HELSINKI UNIVERSITY OF TECHNOLOGY
Systems Analysis Laboratory

PROJECT PLAN

MAT-2.177 SEMINAR ON CASE STUDIES IN OPERATION RESEARCH
VTT: PROJECT PORTFOLIO AND DECISION MAKING

Wednesday, March 14, 2007

Kalle Korpiaho 54468S
Mikko Pitkänen 68815U
Juuso Soininen 57819C
Kimmo Turunen 63434P
Reetta Vartiainen 57893A

ABSTRACT

The Problem

VTT Technical Research Centre of Finland is an impartial expert organisation. VTT has hundreds of ongoing research and development (R&D) projects. Currently VTT needs process description for the research projects lifespan and tools for analyzing project portfolios of ongoing projects.

Methodology and material

The project team will interview the key decision makers to gain knowledge of the current decision making process. Building the mathematical model for optimizing the project portfolio is done by literature study of relevant articles. The model is then tested on either real world data or simulated data to verify its functionalities.

Deliverables

The project team will provide three deliverables. Deliverable 1: A description of the decision process. Deliverable 2: A mathematical model to compute the optimal portfolios. Deliverable 3: The final report, which describes the decision process in detail and demonstrates how the mathematical model is applied.

CONTENTS

1 BACKGROUND

VTT Technical Research Centre of Finland is the biggest impartial contract research organisation in Northern Europe with over 2700 employees. VTT has hundreds of ongoing research and development (R&D) projects. These projects are divided to different technology areas (biotechnology, materials and building, industrial systems, etc.). New projects are founded on a regular basis during the whole calendar year.

Currently VTT is in need of process description for the research projects lifespan and also tools for analyzing project portfolios of ongoing research projects.

Selecting R&D projects has attracted considerable academic interest in the last few decades. Multiple inexactly defined goals and subjective evaluation criteria are typical for competing R&D project submissions. Thus selecting an optimal group (portfolio) of R&D projects is a multi-criteria decision analysis (MCDA) problem for the decision makers.

In VTT, the decision for funding a new research project seems at the moment to be based on the general feeling the decision makers (DM) get from the project application forms. It seems also that all the DM's do not take part in the decision making even though they are all responsible for the made decision.

The surveillance of ongoing projects has been somewhat neglected. This can be due to fact that gathering the up-to-date information of the projects is difficult. As the result of this negligence research projects are not suspended for re-evaluation even though the risks of the project have been realized. Either the ongoing research projects are not studied in context to discover if they fulfill VTT's strategy.

2 NEEDS, OBJECTIVES AND SCOPE

2.1 Needs

VTT has several needs related to the problem at hand:

- Need to select the most suitable projects to the portfolio
- Need to improve the ability to keep track of existing projects
- Need to make the decision making process more transparent
- Need to make the decision making process more efficient
- Need to emphasize the matters that need more discussion

2.2 Objectives and scope

The project can be roughly divided in two different phases. Firstly, the project team focuses to decision making situation where the go or no-go decision to project proposal is made. The main objectives are:

- To make the decision process more transparent
- Help the DMs to spend their time on right project proposals and to the valuable parts of the proposal
- To get each DM to share his/her opinion on each project proposal.

To achieve these goals project group tries to identify criteria of which the DM's are implicitly or explicitly using while evaluating the project proposal. The project group is also studying new criteria which should be considered at the decision phase. With predefined criteria the decision process can be made more efficient and the process is also more transparent to all participants (DMs, applicants, other possible stakeholders).

Secondly, the project team will examine ways for monitoring the ongoing projects. The goal is at any given moment to:

- Find the best projects for e.g. marketing purposes
- The underachieved projects for re-evaluation or termination.

To achieve this goal the project group studies and applies Robust Portfolio Modeling[1] (RPM) to the group of ongoing projects. At this phase the criteria are in key role. Main questions are: which criteria should be the same as in the first phase? What other criteria can and should be used?

The mathematical model should be able to handle portfolio consisting of maximum 200 projects. The project team simulates a data set which imitates the real world data statistics. Alternatively the VTT ICT project portfolio may be used for simulating the model.

The final goal is naturally to write a report which consists of the key criteria, the explicit model of decision process and the method for constructing optimal portfolio.

[1] Robust Portfolio Modeling is based on additive scoring system. Roughly speaking this means that the total score of a portfolio is a sum of its members' scores. This may be to restrictive so the project group tries to extend the RPM model to take into account the characteristics of the portfolio. For example the co-operation of projects is a property of a whole portfolio not a property of a single project.

3 APPROACH, STUDY DESIGN, METHODS

The project team will interview the key DMs to gain knowledge of the current decision making process. Based on these interviews the project group chooses the relevant criteria for project start-up phase and the portfolio modeling phase.

Building the mathematical model for optimizing the project portfolio is done by literature study of relevant articles (see References). These articles need to be fully understood to be able to extend the described method to take in account the qualities of a portfolio.

The model is tested on either real world data or simulated data to verify its functionalities.

3.1 Results and deliverables

Deliverable 1: A description of the decision process
Deliverable 2: A mathematical model to compute the recommended portfolios
Deliverable 3: The final report. The final report describes the decision process in detail and demonstrates how the mathematical model is applied.

4 TASKS AND SCHEDULE

4.1 Tasks

4.1.1 Task 1 - Evaluation criteria

Title:	Evaluation criteria 1.2.2007 – 31.3.2007
Description:	The first task is to seek out a set of criteria and to build a prototype model of the decision process.
Resources:	Mikko Pitkänen, Kalle Korpiaho, Reetta Vartiainen
Responsible person:	Mikko Pitkänen
Outcome:	From the basis of these criteria a model presentation (ppt.) will be created in order to provide input to the interviews.

4.1.2 Task 2 - Interviews

Title:	Interviews 1.2.2007 – 15.3.2007
Description:	The model is presented at the interviews (3-5) to provide feedback, generate discussion and reverse opinions.
Resources:	At least 2 team members will participate in each interview, one as a rapporteur of the discussions to the whole team.
Responsible person:	Reetta Vartiainen

Outcome:	Based on these discussions the key criteria will be chosen and more sophisticated model will be generated.

4.1.3 Task 3 - Modeling

Title:	Modeling 1.3.2007 – 31.3.2007
Description:	Building the mathematical model
Resources:	Juuso Soininen, Reetta Vartiainen, Mikko Pitkänen, Kalle Korpiaho
Responsible person:	Kimmo Turunen
Outcome:	A mathematical model of the project portfolio management.

4.1.4 Task 4 - Simulation

Title:	Simulation 1.4.2007 – 15.4.2007
Description:	VTT ICT project portfolio is a case example for testing the model in practice
Manpower:	Kalle Korpiaho
Responsible person:	Juuso Soininen
Outcome:	

4.1.5 Task 5 - Literature review

Title:	Literature review 1.2.2007 – 15.4.2007
Description:	Academic literature review on most important publications. (See background.)
Manpower:	Kimmo Pitkänen, Reetta Vartiainen
Responsible person:	Kalle Korpiaho
Outcome:	Short overviews on state of the art in support for creating the mathematical model.

4.2 Milestones

- Meeting to examine interview data on decision process and criteria
- Meeting to simulate mathematical model in portfolio management
- Publication and dissemination of the final report (Final seminar)

4.3 Schedule

- 2.3.2007 Project plan (5 pages)
- 30.3.2007 Intermediate report (3 pages)
- 23.4.2007 Final report submission (40 pages)
- 27.4.2007 Final seminar, presentation of project results

5 RESOURCES, ORGANIZATION, REPORTING

Project manager: Kalle Korpiaho

Project team: Kalle Korpiaho, Mikko Pitkänen, Juuso Soininen, Kimmo Turunen, Reetta Vartiainen

Steering committee members: Ahti Salo, Toni Jarimo

6 RISK ASSESSMENT

One of the major risks of this project is that the deliverables will never end up being used at VTT or that the process of decision making is instead of making it easier being made more time consuming and complex by new mathematical methods. In order to avoid this, we should keep in mind the needs and circumstances of the decision makers and adapt our deliverables to that.

7 REFERENCES

J. Liesiö, P. Mild, A. Salo, Preference programming for robust portfolio modelling and project selection, 2005

J. Liesiö, P. Mild, A. Salo, Robust Portfolio Modeling with Incomplete Cost Information and Project Interdepencies, 2006

C. Stummer, K. Heidenberger, Interactive R&D Portfolio Analysis With Project Interdepencies and Time Profiles of Multiple Objectives, 2003

J. Gustafsson, A. Salo, Contingent Portfolio Programming for the Management of Risky Projects, 2005

8 ATTACHMENTS

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