Detailed Analysis of REA Ontology

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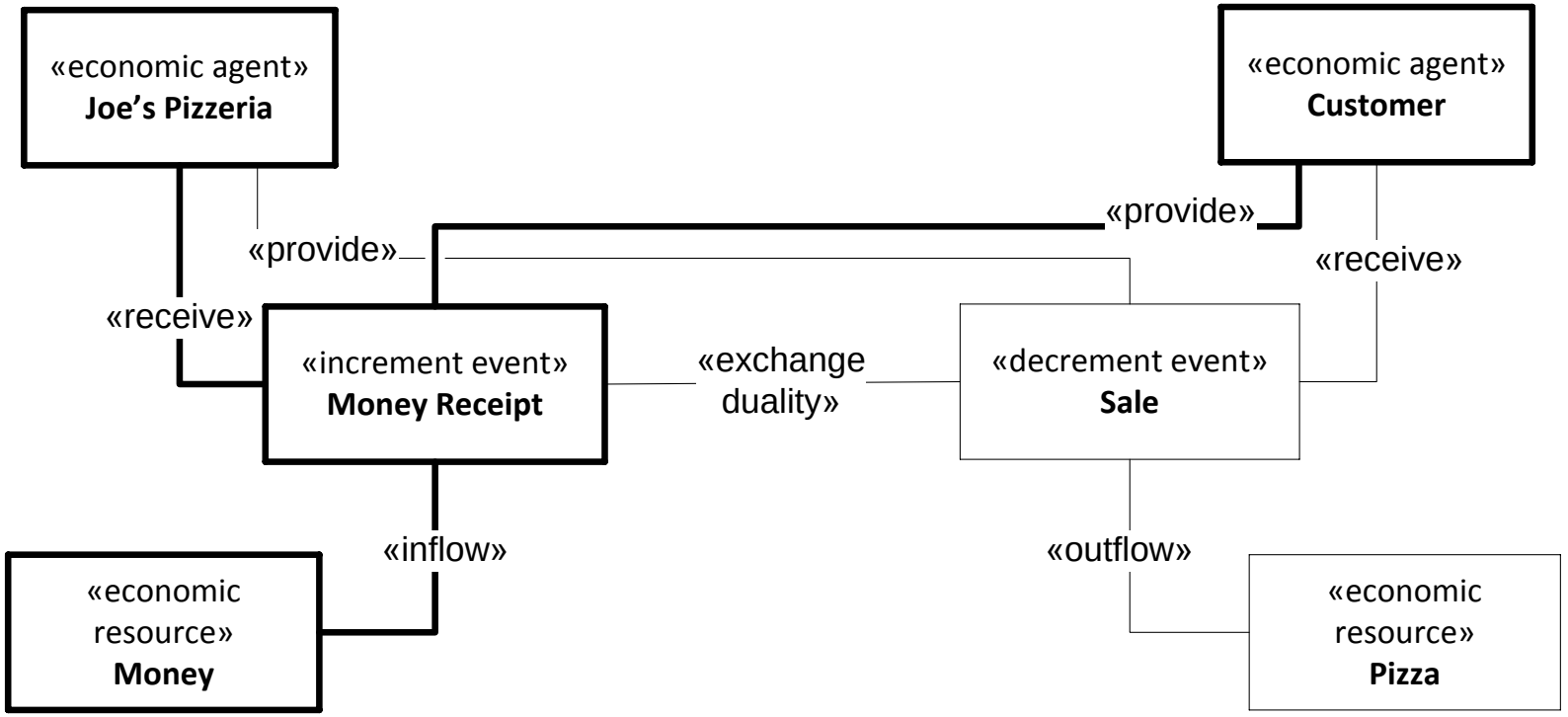
Motivation

- *Accounting artifacts* are in REA derived from the data describing the exchanges or conversions (not vice versa).
- *Revealing deficiencies* and incompleteness in the REA value modeling approach is a guideline for gradual improvement.
- *Possibilities* for DEMO to be closely utilized in compliance with other domain specific ontologies.

Outline

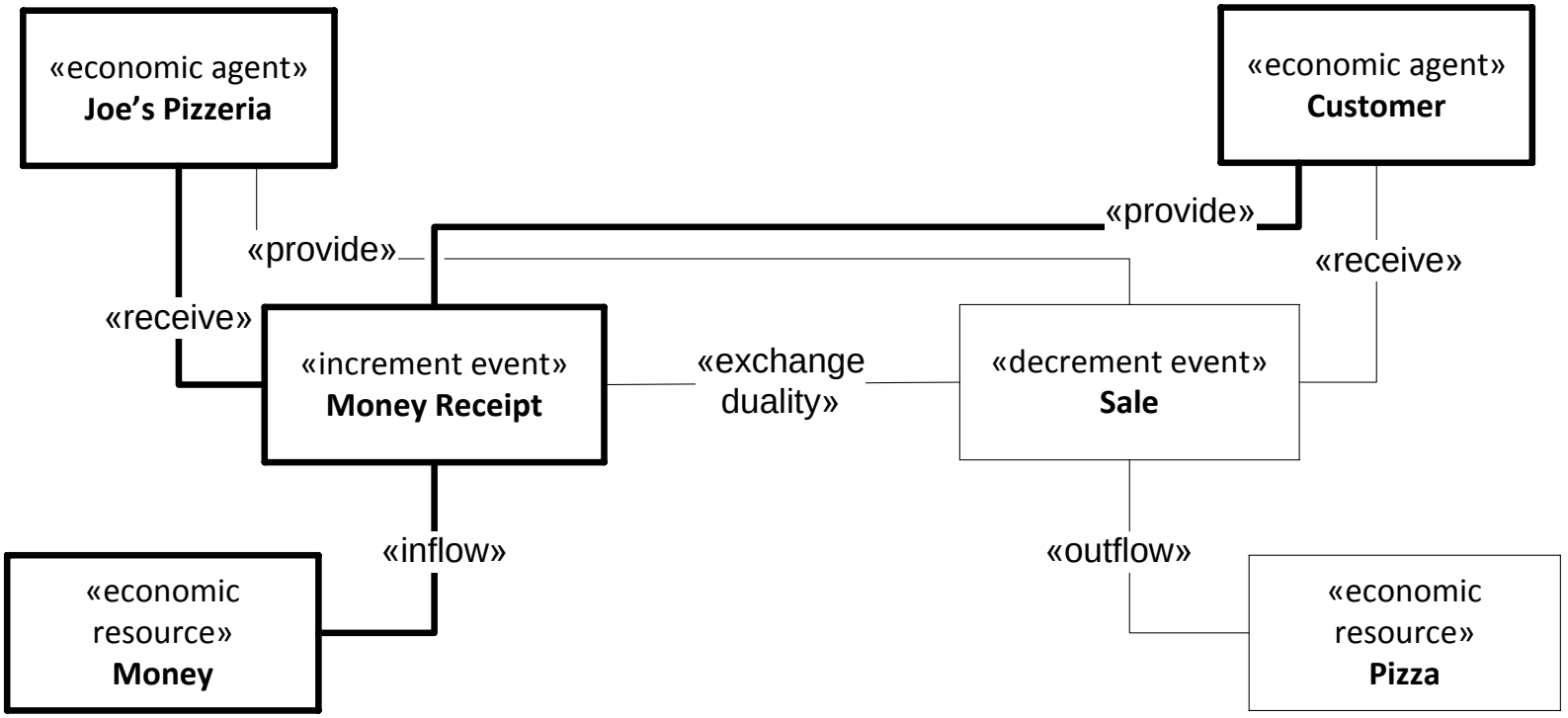
1. REA core pattern.
2. Activities in future (planning) modeled in REA and cardinalities between event & commitment entities.
3. Business transaction and its utilization for planning future activities.
4. Type level in REA value model.
5. Information entities and their modeling.
6. REA value chain - higher modeling abstraction.
7. Conclusion

1. REA Core Pattern



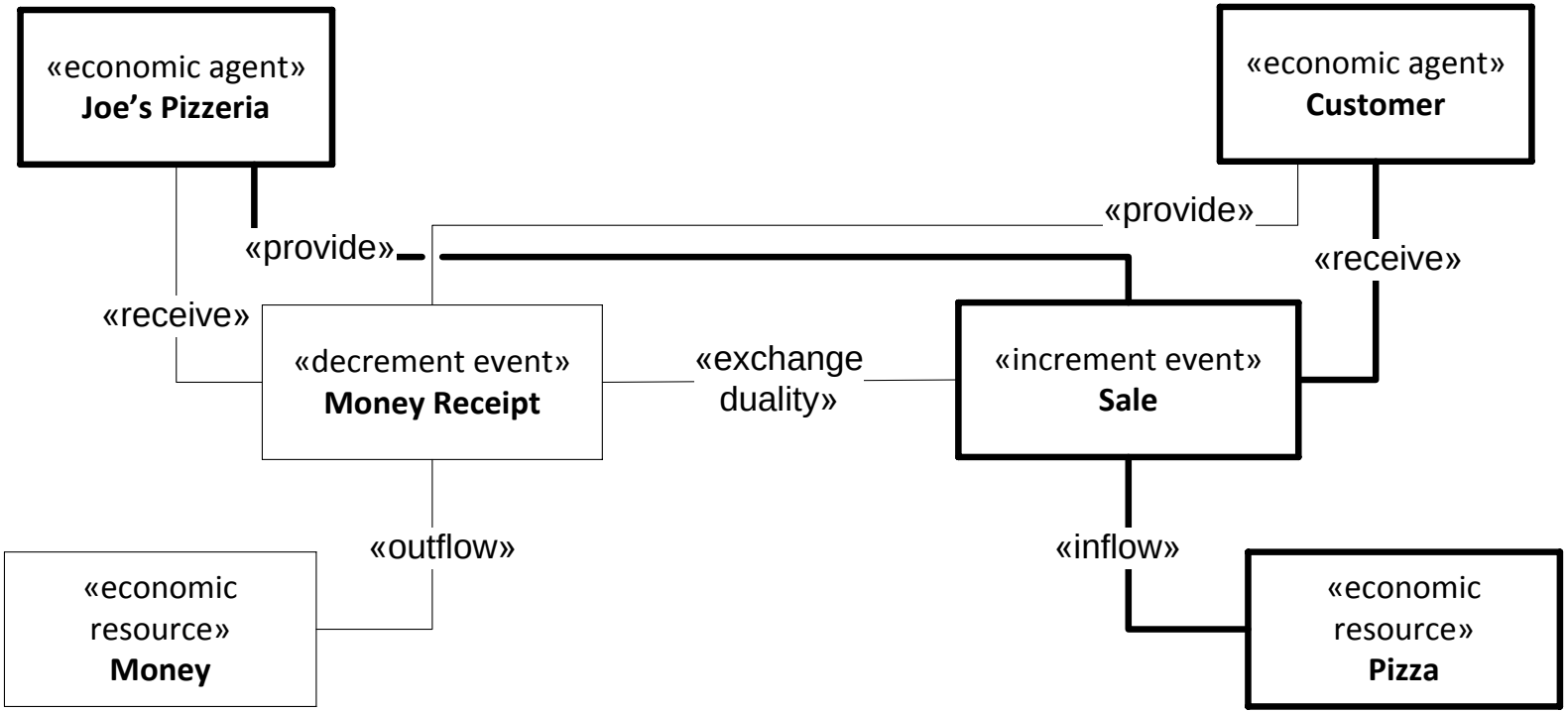
- Two mutually bound transactions.
- *Event* represents an increment or a decrement in the value of economic resources (*transferring rights* from one economic agent to another.

1. REA Core Pattern



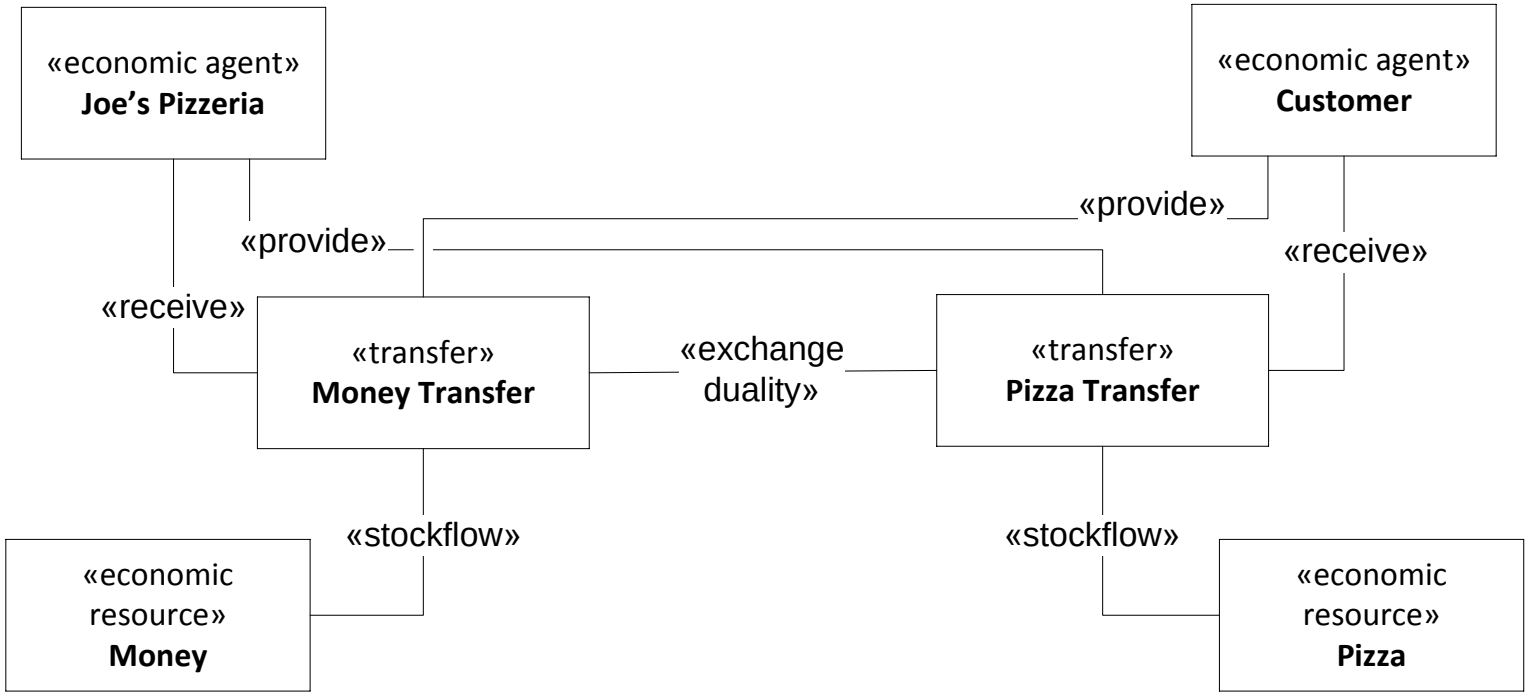
- Events are related to each other by the exchange duality relationship.
- Changes of resource entity rights are *registered*, economic artifacts are *derived* from the registered resource exchanges.

1. REA Core Pattern



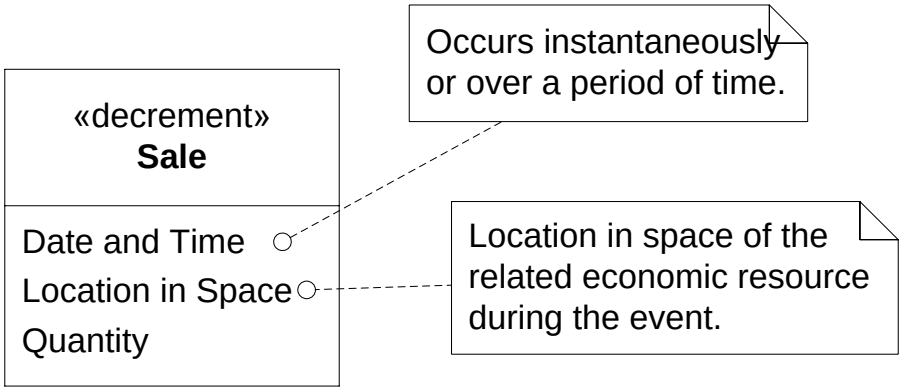
- Dependent view of the transaction.
- *Inflow* is a relationship by which the enterprise receives some rights to the resource as a result of the related *increment* economic event.

1. REA Core Pattern –Independent View



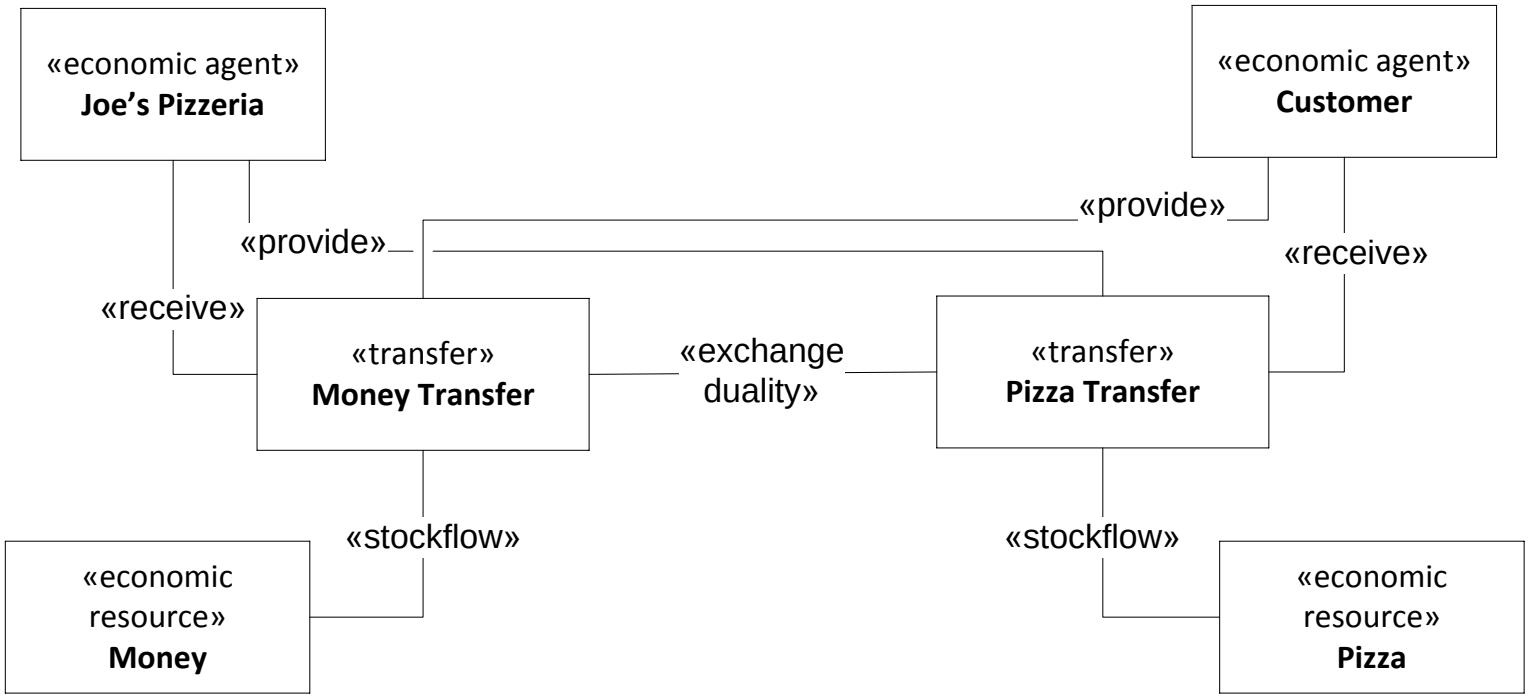
- Many-to-many relationship between event entities.
- *Provide*, *receive* relations between agents.

Economic Event



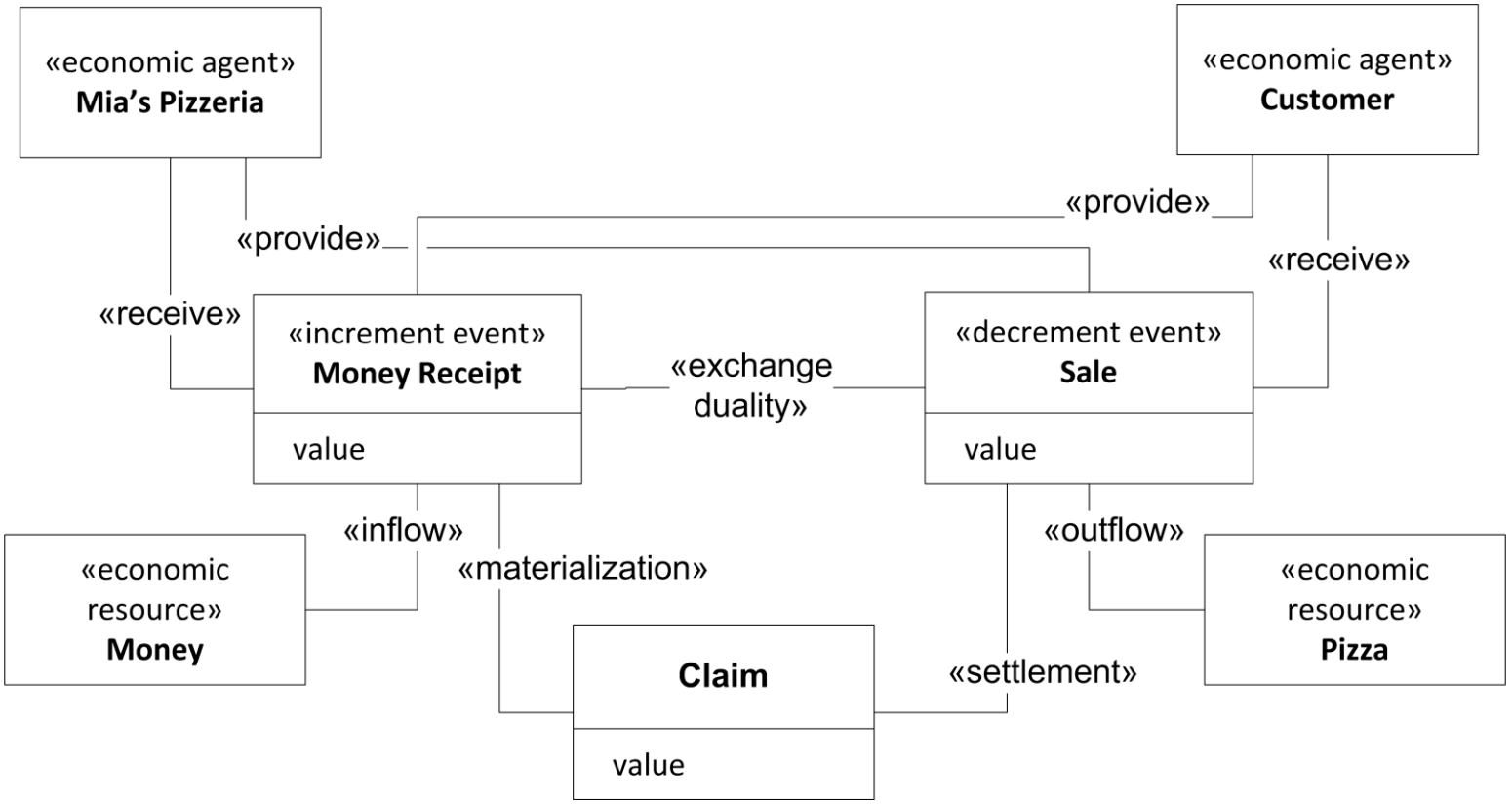
- By its character, *economic event* represents *production act and fact* – similar to the DEMO standard transaction pattern - *execution phase*.

1. REA Core Pattern



- *Provide*, *receive* relations between agents is similar to the *DEMO standard transaction pattern* result phase - the process steps: state and accept.

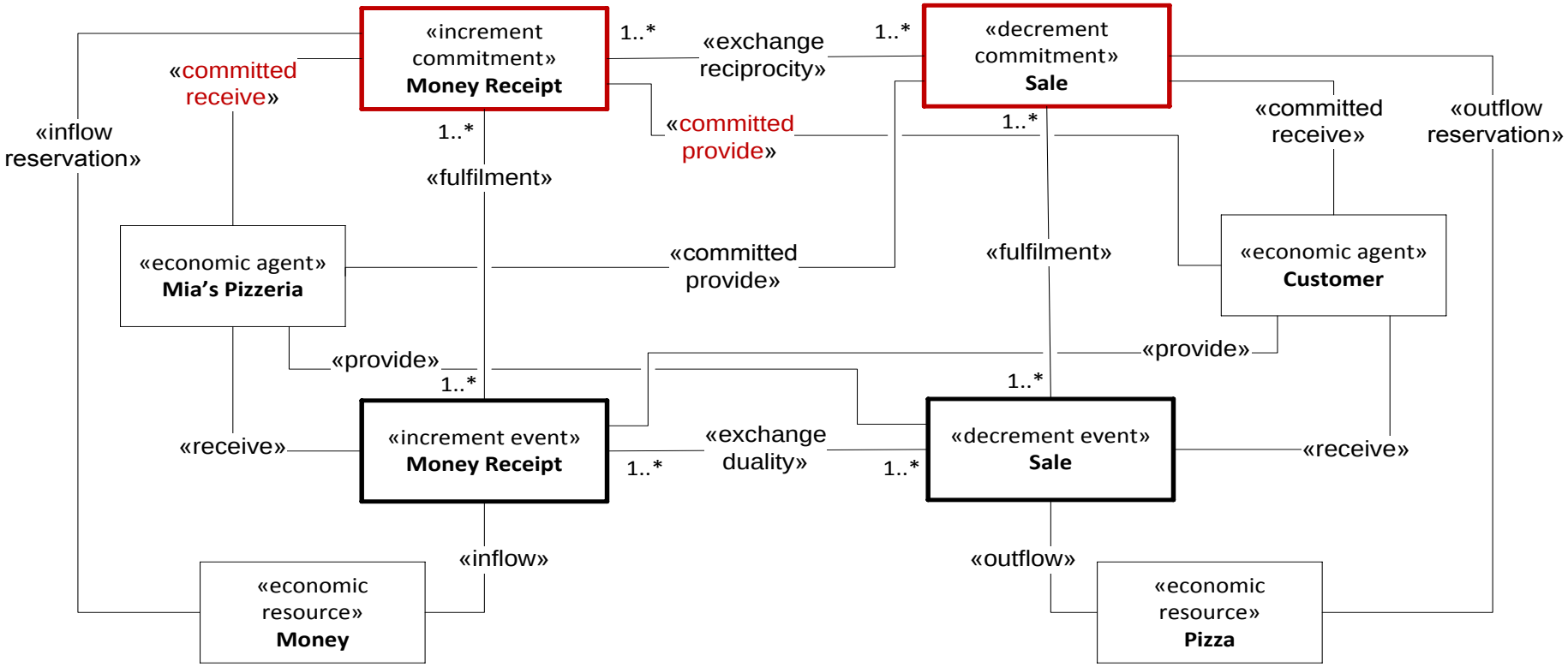
Balancing discrepancies between economic events



1. REA Core Pattern - Sumary

- REA core pattern shows that:
  - main entities: human beings, events, resources,
  - contains at least two resources,
  - includes *production acts/facts*; it stems from originally accountancy system,
  - *provide* and *receive* relationships can be viewed as result phase of the DEMO standard transaction pattern, coordination acts/facts (state, accept),
  - looks like two mutually bound “DEMO” transactions.

2. Future activities in REA value model

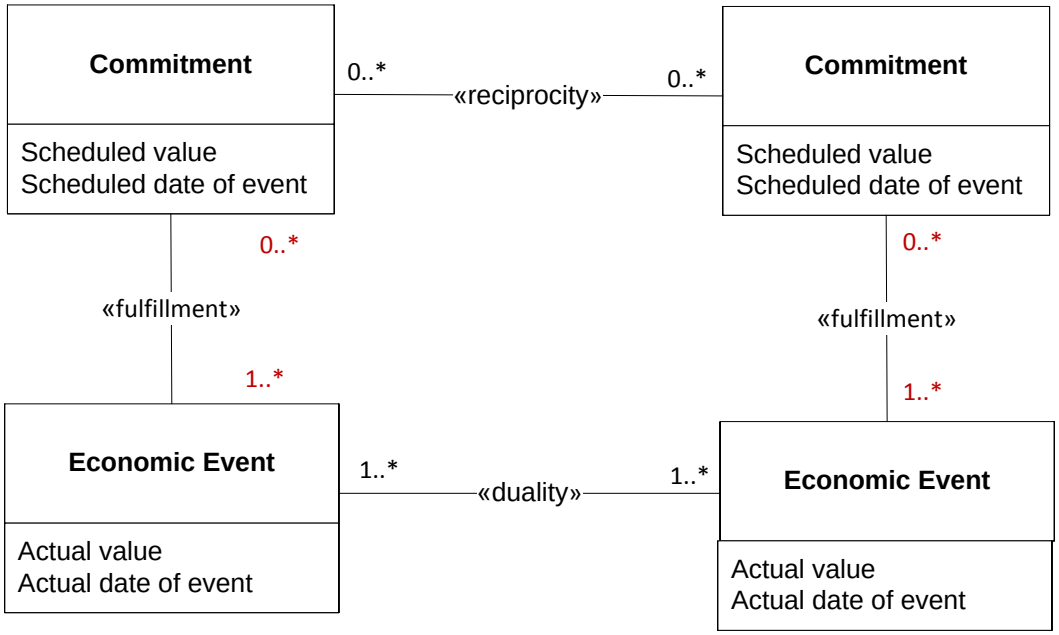


- *Commitment* is a promise or obligation of economic agents to perform an economic event in the future.

Commitment Entity

- Main purpose of the commitment entity is to *reserve* needed *resources* for the “future event”.
- *Committed receive* and *committed provide* relationships seems to be similar to the *proposition phase* of the DEMO standard transaction pattern -process steps: *request*, *promise*.

Commitment & Event many-to many relationships



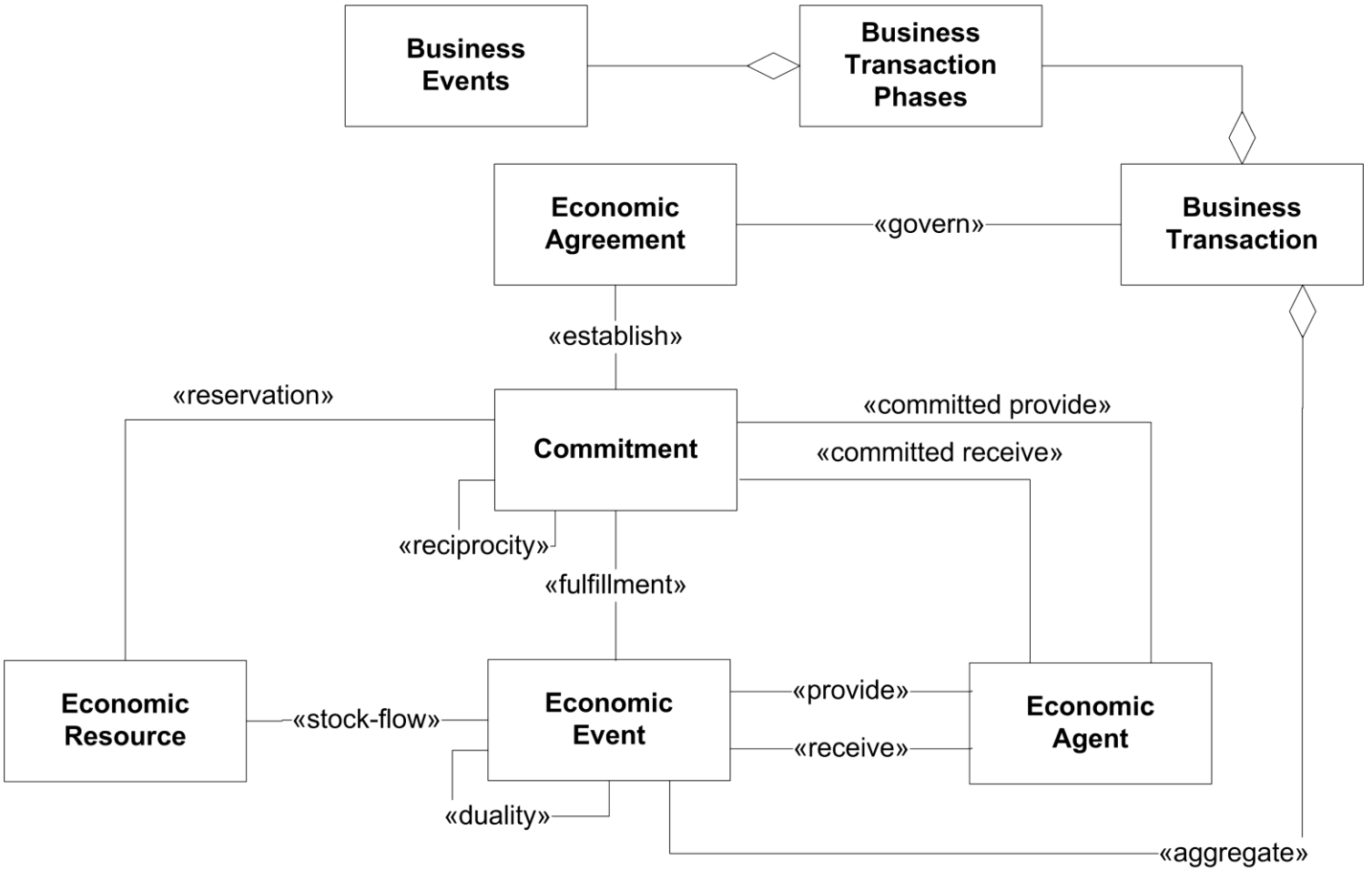
- *One-to-many:* a book delivery is performed by several shipments.

- *Many-to-one:* many promised payments are fulfilled by one payment (event).

Commitment & Event Entities

- REA state machine is still insufficient:
  - missing perfoma-informa-forma analysis,
  - commitment entity is taken as a future event entity – not proper way for modeling,
  - missing distinction of coordination / production activities.
- Inspiration for improvement: *business transaction phases*.

3. Business Transaction



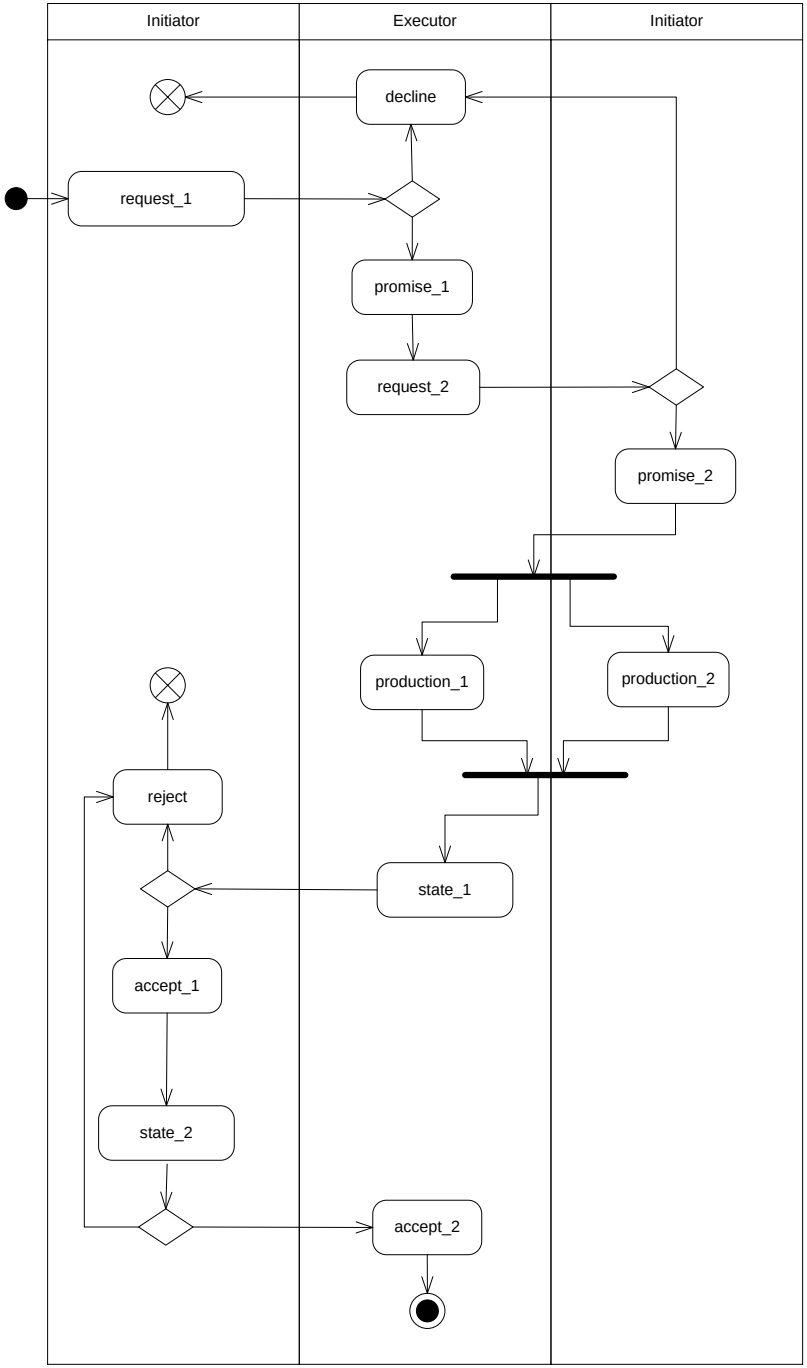
Business transaction declared by **ISO Open-edi Phases of a Business Process**

ISO Open-edi Phases of a Business Process

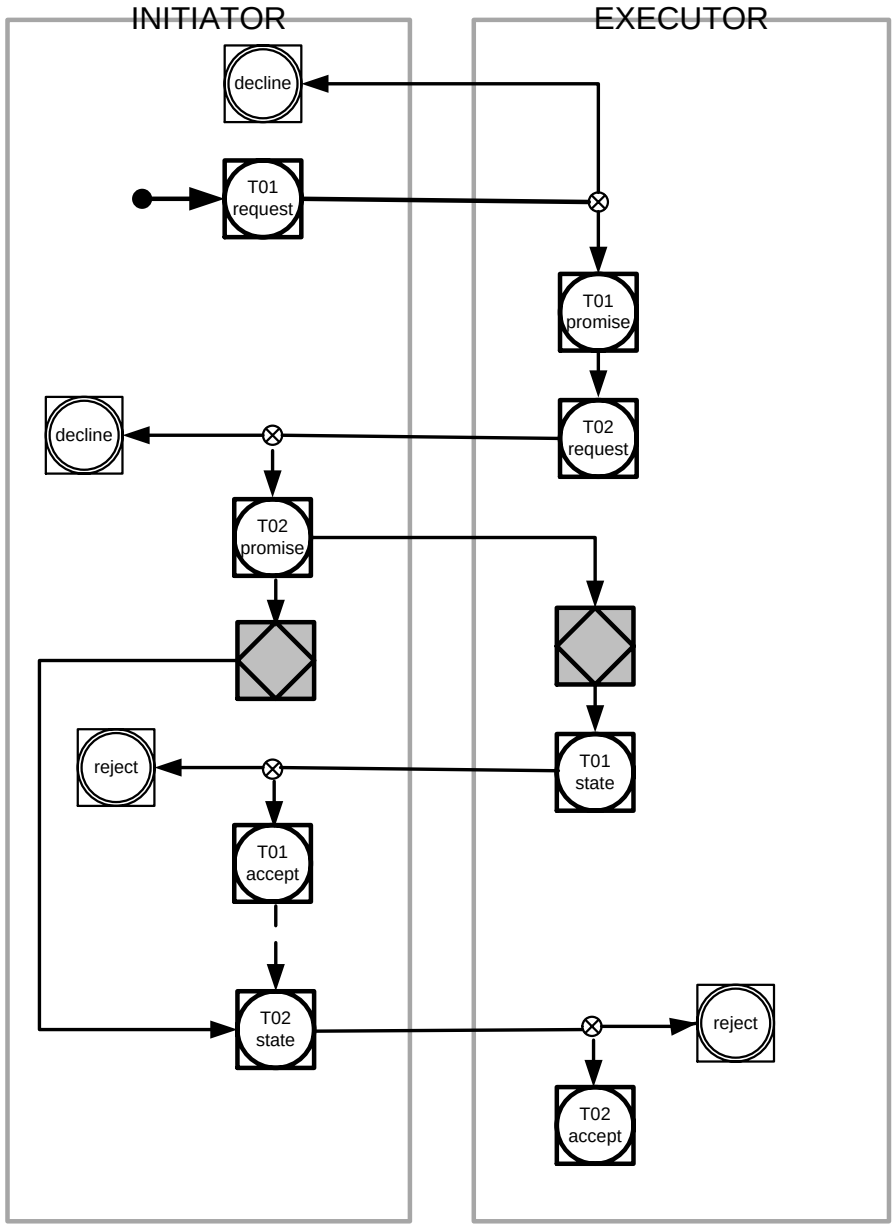
- Planning: In the Planning Phase, both the buyer and seller are engaged in activities to decide what action to take for acquiring or selling a good, service, and/or right.
- Identification: The Identification Phase pertains to all those actions or events whereby data is interchanged among potential buyers and sellers in order to establish a one-to-one linkage.
- Negotiation: The Negotiation Phase pertains to all those actions and events involving the exchange of information following the Identification Phase where a potential buyer and seller have (1) identified the nature of good(s) and/or service(s) to be provided; and, (2) identified each other at a level of certainty. The process of negotiation is directed at achieving an explicit, **mutually understood, and agreed upon goal of a business collaboration and associated terms and conditions**. This may include such things as the detailed specification of the good, service, and/or right, quantity, pricing, after sales servicing, delivery requirements, financing, use of agents and/or third parties, etc.
- Actualization: The Actualization Phase pertains to all activities or events necessary for the execution of the results of the negotiation for an actual business transaction. Normally the seller produces or assembles the goods, starts providing the services, prepares and completes the delivery of good, service, and/or right, etc., to the buyer as agreed according to the terms and conditions agreed upon at the termination of the Negotiation Phase. Likewise, **the buyer begins the transfer of acceptable equivalent value, usually in money, to the seller providing the good, service, and/or right**.
- Post-Actualization: The Post-Actualization Phase includes all of the activities or events and associated exchanges of information that occur between the buyer and the seller **after the agreed upon good, service, and/or right is deemed to have been delivered**. These can be activities pertaining to warranty coverage, service after sales, post-sales financing such as monthly payments or other financial arrangements, consumer complaint handling and redress or some general post-actualization relationships between buyer and seller.

Business Transaction

- Business transactions must be included inside the REA value model.
- The commitment entity should be also declared and viewed as *coordination activities*
  - committed receive - request,
  - committed provide – promise.
- Creating *proposition phase* of the transaction.
- Event entity should be in compliance with the *execution phase* and the *result phase*.



- Promise_2 may lead to other request for “conversion” process.
- Promise process step means: reservation of necessary resources.
- Reservation may be expressed in *resource type entities* instead of resource entities.
- DEMO standard transaction pattern.



- REA core pattern modelled as a DEMO process model.

4. Type Level in REA Value Model

- REA value model explicitly utilizes types, to define abstractions of economic phenomena such as *resource type*, *agent type*, *event type*.

1. *Type definition*, specifications and guidelines can be applied to each instance that conforms to the type, may be utilized as a form of policy.

4. Type Level in REA Value Model

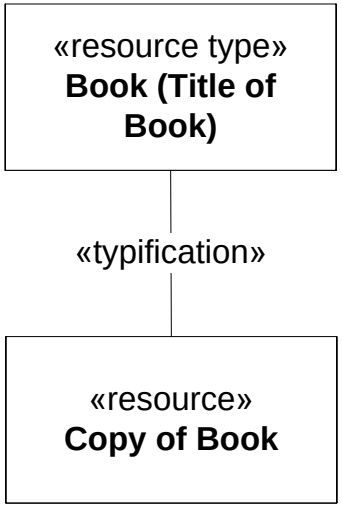
2. The type definition enables the declaration of a *type entity instance* that holds all properties which create a “form” for all object instances that conform to the type instance.

- *E.g. employee type* refers to a category of people who have the employment relationship with one or more organization.

Resource type entity example

- All resource entities that conform to resource type entity share the properties of the resource type entity.
- Similar issues: Book (Book Title) & Book Copies.
- All book copies conform to a book (title).
- Book contains all information for searching.
- REA distinguishes: a *book type* entity and a *book entity*.

Type level in REA Value Model

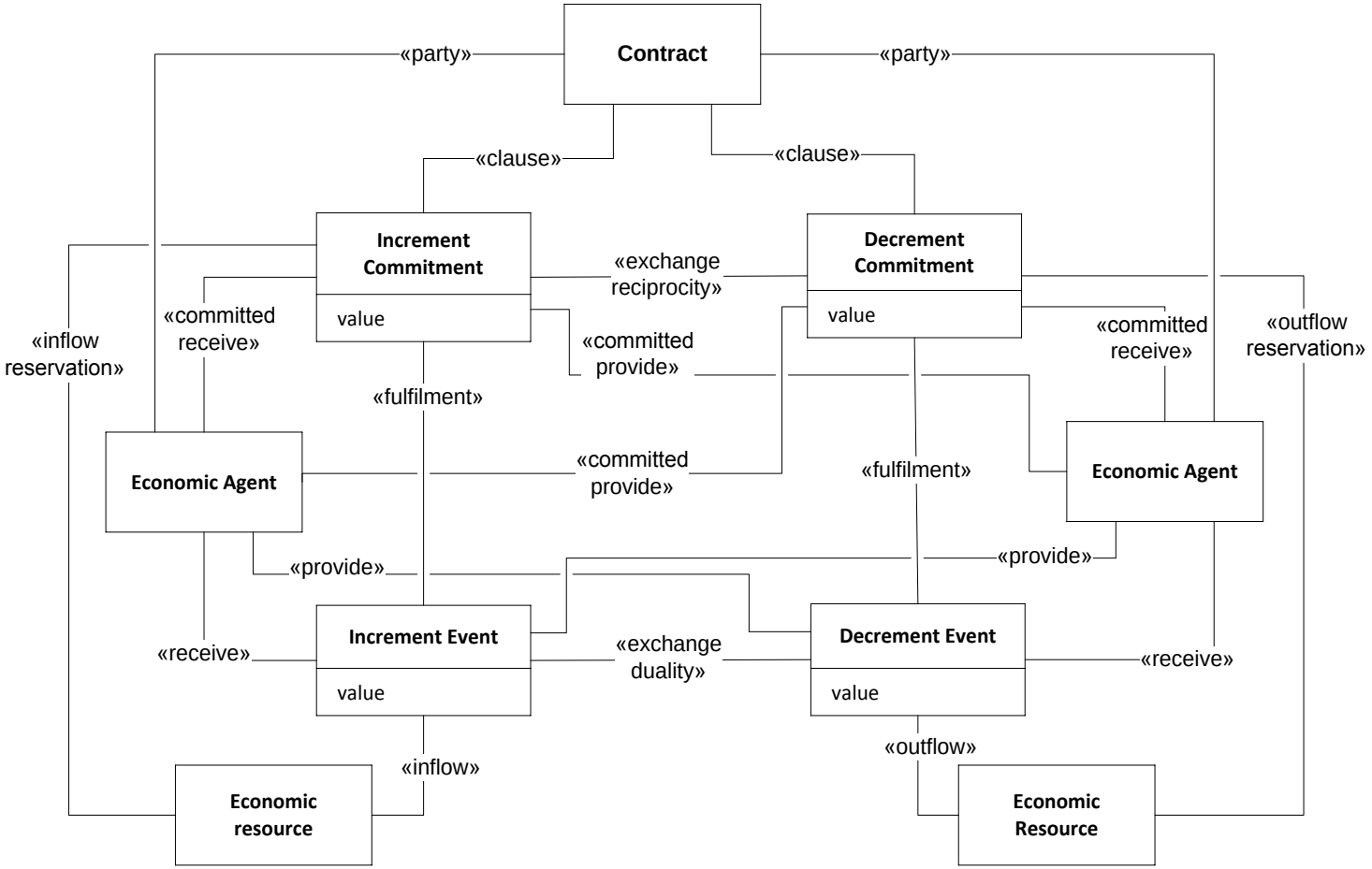


- A *resource entity* conforms to *resource type entity*.
- Resource type entities mostly used with *commitment entity* for resource entity reservation,
  - due to that only a corresponding entity type is known.

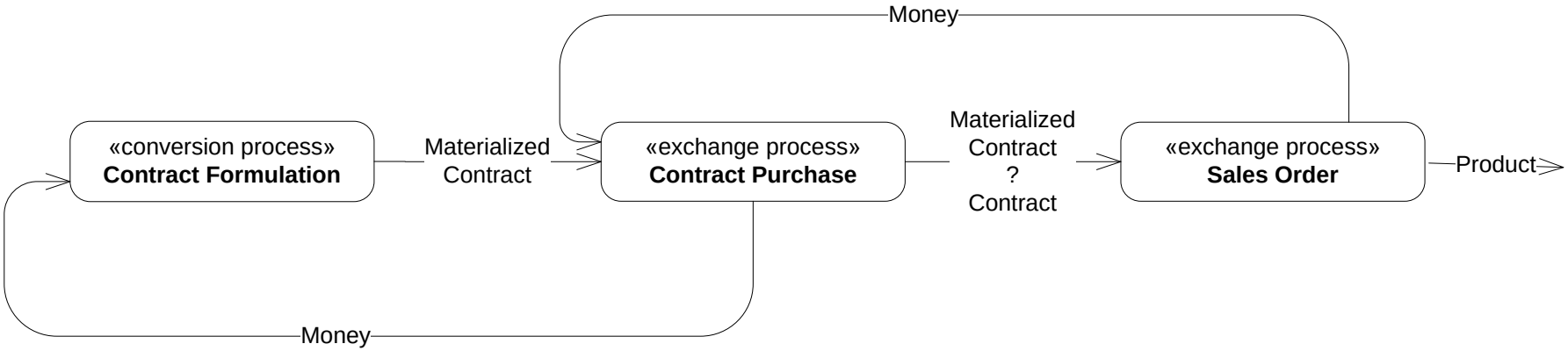
5. Information Entity and its Modeling

- A *Contract* is an entity in the REA application model containing *increment* and *decrement commitments* that promise an exchange of economic resources between economic agents, and *terms*.
- *Terms* are potential commitments that are instantiated if certain conditions are met.
- How to create and move an information entity into another process?

5. Information Entity and its Modeling



Information Entity Creation and Flow into another Process



- Information entity characteristics:
  - *resource*: Contract Formulation, Contract Purchase
  - *information entity*: Sales Order
- REA lacks of natural (tree) structuring of the processes.

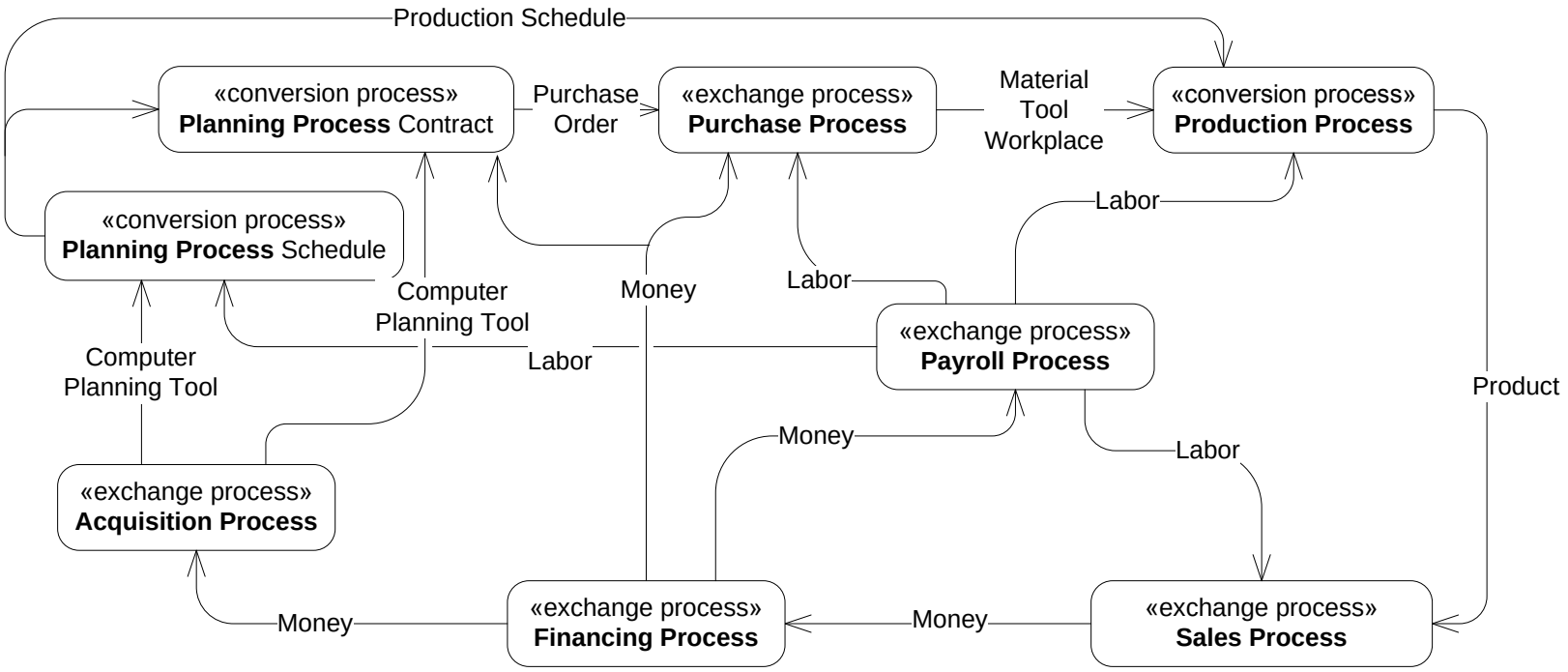
5. Information Entity and its Modeling

- Value modeling process is focused on *resources*. They are crucial.
- Resources can flow in the REA value chain.
- In case of the contract entity, it becomes information entity after being promised.

6. REA Value Chain - Higher Modeling Abstraction

- REA value models utilize only a sequential order as the other business process modeling methodologies.
- The whole REA application create so called *transaction cycles* – arranged in REA value chain.
- The flow of resources only specifies the amount of resource that inflow into the following REA value model.

REA Value Chain



- Value modeling – only a resource flow is possible.

7. Conclusion

- *Structuring REA* processes in compliance with the DEMO transaction pattern would be useful in many areas:
  - help to introduce REA state machine,
  - enable to structure REA processes in tree structure which is more natural.
- Coordination and production acts/facts *are hidden* and has to be specified.

7. Conclusion

- Justifiable utilization of *types* particularly for *resource entity reservation*.
- Problem of information entity is dependent on introducing REA state machine in compliance with DEMO.
- Whole application: REA utilizes resource flows that interrelate individual processes.

Thank you for your attention.