

**The REA Accounting and
Economic Ontology – Its Use in
ISO 15944-4 and Its
Development as a Literary
Warrant**

by

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Michigan State University**

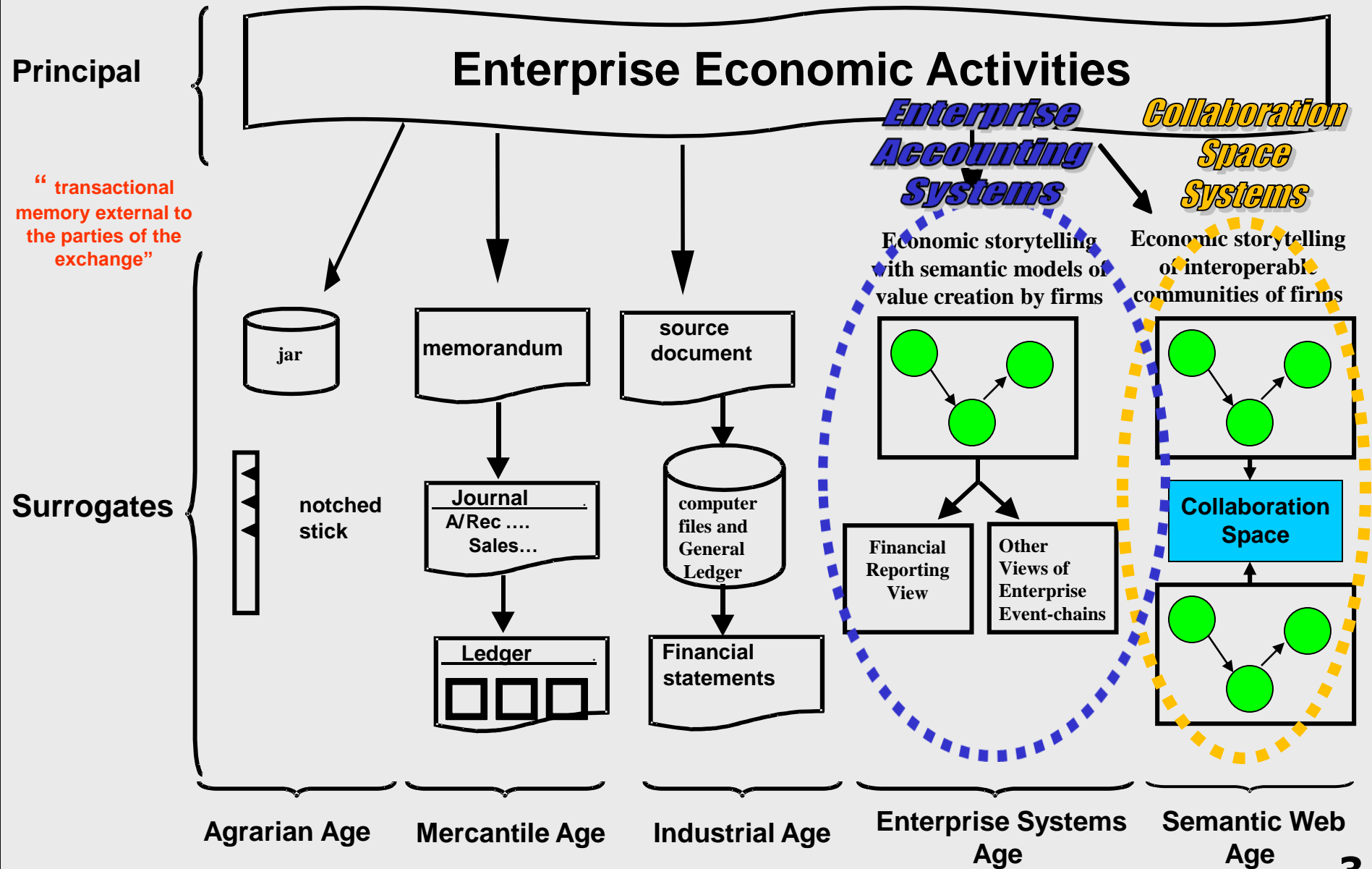


REA Overview

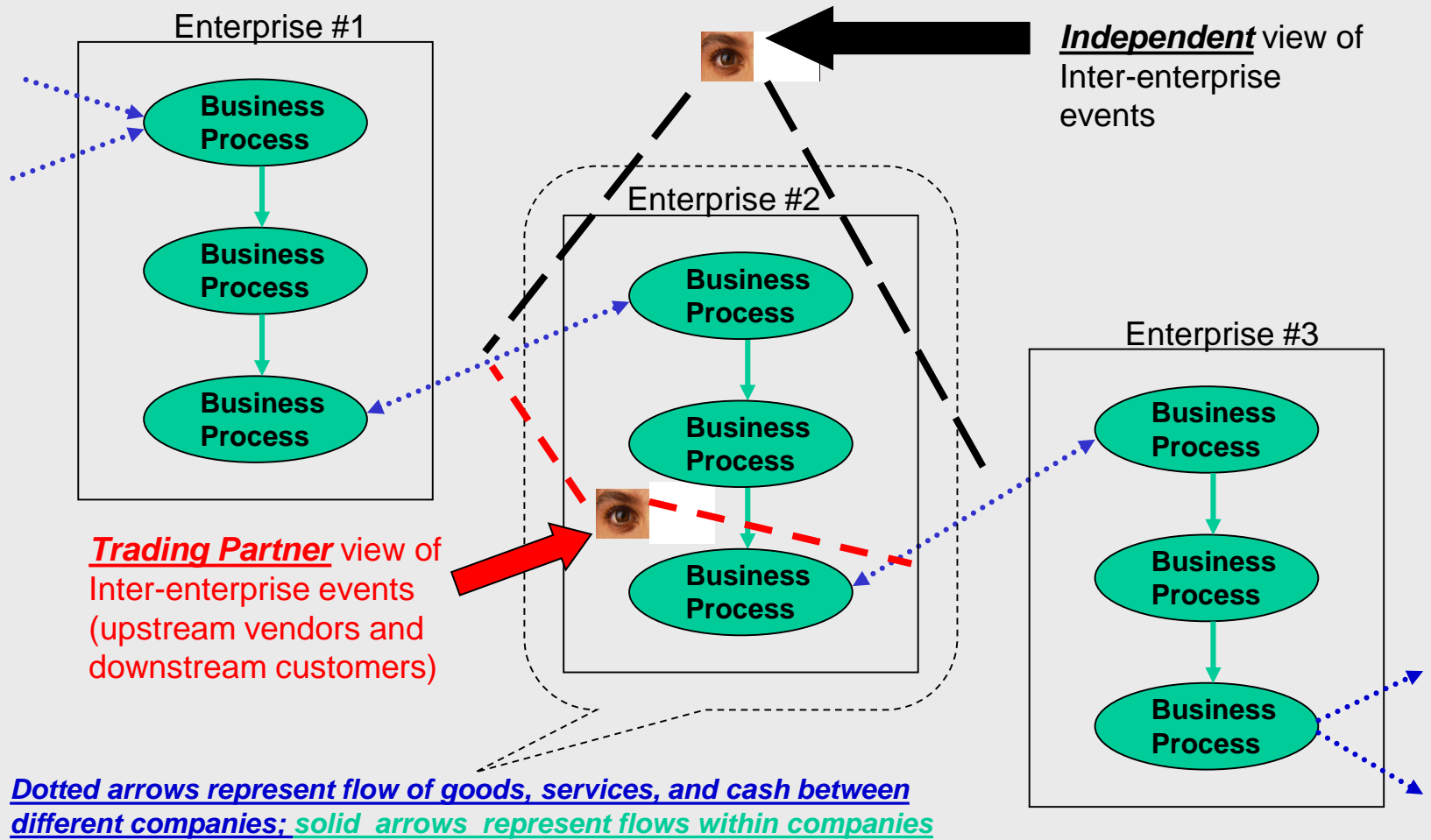
- **REA = Resource-Event-Agent**
- **REA started off as a semantic accounting model in *The Accounting Review* (top accounting research journal)**
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Clare Beghtol (1986)

The evolution of accounting systems



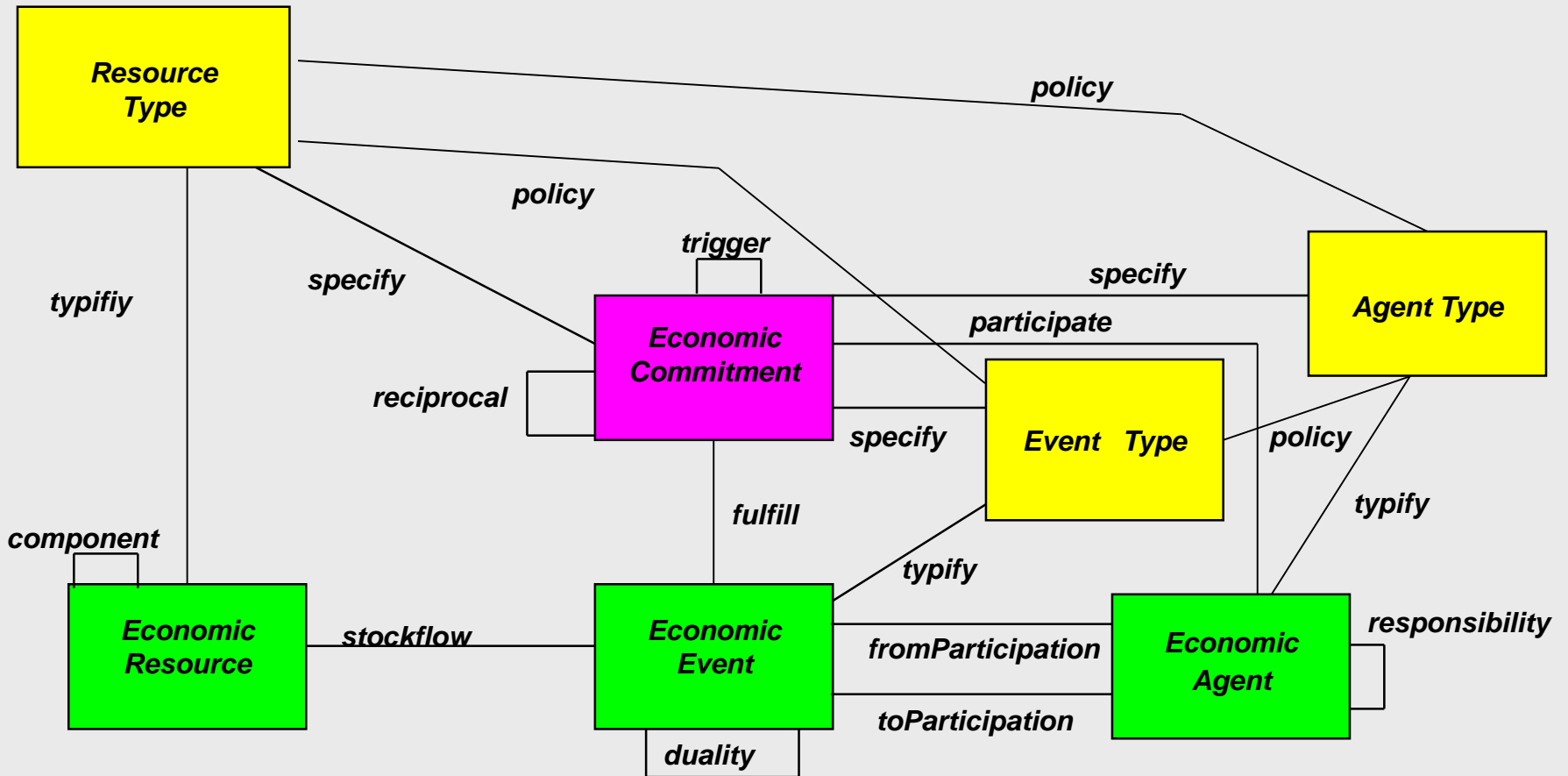
Collaboration Perspective: Trading Partner vs. Independent



Different Views of Business Collaboration (ISO 15944-4)

This figure is Japan expert contribution to 15944-4,

In philosophy and computer science, an ontology is a formal representation of a set of concepts within a domain and the relationships between those concepts. It is used to reason about the properties of that domain, and may be used to define the domain (Wikipedia).



Resource

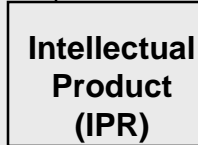
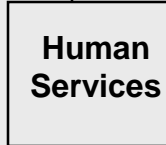
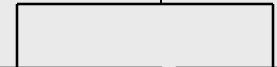
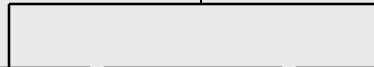
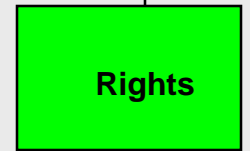
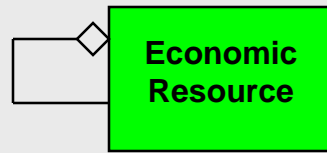
Event

Agent

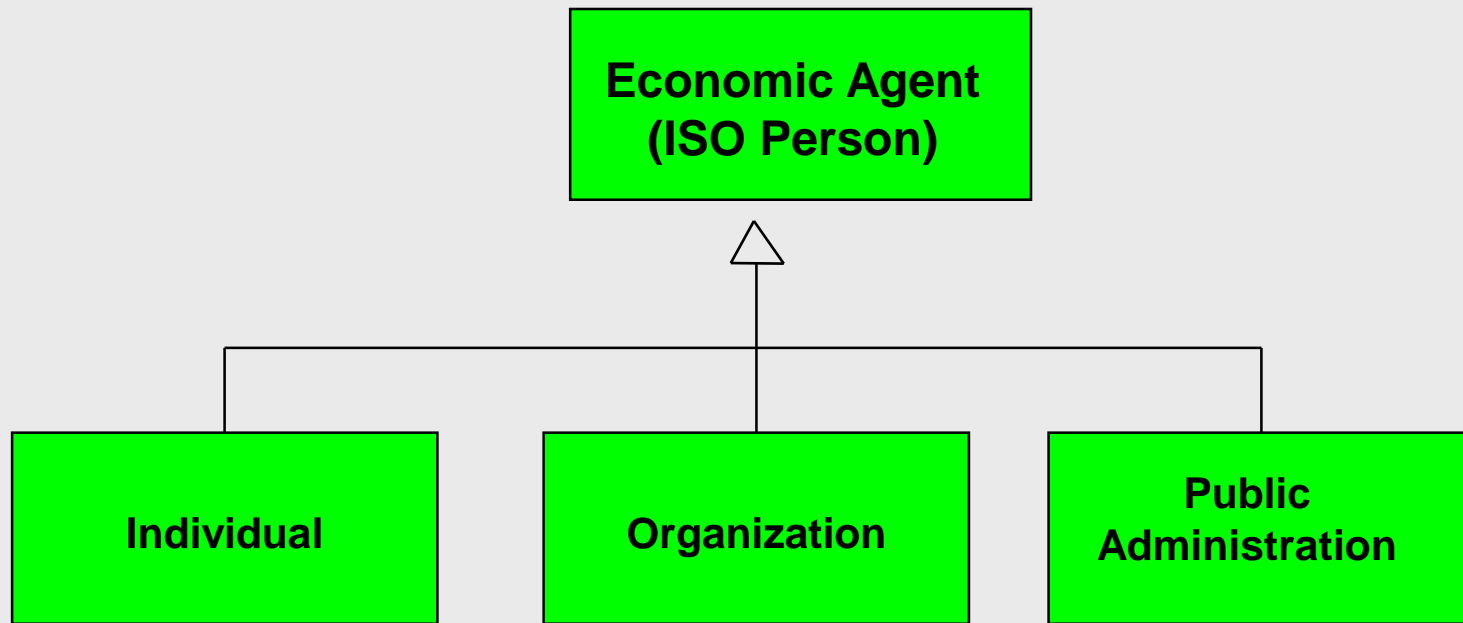
Key REA ontological primitive = Economic Resource

**Economic
Resource**

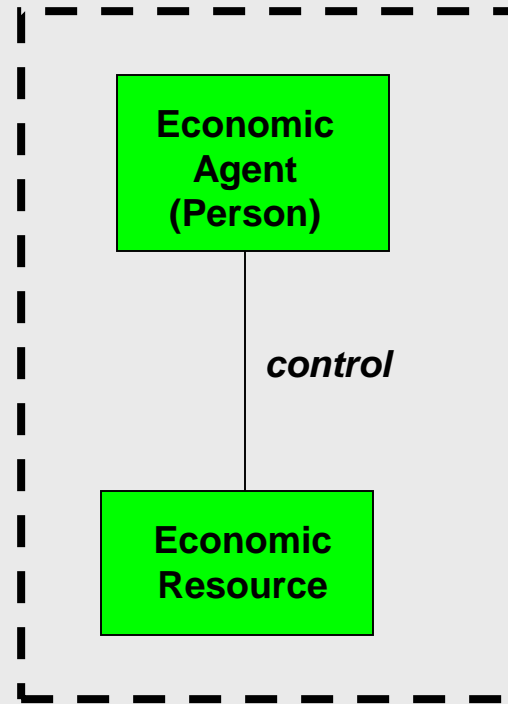
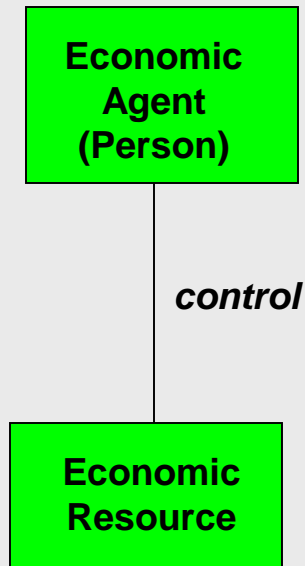
**Something that is
scarce and has utility,
and is under the
control of an
enterprise (1982 paper
& Ijiri)**



Subtypes (possible) for ECONOMIC RESOURCE (ISO 15944-4)

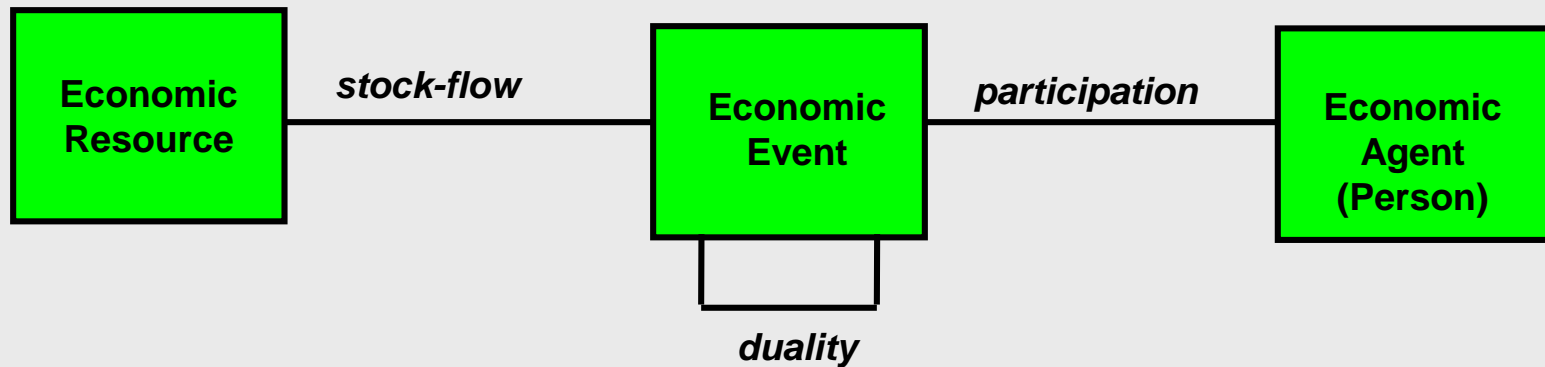


Subtypes of Person (15944-4)



Person and Economic Resource as the Basis for Exchange (ISO 15944-4)

What has occurred



Normative primitives of a transaction ontology

An economic story

Once upon a time at
the cookie store

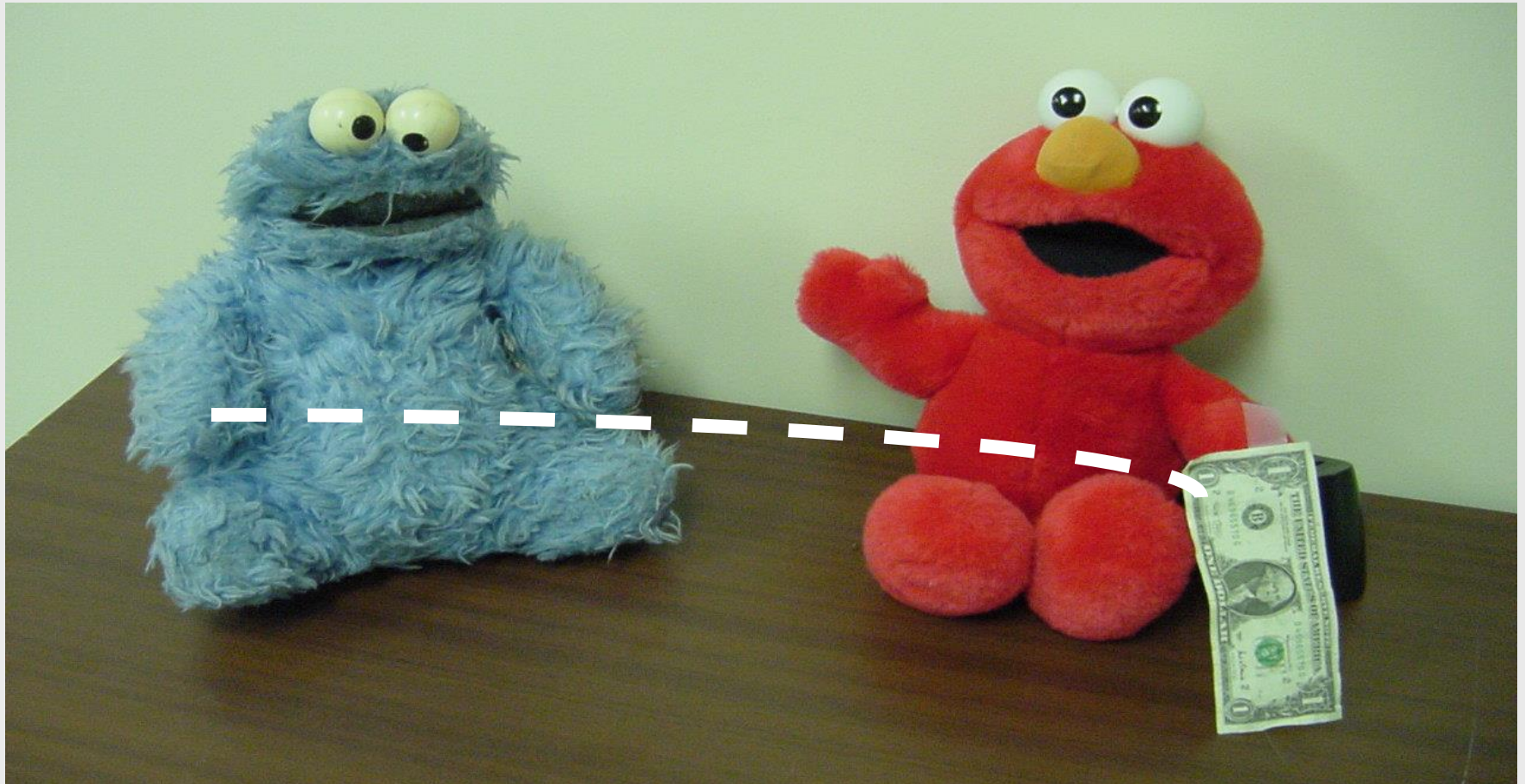
Cookie-Monster (the customer) and **Elmo (the entrepreneur)** meet in the (real or virtual) marketplace, thus setting the stage for an Economic Exchange

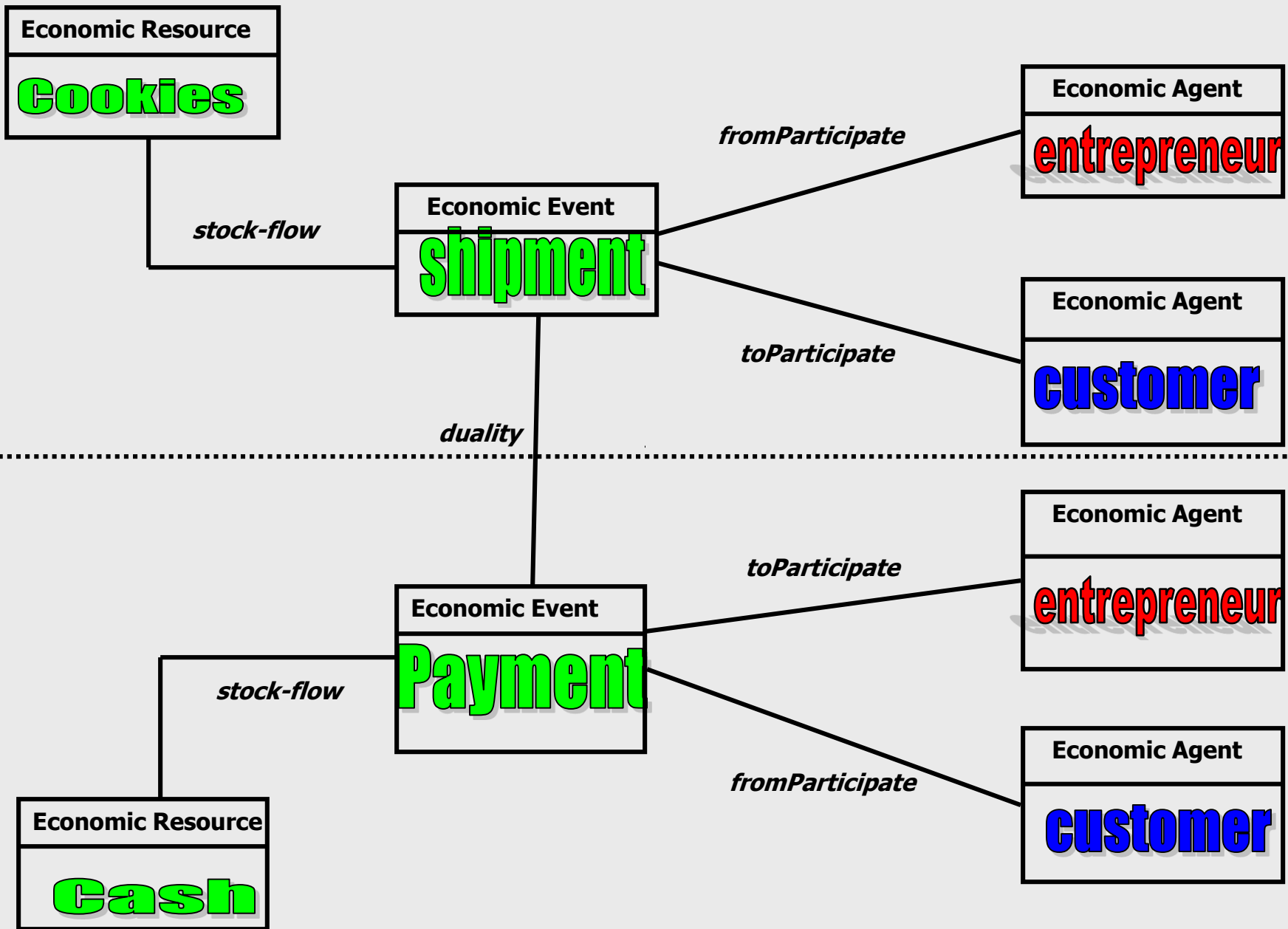


Cookie-Monster and Elmo engage in a SHIPMENT (transfer of Cookie Inventory)



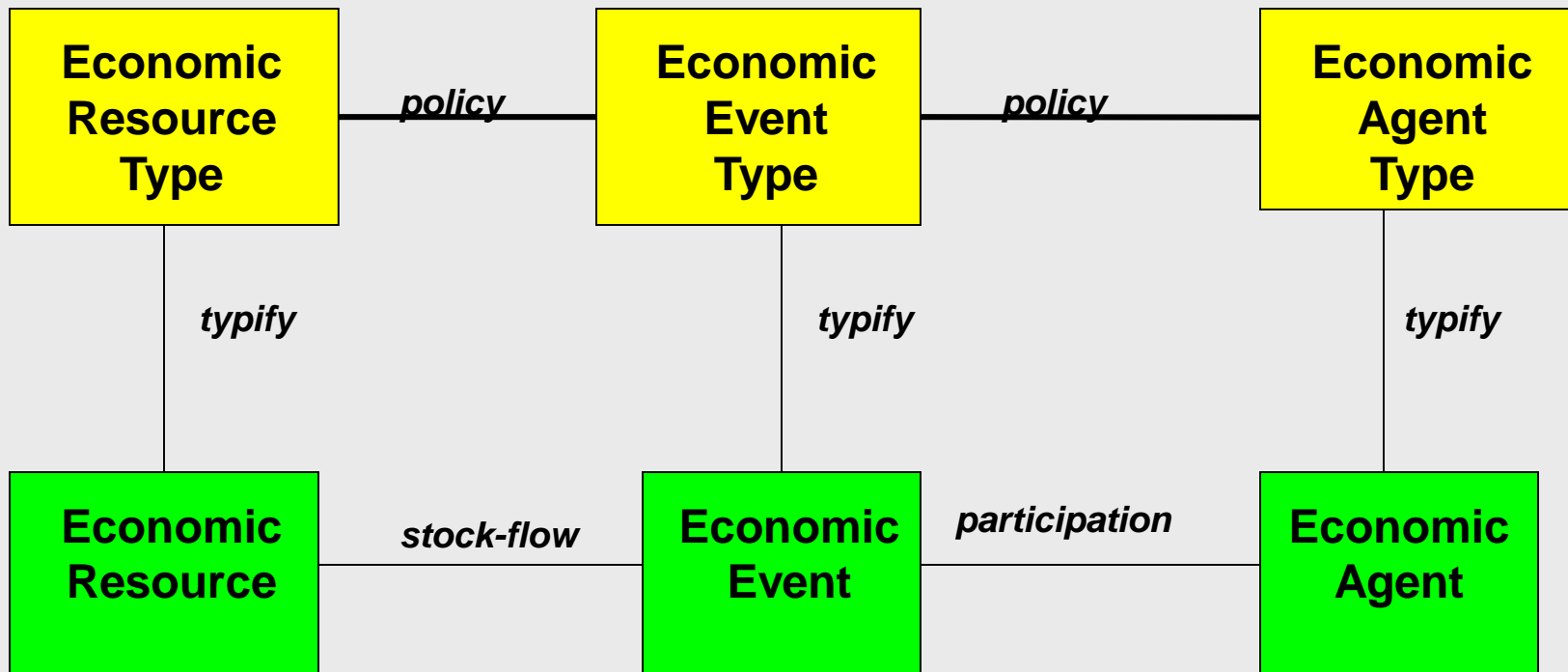
Cookie-Monster and Elmo engage in a PAYMENT (transfer of Cash)





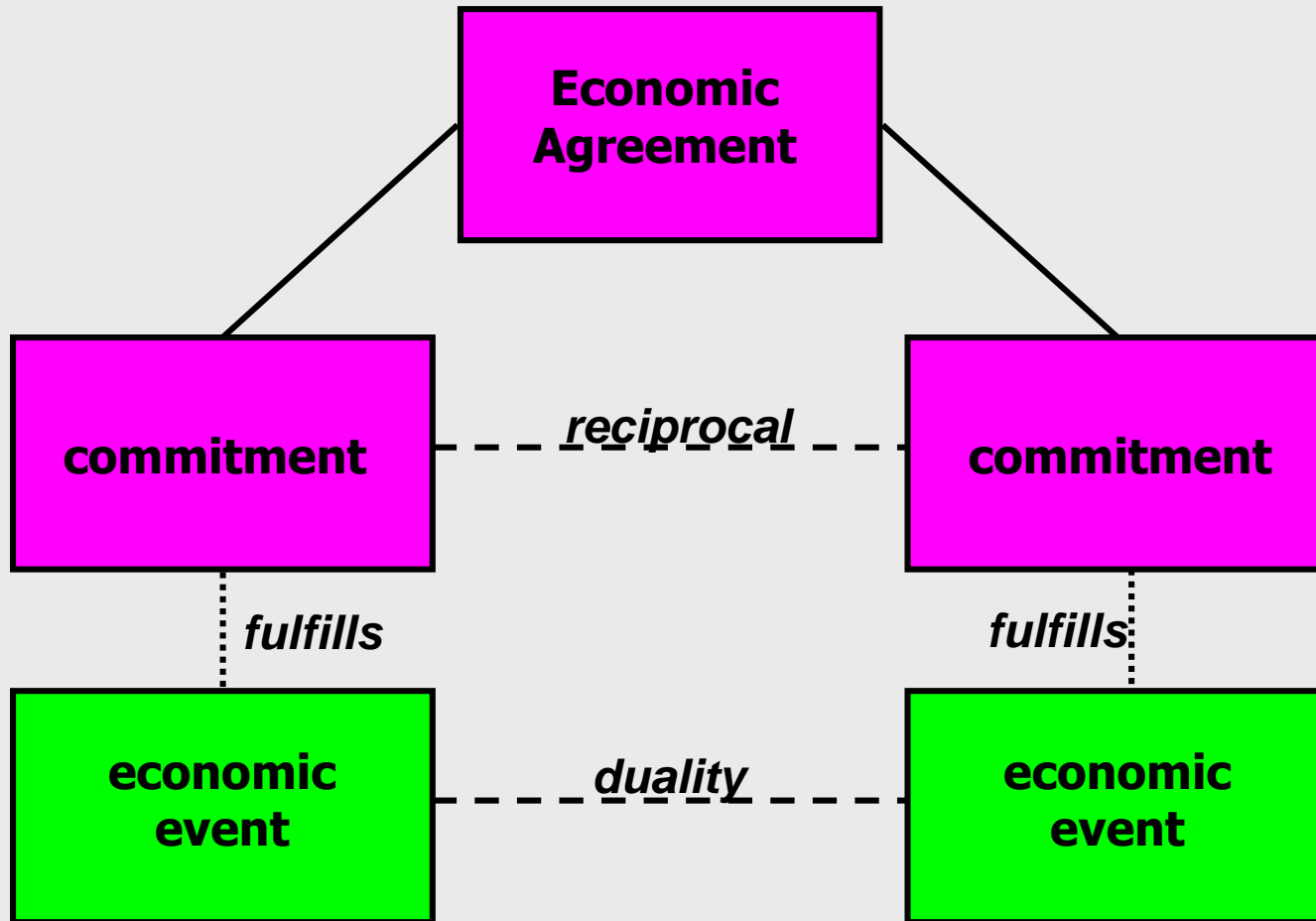
Modeling required transactions

What could be or should be

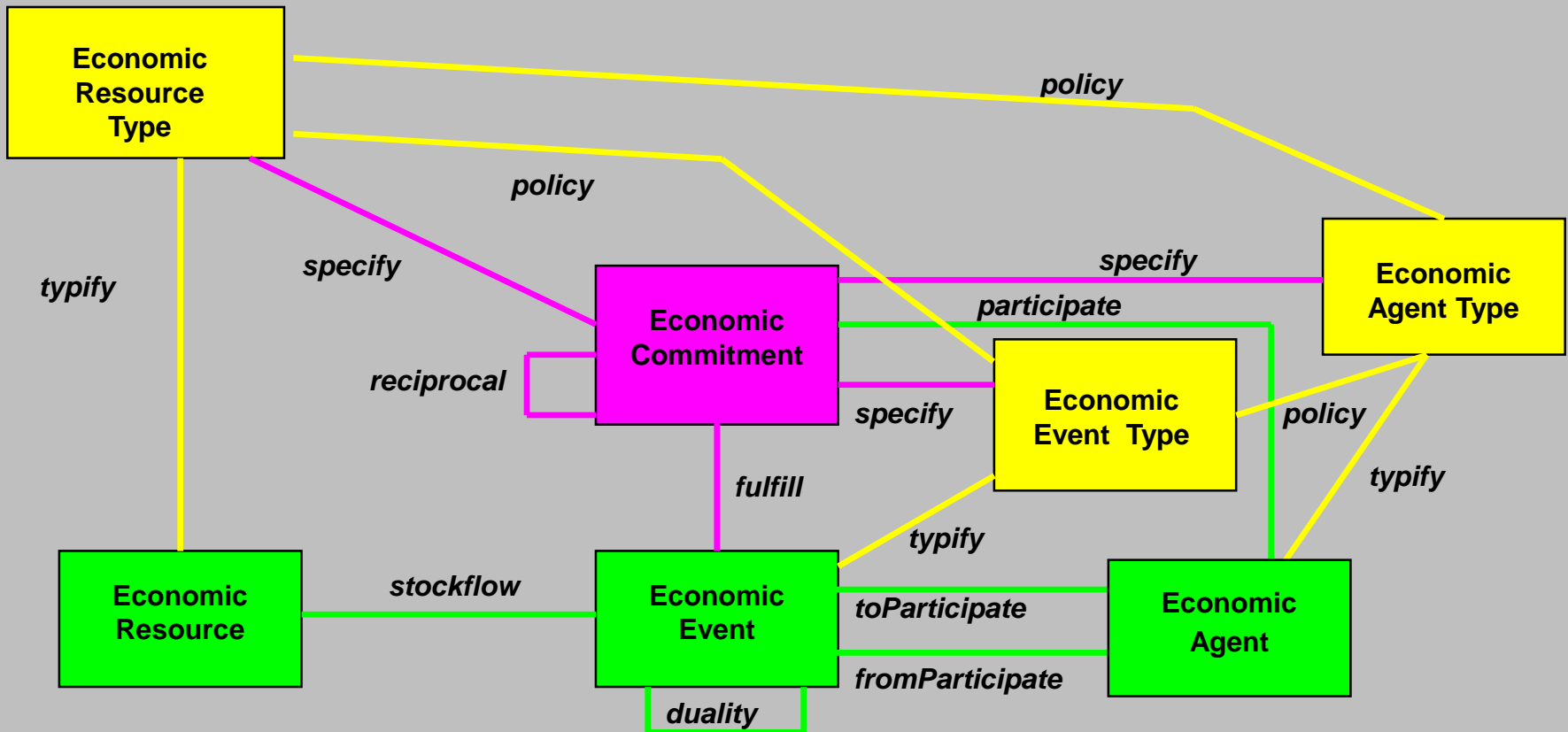


Adding Types

What is planned or scheduled



Adding Commitments



1. **Green** – “What has occurred” – REA, duality, stockflow {inflow, outflow}, participate {from, to} {inside, outside}
2. **Yellow** – What could be or should be – TYPES, typify, policy
3. **Purple** – What is planned or scheduled – COMMITMENTS, specify, fulfill, reciprocal, triggers

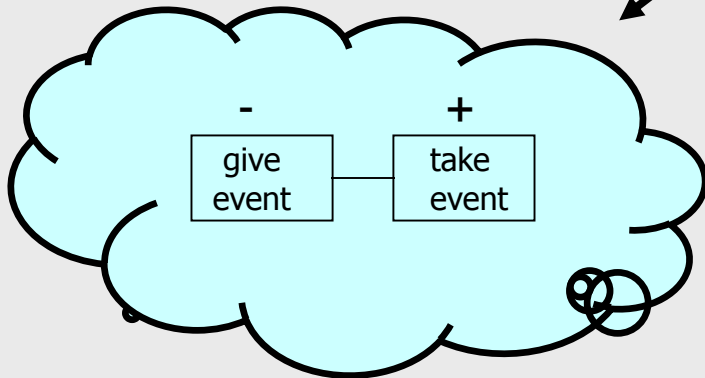
Business Process Network
(entrepreneur script for creating value)



Coase

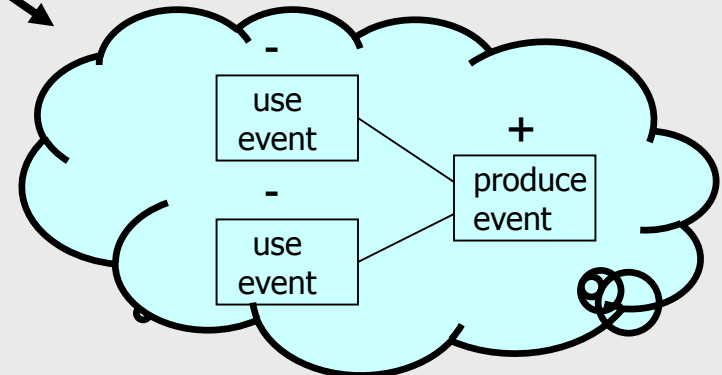


Exchange (buy) Processes

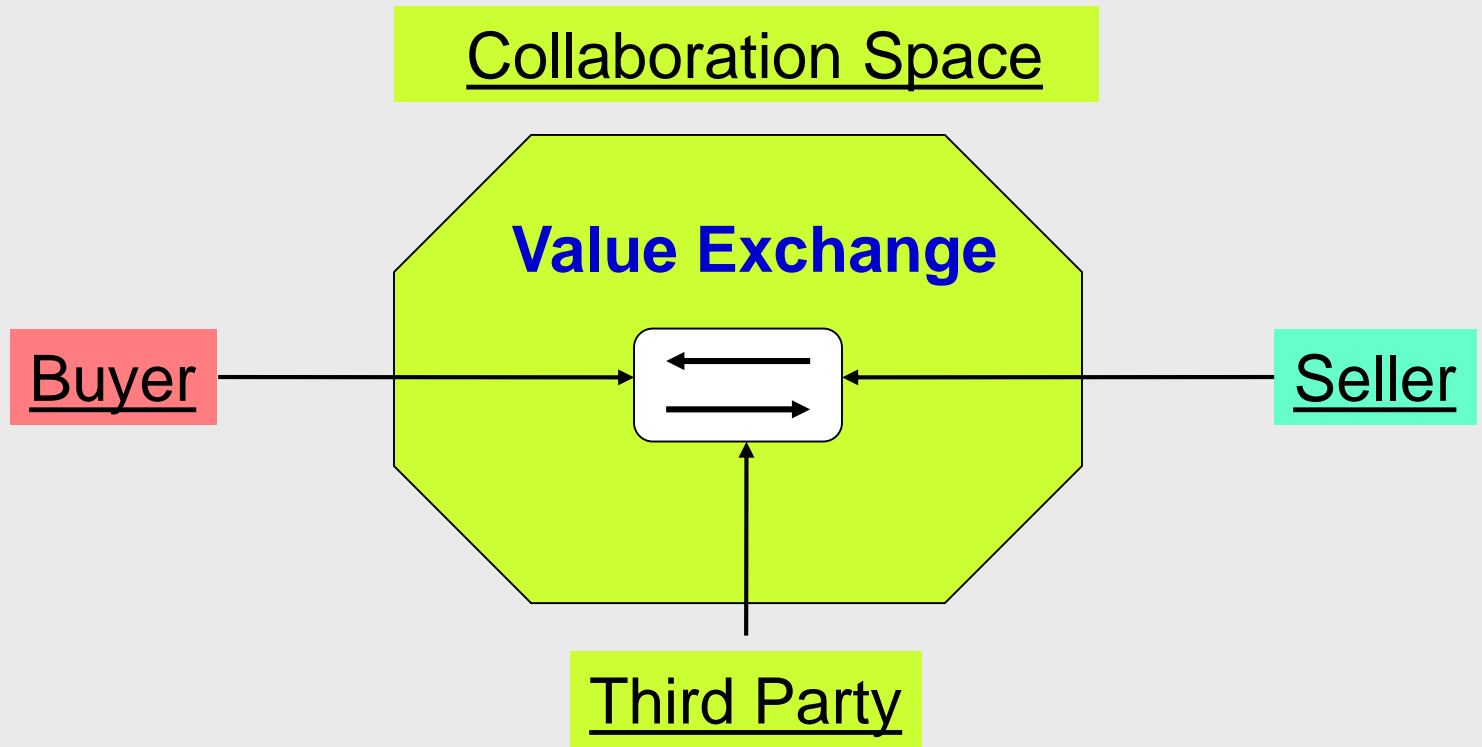


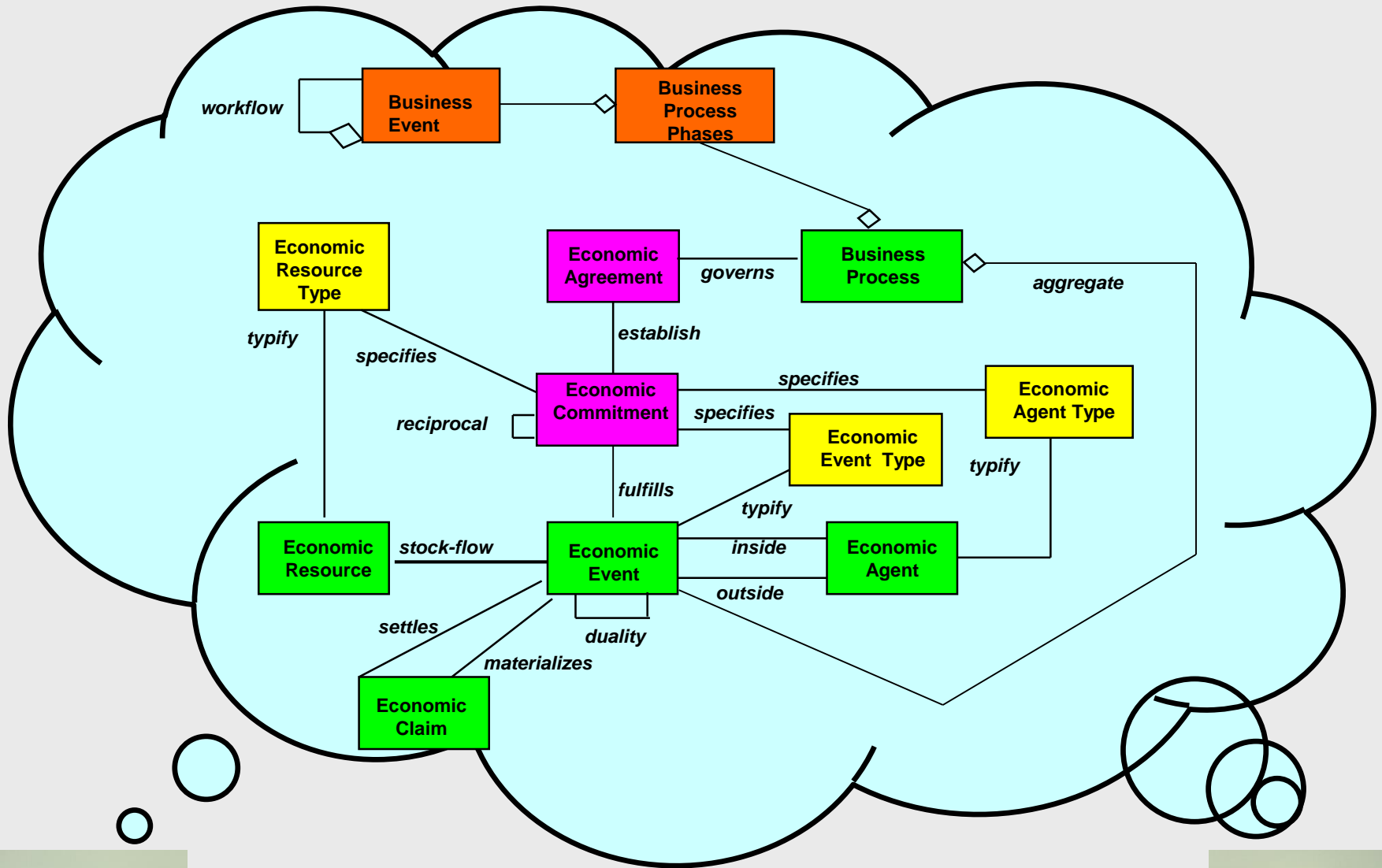
1. *Planning—Identification-Negotiation-Actualization-Post-actualization* phases
2. inside/outside participate
3. 1-to-1, 1-to-n, n-to1, m-to-n duality

Conversion (make) Processes



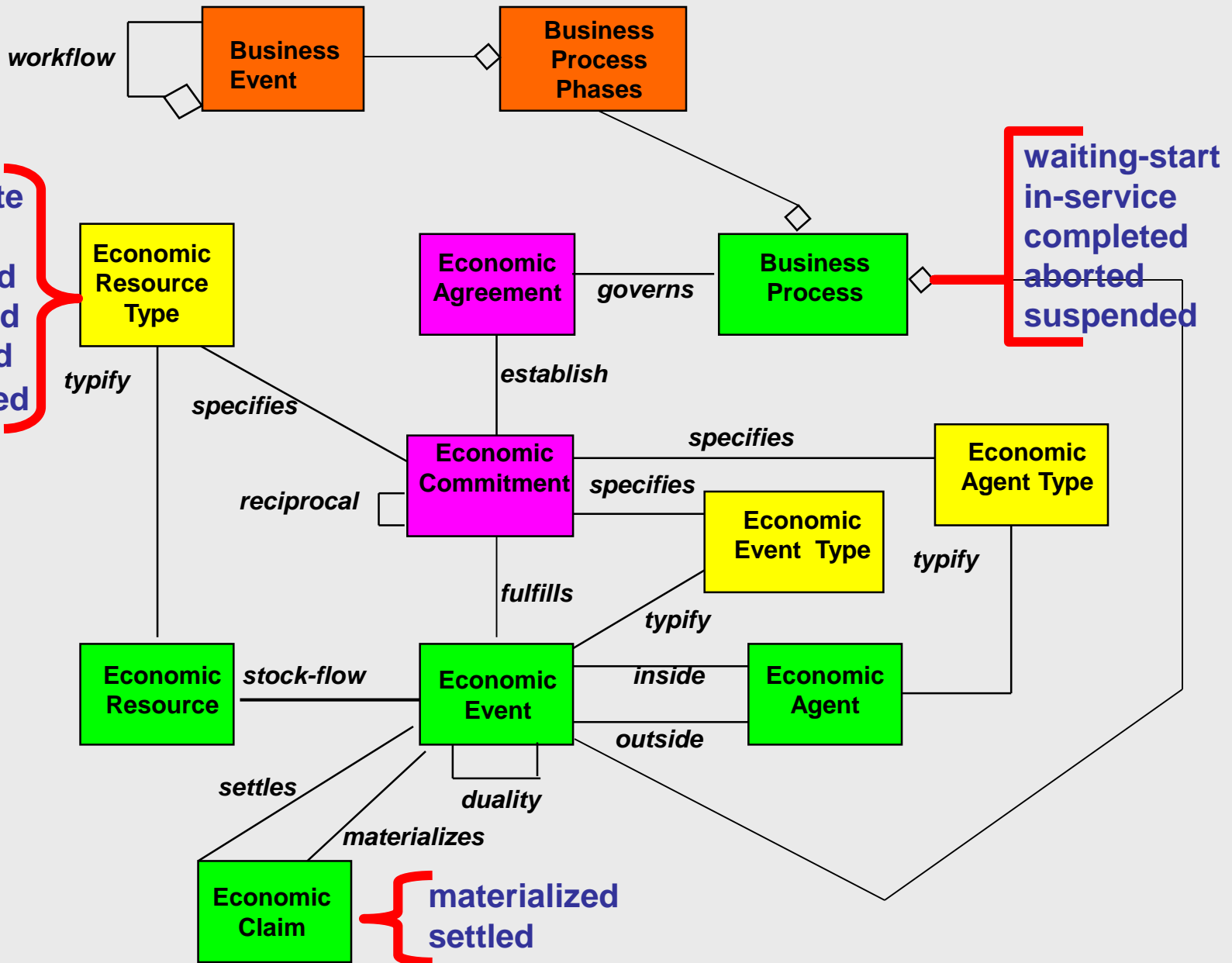
1. *Planning—Negotiation-Actualization-Post-actualization* phases
2. inside only participate
3. n-to-1 dualities (meronymy)



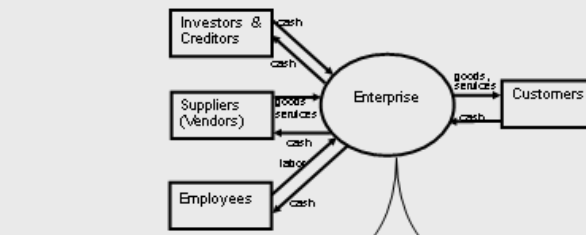


Buyer & Seller --> collaboration space

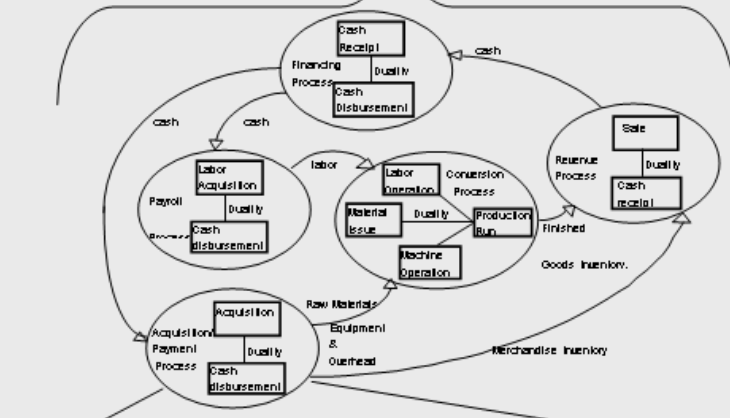




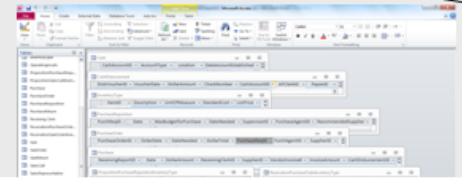
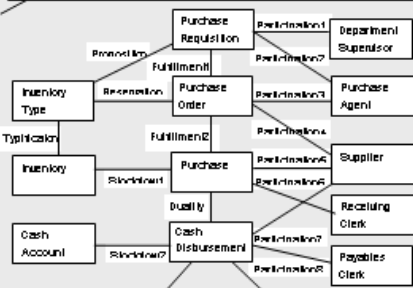
ISO 15944-4 -- Business Objects with States
(ebXML source)



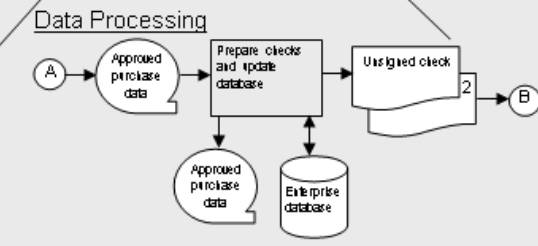
Value System Level
 External connections between enterprise and its business partners as indicated by resource flows



Value Chain Level
 Internal resource flows within an enterprise, between its various business processes. Notice NO external business partners are included on this level. The value chain level describes what occurs inside the bubble labeled Enterprise at the value system level.

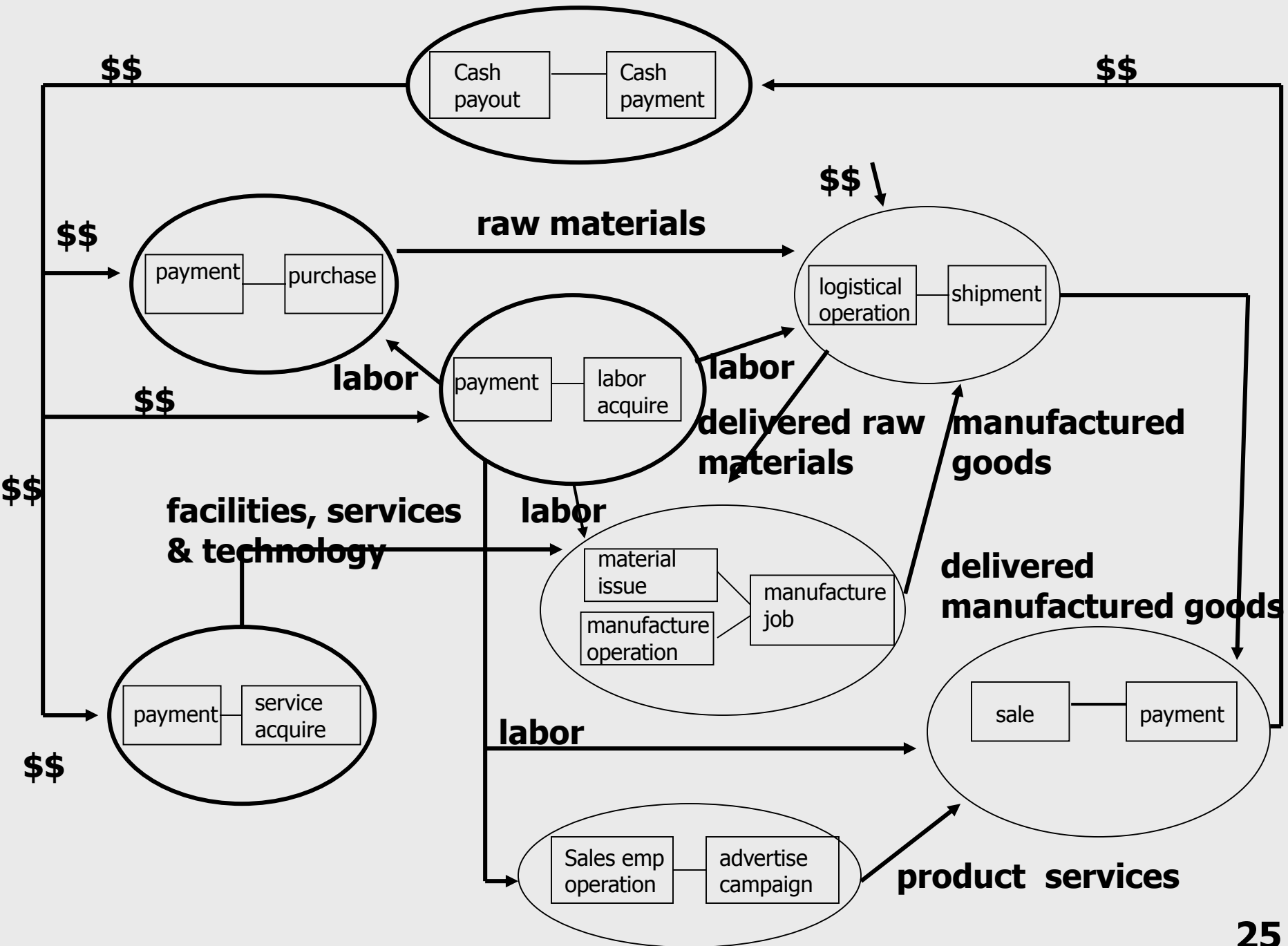


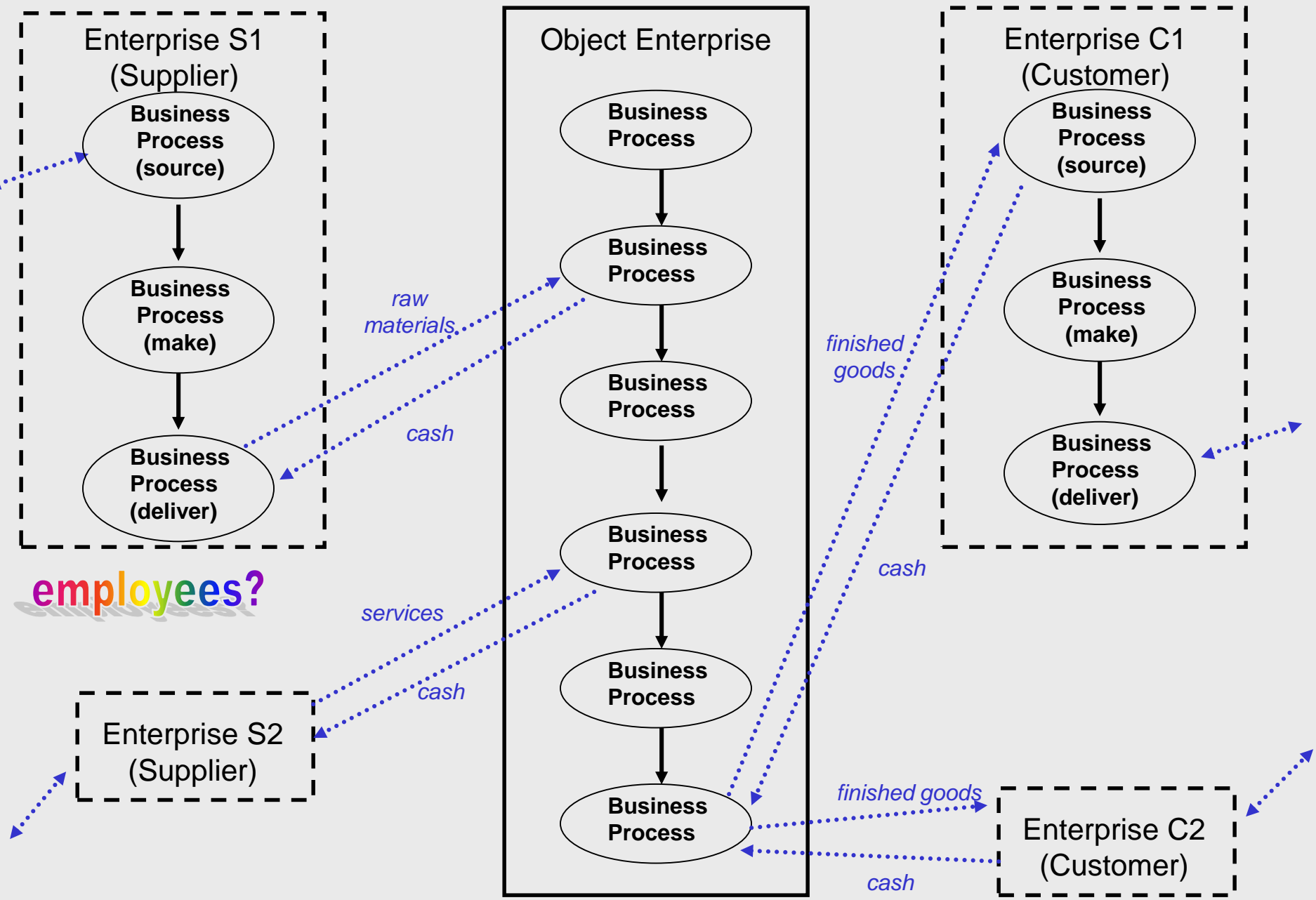
Business Process Level
 Each transaction cycle from the value system level is decomposed into the resources, economic events (both increment and decrement events), agents, as well as other entities. Relationships between entities include duality, stockflow, participation, and many others. Business process level models from each of the transaction cycles are integrated into one overall conceptual model for the company, merged on common entities and relationships. Once merged, the conceptual model is converted into relational database tables or some other type of physical



Task Level
 Each event from the Business Process Level is decomposed into the workflow by which the event is accomplished, including the inputs, processes, and outputs as well as identifying areas of responsibility. Task Level models may be represented in many different formats including document flowcharts, process maps, data flow diagrams, and others. The flowchart shown at left is only a small piece of a flowchart to represent purchase and payment

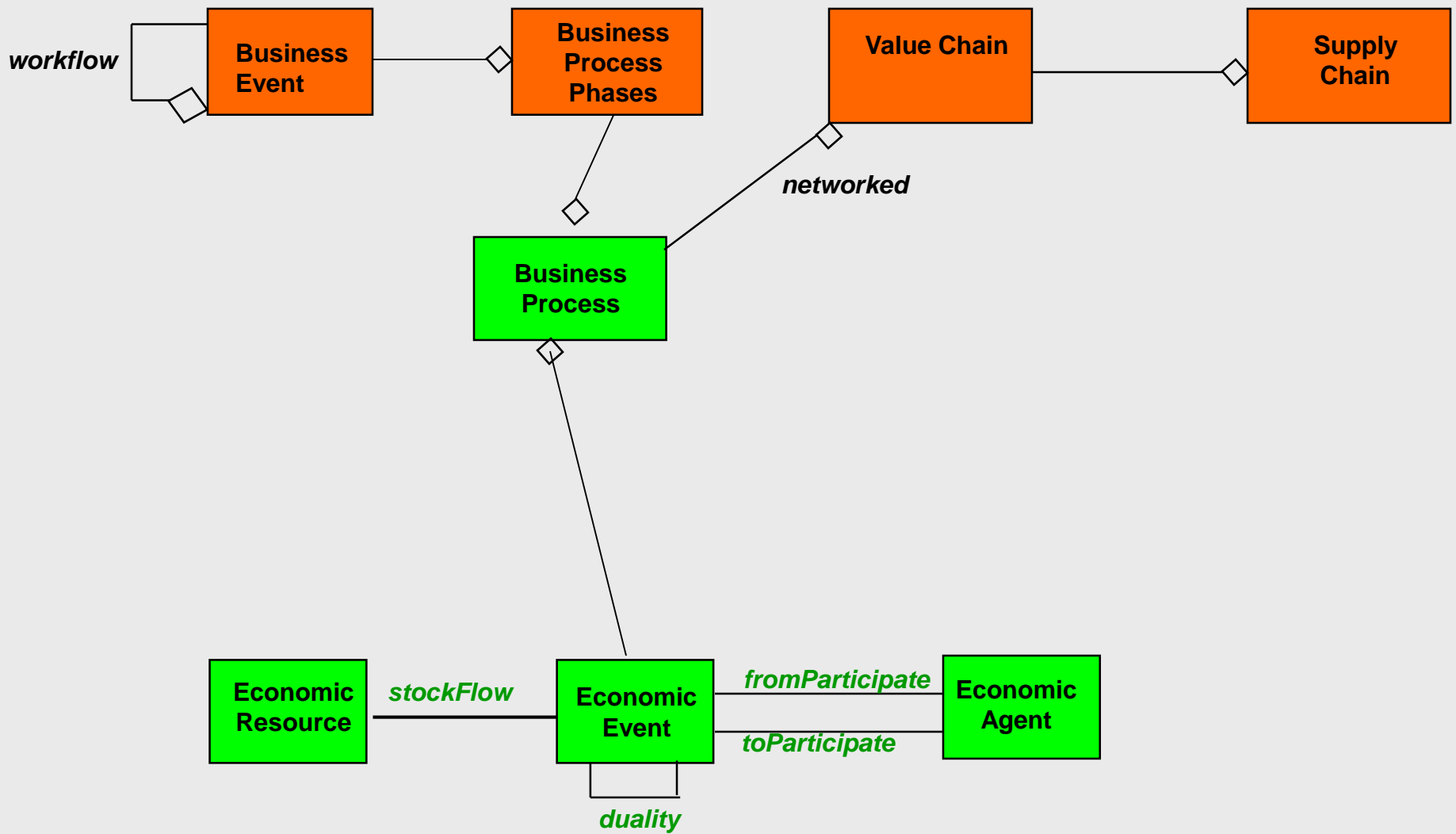
Granularity Hierarchy for REA Business Process Models (figure done by Cheryl Dunn)





- 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.

SOURCE: ISO FDIS 15944-1 – *Operational Aspects of Open-edi for implementation*



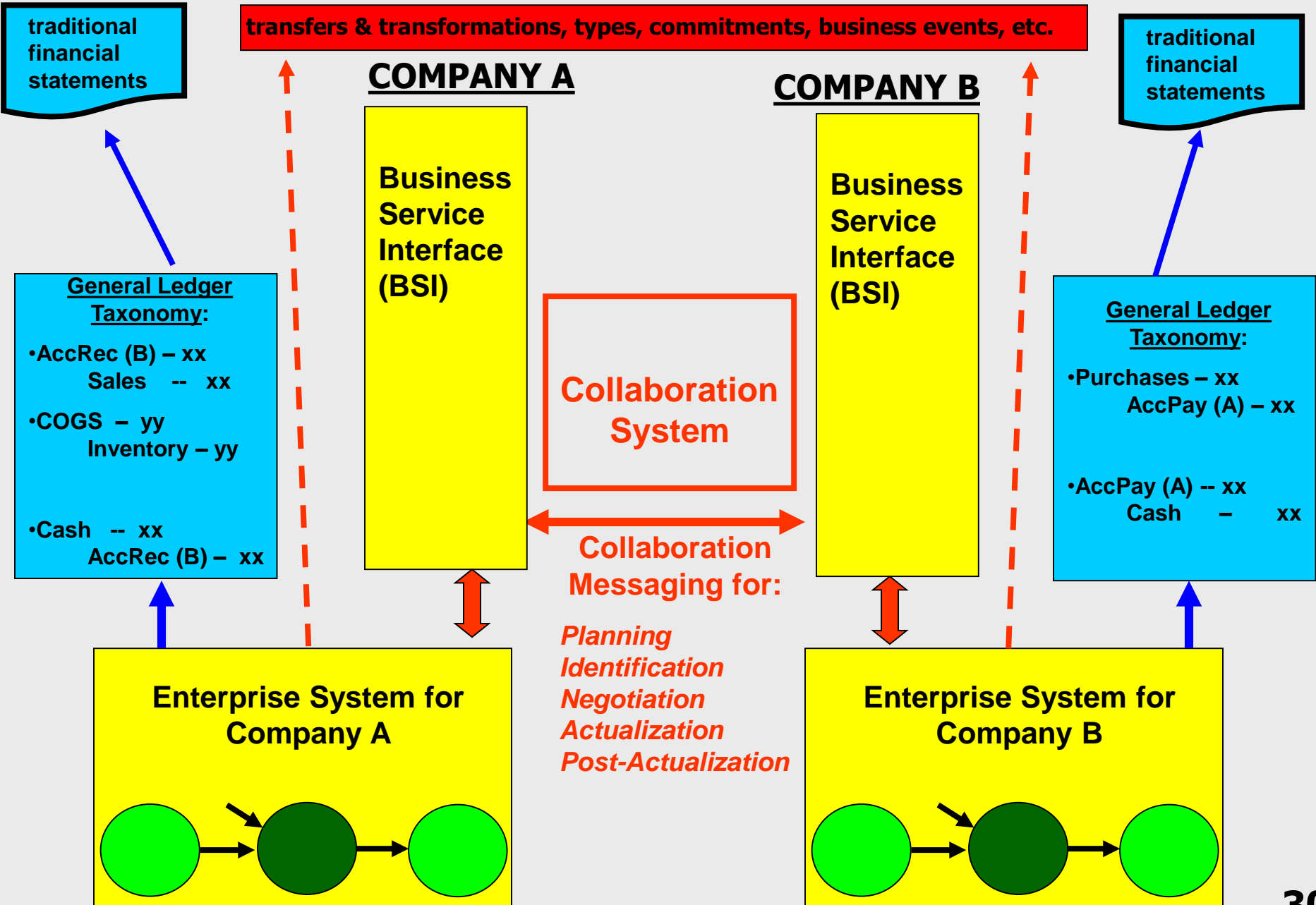
REA Class Model of Different Granularity Levels

REA Overview

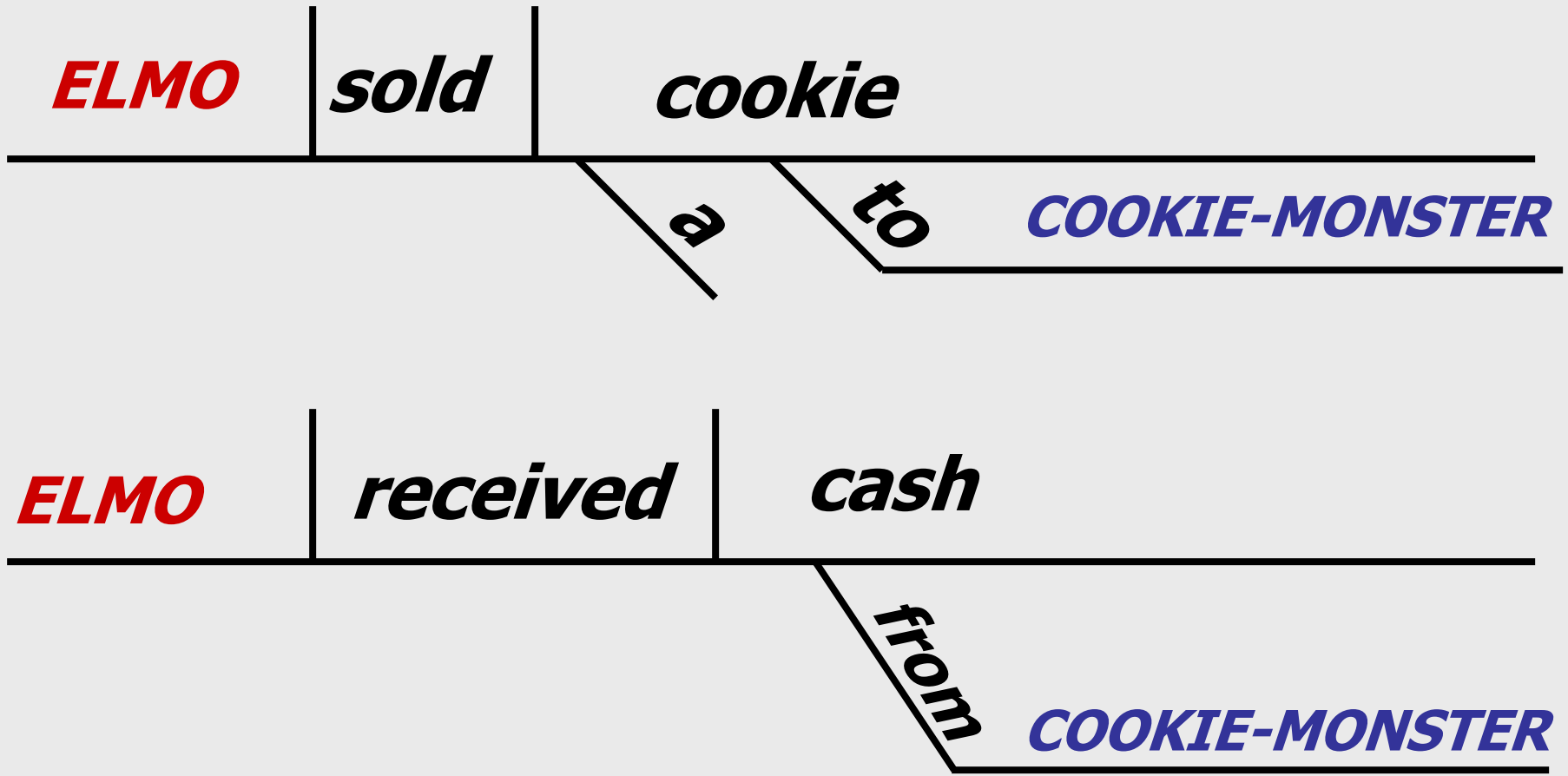
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← XBRL → ← transaction-level processes (ISO 15944-4) → → ← XBRL →



Trading Partner View



Independent View

