



Agents, Markets, Institutions & Protocols



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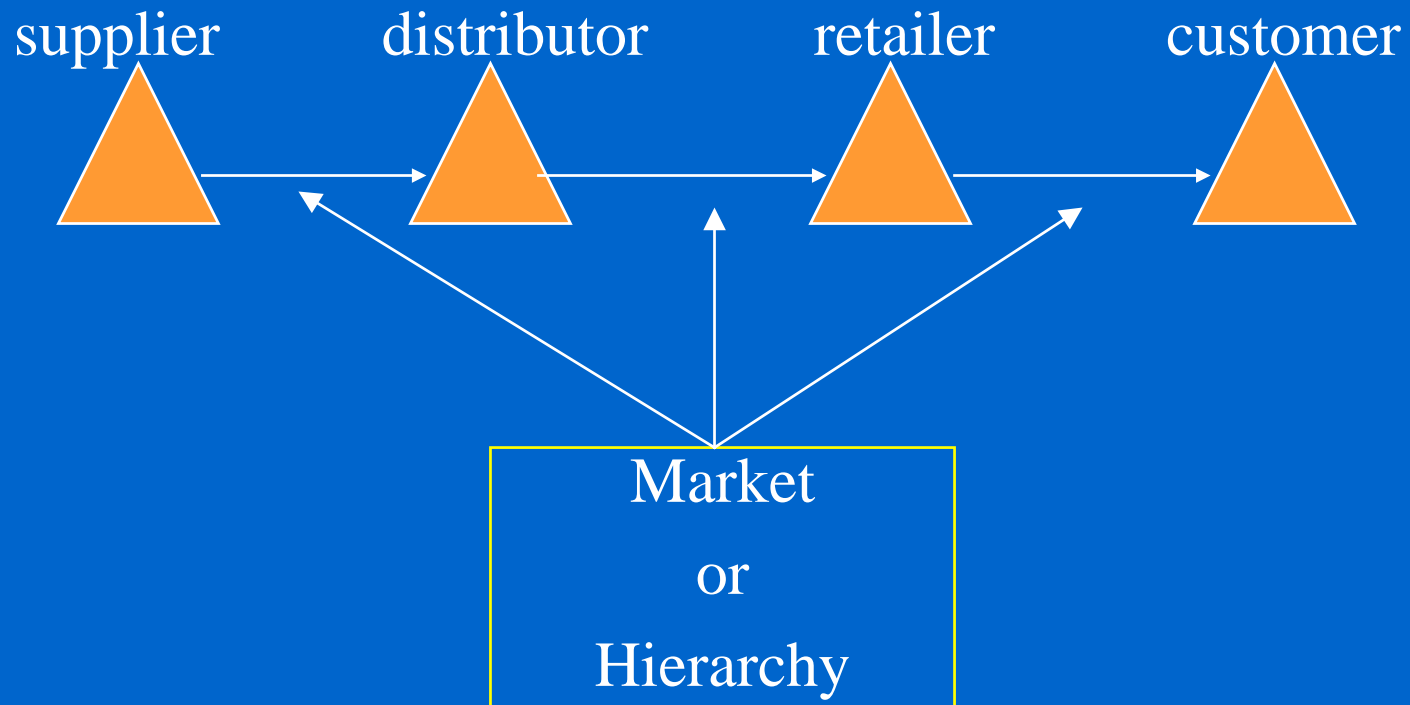
Outline

- Markets and institutions
- Agents and institutions
- Protocols and conventions
- Future work



Organisational perspective on coordination

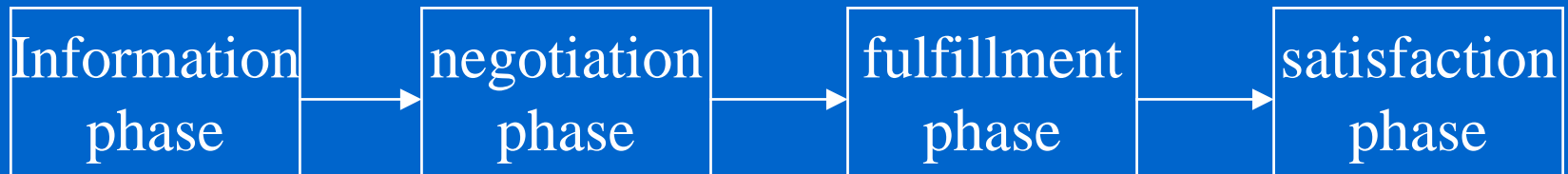
Supply chain



Coordination mechanisms

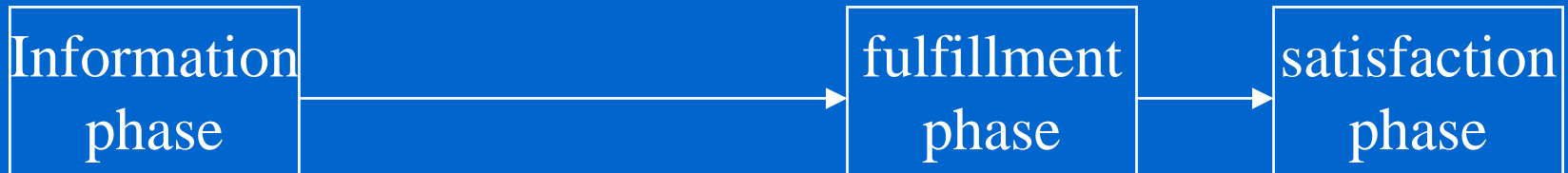
- Transactions through market
 - no longstanding relations
 - “supply” and “demand” determine price
- Transactions through hierarchy
 - tight relation between supplier and customer
 - price is management decision

Transaction costs in market



- Gather information
- negotiate contracts
- protect against *opportunistic* bargaining

Transaction costs in hierarchy



- decision making
- accounting
- planning

Market vs. hierarchy

	Production costs	Coordination costs
markets	low	high
hierarchy	high	low

Other influences on coordination

- Asset specificity
 - location specificity
 - time specificity
 - customer specificity
- Product complexity
 - specification problem
- Market players

Electronic interconnections

- Lower communication costs
- Lower coordination costs
 - market efficiency
 - information gathering (Intelligent Information Agents)
 - price comparison (Shopbots)
 - global competition (WWW)
 - hierarchy integration
 - use of EDI in supply chains

Electronic institutions

- Define infrastructure (facilities)
- Define possible interactions at institution
 - An institution may support several types of interaction (e.g. shopping mall and auctions).

Infrastructure for electronic institutions

- Banking facilities
- Communication facilities (security)
 - confidentiality
 - integrity
 - authentication
 - non-repudiation
- Common ontology

Banking facilities

- Different payment methods should be supported
- Payment should be safe
- Payment (and delivery) guaranteed

Communication

- Some common ontology should be used.
- A formal language should be provided in case of contracting and negotiation
- This language should have a precise and formal meaning.
 - Note: currencies should be clear
- Contracts should be grounded.
 - Obligations should be visible

Types of interactions I

- Direct transactions
 - shopping mall
 - classified ads
 - direct negotiation
- Brokered transactions
 - distributors
 - brokers
 - auctions

Types of interactions II

- Direct transactions
 - direct contact buyer and seller
 - natural control institution smaller
- Brokered transactions
 - controlled contact between buyer and seller
 - transaction protocol can be determined by third party
 - institution has more control

Brokers or direct trading?

- Broker functions:
 - information provider (match buyer and seller)
 - price discovery mechanism
 - logistics
 - trusted third party
- Direct trading:
 - When market is good (e.g. commodities)
 - Long term contact between buyer and seller

Agents

- Agent properties:
 - autonomous
 - pro-active
 - reactive
 - social ability
- Agent functions:
 - information gathering and filtering
 - negotiation (simple like ContractNet)
 - monitor long-term processes

Agents and electronic commerce

- Agents for support:
 - information gathering and comparison (e.g. shopbots)
 - logistics
- Agents as delegates:
 - only when trust is not important or easy
 - Price and risk are low
 - Process well defined

Agents and Institutions

- Two types of interaction
 - Interaction with institution itself.
I.e. registration as buyer/seller, payment, etc.
(use of facilitating services)
 - Interactions (within the institution) with other parties.

Interaction with institution

- Protocol determined by institution.
 - Agents participating in the institution should “know” how to use the facilities of the institutions.
 - There should be a standard way to describe the facilities (and protocols) of the institutions!

protocols within interactions

- In brokered trading the institution can prescribe the way of interaction. (It has control over this communication).
- In this case protocols for simple cases (like auctions) can be described using State-charts or Petri-nets.
- Connections between the protocols can also be precisely defined.

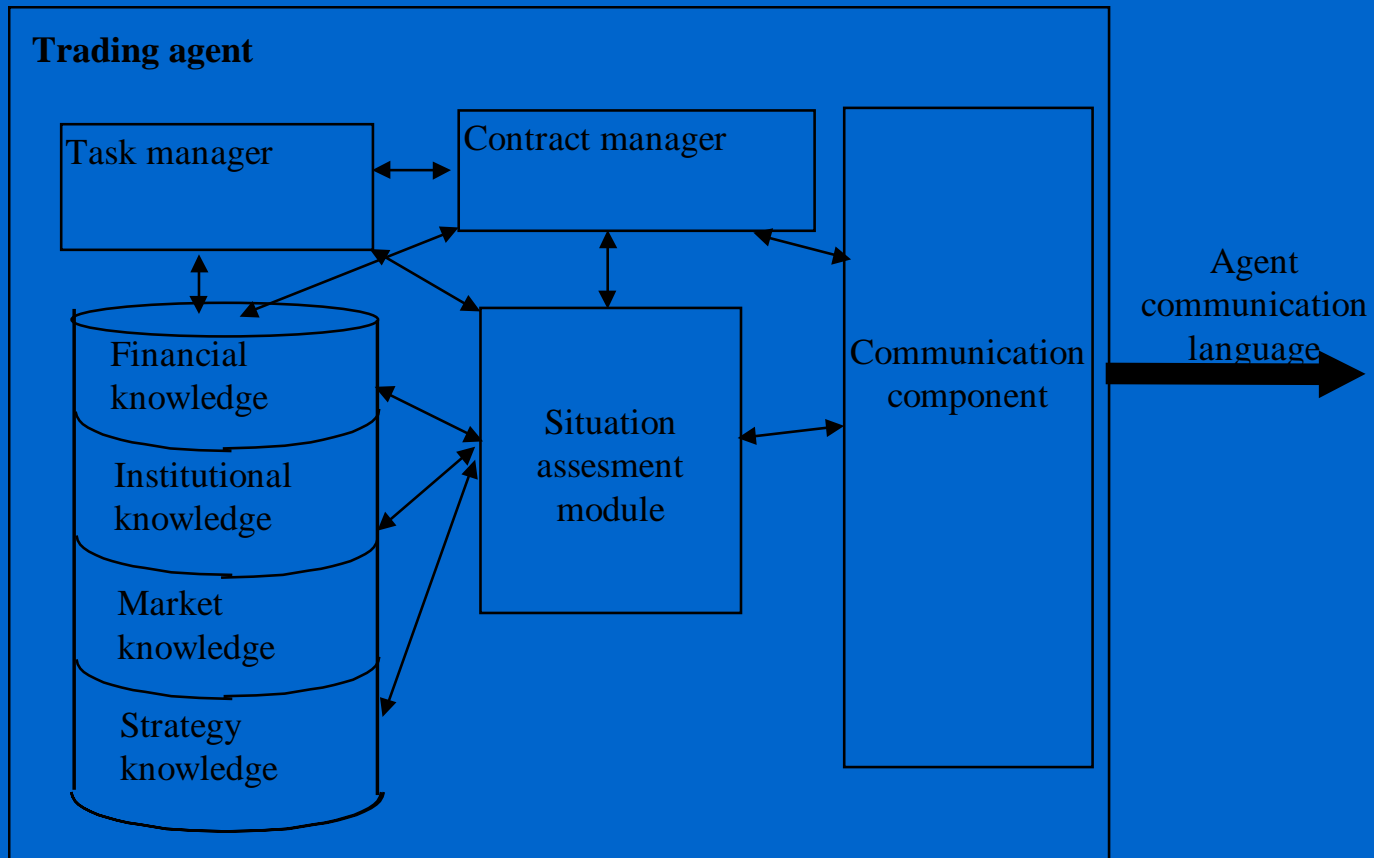
protocols within interactions

- In direct transactions the institution can only prescribe the conventions of interactions within the institution.
- In this case only the boundaries of the interactions are described.
- The institution cannot prescribe the moments and order of interaction with the facilities of the institution.

Agents and institutions

- Agents need to be able to find out the different possible transactions, conventions and protocols of an institution.
- In case of direct transactions, agents should first determine each other capabilities and set up a protocol of interaction.
- In general: Less control of institution means more complex communication between agents.

Mediating Trading Agents



Future work

- Define a standard way to describe protocols of interactions with institutions
- Define a standard way to describe conventions for the “free” interactions
- Define standard way of describing agent capabilities

Research questions

- Define “rules for dialogues” for different settings.
- Define the concepts of negotiation, such that the support needed for each setting can be determined.