A real Decision Aiding Process
Call for tendes in software acquisition

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Outline

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What is all about?

In early 1996 a very large Italian company operating a network based service decided, as part of a strategic development policy, to equip itself with a Geographical Information System (GIS) on which all information concerning the structure of the network and the services provided all over the country was to be transferred. However, since (at that time) this was quite a new technology, the company's Information Systems Department (ISD) asked the affiliated research and development agency (RDA) and more specifically the department concerned with this type of information technology (GISD) to perform a pilot study of the market in order to orient the company towards an acquisition.

Who has a problem?

- The company
- The Information Systems Department
- The Acquisitions Manager
- The Legal Department
- The R&D Division
- The Software Evaluation team within R&D
- The GIS team within R&D
- External experts
- The GIS suppliers and mnufacturers
- Academic Advisor

Who is the client?

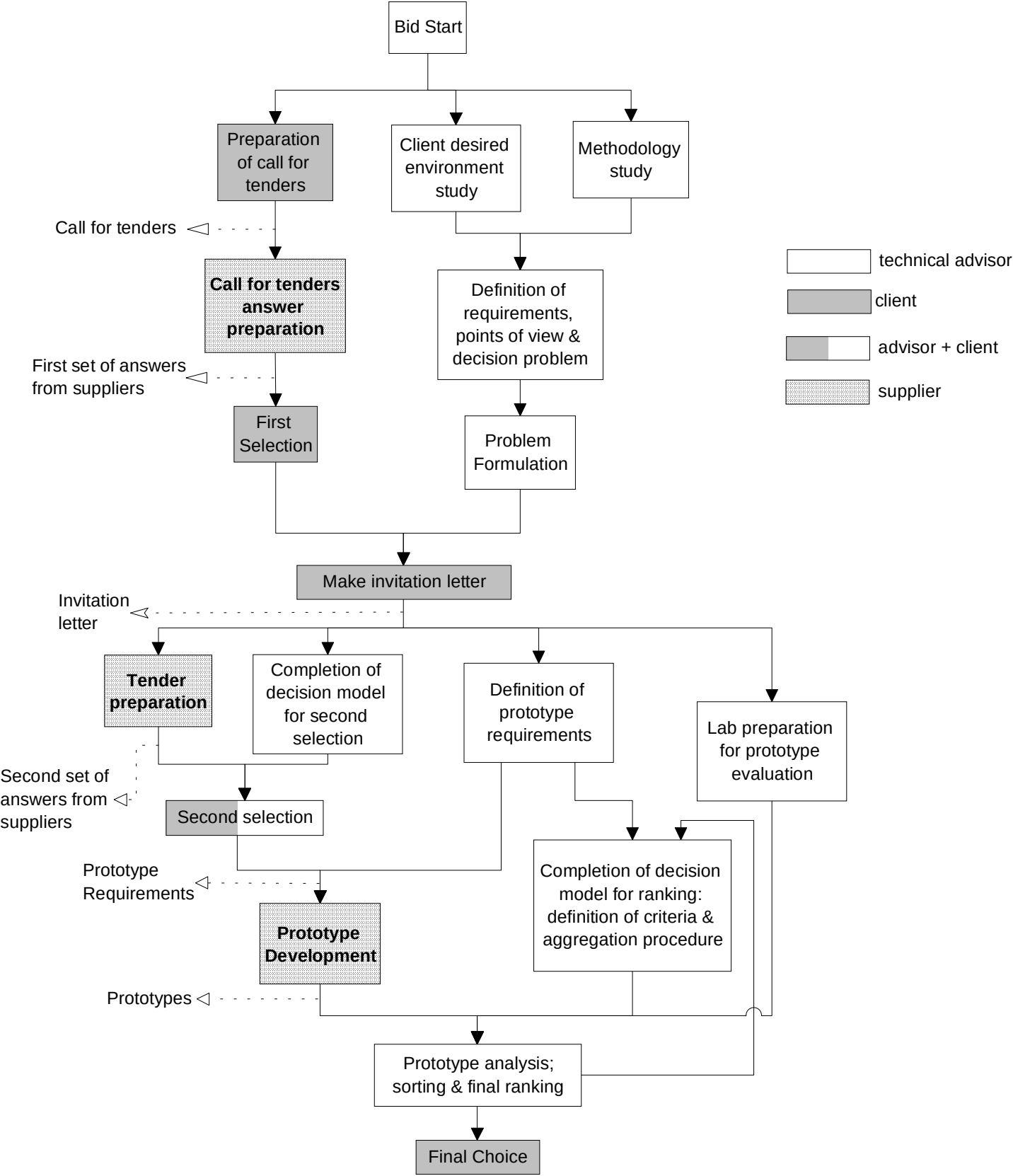
1. The company is a client in a decision aiding process where the Information Systems Manager act as an analyst.
2. The Information Systems Manager is the client in a decision aiding process where the GIS team and the Software Evaluation team act as analysts.
3. The Software Evaluation team (and associate to it the GIS team) are the clients in a decision aiding process where the Academic Advisor is the analyst.

What are the problems?

- The GIS software as such
- The GIS suppliers
- The use of the GIS within the company
- The power within the company
- The power within the R&D division
- Strategic partnership between the company and the suppliers

Why these are problems?

- Time
- Money
- New Technology
- Acquisition methodology and call for tenders evaluation
- Software evaluation methodology
- European regulations
- Legal constraints


Bid Start
Preparation of call for tenders
Client desired environment study
Methodology study
Call for tenders
Call for tenders answer preparation
Definition of requirements, points of view & decision problem
First set of answers from suppliers
First Selection
Problem Formulation
Make invitation letter
Invitation letter
Tender preparation
Completion of decision model for second selection
Definition of prototype requirements
Lab preparation for prototype evaluation
Second set of answers from suppliers
Second selection
Prototype Requirements
Prototype Development
Completion of decision model for ranking: definition of criteria & aggregation procedure
Prototypes
Prototype analysis; sorting & final ranking
Final Choice
technical advisor
client
advisor + client
supplier

Outline

What are we focussing upon?

- The offers?
- The modules (COTS) within the offers?
- The suppliers?
- The software companies from which the COTS have been taken?

NB

The choice of any among the above items is not neutral with respect to the final outcome and will not result in a similar way to make the evaluation.

What are we interested for?

- Technical features and appropriateness for the foreseeable use of the software.
- Performance measurement.

NB

The above makes sense if we consider the Information Systems Manager as a client. However, in doing that we have to analyse these points of view taking into account that this client will use the model in another decision aiding process.

What are we going to offer?

Technical advice to the Information Systems Manager as far as the suitability of the offers is concerned with respect to a potential acquisition of some hundreds of licenses of GIS software tailored for specific applications. This has to occur within a call for tenders.

Offers have to be evaluated independently one from another before any recommendation is to be suggested

Outline

What do we evaluate?

The offers received as a reply to the call for tenders.

NB

- This allowed to have specific objects to work with on which the “analysts” had knowledge to use.
- This corresponds precisely to the mandate received by the client.

What do we want to know?

- Land Base Management
- Geomarketing
- Planning, Design and Operating Support
- Diagnosis Support and Customer Support
- Spatial Data Manager
- Software Quality
- Performance on benchmark applications

NB

The above decompose to further nodes through a 5 layers hierarchy down to 134 leaves.

What do we evaluate?

Example 1

Given the leave 1.1.3 "*customisation of the user interface in the land-base management*" where the possible values are:
- availability of a graphic tool (T),
- availability of an advanced graphic language (E),
- availability of a standard programming language (S),
- no customisation available (N)

We want to know that T>E>S>N

What do we evaluate?

Example 2

Given the node 1.1 "*User Interface*" decomposable in
- 1.1.1 "*standard graphics*": Y>N;
- 1.1.2 "*graphic engine*": M>OA>ON
- 1.1.3 "*customisation*": T>E>S>N

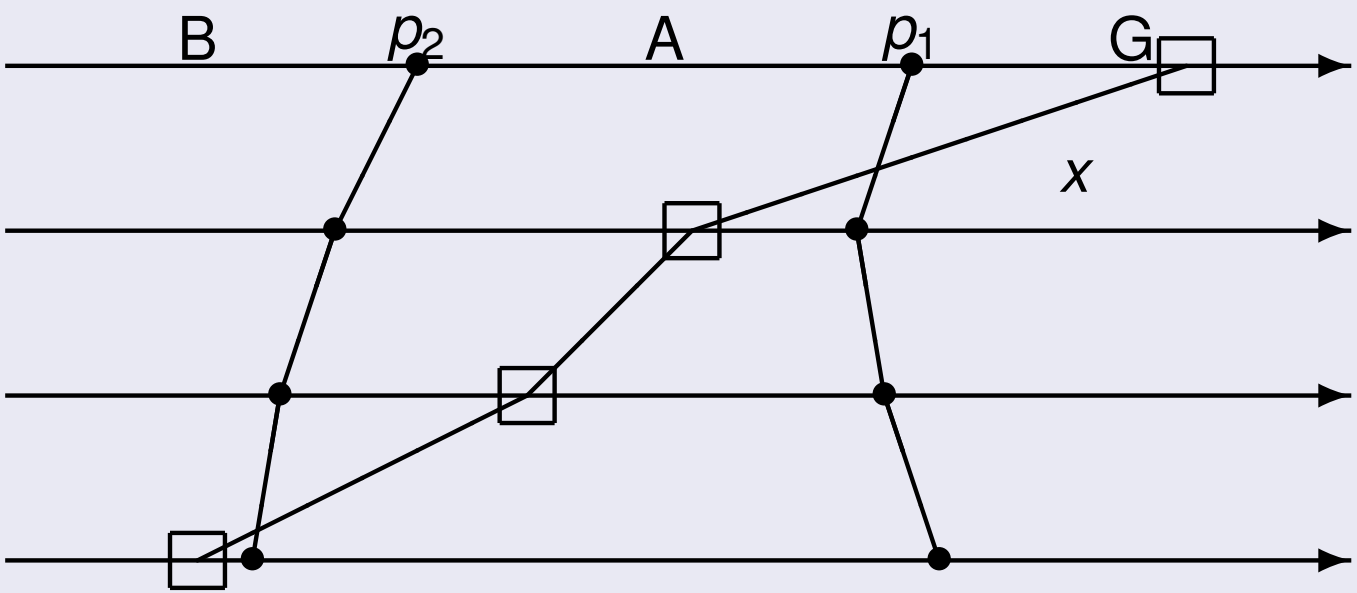
We want to to associate to each offer a value on the scale unacceptable (U), acceptable (A), good (G), very good (VI), excellent (E)

Are we sure about all that?

YES

How do we do it?

Example 3



How to classify x with respect to classes G, A and B defined by profiles p_1 and p_2?

Ordinal aggregation of ordinal measures

$$C_i(x) \Leftrightarrow P(x, p_i) \wedge \neg S(p_{i-1}, x)$$

$$S(x, p_i) \Leftrightarrow C(x, p_i) \wedge \neg D(x, p_i)$$

$$C(x, p_i) \Leftrightarrow \frac{\sum_{j \in P^{\pm}} w_j}{\sum_j w_j} \geq \delta$$

$$D(x, p_i) \Leftrightarrow \text{veto condition}$$

Outline

What are the results?

	O1	O2	O3	O4	O5	O6
C1	A-A	G-G	A-VG	A-G	G-VG	A-A
C2	A-A	G-VG	A-VG	A-VG	G-G	A-G
C3	A-A	G-G	A-VG	G-G	A-A	A-A
C4	A-G	G-VG	A-VG	G-VG	A-VG	A-G
C5	U-U	G-VG	G-G	A-G	G-VG	U-U
C6	A-A	VG-VG	E-E	VG-VG	G-G	VG-VG
C7	A-A	G-G	G-G	A-A	E-E	A-A

Three possible results?

- $O2??O5 \succ O3 \succ O4 \succ O6 \succ O1$
- $O2 \succ O5 \succ O3 \succ O4 \succ O6 \succ O1$.
- $O2 \succ O5 \succ O3, O4 \succ O6 \succ O1$

1. Intersection between $C_1 - C_6$ and C_7.
2. Lexicographic aggregation of $C_1 - C_6$ and C_7.
3. Weighted majority rule on $C_1 - C_7$.

This is the End!

- Supporting the Decision Process and not the Decision.
- Ownership of the model and the results.
- Theoretical Soundness and Operational Completeness.
- Easy Implementation
- Organisational Legitimation

Paschetta E., Tsoukiàs A., “A real world MCDA application: evaluating software”, *Journal of Multi-Criteria Decision Analysis*, vol. 9, 205 - 226, 2000.

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