The Dis-Integration of the Mapping Industry

And Where the Money Will Flow in the Emerging Location-based Services Industry

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ITS World Congress - Chicago

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Dr. Mike Jackson

Dr. Barry J. Glick

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- Moderator's Overview
- Mike Dobson
- Mike Jackson
- Barry Glick

The Dis-Integration of the Mapping Industry
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- Disintegration - Destruction

The building was disintegrated by the explosion

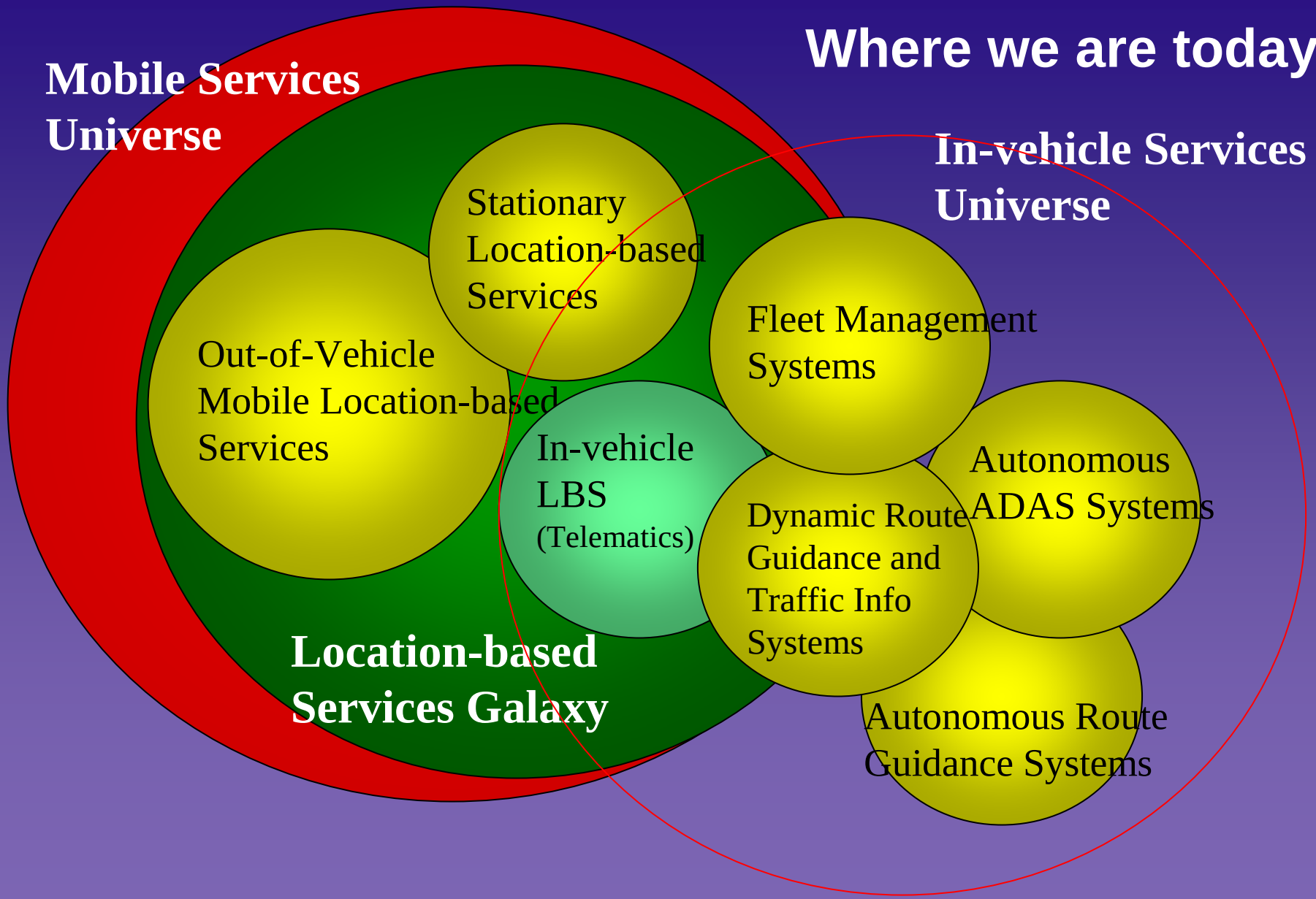
- Dis-Integration - Decoupling/Separation

The alliance dis-integrated into separate states

Summary

- Location-based services is a new and emerging industry, with telematics as an important subset of LBS
- LBS are enabled by wireless telecommunications, satellite and other positioning technologies and mobile devices--but most of all, it is based on developments in the mapping industry that provide the essential content for the services
- The evolution of the mapping industry from vertically integrated to dis-integrated businesses, providing selectable content and device-independent applications and services, is the foundation for delivering LBS
- The LBS industry will follow a similar path of evolution as the mapping industry, from vertically integrated to dis-integrated
- The dis-integration of the LBS industry will offer new investment and business opportunities--look for the interdependencies among the components in the value chain

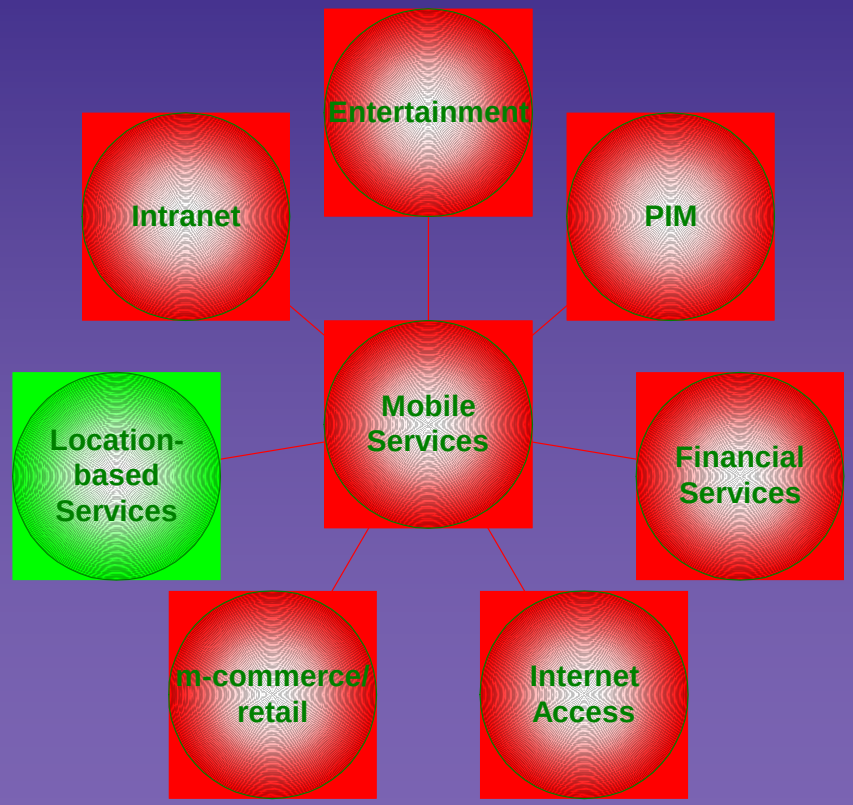
Where we are today



Two Universes: Mobile and In-vehicle Services

Mobile Applications and Location-based Services

- Location-based services are currently estimated to be ranked fifth in popularity amount the constellation of seven primary mobile services (Source: ARC Group: Future Mobile Handsets; 2001 ed.)
- The same report projects that by 2006 LBS will be ranked first, with approximately 24% of mobile users accessing them.



We begin with a few definitions:

Mobile Services *- Any type of service that can be delivered to a wireless device, such as financial services, weather, Internet access, personal information management, m-commerce, entertainment.*

Location-based Services *– A subset of mobile services. Location-based services deliver information and assistance to individuals who use position-enabled devices to communicate their location via a wireless network to service and content providers.*

- *Stationary devices - toll booths, ATMs, info kiosks*
- *Out-of-vehicle mobile devices - wireless handsets, PDAs*
- *In-car devices*

More definitions:

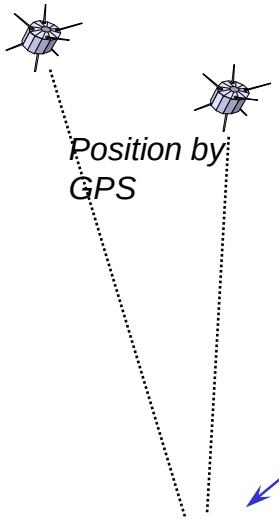
In-vehicle Location-based Services - Telematics

The application of digital information, location sensing and wireless communications in the vehicle environment. Commonly known in the automotive industry as Telematics.

Systems with one-way communications to or from the vehicle involving such technologies as RDS-TMC,cell broadcasting, satellite and paging can also be classified as Telematics.

Not classified as in-car location-based services are the autonomous navigation systems which predominate the market, and the advanced driver assistance systems (ADAS) under development that use on-board data only.

Off-board Navigation
How It Works

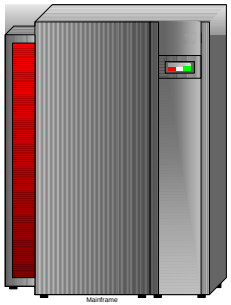


Position by GPS

Latitude and Longitude Sent to CSC, along with Vehicle information

Wireless Communication s

Central Server for Positioning, Route Planning and Route Guidance



A The driver voice activates the route planning function and provides a destination and possibly way points.

Vehicle-independent wireless device mounted in the vehicle, loaded with route planning and navigation software.

C Via wireless communications, server sends package containing route guidance voice instructions, maps and diagrams, which are delivered to the driver

B Server software locates the vehicle with a start point, geocodes destination and way points, and delivers a route guidance package

Telematics - In-vehicle Location Based Services

Purpose

To allow the car and the driver to communicate with other cars, other drivers and the transportation service infrastructure.

Alternatives

• Stopping to find a telephone booth and hooking up a cable from the car with a dial-up modem.

• It is not an alternative to having a mobile phone available in the car.

Prerequisites

• Integration with the vehicle's systems.

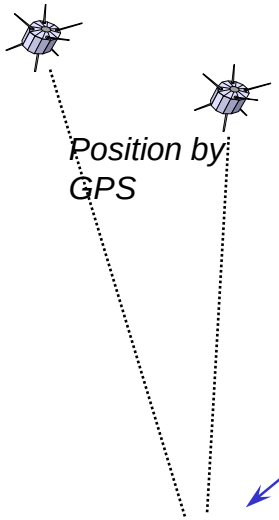
• Connectivity across all possible boundaries.

• A functioning service infrastructure

User's Value Proposition

A trade-off between the chances of having an accident or a mechanical problem, or requiring some form of emergency assistance and the cost of connectivity

Telematics
How It Works



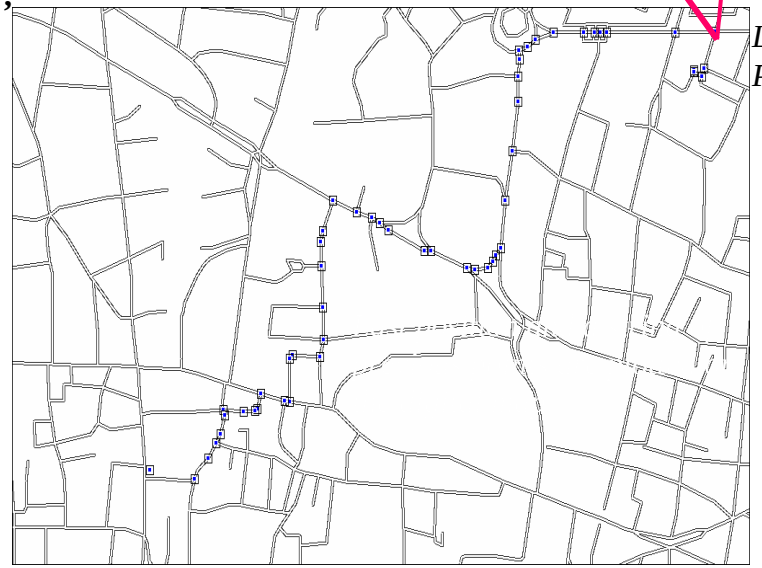
Position by GPS

Latitude and Longitude Sent to CSC, along with Vehicle information

Wireless Communications

B Software locates the vehicle on a digital street map, presents it to the CSC operator, who provides the necessary service

Customer Service Center Mapping and Positioning Application on service delivery platform



Last Position

Street-level Map Database

Integrated Telematics System with GPS and Wireless Communications

A When a button is pushed on the telematics system, or when a crash sensor is activated, a message is prepared that includes the current position of the vehicle along with vehicle information. This is sent via a wireless network to a Customer Service Center

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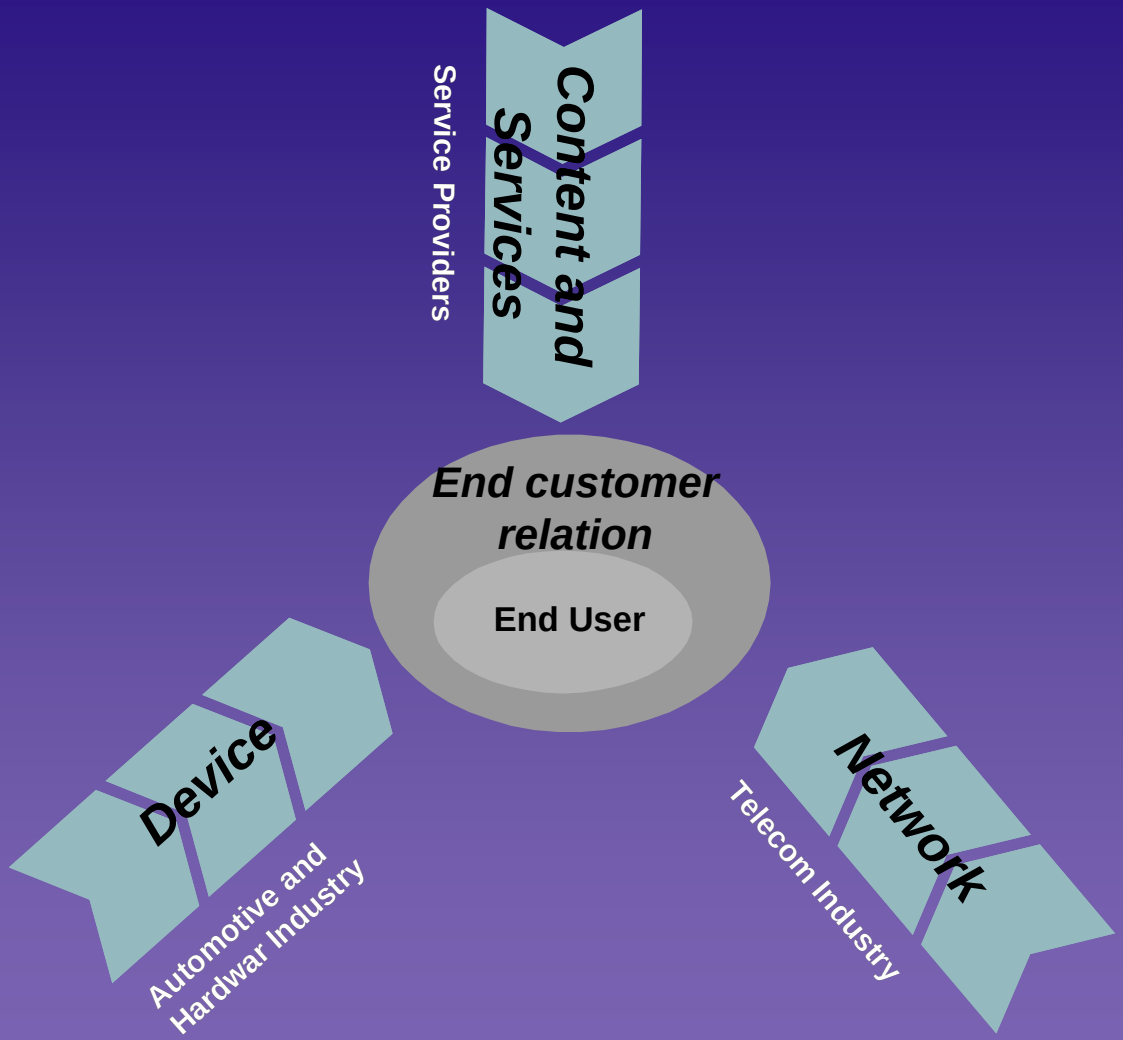
The Location-based Services Value Chain



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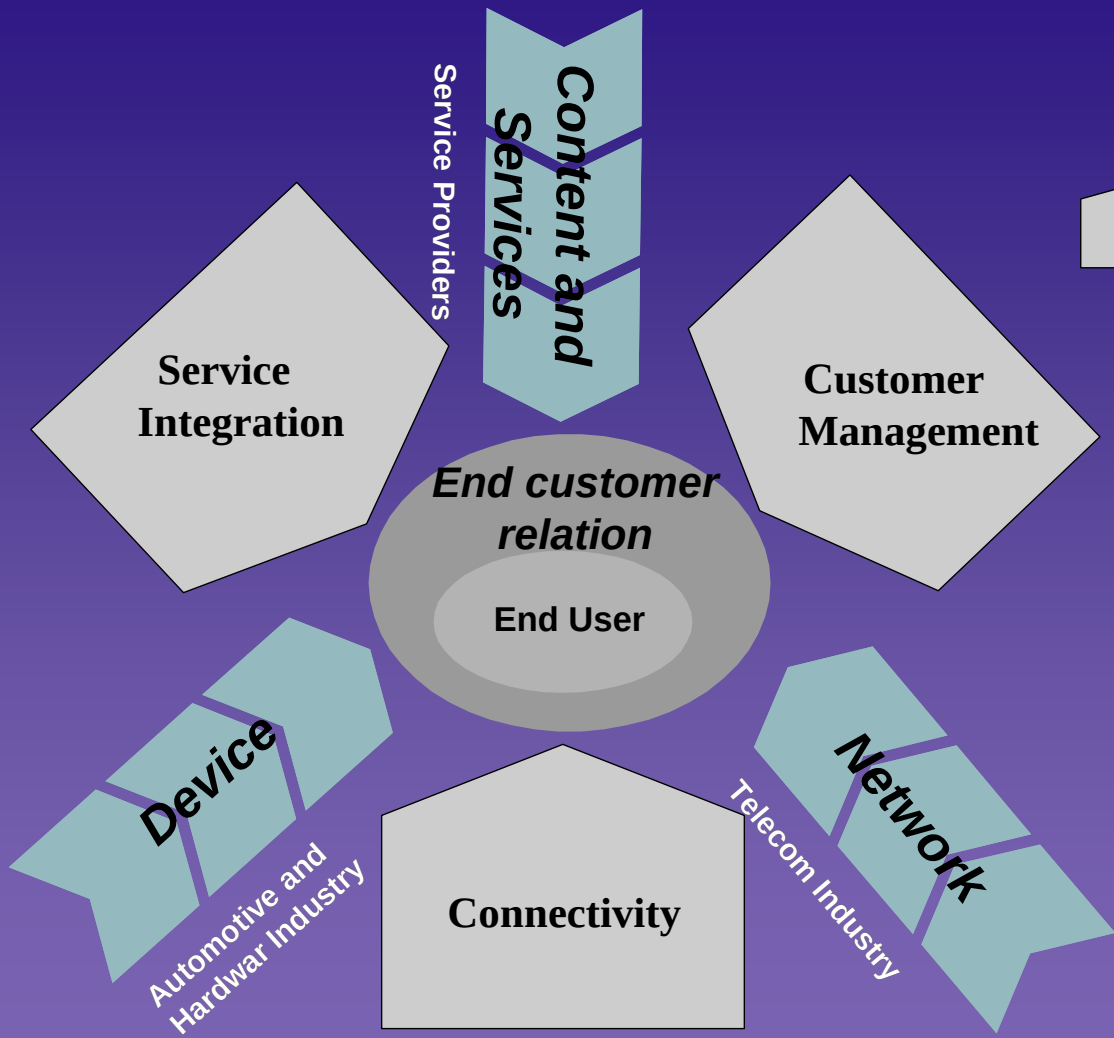

Customer Management
- Billing
- Provisioning
- Customer and Vehicle Database
- Database interfaces

Connectivity
- Data message conversion to and from Vehicle
- Routing of data messages to and from Service Providers

Service Integration
- Data message to and from Service Providers
- IP connection to multiple content and service providers

In-vehicle Location-based Services - Key Developments

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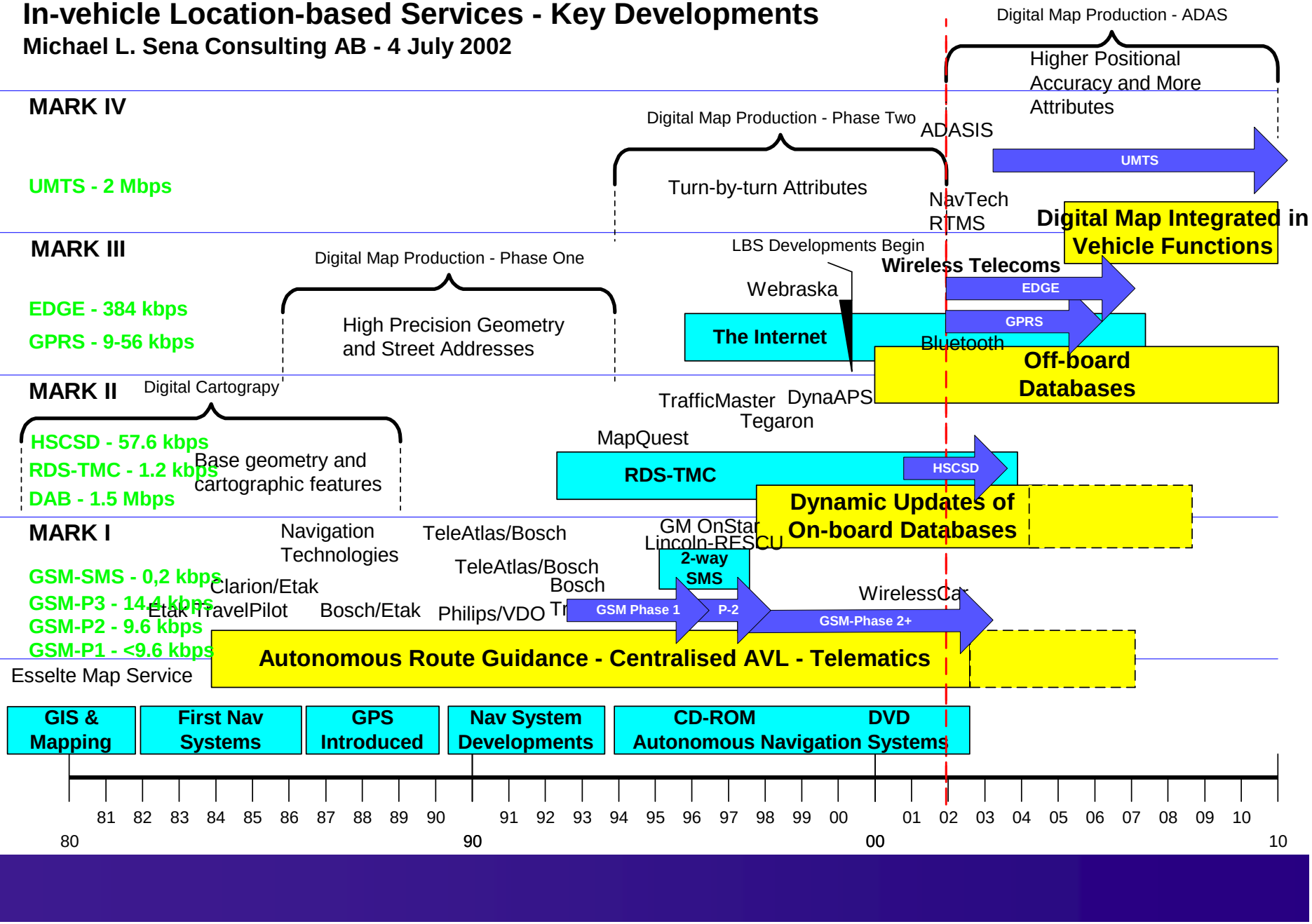
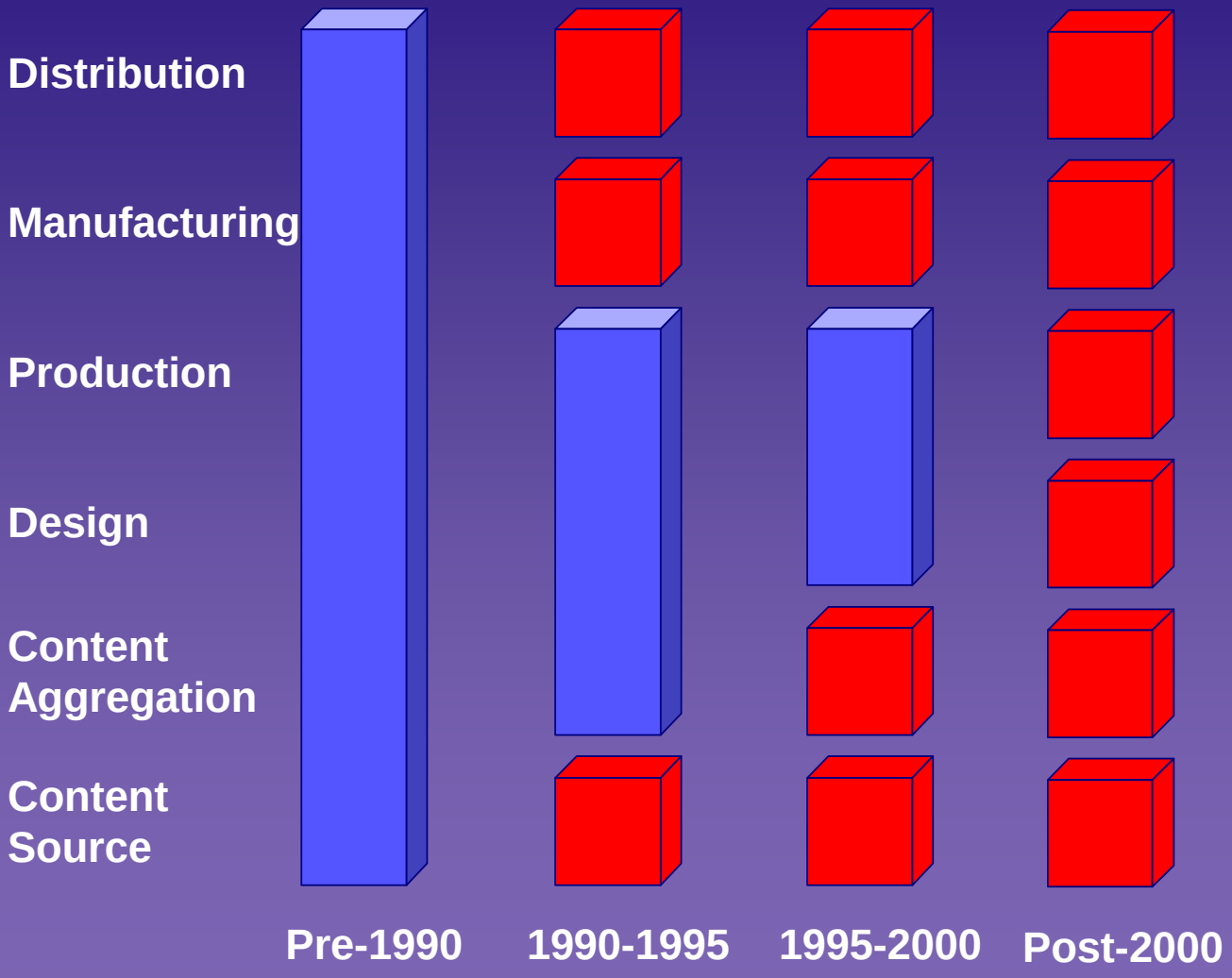


The Evolution of the Mapping Industry



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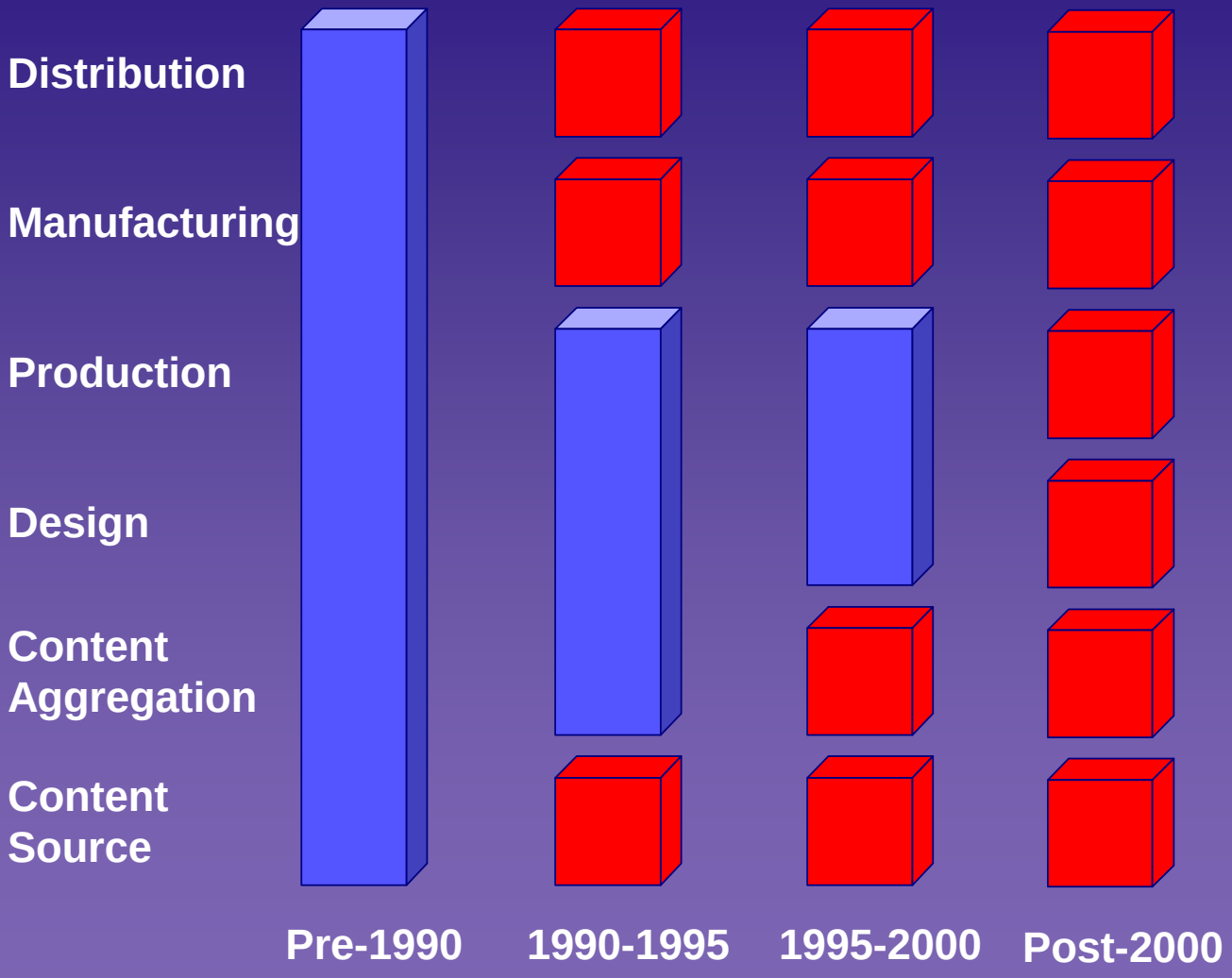

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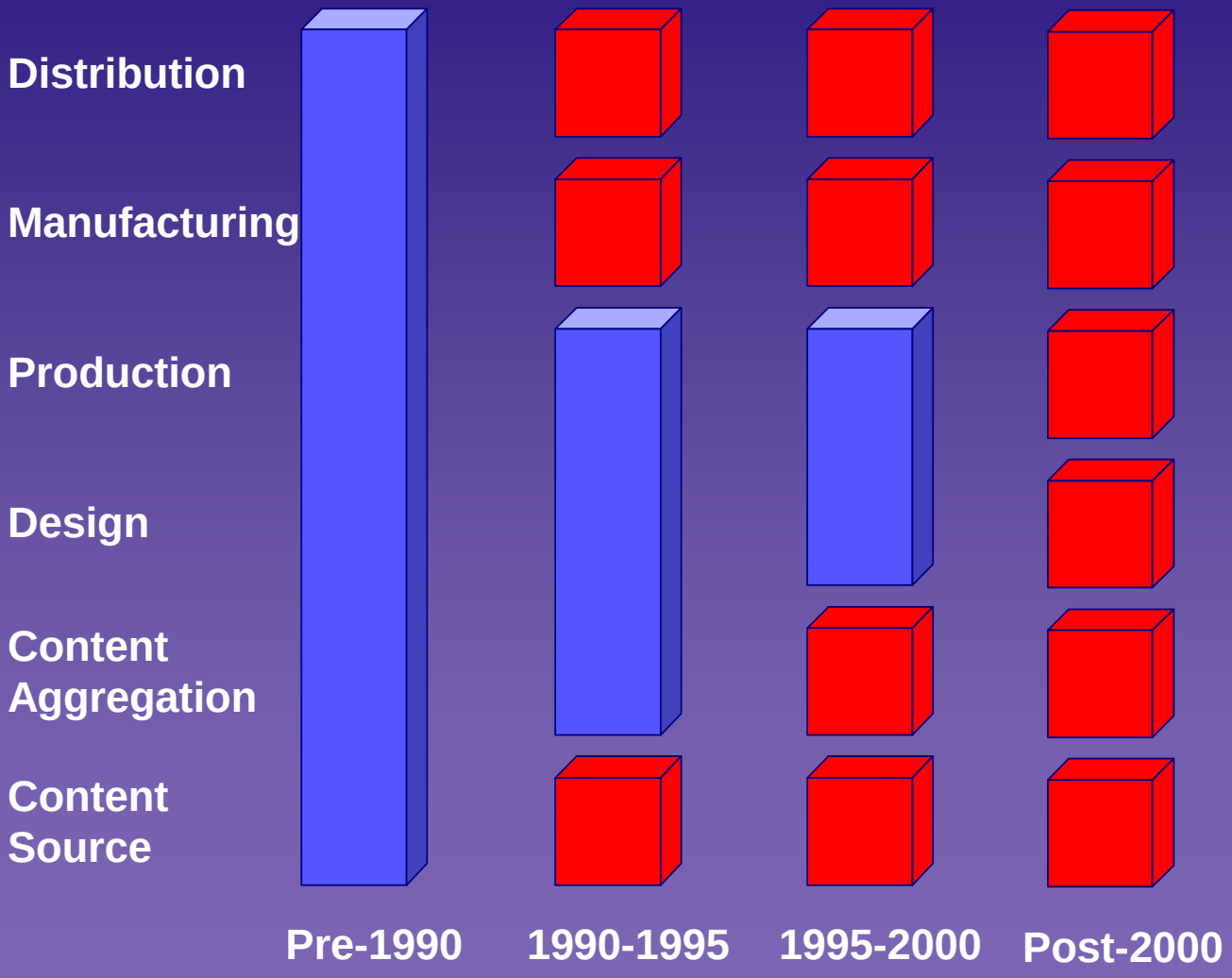

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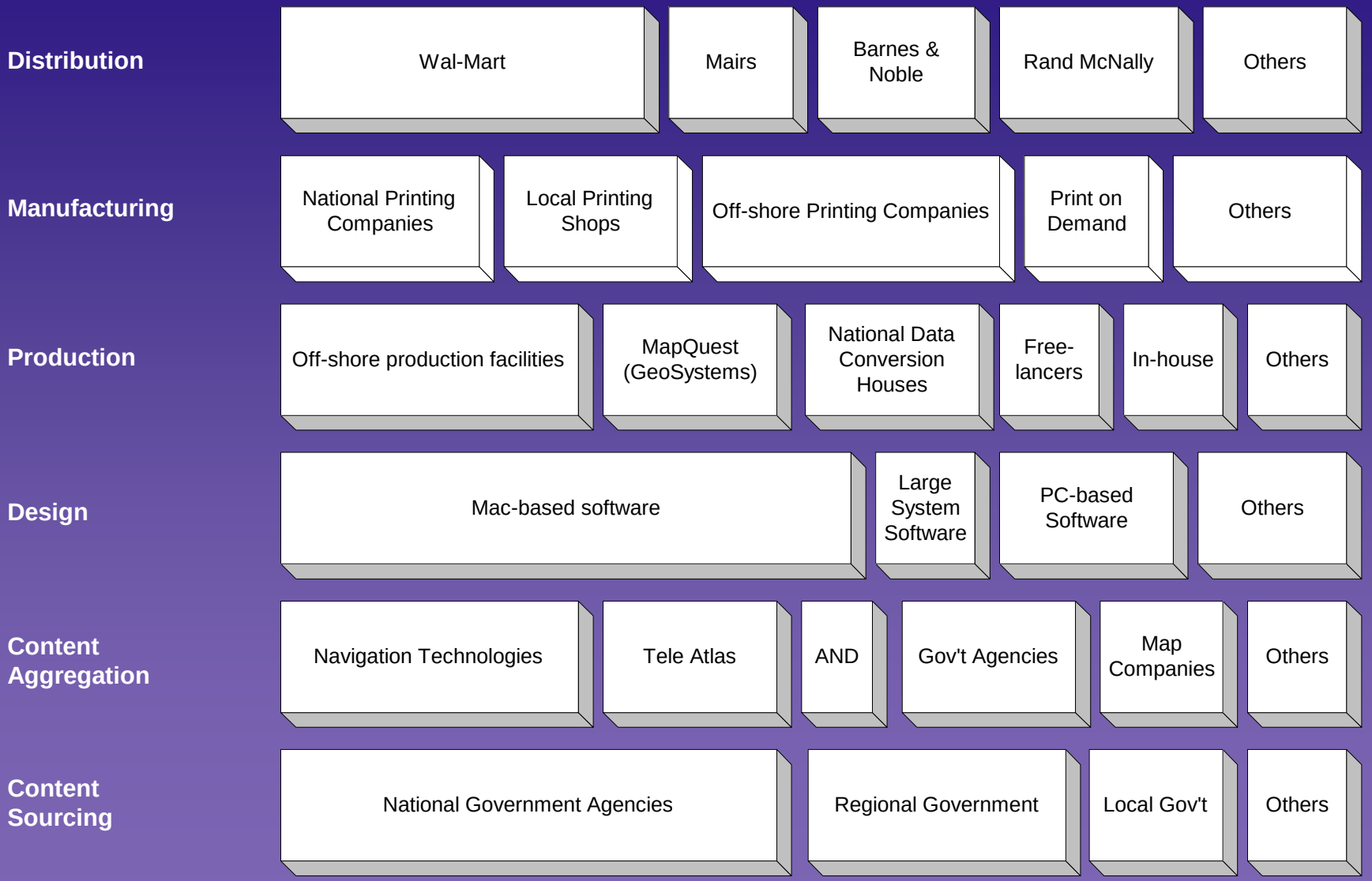
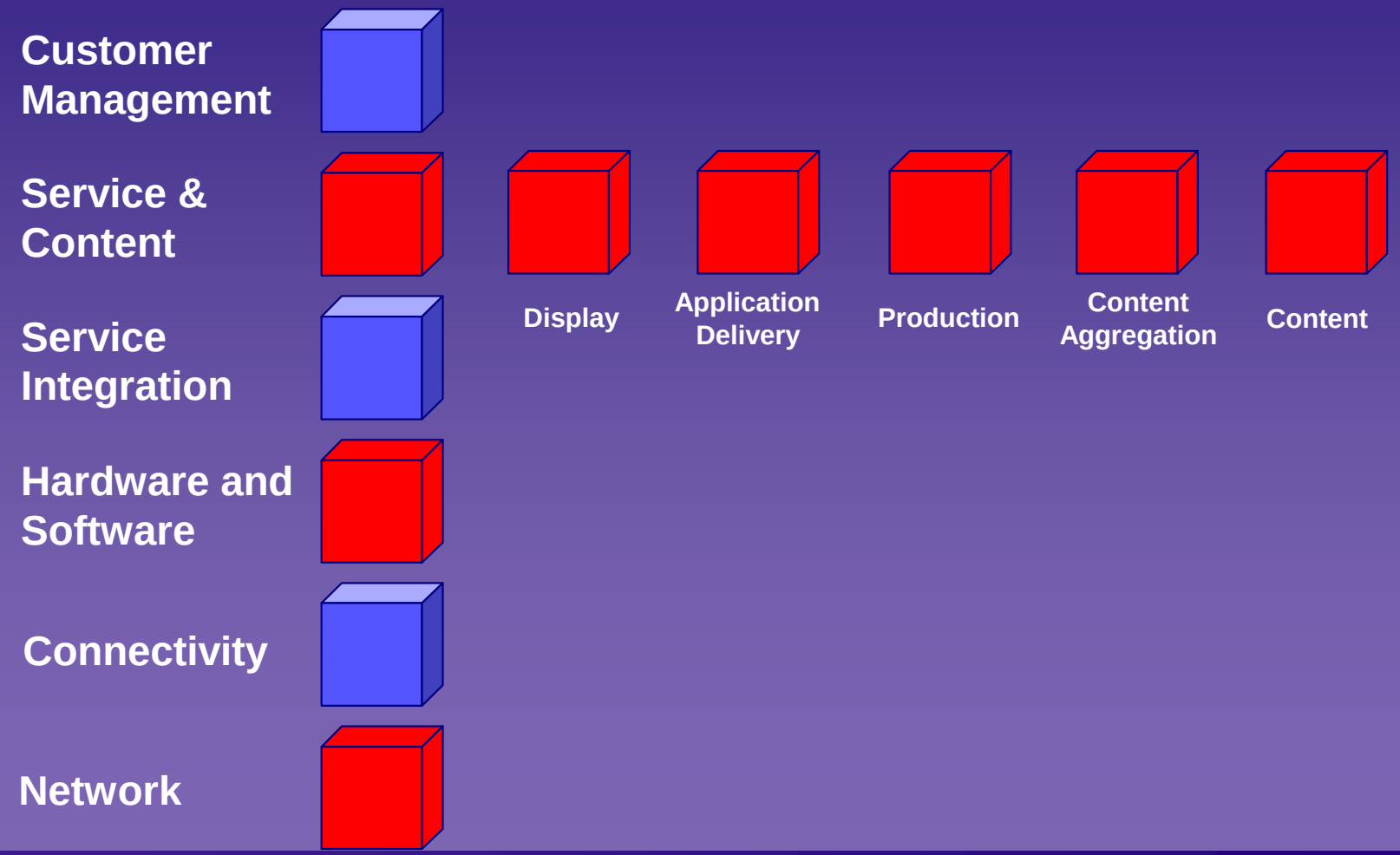
The Mapping Industry Circa 1982

	Swedish Land Survey	Kümmerly+Frey	Esselte Kartor	Rand McNally
Distribution	Own Shops Own Distribution and Contract	Own Distribution and Contract	Own Shops Own Distribution and Contract	Own Shops Own Distribution
Manufacturing	In-house and Contract	In-house	Contract	In-house
Production	Manual	Manual and Automated (Scitex)	Manual and Automated (Scitex)	Manual
Design	Manual	Manual	Manual and Automated (Scitex)	Manual
Content Aggregation	Manual and Automated	Manual	Manual and Automated (Intergraph)	Manual
Content Sourcing	Aerial Photography & Land Survey	Own Collection and License Gov't Maps	Own Collection and License Gov't Maps	Own Collection and License Gov't Maps

The Paper Mapping Industry Circa 2002



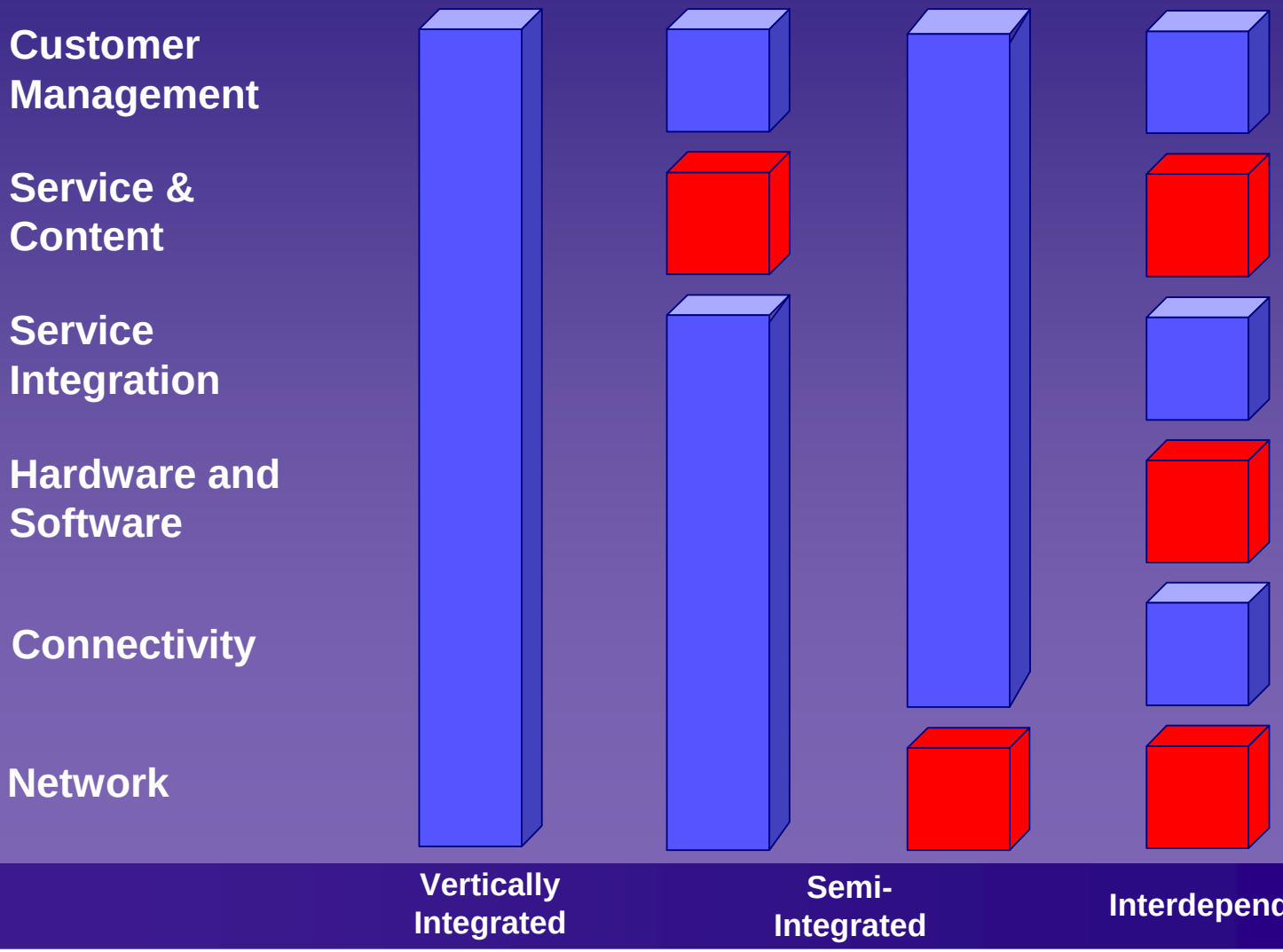
The Mapping Industry in the Location-based Services Value Chain



Location-based Services and Telematics Business Models

- The manner in which the components are combined is a direct result of business's ability to control each of the components
  - Network Operators can control all three
  - Device Manufacturers and OEM can control up to two: Device and Service/Content
  - Content and Service Providers can control only one
- With greater control over the basic components comes a greater ability to control the money flow and retain income earned from the sale of systems and services.

The Dis-Integration of the Location-based Services Industry



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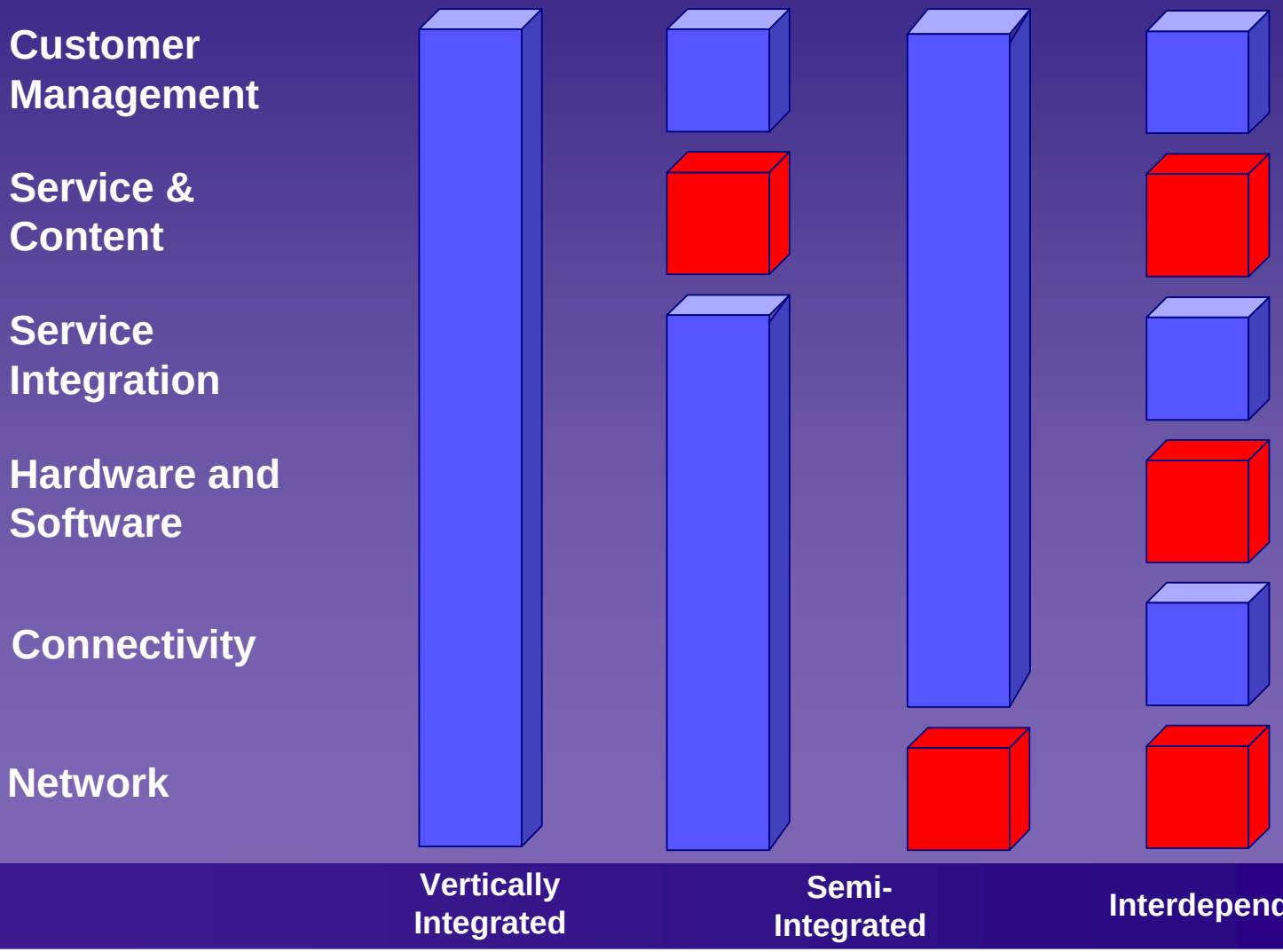

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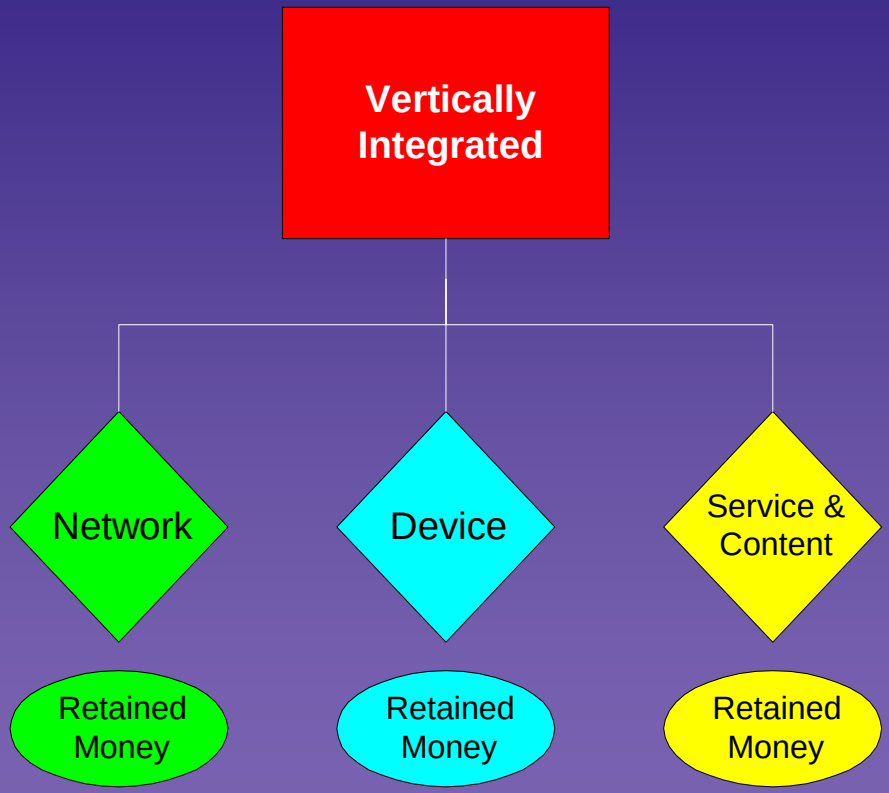
In-vehicle Location-based Services - The Vertical Industry Structure

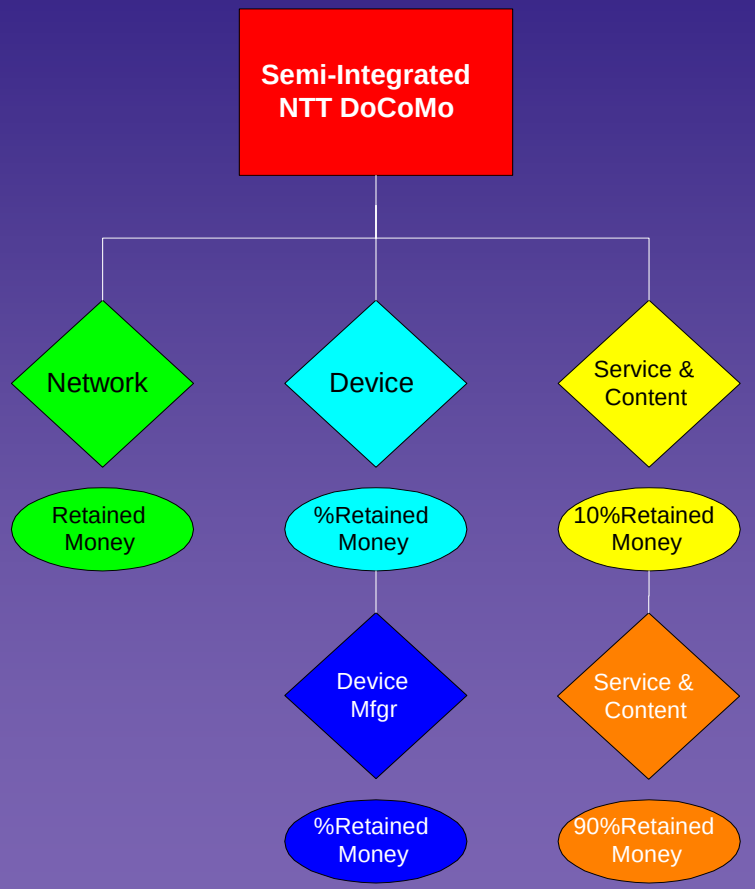
Vertically Integrated

- The objective of vertical integration it to retain as much profit as possible inside the company by outsourcing as little as possible, and converting whatever is outsourced to an internal component by re-branding it.
- The network operators who are creating location-based services have the best opportunity to retain profits in all three areas: network, device and content. To do this they must also build their own connectivity, service integration and customer management systems.
- As long as there are no standards for network connectivity, device interoperability and customer interchangeability, these companies can retain their dominance. They can brand the device and re-brand content and services and sell their own network time.



Semi-Vertically Integrated - NTT DoCoMo

- NTT DoCoMo and GM's OnStar division in the US are examples of semi-integrated companies. NTT DoCoMo can retain all of the money for its network, although it must pay a portion of its customer usage fees to the fixed line company, NTT.
- Matsushita Communications Industrial (MCI) and NEC are two of the principal suppliers of handsets to NTT DoCoMo. They are paid for their hardware, but it is NTT DoCoMo who brands and sells the devices.
- NTT DoCoMo's policy on services and content might appear unusual given that they could certainly have created their own location-based and other service and content infrastructure like their rival J-Phone. They retain only a 10% fee for enabling the connectivity between the consumer and the service and content supplier, but this strategy has created a wealth of willing suppliers.



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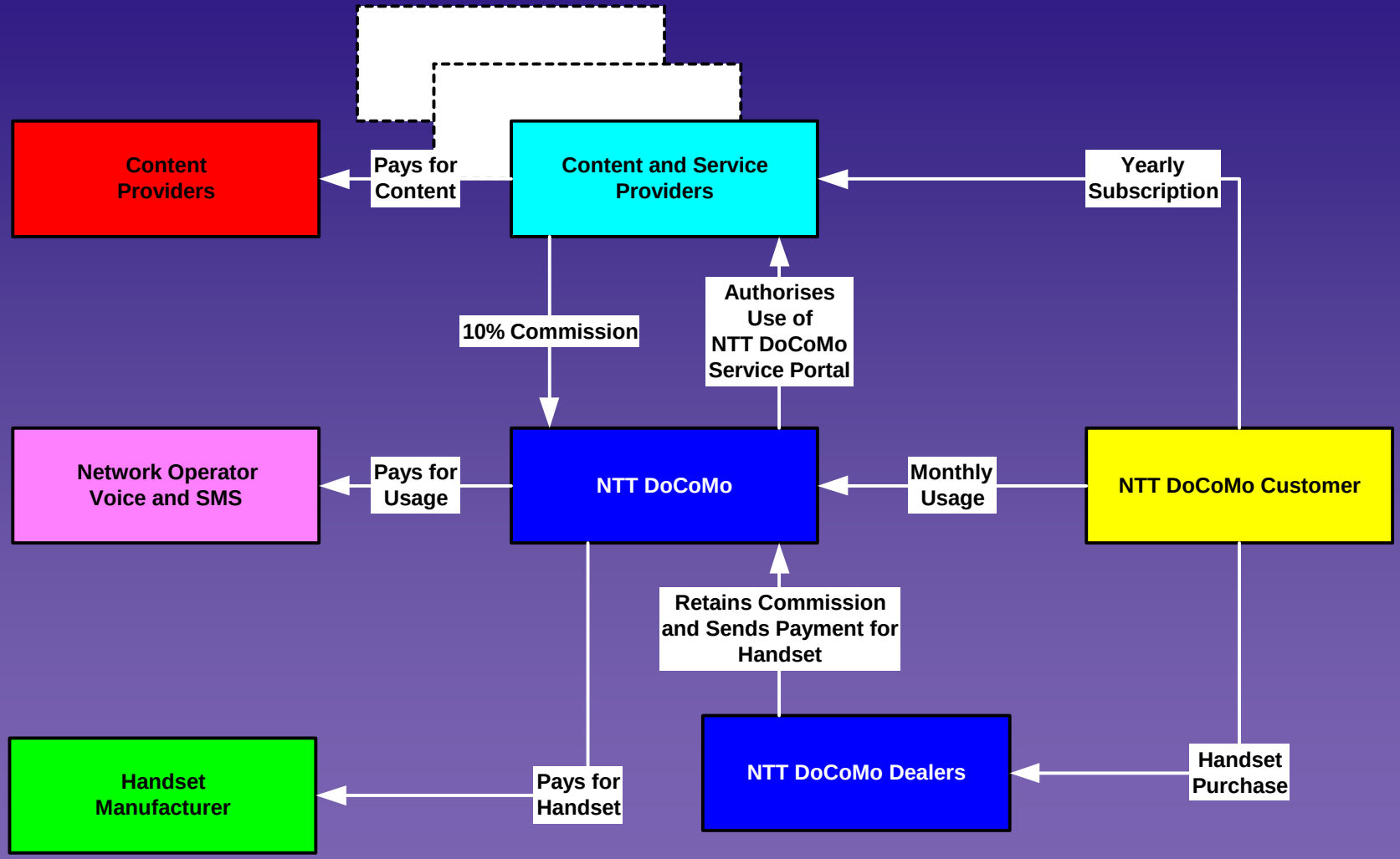

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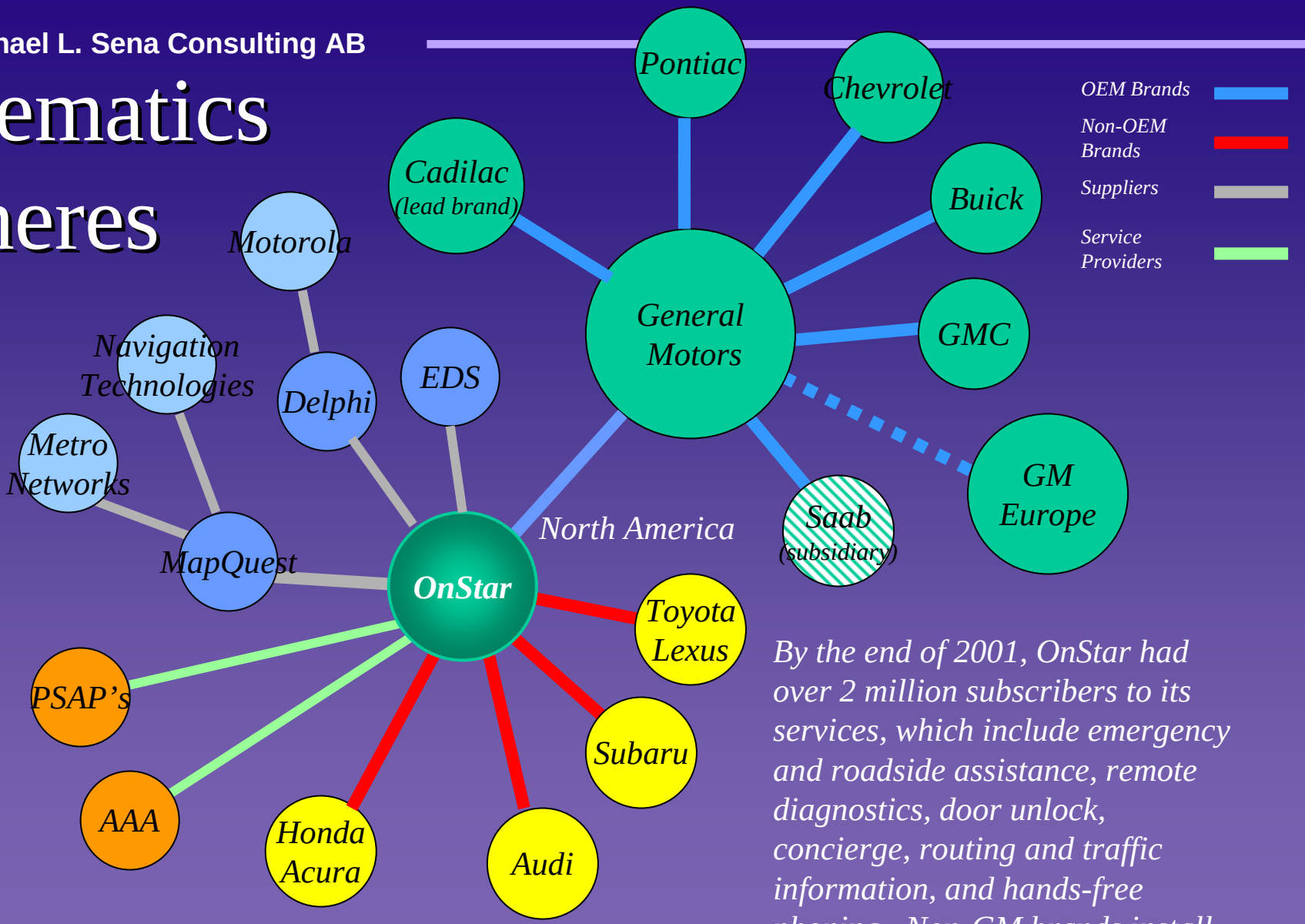
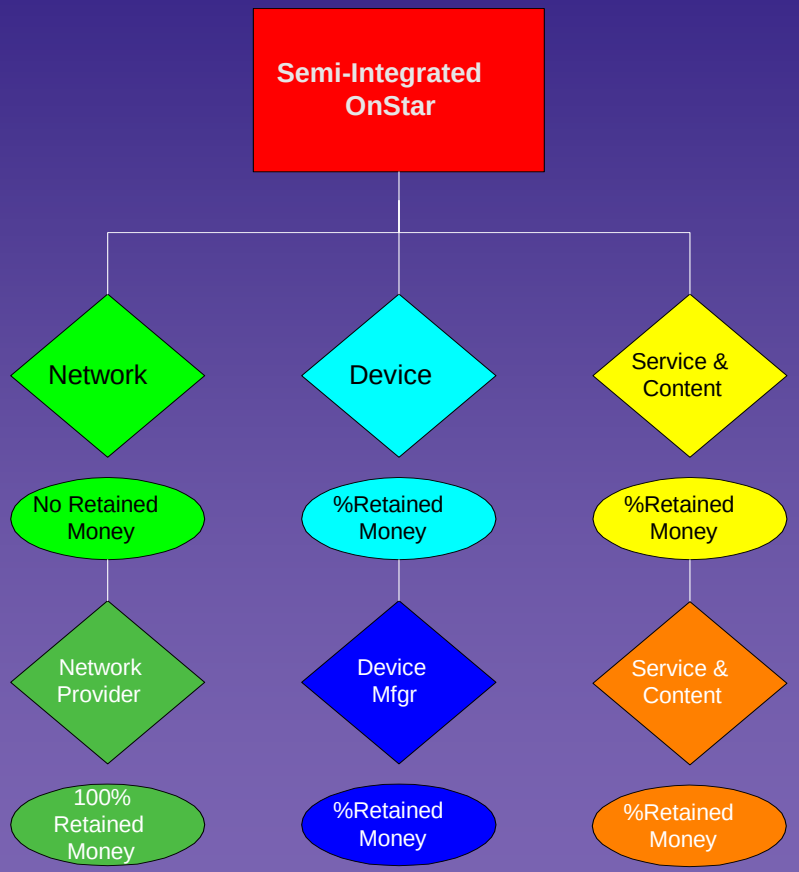
Telematics Spheres



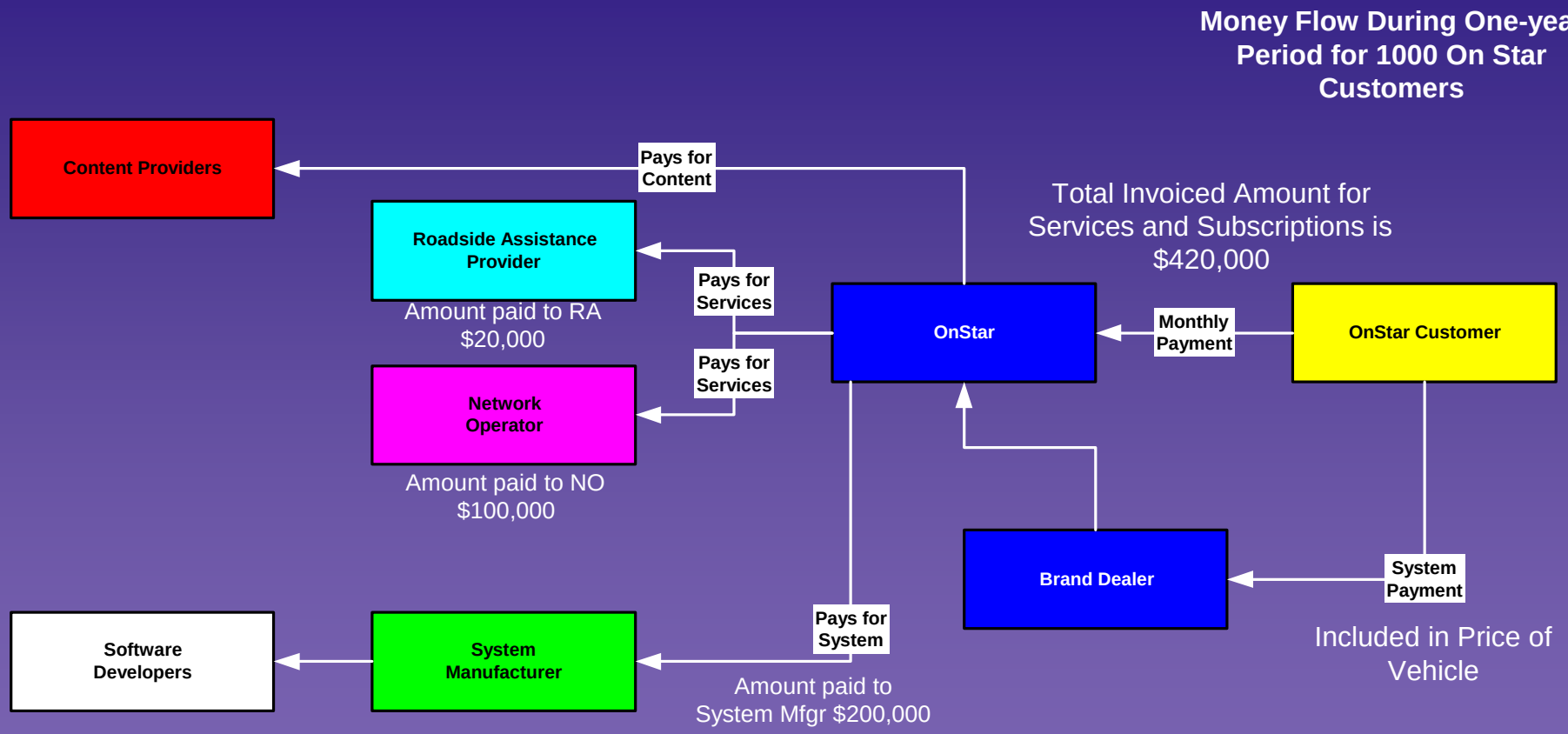
By the end of 2001, OnStar had over 2 million subscribers to its services, which include emergency and roadside assistance, remote diagnostics, door unlock, concierge, routing and traffic information, and hands-free phoning. Non-GM brands install the OnStar system and connect to its services.

Semi-Vertically Integrated - OnStar

- OnStar is not currently billing for airtime. It pays the network operators directly out of the subscription fees it receives from its customers.
- The in-vehicle telematics device is built to OnStar specifications by different suppliers, Delphi, formerly part of GM and now an independent automotive Tier 1 supplier, and Motorola.
- The systems are branded OnStar and OnStar retains a portion of the profit from their sale. They also retain a portion of the intellectual property rights in these systems.
- OnStar has built its own location-based service center with automated and operator-based services. It has licensed mapping technology from MapQuest, licenses and integrates data from among others, Navtech.



Semi-Vertically Integrated - OnStar



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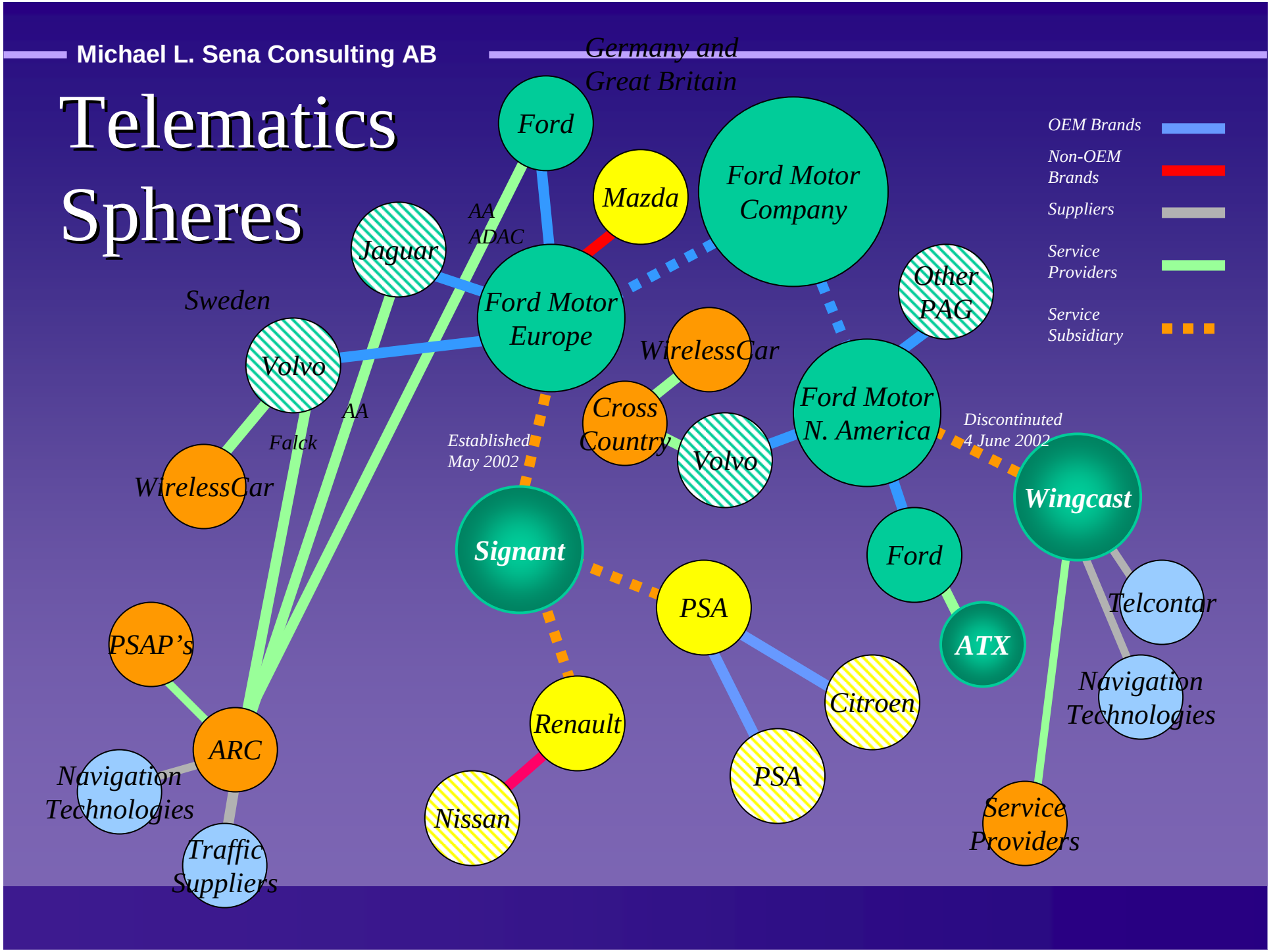
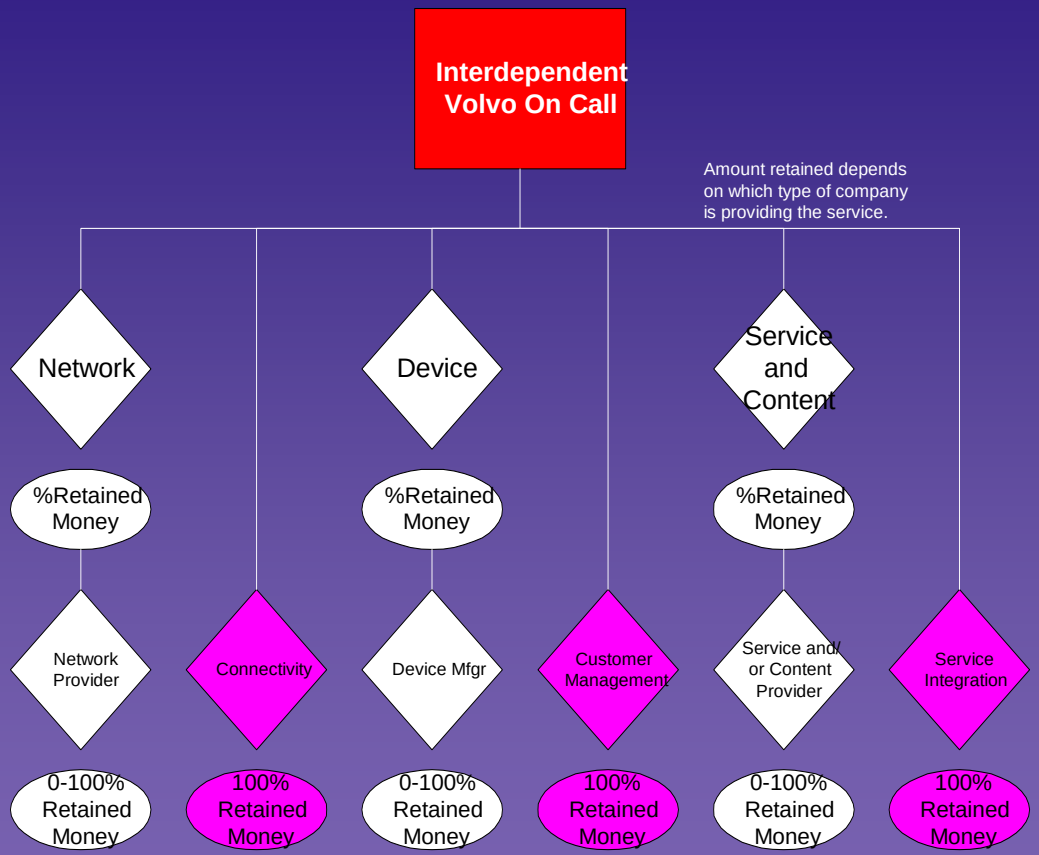
Telematics Spheres



Interdependent - Volvo On Call

- The Interdependent model is a move in the direction of dis-integration. The Volvo On Call telematics service, now operational in Sweden and soon to be introduced in the US, is a prime example of the interdependent model.
- Volvo has contracted separately with the network provider (Vodofone Europolitan); the device manufacturer (Tier 1 automotive supplier Autoliv); and the service and content supplier (roadside assistance, emergency assistance and security services company Falck). These companies on their own cannot delivery a telematics services.
- Volvo has contracted with a fourth company, WirelessCar, to provide the needed connectivity, customer management and service integration.
- It is clear that in this model the money flows from the company selling the service to all the companies providing the actual services or systems.



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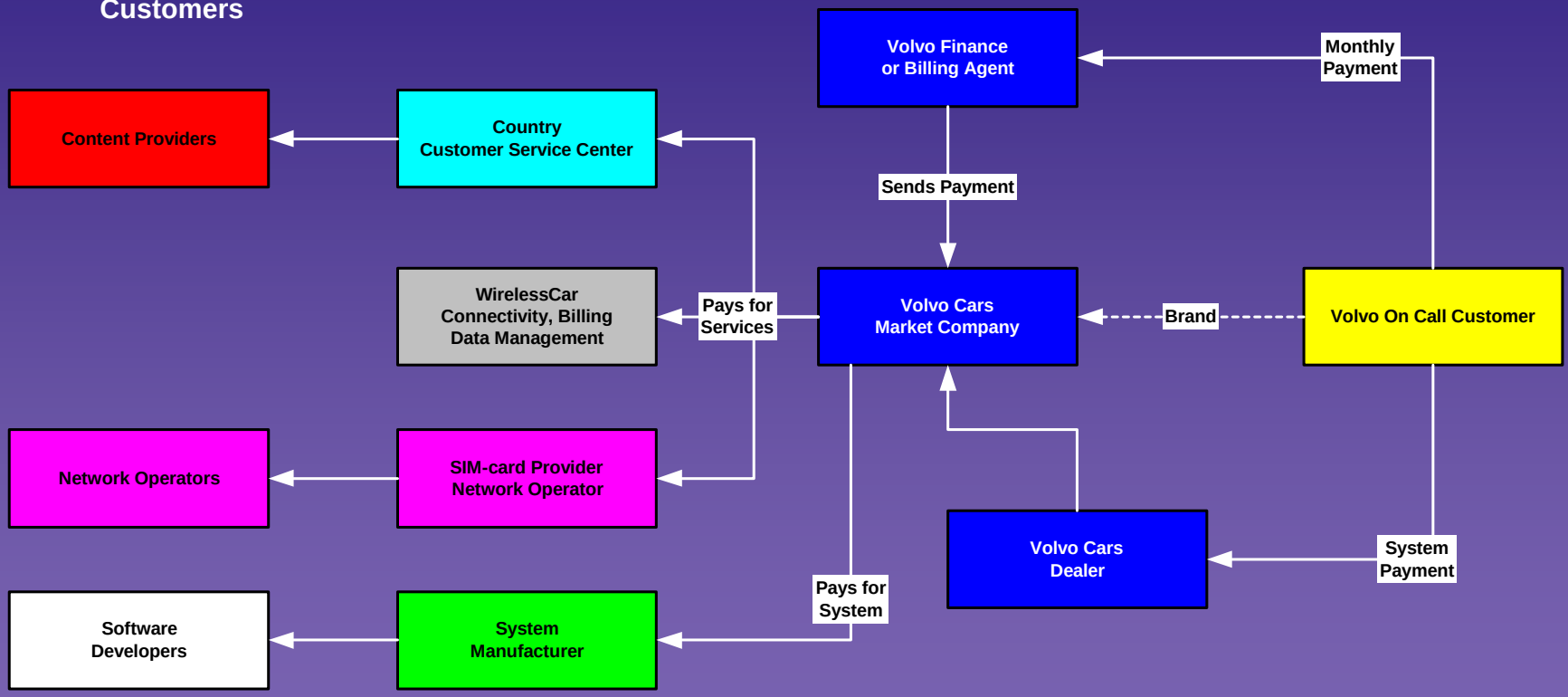
Interdependent - Volvo On Call

Money Flow During One-year Period for 1000 Volvo On Call Customers



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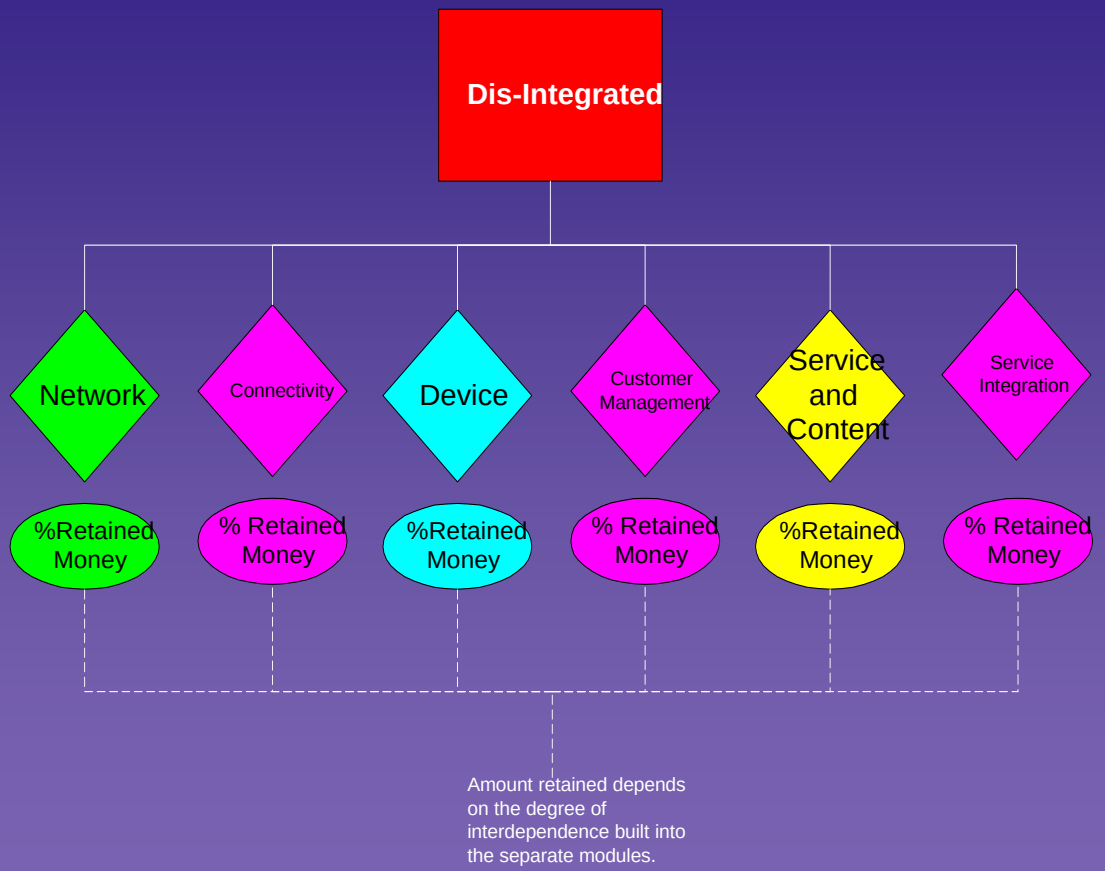
In-vehicle Location-based Services - The Horizontal Industry Structure

In-vehicle Location-based Services - The Horizontal Industry Structure

Dis-Integrated - The Horizontal Future

- If the LBS industry follows other industries, the vertically integrated model will initially be the most successful. Those companies who adopt it will hold on to the largest profits. By default, the network operators have the clear advantage.
- Eventually, the links in the LBS chain will become more modular and standardised, and the industry will dis-integrate. The power to make money will shift away from companies that create the end-use product toward the back end of the value chain to those companies that supply subsystems with internal architectures that are still technologically interdependent.
- In the dis-integrated LBS industry, profits will fall to the companies that have the greatest control over the interdependent links in the dis-integrated value chain.



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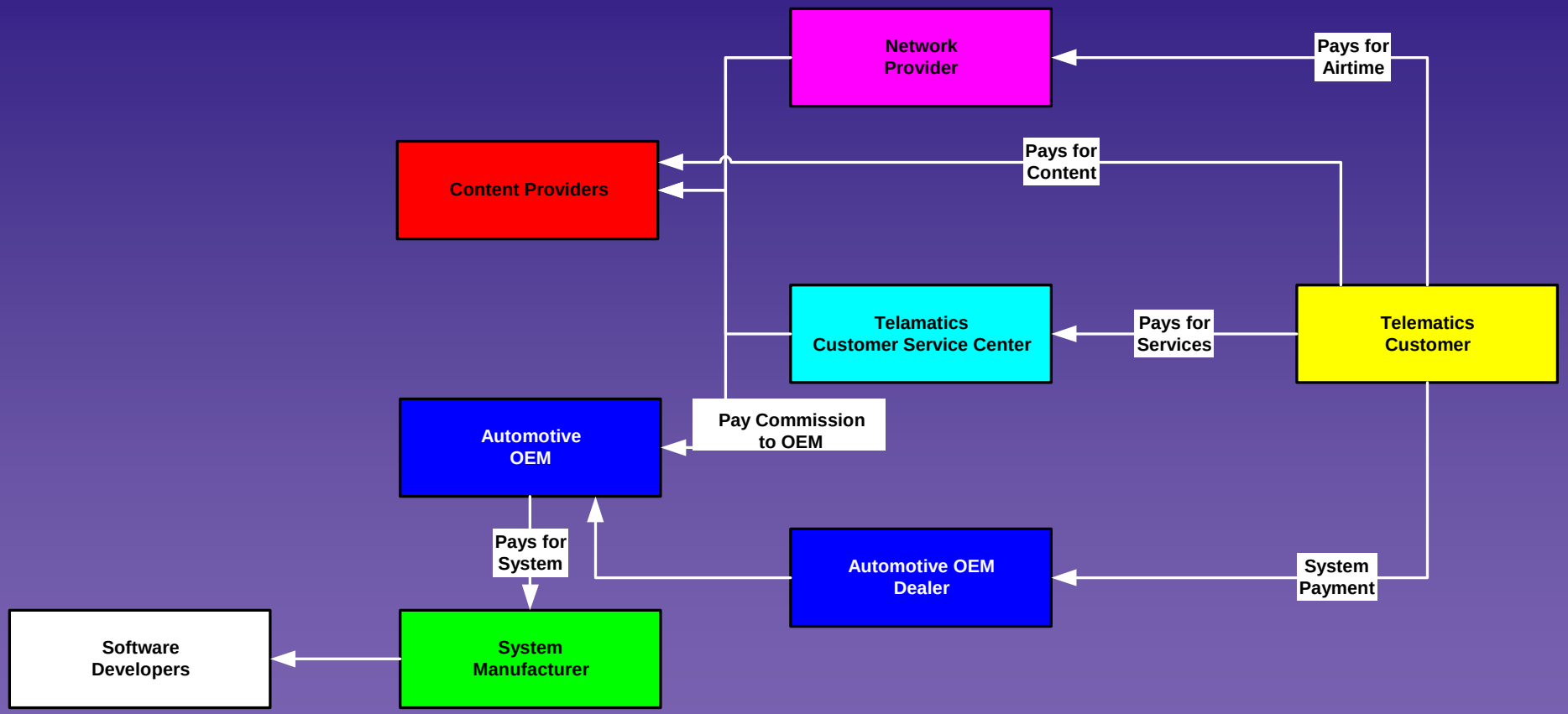
The Disintegrated Telematics Model



Where the Money Flows

- Where will the money be made in the location-based services business?
  - Vertically integrated
  - Interdependent
  - Dis-integrated
- “When product functionality is not yet good enough”--which is where we are today--”integrated companies that design and make end-use products typically make the most money for two reasons:
  - “The interdependent, proprietary architecture of their products makes differentiation straightforward;
  - “The high ratio of fixed to variable costs creates steep economies of scale--larger companies can amortize high fixed costs.”
- As the links between subsystems standardise, the subsystems that have internal architectures that are technologically interdependent are where the money flows.

Recapitulation

- Location-based services, with telematics as a subset, is a new and emerging industry
- LBS are enabled by wireless telecommunications, satellite and other positioning technologies and mobile devices--but most of all, it is based on developments in the mapping industry that provide the essential content for the services
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The End