A Graphical Framework for the Analysis of Mixed Multi-Unit Combinatorial Auctions

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Outline

- Mixed Multi-Unit Combinatorial Auctions
- The Mixed Multi-Unit Auction Platform
- Automated design of electronic institutions
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Mixed Multi-Unit Combinatorial Auctions
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Automated design of electronic institutions
What are Mixed Multi-unit Combinatorial Auctions?

Suppose that an auctioneer allows agents to bid for goods to buy, to sell or to transform.

A bidder would be able to express his ability to transform goods at a certain cost:

$1 \text{ gin} + 1 \text{ lemon juice} \rightarrow 1 \text{ gin lemon} \quad \text{for 5 \$}$

We call the resulting model mixed auctions (direct and reverse auctions combined) Mixed Multi-Unit Combinatorial Auctions.

Generalizes several type of combinatorial auctions (Cerquides et al, IJCAI 2007)
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Example of MMUCA: GIN & LEMON

Bidder 1, -3€

Bidder 3, -7€

Bidder 2, -5€

Bidder 4, -5€

Bidder 5, -6€

Bidder 6, 15€

OPTIMAL SOLUTION?
Goals:

- Prototype and demonstrate the possibilities of application of MMUCA for Supply Chain Formation.
- Experiment with graphical visualization tools and user interfaces for MMUCA and evaluate their usefulness and comprehensibility.
- Integrate access to MMUCA tools.
- Automate the process of generation of an electronic institution for Supply Chain Formation.
Architecture of the MMUCA platform

A Graphical Framework for the Analysis of MMUCA
The Supply Chain Generation Process

- An auctioneer starts a Mixed Multi-Unit Combinatorial Auction (MMUCA) and agents are free to submit their bids.
  - Bids submitted are loaded in the MMUCA viewer.
  - The auctioneer collects all bids and solves the winner determination problem to assess the optimal supply chain configuration.
  - Optimal solution is loaded in the MMUCA viewer.
  - Automated generation of the supply chain processes as the specification of an electronic institution.

The resulting specification can be either:
  - Uploaded by ISLANDER for further refinements.
  - Uploaded by AMELI to run the supply chain as an electronic institution.
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Institutions in the sense proposed by North “...set of artificial constraints that articulate agent interactions”
Electronic Institutions Development Environment (EIDE)

http://e-institutions.iiiia.csic.es

INSTITUTIONAL DESIGN BY HAND!

START

design & verify

ISLANDER

SIMDEI

AMELI

aBUILDER

test & deployment

GO

simulate

development

IIIA-CSIC, WAI-UB
A Graphical Framework for the Analysis of MMUCA
The xml specifies for the generated supply chain:

- Performance Structure
- Roles
- Ontology
- Scenes & protocols
A Graphical Framework for the Analysis of MMUCA
Islander

BUY

DELIVER & RECEIVE

DELIVER

A Graphical Framework for the Analysis of MMUCA
Demo: MMUCA platform

A Graphical Framework for the Analysis of MMUCA