TU Delft

Exam SPM4110 – Designing Multi-Actor Systems
Faculty of Technology, Policy and Management
Tuesday 28-10-2008, 09:00-12:00, Room J, Faculty 3mE

Read these Important Notes:

- The use of all course material on paper (lecture notes, personal notes, lecture slides, books) is allowed including a dictionary, if needed.
- Computers and devices for communication are not allowed and should be turned off and out of sight.
- Be concise and sharp in your answers; the insight into the material and line of reasoning is most important. Lengthy answers can also work against you. So, avoid excessive writing in the hope of hitting the right answer or confusing your instructor. Your answers should be relevant and up to point.
- Reference to course material in your answers is allowed and can even support your argument, but always requires your concise rephrasing or summary (so not only "See page 20 in J.Doe, 2000" as your answer). Your answers should be self-contained.
- Answers have to be in English.
- Answers for each question should start on a new exam sheet.
- Answers should be expressed in your own words not exact copy from the sources.
- Use a black and/or blue pen for your answers.
- The exam will be corrected within the official TU Delft correction period.
- You can get 100 points in total. Handing in a page with your name is worth 10 points. The remaining 90 points are divided among the questions as per below.

Question 1: System Thinking (30 Points)

A good deal of the course included discussion and comparison of Hard and Soft System Thinking (Jackson, 1991; Checkland, 1993). To demonstrate your knowledge of the two paradigms, answer the following questions in relation to the EMR context:

a. In the context of EMR case that you studied in this course, explain the following notions using examples related to EMR:
    - *objectivity* (according to hard system thinking);
    - *subjectivity* (according to soft system thinking);
    - *ill-structured problem*;
    - *reductionism*.
b. In the case with EMR system, argue and justify why hard system thinking would have advantages (provide arguments) and soft systems disadvantages?
c. In the case with EMR system, argue and justify why soft system thinking would have advantages (provide arguments) and hard systems disadvantages?

(Note: the last two questions basically requires analysis and appraisal/criticism of both system thinking paradigms by using the EMR case for the illustration of your arguments)

Question 2: Process Management (15 points)

In the course we have introduced and discussed "Process Management" in the context of multi-actor systems as opposed to project management (Bruijn et al). Based on what you have studied and read, answer the following questions:

a. In the context of EMR system, explain why project management will fail and how process management will prevent the failures. What would be the advantages of process management over project management?
b. Section 3.5.1 of Bruijn et al., discusses "The process should create prospects of gain and incentives for cooperative behavior". How would you address this principle in the EMR context? Be specific in your description of gains for each stakeholder (actor).
c. In the EMR case, what would be the main disadvantages of using process management? Name 3 major disadvantages.

Question 3: System Architecting (15 Points)

A good deal of the discussion in this course was directed on the art, role and importance of System Architecture. In particular, the aspects, matter, and the role of system architecture and architecting were discussed in Maier & Rechtin, and Klir & Elias. Based on these two sources, answer the following questions:

a. What is the role of architects in designing systems and what are the scope and focus of their work in a typical multi-actor system?
b. What is the product of architecting (architect's work) in terms of the level of detail and aspects it should address? Emphasize the parallels and differences as discussed in Maier & Rechtin, and Klir & Elias.
c. What are the main aspects and characteristics of socio-technical systems and why social systems are more amenable to insights and heuristics?

Question 4: Modeling and Collaboration Engineering (15 Points)

Through two GSS workshops and lectures, you have learned about collaborative/collaboration engineering. Also you have learned about the role of modeling and promises of multi-methodology. Based on the theoretical and practical knowledge gained and the readings (Briggs *et al.*, 2006; Kolfschoten *et al.*, 2007; De Vreede *et al.*, 2006; Mingers & Brocklesby, 1997), answer the following questions:

a. What is contribution of collaboration processes in designing multi-actor systems and how it benefits the system design?
b. What would be your arguments that multi-methodology may benefit practitioners of multi-actor systems? Also based on your knowledge of multi-actors systems and different methodologies you have learned throughout your study in different courses, suggest which methodologies should be put together (to make up a multi-methodology) to better accomplish MAS design – list the methodologies and the corresponding aspects of MAS design that can be addressed by each of the suggested methodology/method (you may refer to the framework introduced in Mingers & Brocklesby, 1997).
c. In the course we talked a lot about modeling. Discuss what important roles do models play in system design (refer to Maier & Rechtin)? Also provide a definition of modeling (what is modeling?) in your own words and the way you perceive modeling.

Question 5: Simulation and Gaming in MAS Design (15 points)

In the course we have discussed simulation and gaming as tools and methods used in MAS design. The discussion was based on a lecture and readings (Mayer & Veeneman, 2002; Mayer, Bockstael, & Valentine, 2004). This should allow you to discuss the following questions:

a. Explain, in which way the combination of simulation building blocks and process management contributes to mutual understanding and the quality and process of negotiation in multi-actor systems?
b. Discuss four major drawbacks of applying simulation in complex multi-actors systems design.
c. Explain the added value of simulation in complex multi-actor system design projects. For example, in the class we demonstrated the OLS video. Also provide a definition of simulation (what is simulation?) in your own words and the way you perceive simulation.