Multi-Attribute Auction Mechanism for Supporting Resource Allocation in Business Process Enactment

Albert Pla, Beatriz López

albert.pla@udg.edu beatriz.lopez@udg.edu

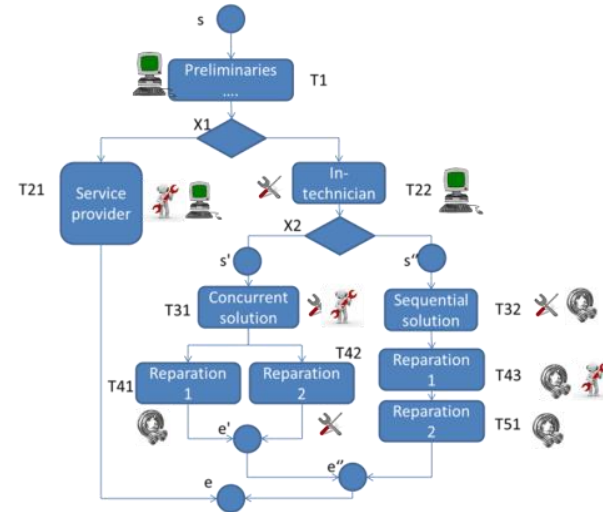University of Girona (Spain)

Javier Murillo

javier.murillo@newronia.es

Newronia (Spain)

Universitat de Girona

eXiT
Control Engineering and Intelligent Systems

NEWRONIA
OPTIMIZING TECHNOLOGIES

Objectives & Motivation

- Resource allocation in business process when production agenda, resource needs and resource availability are unknown.
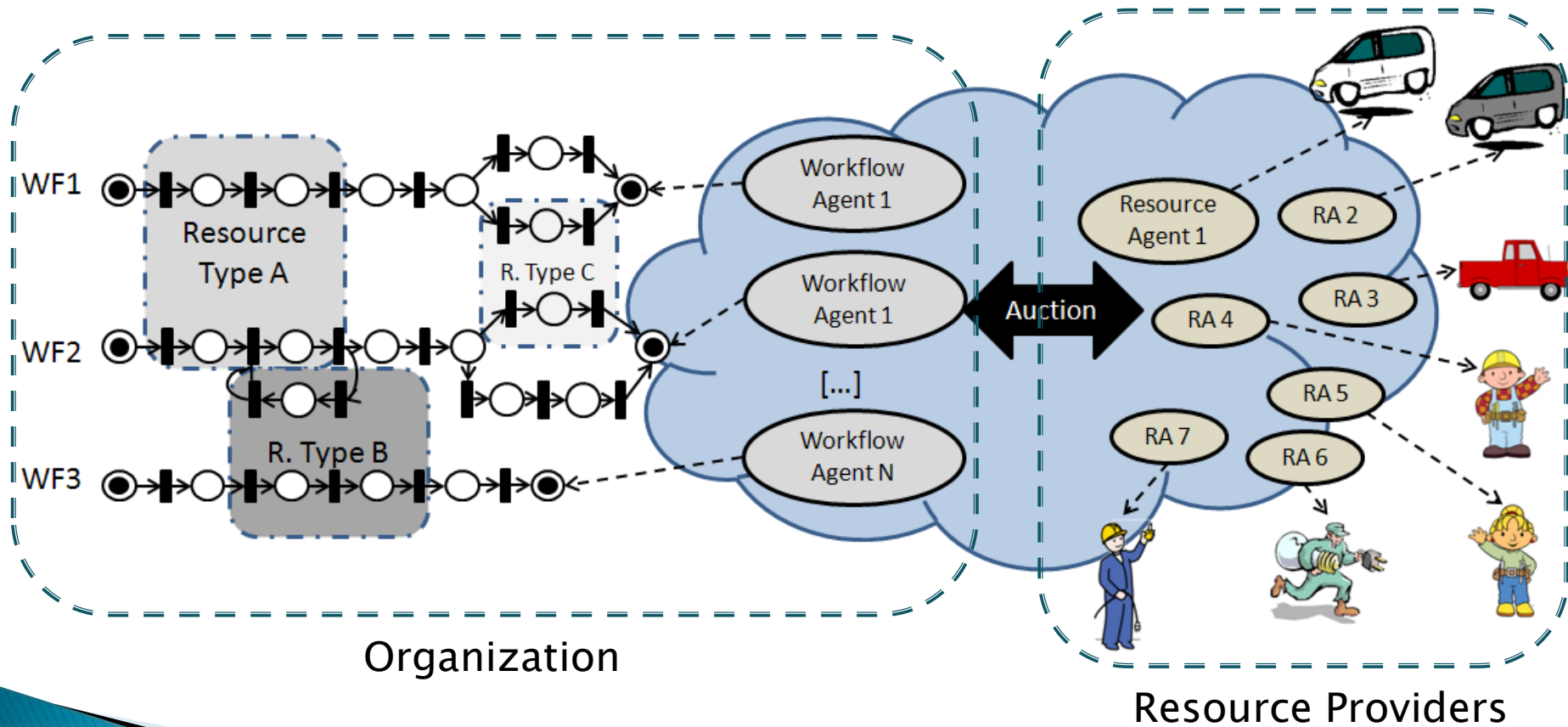

- Multi-Attribute: take into account other attributes besides the economic cost (time, quality, etc.)

	Task	Cost (€)	End Time (s)	CO2 (kg)
RP1	T1	100	300	1.2
RP2	T1	90	350	1.4
RP3	T2	100	280	1.6
…	…	…	…	…
RP n				

Resource Providers (RP) with different resource characteristics

Proposed Solution

- Second Price Reverse Multi-Attribute Auction:


Organization

Resource Providers

Proposed Solution

- Second Price Reverse Multi-Attribute Auction:
  - Evaluation function: $V(cost, attributes)$
  - Auctioneers are the buyers, bidders the sellers.

  - The winning bid receives the second best price
  - The winning bidder receives the *cost* it should have bid to equal the second best bid.

  - If breaking the agreement (attributes are not the bided ones), the bidder receives the *cost* it should have bid to win the auction with the delivered attributes

  - Incentive compatible mechanism for independent auctions
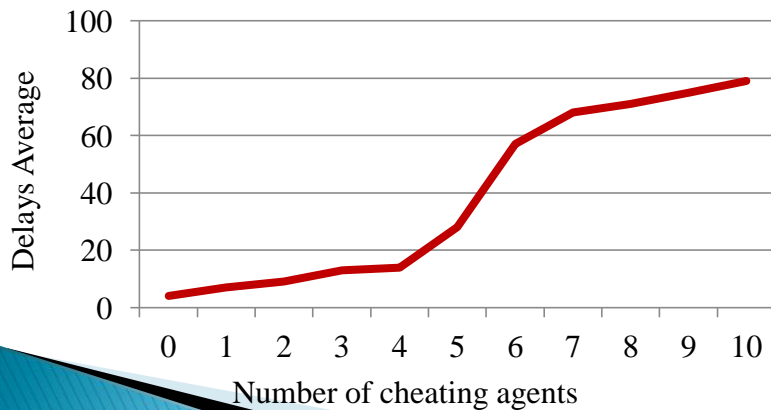
Experimentation & Results

Strategy-proofness of the mechanism
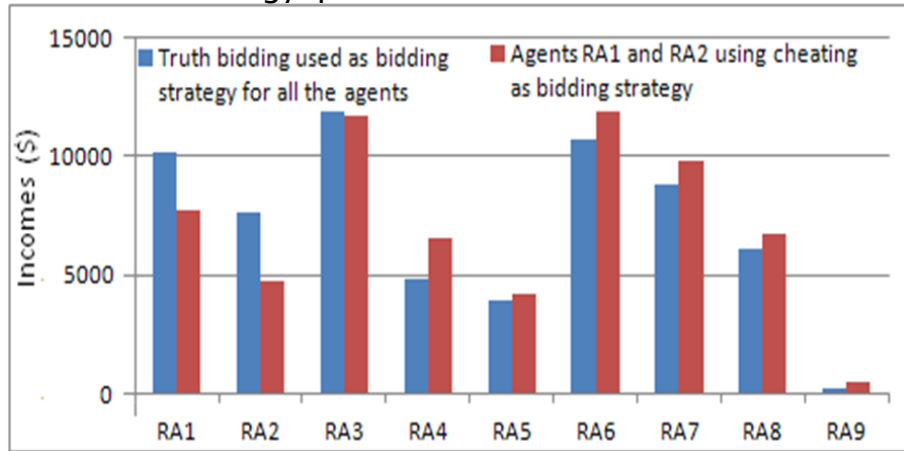
Comparison with other Multi-attribute mechanisms
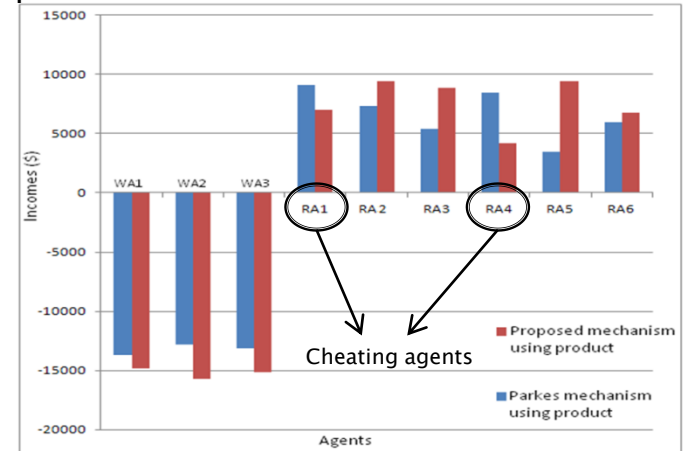
Sensibility to cheating agents: delays in tasks

Sensibility to cheating agents: Agents utilty