i>Empowerment</i>	<i>Principles of IMA Management</i>	<i>Business Process Re-engineering</i>	<i>Sum Requirements</i>
Requirements	50%	10%	5%	5%	5%	60%	185%
Availability 90% <-> 99.5% Uptime	50%	5%	5-10%	0%	0%	200%	265%
Usability 200 <-> 60 Requests by Users	50%	5-10%	5-10%	50%	0%	10%	130%
Responsiveness 70% <-> ECP's on time	50%	10%	50%	25%	5%	50%	180%
Productivity 3:1 Return on Investment	45%	R → D Impacts			100%	53%	303%
Morale 72 <-> 60 per month on Sick Leave	50%				15%	61%	251%
Data Integrity 88% <-> 97% Data Error %	42%	10%	25%	5%	70%	25%	177%
Technology Adaptability 75% Adapt Technology	5%	30%	5%	60%	0%	60%	160%
Requirement Adaptability ? <-> 2.6% Adapt to Change	80%	20%	60%	75%	20%	5%	260%
Resource Adaptability 2.1M <-> ? Resource Change	10%	80%	5%	50%	50%	75%	270%
Cost Reduction FADS <-> 30% Total Funding	50%	40%	10%	40%	50%	50%	240%
<i>Sum of Performance</i>	482%	280%	305%	390%	315%	649%	
Money % of total budget	15%	4%	3%	4%	6%	4%	36%
Time % total work months/year	15%	15%	20%	10%	20%	18%	98%
<i>Sum of Costs</i>	30	19	23	14	26	22	
<i>Performance to Cost Ratio</i>	16:1	14:7	13:3	27:9	12:1	29:5	

Source: Gib, CE book, page 284. Persinscom US Army Personnel System.

THE PRINCIPLE OF 'Design QUANTIFICATION'

- **All critical system design, performance and cost factors can be expressed quantitatively**
- ***Quality factors like Usability are no exception !***

"In physical science the first essential step in the direction of learning any subject is to find principles of numerical reckoning and practicable methods for measuring some quality connected with it.

I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it;

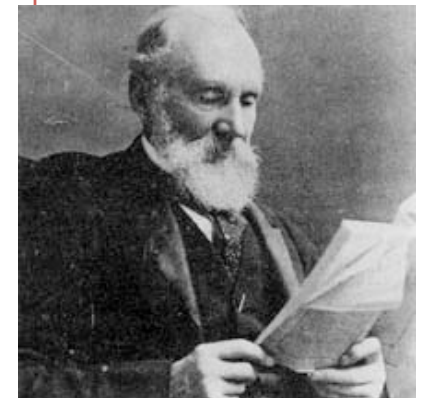
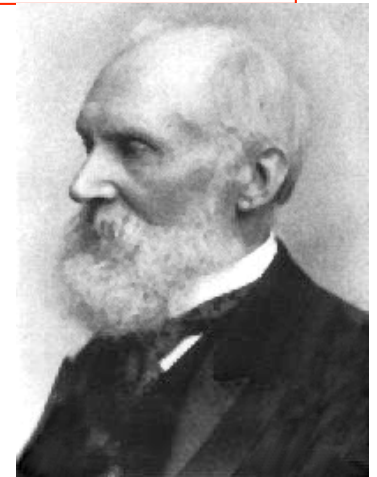
but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind;

it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the state of Science, whatever the matter may be."

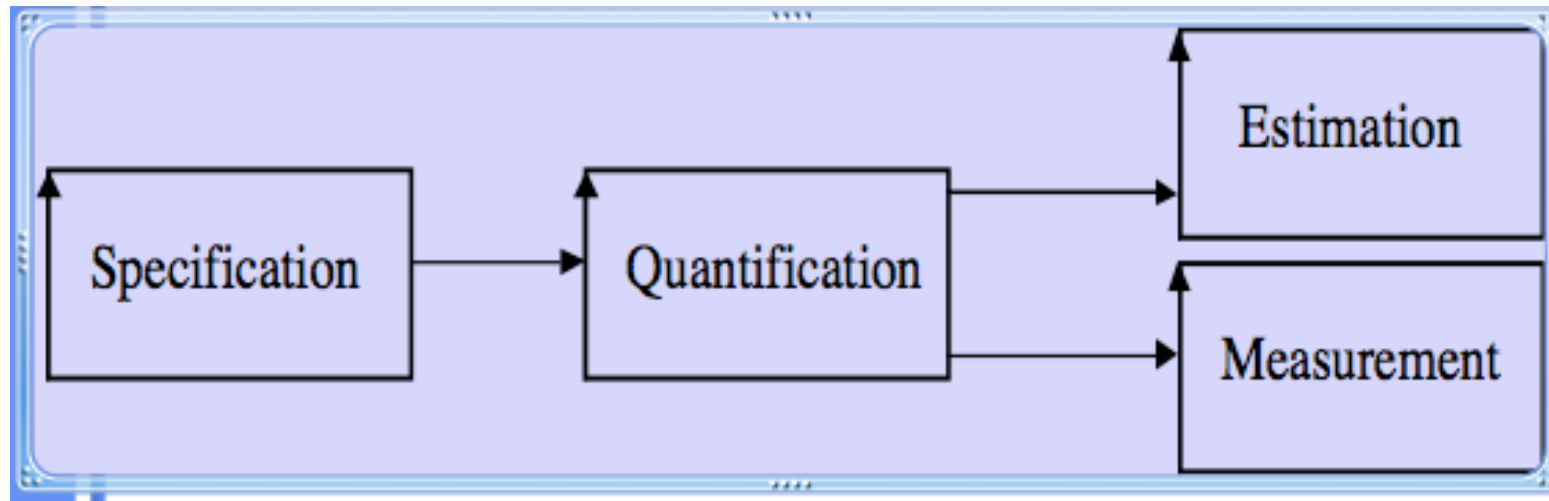
Lord Kelvin, 1893

from

<http://zapatopi.net/kelvin/quotes.html>



Principle 5. Usability levels can be measured and tested



‘Quantification’ is NOT =
Measurement and Testing

EVO - 2, project step planning and accounting: using an Impact Estimation Table

- IET for MR Project – Confrimit 8.5
- **Solution:** Recoding
 - Make it possible to recode variable on the fly from Reportal.
 - Estimated effort: 4 days
 - Estimated Productivity Improvement: 20 minutes (50% way to Goal)
 - actual result 38 minutes (95% progress towards Goal)

	A	B	C	D	E	F	G	BX	BY	BZ	CA
1											
2		Current Status	Improvements		Goals			Step9			
3								Recoding			
4								Estimated impact		Actual impact	
5		Units	Units	%	Past	Tolerable	Goal	Units	%	Units	%
6					Usability.Replacability (feature count)						
7		1,00	1,0	50,0	2	1	0				
8					Usability.Speed.NewFeaturesImpact (%)						
9		5,00	5,0	100,0	0	15	5				
10		10,00	10,0	200,0	0	15	5				
11		0,00	0,0	0,0	0	30	10				
12					Usability.Intuitiveness (%)						
13		0,00	0,0	0,0	0	60	80				
14					Usability.Productivity (minutes)						
15		20,00	45,0	112,5	65	35	25	20,00	50,00	38,00	95,00
20					Development resources						
21			101,0	91,8	0		110	4,00	3,64	4,00	3,64

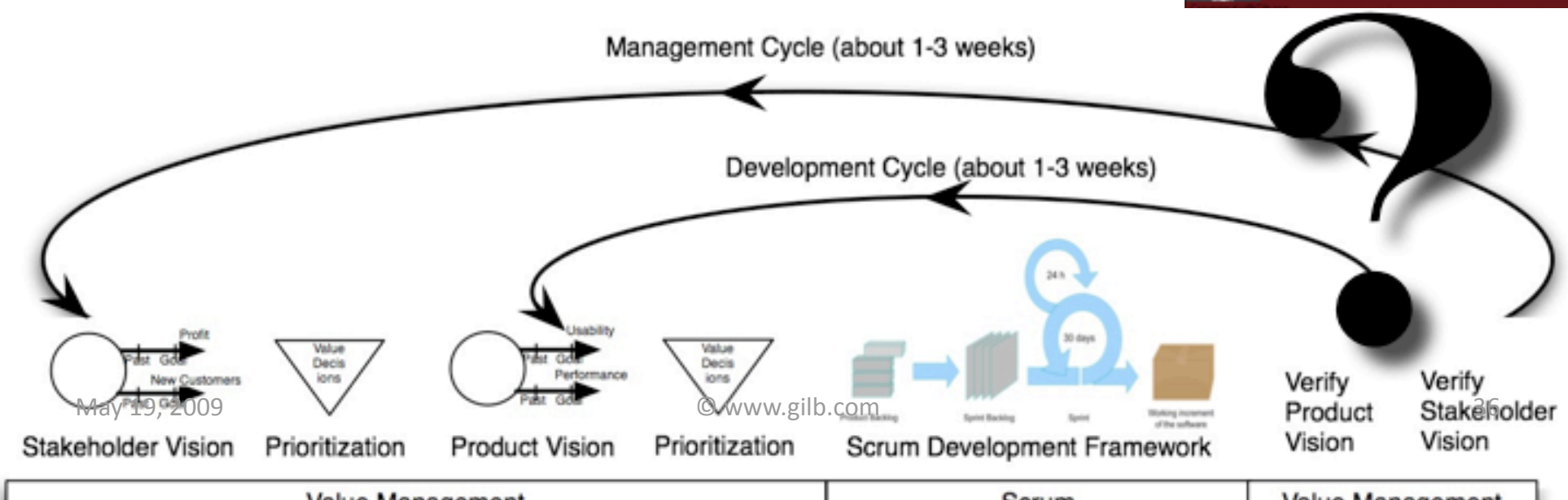
EVO Plan Confronto 8.5

4 more product areas were attacked concurrently

Information Table: Reportal codename "Hyggen"									
Current Status			Improvements				Reportal - E-SAT features		
Units	Units	%	Past	Tolerable	Goal		Usability.Intuitiveness (%)		
75,0	25,0	62	50	75	90		Usability.Consistency.Visual (Elements)		
14,0	14,0	100	0	11	14		Usability.Consistency.Interaction (Components)		
15,0	15,0	107	0	11	14		Usability.Productivity (minutes)		
5,0	75,0	96	80	5	2		Usability.Flexibility.OfflineReport.ExportFormats		
5,0	45,0	95	50	5	1		Usability.Robustness (errors)		
3,0	2,0	66	1	3	4		Usability.Repability (nr of features)		
1,0	22,0	95	7	1	0		Usability.ResponseTime.ExportReport (minutes)		
4,0	5,0	100	8	5	3		Usability.ResponseTime.ViewReport (seconds)		
1,0	12,0	150	13	13	5		Development resources		
1,0	14,0	100	0		191				
203,0									
Current Status			Improvements				Survey Engine .NET		
Units	Units	%	Past	Tolerable	Goal		Backwards.Compatibility (%)		
83,0	48,0	80,0	40	85	95		Generate.WI.Time (small/medium/large seconds)		
0,0	67,0	100,0	67	0	0		Testability (%)		
4,0	59,0	100,0	63	8	4		Usability.Speed (seconds/user rating 1-10)		
10,0	397,0	100,0	407	100	10		Runtime.ResourceUsage.Memory		
94,0	2290,0	103,9	2384	500	180		Runtime.ResourceUsage.CPU		
10,0	10,0	13,3	0	100	100		Runtime.ResourceUsage.MemoryLeak		
774,0	507,0	51,7	1281	600	300		Runtime.Concurrency (number of users)		
5,0	3,0	60,0	2	5	7		Development resources		
0,0	0,0	0,0		?	?				
3,0	35,0	97,2	38	3	2				
0,0	800,0	100,0	800	0	0				
1350,0	1100,0	146,7	150	500	1000				
64,0			0		84				
Current Status			Improvements				XML Web Services		
Units	Units	%	Past	Tolerable	Goal		TransferDefinition.Usability.Efficiency		
1,0	1,0	50	14	13	12		TransferDefinition.Usability.Response		
20,0	45,0	112	65	35	25		TransferDefinition.Usability.Intuitiveness		
4,4	4,4	36	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		TransferDefinition.Usability.Response		
17,0	8,0	53,3	25	15	10		TransferDefinition.Usability.Intuitiveness		
943,0	-186,0	#####	170	60	30		Development resources		
5,0	10,0	95,2	15	7,5	4,5				
2,0			0		48				

Principle 6. Usability can be delivered incrementally

1. Every week or so
2. Most critical types first
3. Learn rapidly what works for real



EVO - 2, project step planning and accounting: using an Impact Estimation Table

- IET for MR Project – Confrimit 8.5
- **Solution:** Recoding
 - Make it possible to recode variable on the fly from Reportal.
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	A	B	C	D	E	F	G	BX	BY	BZ	CA
1											
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3								Recoding			
4								Estimated impact		Actual impact	
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6					Usability.Replacability (feature count)						
7		1,00	1,0	50,0	2	1	0				
8					Usability.Speed.NewFeaturesImpact (%)						
9		5,00	5,0	100,0	0	15	5				
10		10,00	10,0	200,0	0	15	5				
11		0,00	0,0	0,0	0	30	10				
12					Usability.Intuitiveness (%)						
13		0,00	0,0	0,0	0	60	80				
14					Usability.Productivity (minutes)						
15		20,00	45,0	112,5	65	35	25	20,00	50,00	38,00	95,00
20					Development resources						
21			101,0	91,8	0		110	4,00	3,64	4,00	3,64

Confirmit's 'Evo' week cycle

	Development Team	Users (PMT, Pros, Doc writer, other)	CTO (Sys Arch, Process Mgr)	QA (Configuration Manager & Test Manager)
Friday	<ul style="list-style-type: none"> PM: Send Version N detail plan to CTO + prior to Project Mgmt meeting PM: Attend Project Mgmt meeting: 12.00-15.00 Developers: Focus on general maintenance work, documentation. 		<ul style="list-style-type: none"> Approve/reject design & Step N Attend Project Mgmt meeting: 12-15 	<ul style="list-style-type: none"> Run final build and create setup for Version N -1. Install setup on test servers (external and internal) Perform initial crash test and then release Version N -1
Monday	<ul style="list-style-type: none"> Develop test code & code for Version N 	<ul style="list-style-type: none"> Use Version N -1 		<ul style="list-style-type: none"> Follow up CI Review test plans, tests
Tuesday	<ul style="list-style-type: none"> Develop Test Code & Code for Version N Meet with users to Discuss Action Taken Regarding Feedback From Version N -1 	<ul style="list-style-type: none"> Meet with developers to give Feedback and Discuss Action Taken from previous actions 	<ul style="list-style-type: none"> System Architect to review code and test code 	<ul style="list-style-type: none"> Follow up CI Review test plans, tests
Wednesday	<ul style="list-style-type: none"> Develop test code & code for Version N 			<ul style="list-style-type: none"> Review test plans, tests Follow up CI
Thursday	<ul style="list-style-type: none"> Complete Test Code & Code for Version N Complete GUI tests for Version N -2 			<ul style="list-style-type: none"> Review test plans, tests Follow up CI

EVO's impact on Conformat product qualities

- Only highlights of the impacts are listed here

Description of requirement/work task	Past	Status
Usability.Productivity: Time for the system to generate a survey	7200 sec	15 sec
Usability.Productivity: Time to set up a typical specified Market Research-report (MR)	65 min	20 min
Usability.Productivity: Time to grant a set of End-users access to a Report set and distribute report login info.	80 min	5 min
Usability.Intuitiveness: The time in minutes it takes a medium experienced programmer to define a complete and correct data transfer definition with Conformat Web Services without any user documentation or any other aid	15 min	5 min
Performance.Runtime.Concurrency: Maximum number of simultaneous respondents executing a survey with a click rate of 20 sec and an response time<500 ms, given a defined [Survey-Complexity] and a defined [Server Configuration, Typical]	250 users	6000

Confirmit 9.0 and product qualities

- Theme for 9.0:
 - Extend usage in large corporations,
 - hence focus on **usability, intuitiveness, easy to learn**
 - Market Research:
 - Support for large panels, up to 200 000 panellists.
 - Improve productivity in general for those who work with such large panels
 - Improve throughput
 - for users that receive reports with more than 1 000 000 responses
 - (important for large corporations; HP, Microsoft, Accenture etc)

Description of requirement/work task	Past	Status 11.09	Goal
Usability.Intuitiveness: Probability that a defined User can intuitively figure out how to do a defined Task correctly (without any errors needing correction)	30%	45%	80%
Panel.Scalability: Maximum number of panelists that the system can support within a timeframe of 120 seconds for creating a sample of 50 000, with all components of the panel system performing acceptably.	30,000	500,000	200,000
Performance.DataVolume: Numbers of survey responses that can be handled by Reportal. Tables should be generated within 5 seconds.	20,000	500,000	500,000

Principle 7. 'Usability needs' depend on *many* factors

1. There are many different Usability stakeholders, for example

1. Novice user
2. Professional user
3. Help desk advisor
4. Potential customer
5. Course participant

2. Who have a variety of usability needs, for example

1. Learning
2. Doing
3. Understanding
4. Helping others
5. Complaining and feedback

3. Under a variety of usability circumstances, for example

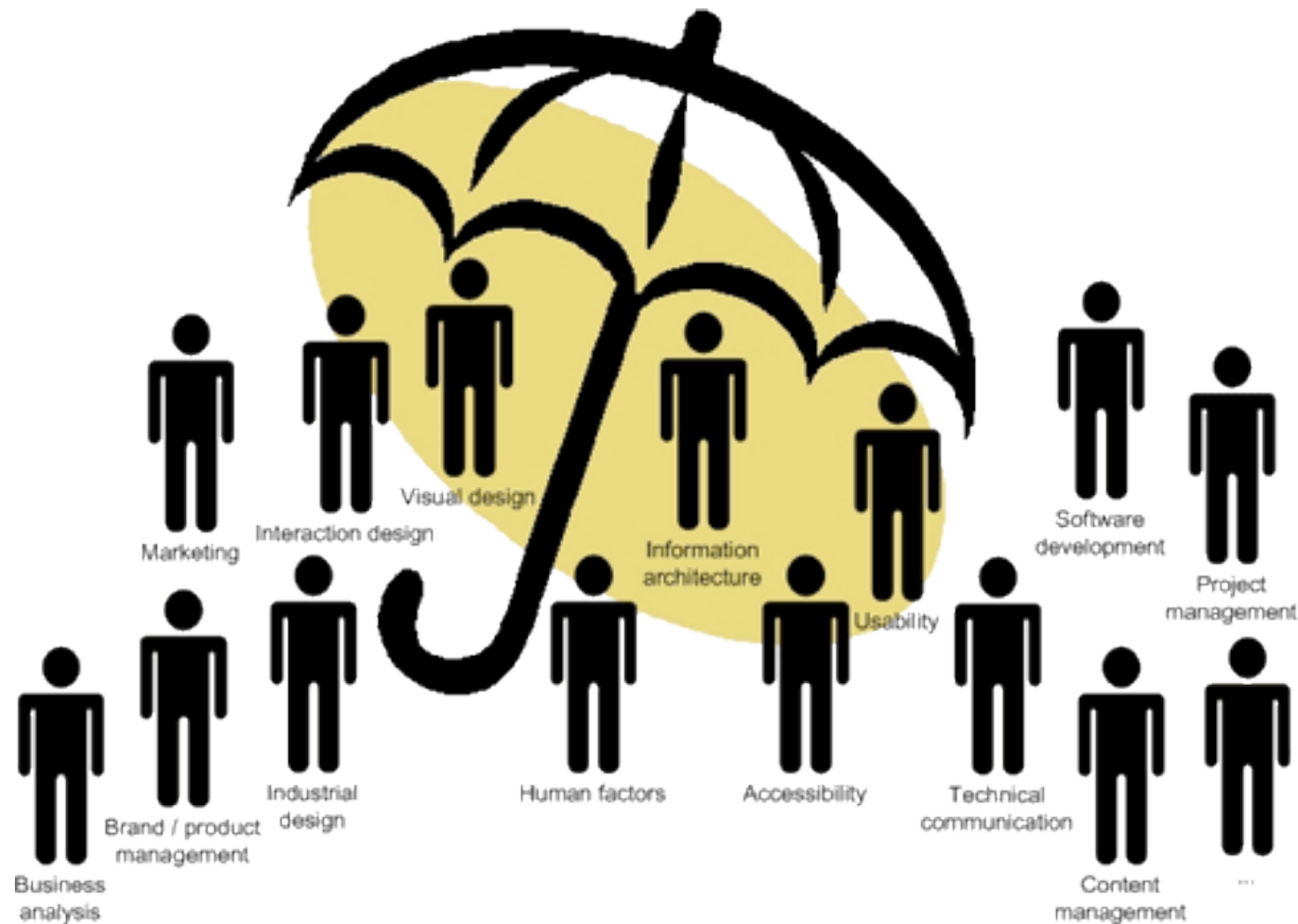
1. Home office
2. Offshore users
3. Non native to interface language
4. High pressure and high volume work

5. Exceptional circumstances, no experience

So, we need to analyze and specify these needs – example in Planguage

- **Learning Time:**
- **Scale:** minutes to learn defined Tasks, by defined Users for defined Cases.
- **Goal** [Deadline = Version 2.0, Task = All Daily, Users = Novice, Cases = Teach Oneself] 60 minutes.
- **Fail** [Deadline = Version 3.0, Task = Emergency Restore, Users = Professional, Cases = Local Site Failed] 30 minutes.

Internal Stakeholders for Usability



Usability: decomposed into quantifiable elementary measures

- **Usability:**
- **Type: Complex Quality Requirement.**
- **Includes {Entry Conditions, Training Requirement, Computer Familiarity, Web Experience Level, Productivity, Error Rate, Likeability, Intuitiveness, Intelligibility}.**

Usability: decomposed into quantifiable elementary measures

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-
- **Entry Conditions** : Scale: <Grade Level of User>.
- **Training Requirement**: Scale: Time needed to read <any instructions> or get <any help> in order to perform defined [Tasks] successfully.
- **Computer Familiarity** : Scale: Years of <experience with computers>.
- **Web Experience Level** : Scale: Years of <experience with using the web>
- **Productivity**: Scale: Ability to correctly produce defined [Work Units: Default: Completed Trans- actions].
- **Error Rate**: Scale: Number of Erroneous Transactions requiring correction each <session>.
- **Likeability**: Scale: Option of <pleasure> on using the system on scale of -10 to +10.
- **Intuitiveness** : Scale: Probability that a defined [User] can intuitively figure out how to do a defined [Task] correctly (without any errors needing correction).
- **Intelligibility** : Scale: Probability in % that a defined [User] will correctly interpret defined [Messages or Displays].

Principle 8.

Usability must be architected, not hacked

- If the Usability requirements are not well formulated (quantified, well defined, relevant to stakeholders) THEN THE ARCHITECT HAS NO RELEVANT INPUT TO WORK FROM!
- The architecture has to be about big framework (for designers) ideas
 - The impact of these architecture ideas should be estimated, based on experience

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

Technical Strategies



Objectives		Technical Strategies											
		Viking De											
		hardware adaptation	Telephony	Reference designs	IFace	Modularity	Defend vs Technology 66	Tools	User Exper'ce	GUI & Graphics	Security	Defend vs OCD	Enterprise
Business Objective	1 2 3 4 5												
Time to market		20%	10%	30%	5%	10%	5%	15%	0%	0%	0%	5%	5%
Mid-range		15%	10%	30%	5%	10%	5%	5%	10%	5%	5%	0%	0%
Platformisation Technology		25%	10%	30%	0%	5%	10%	0%	5%	0%	10%	0%	5%
Interface		5%	15%	15%	0%	5%	0%	5%	0%	0%	10%	0%	10%
Operator preference		0%	10%	10%	0%	0%	20%	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%	0%	0%	40%	0%	0%	0%	5%	20%	5%
Competitiveness		10%	15%	20%	0%	10%	20%	10%	10%	20%	10%	10%	10%
User experience		5%	0%	0%	0%	20%	0%	0%	30%	10%	0%	0%	0%
Downstream cost saving		15%	10%	10%	0%	10%	20%	10%	10%	0%	0%	10%	5%
Platformisation IFace		10%	10%	20%	40%	0%	20%	5%	0%	0%	0%	0%	5%
Japan		10%	5%	20%	0%	10%	0%	0%	10%	5%	0%	0%	0%
Contribution to overall result		15%	9%	17%	4%								5%
Cost (£M)		£ 2.85	£ 0.49	£ 3.21	£ 2.54	£ 1.92	£ 2.31	£ 0.81	£ 1.21	£ 2.68	£ 0.79	£ 0.62	£ 0.60
ROI Index (100=average)		106	358	109	33	78	127	148	107	10	152	202	174

Principle 9.

Usability must be led and driven by management
as a top level requirement

- Like Steve Does!!!

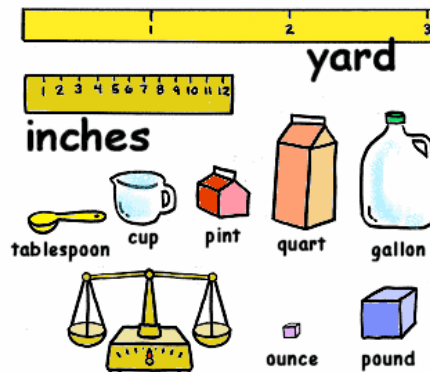


- Not like our old Bill

Summary of Top '8' Project Objectives

Real Example of **Lack** of Scales

- **Defined Scales of Measure:**
 - Demands **comparative thinking**.
 - Leads to requirements that are unambiguously **clear**
 - Helps Team be **Aligned** with the Business



1. Central to The Corporations business strategy is to be the world's **premier** integrated_<domain> service **provider**.
2. Will provide a much more efficient **user** experience
3. Dramatically scale back the **time** frequently needed after the last data is acquired to time align, depth correct, splice, merge, recompute and/or do whatever else is needed to **generate** the desired **products**
4. Make the system much **easier** to **understand** and **use** than has been the case for previous system.
5. A primary goal is to provide a much more **productive** system **development** environment than was previously the case.
6. Will provide a richer set of functionality for **supporting** next-generation logging **tools** and applications.
7. **Robustness** is an essential system requirement (see rewrite in example below)
8. Major improvements in **data quality** over current practices

This lack of clarity cost them \$100,000, 000

What the CIO Director Told Me

"In 1998 I voted to veto this project start because the requirements were insufficient.

But I was overruled by the other directors (including the current CEO)"

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Lemming rush hour

3. Much easier to understand and use

A critical requirement for HORROR's success is to make the software much easier to understand and use than has been the case for previous CORPORATION MINE software.

Benefits of this requirement include
reduced training time, better utilization of system features
and fewer operational errors.

As an aid in achieving this objective, HORROR has adopted a new use-case centric development process,

which makes the users and their use of the system a focal point of the development

The intent is to design for and evaluate usability continually during the development process rather than fixing it at the end.

(And it goes on about processes and designs)



• **Gilb Comment:** essentially same criticism as above. This concept could be defined quantitatively (See Usability, Gilb CE Chapter 5, www.gilb.com download).

- **'To understand'** needs definition (scale) and **'much easier'** needs specification of numeric points on the scale for various users and tasks.

- The rest of the requirement makes the systemic mistake of diving into **specific design detail ("Minimized panes., Docked and undocked panes, Product generation console"** for example).

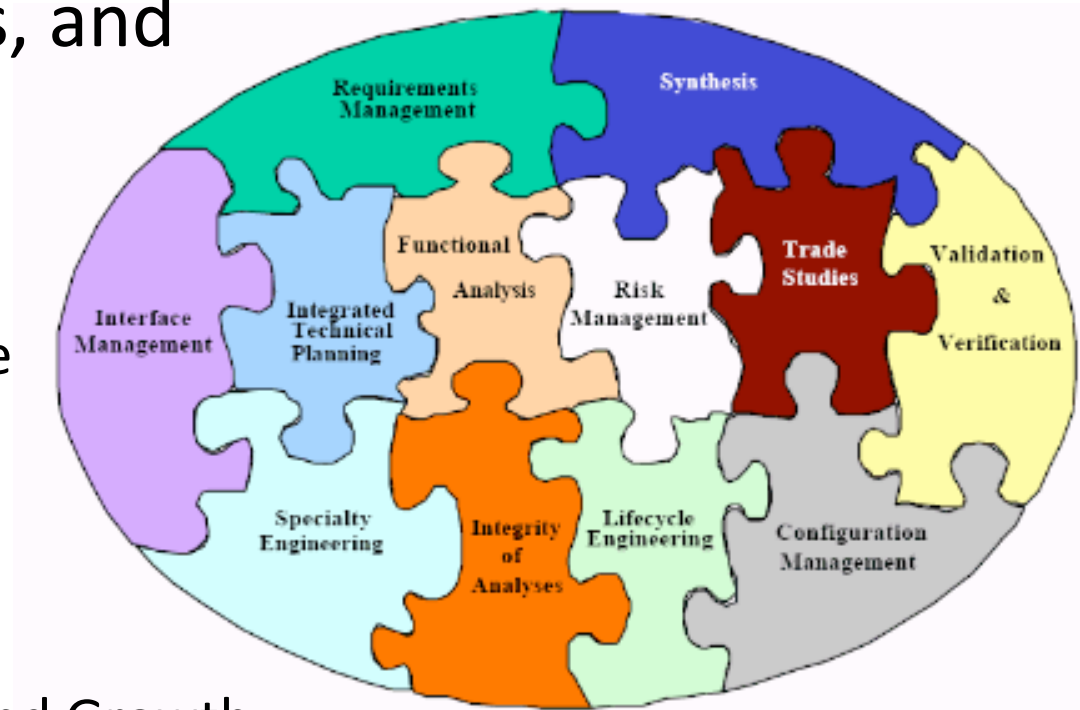
- These are badly defined, and badly justified designs for an undefined problem.

- We would end up building them into the system and there is no guarantee that we would end up getting the 'operational efficiency' we need (since we have not even decided what we want!).

Principle 10.

Usability is a systems engineering discipline

- All critical stakeholders
- All related processes, and components
 - subsystems
 - and suprasystems
 - Not just the software
 - Not the hardware
 - Training
 - Motivation
 - Service
 - Long Term Change and Growth
 - The whole wax works



May I *simplify*?

- **Usability**
 - **Quantify**
 - **Be clear!**
 - **Design**
 - **Be imaginative**
 - **Verify**
 - **learn fast**