



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ

Ψηφιακή Οικονομία

Διάλεξη 5η: Service Value Networks

Μαρίνα Μπιτσάκη

Τμήμα Επιστήμης Υπολογιστών



Course Outline



The course will cover the following topics:

- **Part I: Service Science**
 - Introduction
 - Basics of Network Economics
 - Supply Chains
 - **Service Value Networks**
 - Tools
 - Vensim



How to Define Networks?

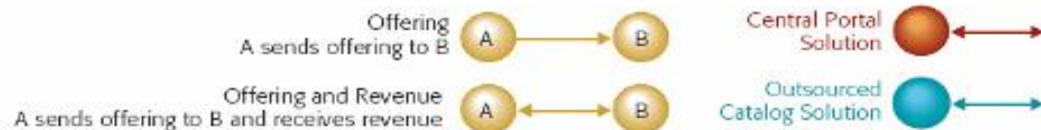
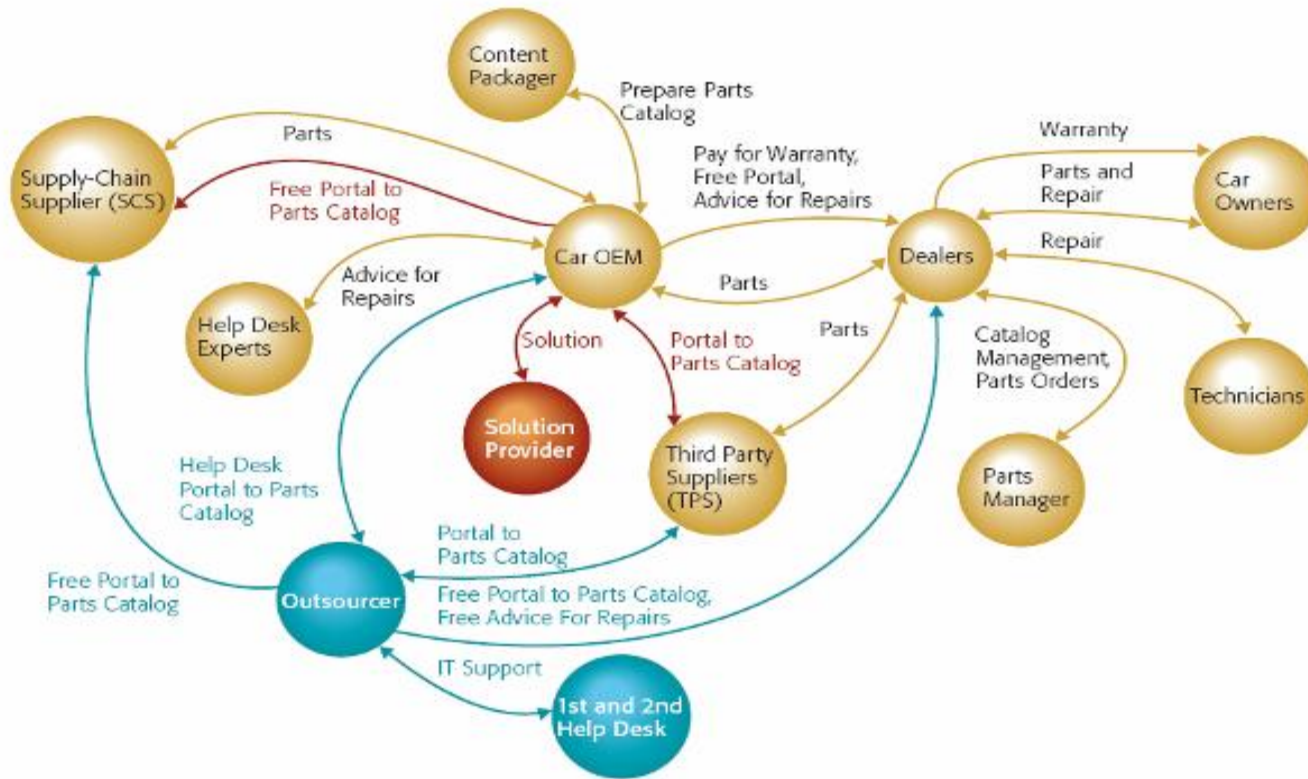


- Sets of multiple autonomous organizations which interact directly or indirectly, based on one or more alliance agreements
- Goal: gain a competitive advantage for the individual organizations involved or the network as a whole

Source: Ard-Pieter de Man, "The Network Economy : Strategy, Structure and Management, 2004"



An Example: Repair Service Network





Research on Service Value Networks (SVNs)



- Seminal work by Verna Allee: **ValueNet Works**TM analysis, using the intuitive **HoloMapping**TM method, which is a methodology for analyzing the dynamics of value in value networks at the operational, tactical, and strategic level.
- The e3Value methodology and tools (Gordijn et al.) provide formal models, visualization, value estimation for value networks
- Network formation by (economic) agents has been studied in the literature, (Jackson, Bloch, Currarini, Morelli). The objective there is to form both effective and stable networks, which in general is difficult to achieve.
- Social networks work and their correlations with economic networks (Wakolbinger, Nagurney).
- Value Net research from a business administration perspective (Iansiti, Parolini).
- Research work on services at IBM Almaden Research (Spohrer, Maglio)



A Proposal to define the “Value” of a Value Network



- Use flow graph methods to represent SVNs
 - Nodes
 - economic entities b_j (firms, service centers, individuals, ...)
 - Arcs
 - predicates t_{ij} over pairs of economic entities
 - Transfer entities
 - offerings o_k (services, goods, information)
 - funds



A Proposal to define the “Value” of a Value Net



- Properties of Economic Entities
 - Input offerings - Output offerings
 - Demand - Supply
 - Price - Quantity
 - Revenues
 - Costs



A Proposal to define the “Value” of a Value Net



- Properties of Customers
 - **Satisfaction Index (Sat_{ij})**: a rational preference relation that measures the degree of satisfaction of a customer to his own supplier and depends on
 - Prices
 - Service/product delivery time
 - Brand names
 - Product quality
 - **Utility function (u_i)**: maximum willingness-to-pay in order to obtain the good or service
 - Assumption: customers’ satisfaction indices are taken to be known



A Proposal to define the “Value” of a Value Net



- Computing **Value** in SVNs

- Value for b_i is accrued by the generation of revenues and by its relationships with other entities:

- At the end of time interval $[T_{N-1}, T_N]$, b_i has

- Revenues $R_i(T_N)$

- Payments $P_i(T_N)$

- (if b_i is not an end customer) Relationship value $v_i(T_N)$ of all “downstream” relationships

- Total value for b_i

$$V_i(T_N) = \begin{cases} R_i(T_N) - P_i(T_N) + v_i(T_N), & \text{if } b_i \text{ is not an end customer} \\ u_i(\text{Sat}_i(T_N), p_i(T_N)) - P_i(T_N), & b_i \text{ is an end customer} \end{cases}$$



A Proposal to define the “Value” of a Value Net



- Calculation of the Relationship Value
 - Relationship value of b_i generated by b_j

$$v_{ij}(T_N) = \bar{R}_{ij}(T_N) - \bar{P}_{ij}(T_N) + \frac{\overline{Sat}_{ij}(T_N) - \overline{Sat}_{ij}(T_{N-1})}{\overline{Sat}_{ij}(T_{N-1})} (\bar{R}_{ij}(T_N) - \bar{P}_{ij}(T_N))$$

$$v_{ij}(T_N) = [\bar{R}_{ij}(T_N) - \bar{P}_{ij}(T_N)] \frac{\overline{Sat}_{ij}(T_N)}{\overline{Sat}_{ij}(T_{N-1})}$$

where $\bar{R}_{ij}(T_N)$, $\bar{P}_{ij}(T_N)$, $\overline{Sat}_{ij}(T_N)$ are the expected values of period $[T_N, T_{N+1}]$



A Proposal to define the “Value” of a Value Net



- Relationship value of b_i generated by all customers he has in the network

$$v_i(T_N) = \sum_{t_{ij} \in T} v_{ij}(T_N)$$



A Proposal to define the “Value” of a Value Net



$$V(t) = \sum \text{of all the revenue flows} - \sum \text{of all the cost flows} \\ + \sum \text{of the value of all relationships}$$

- **Relationship Value:** expected service sales of the provider over the next time period to a particular consumer
- **Expected service sales:** look into the recent past, modulate by customer satisfaction index
- ... similarly for the value of a partner participation to an SVN – for customers, value is **utility** of service provided



Why is the above useful?



- Because value computations can be linked to KPIs - examples:
 - Line of business (LOB) sales to relationship values
 - Market share to charting the business ecosystem, predicting formation of new relationships (based on anticipated value), new products that fill the quality-product space, and related market research about customer requirements and their clustering in the Q-P space
- Because “business pains” can be translated to:
 - Either redesign of business processes (solution engineering),
 - and/or to redesign of the Value Net (Value Net Analysis and Engineering)
- Because value net computations can be used for value net comparisons:
 - How are my competing value nets doing (do they have higher value)?
 - What if I (a value net partner) added/removed/modified links?
 - What if I participated in another value net?
 - Are there opportunities for forming new value nets around new value propositions?



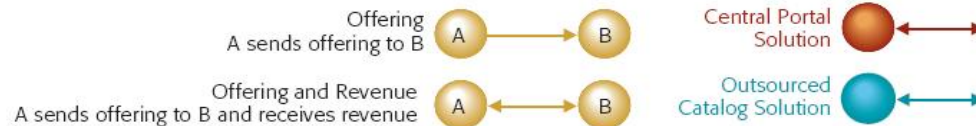
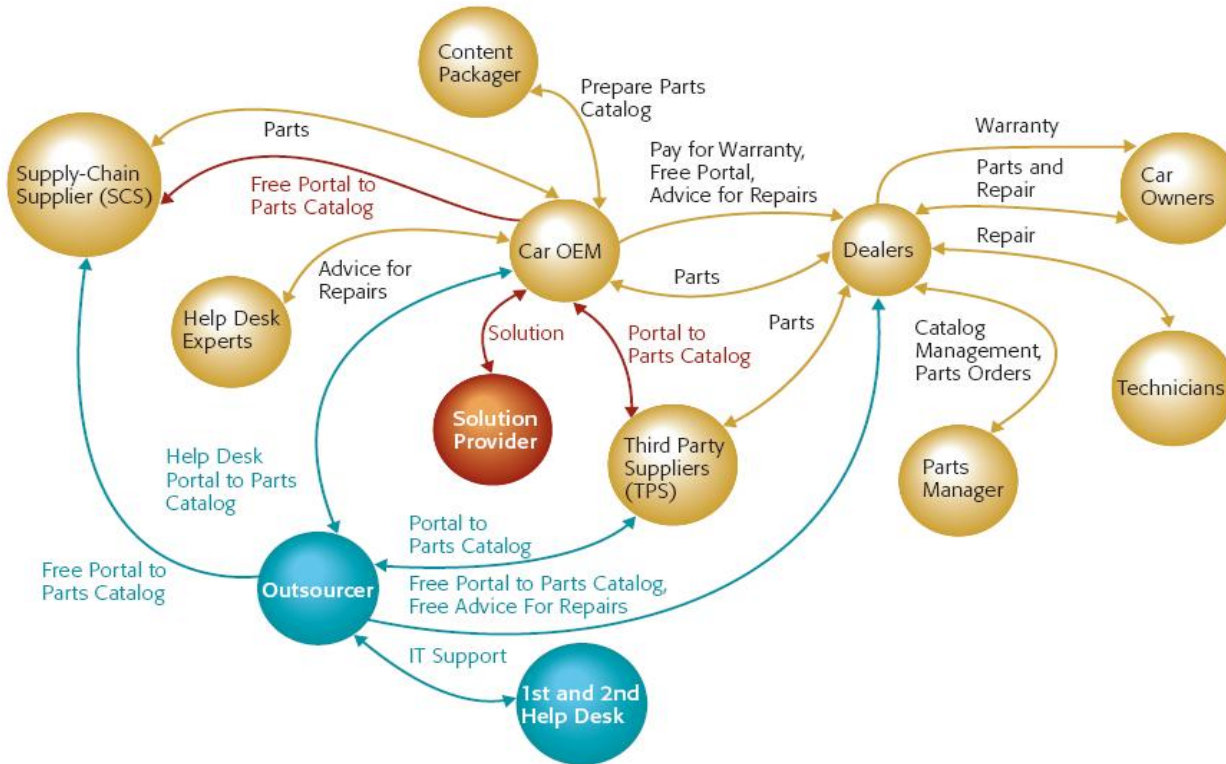
Example: The Repair Service System (Model 1)



- Nodes of the network
 - Original-Equipment-Manufacturer (OEM)
 - Content Packager
 - Help Desk Experts
 - Dealers
 - Technicians
 - Parts Manager
 - Supply-Chain-Suppliers (SCS)
 - Third-Party Suppliers (TPS)
 - Customers



The Repair Service System





The Repair Service System (Model 2)



- Transformation of the traditional value network by introducing a solution provider
 - Develop a central portal (operated by the OEM) to have access to up-to-date parts information at any time (electronic catalog)
- Value adjustments
 - Mailing costs reduced
 - Number of help desk experts reduced
 - Charge TPSs for access to the electronic catalog
 - OEM's value increases
 - Repair time reduced
 - increased satisfaction, decreased revenues: dealers' value increases or decreases



The Repair Service System (Model 3)



- Transformation of the second model by replacing the solution provider with an outsourcer
 - Provide the electronic catalog system and its maintenance as a service



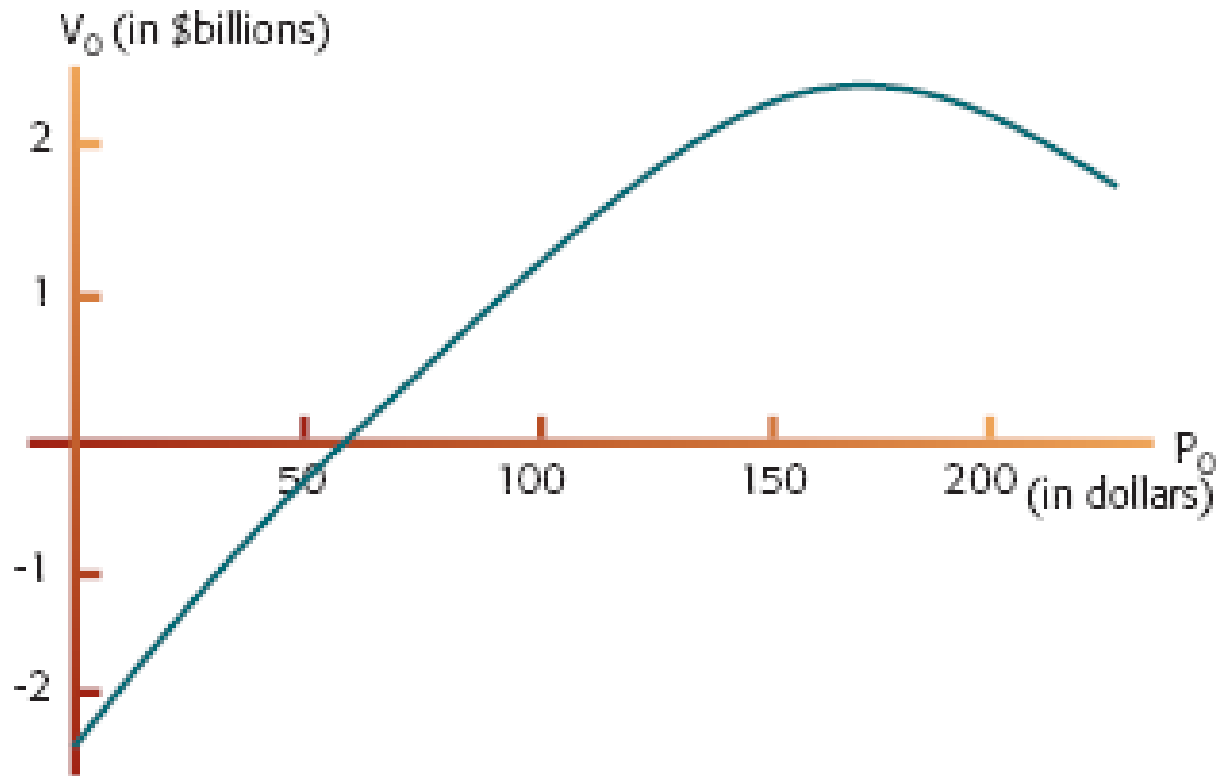
The Repair Service System: Calculation Results



Values	Model 1	Model 2	Model 3
OEM	\$2.02122	\$2.07726	\$2.0797
Dealer	\$0.46224	\$0.40224	\$0.40224
TPS	\$0.6528	\$0.6468	\$0.6468
Total Value	\$18.8447	\$18.5931	\$18.5915

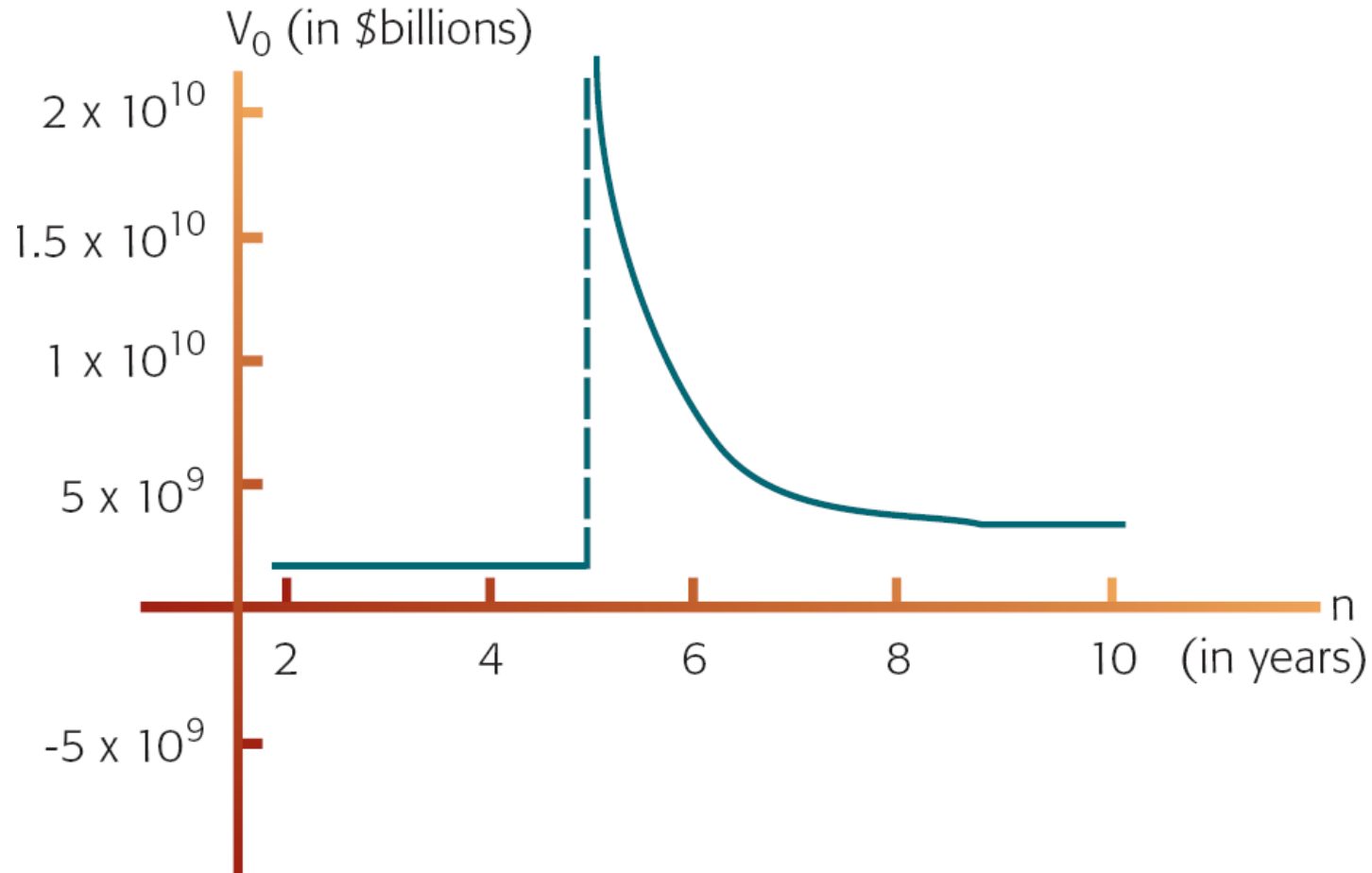


The Repair Service System: Calculation Results





The Repair Service System: Calculation Results





The Dynamics of Emergent Service Value Networks



- Capturing the dynamics of the SVNs (emerging markets and business models, networks, consumers, regulators, etc.) is to a large extent an open problem today.
- Special interest in **analyzing** and **predicting** how existing market interactions can give rise to emergent SVNs, with possibly business sector specific patterns:
 - develop **models** of value creation and destruction in networks and of value optimization.
 - Use game theory to understand behavior, evolution of competing SVNs
 - show how the drive for **value optimization** and the **constant change of the environment** (new businesses enter the ecosystem and others die, innovative services and products appear, etc.) push the network to waves of restructuring in order to remain competitive.
 - develop **criteria and indicators of change** that can serve as input for business process and alliances redesign and realignment.



Case Study: Information and Communications Services Industry

**Enhanced Telecom Operations Map (eTOM)
(TeleManagement Forum)**



SVN to Set up a New Service





Actors (as described in eTOM)



Call center CSR (Customer Service Representative) A person who is an agent of the telecommunications provider who performs a set of business functions in response to requests communicated over the telephone by clients. The person acting as Call Center CSR can be busy responding to the telephone and performing sales and/or support activities.

Sales Agent A person who is an agent of the telecommunications provider who performs a set of business functions in response to requests from clients in a branch, retail, or distribution environment. The person acting as an Agent can be busy responding to individuals and performing sales and/or support activities.

Service agent A person who is an agent of the telecommunications provider who is responsible for the setup and configuration of a customer's service order along with the dispatching of the field agents to perform service installations.

Field agent A person who is an agent of the telecommunications provider who is responsible for service installations at the customer's site.



Actors (as described in eTOM)



Account manager

An agent of the institution who manages customer accounts, who has management rights over the customer accounts to create and update them.

Subscriber

A person who is acting on his or her own behalf to perform a set of authorized business functions through an intermediary device (Phone-data, Internet).

The subscriber uses guided interactions to perform specific tasks. If support is required, the subscriber may contact the call center.



Modeling and Analysis



- Steps
 - Identify the relationships between partners
 - Describe the offerings for each relationship
 - Determine KPIs for each partner
 - Compute values for each partner
 - Make decisions ...

Τέλος Ενότητας



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Ευρωπαϊκό Κοινωνικό Ταμείο



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