ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

SYSTEMIC MODELING LABORATORY LAMS

CREDIT SUISSE

The Integration of an RE Method and AHP: A Pilot Study in a Large Swiss Bank

Arash Golnam, Sofia Kyriakopoulou ,Gil Regev, Alain Wegmann

July 2013

Structure of the Presentation

1. Systemic Enterprise Architecture Method (SEAM)
2. Analytic Hierarchy Process (AHP)
3. SEAM and AHP Integration: The Why
4. SEAM and AHP Integration: The How
5. SEAM and AHP Integration: The Results
6. Implications for Organizational Decision Making

Systemic Enterprise Architecture Method (SEAM)

What is SEAM?	• An integration of systems thinking principles into discipline-specific methods. • A methodology for problem structuring in business - IT alignment.
History	• Developed in LAMS, EPFL. • Applied for teaching and consulting since 2001
Foundations	• General Systems Theory • RM-ODP (A software engineering ISO standard)
Applications	• SEAM for Enterprise Architecture • SEAM for Software Engineering • SEAM for Requirements Engineering

SYSTEMIC MODELING LABORATORY LAMS

What Type of Models?

Models are simplifications, abstractions of those aspects of reality that are deemed to be important by the modeler.

(Pidd, 2003)

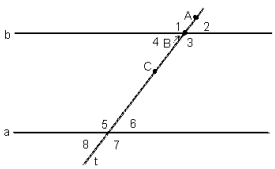
Modeling is constructing systems that account for some aspect of the domain to be investigated.

(Klir, 1991)

Modeling a system is required if sense is to be made of the system's behavior and the appropriate problem-solving measures are to be implemented.

(Jackson, 2000)

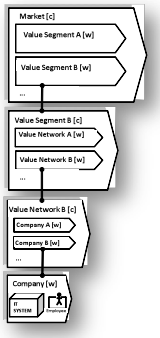
Thinking Tools
Learning Devices



SYSTEMIC MODELING LABORATORY LAMS

4

SEAM – The Three Representations



The System Diagram

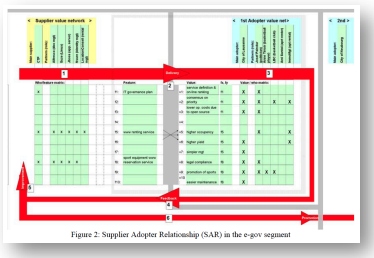
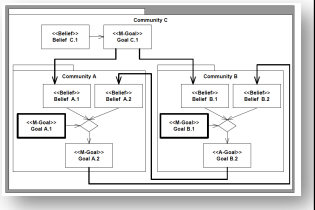


Figure 2: Supplier Adopter Relationship (SAR) in the e-gov segment

The Supplier-Adopter Relationship Diagram



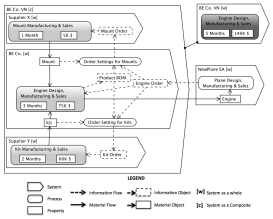
The Goal- Belief Model

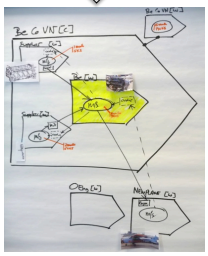
Systems

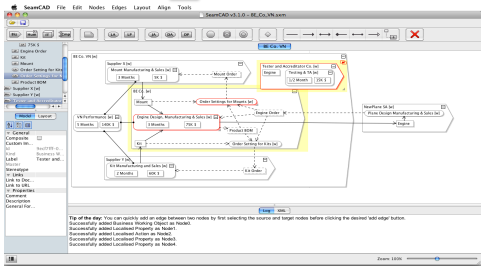
Technical Details of an Offering

Unstated Assumptions of Stakeholders

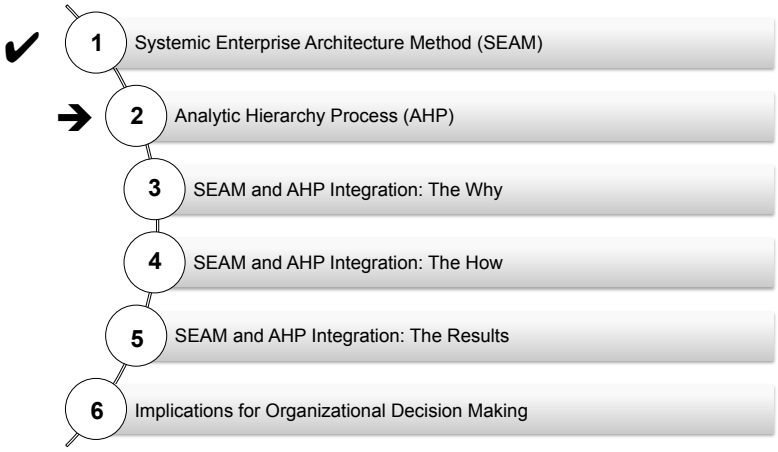
Problem Structuring Process with SEAM







Structure of the Presentation



OR Method - The Analytic Hierarchy Process (AHP)

Multi-criteria Decision Making (MCDM)

Selection of the best alternative, from a set of alternatives, each of which is evaluated against multiple, and often conflicting criteria.

Multiple Attribute Decision Making (MADM)

problems are assumed to have a predetermined , limited number of decision alternatives.

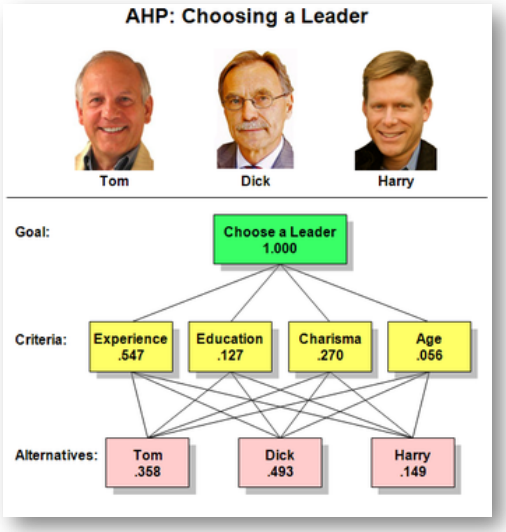
Multiple Objective Decision Making (MODM)

The decision alternatives are not given instead, the set of decision alternatives is defined by constraints using multiple objective programming.

Analytic Hierarcy Process

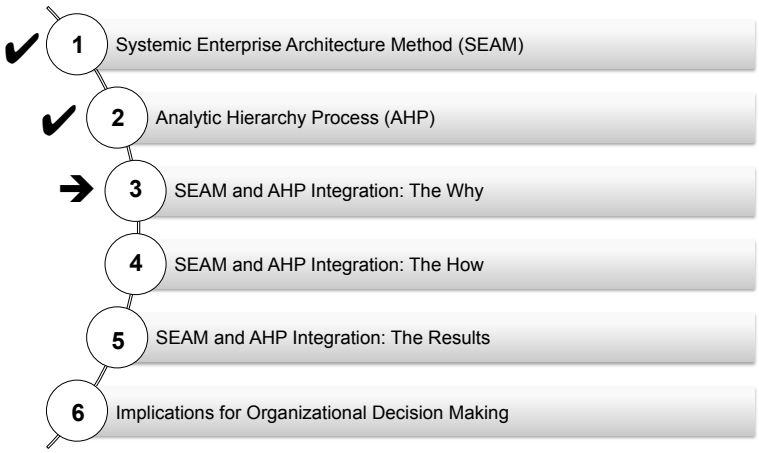
- Developed by Saaty in 1980.
- It is a popular and widely used method for multi-criteria decision making.
- Allows the use of qualitative, as well as quantitative criteria in evaluation.
- Wide range of applications exists:
  - Selecting a car for purchasing
  - Selecting a software application
  - ...

The Analytic Hierarchy Process (AHP) - Example

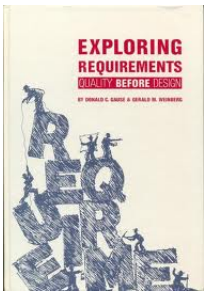


http://en.wikipedia.org/wiki/Analytic_hierarchy_process

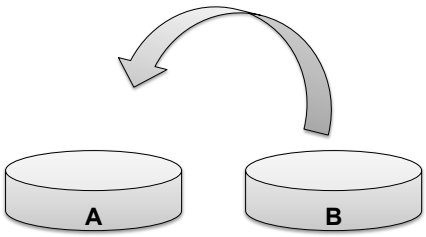
Structure of the Presentation



The Guaranteed Cockroach Killer !!



(Gause and Weinberg 1989)



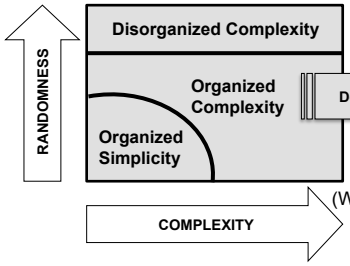
Guaranteed Cockroach Killer Instructions:

1. Place cockroach on block A.
2. Hit cockroach with block B.

Guaranteed OR Problem Solver ☺ Instructions:

1. Formulate the problem.
2. Construct a mathematical model.
3. Solve the model.
4. Test the model and the solution.
5. Put the solution to work.

Problems?!!



Definitions

(Weinberg, 1975)

- **Messes Vs. Problems** (Ackoff, 1974)
- **Wicked problems Vs. Tame Problems** (Rittel, 1973)
- **Swamps Vs. High ground** (Schon, 1987)
- **Unprogrammed Vs. Non-programmed** (Simon, 1965)

Characteristics

- **Multiple stakeholders**
- **Multiple perspectives**
- **Conflicting interests**
- **Key uncertainties**

(Mingers & Rosenhead 2004)

Methods of Inquiry

- **Reasoning:** Informal reasoning and judgment
- **Evidence:** Intuitive perceived facts
- **Generalizations:** Quasi laws
- **Models:** Heuristic-based
- **Explanations:** Perceived causal relationships
- **Predictions:** Intuitive based on considerations

(Van Gigch, 1991)

Problem Structuring Methods (PSMs)

PSMs

… are broad group of problem-handling approaches whose purpose is to assist in structuring problems rather than directly with solving them.

(Rosenhead, 1996)

PSMs must

- be participative and interactive
- enable several alternative perspectives to be brought into conjunction with each other
- operate iteratively
- permit partial or local improvements to be identified and committed

(Mingers & Rosenhead, 2002)

How can the problem be represented to facilitate the solution?

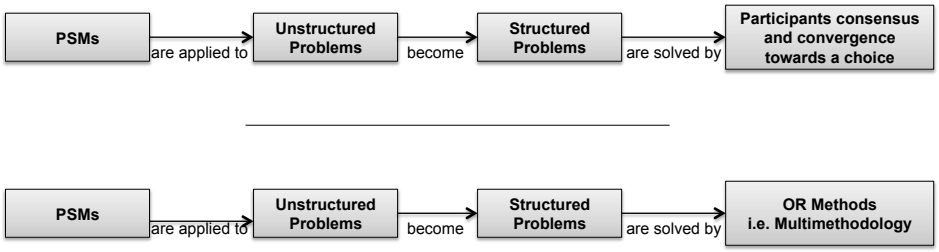
Problem representation is the most crucial and the least understood step in the problem solving process.

(Simon, 1992)

Graphical representations, in particular graphical models and diagrams, are more cognitively effective than other forms representation such as sentential or verbal representations in conveying both qualitative and quantitative information of a complex nature.

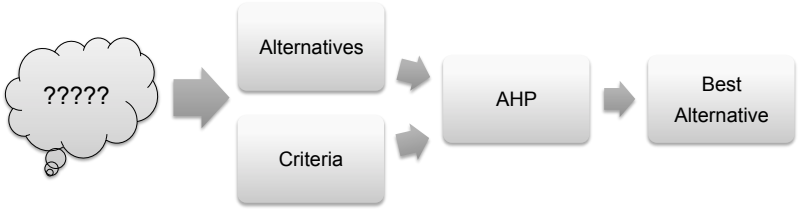
(Larkin and Simon, 1987;Tufte, 1990)

PSMs in Action



(Mingers & Rosenhead, 2002; Mingers & Brocklesby, 1997)

Decision Making with AHP



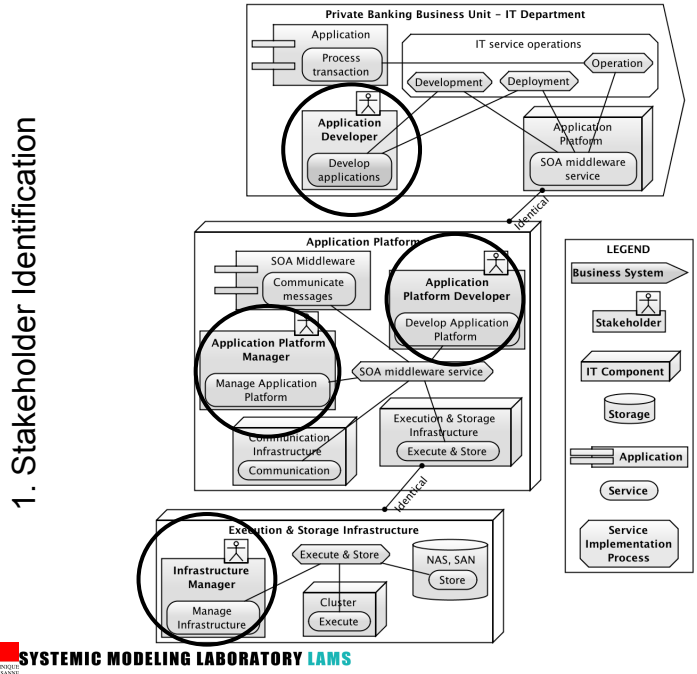
Research Question

Where do criteria come from in (group) decision making with AHP?

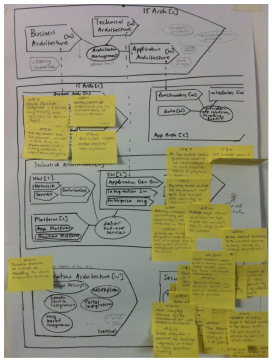
Structure of the Presentation

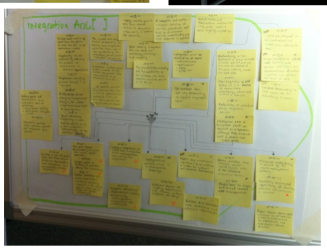
1. ✔ Systemic Enterprise Architecture Method (SEAM)
2. ✔ Analytic Hierarchy Process (AHP)
3. ✔ SEAM and AHP Integration: The Why
4. ➔ SEAM and AHP Integration: The How
5. SEAM and AHP Integration: The Results
6. Implications for Organizational Decision Making

1. Stakeholder Identification

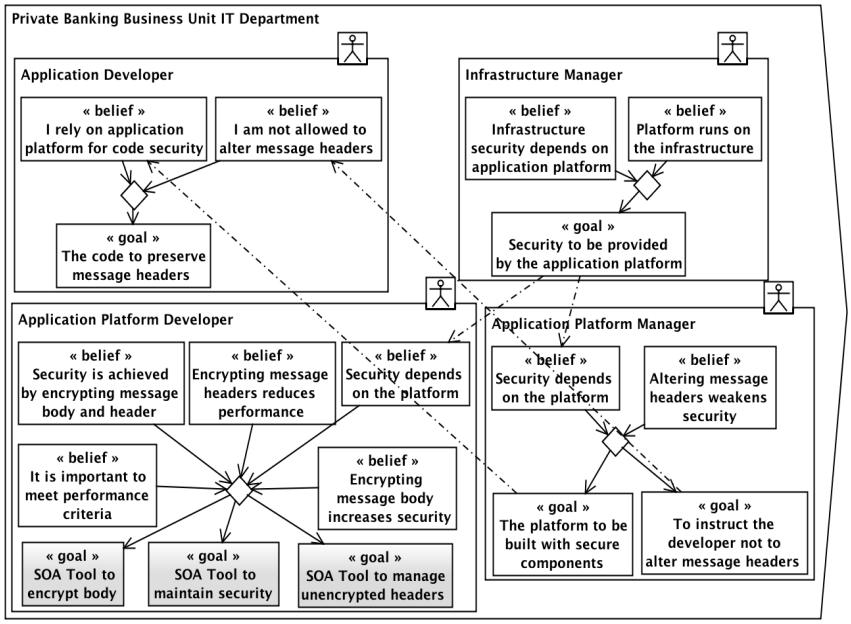


2. Stakeholders' Goals Surfacing

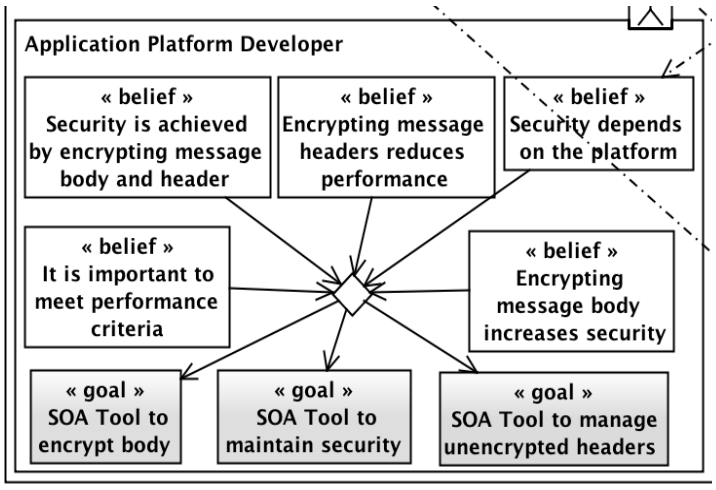


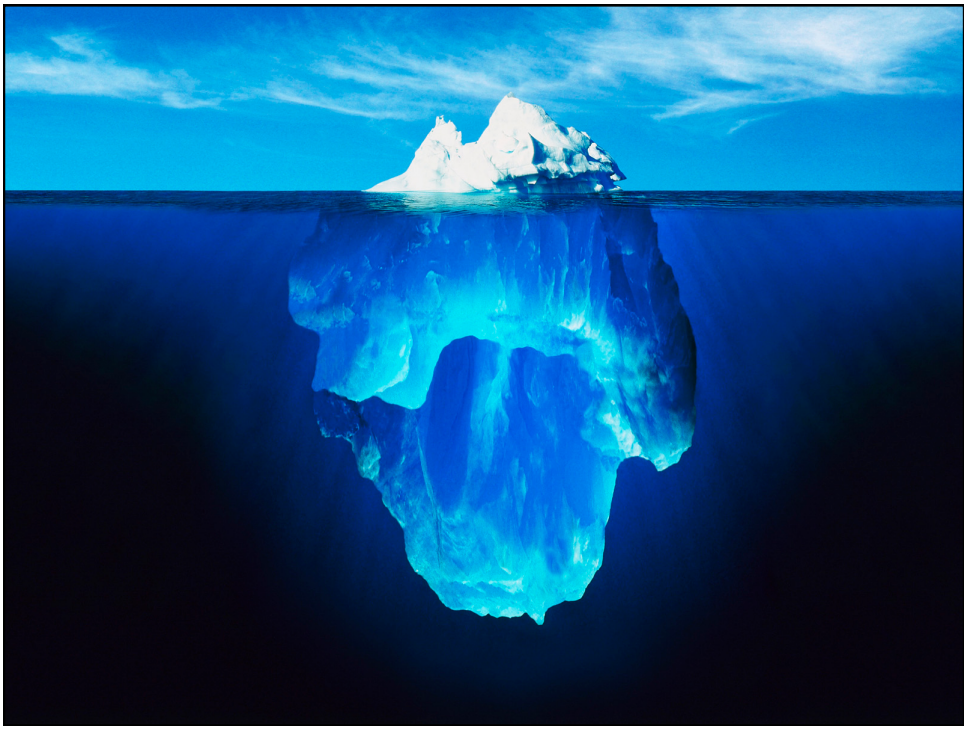


2. Stakeholders' Goals Surfacing – Cnt'd



2. Stakeholders' Goals Surfacing – Cnt'd

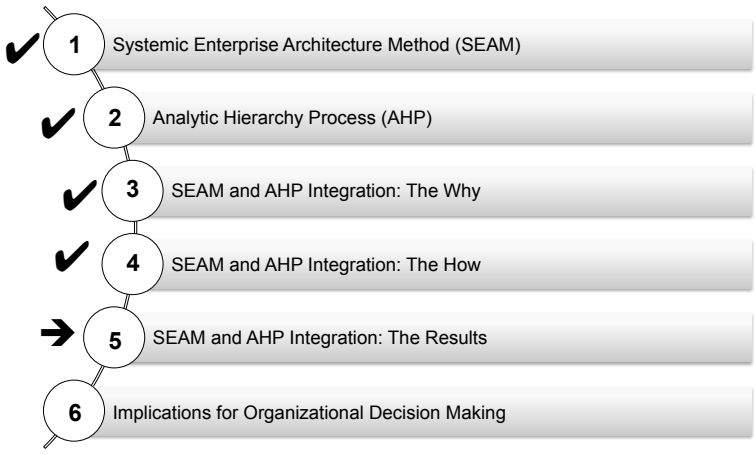




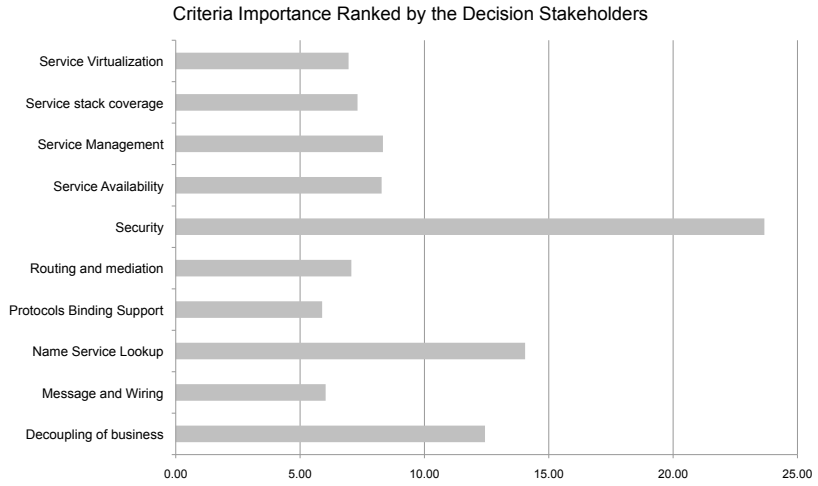
3. Decision Criteria Definition

C1	**Service stack coverage** - Java binding implementation of JAX-WS - .NET binding, compatibility with WCF C++ binding	C6	**Name service lookup** - Group multiple endpoints against a single service instance - Look up capability of a physical endpoint - Service endpoint availability information
C2	**Service virtualization** - Hiding the true location of services - Central or p2p functionality - Dynamic composition of endpoint address	C7	**Protocols binding support** - SOAP over HTTPS - SOAP over JMS - SOAP over HTTP - COBRA
C3	**Decoupling of business** - Physical endpoint lookup - Late transport and data binding	C8	**Security** - Message body encryption - Managing unencrypted message headers
C4	**Routing and mediation** - Bridge different transport technologies - Bridge different wire formats	C9	**Service availability** - Notify of changes on availability - Metrics to measure the availability - Monitor active and inactive services
C5	**Message and wiring** - Comma delimited wire encoding - JSON wire encoding - Non-SOAP XML encoding	C10	**Service management** - Transport and context properties in metadata - Logging and auditing - Policy and SLA in metadata

Structure of the Presentation



4. Evaluation Phase



Alternatives

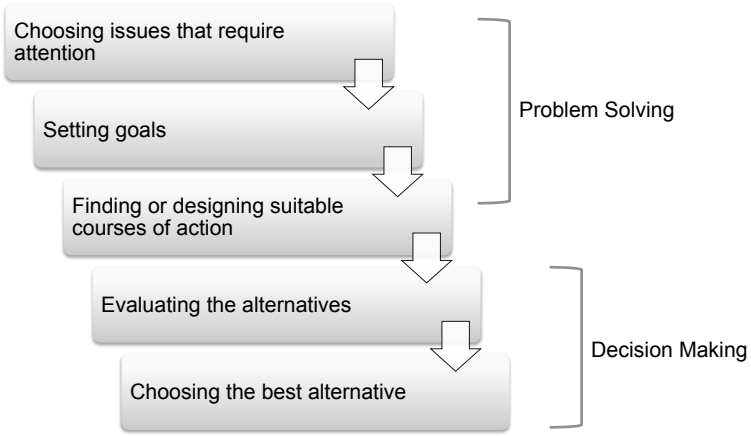
	Tool	Key Features
1	AXIS 2	Implementation is available in C/C++ and Java
2	CXF	Development of web services using frontend programming APIs, like JAX-WS.
3	WSO2	Implementation is available in C, C++, PHP, PERL, RUBY, PYTHON, JAVA.
4	METRO	Offers development of Web Services by using Java Technology APIs and tools powered by SUN JAVA. It consists of JAX-WS, JAXB, and WSIT.
5	JBossWS	It includes many specifications / standards implementations as well as tools to improve ease of use, endpoint management and monitoring.
6	Spring WS	Provides features such as configuration, transaction management, object-relational mapping, database abstraction, logging, etc.
7	WCF	It's based on .NET framework, can be developed using languages such as Visual Basic, C/C++, C# and Java.

4. Evaluation Phase – Cnt'd

Structure of the Presentation

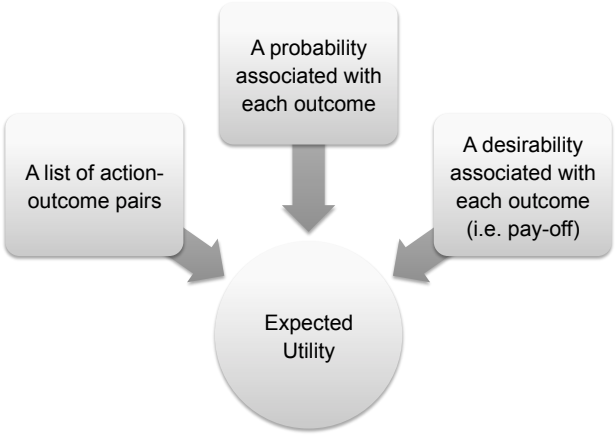
- ✔ 1 Systemic Enterprise Architecture Method (SEAM)
- ✔ 2 Analytic Hierarchy Process (AHP)
- ✔ 3 SEAM and AHP Integration: The Why
- ✔ 4 SEAM and AHP Integration: The How
- ✔ 5 SEAM and AHP Integration: The Results
- ➔ 6 Implications for Organizational Decision Making

Organizational Problem Solving and Decision Making



(Simon, 1992)

The Rational Choice Model



(Radner, 1972; Bross, 1953)

Divergence from the Rational Choice Model

Source of divergence	Divergence from Rationality	Ref.
Limited computational capacity of the decision maker	Bounded rationality and satisficing	(Simon, 1995)
Dynamic and ambiguous nature of preferences	Development and evaluation of alternatives are impractical	(March & Shapira, 1992)
Conflicting and inconsistent interests among decision makers	Political brokerage , accommodating a coalition of preferences	(March, 1962; Mingers & Rosenhead, 2004)
Normative/affective (N/A) factors outweigh the logical/empirical (L/E) factors	Omitting alternatives or assigning weights to certain alternatives	(Etzioni, 1988)
Decision maker's Judgment	Judgment is the prime ingredient in evaluation of alternatives	(Tversky & Kahneman, 1974; Mintzberg, 1976)

2 0 0 5

ANNUAL REPORT

amazon.com

The Structure of "Unstructured" Decision Processes

Henry Mintzberg; Duru Raisinghani; Andre Theoret

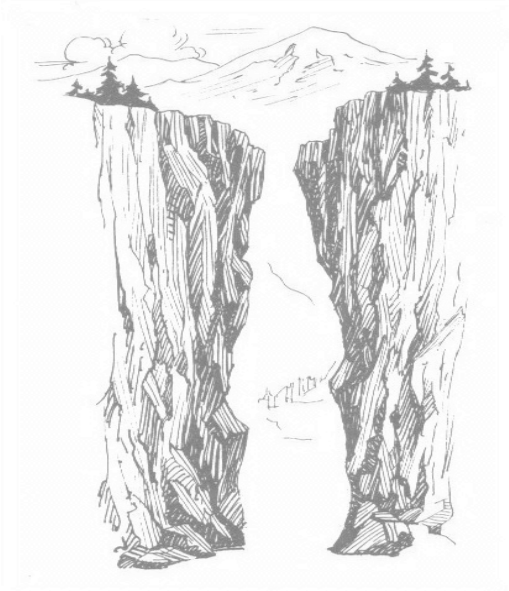
Administrative Science Quarterly, Vol. 21, No. 2. (Jun., 1976), pp. 246-275.

STOR

……As you would expect, however, not all of our important decisions can be made in this enviable, math-based way. Sometimes we have little or no historical data to guide us and proactive experimentation is impossible, impractical, or tantamount to a decision to proceed. Though data, analysis, and math play a role, the prime ingredient in these decisions is judgment.

Jeff Bezos Letter to Shareholders 2005

Crossing the Chasm



DISCUSSION TIME

www.lams.epfl.ch
www.golnam.net