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ICEBERG: a different look at Software Project Management

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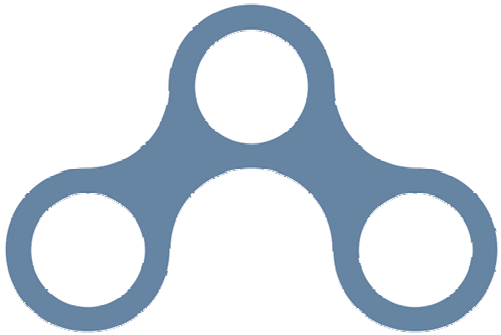
SchlumbergerSema

Agenda

- Introduction
- Evolution and contribution of Quality Approaches
  - *Evolution of Quality Management frameworks*
  - *Software Process Improvement models and Quality Models*
  - *Software Projects measurement frameworks*
- The ICEBERG approach
- Conclusions



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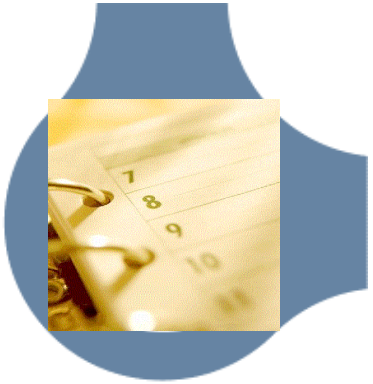

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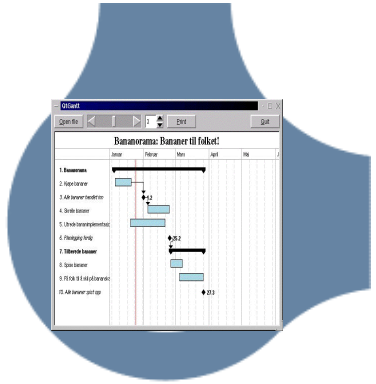
Introduction

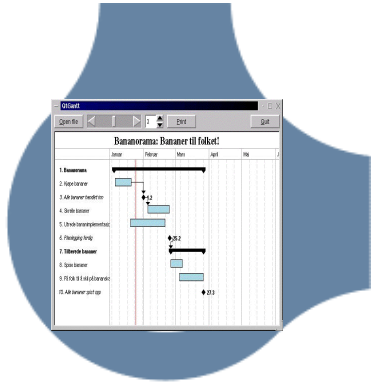


Project Management has been defined in the PMBOK (1996 ed.) as "*the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project. Meeting or exceeding stakeholders needs and expectations invariably involves balancing competing demands among:*

- Scope, time, cost and quality
- Stakeholders with differing needs and expectations
- Identified requirements (needs) and unified requirements (expectations)

The term project management is sometimes used to describe an organizational approach to the management of ongoing operations"

Introduction



- Starting point - every project should be properly managed taking into account 4 dimensions (Time, Cost, Quality and Risk) according to best practices in the Project Management domain
- Arrival point – an approach to reduce the occurrence of risks in projects
- Question: how to do it?

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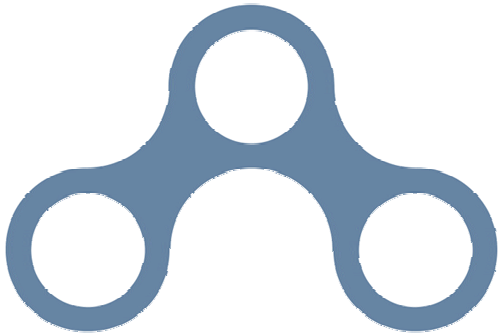

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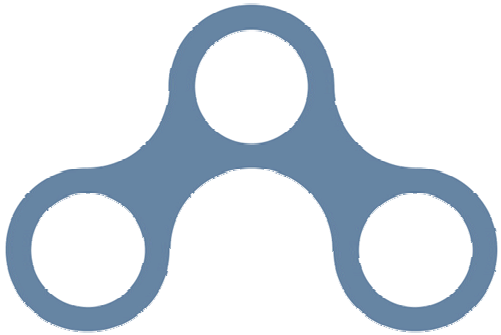
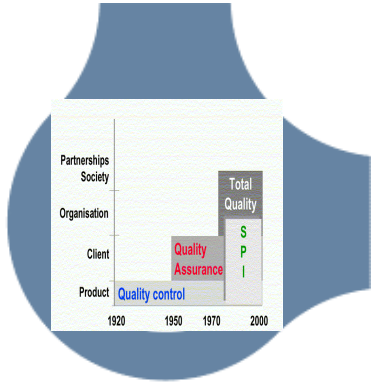
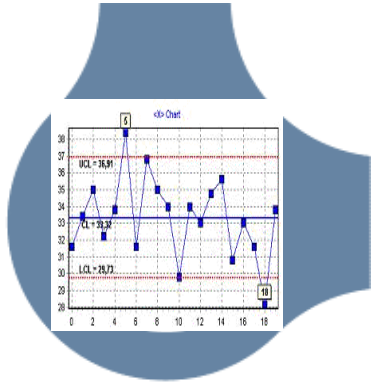


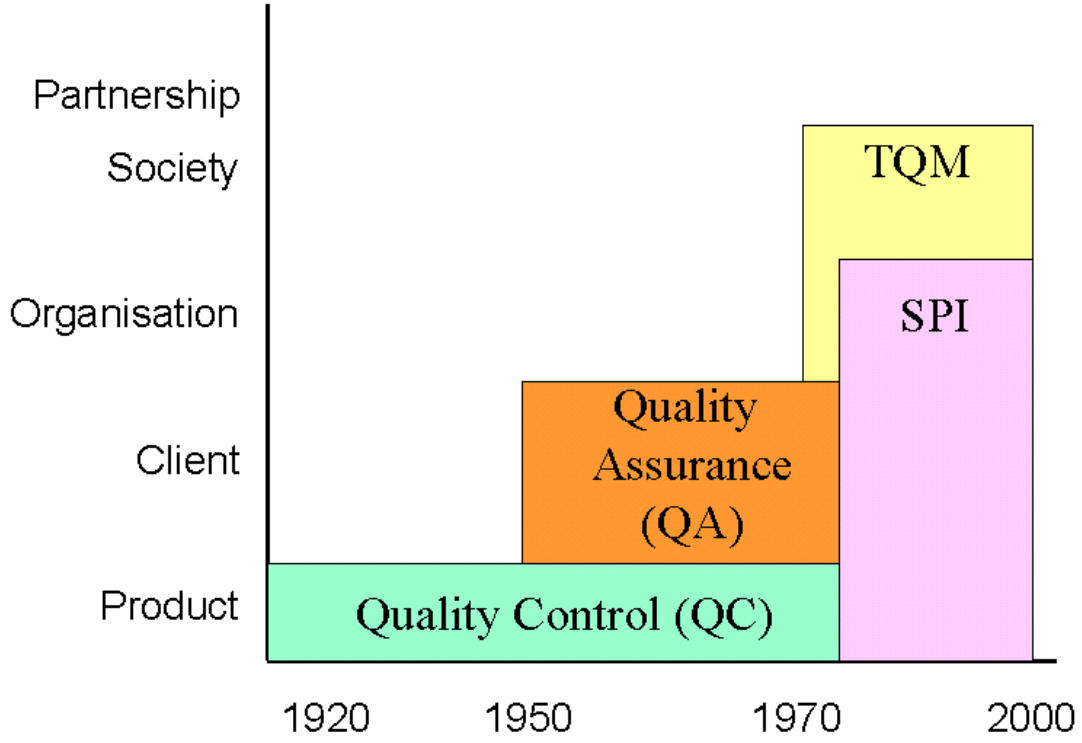
Evolution of Quality Management frameworks



- Quality Management System (QMS) can be viewed as a risk mitigation strategy.
- Three main stages in the evolution of QM frameworks:
  - *QC - Quality Control*
  - *QA - Quality Assurance*
  - *TQM - Total Quality Management (QI - Quality Improvement)*

Evolution of Quality Management frameworks





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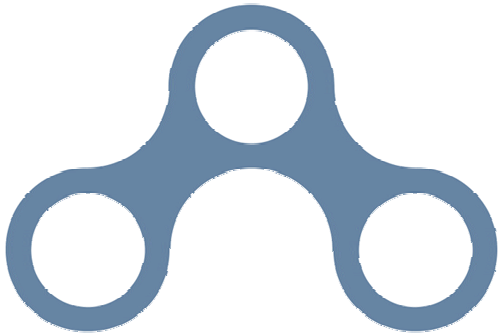
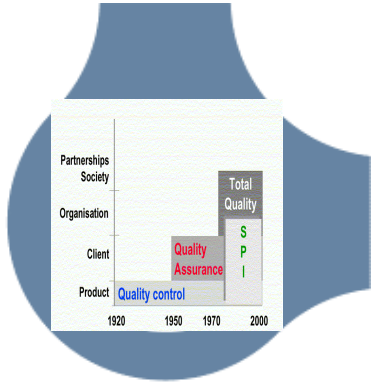


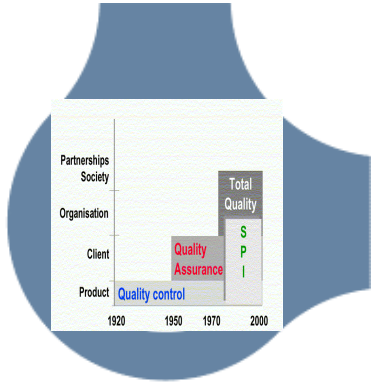
SPI models and QM models



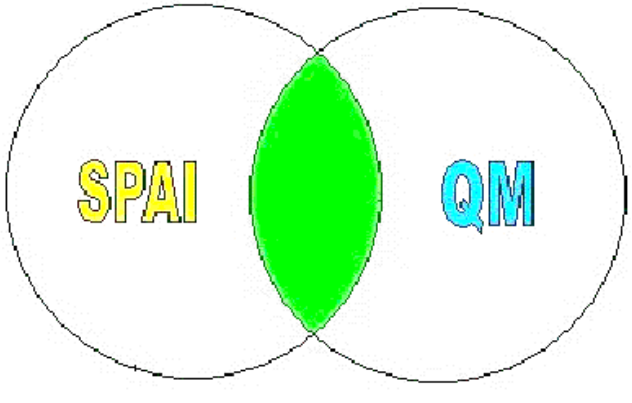
- To be competitive on the market, QA is not sufficient
- First solution: to move towards SP(A)I models and frameworks, such as CMMI, SPICE, Bootstrap...
- But...: some areas are not covered (although complementary), such as documentation, customer complaints management, servicing....these issues are largely tackled by QMs such as ISO 9001

TOPIC	SW-CMM v.1.1	ISO 9001:1994	ISO 9001:2000
Corrective actions	L2 KPA SPTO, Goal 2 – Activity 6	4.14.2	8.5.2
Prevention of problems	L5 KPA DP	4.14.3	8.5.3
Resources	*Abilities* Common Feature in every KPA	4.1.2.2	6.1 + 6.2.1
Training	*Abilities* Common Feature in every KPA	4.18	6.2.2
Audits	L2 KPA SQA, *Verification* KP in all KPAs	4.17	8.2.2 + 8.2.3
Process and lifecycle definition	L2 KPA SPP, L3 KPA OPD	4.4	7.2 + 7.3.x
		4.9	6.3 + 6.4 + 7.5.1 + 7.5.2
Continuous Improvement	L5	4.14	8.5.2 + 8.5.3
		4.17	8.2.2 + 8.2.3

SPI models and QM models



• Final solution: to merge the two families of methods into a single, stronger and reinforced approach



• This path to quality excellence is called **ICE** (**I**mprovement after **C**ontrol & **E**valuation)

• A path to excellence: through a gradual and constant increase of the maturity and capability level of an organization

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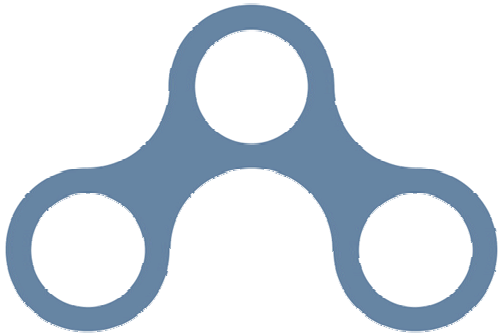
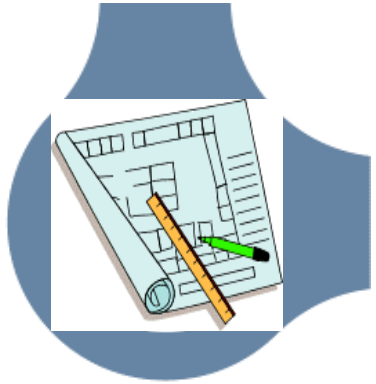
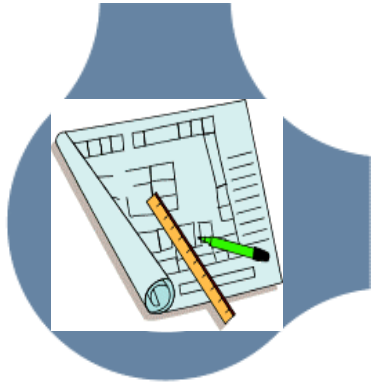


Software Project Measurement frameworks



- Several Software Project Measurement (SPM) frameworks help in the measurement activity, but not for the identification and selection of the right entities to measure
- The usual triad of measurable entities is: *resources*, *process*, *product*
- Strengths: general
- Weaknesses: it misses the broader project context
- Solution: to move up to the "ICE" approach, taking into account also the project risks and the causal chains generated by the linkage among the processes and goals of an organization (i.e. as in the Balanced Scorecard approach)
- But...: a BSC also misses something...

Software Project Measurement frameworks



FAMILY METHOD	STRENGTHS	WEAKNESSES
SPAI	• Path to organizational maturity	• No focus on the business organisational strategy. Pre-defined path from L1 to L5 (staged Model)
QM	• Strong focus on Controls and Assurance	• Little attention to improvements (even with the ISO Vision 2000 series)
PM (BSC)	• Causal Chain among perspectives	• No clear nor defined action plan after measurement and the strategy map

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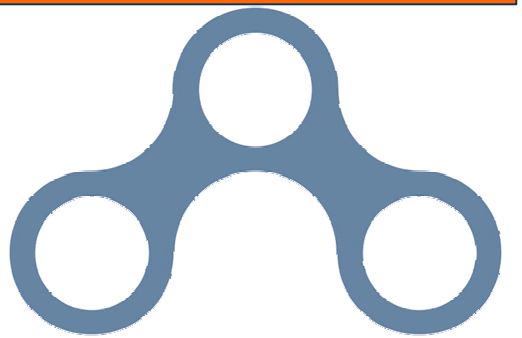
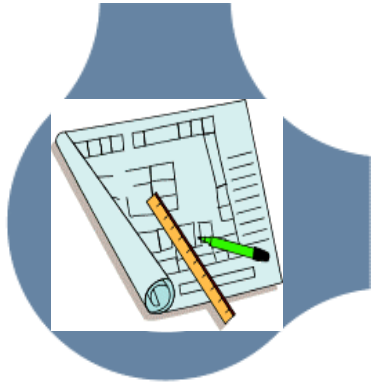


The ICEBERG approach

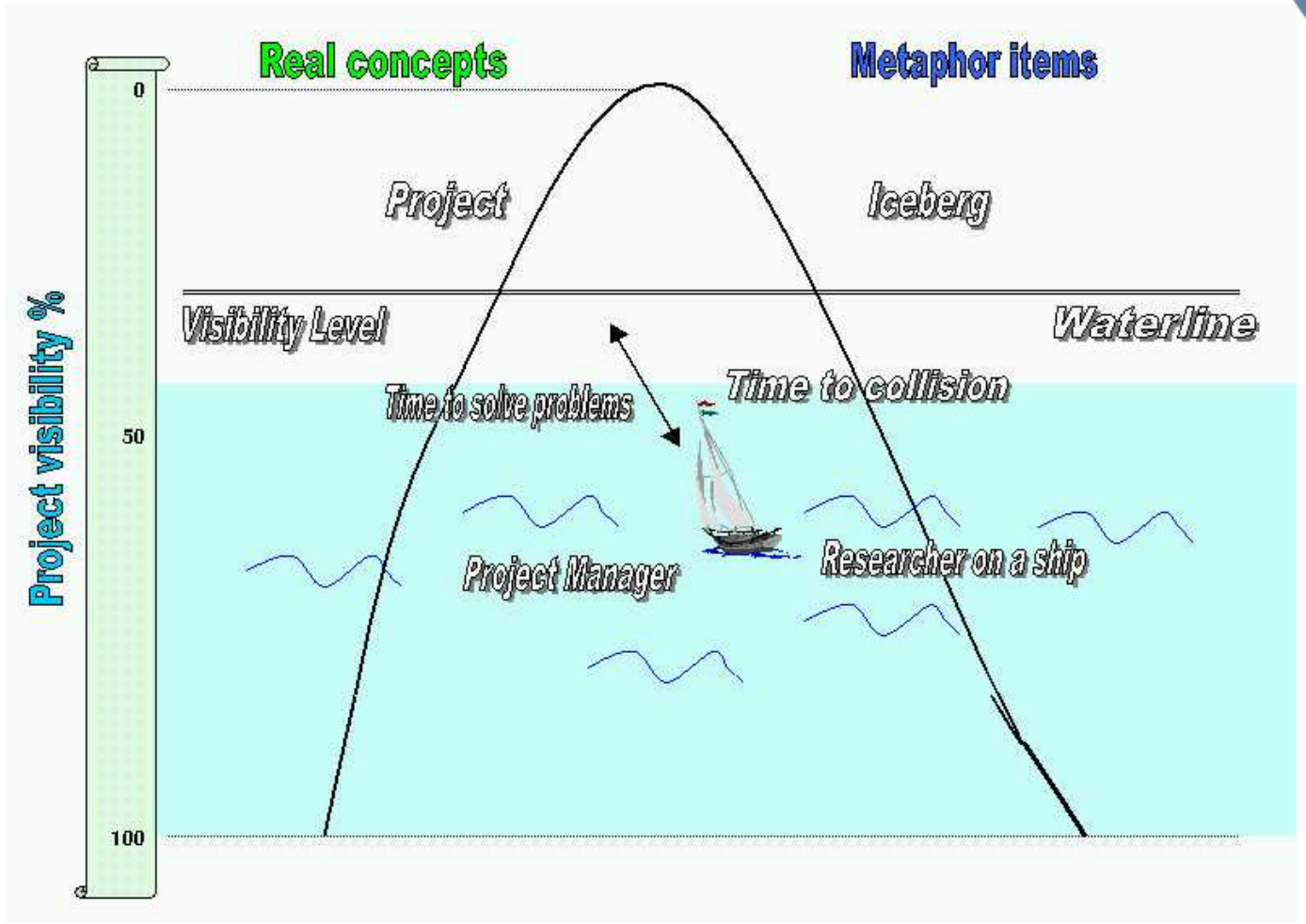


- Objective: to leverage the ICE approach towards a better project risk management
- How to do it? Through the achievement of a better *project visibility*, defined as:

$$\sum_i available\_\inf o_i * \% probability\_occurrence$$

- How to represent it? Through the *iceberg* metaphor

The ICEBERG approach



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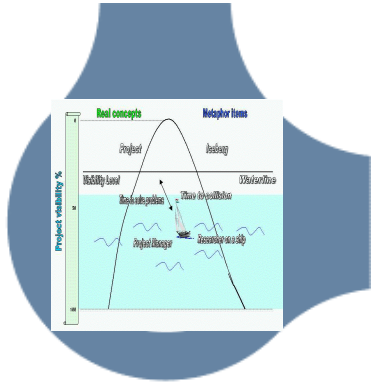
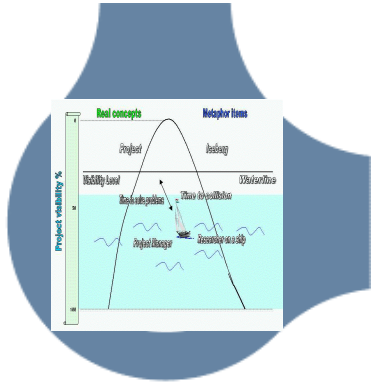


- **What is required**?
  - To figure out what is below the *waterline* level *(more information on the project: through an in depth measurement activity)*
  - To implement mitigation strategies to maintain a sufficient distance between the ship and the iceberg to avoid crashes *(problems solved on time)*

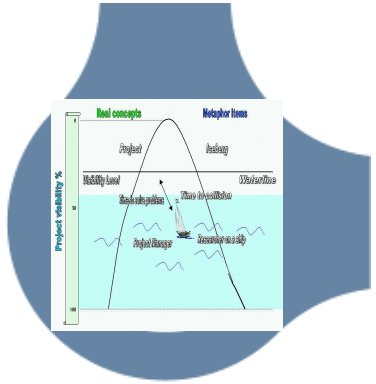
The ICEBERG approach



- **Are the right entities captured**?

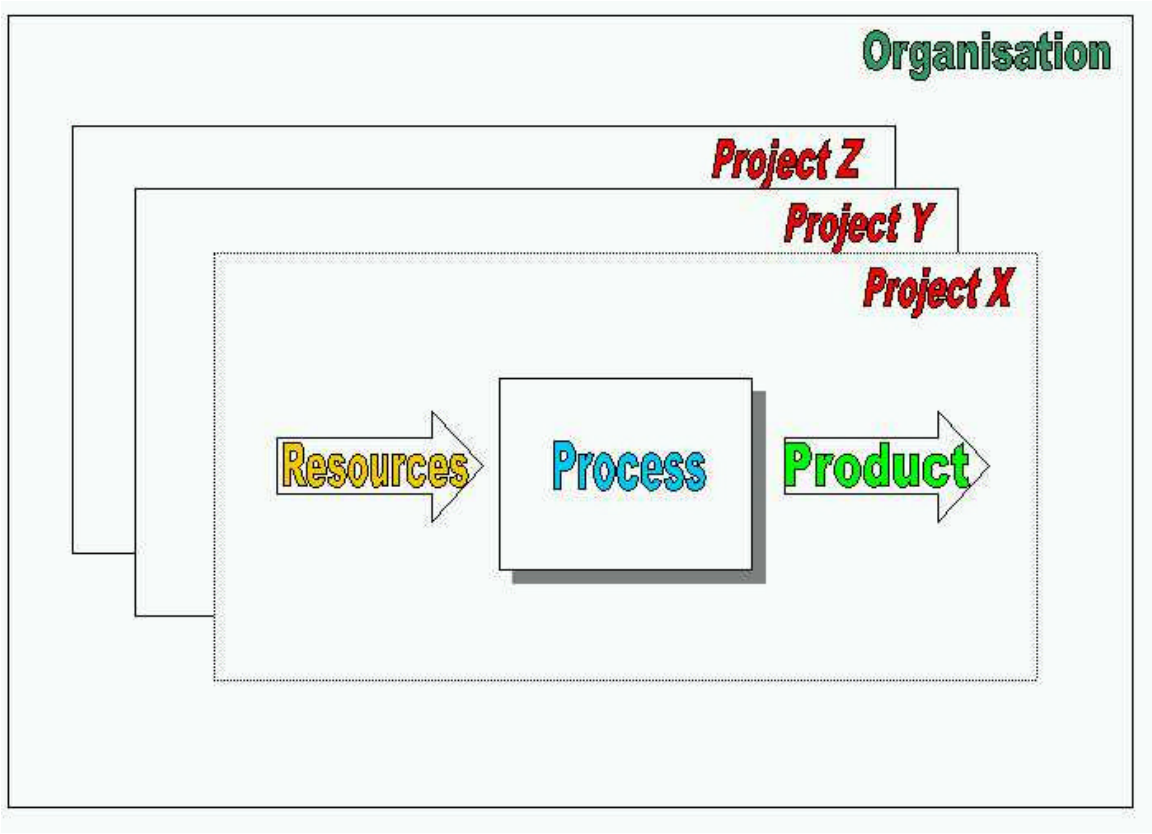
At least, two more entity types have to be taken into account:

- the Organization itself
- the Projects the Organization is running and managing



The ICEBERG approach

- **STAR (Software entities TAxonomy Revised)**



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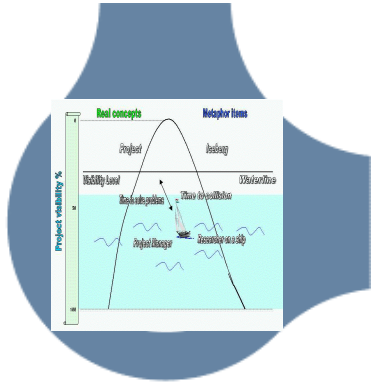
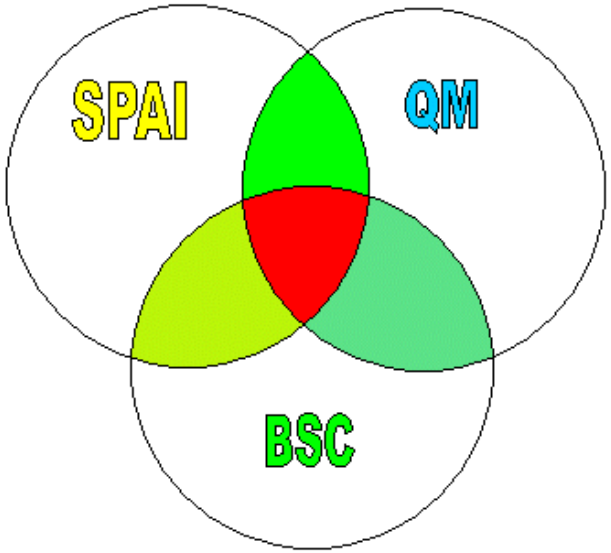


• What is missing in ICE? The missing point is the “strategy” issue typical in Performance Management techniques such as the BSC

• Solution: Expand the ICE view to **ICEBERG** (**I**mprovement after **C**ontrol & **E**valuation-**B**as**E**d **R**ules and **G**uidelines)



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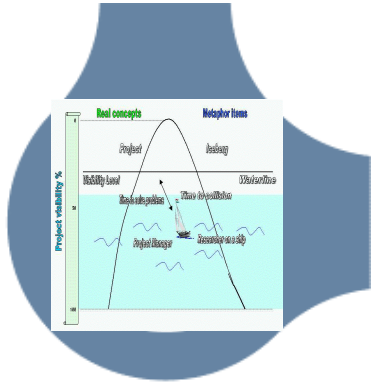
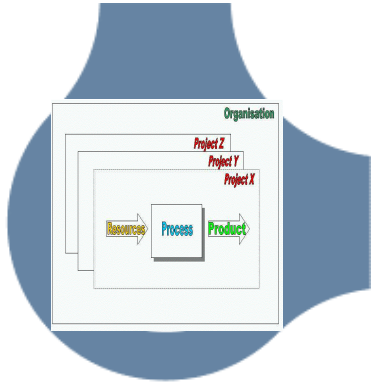


A possible schema of models to apply in an ICEBERG context could be as follows:

FAMILY METHOD	FRAMEWORK CHOSEN	WHICH USAGE…
SPAI	• **CMMI v.1.1 Continuous Model**	• ***For the maturity path and the improvement actions (according to BITS)***
QM	• **ISO 9001:2000**	• ***For the Quality Assurance topics***
PM (BSC)	• **ESI's BITS (5 perspectives)** • **QEST/LIME [BUGL01] [ABRA02]**	• ***For the Performance Management issues (general framework)*** • ***For the measurement of the performances obtained applying BITS***

The ICEBERG approach



- **But which measures can be used with STAR?**

Two points have to be stressed:

1) matching software entities with ICT BSC perspectives

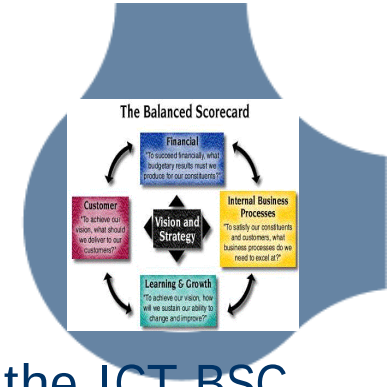
2) search and list possible measures/indicators for each of the ICT BSC perspectives

The ICEBERG approach

1) matching software entities with ICT BSC perspectives

Software Entity			Main ICT BSC perspective(s) involved
1st layer	*2nd layer*	*3rd layer*	
Organization			**Financial**
	Project		**Infrastructure & Innovation**
		Resources	**People, Customer (requirements), Infrastructure & Innovation**
		Process	**Process**
		Product	**Process, Customer (feedback)**

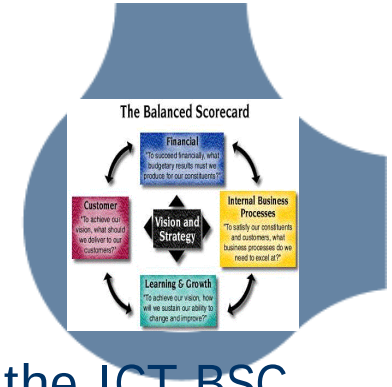
The ICEBERG approach



2) search and list possible measures/indicators for each of the ICT BSC perspectives (1/3)

Software Entity	Measures /Indicator	Notes
Organisation	- ROI (Return On Investment) - ROS (Return On Sales) - ROCE (Return On Capital Employed) - EVA (Economic Value Added) - Breakeven time - Percent of revenue from products developed in last 4 years - Proposal win % - Cost performance - Net present value of cash outflows for development and commercialization and the inflows from sales - …	***Measures linked to financial issues, as in the Financial perspective in the ICT BSC***
Project	- Development cycle time trend (normalized to program complexity) - Earned Value (EV) - Schedule performance - Program/project cost performance - Actual staffing (hours or headcount) vs. plan - Personnel turnover rate % of milestone dates met - Schedule performance - Milestone or task completion vs. plan - On-schedule task start rate - Phase cycle time vs. plan - Time-to-market or time-to-volume - …	***Measures typical for a Project Manager in deploying his activity, looking at both Technical and Economical viewpoints***

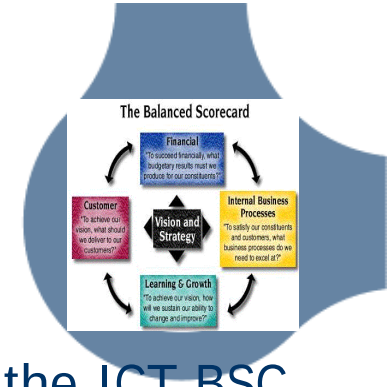
The ICEBERG approach



2) search and list possible measures/indicators for each of the ICT BSC perspectives (2/3)

Software Entity	Measures /Indicator	Notes
Resources	- **Percent project personnel receiving team building/team launch training/facilitation** - **Average training hours per person per year or % of payroll cost for training annually** - **IPT/PDT turnover rate or average IPT/PDT turnover rate** - **Percent core team members physically collocated** - **Staffing ratios (ratio of each discipline's headcount on project to number of design engineers) Personnel ratios** - **Staffing (hours) vs. plan** - **Requirements Coverage** - **Technology Impact** - **…**	*Measures intended to focus on the management of people, infrastructure and materials, searching for information about the degree of efficiency they are managed*
Process	- **Product ship date vs. announced ship date or planned ship date** - **Mean time between failure (MTBF)** - **Labor hours or labor hours / target labor hours** - **Mean time to repair (MTTR)** - **Productivity** - **Cycle Time** - **Defect Containment** - **Process Audit Findings** - **Reference Model Ratings** - **…**	*Measures intended to focus on the way a certain process (typical to a certain industry) is deployed, in direct or indirect way*

The ICEBERG approach



2) search and list possible measures/indicators for each of the ICT BSC perspectives (3/3)

Software Entity	Measures /Indicator	Notes
Product	- **Product performance or product performance / target product performance or technical performance measures (e.g., power output, mileage, weight, power consumption, mileage, range, payload, sensitivity, noise, CPU frequency, etc.)** - **Number of parts or number of parts / number of parts for last generation product** - **Defects per million opportunities or per unit** - **Field failure rates or failure rates per unit of time or hours of operation** - **Engineering changes after release by time period** - **Design/build/test iterations** - **% of requirements analyzed/simulated** - **…**	***Measures to focus on the final product***

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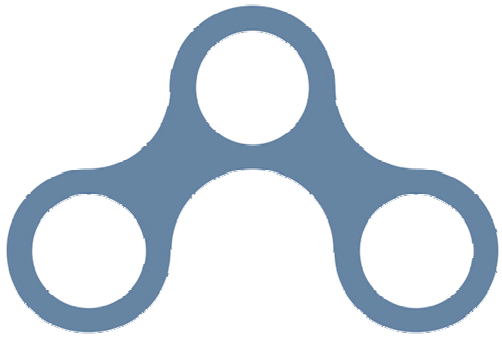


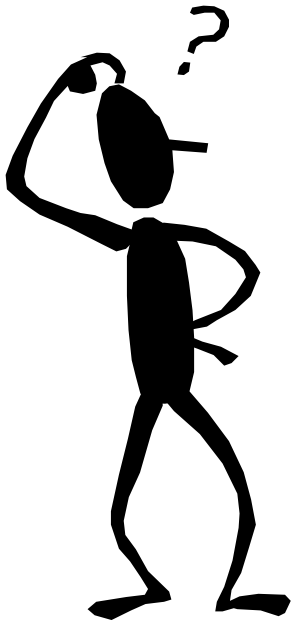
Conclusions

- Managing a project requires to take into account several organizational and project aspects, in addition to the traditional IPO view
- Again, it is not possible to consider only the QA view, but in a competitive market an Organization absolutely needs to be proactive and move towards a Quality Improvement views on Quality issues
- ICE represents a first step towards this new vision of Quality; but it misses the *strategical* part of the "journey"
- ICEBERG represents the step beyond, merging SPAI+QM+PM models and frameworks in a unique, integrated view, increasing the *project visibility* for Project Managers
- The way to manage an ICEBERG passes always through measurement: the STAR taxonomy is the answer

Conclusions

- Some furtherissues:
  - the way an ICT BSC could be applied (traditional BSC way, multi-level BSC)
  - the way to move from a traditional approach to manage software project towards the STAR logic
  - the way risk can be tackled and minimised using an ICT BSC (in each perspective or in an overall way)

Q&A



Thanks for your attention!

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