Market Engineering

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Fortunately for him, Eastman spoke first. (Asimov, 1982)

Leo Baekeland sold the rights to his invention, Velox photographic printing paper, to Eastman Kodak in 1899. It was the first commercially successful photographic paper and he sold it to Eastman Kodak for $1 million. Baekeland had planned to ask $50,000 and to go down to $25,000 if necessary, but...

"... Market Design matters!" (cf. McAfee 1998)
The Market Engineering perspective (ii)

- Environment (V. Smith 1996)
- Market outcome
- Conduct
- Market structure
  - Microstructure
  - Infrastructure
  - Business structure
- Transaction object
  - Goals of all traders /market stakeholders (Holtmann, Neumann, Weinhardt 2002)

- Regulation
- Operator
- Instantiates the framework
- Conduct / expectations determine the market outcome
- Market structure determines conduct
- Elements of the market structure
- Item to be traded
- Complex grid of objectives of stakeholders
"structured, systematic and theoretically founded procedure of analyzing, designing, introducing and also quality assuring and advancing of electronic market platforms as well as their legal framework - regarding simultaneously their micro structure, IS infra structure, business structure".

(Weinhardt, Holtmann, Neumann 2003)
Design in Market Engineering: Why is it so hard?

Example: „sniping“ in eBay

= Phenomenon in electronic Auctions:

„last minute“-Bids ⇒ Information feedback (IF) ?

![Graph showing arriving bids over time for Amazon and eBay](image)

**Microstructure:** AMAZON („soft-end“) ⇒ IF ?

**Business structure:** EURONEXT („trading fees“) ⇒ IF ?

**IT-Infrastructure:** ESNIPE.COM („sniping agents“) ⇒ IF ?
Design in Market Engineering: Why is it so hard?

- Complexity involved in Design
  - Details Matter
  - Size of the Design Space

- Information Requirements
  - “Godlike Knowledge“ about the Participants
  - Uncertainties in a turbulent environment

⇒ Engineering Markets is a “wicked problem“

....characterized by

- the requirements can be contradicting,
- the problem may change over time, and
- there is uncertainty whether the offered solution is the optimal solution or is even a solution.

Rittel and Webber (1973)
Market Engineering Process

- evaluate (simulations, experiments, business game analysis...)
- decide on structure & implementation
- analyse requirements
- identify customers
- design the product
- operate / monitor platform
- introduce / teach platform use

iterative re-design

market outcome

conduct

market structure

transaction object
Intuition for Computer-Support

- Automation of significant parts of this time-consuming development life cycle:
  - Speeding up the process
  - Guarantee appropriate quality of the process and the result
  - Standardized process
  - ...

- Storage of Design Knowledge
- Simulate Market Process
The CAME Toolset e-FITS

- Market Design Configurator
- Compiler
- Market Server Core
- Simulation Shell
- Experimental Shell

Recall that
„there is uncertainty whether the offered solution is the optimal solution or is even a solution“
Agent-based Market Simulation Environment (AMASE)

- Domain Facilitator
- Agent Management System
- Agent
  - Simulation Agents
  - Simulation Control Agent
- Message Transport System

JADE

- e-FIT-System
  - E-FIT Market Server Core
  - Configurator
  - Client
First Steps with AMASE

Scenario:
- CDA (continuous double auction)
- Identical initial endowment
- Static seller strategies
- Learning buyer

Results on convergence:
- CDA converges quickly
- Overshooting is likely

Results on efficiency:
- Ex post efficiency is not always attained
**Wicked Problem alleviated**
- Simulation tool reduces uncertainty on market quality
- Solution quality can be measured along the design process

**Design Space Exploration**
- Gathering information about effects

**Experimental „refining“**
- analyze isolated effects
Thank you very much!
Any Questions?

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