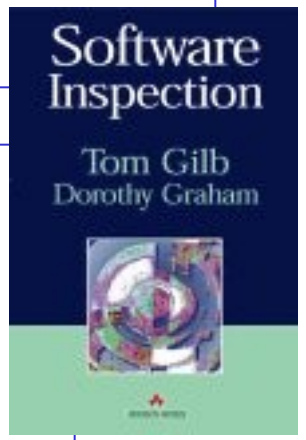
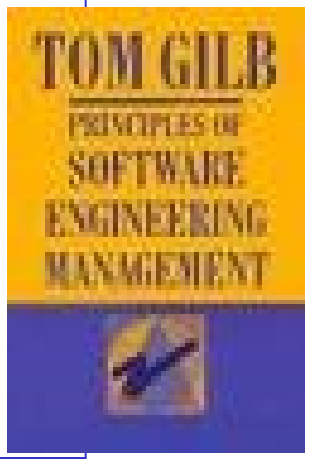
Quality Quantification for Quality Engineering





by

Tom@Gilb.com

www . GILB . Com

For Brno Universities

28 March 2013

YSOFT

Quantifying Music

with Hi to Andrea Provaglio, Venice

Tom Gilb

Lightning Talk at ACCU, Oxford, 2012

Lean QA Audience at ACCU "Surely you cannot quantify 'Music' ?"

- I claimed
  - we can quantify any variable quality of any system
- I replied:
  - *I'll do it in a lightening talk here at ACCU*

What is the problem,
in quantifying music?

- Can you quantify this music?

Black-Eyed Peas song ”I gotta Feeling” gets 8.9 of 10 from Hit Song Science software

Frank Micelotta/Getty Image

The Black Eyed Peas' single "I Gotta Feeling" received a hit score of 8.9 out 10 with Music Intelligenc Solutions' new software Hit Song Science.

“There's no magic in that; it's math”

- "[It's] a series of **algorithms that we use**
  - to look at what's **the potential of a song**
  - to **be sticky with a listener ...**
- To have **those patterns in the music** that would
  - ***correspond*** with what **human brain waves would find pleasing**”

CEO David Meredith

- A study conducted by the Harvard Business School found that the software was accurate 8 out of 10 times.http://www.npr.org/templates/story/story.php?storyId=113673324

Measurable Attributes of Hits

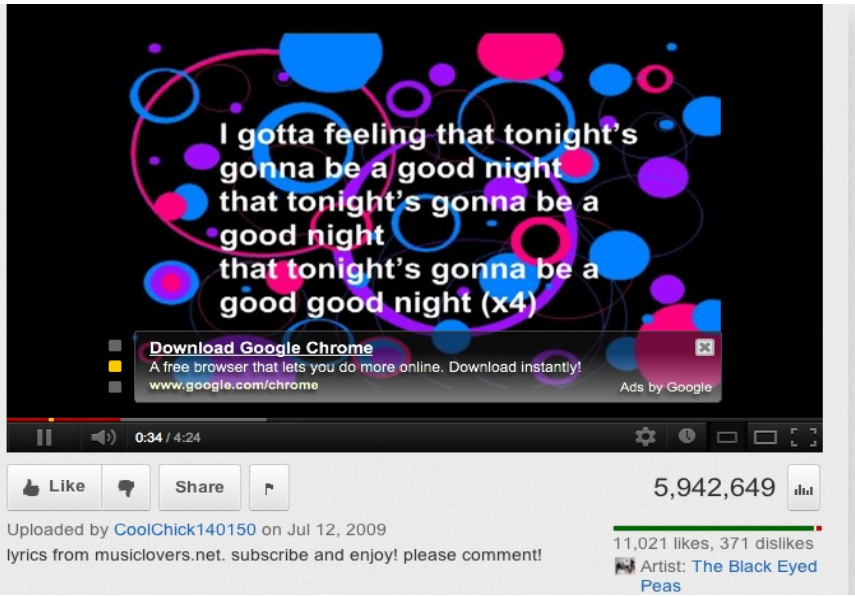
Meredith says his software evaluates songs over sixty elements including

Melody
Harmony
Tempo
Pitch
Octave
Beat
Rhythm
Fullness of sound
Noise
Brilliance
Chord progression

http://edition.cnn.com/2008/WORLD/europe/03/07/spiritof.music/

YouTube Measures

- Number of Likes and Dislikes
  11,021 Likes, 371 Dislikes (April 26, 2012)
- Number of times video has been viewed
  5,942.649 Views (April 26, 2012)



By **Survey**: Most Wanted Attributes

- Yudkin reports on a web-based survey into American musical tastes conducted by Komar and Melamid in 1996
- If you want to please the greatest number of Americans (72% ± 12%) consider
  - Male and female solo voices
  - R&B with a love theme
  - Small ensemble of musicians
  - Length of about 5 minutes
  - Moderate pitch, tempo and volume

http://www.bu.edu/cfa/music/faculty/yudkin/

Most Unwanted Attributes

To appeal to only about 200 Americans

- Extreme length
- Wide range of dynamics, tempo and pitch in abrupt succession
- An operatic soprano singing atonally
- A cowboy song with political slogans
- A children's choir singing holiday songs
- Large orchestra featuring harp, accordion and bagpipes

http://www.bu.edu/cfa/music/faculty/yudkin/

There are samples of two songs written by David Soldier with lyrics by Nina Mankin to these wanted and unwanted guidelines about 19 minutes into Yudkin's lecture

Some potentially quantifiable Quality dimensions of Music

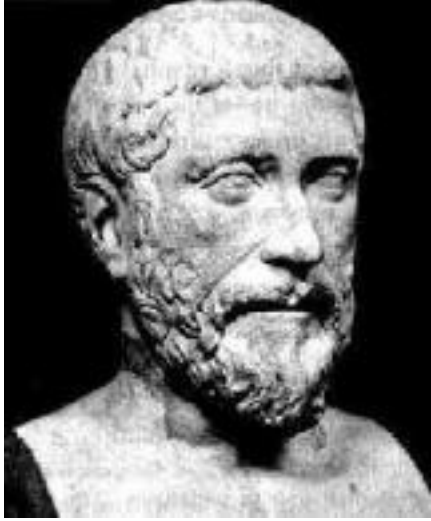
Brainstormed by Steve F. and Rachel D. At lunch

- In tune
- Applause
- Moving
- Encores
- Repeat Gigs
- Busking Hat Collection
- MRI Brain Scan
- Downloads
- Utube Reviews
- Royalties
- … (many more!!)

Examples in Planguage

- **Music.Moving:**
- **Type: primary music quality attribute**
- **Ambition Level: the majority of listeners feel moved to tears or strong physical emotional reactions.**
- **Scale: the % of defined [Listeners] hearing defined [Music] under defined [Environments] who reports a defined [Emotion] at a defined [Strength]**
- **Goal [1st UK Release, Music = Hip Hop, Environment = Itunes, Emotion = {Tears, Sadness}, Strength = Powerful] 50% ± 20% ?**

Philolaus on Numbers



- Over four hundred years BC,
- a Greek by the name of
- **Philolaus** of Tarentum said :
- *" Actually, everything that can be known has a Number;*
  - *for it is impossible to grasp anything with the mind or to recognize it without this (number)."*

Best regards (Aug 2005),
N.V.Krishnawww.microsensesoftware.com

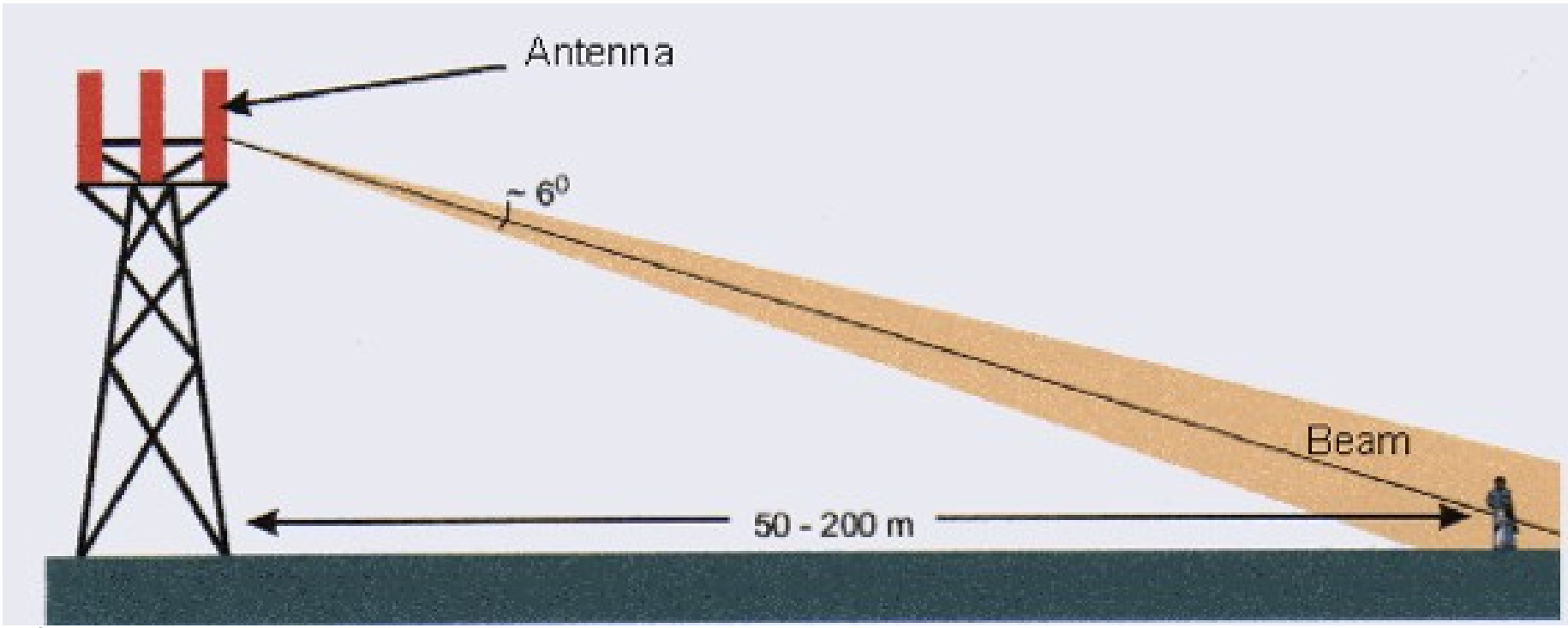
Software Engineering Productivity Study

ERICSSON

An example of setting objectives for process improvement

For 1997 with 70% software labor development content in products

.



Main beam from a macrocell base

The problem

- Great Market Growth Opportunities
- Too Few Software Engineers

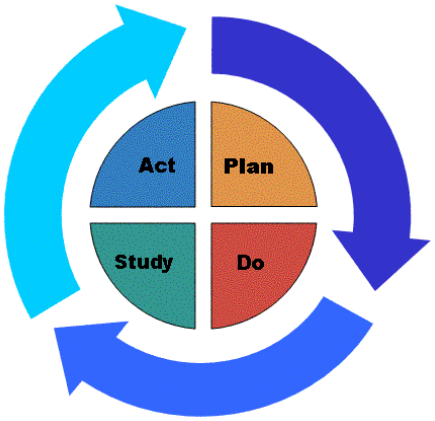
- Solution:
  - Increase productivity of existing engineers

The One Page Top Management Summary (after 2 weeks planning)

The Dominant Goal

Improve Software Productivity in R PROJECT by 2X by year 2000

Dominant (META) Strategies



Continual Improvement (PDSA Cycles)
.DPP: Defect Prevention Process
.EVO: Evolutionary Project Management

Long Term Goal [1997-2000+]

DPP/EVO, Master them and Spread them on p

Short Term Goal [Next Weeks]

DPP [RS?]
EVO [Package C ?]

Decision: {Go, Fund, Support}

The Ericsson Quality Policy:

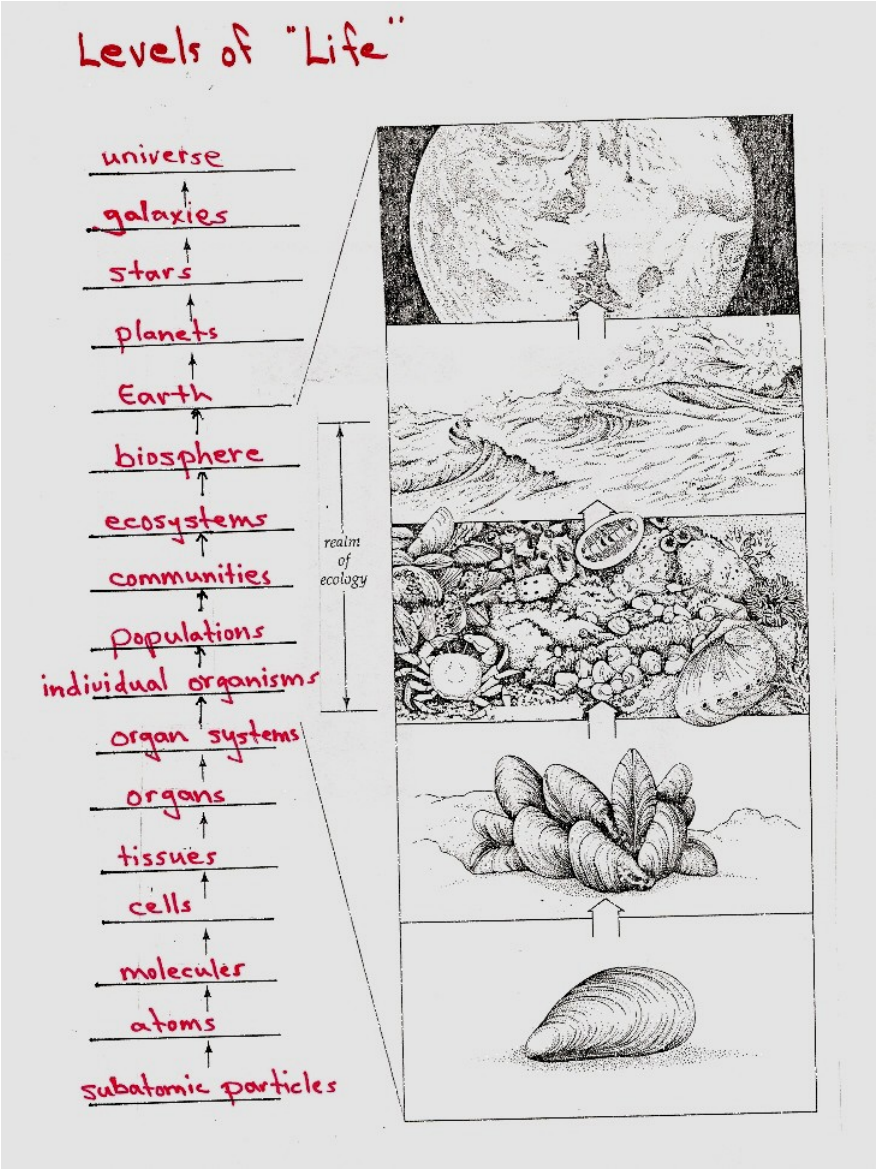
"every company shall *define* **performance** indicators (which) ..

- –reflect **customer satisfaction**,
- – internal **efficiency**
- –and business **results**.

- The performance indicators are used in **controlling** the operation."
- Quality Policy [4.1.3]

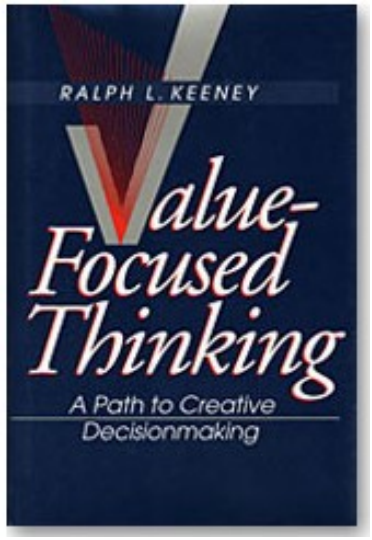
Levels of Objectives.

- **Fundamental Objectives**
- **Strategic Objectives**
- **Means Objectives:**
-
- **Organizational Activity Areas.**
  - Pre-study.
  - Feasibility Study.
  - Execution.
  - Conclusion.
- **Generic Constraints**
  - Political Practical
  - Design Strategy Formulation Constraints
  - Quality of Organization Constraints
  - Cost/Time/Resource Constraints



Keeney's: Levels of objectives.

- **1. Fundamental Objectives**
  - **(above us)**
- **2. Generic Constraints**
  - **(our given framework)**
  - Political Practical
  - Design Strategy Formulation Constraints
  - Quality of Organization Constraints
  - Cost/Time/Resource Constraints
- **3. Strategic Objectives**
  - **(objectives at our level)**
- **4. Means Objectives:**
  - (*supporting* our objectives)



Constr aints

The Strategic Objectives (CTO level)

- Support
  - the **Fundamental** Objectives (Profit, survival)
  - **Software Productivity:**
    - **Lines of Code Generation Ability**
  - **Lead-Time:**
  - **Predictability.**
  - **TTMP: Predictability of Time To Market:**
  - **Product Attributes:**
  - **Customer Satisfaction:**
  - **Profitability**:

‘Means’ Objectives:

- Support the **Strategic** Objectives
  - ***Complaints:***
  - ***Feature Production:***
  - ***Rework Costs:***
  - ***Installation Ability:***
  - ***Service Costs:***
  - ***Training Costs:***
  - ***Specification Defectiveness:***
  - ***Specification Quality:***
  - ***Improvement ROI:***

**"Let no man turn aside,
ever so slightly,
from the broad path of honour,
on the plausible pretence
that he is justified by the goodnes
of his end.
All good ends can be worked ou
by good means."** Charles Dicker

Strategies: (total brainstormed list) 'Ends for delivering Strategic Objectives'

- **Evo [Product development]:**
- **DPP [Product Development Process]: Defect Prevention Process.**
- **Inspection?**
- **Motivation.Stress-Management-AOL**
- **Motivation.Carrot**
- **DBS**
- **Automated Code Generation**
- **Requirement -Tracability**
- **Competence Management**
- **Delete-Unnecessary -Documents**
- **Manager Reward:?**
- **Team Ownership:?**
- **Manager Ownership:?**

- **Training:?**
- **Clear Common Objectives:?**
- **Application Engineering area:**
- **Brainstormed List (not evaluated or prioritized yet)?**
- **Requirements Engineering:**
- **Brainstormed Suggestions?**
- **Engineering Planning:**
- Process Best Practices**:**
- Brainstormed Suggestions?
- Push Button Deployment:
- Architecture Best Practices:
- Stabilization:
- World-wide Co-operation?

Principles for Prioritizing Strategies

- They are well-defined
  - Not vague
- The have some relevant predictable numeric experience
  - On main effects
  - Side effects
  - Costs
  - Risks - Uncertainty
- Not huge spread of experience

"Software Productivity" =

Lines of Code Generation Ability

–*"Software Engineering net production in relation to corresponding costs."*

–*Ambition: Net lines of code successfully produced per total working hours needed to produce them. A measure of the*

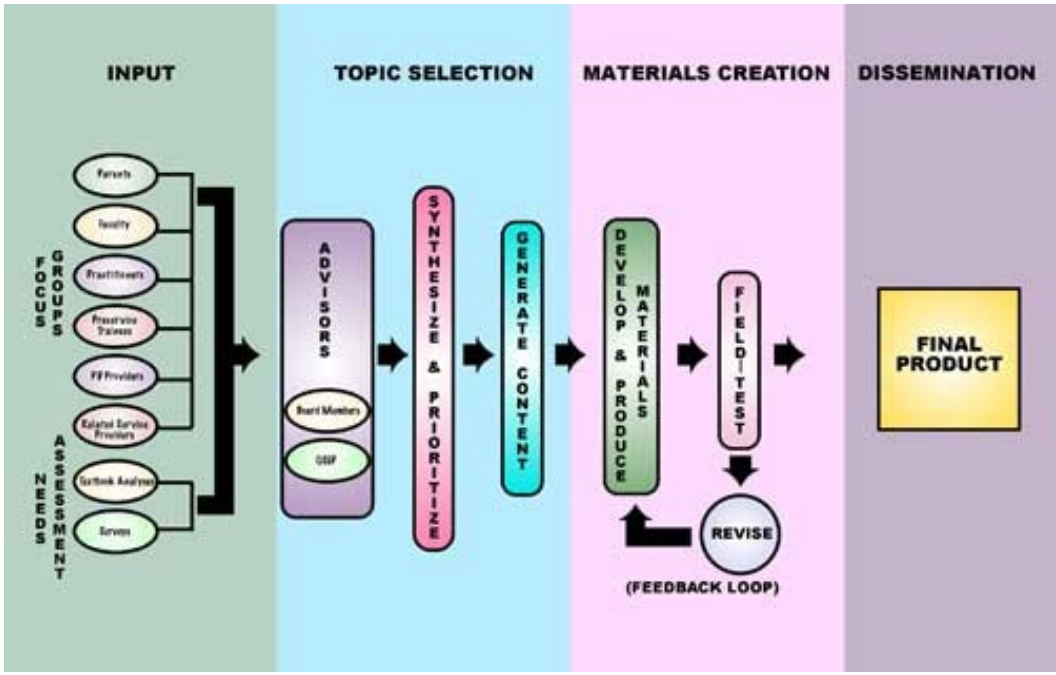
– *efficiency ('effective production/cost of production') of the organization in using its software staff*

Scale: [Defined Volume, kNCSS or kPlex] per Software Development Work-Hour.

- **Scale: [Defined Volume, kNCSS or kPlex] pe**
  - **Software Development**: Defined:
- Productivity calculations include Work-Hour
- **Meter : <PQT Database and EPOS, CPAC>**
  - *–Comment: we know that real software proc … asure as it is available in our current culture. AB, PK,*
  - **–P1: Past [1997, ERA/AR] < to be calculated**
- **Past-R PROJECT: Past [1997, R PROJECT] < to be calculated when data available, available Volume/Work Hours >**
- **Past-EEI: Past [1997, Ireland, Plex] ___??__ kPLEX / Work-Hour.**
- **<add more like LuleÂ>**
- **Fail [end 1998, R PROJECT, Same Reliability] 1.5 x Past-R PROJECT <- R PROJECT AS 3 c " by 50%".**
  - *–"50% better useful code productivity in 1.5 years overall"*
- **Same Reliability: State: The Software Fault Density is not worse than with comparable productivity. Use official The Company Software Fault Density measures <- 1997 R PROJECT Balanced Scorecard (PA3).**
- **Goal [Year=2000, R PROJECT, Same Reliability] 2 x Past-R PROJECT,**
  - **– [Year=2005, RPL, Same Reliability] 10?? x Past-R PROJECT**
- **Wish [Long term, vs. D pack.] 10 x Past-R PROJECT "times higher productivity" <- R PROJECT 96 1.1 c**
- **Wish [undefined time frame] 1.5 x Past-R PROJECT <- R PROJECT AS 3 c " by 50%"**
  - *–Comment: May 13 1997 1600, We have worked a lot on the Software Productivity objectives (all day) and are happy that it is in pretty good shape. But we recognize that it needs more exposure to other people.*

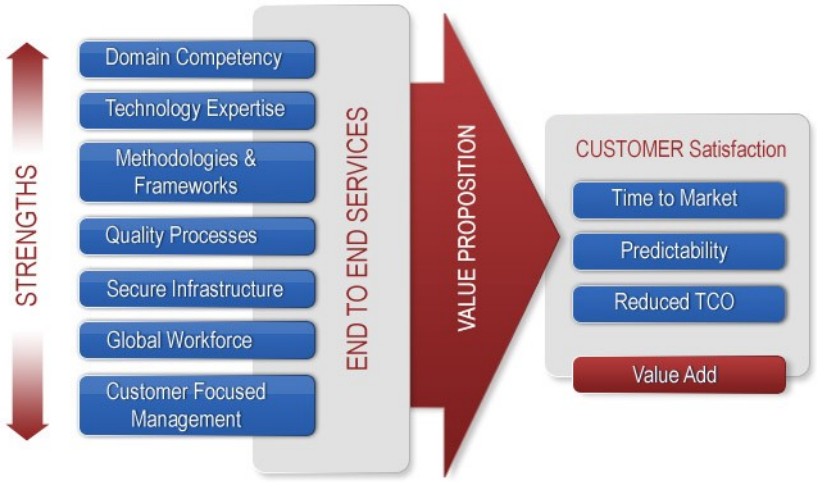
- **Lead-Time:**
  - *"Months for major Packages"*
- ***Ambition**: decrease months duration between major Base Station package release.*
- **Scale: Months from TG0, to successful first use for**
  - **major work station package.**
  - ***Note: let us make a better definition. TG***
- **Past [C Package, 1996?] 20? Months?? <-guess tg**
- **Goal [D-package] 18 months <- guess tg**
- **Goal [E-package and later] 10.8 Months <- R PROJECT 96 1.1 a "40% > D"**
- **Goal [Generally] ??? <- R PROJECT AS 3a**
  - ***"10% Lead-Time reduction compared to any benchmark".***

Lead-Time:



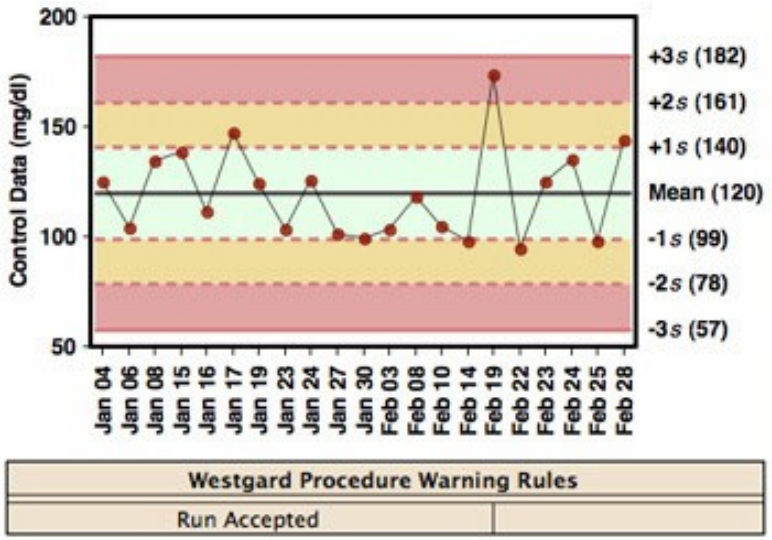
Predictability of Time To Market:

- **TTMP: Predictability of Time To Market:**
  - *Ambition: From Ideas created to customers can use it. Our ability to meet agreed specified customer and self-determined targets.*
  - **Scale: % overrun of actual Project Time compared to planned Project Time**
    - **Project Time: Defined:** time from the date of Toll-Gate 0 passed, or other Defined Start Event, to, the Planned- or Actually- delivered Date of All [Specified Requirements], and any set of agreed requirements.
    - **Specified Requirements: Defined:** written approved Quality requirements for products with respect to Planned levels and qualifiers [when, where, conditions].
      And, other requirements such as function, constraints and costs.
  - **Meter: Productivity Project or Process Owner will collect data from all projects, or make estimates and put them in the Productivity Database for reporting this number.**
  - **Past [1994, A-package] < 50% to 100%> <- Palli K. guess. [1994, B-package] 80% ?? <- Urban Fagerstedt and Palli K. guess**
  - **Record [IBM Federal Systems Division, 1976-80] 0% <- RDM 9.0 quoting Harlan Mills in IBM SJ 4-80**
  - ***"all projects on time and under budget"***
  - **[Raytheon Defense Electronics, 1992-5] 0% <- RDE SEI Report 1995 Predictability.**
  - **Fail [All future projects, from 1999] 5% or less <- discussion level TG**
  - **Goal [All future projects, from 1999] 0% or less <- discussion level TG**



Product Attributes:

- **Product Attributes:**
  - *"Keeping Product Promises."*
  - *Ambition: Ability to meet or beat agreed targets, both cost, time and quality. (except TTMP itself, see above)*
- ***Scale*: % +/- deviation from [defined agreed attributes with projects].**
- ***Past* [1990 to 1997, OUR DIVISION] at least 100% ???**
  - **<- Guess. Not all clearly defined and differences not**
    - **tracked. TSG**
- *Goal* [Year=2000, R PROJECT] **near 0%** negative deviation <- TsG for discussion.



Customer Satisfaction

Customer Satisfaction:

"Customer Opinion of Us"

Scale: average survey result on scale of 1 to 6 (best)

Meter: The Company Customer Satisfaction Survey

Past [1997] **4**

Goal [1998-9?] **5** <- R PROJECT 96 1.1 b

Profitability

- **Profitability:**
  - ***"Return on Investment."***
  - ***Ambition: Degree of saleable product ready for installation.***
  - **Scale: Money Value of Gross Income derived by**
    - **[All R PROJECT Production OR**
    - **defined products] for**
    - **[Product Lifetime OR**
    - **a defined time period]**
  - **Goal: <we did not complete this>**

‘Means Objectives’ Samples
Same *definition* process as higher level objectives

Means Objectives

- *"support Strategic Objectives"*

- Summary:
  - **'Means Objectives'** are
    - not our major Strategic Objectives (a
    - but each one represents areas which
      - will normally help us achieve our Strategic Objectives.
  - Means Objectives have a lower priority than Strategic Objectives.
  - They must never be 'worked towards'
    - to the point where they reduce our ability to meet Strategic Objectives.

Complaints

Complaints:

"Customer complaint rate to us"

***Ambition**:*

Means Goal: for Customer Satisfaction (Strategic).

Scale: number of complaints per customer in [defined time into <operation>]

Past [Syracuse Project , 1997] ?? <bad> <- ML

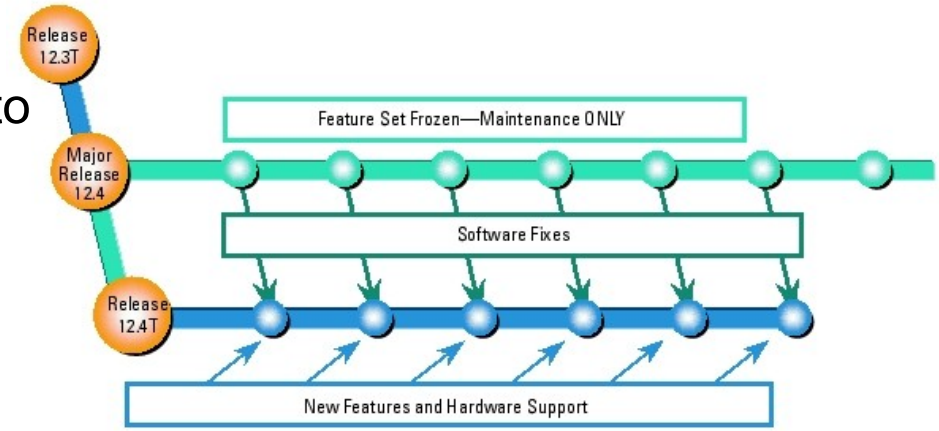
Goal [Long term, software component, in first 6 months in Operation] **zero complaints** <- R PROJECT 96 1.1 b

"zero complaints on software features"

Impacts: <one or more strategic objectives>

Feature Production:

- **Feature Production:**
  - *"ability to deliver new features to customers"*
  - ***Ambition**: reverse our decreasing ability to deliver new features <- R PROJECT AS 1.1*
  - **Scale**: Number of new prioritized <Features> delivered successfully to customer per year per software development engineer.
  - Too Little: **Past** [1997] ?? "estimate needed, maybe even definition of feature"
  - **Goal** [1998-onwards] **Too Little + 30% annually**?? <-For discussion purposes TsG.
  - "we need to drastically change our ability to effectively develop SW" <- R PROJECT AS 1.1



Improvement ROI:

Improvement ROI:

"Engineering Process Improvement Profitability"

Ambition: Order of magnitude return on investment in process improvement.

Scale:

The average [annual OR defined time term] Return on Investment in Continuous Improvement as a ratio of [Engineering Hours OR Money]

Note: The point of having this objective is to remind us to think in terms of real results for our process improvement effort, and to remind us to prioritize efforts which give high ROI. Finally, to compare our results to others. <-TsG

Record

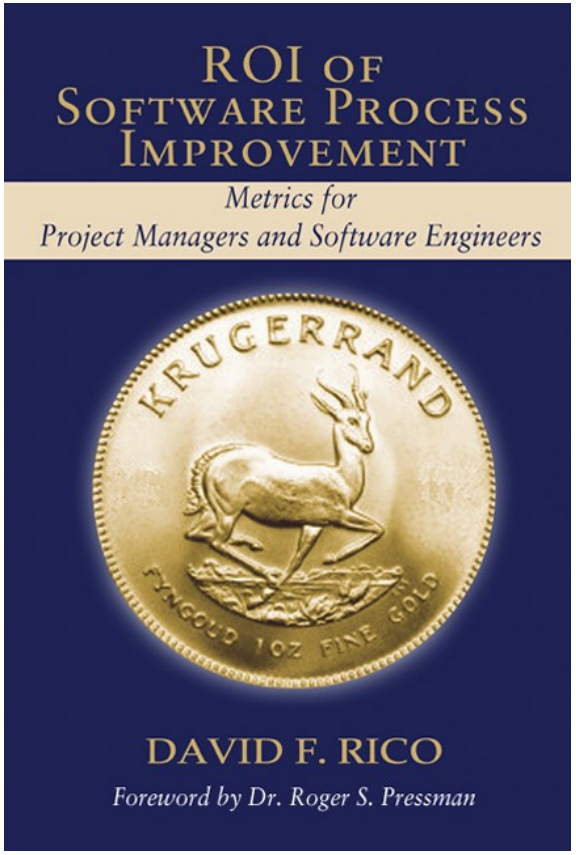
____[Shell NL, Texas Instruments , Inspections] 30:1 <- Independently published papers TsG

Past

____[IBM RTP, 1995, DPP Process] 13:1 <- Robert Mays, Wash DC test conference slides TsG

[Raytheon, 1993-5, Inspection & DPP] $7.70:1 <- RDE Report page 51 ($4.48 M$0.58M) Includes detail on how calculated. PK has copy.

[IBM STL, early 1990's] Average 1100% ROI (11:1) <- IBM Secrets pp32. PK has copy. NB Conservative estimate. See Note IBM ROI below.



2004

How to Quantify any Qualitative Requirement

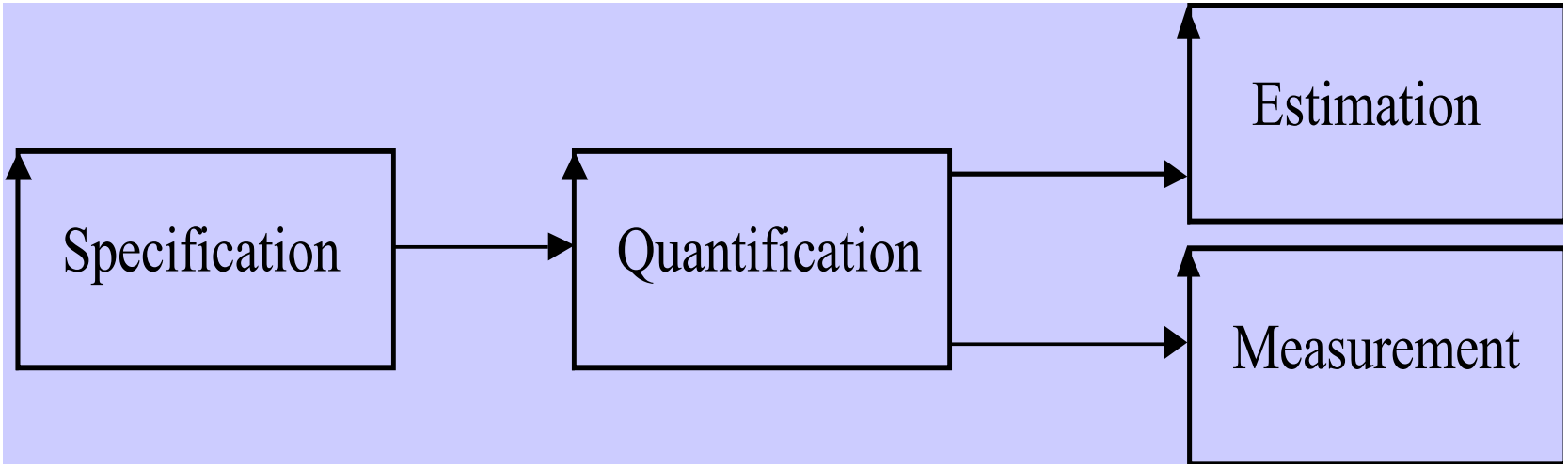


Diagram from 'Competitive Engineering.' book.

Quality Quantification Methods 1

- Common Sense, Domain Knowledge
  - Decompose “until quantification becomes obvious”.
  - Then use Planguage specification:
    - **Scale**: define a measurement scale
    - **Meter**: define a test or process for measuring on the scale
    - **Past**: define benchmarks, old system, competitors on the scale
    - **Goal**: define a committed level of future stakeholder quality, on your scale.

Maintainability:
Type: Complex Quality Requirement.
Includes: {Problem Recognition, Administrative Delay, Tool Collection, Problem Analysis, Change Specification, Quality Control, Modification Implementation, Modification Testing {Unit Testing, Integration Testing, Beta Testing, System Testing}, Recovery}.

Problem Recognition:
Scale: Clock hours from defined [Fault Occurrence: Default: Bug occurs in any use or test of system] until fault officially recognized by defined [Recognition Act: Default: Fault is logged electronically].
Administrative Delay:
Scale: Clock hours from defined [Recognition Act] until defined [Correction Action] initiated and assigned to a defined [Maintenance Instance].
Tool Collection:
Scale: Clock hours for defined [Maintenance Instance: Default: Whoever is assigned] to acquire all defined [Tools: Default: all systems and information necessary to analyze, correct and quality control the correction].
Problem Analysis:
Scale: Clock time for the assigned defined [Maintenance Instance] to analyze the fault symptoms and be able to begin to formulate a correction hypothesis.
Change Specification:
Scale: Clock hours needed by defined [Maintenance Instance] to fully and correctly describe the necessary correction actions, according to current applicable standards for this.
Note: This includes any additional time for corrections after quality control and tests.
Quality Control:
Scale: Clock hours for quality control of the correction hypothesis (against relevant standards).
Modification Implementation:
Scale: Clock hours to carry out the correction activity as planned. "Includes any necessary corrections as a result of quality control or testing."
Modification Testing:
Unit Testing:
Scale: Clock hours to carry out defined [Unit Test] for the fault correction.
Integration Testing:
Scale: Clock hours to carry out defined [Integration Test] for the fault correction.
Beta Testing:
Scale: Clock hours to carry out defined [Beta Test] for the fault correction before official release of the correction is permitted.
System Testing:
Scale: Clock hours to carry out defined [System Test] for the fault correction.
Recovery:
Scale: Clock hours for defined [User Type] to return system to the state it was in prior to the fault and, to a state ready to continue with work.

Source: The above is an extension of some basic ideas from Ireson, Editor, Reliability Handbook, *McGraw Hill, 1966* (Ireson 1966).

Quality Quantification Methods **2**, **Look it up in a book**

Chapter 5

SCALES OF MEASURE

How to Quantify

Quality Quantification Methods **2**, **Look it up in a book**

Maintainability:
Type: Complex Quality Requirement.
Includes: {Problem Recognition, Administrative Delay, Tool Collection, Problem Analysis, Change Specification, Quality Control, Modification Implementation, Modification Testing {Unit Testing, Integration Testing, Beta Testing, System Testing}, Recovery}.

Problem Recognition:
Scale: C
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fault and

Tool Collection:
Scale: Clock hours for defined [Maintenance Instance: Default: Whoever is assigned] to acquire all defined [Tools: Default: all systems and information necessary to analyze, correct and quality control the correction].

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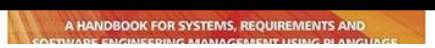
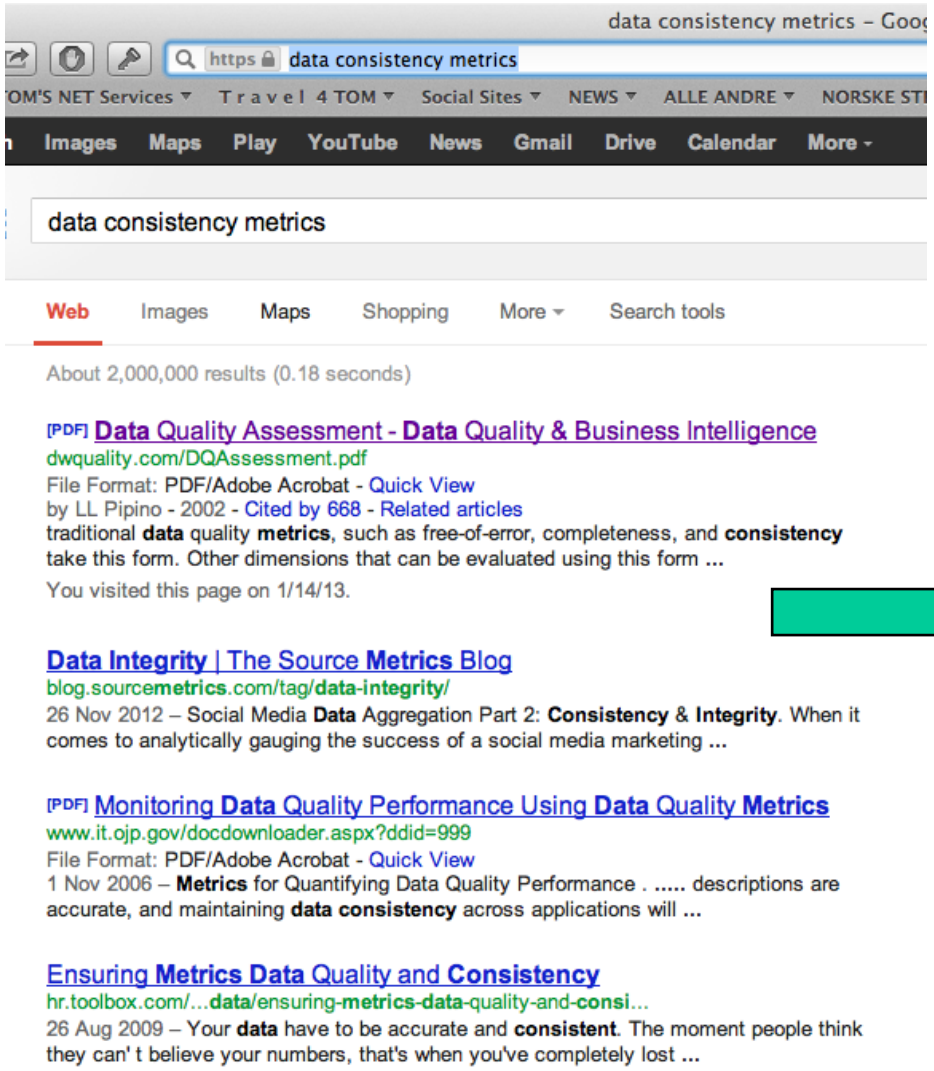


Quality Quantification Methods **3**, Google It



dwquality.com/DQAssessment.pdf

Travel 4 TOM | Social Sites | NEWS | ALLE ANDRE | NORSKE STEDER | VG Nett | tompeters | peramananda@gmail.

e 1. Data quality dimensions.

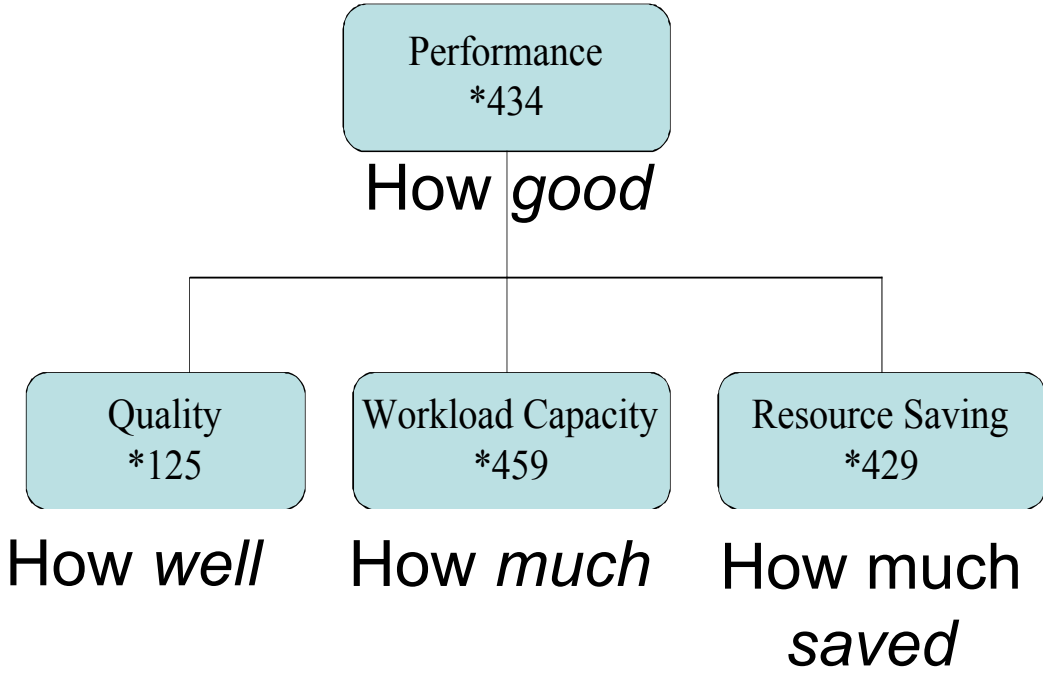
Dimensions	Definitions
Accessibility	the extent to which data is available, or easily and quickly retrievable
Appropriate Amount of Data	the extent to which the volume of data is appropriate for the task at hand
Believability	the extent to which data is regarded as true and credible
Completeness	the extent to which data is not missing and is of sufficient breadth and depth for the task at hand
Concise Representation	the extent to which data is compactly represented
Consistent Representation	the extent to which data is presented in the same format
Ease of Manipulation	the extent to which data is easy to manipulate and apply to different tasks
Free-of-Error	the extent to which data is correct and reliable
Interpretability	the extent to which data is in appropriate languages, symbols, and units, and the

Quality: the concept, the noun

Planguage Concept *125, Version: March 20, 2003

A '**quality**' is

- a scalar attribute -|-|-|-|- (Scale symbol)
- reflecting 'how *well*' ------Past Level<----------->
- a system functions. (Fn)------Past Level<-------->



Quality *is characterized by these traits (from CE book)*

1. **Quality describes 'how well' a function is done.**
2. **Quality describes the *partial effectiveness* of a function (as do all other performance attributes).**
3. **Quality is *valued* to *some* degree by *some* stakeholders of the system**
4. ***More* quality is generally *valued* by stakeholders; especially if the increase is free, or lower cost, than the value of the increase.**
5. **Quality attributes can be *articulated* independently of the particular means (designs) used for reaching a specific quality level –**
6. **even though all quality levels *depend* on the particular designs used to achieve them.**
7. **A particular quality can be a described in terms of a *complex* concept, consisting of multiple elementary quality concepts.**
8. **Quality is *variable* (along a definable scale of measure: as are all scalar attributes).**
9. **Quality levels are capable of being specified *quantitatively* (as are all scalar attributes).**
10. **Quality levels can be *measured* in practice.**
11. **Quality levels can be traded off to some degree; with other system attributes valued more by stakeholders.**
12. **Quality can never be perfect (100%), in the real world.**
13. **There are some levels of a particular quality that may be outside the state of the art; at a defined time and circumstance.**
14. **When quality levels increase towards perfection, the resources needed to support**

Quality *is characterized by these traits*

1. Quality describes 'how well' a function is done.
2. Quality describes the *partial effectiveness* of a function (as do all other performance attributes).
3. Quality is *valued* to *some* degree by *some* stakeholders of the system
4. *More* quality is generally *valued* by stakeholders; especially if the increase is free, or

9. Quality levels are capable of being specified *quantitatively* (as are all scalar attributes).

11. Quality levels can be traded off to some degree; with other system attributes valued more by stakeholders.
12. Quality can never be perfect (100%), in the real world.
13. There are some levels of a particular quality that may be outside the state of the art; at a defined time and circumstance.
14. When quality levels increase towards perfection, the resources needed to support those levels tend towards infinity.

Love Quantification

a 4.5 minute lightening Talk at ACCU Conference, Oxford April 15 2010

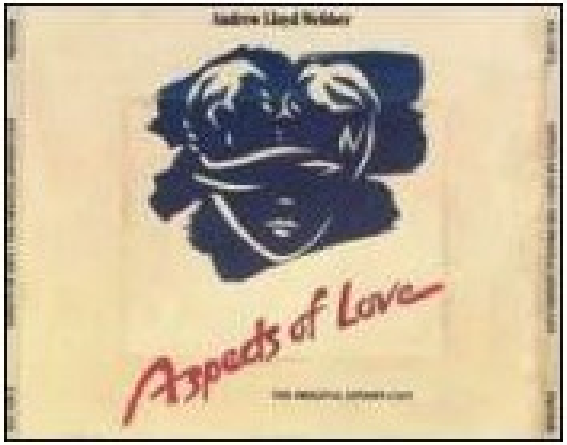
Class Exercise: Aspects of Love, or Love is a many splendored thing!

- METHOD
  - Make a list of love's many aspects
  - Quantify *one* random requirement, for love
    - To show that all of the aspects can be similarly quantified

Love Attributes:
Brainstormed By Dutch Engineers

- **Kissed-ness**
- **Care**
- **Sharing**
- **Respect**
- **Comfort**
- **Friendship**
- **Sex**
- **Understanding**
- **Trust**

- Support
- Attention
- Passion
- Satisfaction
- ...
- ...
- ...



Trust Defined

- **Love.Trust.Truthfulness**

  Ambition: No lies.

  Scale:

  Average **Black** lies/month from [defined sources].

  Meter:

  independent confidential log from sample of the defined sources.

  Past Lie Level:

  Past [My Old Mate, 2004] 42 <-Bart

  Goal

  [My Current Mate, Year = 2005] Past Lie Level/2

  Black: Defined: Non White Lies

- Other aspects of Trust:
- 1. 'Truthfulness'
  2. **Broken Agreements**
  3. **Late Appointments**
  4. **Late delivery**
  5. **Gossiping to Others**

Camaraderie (Real Case UK)

Ambition: *to maintain an exceptionally high sense of good personal feelings and co-operation amongst all staff: family atmosphere, corporate patriotism. In spite of business change and pressures.*

Scale: **probability that individuals enjoy the working atmosphere so much that they would not move to another company for less than 50% pay rise**.

Meter: Apparently real offer via CD-S

Past [September 2001] 60+ % <- R & CD

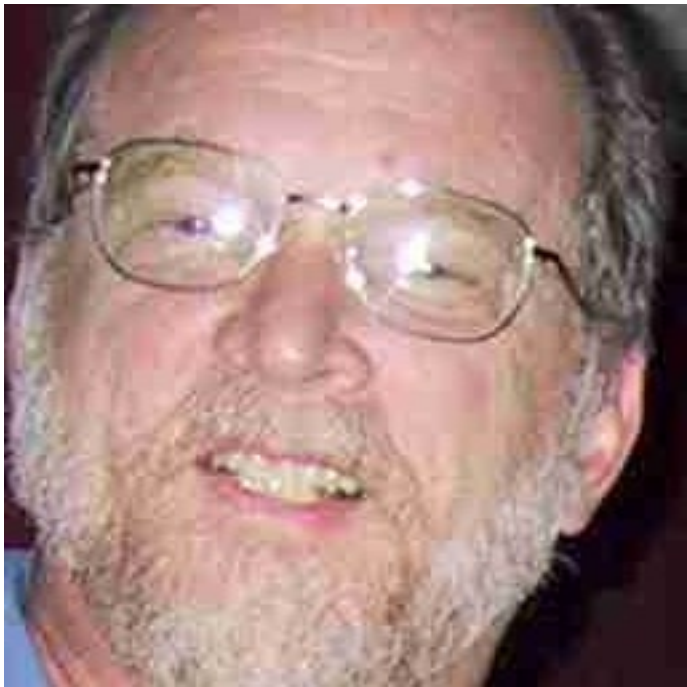
Goal [Mid 2002] 10%, [End 2002] **<1%** <- R & CD

Rationale:

maintain staff number, and morale as core of business and business predictability for customers.

My ‘Christian’ Friend

- Lawrence Day. Seattle Washington
- “Love is not quantifiable”
  - Not in Bible
  - Little guidance from God and Jesus



Love: Biblical Dimensions
<- Lawrence Day, Boeing

The biblical citation (Book of First Corinthians, Chapter 13) I included gives the quantification of the term "love" (agape in Greek). The 'quantification' for love would be as follows:

---------->

A person who loves acts the following way toward the person being loved:

1. **suffereth long**
2. **is kind**
3. **envieth not**
4. **vaunteth not itself, vaunteth...:**
   or, is not rash (Vaunt = extravagant self praise)
5. **is not puffed up**
6. **Doth not behave itself unseemly**
7. **seeketh not her own**
8. **is not easily provoked**
9. **thinketh no evil**
10. **Rejoiceth not in iniquity (=an unjust act)**
11. **rejoiceth in the truth**
12. **Beareth all things**
13. **believeth all things**
14. **hopeth all things**
15. **endureth all things**
16. **never faileth**

A Paper on ‘Love Quantified’

http://www.gilb.com/tiki-download_file.php?fileId=335

Love Quantified

By:

Lawrence E. Day

for

Dr. Larry Beebe

And

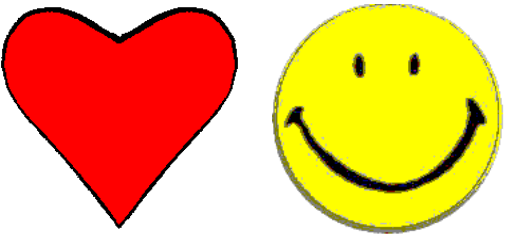
Dr. Raghu Korrapati

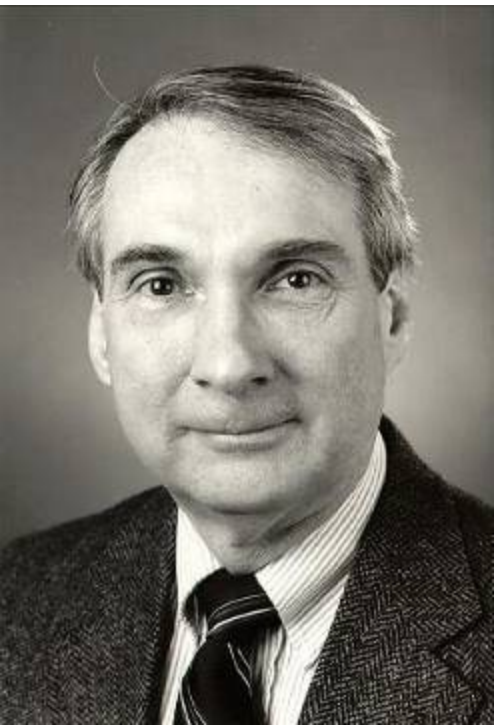
Table of Cor

Mathematical Models of Love & Happiness

http://sprott.physics.wisc.edu/ lectures/love&hap/

(This talk)





J. C. Sprott

Department of Physics

University of Wisconsin - Madison

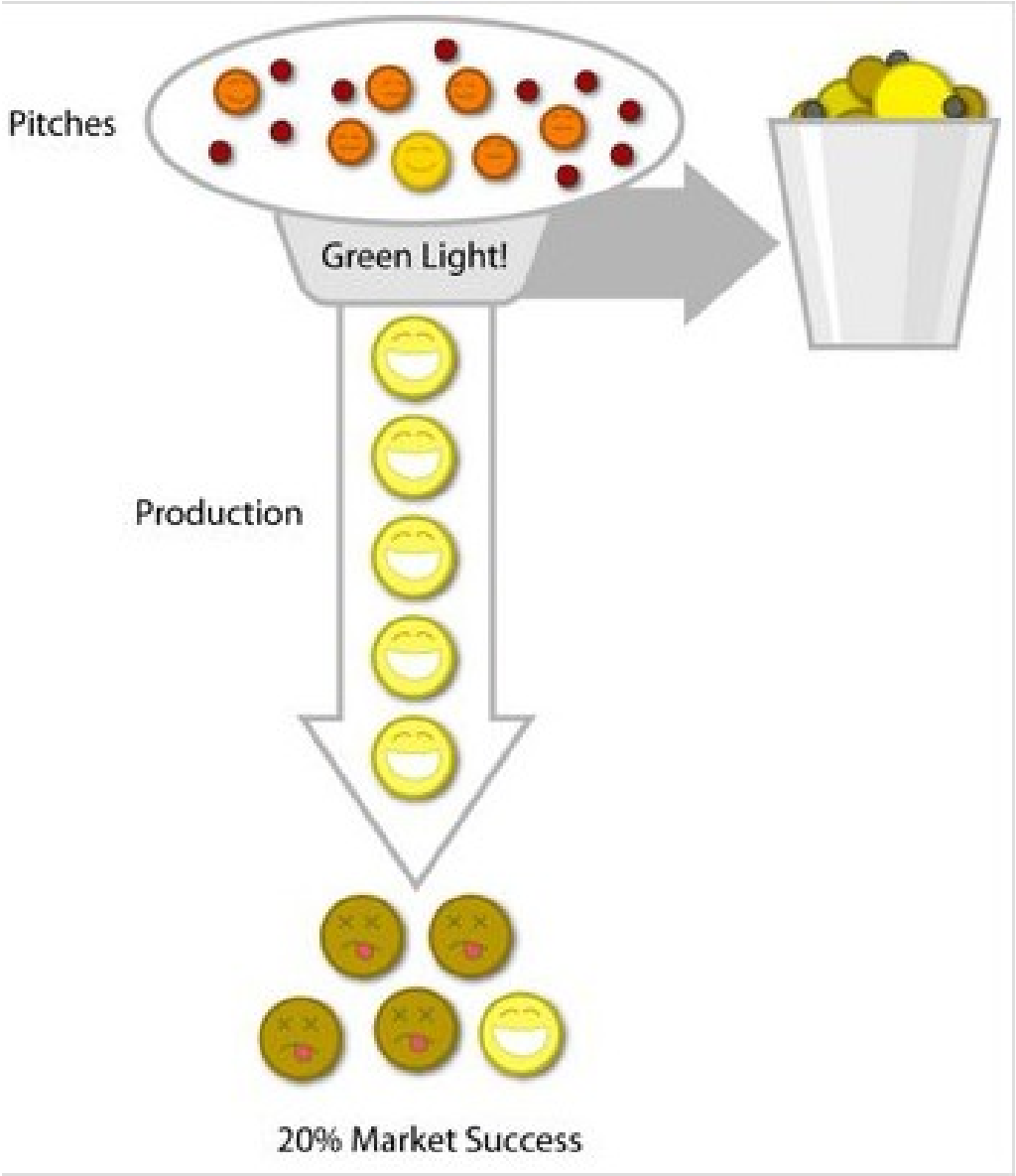
Presented to the

Chaos and Complex Systems Seminar

in Madison, Wisconsin

on February 6, 2001

Horror Project Requirements Case

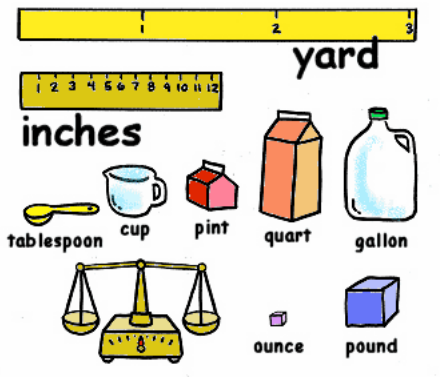


Based On Real Case 2006-8

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

The Lesson

- If management does not clarify the main reasons for a software development project, QUANTITATIVELY,
- It can cost $100,000,000+ and 8 years of wasted time

What the Project Manager Wanted after $160,000,000* was spent

"Able to add features *without fear …*

Able to improve code *without fear …*

Able to incorporate improved technology *without fear …*

Able to rapidly adapt to changing requirements …

Code that's easy to maintain …

Code that's uniform, easy to understand …

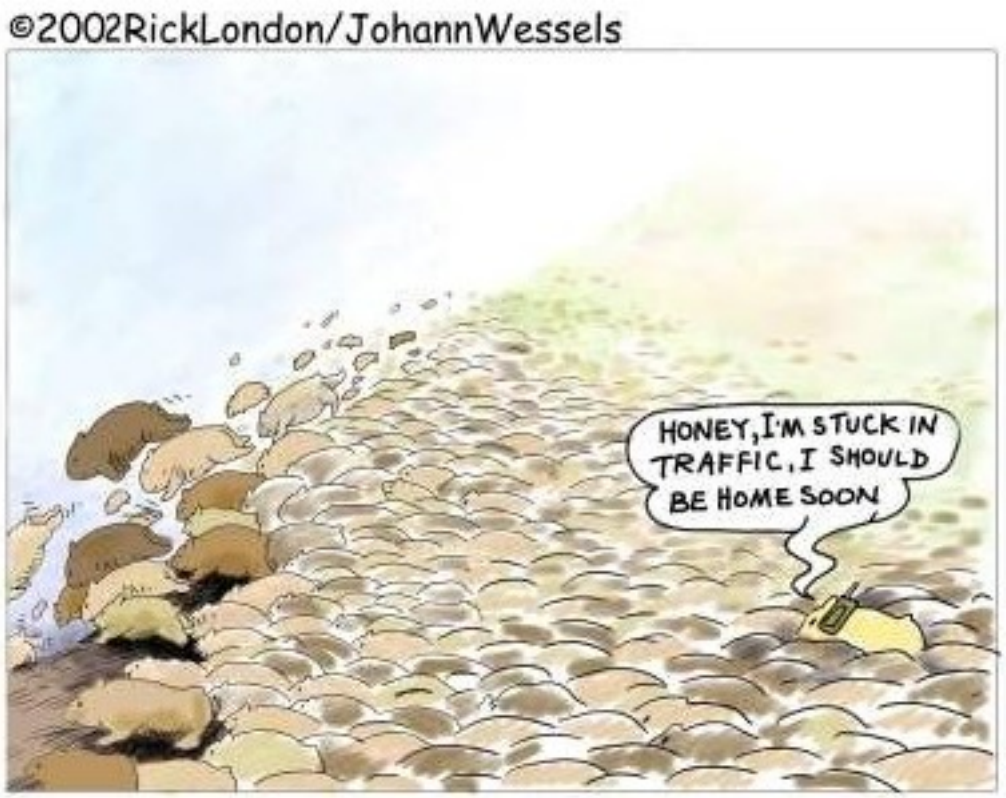
Code that's readily and thoroughly testable …"

* The number was sometimes quoted at $100 million, and by 2008 it was certainly much higher, no deliveries had taken place by May 2008.

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



Main Hypothesis by Gilb:

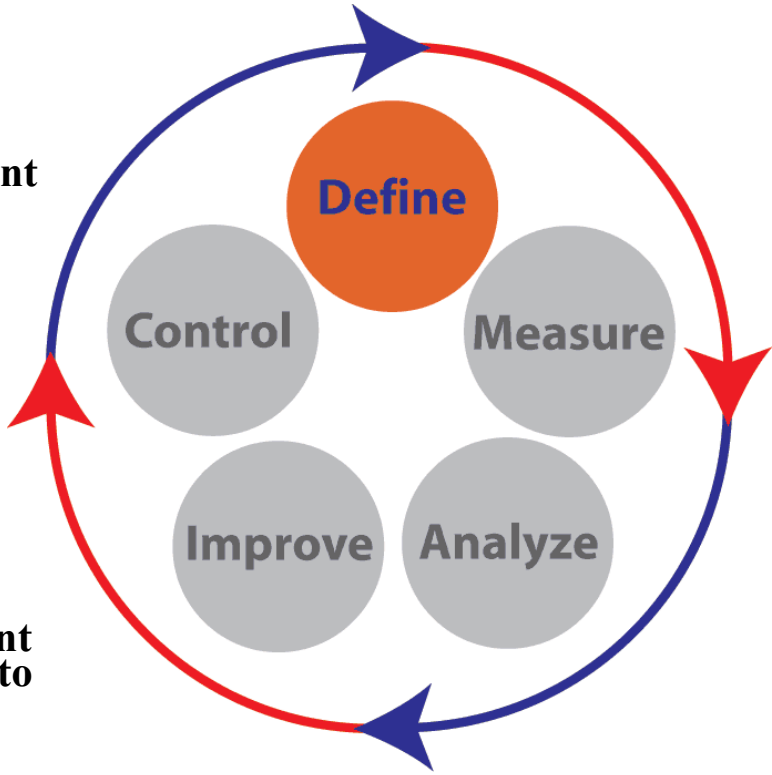
1. **The requirements are unacceptably unclear.**

2. **The project has proceeded to throw masses of detail ('design') at the unacceptably unclear requirements.**
3. **There is no objective way to decide if any of the built or planned detail is necessary or sufficient to meet the unclear requirements.**
4. **There is no point whatsoever in continuing the project on this basis (the bad requirements).**

   Because there is no way to determine if the project is progressing towards any reasonable goals.

Suggested Practical Actions for HORROR Project.

1. **Stop all HORROR Project Effort based on the old plans**
2. **Adopt a new 'policy' for running this project**
3. **Quickly (in a week or 2) rewrite the top level requirements.**
    1. **Review the current business and technical environment to see if new and different requirements are more appropriate than the current (3.13 2003 set)**
    2. **Quantify all the top few objectives**
    3. **Estimate the value of reaching the objectives**
    4. **Get the objectives approved by top management**
        1. **This is not the same as project funding approval.**
        2. **It just says we would value reaching these objectives**
        3. **And we don't know of any better ones.**
4. **Let a 'qualified' system architect decide the best way to deliver the results.**
    1. **The big question is how much, if any of the current HORROR project investment can be applied, and to what degree the results need to be evolved into the current customer product and environment.**
    2. **Approve the architecture**
5. **Don't ever pour money into the project unless real measurable improvements are promised and delivered in short cycles.!**



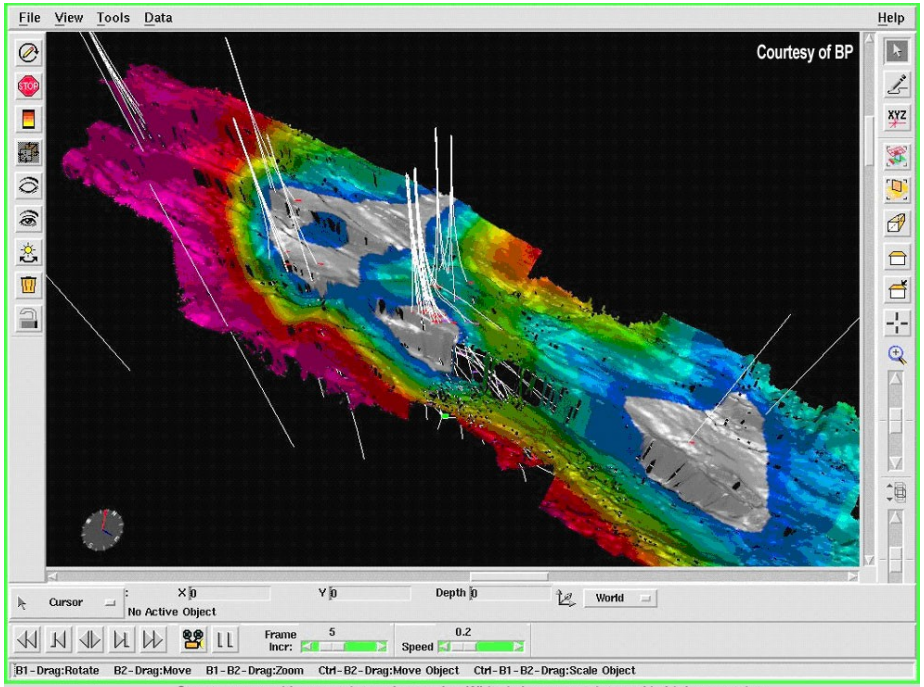
1. Seamless ROCKfield data and workflow

Central to THE CORPORATION's ROCKfield business strategy is to **be the world's premier INTEGRATED** ROCKfield service provider. Software is a key enabling technology towards providing this integration. As an active contributor to this overall strategy, Horror will provide the following:

Broad MINESITE data coverage.

Horror will be able to tap a **broad variety** of data about the well and its environment. Each of the Horror products will be able to store and exchange all of the following data types, e.g. wireline will be able to access MINING data, etc. These data types include:

- *GILB COMMENT: There is no attempt to define "**seamless**" quantitatively so that we can **measure** and **track** the final **result**.*
- *The content of the rest of the requirement is an equally vague set of functional requirements (like "will support standard Windows OLE compound document functionality").*
- *It is not at all clear how well these things will be done (no performance or quality requirements for these are mentioned.*
- *The result is likely to be that the function is there but has substandard user quality and performance.*
- *We need to define the user experience – how fast, how easy.*
- *We need to define the end state that would make us the worlds premier provider.*
- *We have not even got close to it.*



Structure map with uncertainty color overlay. White is low uncertainty, red is high uncertainty.

2. Dramatic boost in operational efficiency

HORROR will provide a much **more efficient user experience**
by
automating a number of routine activities
and by **removing restrictions on when or how a number of activities may be performed.**

These improvements include:

As-you-go product generation HORROR will provide the following features

to **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
by
semi-automating and/or performing these activities as the data comes in.

GILB ANALYSIS:

There is no unambiguous definition of 'operational efficiency' (no defined Scale or Scales of measure).

There is no defined level on that (undefined) scale that tells us what is Dramatic (and when it is dramatic (short term levels, longer term levels, competitor levels). Goal, Stretch, Trend levels to use Planguage terms.

The 'efficient user experience' is not at all defined in terms quantified

In short this requirement completely fails, where is could have easily succeeded (in 1998)

to specify the level of operational efficiency that the product would measurably achieve.

The rest of the specification with features like

'Automated depth adjustment for data acquired since last deviation survey'
are merely suggested design elements,
that will only contribute to the operational efficiency
if they are well designed and implemented to a defined level of impact on
the (yet undefined quantified definition of operational efficiency).
These design ideas do not belong here at all
(this applies to all the requirements at this level).
They should be in a separate architecture or design specification, that suggested appropriate designs for

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!).

4. Greater software development productivity

"A primary goal of HORROR is to provide a **much more productive software development environment than was previously the case.**

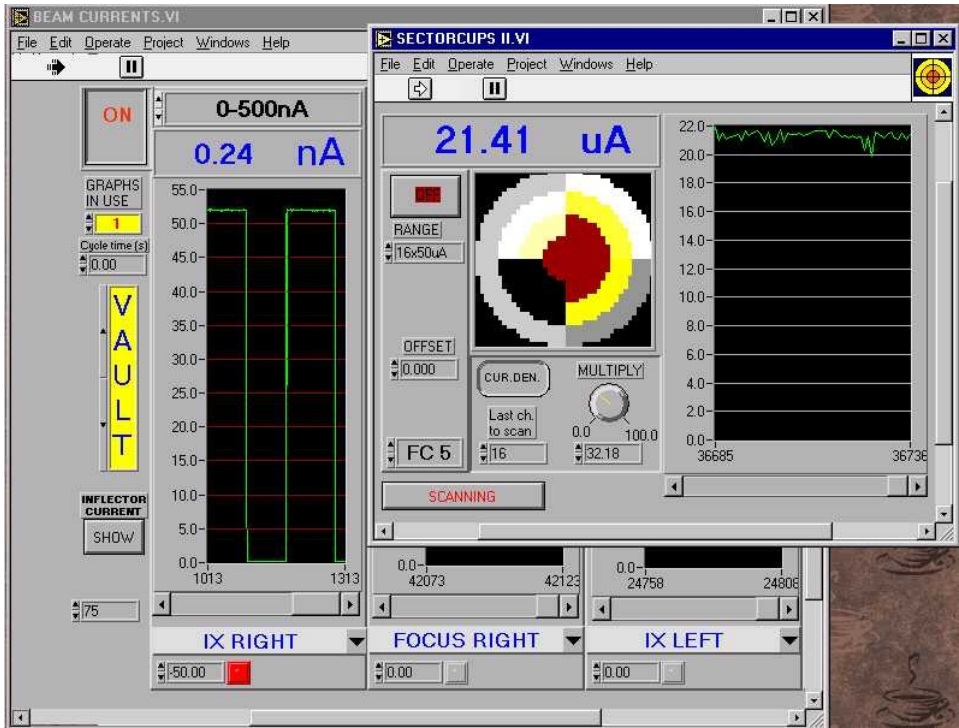
- In addition to traditional software development by professional software personnel,
  - –this goal is aimed at **facilitating the development of exploratory or custom software or reports by personnel such as tool or interpretation algorithm developers whose software expertise is more modest.**
- A related aspect of this goal is that the **software development difficulty should scale,**
  - – i.e. simple applications should **be easy to develop.**

GILB COMMENT:
SAME COMMENTS AS ABOVE

The Major concept (Productivity) is NOT defined.

No level of productivity is numerically and testably set.

It could easily be (ask me how!)



5. Rich support for next-generation tools and applications

"HORROR will provide

– a richer set of functionality

– for supporting

•next-generation logging tools

• and applications.

Provided features include:

Richer equipment model

HORROR will

•provide a

– richer equipment model that

– better fits modern hardware configurations.

•*GILB COMMENT:*

– **Total lack of quantified definition of what this "Supportability"** is.

•It could easily be defined as a clear quantified requirement.

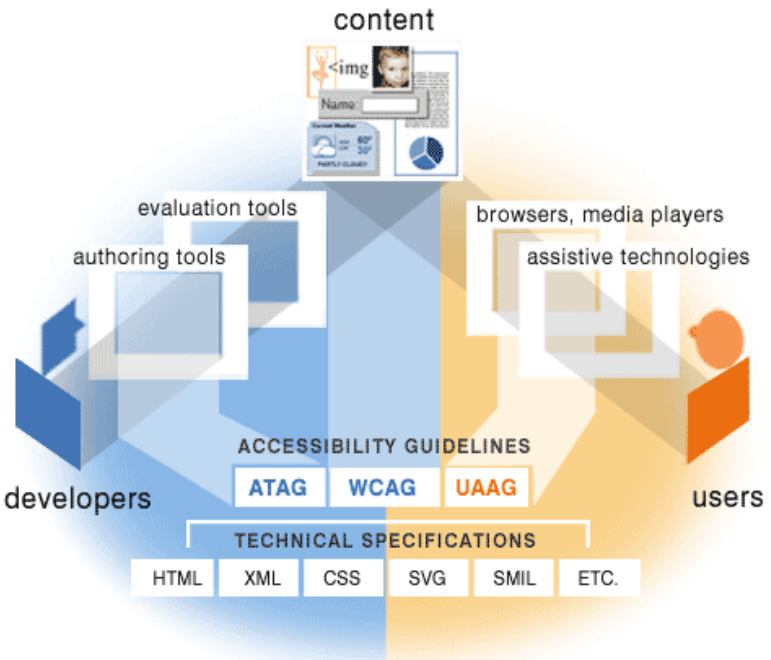
– Masses of ***nice sounding gratuitous design ideas***

–**unjustified** in relation to the (**undefined**) requirement.

– A license to keep on **implementing all these things endlessly**

– with no end in sight

–and no **responsibility** for costs or effects.



6. Rock solid robustness

- *While **robustness** is an **essential** HORROR requirement in all its uses, it is especially critical in MINING applications where the much longer job durations afford software defects (e.g. memory leaks) a greatly expanded opportunity to surface.*
- In this regard,
- HORROR will provide the following features or attributes:
  - ***Minimal down-time***
- A critical HORROR objective is to have **minimal downtime** *due to* **software failures**.
- This objective includes:
  - **Mean time between forced restarts > 14 days**
- HORROR's goal for mean time between forced restarts **is greater than 14 days**.
- *Comment: This figure does not include restarts caused by hardware problems, e.g. poorly seated cards or communication hardware that locks up the system. MTBF for these items falls under the domain of the hardware groups.*
  - **Restore system state < 10 minutes**
- Log scripts and test scripts, subsystem tests
  - ***Built-in testability***
- HORROR will provide the following features and attributes to facilitate testing.
  - **Tool simulators**

- *GILB COMMENT:*
  - *For once a reasonable attempt was made to quantify the meaning of the requirement!*
  - *But is could be done much better*
  - *As usual the **set of designs** to **meet the requirement** do not belong here.*

*–And none of them make any **assertion** about how well (to what degree) they will meet the defined numeric requirements.*

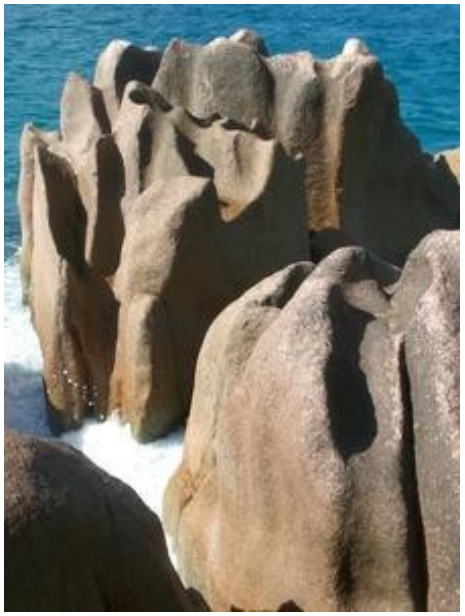
- *And as usual another guarantee of eternal costs on pursuit of a poorly defined requirements is most of the content.*

“Rock Solid Robustness” Defined Clearly in Planguage over a beer

<u>Rock Solid Robustness</u>:

Type: *Complex* Product Quality Requirement.

Includes: { Software Downtime, Restore Speed, Testability, Fault Prevention Capability, Fault Isolation Capability, Fault Analysis Capability, Hardware Debugging Capability}.



Software Downtime:

Software Downtime:

Type: Software Quality Requirement.

Ambition: *to have minimal downtime due to software failures <- HFA 6.1*

***Issue**: does this not imply that there is a system wide downtime requirement?*

Scale: <mean time between forced restarts for defined [Activity], for a defined [Intensity].>

Fail [Any Release or Evo Step, Activity = Recompute, Intensity = Peak Level] **14 days** <- HFA 6.1.1

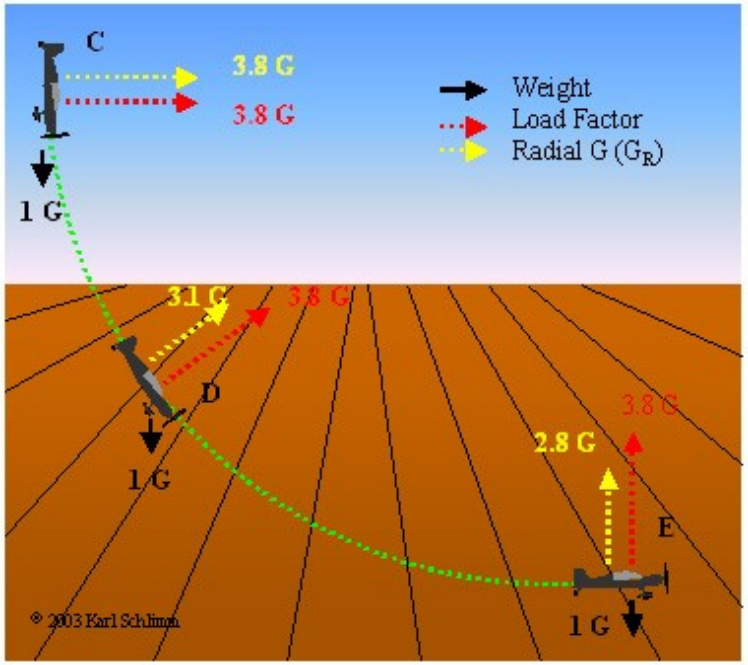
Goal [By 2008?, Activity = Data Acquisition, Intensity = Lowest level] **: 300 days** ??

Stretch: **600 days**

Restore Speed:

Restore Speed:
Type: Software Quality Requirement.

Ambition: Should an error occur (or the user otherwise desire to do so), Horizon shall be able to restore the system to a previously saved state in less than 10 minutes <-6.1.2 HFA.



Scale: Duration from Initiation of Restore to Complete and verified state of a defined [Previous: Default = Immediately Previous]] saved state.

Initiation: defined as {Operator Initiation, System Initiation, ?}. Default = Any.

Goal [Initial and all subsequent released and Evo steps] 1 minute?

Fail [Initial and all subsequent released and Evo steps] 10 minutes. <- 6.1.2 HFA

Catastrophe: 100 minutes.

Testability:

Type: Software Quality Requirement.
Version: 20 Oct 2006-10-20
Status: Demo draft,
Stakeholder: {Operator, Tester}.
Ambition: Rapid-duration automatic testing of <critical complex tests>, with extreme operator setup and initiation.

Scale: the duration of a defined [Volume] of testing, or a defined [Type], by a defined [Skill Level] of system operator, under defined [Operating Conditions].

Goal [All Customer Use, Volume = 1,000,000 data items, Type = WireXXXX Vs DXX, Skill = First Time Novice, Operating Conditions = Field, {Sea Or Desert}. <10 mins.

Design Hypothesis*: Tool Simulators, Reverse Cracking Tool, Generation of simulated telemetry frames entirely in software, Application specific sophistication, for drilling – recorded mode simulation by playing back dump file, Application test harness console <-6.2.1 HFA*

The Confirmit Case Study 2003-2013

See paper on this case at www.gilb.com

Papers/Cases/Slides, Gilb Library,

value slide w…	http://www.gilb.com/tiki-download_file.php?fileId=152
ppr wrong ag…	http://www.gilb.com/tiki-download_file.php?fileId=50
Paper Firm	http://www.gilb.com/tiki-download_file.php?fileId=32

And see papers (IEEE Software Fall 2006) by Geir K Hanssen, SINTEF

Their product =

confirmit

Chief Storyteller =

Trond Johansen

Real Example of 1 of the 25 Quality Requirements

Usability.Productivity ***(taken from Confirmit 8.5,***
performed a set of predefined steps, to produce a standard MR Report.

development)

Scale for quantification: Time in minutes to set up a typical specified Market Research-report

Past Level [Release 8.0]: 65 mins.,

Tolerable Limit [Release 8.5]: 35 mins.,

Goal [Release 8.5]: 25 mins.

Note: end result was actually 20 minutes ☺

Meter [Weekly Step]: Candidates with Reportal experience, and with knowledge of MR-specific reporting features

confirmit

Trond Johansen

Shift: from Function to Quality

- **Our new focus is on the day-to-day operations of our Market Research users,**
  - **not a list of features that they might or might not like. 50% never used!**
  - **We KNOW that increased efficiency, which leads to more profit, will please them.**
  - **The '45 minutes actually saved x thousands of customer reports'**
    - **= big $$$ saved**
- **After one week we had defined more or less all the requirements for the next version (8.5) of Confirmit.**

confirmit

FIRM (Future Information Research Management, Norway)
project step planning and accounting:
using **an Impact Estimation Table**

Trond Johansen

- IET for MR Project – Confirmit (<-FIRM Product Brand) 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 Confirmit 8.5 in **Evo Step Impact *Measurement***

4 product areas were attacked in all: **25 Qualities** concurrently, one quarter of a year. Total development staff = 13

Impact Estimation Table: Reportal codename "Hyggen"

9

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	
			Usability.ResponseTime.Export		
1,0	12,0	150,0	13	13	
			Usability.ResponseTime.ViewR		
1,0	14,0	100,0	15		
			Development resources		
203,0			0		

8

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		
		97,2	38	3	2
			Runtime.ResourceUsage.MemoryLeak		
		100,0	800	0	0
			Runtime.Concurrency (number of users)		
		146,7	150	500	1000
			Development resources		
			0		84

3

Current Status	Improvements		Reportal - MR Feat		
Units	Units	%	Past	Toler	
			Usability.Replacability (feature c		
1,0	1,0	50,0	14	13	
			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

3

ments			XML Web Services		
		%	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

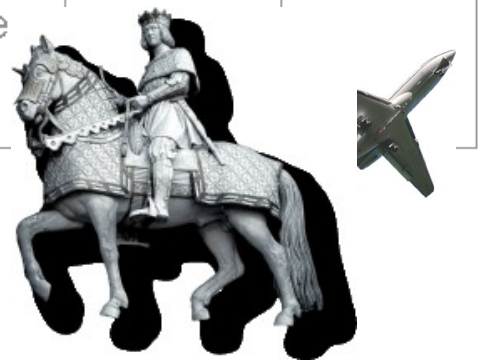
Confirmit **Evo Weekly Value Delivery Cycle**

	Development Team	Users (PMT, Pros, Doc writer, other)	CTO (Sys Arch, Process Mgr)	QA (Configuration Manager & Test Manager)
Friday	✓ 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 genereal maintenance work, documentation.		✓ Approve/reject design & Step N ✓ Attend Project Mgmt meeting: 12-15	✓ 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	✓ Develop test code & code for Version N	✓ Use Version N-1		✓ Follow up CI ✓ Review test plans, tests
Tuesday	✓ Develop Test Code & Code for Version N ✓ Meet with users to Discuss Action Taken Regarding Feedback From Version N-1	✓ Meet with developers to give Feedback and Discuss Action Taken from previous actions	✓ System Architect to review code and test code	✓ Follow up CI ✓ Review test plans, tests
Wednesday	✓ Develop test code & code for Version N			✓ Review test plans, tests ✓ Follow up CI
Thursday	✓ Complete Test Code & Code for Version N ✓ Complete GUI tests for Version 2			✓ Review test plans, tests ✓ Follow up CI

Evo's impact on Confirmit product qualities 1st Qtr

- Only 5 highlights of the 25 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 Confirmit 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



Initial Experiences and conclusions

- **EVO has resulted in**
  - **increased motivation and**
  - **enthusiasm amongst developers,**
  - **it opens up for *empowered creativity***

- **Developers**
  - **embraced the method and**
  - **saw the value of using it,**
  - **even though they found parts of Evo difficult to understand and execute**

confirmit

Trond Johansen

Conclusions -

- **The method's positive impact on Confirmit product qualities has convinced us that**
  - **Evo is a better suited development process than our former waterfall process, and**
  - **we will continue to use Evo in the future.**
- **What surprised us the most was**
  - **the method's power of focusing on delivering value for clients versus cost of implementation.**
  - **Evo enables you to re-prioritize the next development-steps based on the weekly feedback.**
  - **What seemed important**
    - **at the start of the project**
    - **may be replaced by other solutions**
    - **based on knowledge gained from previous steps.**

- **The method has**
  - **high focus on measurable product qualities, and**
    - **defining these clearly and testably, requires training and maturity.**
  - **It is important to *believe* that everything can be measured,**
    - **and to seek guidance if it seems impossible.**

Trond Johansen

Evo's impact on Confirmit 9.0 product qualities Results from the second quarter of using Evo. 1/2

Product quality	Description	Customer value
Intuitiveness	Probability that an inexperienced user can intuitively figure out how to set up a defined Simple Survey correctly.	Probability increased by **175%**
Productivity	Time in minutes for a defined advanced user, with full knowledge of 9.0 functionality, to set up a defined advanced survey correctly.	Time reduced by **38%**

Product quality	Description	Customer value
Productivity	Time (in minutes) to test a defined survey and identify 4 inserted script errors, starting from when the questionnaire is finished to the time testing is complete and is ready for production. (Defined Survey: Complex survey, 60 questions, comprehensive JScripting.)	Time reduced by **83%** and error tracking increased by **25%**

Evo's impact on Confirmit 9.0 product qualities Results from the second quarter of using Evo. 2/2

Product quality	Description	Customer value
Performance	Max number of panelists that the system can support without exceeding a defined time for the defined task, with all components of the panel system performing acceptable.	Number of panelists increased by **1500**%
Scalability	Ability to accomplish a bulk-update of X panelists within a timeframe of Z second	Number of panelists increased by **700%**
Performance	Number of responses a database can contain if the generation of a defined table should be run in 5 seconds.	Number of responses increased by **1400%**

Code quality – ”green” week

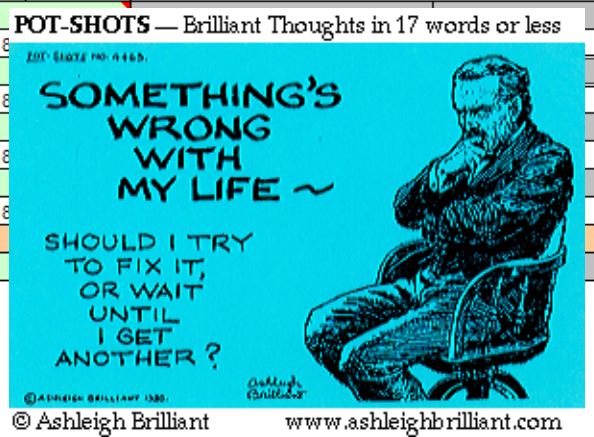
Confirmit (2005) Norway

decided to design ‘ease of change’ in, to a legacy system, in one-week delivery-cycles, per month, using ‘Evo’ Agile

‘Refactoring to reduce technical debt’ -> Re-Engineering

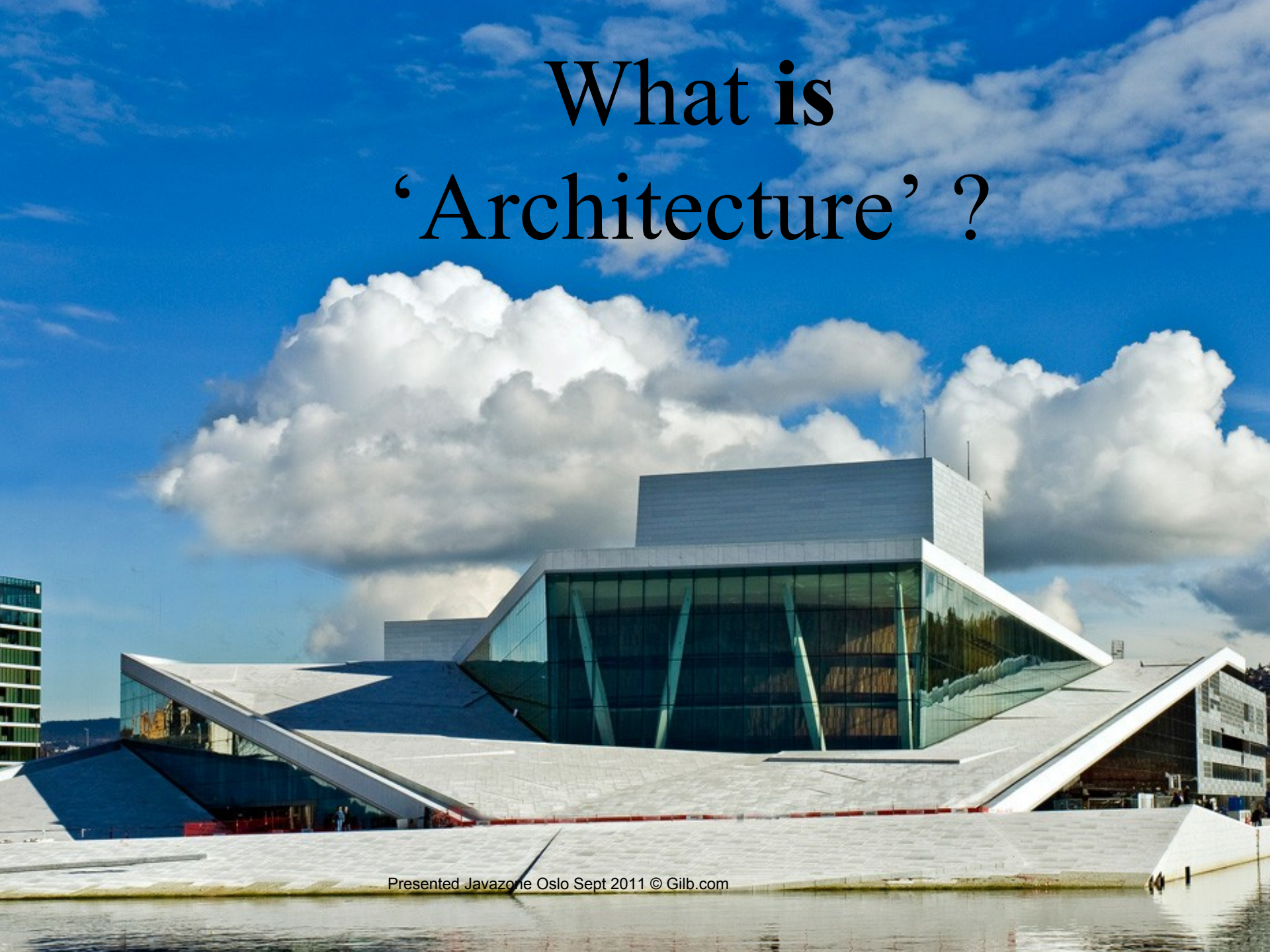
- **In these ”green” weeks, some of the deliverables will be less visible for the end users, but more visible for our QA department.**
- **We manage code quality through an Impact Estimation table.**

Current Status		Improvement	Goals			Step 6 (week 14)		Step 7 (wee	
	Units		Past	Tolerable	Goal	Estimated Impact	Actual Impact	Estimated Impact	A
	100,0	100,0	0	80	100			100	
Speed									
	100,0	100,0	0	80	100	100	100		
Maintainability.Doc.Code									
	100,0	100,0	0	80	100	100	100		
InterviewerConsole									
NUnitTests									
	0,0	0,0	0	90	100				
PeerTests									
	100,0	100,0	0	90	100			100	
FxCop									
	0,0	10,0	10	0	0				
TestDirectorTests									
	100,0	100,0	0	90	100			100	
Robustness.Correctness									
	2,0	2,0	0	1	2	2	2		
Robustness.BoundaryConditions									
	0,0	0,0	0						
Speed									
	0,0	0,0	0						
ResourceUsage.CPU									
	100,0	0,0	100						
Maintainability.Doc.Code									
	100,0	100,0	0						
SynchronizationStatus									
NUnitTests									



- Speed
- Maintainability
- Nunit Tests
- PeerTests
- TestDirectorTests
- Robustness.Correctness
- Robustness.Boundary Conditions
- ResourceUsage.CPU
- Maintainability.DocCode
- SynchronizationStatus

What **is** ‘Architecture’ ?



Architect = **Master** Builder

Architect is from ‘Arc
Tecton,’

which means
‘Master Builder’.

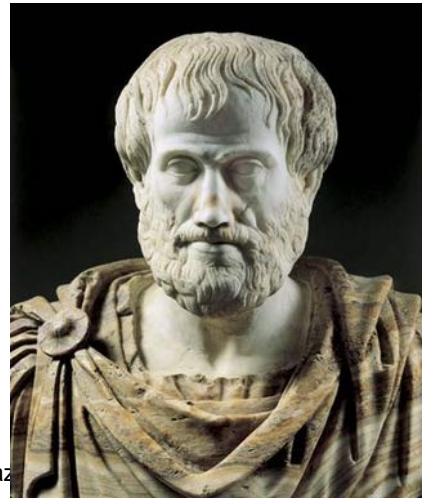
‘Archi’ is not from
‘Arch’,

but from ‘Arche’:
primitive, original,
primary.

The architecture is there to satisfy requirements

The closer an object is to fulfilling its purpose, the closer it is to perfection.

Aristotle's Belief



Oslo Opera house

- Qualities
- Costs
- Constraints

Oslo Opera house requirements (guess)

- Qualities
  - Impressive
  - Acoustics
  - Flexibility
  - Extendibility
  - Integratedness
  - Performance Visibility
  - National Symbol
  - Access to Fjord View
  - Comfort
- Costs
  - Building
  - Maintenance
  - Operational manpower
- Constraints
  - Legal Building
  - National Architecture
  - Archeological Site
  - Local Materials
  - Local Labour

The architecture is there to satisfy requirements

Architecture
that never refers to
necessary qualities,
performance characteristics,
costs,
and constraints

Is not really architecture

Of any kind

The architecture is there to satisfy requirements

The Architecture *process* is **driven** by requirements

Real (IT/Sw) Architecture

Real Architecture

- Has multidimensional *clear* design performance objectives
- Has *clear* multiple constraints
- Produces architecture ideas which enable and permit objectives to be met reasonably within constraints
- Estimates expected effects

***Pseudo* Architecture**

- Lacks dedication to clear **objectives** and **constraints**
- Does not **estimate** or articulate the expected **effects, on** objectives & constraints, of suggestions

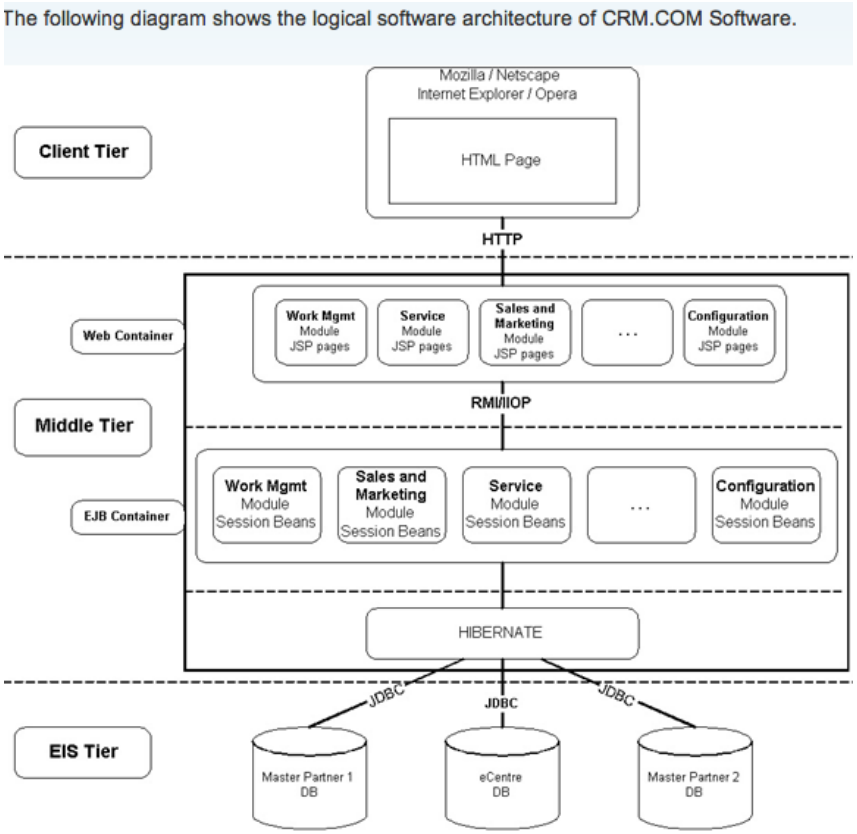
Pseudo Architecture
Does not mention goals and constraints

‘Bad’ ‘Arch.’ definitions

- Software architecture is a collection of software **components** unified via interfaces into decomposable system based on one or more technology platforms.
- Software Architecture shows the **structural** and **behaviour** of a system which is comprised of software **elements** and *exposing the properties* of those elements and relationships among them.

http://www.sei.cmu.edu/architecture/start/community.cfm

Uninformative diagrams



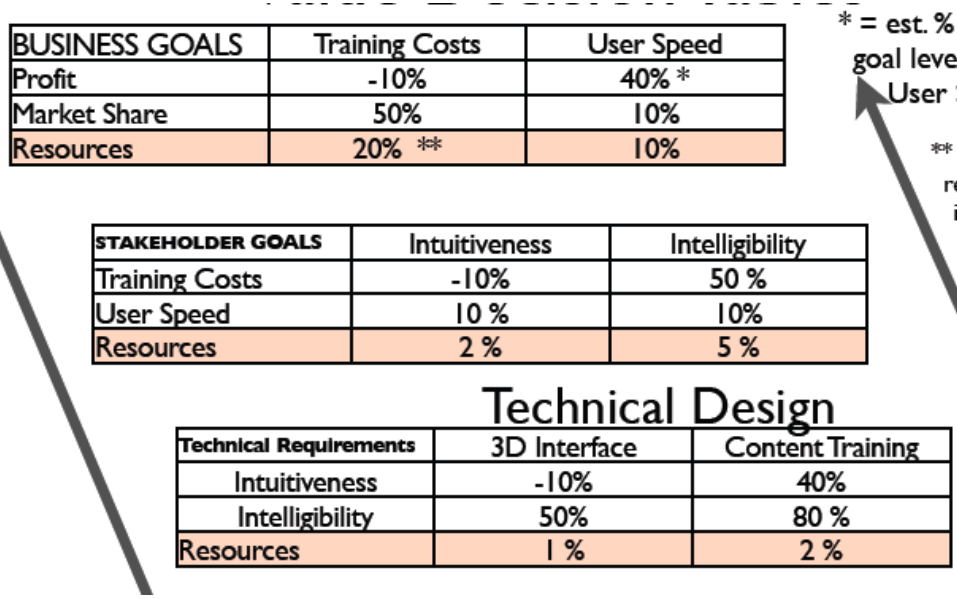
Better Architecture

Better definitions

- Software …needs to address the needs of business **stakeholders** within the organizational, technical and any other **constraints** to achieve the business, technical or any other **goals**.
  - It also needs to address software trustworthy characteristics like reliability, availability, maintainability, robustness, safety, security and survivability.

- System Architecture should contain **goals/requirements** artifacts, and structure and behavior artifacts **based on** those goals.

Real Architecture diagrams



http://www.sei.cmu.edu/architecture/start/community.cfm

A Distinction

Architecture *Process*

- A continuous, and lifecycle long, **activity of finding means for ends**

Architecture *Specification*

- A specification of
  - a set of means
  - for a set of ends

We argue that the following are **absolute essentials** for 'real' architecture

Architecture *Process* has

- Clear multiple objectives
- Clear constraints
- A process of identifying and analyzing (estimating effects of) potential means
  - For reaching objectives, within constraints

Architecture *Specification* has

- Well defined components
  - Able to deliver predictable attributes
- Credible estimates of the multiple effects of each component, and the whole

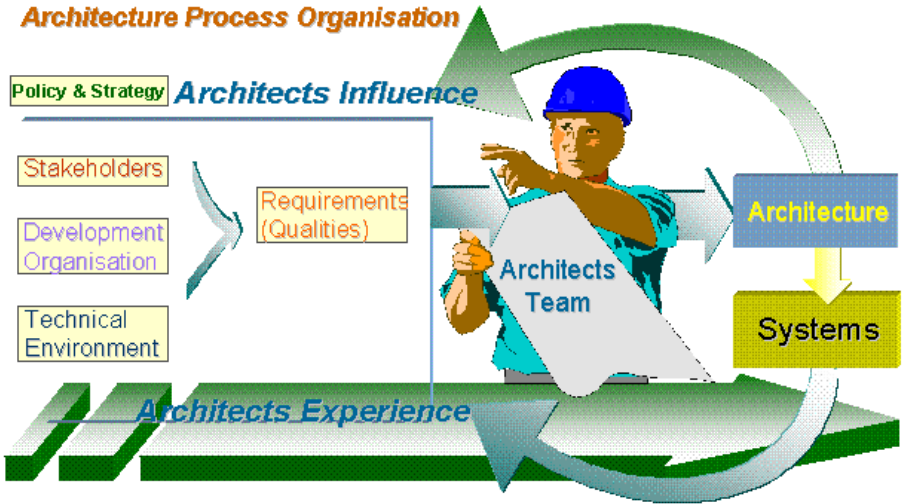
Why are these Architecture essentials, essential?

Why?

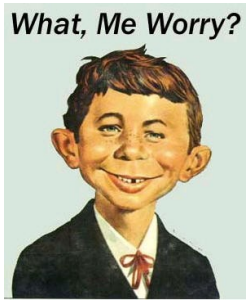
- Failure to reach even one ‘critical’ objective can mean total system failure
  - Example: reliability
- Failure to respect even a single constraint can mean total system failure
  - Example: cost

And if they are missing…

- You cannot expect the specified architecture will reach objectives, within constraints
- You have lost architectural control



What a Difference



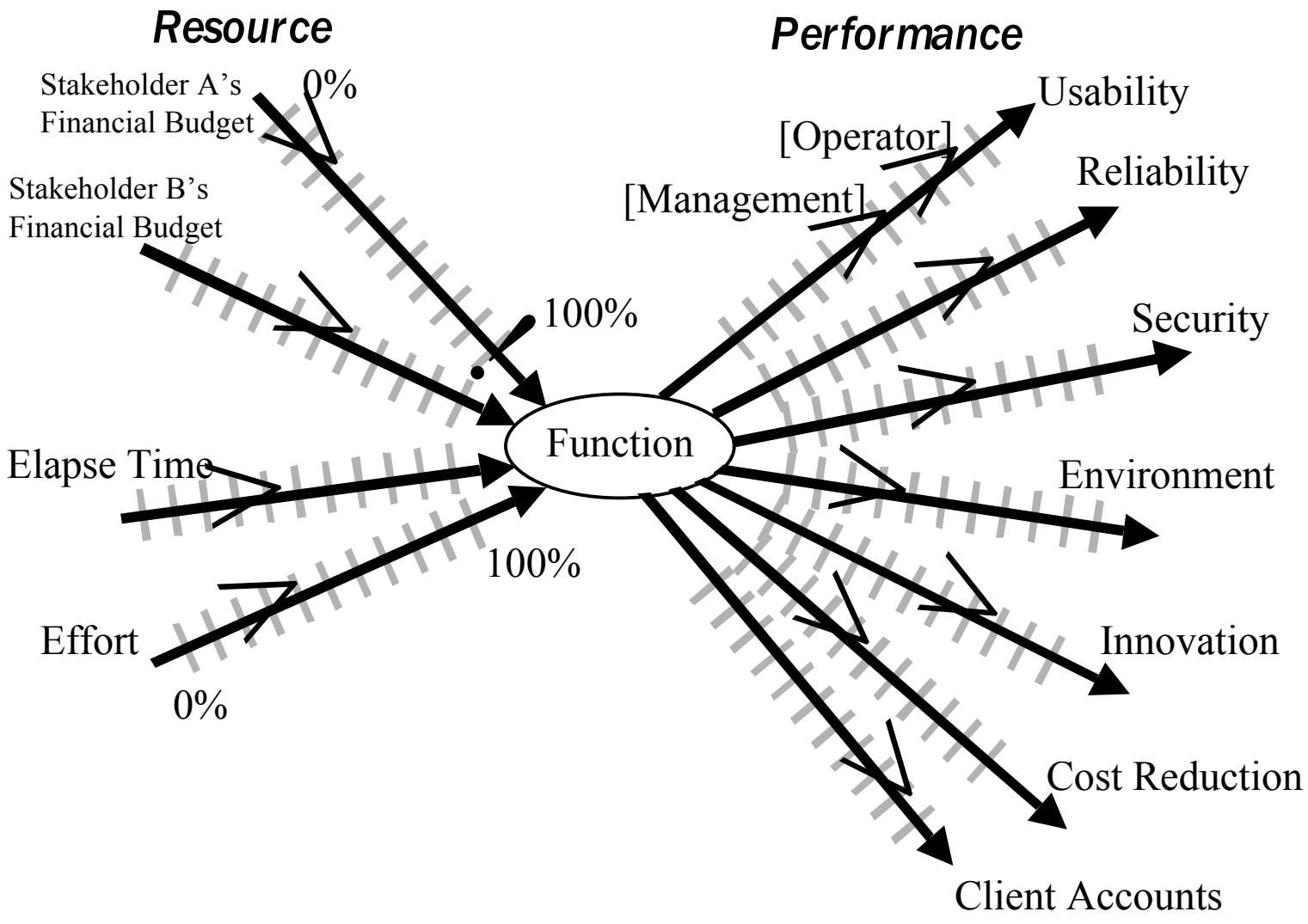
A Real Architect

- Can and does estimate resources needed for any suggested architecture
  - Capital Cost
  - Maintenance Cost
  - Skilled People hours to install and maintain
- Can and Does estimate the impact of each architecture component on the top level critical objectives
  - All '-ilities' (security etc)
  - All Performance (Capacity

A False Architect

- Does not even try to **estimate any costs**
- of any architectures
  - Does **not know how** to do so if asked
  - If they try to estimate they are at least 10x wrong
- Does not **even try to estimate the numeric impact** on even the most critical architectural objectives
- Does not even **realize** they need **quantified performance and quality objectives** to drive and justify architecture
- They have no specific verifiable idea of the impact their ideas have on numeric quality and performance levels.
- It is all 'smoke and mirrors'
- They take **no responsibilit**y for the performance and quality attributes or costs of their suggested architecture: no skin in the game.

Multiple Required Performance and Cost Attributes
are the basis for architecture selection and evaluation



Planguage Glossary

(full glossary 650+ concepts download at www.gilb.com)
http://www.gilb.com/tiki-download_file.php?fileId=387

- **Architecture (collective noun):**
  - Concept *192. May 9 2005

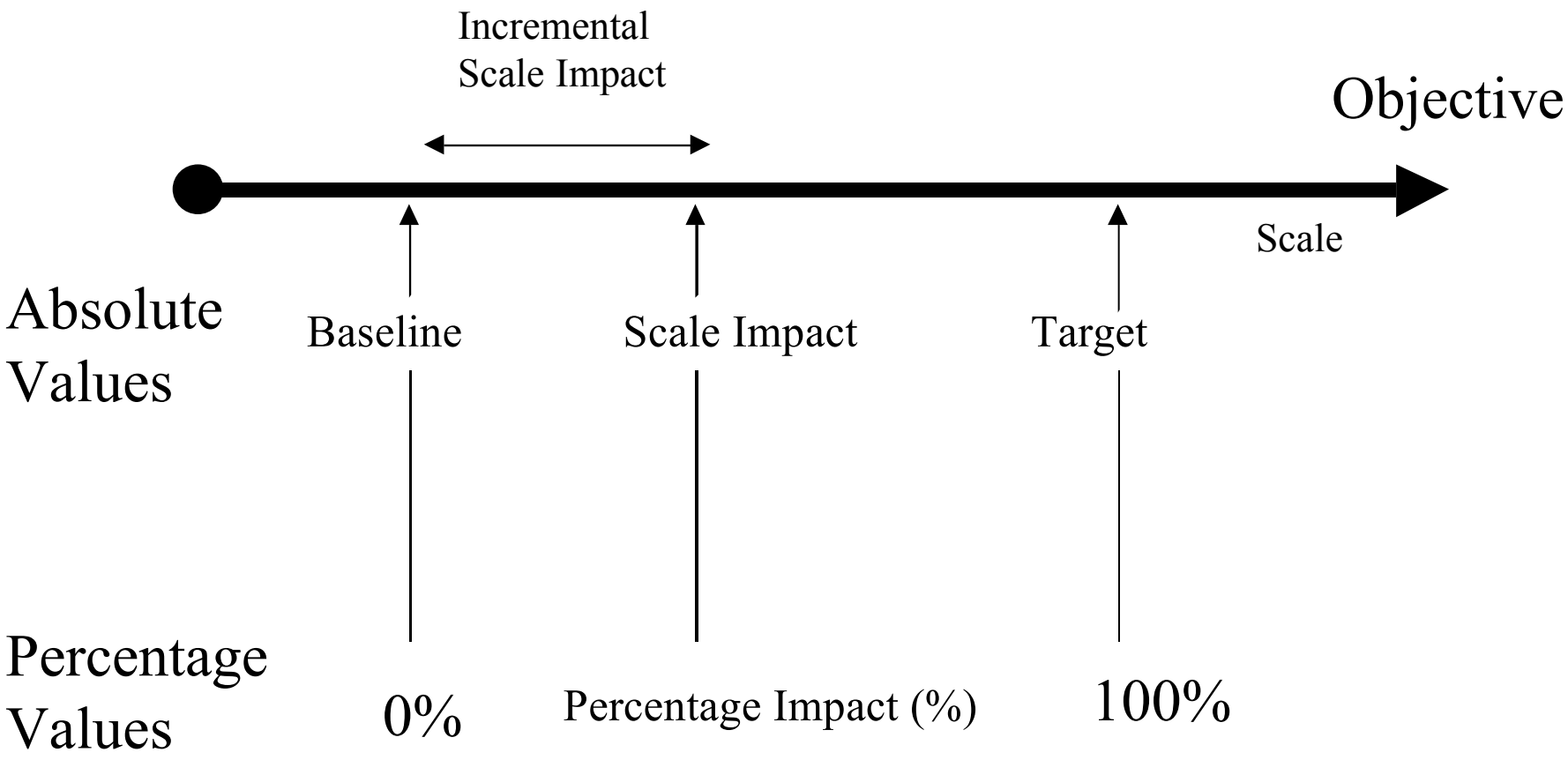
- The 'architecture' is
  - the set of entities that in fact exist
  - and impact a set of system attributes
  - directly, or indirectly, by
    - constraining,
    - or influencing,
      - related engineering decisions.

Requirement

- is a
- **stakeholder-valued system state,**
- **under stated conditions.**

- **Concept *026 (Planguage Glossary, 2012)**
- http://www.gilb.com/tiki-download_file.php?fileId=386

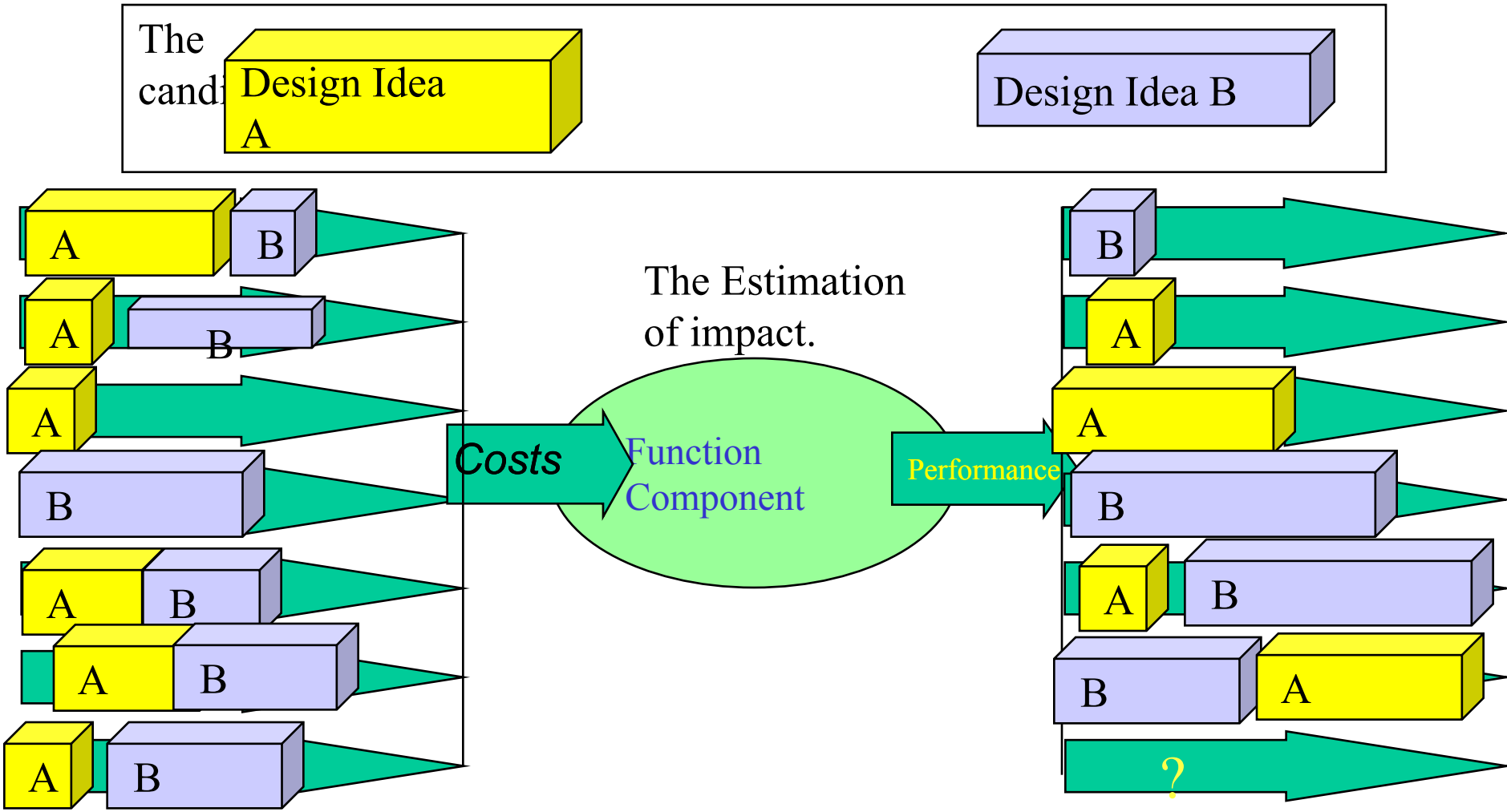
Impact Estimation Basic Concepts



Source: Lindsey Brodie, Editor of Competitive Engineering May 2000

Impact Estimation:

How much do designs impact all critical cost and quality attributes?



Presented

•Figure 1: Real (NON-CONFIDENTIAL version) example of an initial draft of setting the objectives that engineering processes must meet.

Business objective	Measure	Goal (200X)	Stretch goal ('0X)	Volume	Value	Profit	Cash
Time to market	Normal project time from GT to GT5	<9	<6 mo			X	X
Mid-range	Min BoM for The Corp phone	$0	3			X	X
Platformisation Technology	# of Technology 66 Lic. shipping > 3M/yr	4	6	X		X	X
Interface	Interface units	>11M	>13M	X		X	X
Operator preference	Top-3 operators issue RFQ spec The Corp	1	2	X		X	X
Productivity						X	X
Get Torden	Lyn goes for Technology 66 in Sep-04	Yes		X		X	X
Fragmentation	Share of components modified	<10%	<5%		X	X	X
Commoditisation	Switching cost for a UI to another System	yr	>5 rs		X	X	X
Duplication	The Corp share of 'in scope' code in best-selling device	>90%	>95%		X	X	X
Competitiveness	Major feature comparison with MX	Same	Better	X		X	X
User experience	Key use cases superior vs. competition	5	10	X	X	X	X
Downstream cost saving	Project ROI for Licensees	>33%	>66%	X	X	X	X
Platformisation IFace	Number of shipping Lic.	33	55	X		X	X
Japan	Share of of XXXX sales	>50%	>60%	X		X	X
	Numbers are intentionally changed from real ones						

Business Objectives Quantified

Strategy Impact Estimation

Technical Strategies

Objectives

Viking Deliverables

Business Objective	hardware adaptation	Telephony	Reference designs	IFace	Modularity	Defend vs Technology 66	Tools	User Experience	GUI & Graphics	Security	Defend vs OCD	Enterpr
Time to market	20%	10%	30%	5%	10%	5%	15%	0%	0%	0%	5%	
Mid-range	15%	15%	20%	0%	0%	15%	5%	10%	5%	5%	0%	
Platformisation Technology	25%	15%	30%	5%	0%	10%	0%	5%	0%	10%	0%	
Interface	5%	15%	15%	0%	5%	0%	5%	0%	0%	10%	0%	1
Operator preference	0%	15%	20%	5%	0%	20%	5%	10%	10%	20%	5%	1
Get Torden	25%	10%	0%	-10%	0%	20%	0%	10%	-20%	10%	10%	
Commoditisation	20%	10%	20%	10%	-20%	25%	15%	0%	0%	5%	10%	
Duplication	15%	0%	10%	0%	0%	40%	0%	0%	0%	5%	20%	
Competitiveness	10%	15%	20%	0%	10%	20%	10%	10%	20%	10%	10%	1
User experience	5%	0%	0%	0%	20%	0%	0%	30%	10%	0%	0%	
Downstream cost saving	15%	5%	20%	0%	10%	0%	0%	10%	0%	0%	10%	
Platformisation IFace	10%	10%	20%	40%	0%	20%	5%	0%	0%	0%	0%	
Japan	10%	5%	20%	0%	10%	0%	0%	10%	5%	0%	0%	
Contribution to overall result	15%	9%	17%	4%						6%	6%	
Cost (£M)	£ 2.85	£ 0.49	£ 3.21	£ 2.54	£					£ 0.79	£ 0.62	£ 0
ROI Index (100=average)	106	358	109	33						152	202	

Strategy Impacts on Objectives

Cost

Benefit/Cost ratio

THE PRINCIPLE OF 'QUALITY QUANTIFICATION'

•All qualities can be expressed quantitatively,
• *'qualitative'* does *not* mean unmeasurable.

"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;

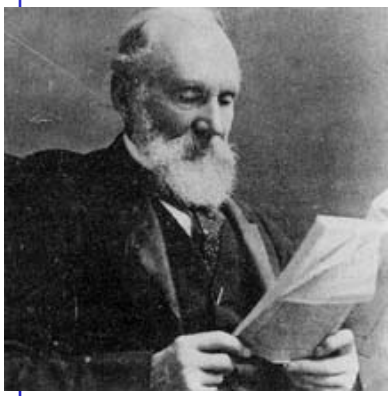
but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind;

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

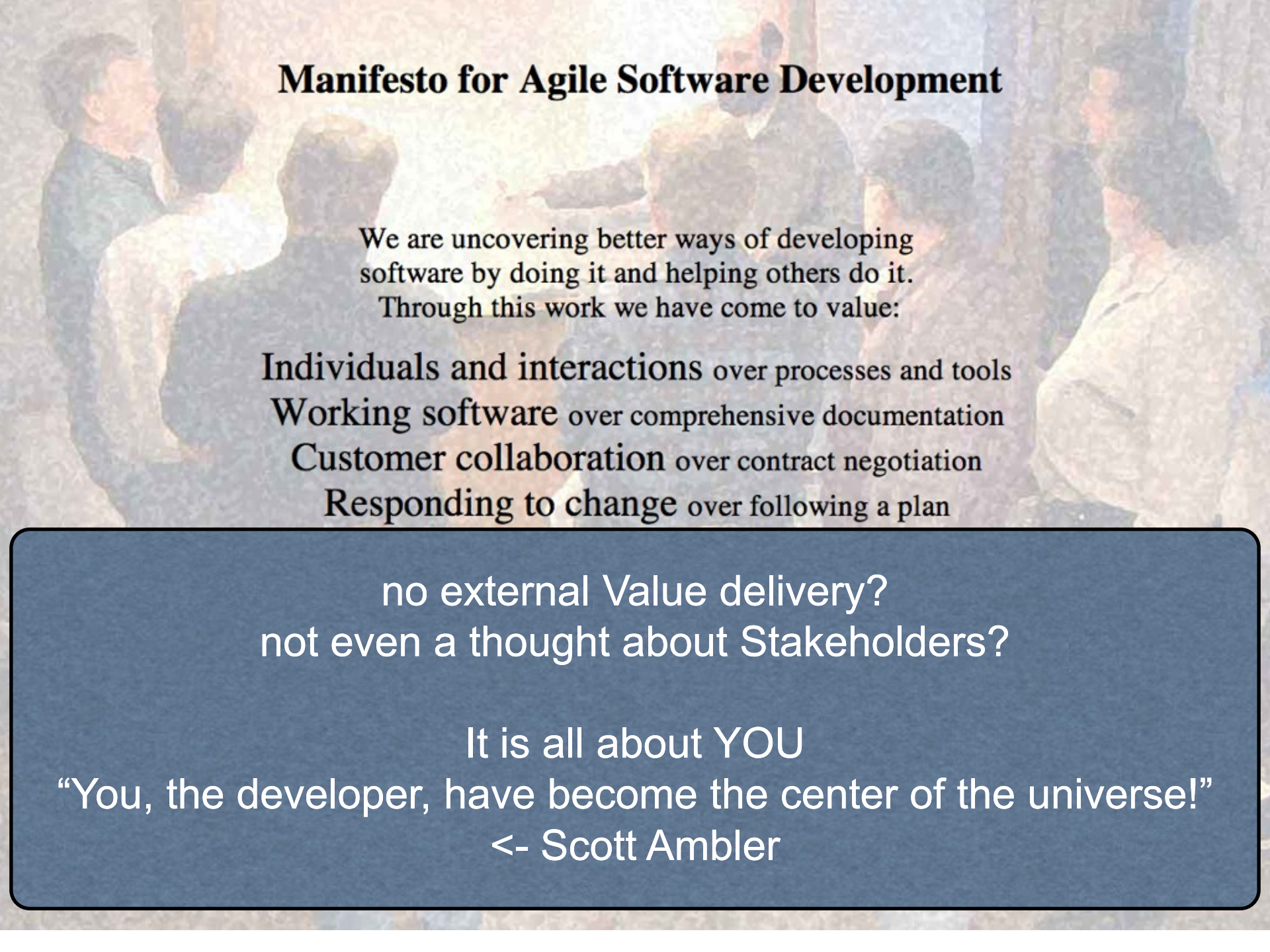


Value Management (Evo) with Scrum development

- developing a large web portal
  www.bring.no
  dk/se/nl/co.uk/com/ee
  at Posten Norge

We have a challenge ...

deliver
value to stakeholders,
within agreeable resources.



Manifesto for Agile Software Development

We are uncovering better ways of developing
software by doing it and helping others do it.
Through this work we have come to value:

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

no external Value delivery?
not even a thought about Stakeholders?

It is all about YOU
“You, the developer, have become the center of the universe!”
<- Scott Ambler

Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.

Give them the environment and support they need, and trust them to get the job done.

Working software is the primary measure of progress.

to maintain a constant pace indefinitely.

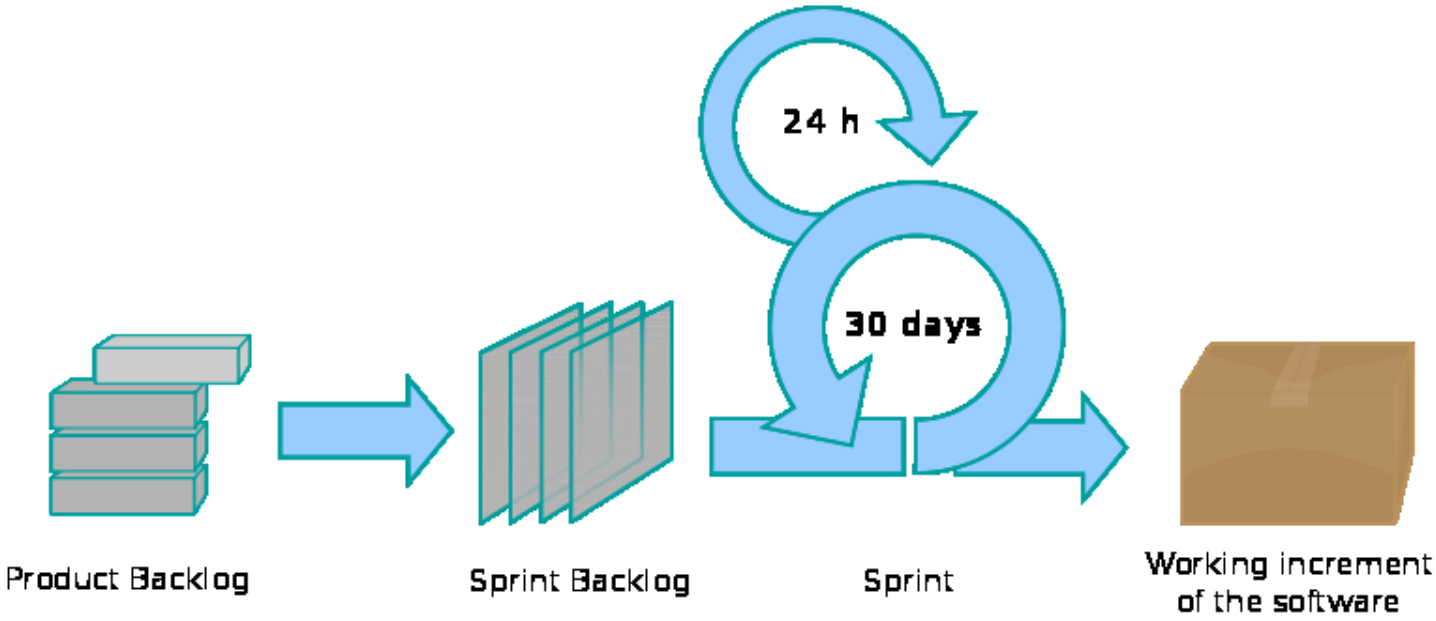
Continuous attention to technical excellence and good design enhances agility.

Simplicity--the art of maximizing the amount of work not done--is essential.

The best architectures, requirements, and designs emerge from self-organizing teams.

At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

Scrum



Should we not try to understand and define what our stakeholders value?
And set out to deliver that!

delivery

of valuable software.

history

- **Posten Norge AS bought a series of companies**
  - within Logistics, Package transport, CRM and Storage
  - in Norway, Sweden, Denmark, Finland, UK, Holland and Estonia.

Velkommen til Bring

Hva kan vi hjelpe deg med?

- Basis brev- og pakkeprodukter
- Sende varer
- Lagre varer
- Postreklame og CRM
- Mange sendinger

Bring Mail

Brev og postreklame. Effektiv distribusjon av Post i Norge og Norden.

- BRING MAIL
- Bring bedriftskort
- Massebrev
- Postreklame Uadressert

Bring Express

Levering samme dag med ekspress bud i Norge og resten av Norden. Transport med bil, sykkel eller fly.

- BRING EXPRESS
- QuickPack
- VIP-bud
- Distribusjonstjenester

Bring Logistics

Transport av gods og frakt av pakker i Norge og utlandet. Din partner for logistikk og lager i Norden.

- BRING LOGISTICS
- Stykkgods
- Bedriftspakke Dør-Dør
- Lagringstjenester (3PL)

Bring Dialogue

Bring Frigoscandia

Logg inn

Nyttige verktøy

Sporing

Sporing av pakker og brev på sending- eller kollinummer

Søk

Finn ut hvor din forsendelse befinner seg.

- SPORING FOR AIR
- SPORING FOR SEA
- SPORING FOR STYKK OG PARTIGODS

- Bestill
- LOAD.09
- Adresseendring og oppbevaring
- Finn postnummer
- Reklamehjelperen
- Finn åpningstid og postkontor

Bring Logisti

Delivering Nordic quality, speed and punctuality in the supply of cargo and parcel transport, warehousing and associated logistical services to the UK market.

Groupage and partload national

SEE ALL GROUP OPTIONS›

- Groupage ›
- Dangerous Goods ›

Groupage and partload international

SEE ALL GROUP OPTIONS›

- Groupage ›
- Special cargo ›

Warehousing

SEE ALL GROUP OPTIONS›

- Warehousing services ›
- Short term storage ›

Useful tools

Quotation Enquiry

The quotation enquiry form allows you to enter all the details of your shipment and have Bring Logistics respond with a quotation. To open the form, click here.

Shortcuts

- LATEST NEWS
- SCANDINAVIA SERVICES
- CUSTOMER SERVICE BRING LOGISTICS
- ABOUT BRING LOGISTICS
- CUSTOMER QUESTIONNAIRE

Some Players

Posten

Webteam - Value Management Certified

Project Owner: Anne Hognestad anne.hognestad@posten.no

Product Owner: Terje Berget terje.berget@posten.no

Lin Smitt-Amundsen & Kristin Nygård

Many Business Groups and internal stakeholders.

Kjetil Halvorsen kjetil.halvorsen@posten.no

Bekk & Ergo Group

Scrum Master: Fredrik Bach fredrik.bach@bekk.no

Technical Architect: Stefan M. Landrø: stefan.landro@bekk.no

Graphics: Espen Satver

Morten Wille Johannessen, Markus Krüger, Dag Stepanenko

NetLife Research

User Experience: Gjermund Also gjermund@netliferesearch.com Kjell-Morten Bratsberg Thorsen

Kai Gilb: Management Coach: Kai


Value Certificate
Decisions - Trained

Value Management Process

Learn

Stakeholders

Values

Solutions

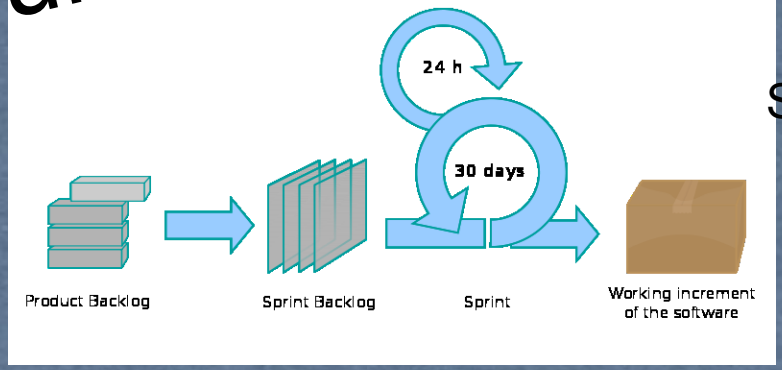
Develop

Decompose

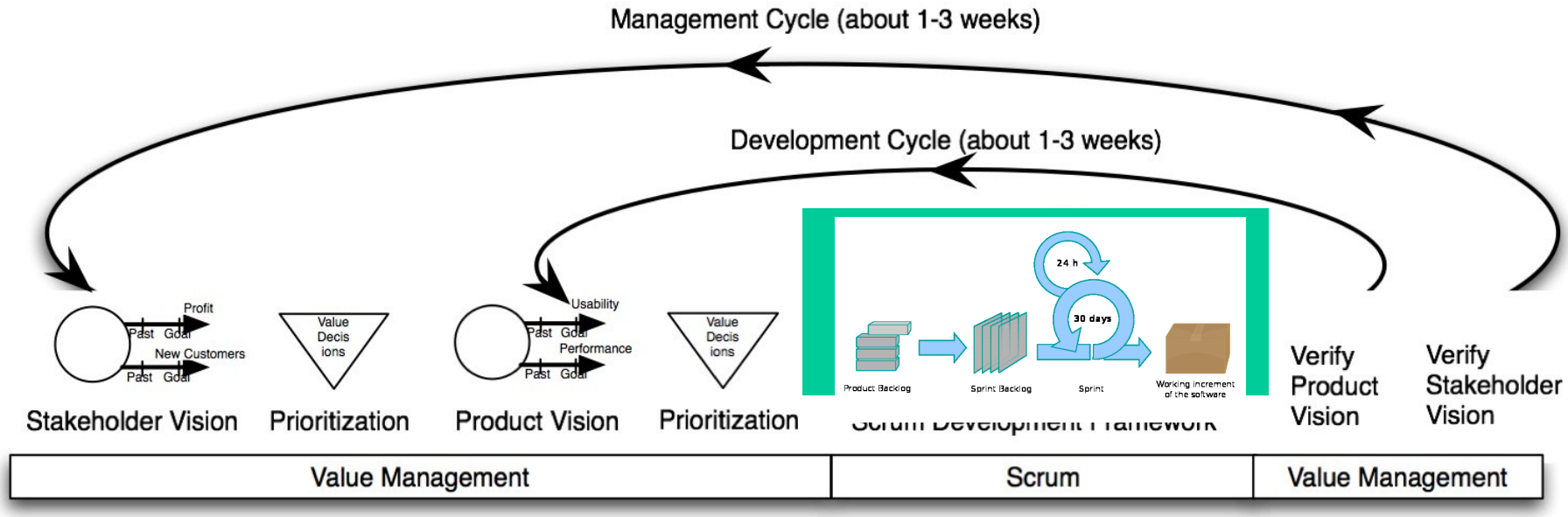
Deliver

Measure

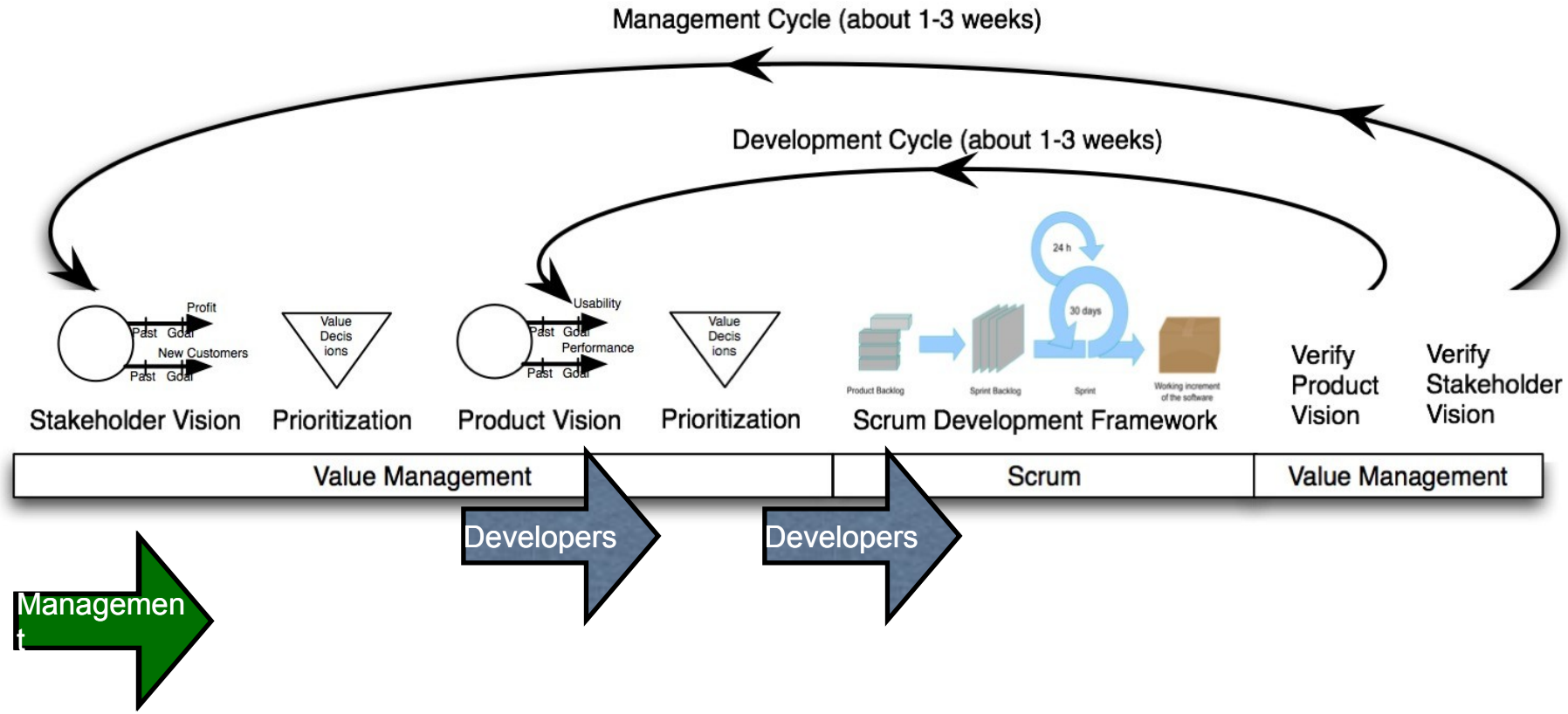
Scrum



Value Management



Value Management



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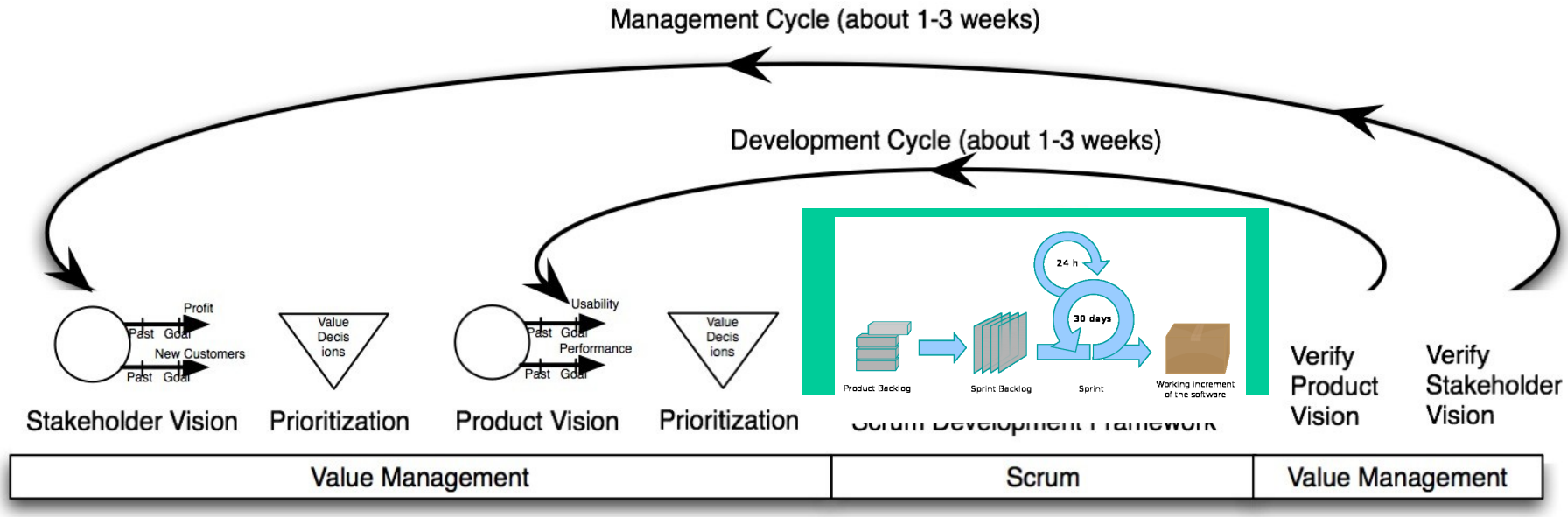


Value Decision Tables

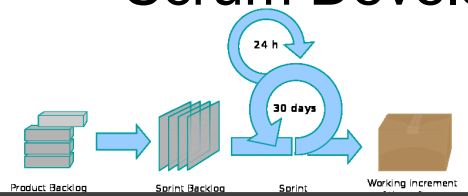
Business Goals	Stakeholder Value 1	Stakeholder Value 2
Business Value 1	-10%	40%
Business Value 2	50%	10%
Resources	20%	10%

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

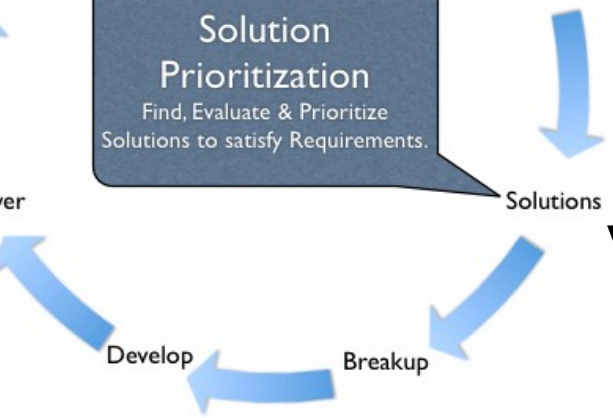
Product Values	Solution 1	Solution 2
Product Value 1	-10%	40%
Product Value 2	50%	80 %
Resources	1 %	2 %

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

Scrum Develops



We measure improvements
Learn and Repeat



Wargame
Value Decision Table

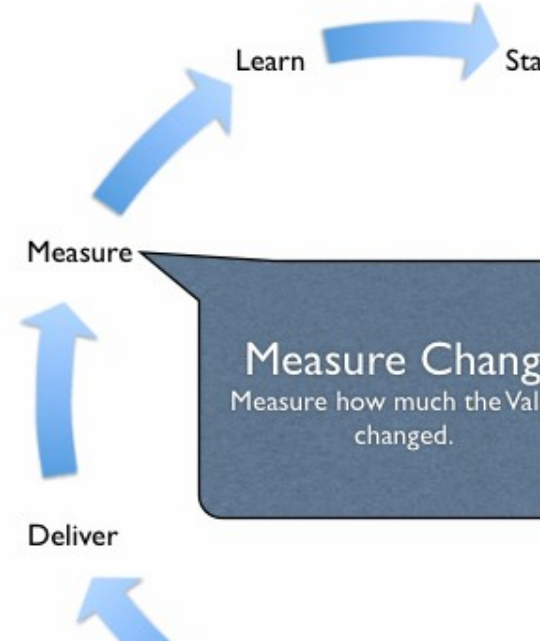
Core-Pro-Funct **Posten Portal**

Value Result Requirements			Next-Level	Sorted.Needs		Service Guide		Kjø
Status when	Tolerable when	Goal when		**Behovsorientert inndeling**		**Produktveileder**		tre
				units	*% of Goal*	*units*	*% of Goal*	*uni*
Find.Fast								
Finn.Raskt				-3	**5 %**	-20	**35 %**	
70	30	13		10	-18 %	-5	9 %	
14.12.2008	31.03.2009	31.03.2009		0		0,7	25 %	
					% of Goals		*% of Goals*	
			Sum Impact		**28 %**		**138 %**	
			Sum ± Variation		132 %		53 %	
			Sum Conservative Impact				97 %	
Development-Resources				*units*	*% of Budget*	*units*	*% of Budget*	*uni*
Resources. External								
Budsjett - eksterne ressurser			*Impact*	100	3 %	400	**13 %**	
1000	4310	4000	*Variation*	10	0 %			
18.12.2008	01.05.2008	01.05.200			-7 %		-27 %	
Resources. Internal								
Interne timer				30	**1 %**	100	**2 %**	
0	5700	5440						
18.12.2008	01.05.2008	01.05.2008			-1 %		-4 %	
					% of Budget		*% of Budget*	
			Sum Impact		**4 %**		**15 %**	
			Sum ± Variation					
			Sum Conservative Impact					

“Our challenge is to measure in practice”

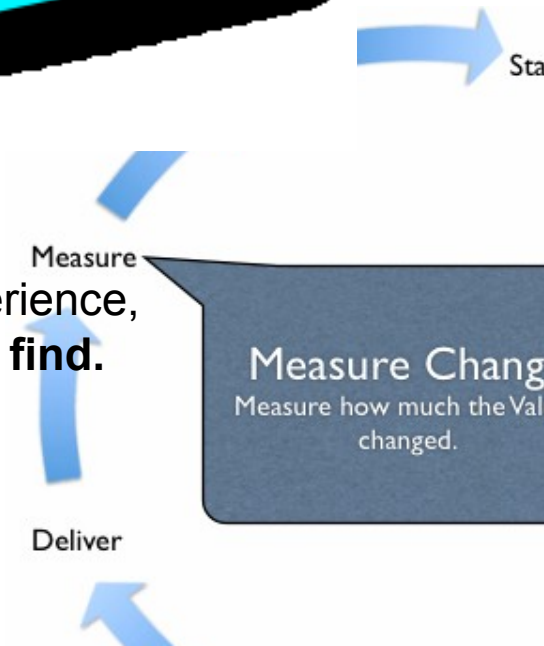
- **Anne Hognestad**

Project Owner:
anne.hognestad@posten.no



Measurements:
Establishing **Past** Levels

Past
[March. 2008]
?? sec.



Scale: Average time, in seconds, a User with def. [User-Experience, default=Normal] **uses to find what they and we want them to find.**

Use Cases: These were used to measure the effectiveness of different solution alternatives

1. Send a contract to another company in Oslo. It has to be delivered within two hours

Correct: (Express – Budservice)

2. Send five books to an office in Trondheim. The time it takes is not critical.

Correct: (Logistics – Bedriftspakke Dør-til-Dør)

3. You are selling sofas. You store them in Kolbotn and ship them to customers accross the country. Find a service to deliver the sofas from your wearhouse to your customers home.

Correct: (Logistics – Hjemlevering, Nasjonalt gods)

4. You have a container stocked with bicycles that you are going to ship to South-Africa. Find a product/service that will do this for you.

Correct: (Logistics – FCL, Full Containerlast)

5. You are expecting a shipment of frozen vegetables. Find a service to store them for 2-3 months.

Correct: (Frigoscandia – Fryselagring, Lagertjenester)

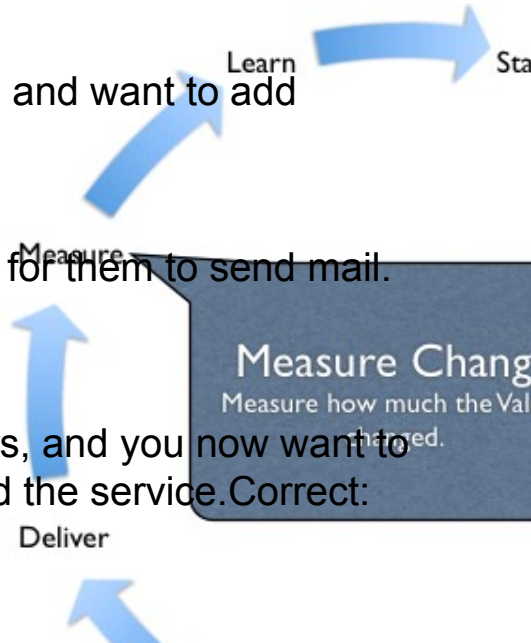
6. You want to send advertising to children families in Tvedestrand and want to add addresses that you do not have in your customer database.

Correct: (Dialogue – Målgrupper og adresser)

7. You are tasked by your company to find the most profitable way for them to send mail. Your company normaly sends about 500 to 600 letters a month.

Correct: (Mail – Fleksipost)

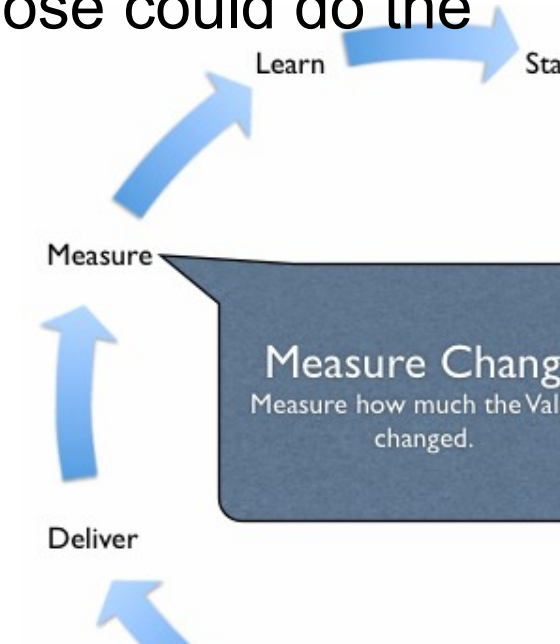
8. You have already sent out an offer to a list of potential customers, and you now want to send to the customers that have not responded, an followup offer. Find the service.Correct: (CityMail – Effekt och oppföljning)



Penalty Time: a device for getting a more realistic measure of customer success in finding our services

Wrong Service: The service the user chose would NOT do the task.
+300 seconds.

Suboptimal Service: The service the user chose could do the task, but it is not the optimal service.
+30-120 seconds



Skåringsskjema Finn.rask. Ukjent-produkt

		Før produktve	Før produktve	Før produktve	Før produktve	Før produktve	Før produktve	Før produktve	Før produktveileder	
Oppgave		1	2	3	4	5	6	7	8 (Citymail)	
TP1	Produktark vist									
	Knapp trykket									
	Brukerens valg:									
	korrekt									
	straffetid									
	korrigert tid									
TP2	Produktark vist									
	Knapp trykket									
	Brukerens valg:									
	korrekt									
	straffetid									
	koririgert tid									
TP3	Produktark vist									
	Knapp trykket									
	Brukerens valg:									
	korrekt									
	straffetid	60			0		300	300		
	korrigert tid	171			542		382	357	279	
TP4	Produktark vist	9	11				29	5		
	Knapp trykket	**42**	**18**				**44**	**17**		
	Brukerens valg:	VIP-bud	pakke dør-dør			Postreklame adressert nye kunder		Massebrev		
	korrekt	tja	ja				tja	nei		
	straffetid	60	0				30	300		
	korirgert tid	102	18				74	317	0	
TP5	Produktark vist	10		120	137			123		
	Knapp trykket	**57**		**144**	**157**			**139**	**271**	
	Brukerens valg:	VIP-bud	jemlevering fra sentrallager		FCL		Frankeringsmaskin		undeservice)	
	korrekt	tja		tja	ja			nesten	nei	
	straffetid	60		30	0			60		
	korrigert tid	117		174	157		0	199	271	
										Totalt snitt:
Snitt	til brukerens valg	66	40	167	350	0	63	71	209	**126**
Strafffetid:		45	0	75	0	12	89	220	-52	441
Anitt	inkl. straffetid	111	40	242	350	12	152	291	157	

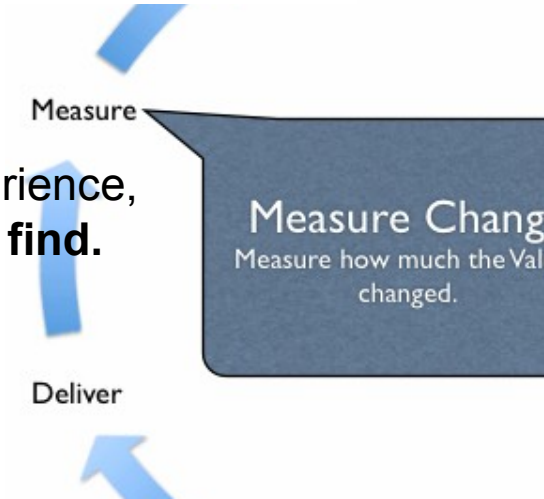
Result data from testing 5 users on Find.Fast

197 seconds

Measurements:
Establishing **Past** Levels

[March 2008]

197 seconds



Scale: Average time, in seconds, a User with def. [User-Experience, default=Normal] **uses to find what they and we want them to find.**

Measurements:
Establishing **Status** Levels

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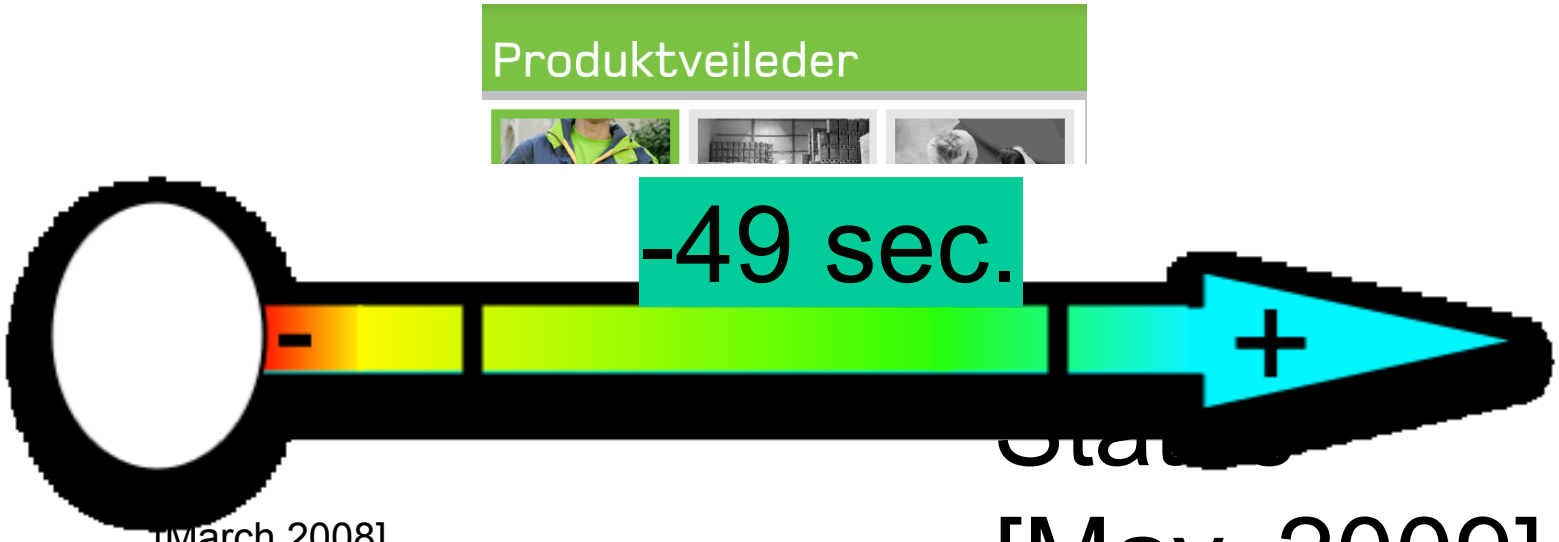
Measurements:
Establishing **Status** Levels



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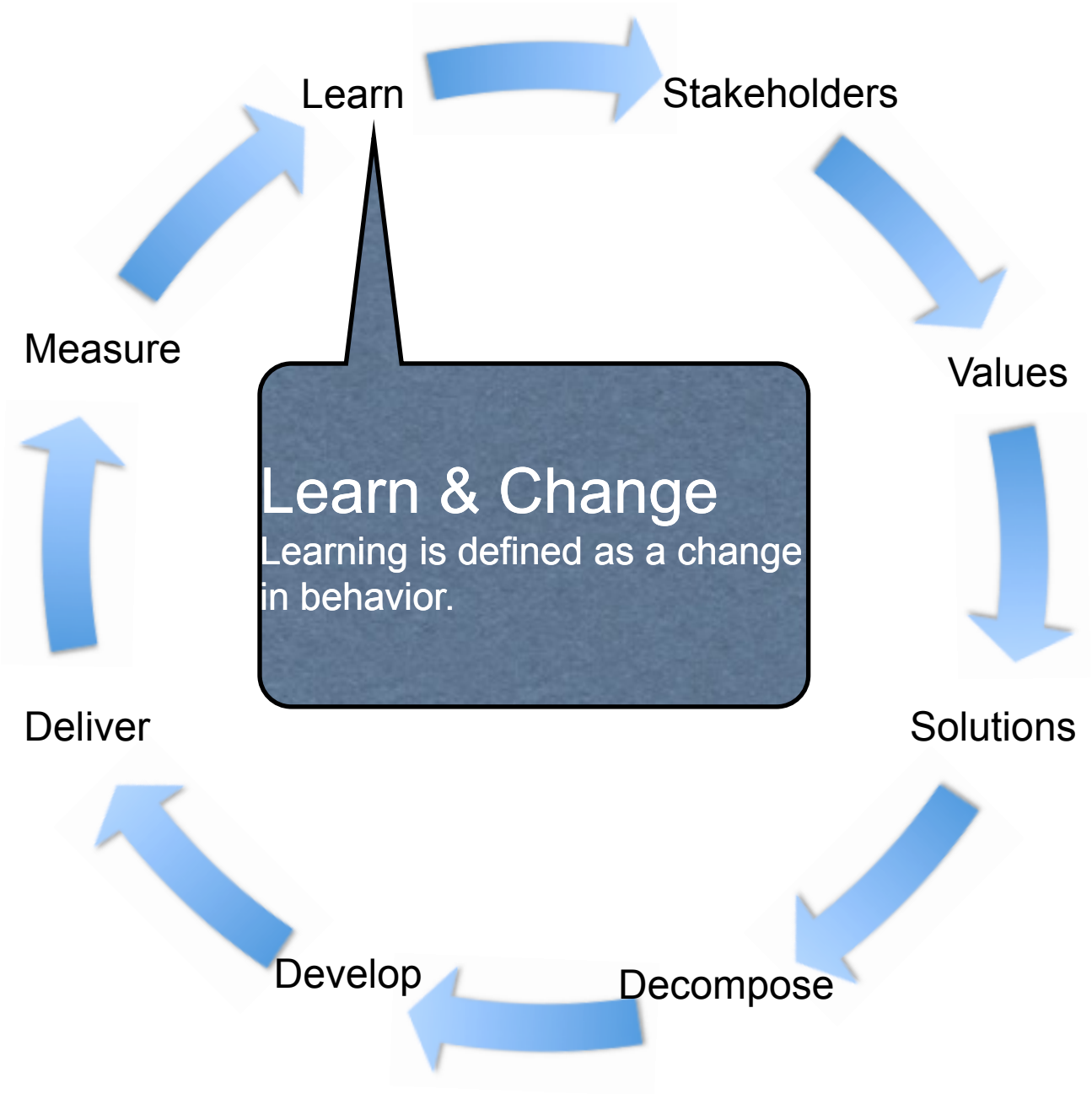

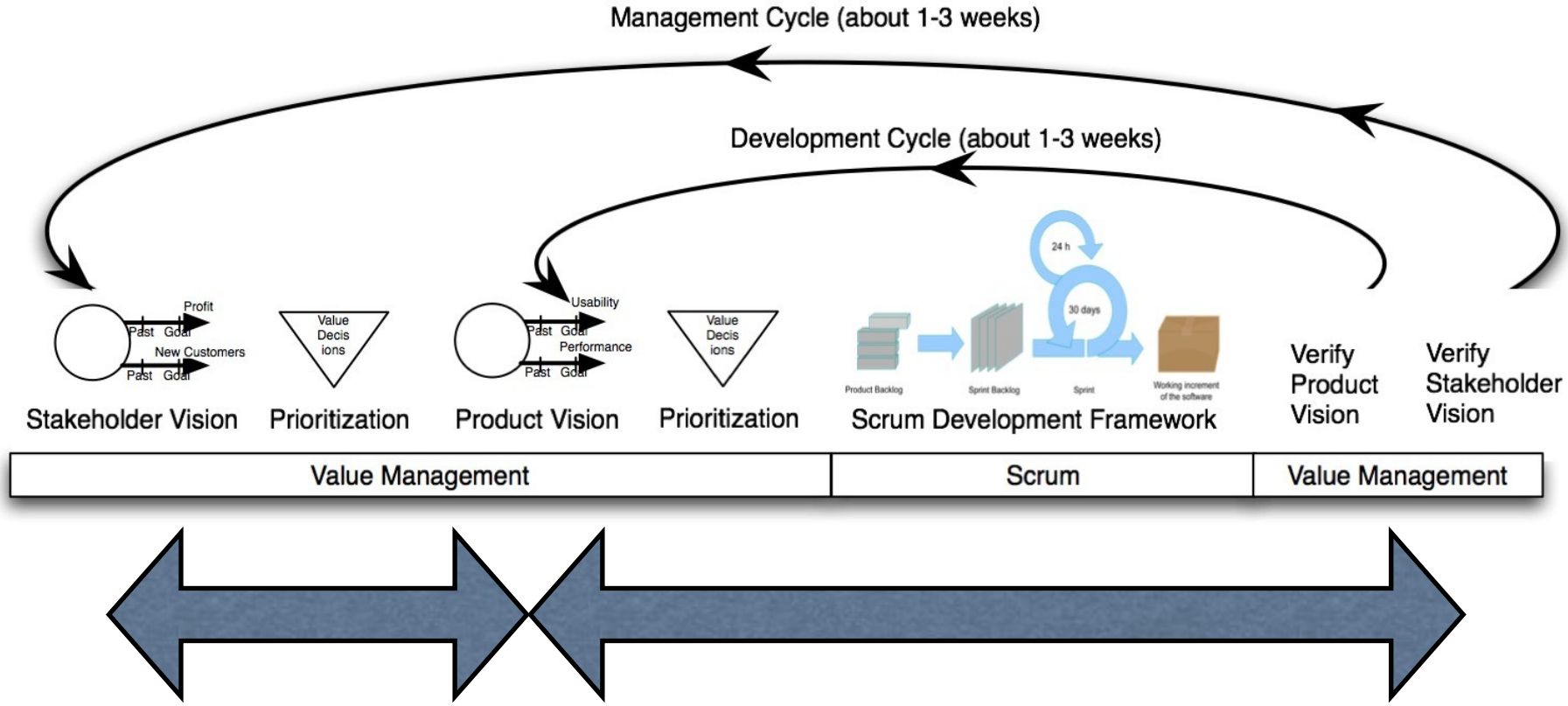

Value Decision Tables

Business Goals	Training Costs	User Productivity
Profit	-10%	40%
Market Share	50%	10%
Resources	20%	10%

Stakeholder Val.	Intuitiveness	Find.Fast
Training Costs	-10%	50 %
User Productivity	10 %	10%
Resources	2 %	5 %

Product Values	GUI Style Rex	Service Guide
Find.Fast	-10%	40%
Performance	50%	80 %
Resources	1 %	2 %

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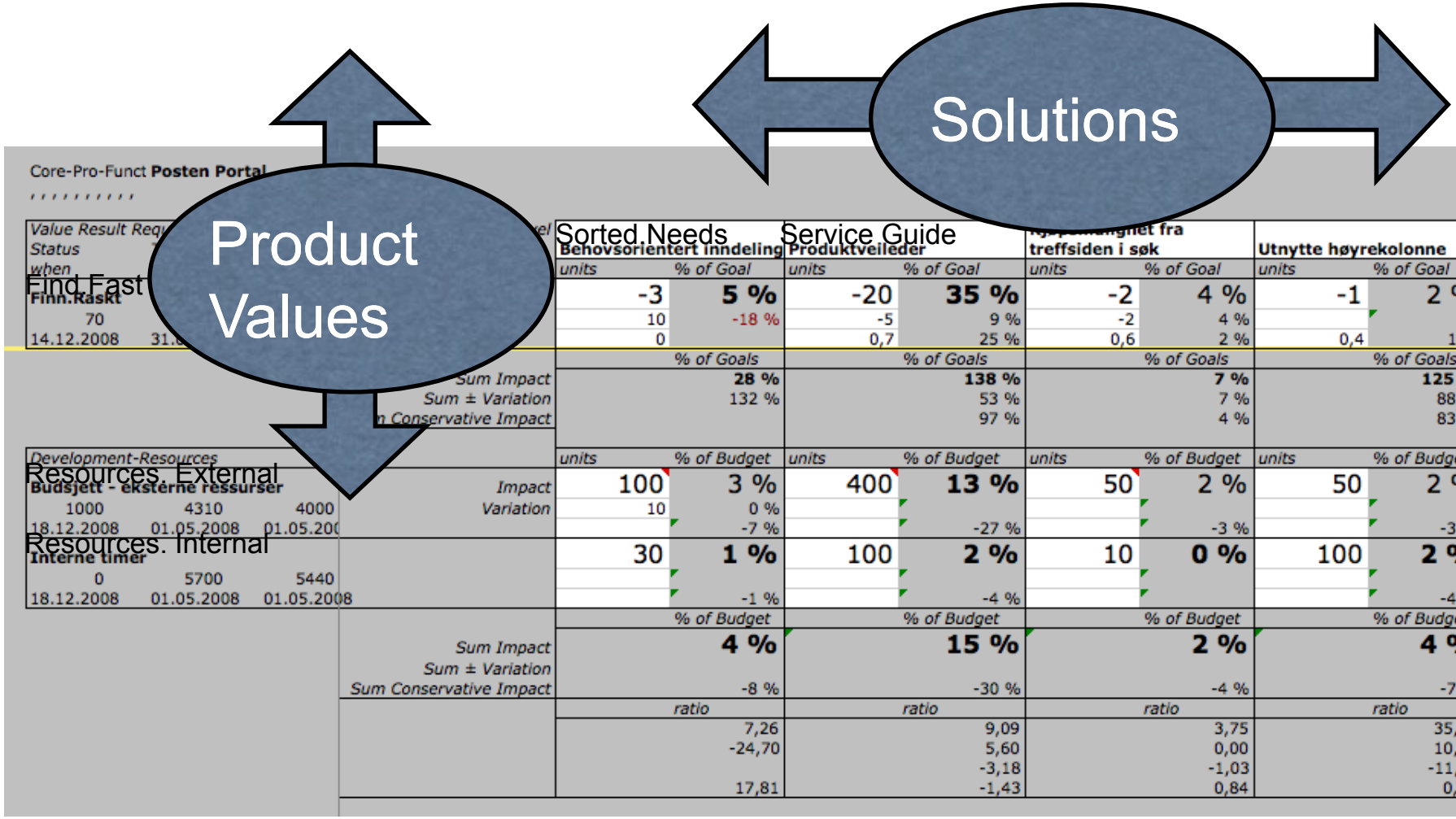
3. Solution 7

Scrum Develop
We measure improvements
Learn and Repeat

Value Decision Table



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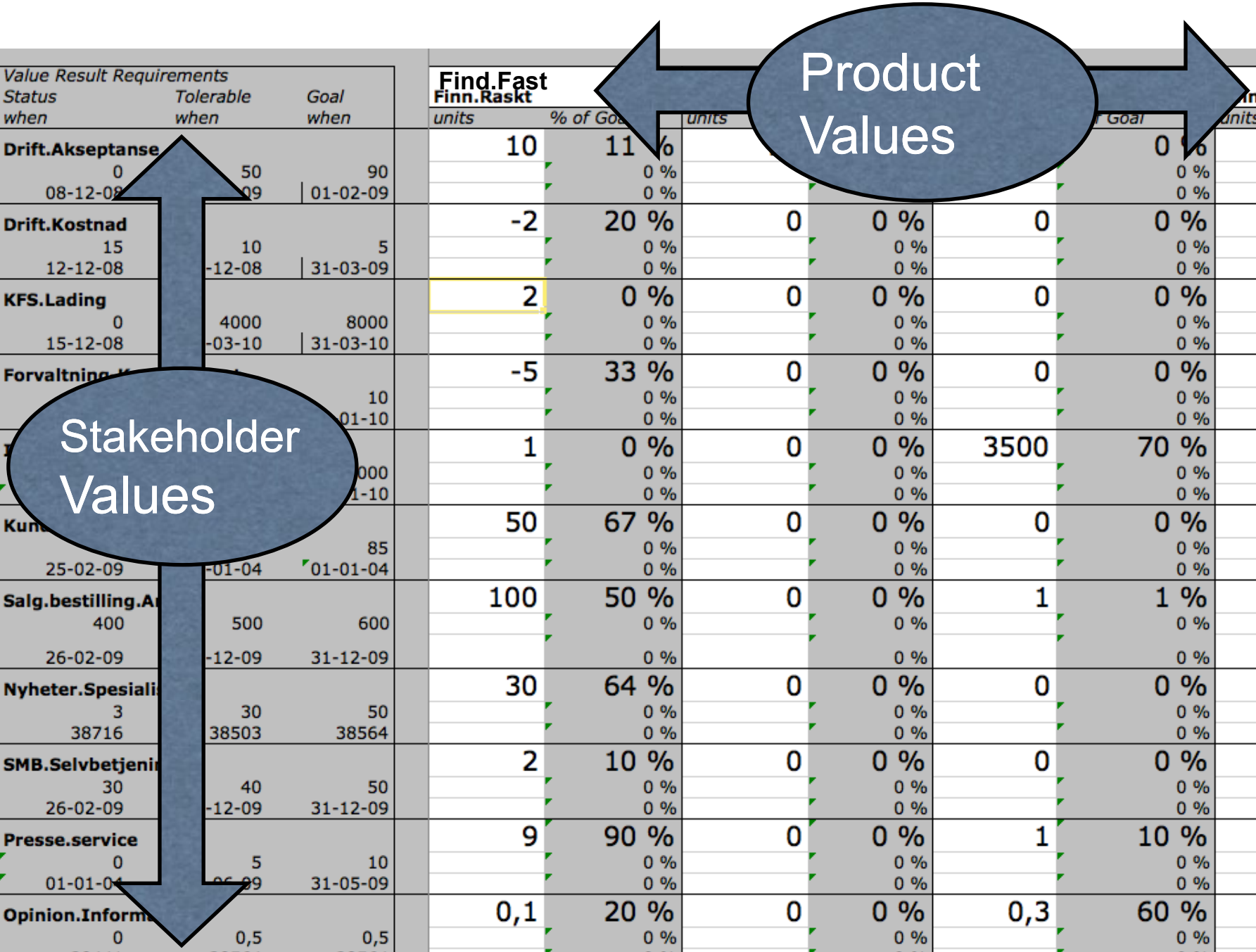
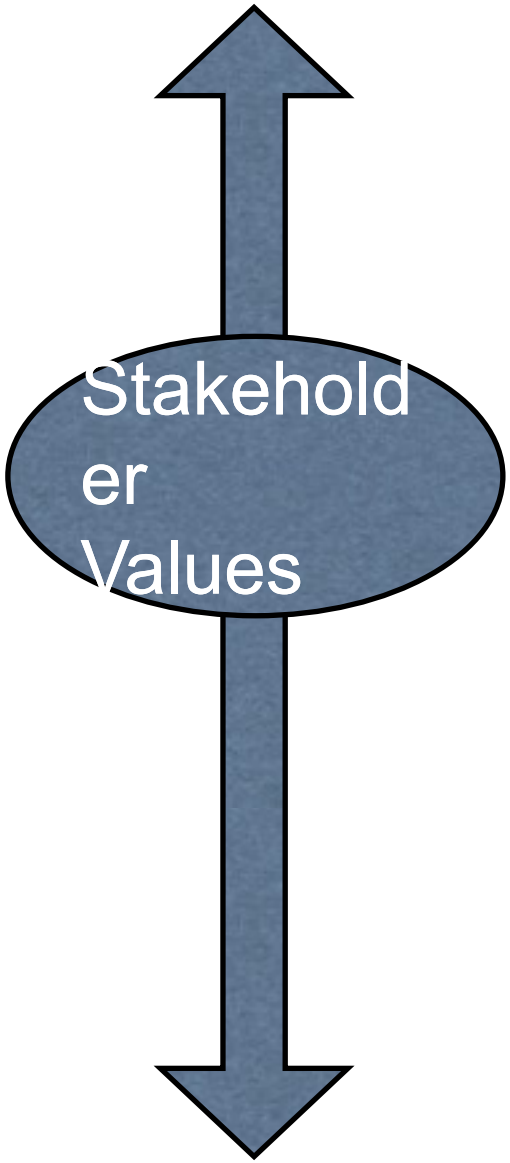
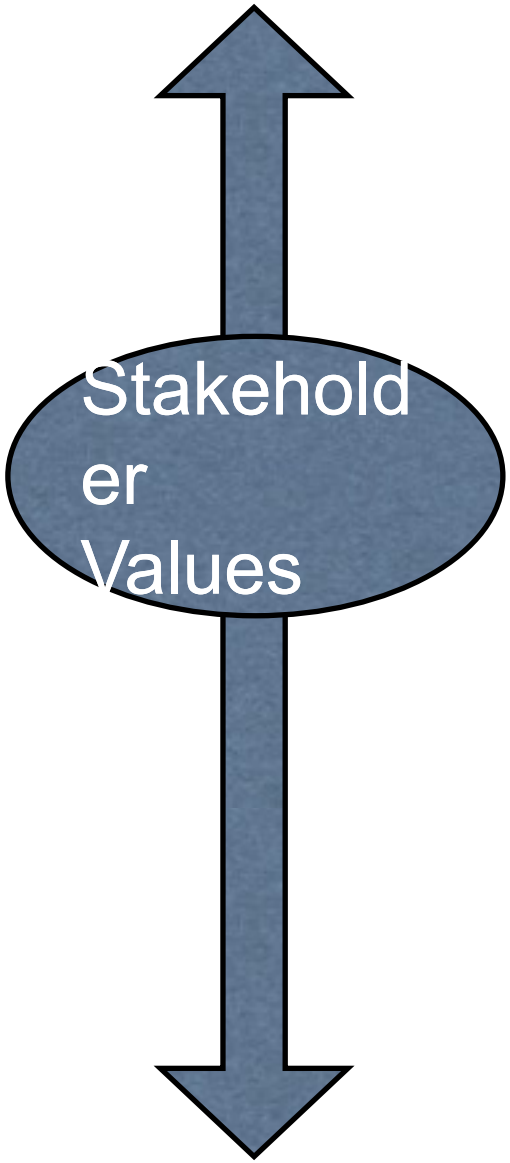


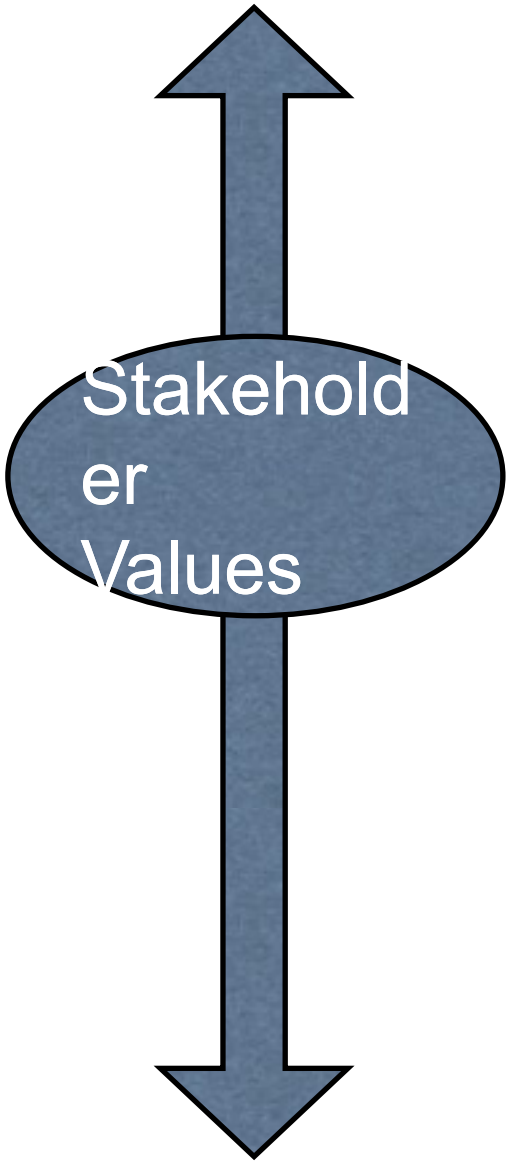

Stakehold
er
Values

Stakeholder Value Examples



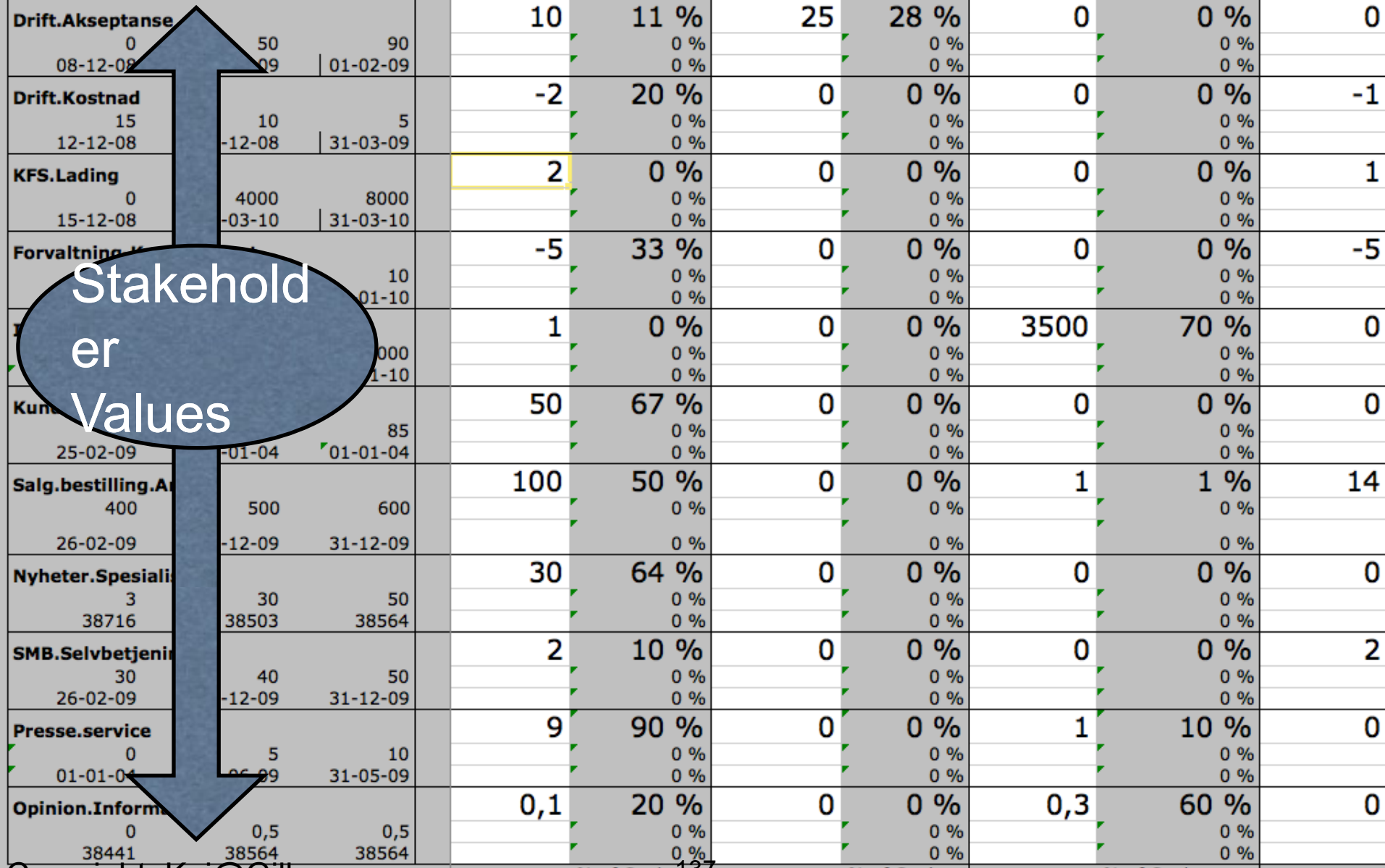
KFS.Charging Scale: number of customers per month that charge their postage meter “frankeringsmaskin” on www.Bring.no/Mail**Customerservice.Contact** Scale: % of customers that get the correct answer on their question, the first time they contact Customerservice.

Stakeholder Value Examples



Sales:Order.Number Scale: number of completed sales per month, from Self.Help.Solutions.
Sales.Leadsgeneration Scale: number of Electronic-Leads per month generated on bring.xx to the Specialists.

SMB.Selfservice Scale: % SMB customers tht use self service solutions rather than other channels.



Value Result Requirements Status when	Tolerable when	Goal when	Finn.Raskt units	% of Goal	Domumentasjon Qa units	% of Goal	Fange Oppmerksomhet kunder units	% of Goal	Finne.priser. units
Drift.Akseptanse			10	11 %	25	28 %	0	0 %	0
0	50	90		0 %		0 %		0 %	
08-12-08	09	01-02-09		0 %		0 %		0 %	
Drift.Kostnad			-2	20 %	0	0 %	0	0 %	-1
15	10	5		0 %		0 %		0 %	
12-12-08	-12-08	31-03-09		0 %		0 %		0 %	
KFS.Lading			2	0 %	0	0 %	0	0 %	1
0	4000	8000		0 %		0 %		0 %	
15-12-08	-03-10	31-03-10		0 %		0 %		0 %	
Forvaltning K			-5	33 %	0	0 %	0	0 %	-5
		10		0 %		0 %		0 %	
		01-10		0 %		0 %		0 %	
I			1	0 %	0	0 %	3500	70 %	0
		000		0 %		0 %		0 %	
		1-10		0 %		0 %		0 %	
Kun			50	67 %	0	0 %	0	0 %	0
		85		0 %		0 %		0 %	
25-02-09	-01-04	01-01-04		0 %		0 %		0 %	
Salg.bestilling.A			100	50 %	0	0 %	1	1 %	14
400	500	600		0 %		0 %		0 %	
26-02-09	-12-09	31-12-09		0 %		0 %		0 %	
Nyheter.Spesiali			30	64 %	0	0 %	0	0 %	0
3	30	50		0 %		0 %		0 %	
38716	38503	38564		0 %		0 %		0 %	
SMB.Selvbetjeni			2	10 %	0	0 %	0	0 %	2
30	40	50		0 %		0 %		0 %	
26-02-09	-12-09	31-12-09		0 %		0 %		0 %	
Presse.service			9	90 %	0	0 %	1	10 %	0
0	5	10		0 %		0 %		0 %	
01-01-0	09	31-05-09		0 %		0 %		0 %	
Opinion.Inform			0,1	20 %	0	0 %	0,3	60 %	0
0	0,5	0,5		0 %		0 %		0 %	
38441	38564	38564		0 %		0 %		0 %	
				% of Goals		% of Goals		% of Goals	
				365 %		28 %		141 %	

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Learn and Repeat

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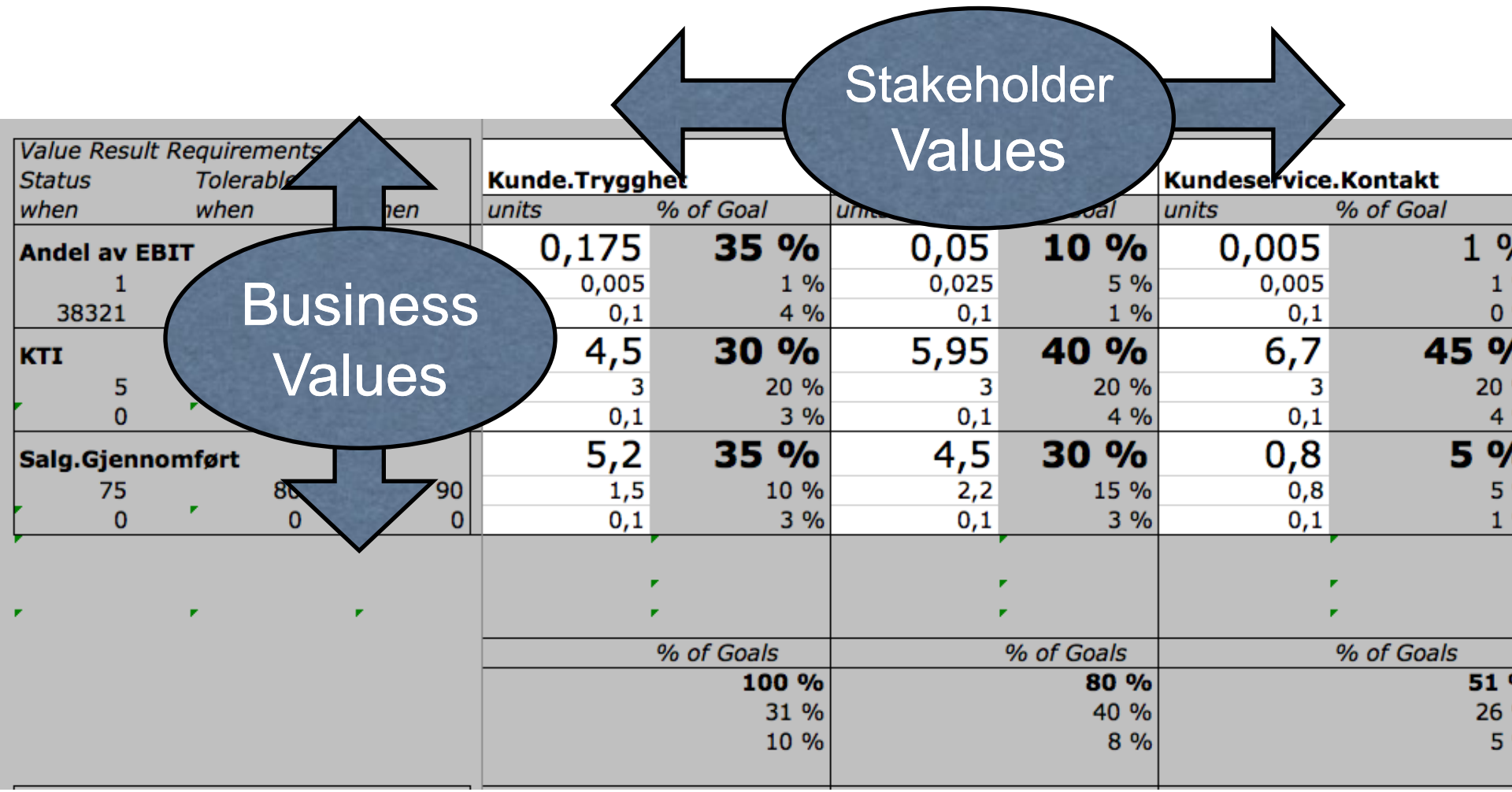

Value Result Requirements			Kunde.Trygghet				Kundeservice.Kontakt	
Status when	*Tolerable when*	*when*	*units*	*% of Goal*	*units*	*% of Goal*	*units*	*% of Goal*
Andel av EBIT			0,175	**35 %**	0,05	**10 %**	0,005	1 %
1			0,005	1 %	0,025	5 %	0,005	1
38321			0,1	4 %	0,1	1 %	0,1	0
KTI			4,5	**30 %**	5,95	**40 %**	6,7	**45 %**
5			3	20 %	3	20 %	3	20
0			0,1	3 %	0,1	4 %	0,1	4
Salg.Gjennomført			5,2	**35 %**	4,5	**30 %**	0,8	**5 %**
75	80	90	1,5	10 %	2,2	15 %	0,8	5
0	0	0	0,1	3 %	0,1	3 %	0,1	1
				% of Goals		*% of Goals*		*% of Goals*
				100 %		**80 %**		**51 %**
				31 %		40 %		26
				10 %		8 %		5

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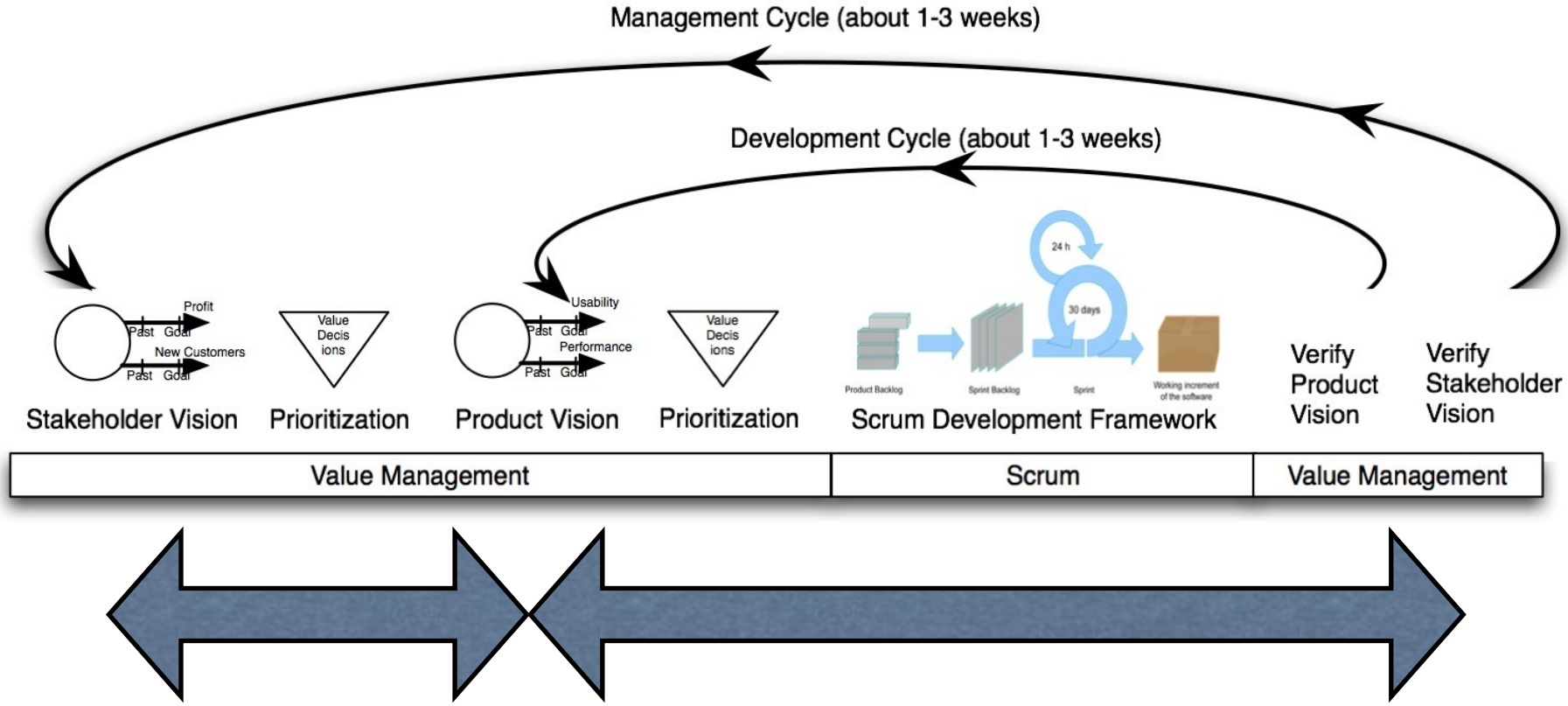

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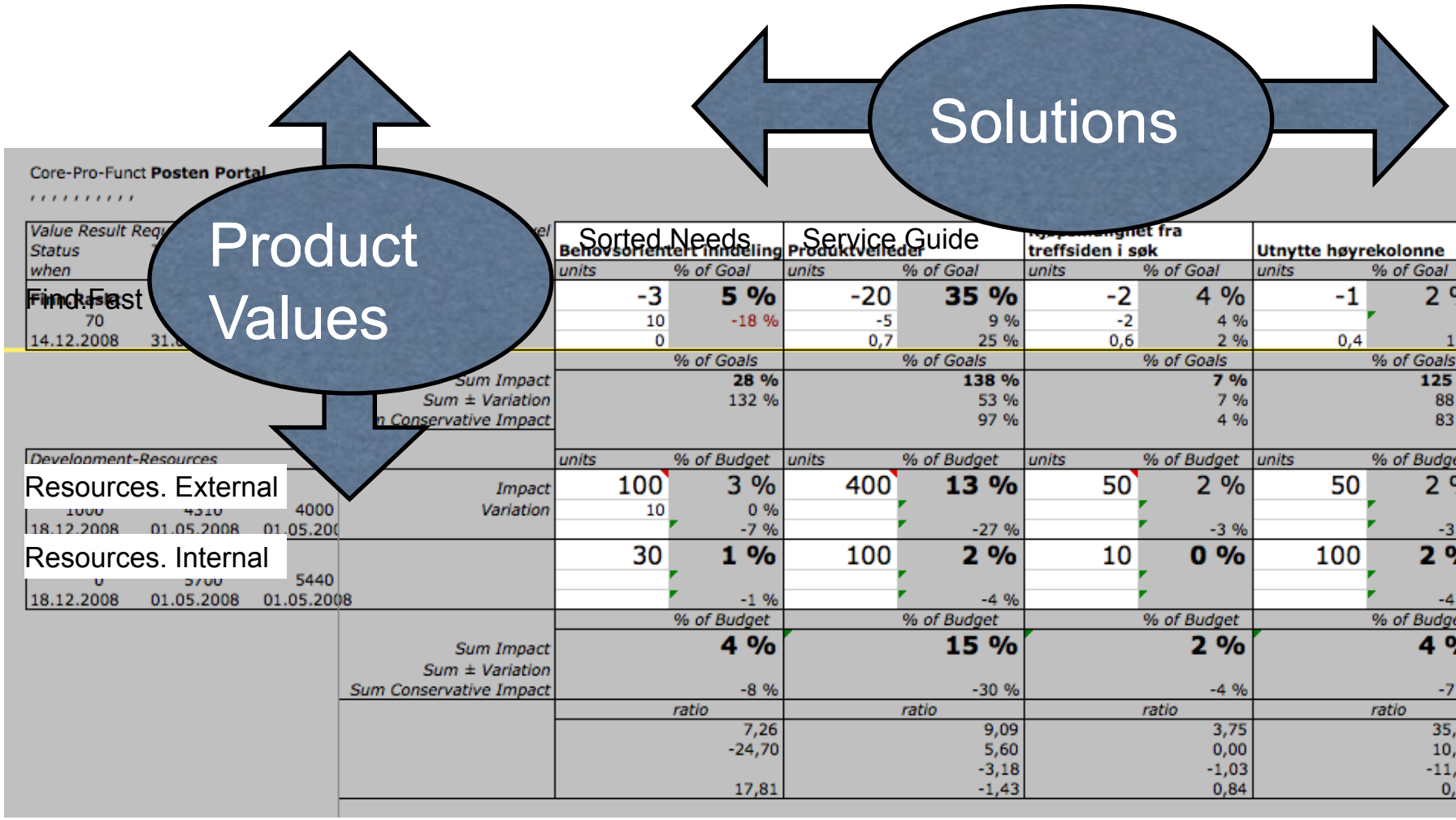

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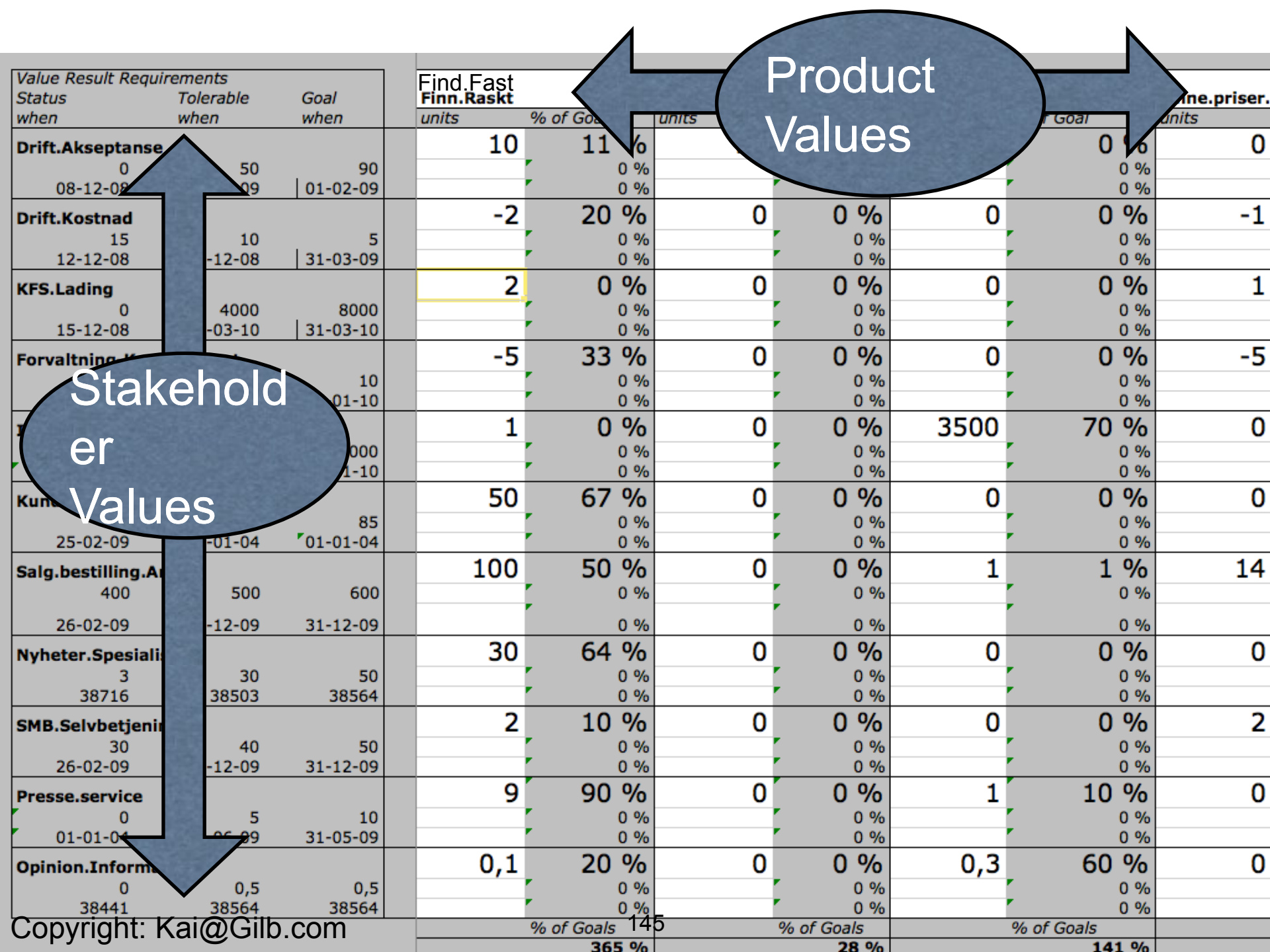
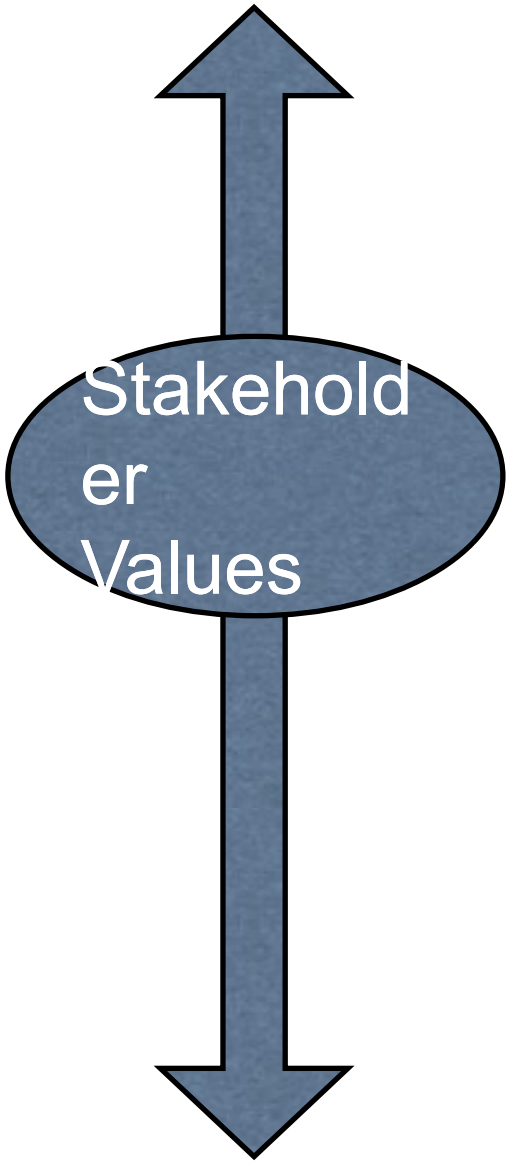
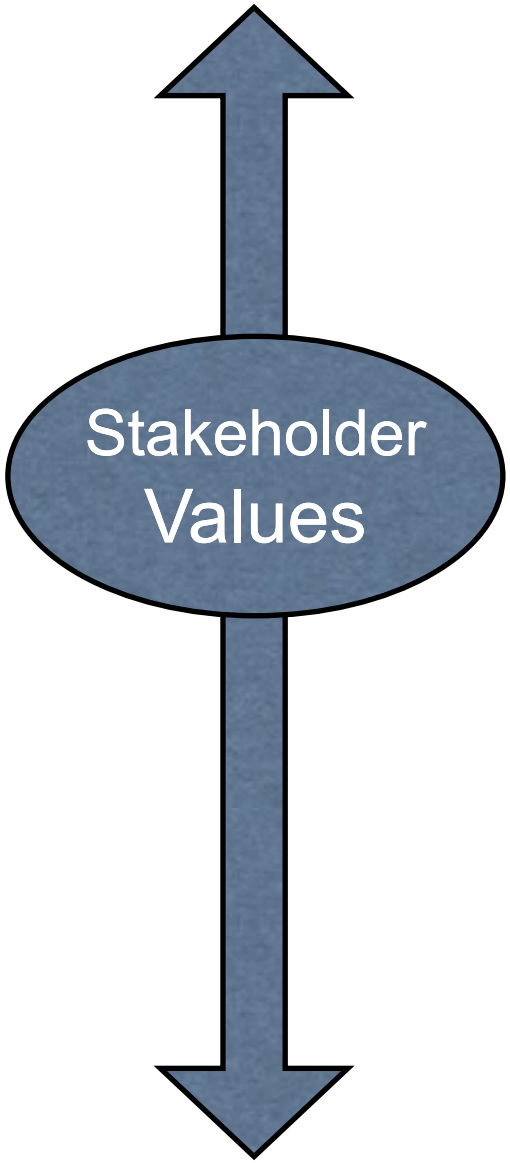
Learn and Repeat



Value Result Requirements Status when	Tolerable when	Goal when	Find.Fast Finn.Raskt units	% of Goal	units	% of Goal	units	% of Goal	ine.priser. units
Drift.Akseptanse			10	11 %				0 %	0
0	50	90		0 %				0 %	
08-12-08	09	01-02-09		0 %				0 %	
Drift.Kostnad			-2	20 %	0	0 %	0	0 %	-1
15	10	5		0 %		0 %		0 %	
12-12-08	-12-08	31-03-09		0 %		0 %		0 %	
KFS.Lading			2	0 %	0	0 %	0	0 %	1
0	4000	8000		0 %		0 %		0 %	
15-12-08	-03-10	31-03-10		0 %		0 %		0 %	
Forvaltning K			-5	33 %	0	0 %	0	0 %	-5
		10		0 %		0 %		0 %	
		01-10		0 %		0 %		0 %	
I			1	0 %	0	0 %	3500	70 %	0
		000		0 %		0 %		0 %	
		1-10		0 %		0 %		0 %	
Kun			50	67 %	0	0 %	0	0 %	0
		85		0 %		0 %		0 %	
25-02-09	-01-04	01-01-04		0 %		0 %		0 %	
Salg.bestilling.A			100	50 %	0	0 %	1	1 %	14
400	500	600		0 %		0 %		0 %	
26-02-09	-12-09	31-12-09		0 %		0 %		0 %	
Nyheter.Spesiali			30	64 %	0	0 %	0	0 %	0
3	30	50		0 %		0 %		0 %	
38716	38503	38564		0 %		0 %		0 %	
SMB.Selvbetjeni			2	10 %	0	0 %	0	0 %	2
30	40	50		0 %		0 %		0 %	
26-02-09	-12-09	31-12-09		0 %		0 %		0 %	
Presse.service			9	90 %	0	0 %	1	10 %	0
0	5	10		0 %		0 %		0 %	
01-01-0	06-09	31-05-09		0 %		0 %		0 %	
Opinion.Inform			0,1	20 %	0	0 %	0,3	60 %	0
0	0,5	0,5		0 %		0 %		0 %	
38441	38564	38564		0 %		0 %		0 %	
				% of Goals		% of Goals		% of Goals	
				365 %		28 %		141 %	

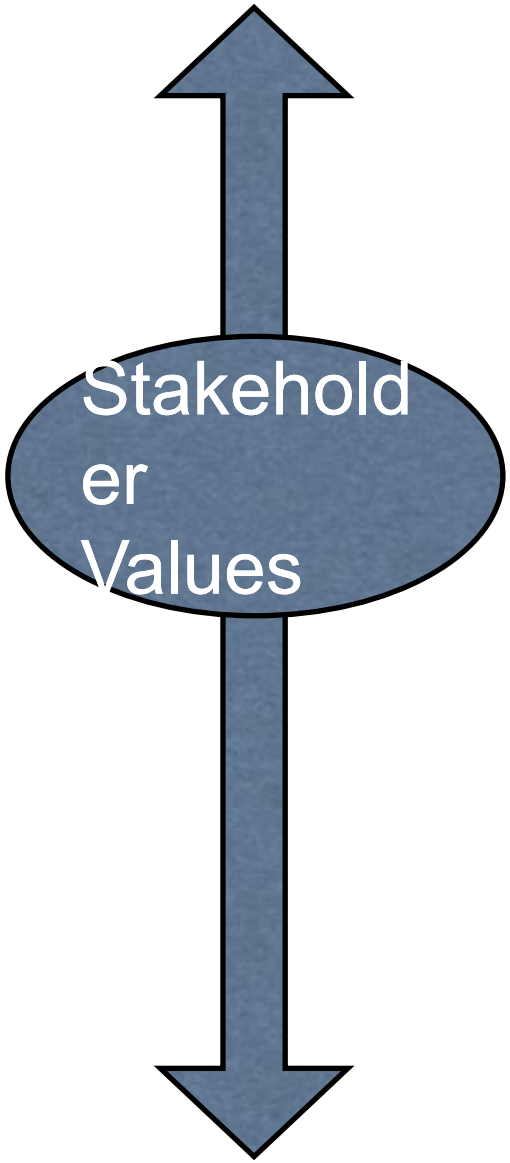

Stakehold
er
Values

Stakeholder Value Examples



KFS.Charging Scale: number of customers per month that charge their postage meter “frankeringsmaskin” on www.Bring.no/Mail**Customerservice.Contact** Scale: % of customers that get the correct answer on their question, the first time they contact Customerservice.

Stakeholder Value Examples



Sales:Order.Number Scale: number of completed sales per month, from Self.Help.Solutions.
Sales.Leadsgeneration Scale: number of Electronic-Leads per month generated on bring.xx to the Specialists.

SMB.Selfservice Scale: % SMB customers tht use self service solutions rather than other channels.

Value Result Requirements Status when	Tolerable when	Goal when	Finn.Raskt units	% of Goal	Domumentasjon Qa units	% of Goal	Fange Oppmerksomhet kunder units	% of Goal	Finne.priser. units
Drift.Akseptanse			10	11 %	25	28 %	0	0 %	0
0	50	90		0 %		0 %		0 %	
08-12-08	09	01-02-09		0 %		0 %		0 %	
Drift.Kostnad			-2	20 %	0	0 %	0	0 %	-1
15	10	5		0 %		0 %		0 %	
12-12-08	-12-08	31-03-09		0 %		0 %		0 %	
KFS.Lading			2	0 %	0	0 %	0	0 %	1
0	4000	8000		0 %		0 %		0 %	
15-12-08	-03-10	31-03-10		0 %		0 %		0 %	
Forvaltning K			-5	33 %	0	0 %	0	0 %	-5
		10		0 %		0 %		0 %	
		01-10		0 %		0 %		0 %	
I			1	0 %	0	0 %	3500	70 %	0
		000		0 %		0 %		0 %	
		1-10		0 %		0 %		0 %	
Kun			50	67 %	0	0 %	0	0 %	0
		85		0 %		0 %		0 %	
25-02-09	-01-04	01-01-04		0 %		0 %		0 %	
Salg.bestilling.A			100	50 %	0	0 %	1	1 %	14
400	500	600		0 %		0 %		0 %	
26-02-09	-12-09	31-12-09		0 %		0 %		0 %	
Nyheter.Spesiali			30	64 %	0	0 %	0	0 %	0
3	30	50		0 %		0 %		0 %	
38716	38503	38564		0 %		0 %		0 %	
SMB.Selvbetjeni			2	10 %	0	0 %	0	0 %	2
30	40	50		0 %		0 %		0 %	
26-02-09	-12-09	31-12-09		0 %		0 %		0 %	
Presse.service			9	90 %	0	0 %	1	10 %	0
0	5	10		0 %		0 %		0 %	
01-01-0	09	31-05-09		0 %		0 %		0 %	
Opinion.Inform			0,1	20 %	0	0 %	0,3	60 %	0
0	0,5	0,5		0 %		0 %		0 %	
38441	38564	38564		0 %		0 %		0 %	
				% of Goals		% of Goals		% of Goals	
				365 %		28 %		141 %	

Value Decision Tables

Business Goals	Training Costs	User Productivity
Profit	-10%	40%
Market Share	50%	10%
Resources	20%	10%

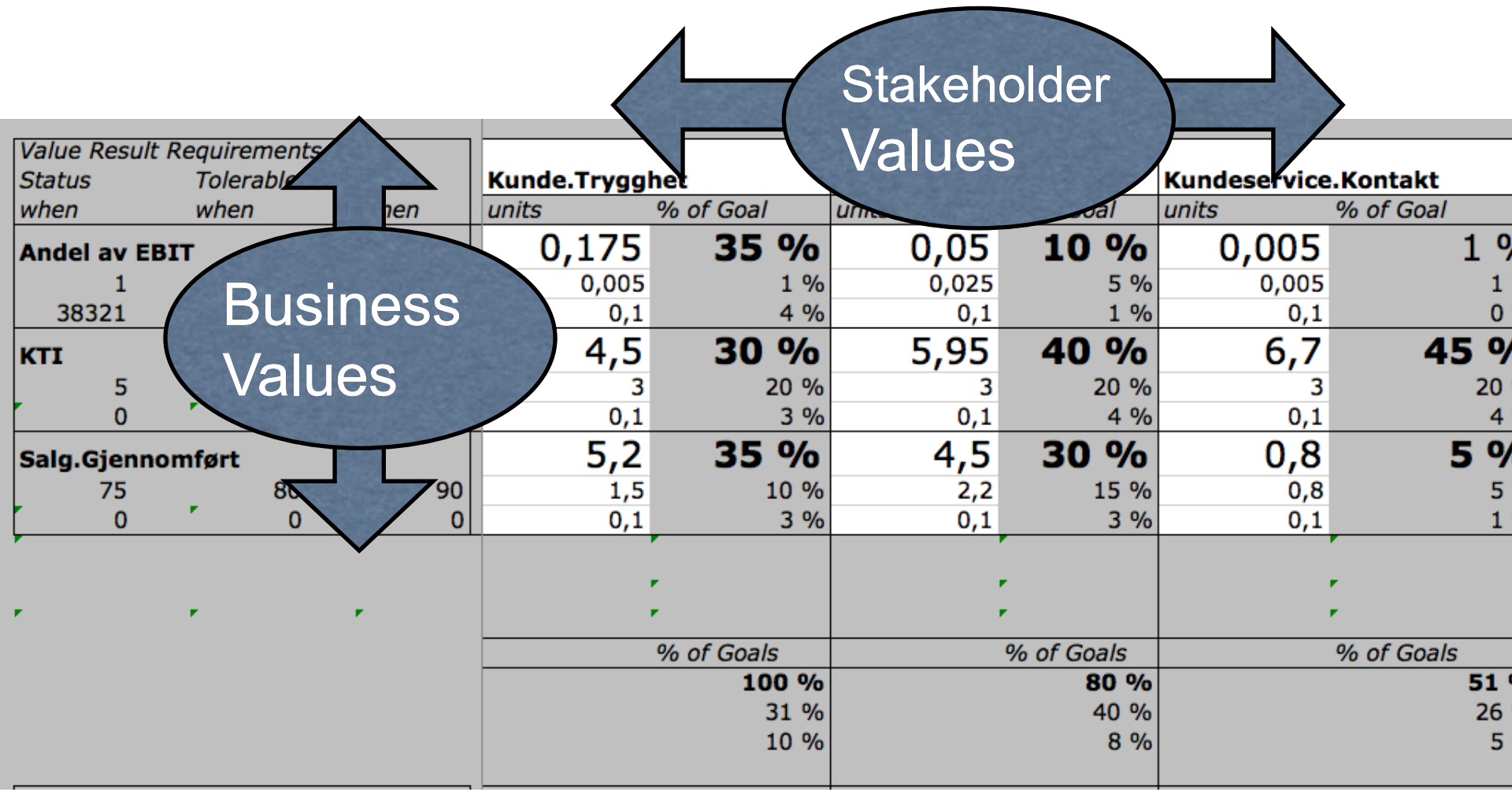
Stakeholder Val.	Intuitiveness	Find.Fast
Training Costs	-10%	50 %
User Productivity	10 %	10%
Resources	2 %	5 %

Product Values	GUI Style Rex	Service Guide
Find.Fast	-10%	35 %
Performance	50%	80 %
Resources	1 %	2 %

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

Scrum Develop
We measure improvements
Learn and Repeat

Value Decision Table



Value Result Requirements			Kunde.Trygghet				Kundeservice.Kontakt	
Status when	*Tolerable when*	*when*	*units*	*% of Goal*	*units*	*% of Goal*	*units*	*% of Goal*
Andel av EBIT			0,175	**35 %**	0,05	**10 %**	0,005	1 %
1			0,005	1 %	0,025	5 %	0,005	1
38321			0,1	4 %	0,1	1 %	0,1	0
KTI			4,5	**30 %**	5,95	**40 %**	6,7	**45 %**
5			3	20 %	3	20 %	3	20
0			0,1	3 %	0,1	4 %	0,1	4
Salg.Gjennomført			5,2	**35 %**	4,5	**30 %**	0,8	**5 %**
75	80	90	1,5	10 %	2,2	15 %	0,8	5
0	0	0	0,1	3 %	0,1	3 %	0,1	1
				% of Goals		*% of Goals*		*% of Goals*
				100 %		**80 %**		**51 %**
				31 %		40 %		26
				10 %		8 %		5

Value Decision Tables

Business Goals	Training Costs	User Productivity
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Performance	50%	80 %
Resources	1 %	2 %

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

Scrum Develop
We measure improvements
Learn and Repeat


Business Owners
Steering Committee
Push Technical Solutions
Wants to make decisions about
nical Solutions
Project Management
Thinks and understands Technical Solutions
Developers


Business Owners
Steering Committee
What are your real needs?
off on Value vements
Project Management
What technical solution will give maximum Product Value improvements?
Developers

the road ahead ...

"Our challenge is to, in practice,
make payments based on value delivery."

- Anne Hognestad

Project Owner

anne.hognestad@posten.no

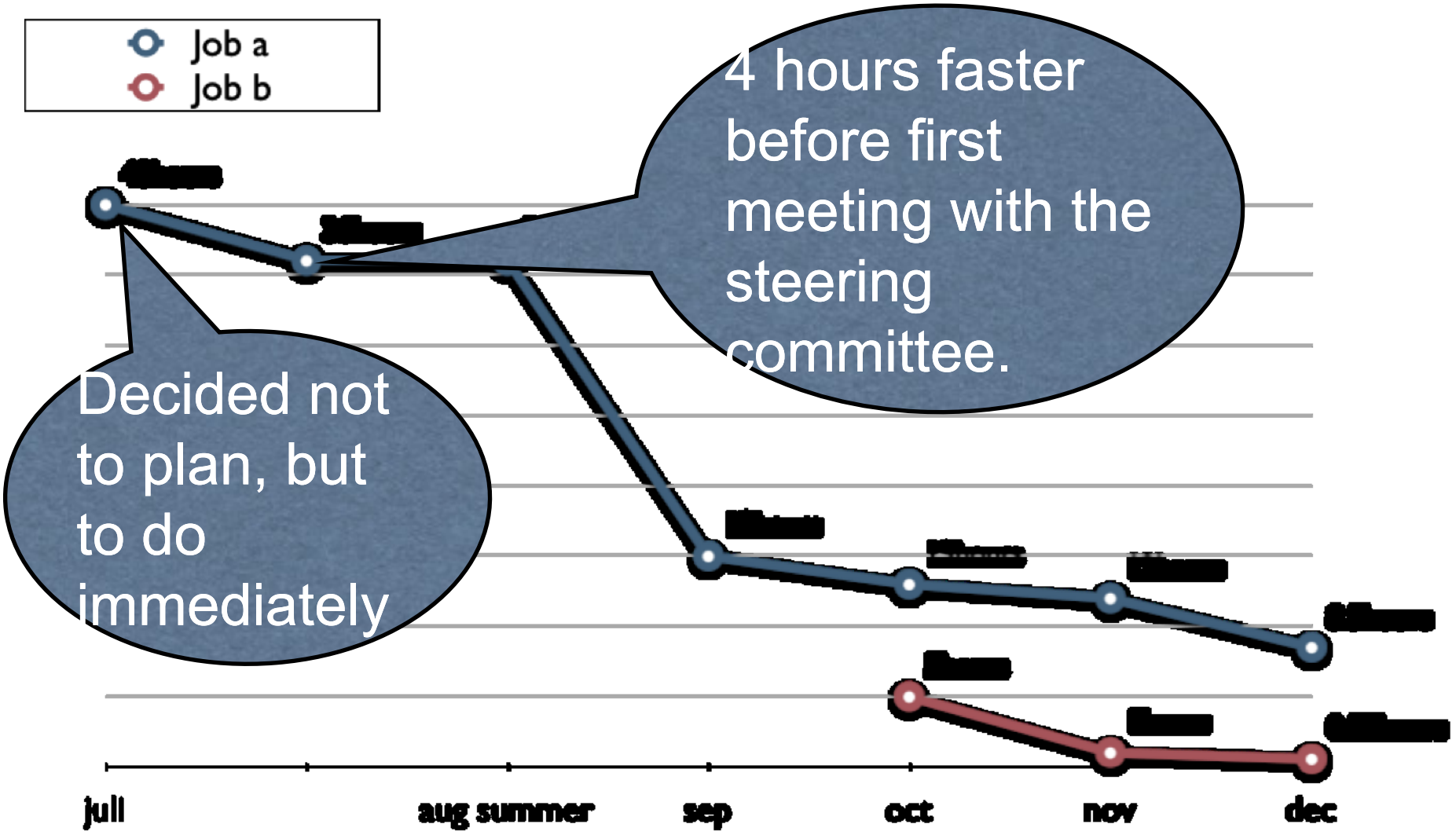
The Team

- **Posten**
  - –Webteam - Value Management Certified
    - •Project Owner: Anne Hognestad anne.hognestad@posten.no
    - •Product Owner: Terje Berget terje.berget@posten.no
    - •Lin Smitt-Amundsen & Kristin Nygård
  - –Many Business Groups and internal stakeholders.
  - –Kjetil Halvorsen kjetil.halvorsen@posten.no
- **Bekk & Ergo Group**
  - –Scrum Master: Fredrik Bach fredrik.bach@bekk.no
  - –Technical Architect: Stefan M. Landrø: stefan.landro@bekk.no
  - –Graphics: Espen Satver
  - –Morten Wille Johannessen, Markus Krüger, Dag Stepanenko
- **NetLife Research**
  - –User Experience: Gjermund Also gjermund@netliferesearch.com
    Kjell-Morten Bratsberg Thorsen
- **Kai Gilb**: Management Coach: Kai

To download this presentation
You will find it here:
http://www.gilb.com/FileGalleries
Direct link: http://bit.ly/BringCase

End of Bring Case

total hours to complete job



Free Digital Book on Quality Quantification

- REQUEST "BOOK" in subject from
  - TOM @ GILB .com
- Tom Gilb,
  - Competitive Engineering: A Handbook For Systems Engineering, Requirements Engineering, and Software Engineering Using Planguage
  - and I will also send links to related papers on requirements and estimation.

I think this is as far as I can get in my 45 minutes

- But here is additional material

Simon Ramo (tRw)

"No matter how complex the situation,

good systems engineering involves putting value measurements on the important parameters of desired goals and performance of pertinent data,

and of the specifications of the people and equipment and other components of the system.

It is *not easy* to do this

and so, very often, we are *inclined to assume that it is not possible* to do it to advantage.

But skilled systems engineers can

change evaluations and comparisons of alternative approaches from purely speculative to highly meaningful.

If some *critical aspect* is not known,

the systems experts seek to make it known.

They go dig up the facts.

If doing so is very tough, such as setting down the public's degree of acceptance among various candidate solutions, then perhaps the *public can be polled*.

If that is not practical for the specific issue, then at least an attempt can be made to *judge the impact of being wrong in assuming the public preference*.

Everything that is clear is used with clarity:

what is not clear is used with clarity as to the estimates and assumptions made,

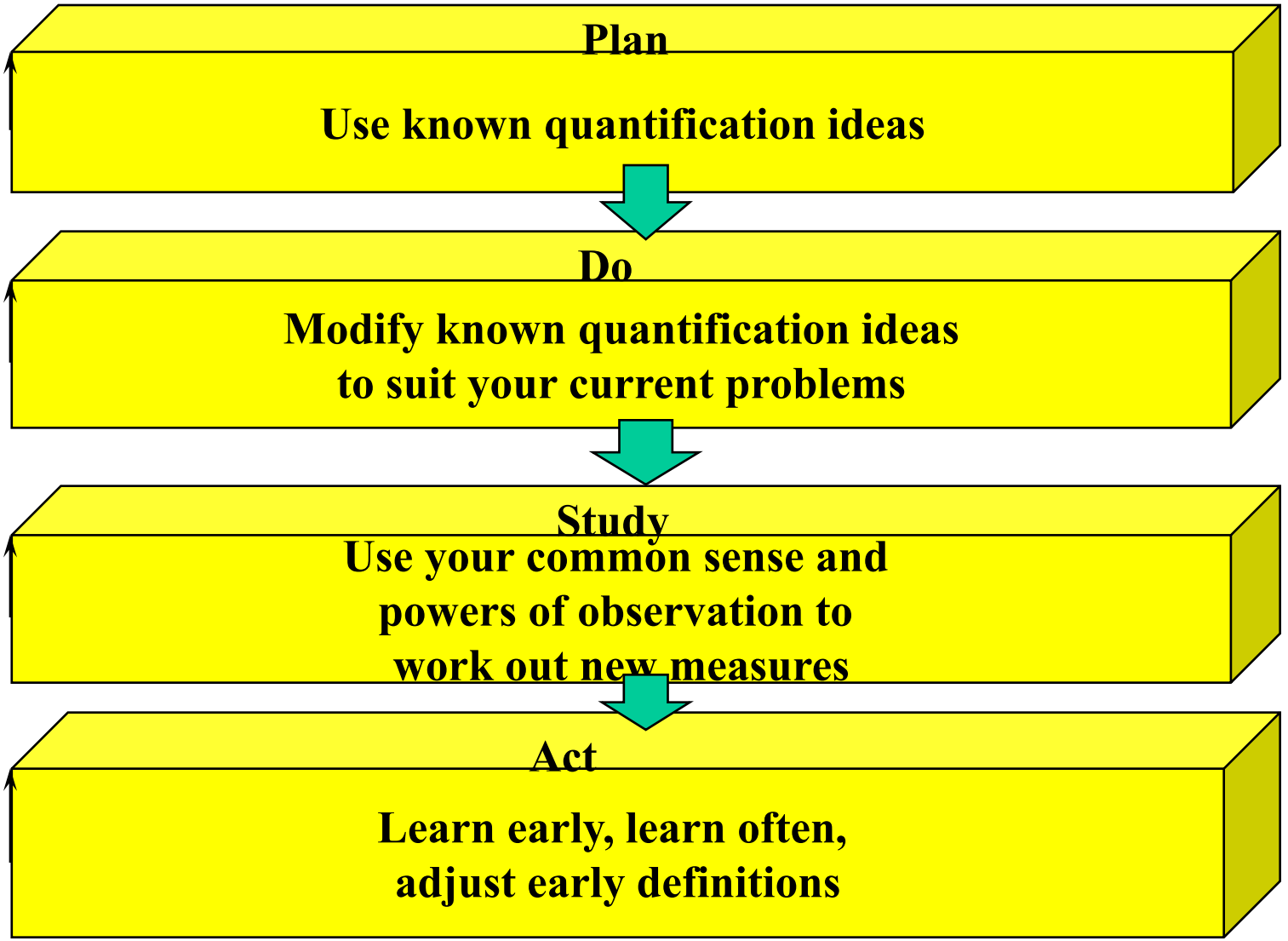
with the possible negative consequences of the assumptions weighed and integrated.

We do not have to work in the dark, now that we have professional systems analysis.

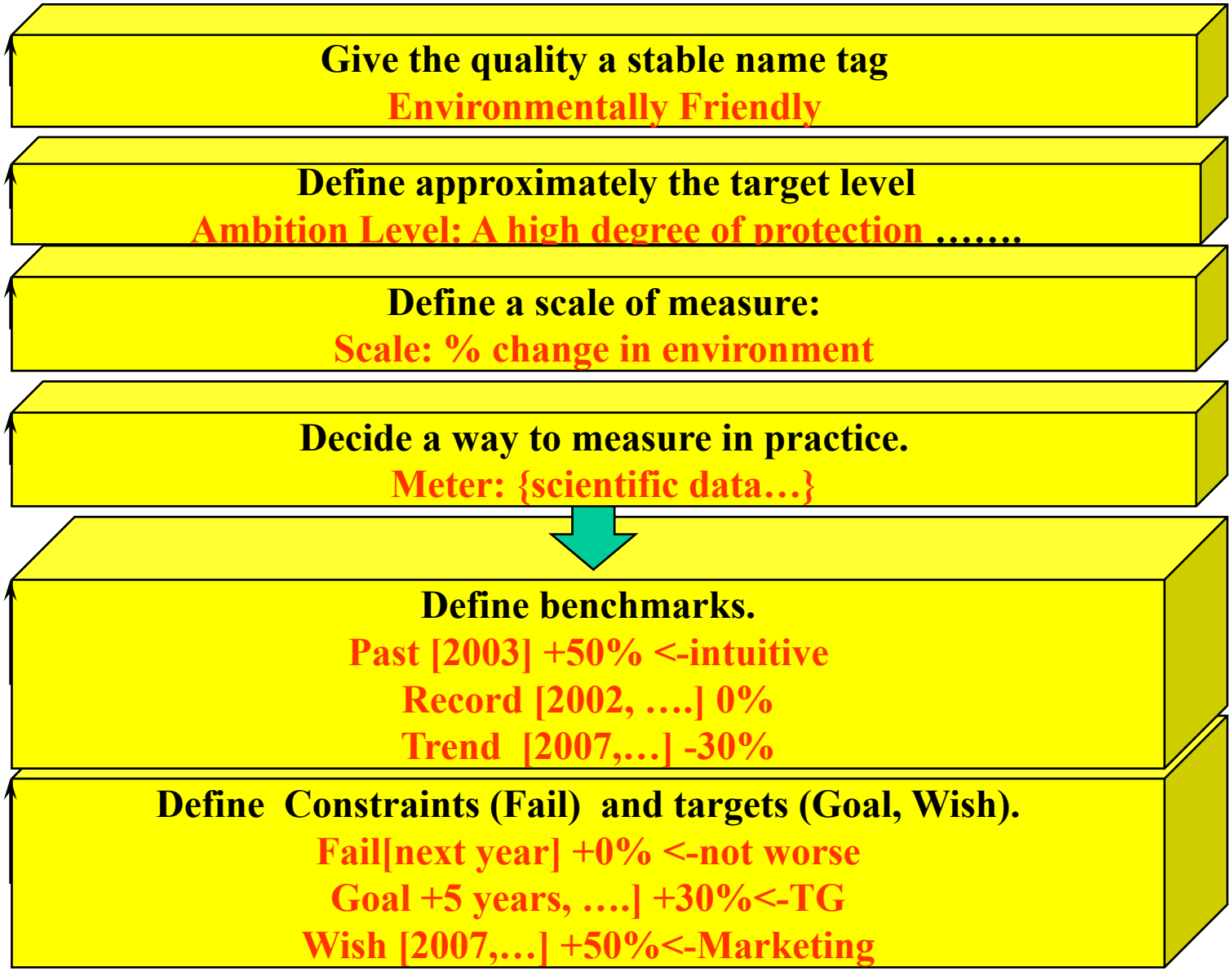
Ramo98 page 81

Simon Ramo and Robin K. St.Clair, The Systems Approach: Fresh Solutions to Complex Civil Problems Through Combining Science and Practical Common Sense, 1998, 150pp, © TRW, Inc., Manufactured in USA, KNI Incorporated, Anaheim CA. Free copy at TRW Stand at INCOSE conference 2002.

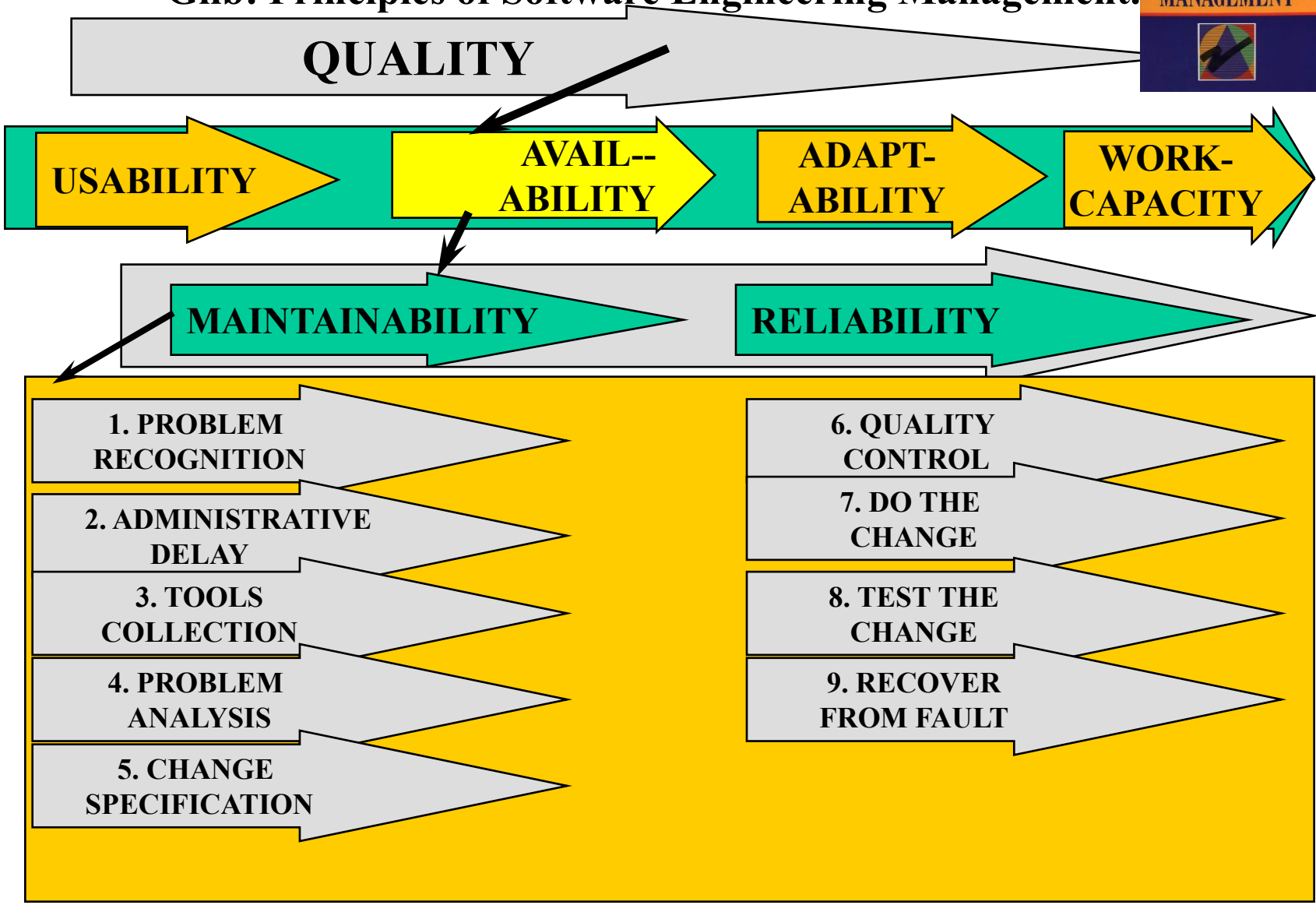
How to Quantify Quality



‘Environmentally Friendly’ Quantification Example



Devices to help quantify quality ideas: Standard Hierarchy of Concepts from Gilb: Principles of Software Engineering Management.



Using 'Parameters' when defining a Scale of Measure

Goal
[Users = NOVICES,
Components = USER MANUAL,
Tasks = ERROR CORRECTION]
60%

- ***Using [qualifiers] in the SCALE definition***
  - ***gives flexibility of detailed specification later***.
- Example
  - SCALE: the % of
    - **defined [Users]**
    - using **defined [system Components]**
    - who can successfully accomplish **defined [Tasks]**

[Scale Parameters]

Quality Quantification Process

(full detail 'Competitive Engineering', Scales chapter, & slide here later 'QQ')

Entry

E1. Do not enter if you can reuse existing standards.
E2.Do not enter if your source documents are poor.

Procedure

P1. Use applicable rules (GR, QR, QQ).
P2. Build list of quality ideas needing control.
P3. Detail qualities by exploding hierarchically.
- use evolutionary or pilot *feedback*.
P4. Revise your draft based on *design work*.
P5. Quality Control the specification.
P6. Get experience and then revise specifications.

Exit

X1. Don't exit if *calculated remaining defects* are more than one per page.
X2. Unless you intentionally do so to learn more from experience.

A 'Quality Quantification' Principle

He had a lot of hats.
He wants to be best in hatmanship.

Scale: hats on his head.
Past:3
Goal: 13

0. *THE PRINCIPLE OF*

'BAD NUMBERS BEAT GOOD WORDS'

Poor quantification is more useful than none; at least it can be *improved systematically*.

General Hatmanship:

GIST: improve ability to have hats on head and nearby

Hatmanship On Head:

SCALE: hats on top of persons head

PAST [Me, This year] 10 <- Guess

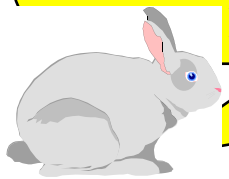
RECORD [2003, UK] 15 <- GB Record

WISH [Guinness Record, April] 20 <- Tom

Hatmanship Nearby:

SCALE: hats not on head, but on, or near, body;within 10 meter radius.

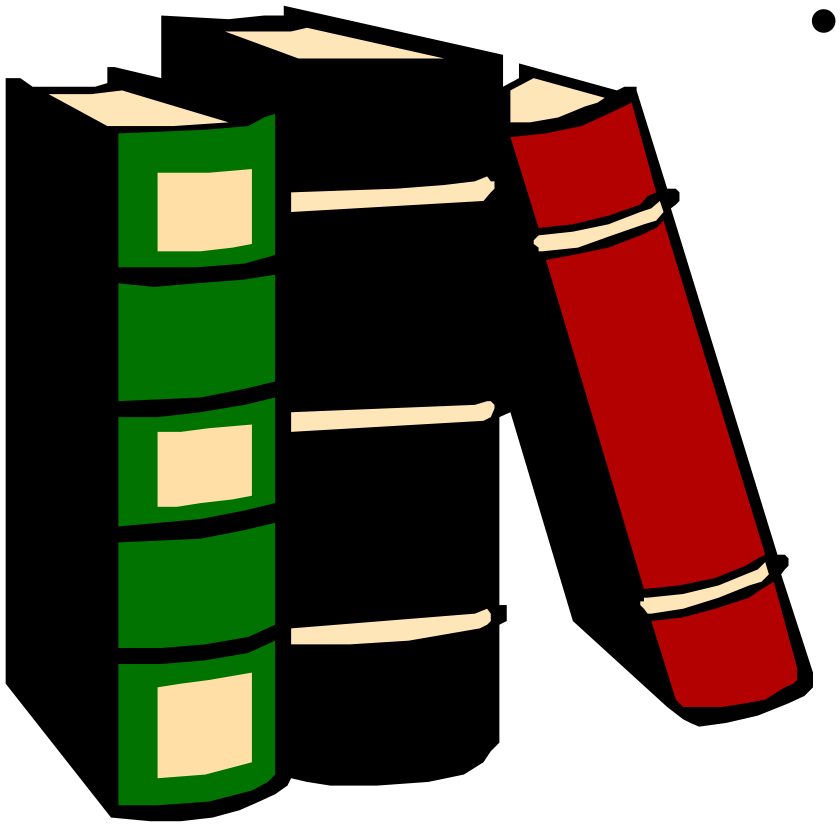
Past…. Goal……..etc.



Quantify for realistic judgements

- *"To leave [soft considerations] out of the analysis*
  - *–simply because they are **not readily quantifiable***
  - *–or to avoid introducing "personal judgments,"*
  - *– clearly biases decisions against investments*
    - *that are likely to have a significant impact on considerations*
      - *– as the quality of one's product, delivery speed and reliability, and the rapidity with which new products can be introduced"*
- *← R. H. Hayes et al "Dynamic Manufacturing", p. 77 in MINTZBERG94: page124*

Principles for Quality Quantification.



- Some hopefully deep and useful guidelines
- to help you quantify quality ideas

0. THE PRINCIPLE OF 'BAD NUMBERS BEAT GOOD WORDS' (re-visited!)

- *Poor* quantification is more useful than none;
- at least it can be improved systematically.

State of the Art Flexibility

Not Clear! *Enhanced Usability*

Improved Performance

1. THE PRINCIPLE OF 'QUALITY QUANTIFICATION'

- All qualities can be expressed quantitatively,
- *'qualitative'* does *not* mean unmeasurable.

"If you think you know something about a subject, try to put a number on it. If you can, then maybe you know something about the subject. If you cannot then perhaps you should admit to yourself that your knowledge is of a meager and unsatisfactory kind.

Lord Kelvin, 1893

2. THE PRINCIPLE OF 'MANY SPLENDORED THINGS'

- Most quality ideas

–are usefully broken into *several* measures of goodness.

Usability:

Entry Qualification: Scale IQ, …….

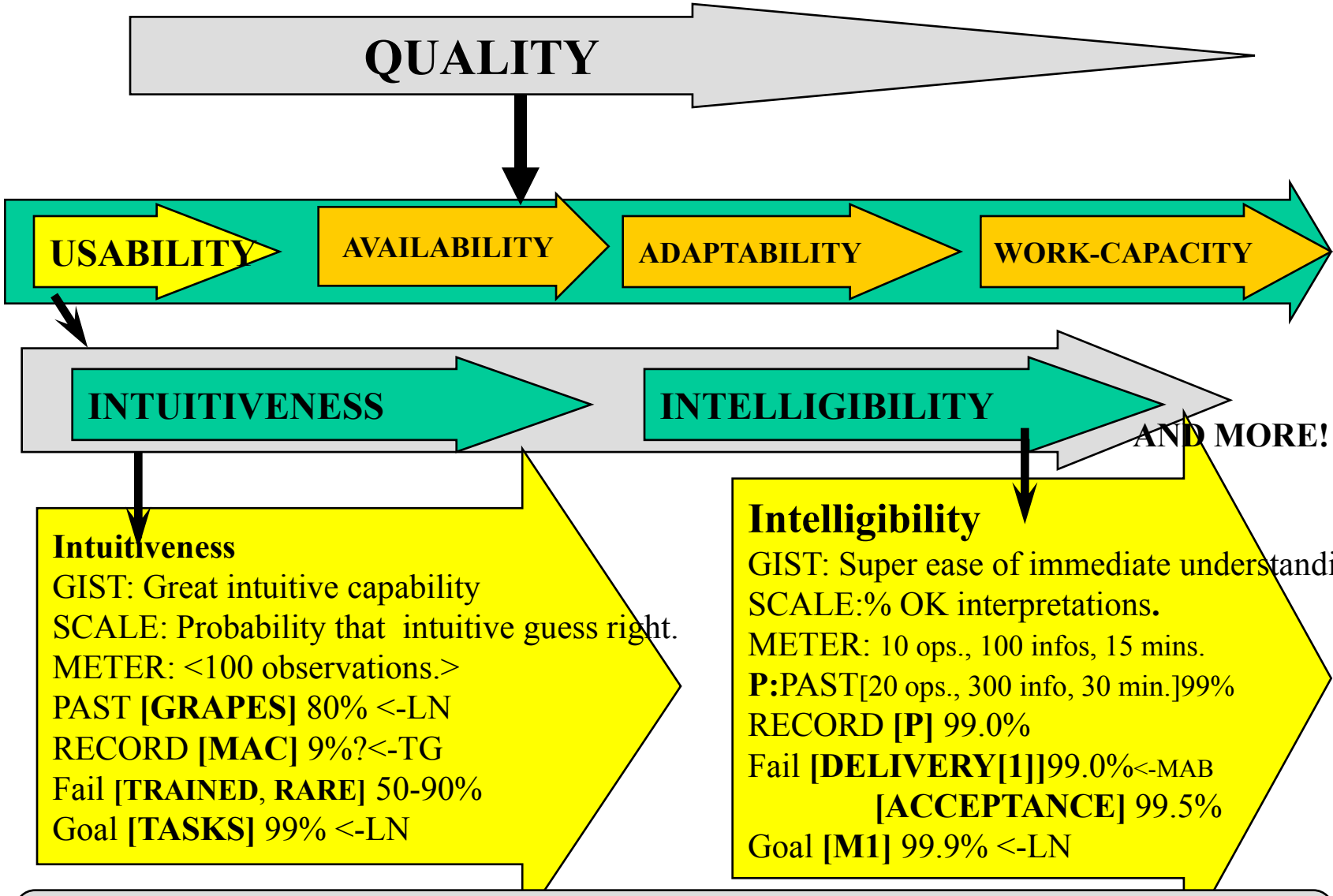
Learning Effort: Scale: Hours to learn, …..

Productivity: Scale: Tasks per hour,…….

Error Rate: Faults per 100 tasks, …..

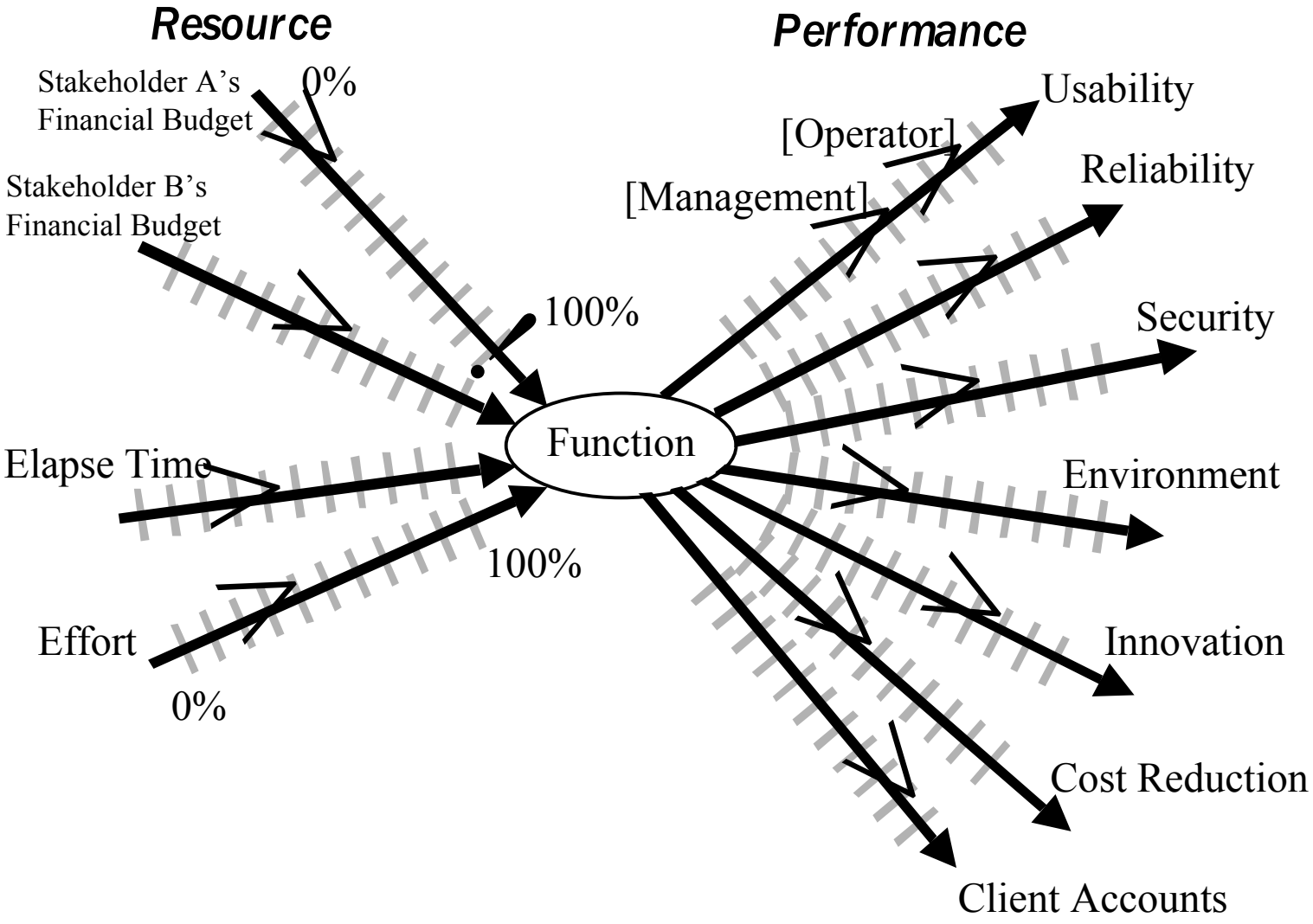
Like-ability: % Users who like the system, ….

Quantifying Usability (Real 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.

Multiple Required Performance and Cost Attributes
are the basis for architecture selection and evaluation



3. THE PRINCIPLE OF 'SCALAR DEFINITION'

- A *Scale of measure* is a powerful practical *definition* of a quality

Flexibility:

Scale: Speed of Conversion to New Computer Platform

(Quality) Requirements Specification Template with <hints>

HOW WE SPECIFY SCALAR ATTRIBUTE PRIORITY

<name tag of the objective>

Ambition: **<give overall real ambition level in 5-20 words>**

Version: **<dd-mm-yy each requirements spec has a version, at least a date>**

Owner: **<the person or instance allowed to make official changes to this requirement>**

Type: **<quality|objective|constraint>**

Stakeholder: **{ , , }** **"who can influence your profit, success or failure?"**

Scale: **<a defined units of measure, with [parameters] if you like>**

Meter **[<for what test level?>]**

====Benchmarks ========== the Past

Past **[ ]** **<estimate of past> <--<source>**

Record **[<where>, <when >, <estimate of record level>]** **<-- <source of record data>**

Trend **[<future date>, <where?>]** **<prediction of level>** **<-- <source of prediction>**

===== Targets ========== the future needs

Wish **[ ]** **<-- <source of wish>**

Goal **[…] <target level>** **<-- Source**

Value **[Goal] <refer to what this impacts or how much it creates of value>**

Stretch **[ ] <motivating ambition level>** **<-- <source of level>**

========== Constraints ==========

Fail **[ ]** **<-- <source>** **'Failure Point'**

Survival **[ ]** **<- <source of limit>** **'Survival Point'**

4. THE PRINCIPLE OF 'THREATS ARE MEASURABLE'

- **If *lack of quality* can destroy your project**
- **then you <u>can</u> measure it *sometime*;**
- **the only discussion will be 'how early?'.**

5. THE PRINCIPLE OF 'LIMITS TO DETAIL'

- **There is a *practical* limit to the number of facets of quality you can define and control,**
- **which is far less than the number of facets that you can *imagine* might be relevant.**

6. THE PRINCIPLE OF 'METERS MATTER'

Practical measuring instruments
improve
the *practical understanding*
and *application*
of ‘Scales of measure’.

Portability:

Scale: Cost to convert/Module

Meter [Data] measure/1,000 words converted

Meter [Logic] measure/1,000 Function Points Converted

7. THE PRINCIPLE OF 'HORSES FOR COURSES'

Different quality-Scale *measuring processes*

will be necessary

for different *points in time*, different *events* and different *places*.

Availability:
Scale: % Uptime for System
Meter [USA, 2001] Test X
Meter [UK, 2002] Test Y

8. THE PRINCIPLE OF 'BENCHMARKS'

Past history and future trends *help* define words like "improve" and "reduce".

Reliability

Scale: Mean Time To Failure

Past [US DoD, 2002] 30,000 Hours

Trend [Nato Allies, 2003] 50,000 Hours

Goal [UK MOD, 2005] 60,000 Hours

9. THE PRINCIPLE OF 'NUMERIC FUTURE'

Numeric future requirement levels *complete* the quality definition of relative terms like 'improved'.

Usability:

Scale: Time to learn average task.

Past [Old product, 2003] 20 minutes

Wish [New product, 2007] 1 minute

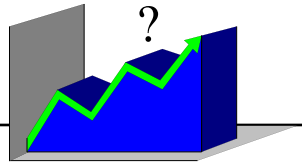
Stretch [End 2008, Students] 2 minutes

Goal [End 2005, Teachers] 5 minutes

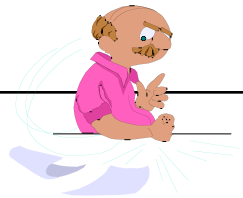
Some Planguage 'Quality Quantification' Concepts

PAST: any useful reference point. Your old product, a competitors organization, a quality achieved in same discipline but different branch of business.

RECORD: best in some class, state of the art. Something to beat. A challenge for you. An extreme PAST.

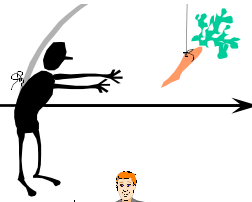


TREND: a future ? guess based on the PAST.

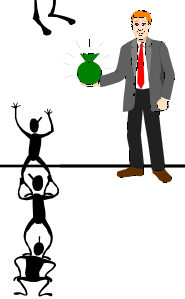


Survival : a level needed for survival of the entire system.

[-----]



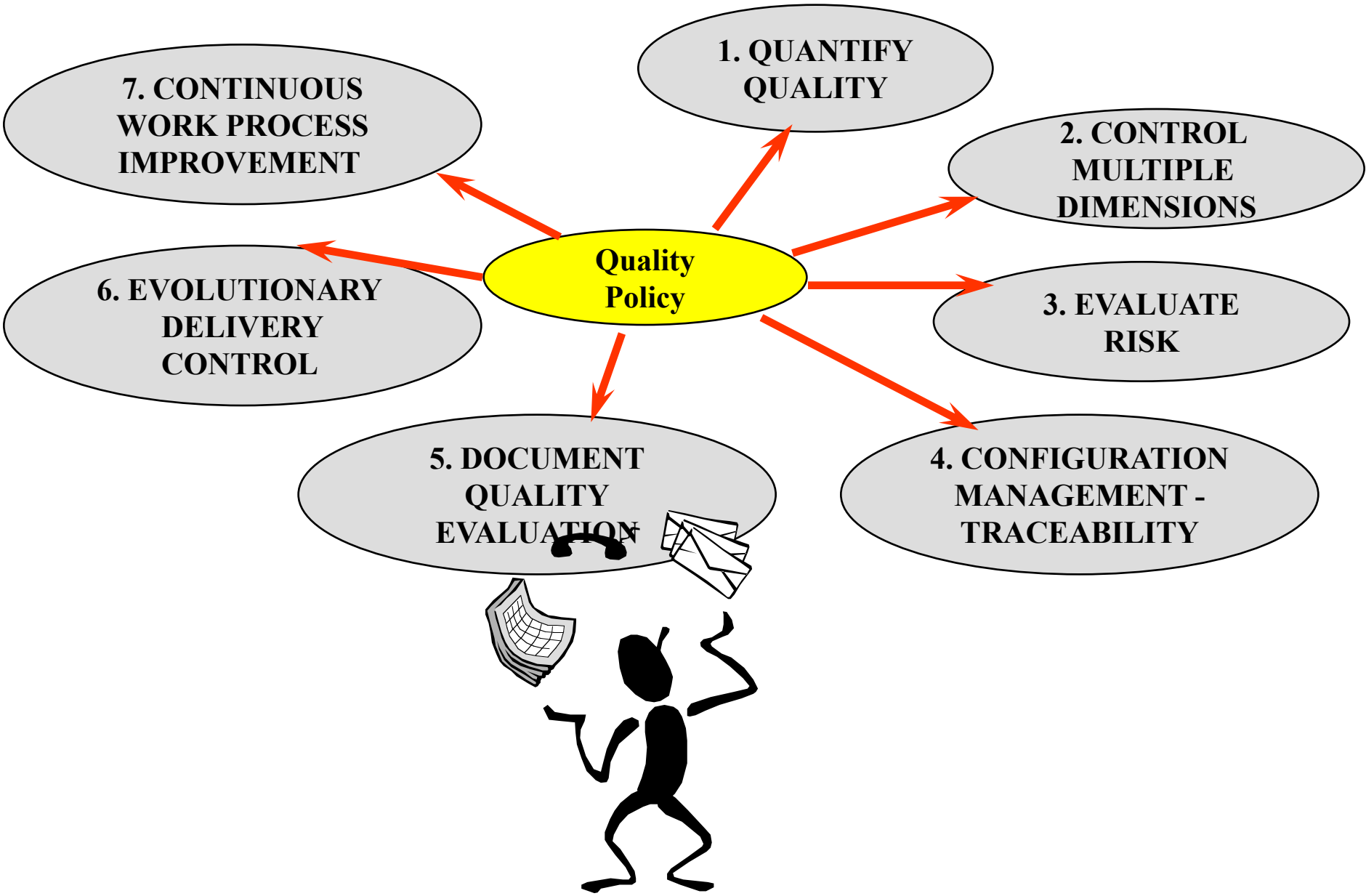
Goal: the level needed for satisfaction, happiness, joy and 100% full payment!



Wish: a level desired by someone, but which might not be feasible. Project is not committed to it.

?

A Corporate Quality Policy (Euro Multinational)



Policy on QUANTIFICATION, CLARIFICATION AND TESTABILITY OF CRITICAL OBJECTIVES:

"All critical factors or objectives (quality, benefit, resource) for any activity (planning, engineering, management) shall be expressed clearly, measurably, testably and unambiguously at all stages of consideration, presentation, evaluation, construction and validation. "

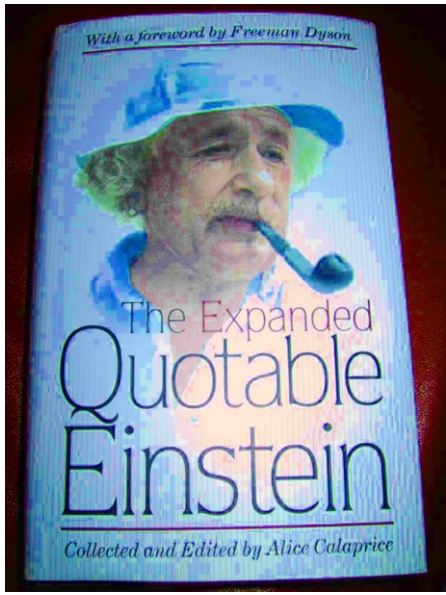
<- (Quality Manual Source is) 5.2.2, 4.1.2, 4.1.5, 5.1.1, 6.1, 6.4.1, 7.1.1, 7.3 and many others.

Einstein on Stretching

- "One should not pursue goals that are easily achieved.
- One must develop an instinct for what one can just barely achieve through one's greatest efforts." (1915)

"We have to do the best we can.

This is our sacred human responsibility" (1940)



Source detail in notes section of this slide. (Calaprice, 2000)

Free Digital Book on Quality Quantification

- REQUEST "BOOK" in subject from
  - TOM @ GILB .com
- Tom Gilb,
  - Competitive Engineering: A Handbook For Systems Engineering, Requirements Engineering, and Software Engineering Using Planguage
  - and I will also send links to related papers on requirements and estimation.

LAST SLIDE

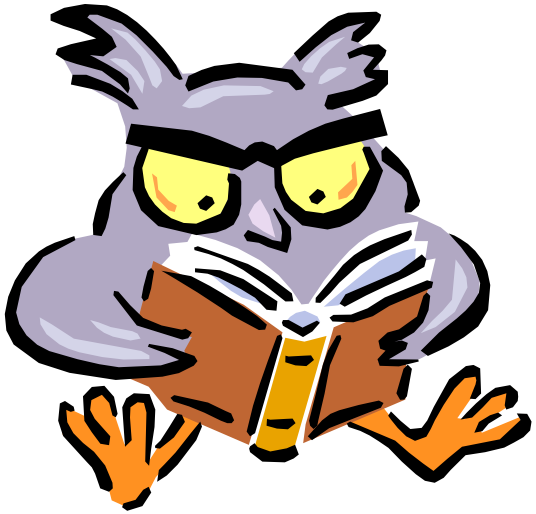
SEE

WWW.Gilb.COM

FOR MORE DETAIL

"Competitive Engineering" at www.gilb.com

(or via memory stick here at conference from presenter):



Supporting Standards for Quality Quantification

These following slides contain supporting Standards in detail which I do not expect to have time to show in my lecture

A
Process for
Quality Quantification.
(PROCESS.QQ)

ENTRY: (ENTRY.QQ)

- 1. Do not enter if company files or standards already have adequate quantification devices.
  - Use existing quantification SCALES and METERS preferably.

- 2. Enter only if your process input documents
  - (contracts, marketing plans, product plans, requirements specification for example)
  - are Quality Controlled,
  - and have *exited* at a known and acceptable standard of defect-freeness
    - *(default standard; less than 1Major defect/page estimated remaining).*

Procedure for the Quality Quantification Task (PROCEDURE.QQ)

NOTE: these following steps cannot be simply sequentially. They need to be repeated many times to evolve realistic quality quantifications.

1. Use applicable rules {RULES.GR, RULES.QR, RULES.QQ}

2. *Build a list* of all quality concerns from your process input documents. Include *implicit* quality requirements *derived from* design requirements. Include any recent practical experience such as from evolutionary steps (of this project, pilot experiences or prototypes.

3. *Detail* the specification to a useful level. Include any recent practical experience such as from evolutionary result delivery steps of this project.

4. Revise these specifications when some design engineering/planning work is done on their basis. Only through design work can you know about the available technology and its costs.

5. Perform Quality Control (Inspection method) calculating remaining Major defects per page for the exit control. Apply valid rules {RULES.GR, RULES.QR, RULES.QQ}

6. Get experience using these specifications and revise specifications to be more realistic.

7. Repeat this process until you are satisfied with the result.

8. Cumulate your improved idea experiences and make available to others.

EXIT: (EXIT.QQ)

1. Calculated remaining Major defects/page less than 1.

2. or exit condition “1.” above is <u>waived</u>

   with the intent of getting experience or opinions

   so as to <u>refine</u> it

   for official exit and more-serious use.

Specific Rules for Quality Quantification (QQ)

- 4.3. Rules: Quality Quantification. (RULES.QQ)

- The following rules would be
  - appropriate for a culture which was intent on raising quality specifications to a high level
  - and to systematically learn as a group,
  - in the long term,
  - from the experiences of themselves and others.
- The rules are guidance to the any writer or maintainer of quality specifications.
- Violations of these rules would be classed as *'defects'* in a quality control process on the document.

Rules for Quality Quantification:(RULES.QQ) 1of2

0:RULES: Rules for technical specification (RULES.GR) apply. This may be used in *addition* to the Quality Requirement Specification Rules (RULES.QR) or whenever serious emphasis on quality definition is required.

1:STANDARD: The Scale shall wherever possible be derived from a standard SCALE (in named files or referenced sources) and the standard *shall* be source referenced (←) in the specification.

2:SCALENOTE: If the Scale is not standard, a notification to Scale owner will inform about this case. "Note sent to <owner>" will be included as comment to confirm this act.

3:RICH: Where appropriate, a quality concept will be specified with the aid of *multiple* Scale definitions, each with their own unique tag, and appropriate set of defining parameters.

4: Meter : a practical and economic Meter or set of Meter s will be specified for each Scale. Preference will be given to previously defined Meter s in our Quantification archives.

5: Meter. NOTE: When 'essentially new' (no reference to previous case in generic archives) Meter specifications are made a Notification to Meter owner will notify about this case. "Note sent to <owner>" will be included as comment.

Continued next slide

Rules for Quality Quantification:(RULES.QQ) 2of2

6:BENCHMARK: Reasonable attempt to establish 'baselines' (Past, Record, Trend) will be made for our system's past, and for relevant competition.

7:TERMS: Future-priority requirements (Fail, Goal) will be made with regard to both *long* and *short* term.

8:DIFFERENTIATE: A distinction will be made, using qualifiers, between those system components which must have significantly higher quality levels than others, and components which do not require such levels. "The best can cost too much".

9:SOURCE: Emphasis will be placed on giving the exact and detailed source (even if a personal guess) of all numeric specifications, and of any other specification which is derived from a process input document (like a Meter which is contractually defined).

10:UNCERTAINTY) Whenever numbers are uncertain, we will have rich annotation about the degree (plus/minus) and reason (a comment like "because contract & supplier not determined yet"). The reader shall *not* be left to guess or remember what is known, or could be known, with reasonable inquiry by the author.

Generic Rules for Technical Specification (including Quality Quantification) GR

0.3. Rules/Forms/Standards: Generic Rules and Requirements Rules sample.

- Here are some formal **rules** which could serve as a **standard** for how to communicate such ideas.
- We call this standard ‘**Generic**‘ because it applies to many types of **specification**.
- ‘Rules’ are a ‘best practice‘ procedure for writing a document. Violation of rules constitutes a formal ‘**defect**‘ in that document.
- Rules are the local law of practice, and violation of them is an 'illegal' act.

GENERIC RULES FOR TECHNICAL AND MANAGEMENT DOCUMENTATION

Tag: RULES.**GR**

- **1:CLEAR Statements should be clear and unambiguous to their intended reader.**
  2:SIMPLE: Statements should be written in their most elementary form.
  3:TAG. Statements shall have a unique identification tag.
  4:SOURCE: Statements shall contain information about their detailed source, AUTHORITY and REASON/Rationale.
  5:GIST: Complex statements should be summarized by a GIST statement.
  6:QUALIFY: When any statement depends on a specific time, place or event being in force then this shall be specified by means of the [qualifier square brackets].
  7:FUZZY: When any element of a statement is unclear then it shall be marked, for later clarification, by the <fuzzy angle brackets>.
  8: COMMENT: any text which is secondary to a specification, and where no defect could result in a costly problem later, shall be written in *italic text statements, or/and headed by suitable warning (NOTE, RATIONALE, COMMENT) or moved to footnotes*. Non-commentary specification shall be in plain text *Italic* can be used for emphasis of single terms in non-commentary statements. Readers shall be able to *visually* distinguish critical from not critical specification.
  9: UNIQUE: requirements and design specifications shall be made one single time only. Then they shall be re-used by cross reference to their identity tag. Duplication is strongly discouraged.

In addition to the general rules,
we can specify some special rules
for the specific types of statement
we are dealing with.

For example SR (below), QQ (above), QR (above).

REQUIREMENTS SPECIFICATION RULES. SPECIFIC RULES.**SR**

- **0:GR-BASE: The generic rules (RULES.GR) are assumed to be at the base of these rules.**
  1:TESTABLE: The requirement must be specified so that it is possible to define an unambiguous test to prove that it is later implemented.
  2:METER: Any test of SCALE level, or proposed tests, may be specified after the parameter METER.
  3:SCALE: Any requirement which is capable of numeric specification shall define a numeric scale fully and unambiguously, or reference such a definition.
  4:MEET:The numeric level needed to *meet requirements fully* shall be specified in terms of one or more [qualifier defined] target level {PLAN, MUST, WISH} goals; mainly the PLAN level here.
  5:FAIL: The minimum numeric levels to *avoid system, political, or economic failure* shall be specified in terms of one or more [qualifier defined] 'MUST' level goals.
  6. QUALIFY. Rich use of [qualifiers] shall specify [when, where, special conditions].

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