

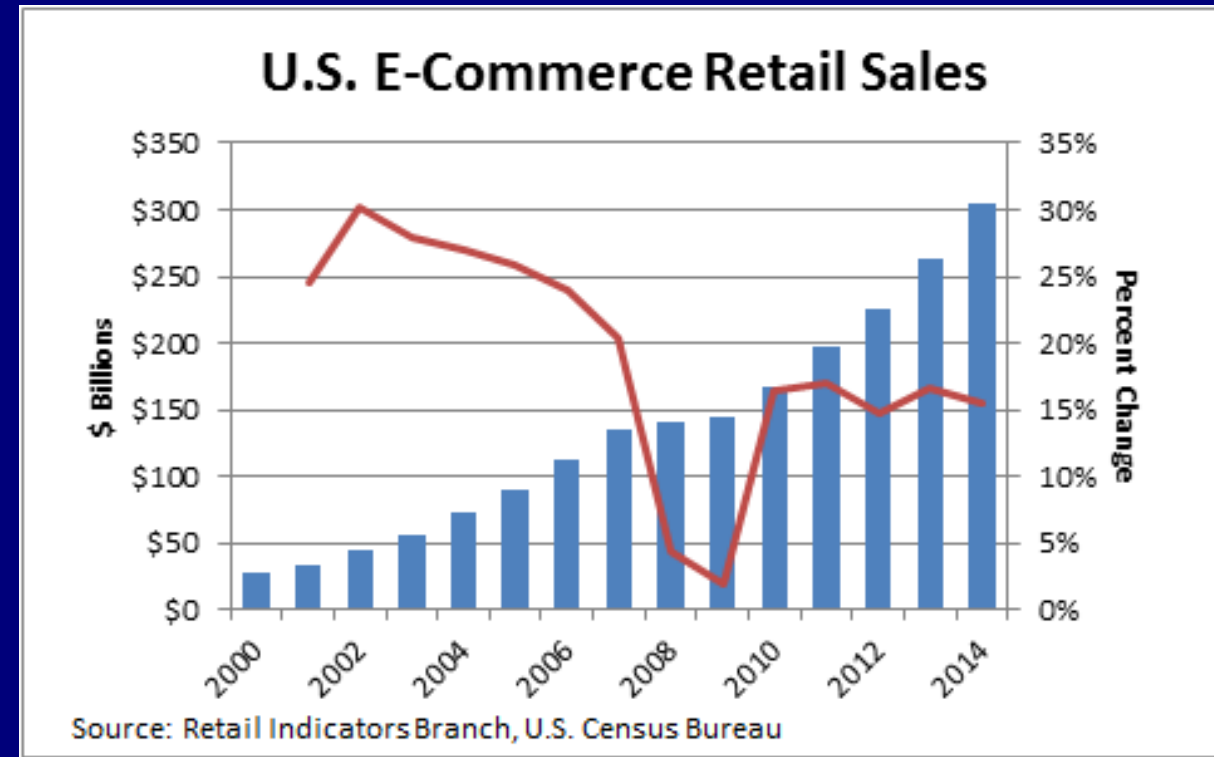
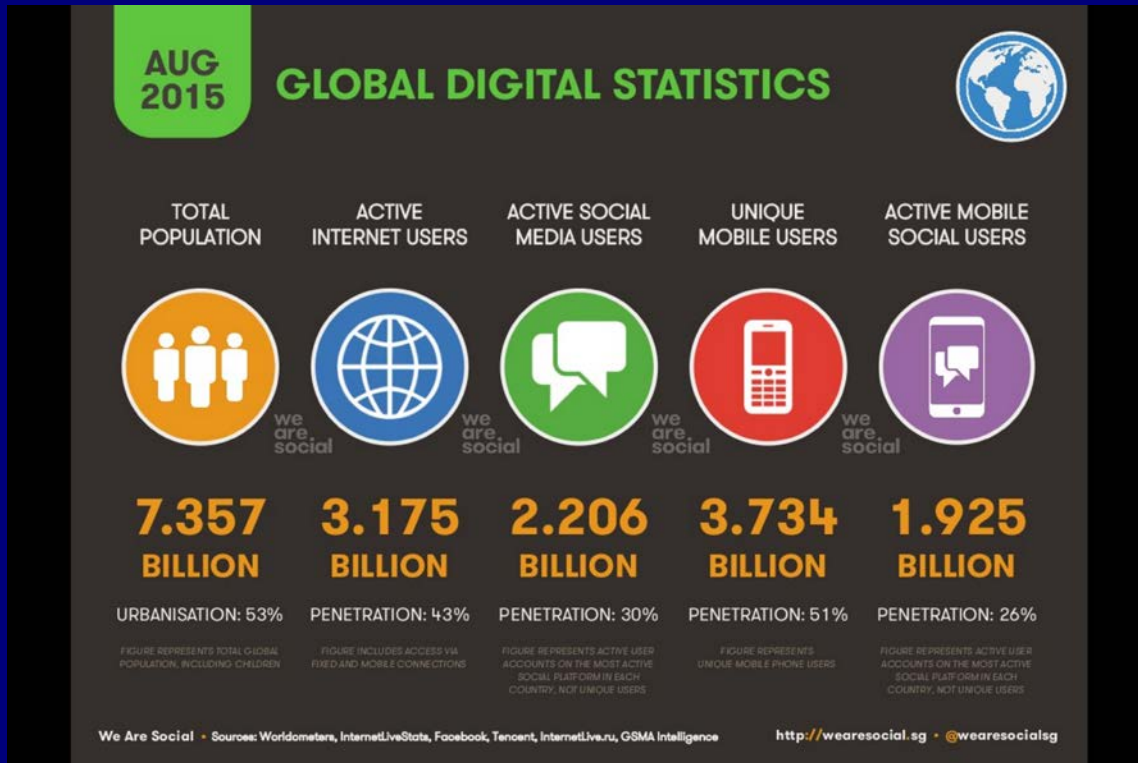
# Connected Vehicle and Connected Consumer: Redefining PLM/ALM/MBSE

Craig A. Brown, GM PLM Leader

Credits to Gahl Berkooz, Ph.D.

Global Chief of Analytics  
Global Connected Consumer Experience  
General Motors

# Unprecedented Connectivity

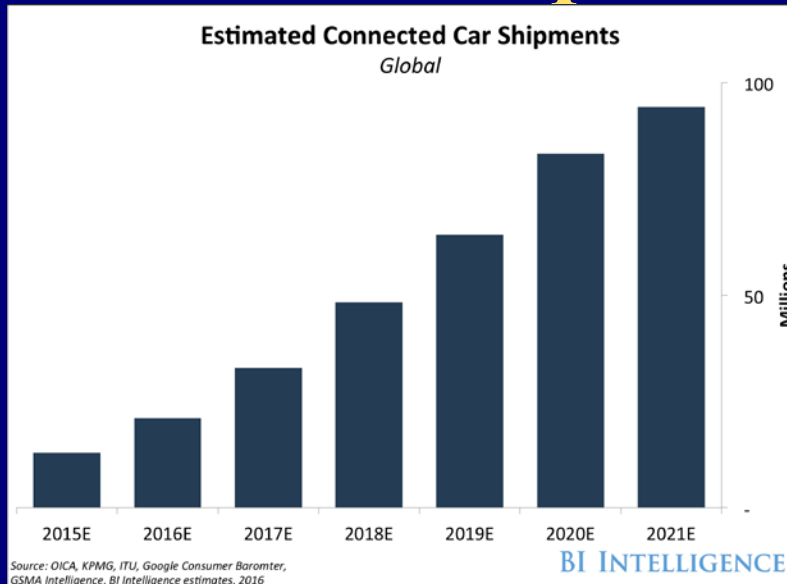


Unprecedented connectivity is driving a new set of consumer expectations

# The Connected Consumer – a sea change in automotive retailing

- Ten hours spent on average by automotive customers on the web to search for information to support buying decision
- 46% of buyers willing to finance purchase online
- Europe's AutoScout has 300 million views a month on cars available for sale
- 500,000 are sold a year on eBay Motors
- Number of dealership visits down from an average of 5 to 1 (one) prior to a car purchase
- More than one third of consumers would consider buying a car on line
- Almost 90% of consumers use the OEM or dealer website when purchasing a car

# The Connected Vehicle – a sea change in Customer Expectations

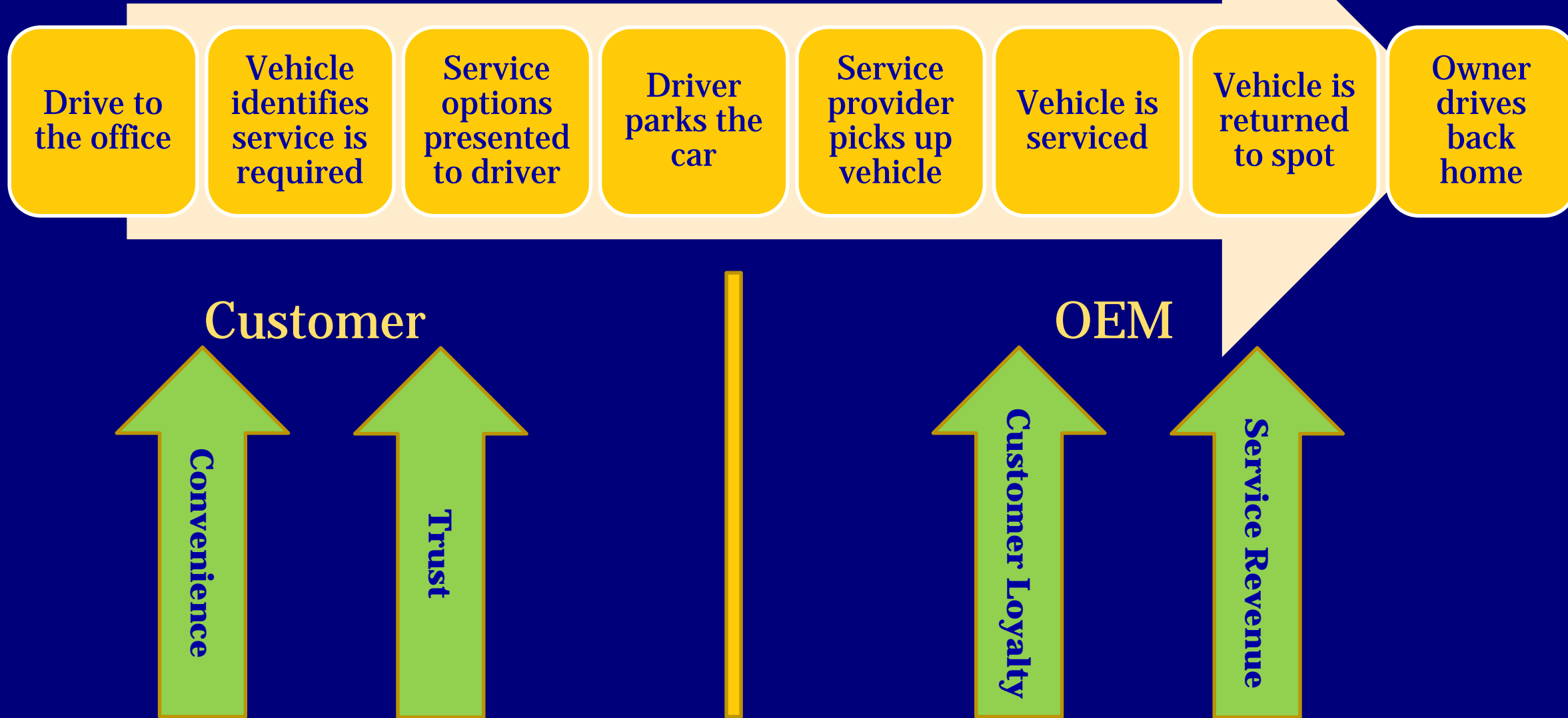


“Gartner Says By 2020, a Quarter Billion Connected Vehicles Will Enable New In-Vehicle Services and Automated Driving Capabilities”

- You can follow your favorite Netflix show from the living room to the back seat to your phone.
- People mod their cars with cool third party apps, and share tips and tricks with other drivers.
- Help the parents of teenagers sleep better at night.

Very large investments – changes in usage patterns – changes in Product Development, Service, and Sales. Where’s the ROI for the OEM? What’s the role of Analytics?

# Connected Vehicle and Connected Consumer: Outcomes

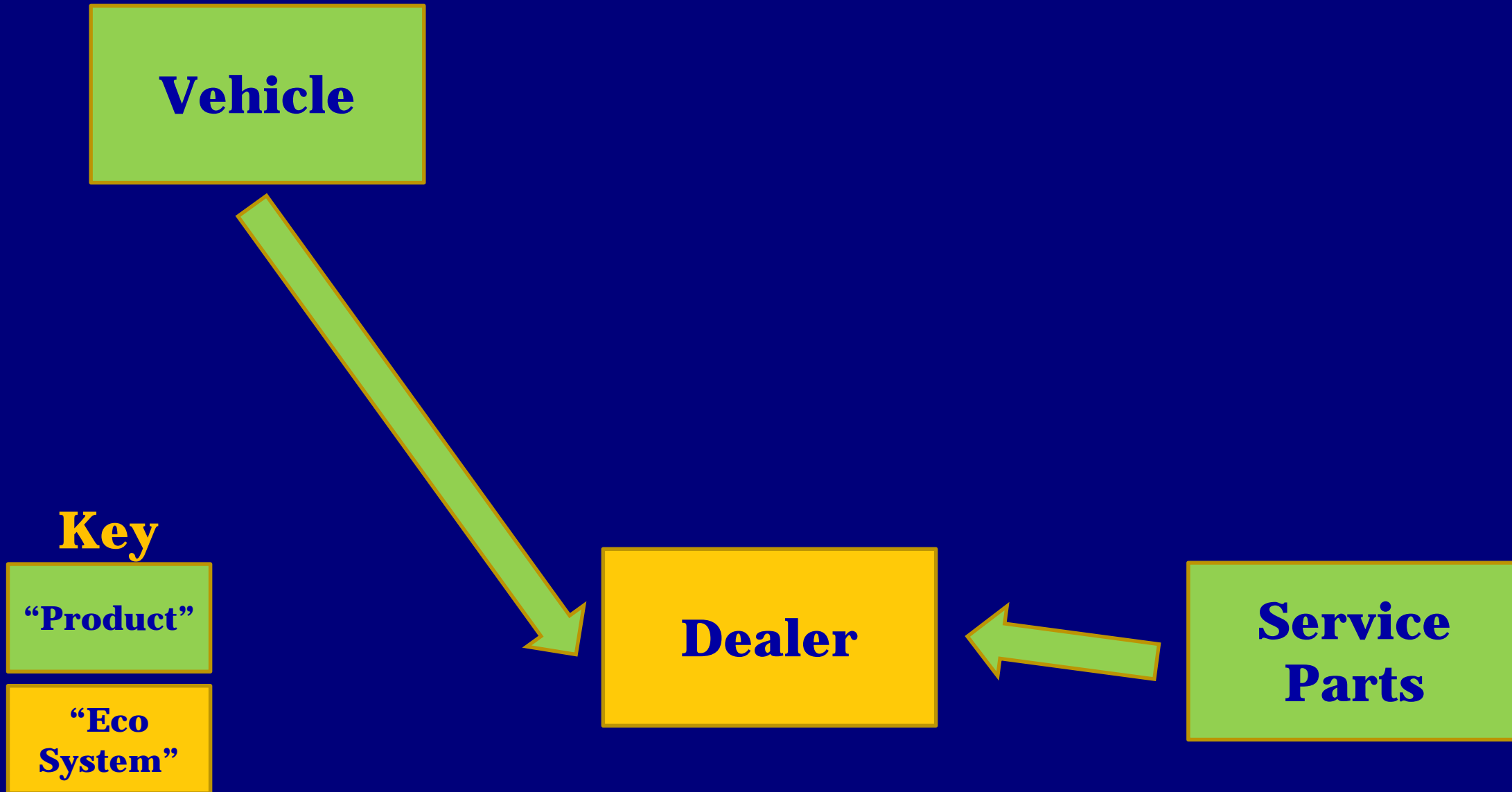


The Connected Vehicle, Consumer, and Ecosystem enable deeper and more rewarding relationships between the customer and the OEM

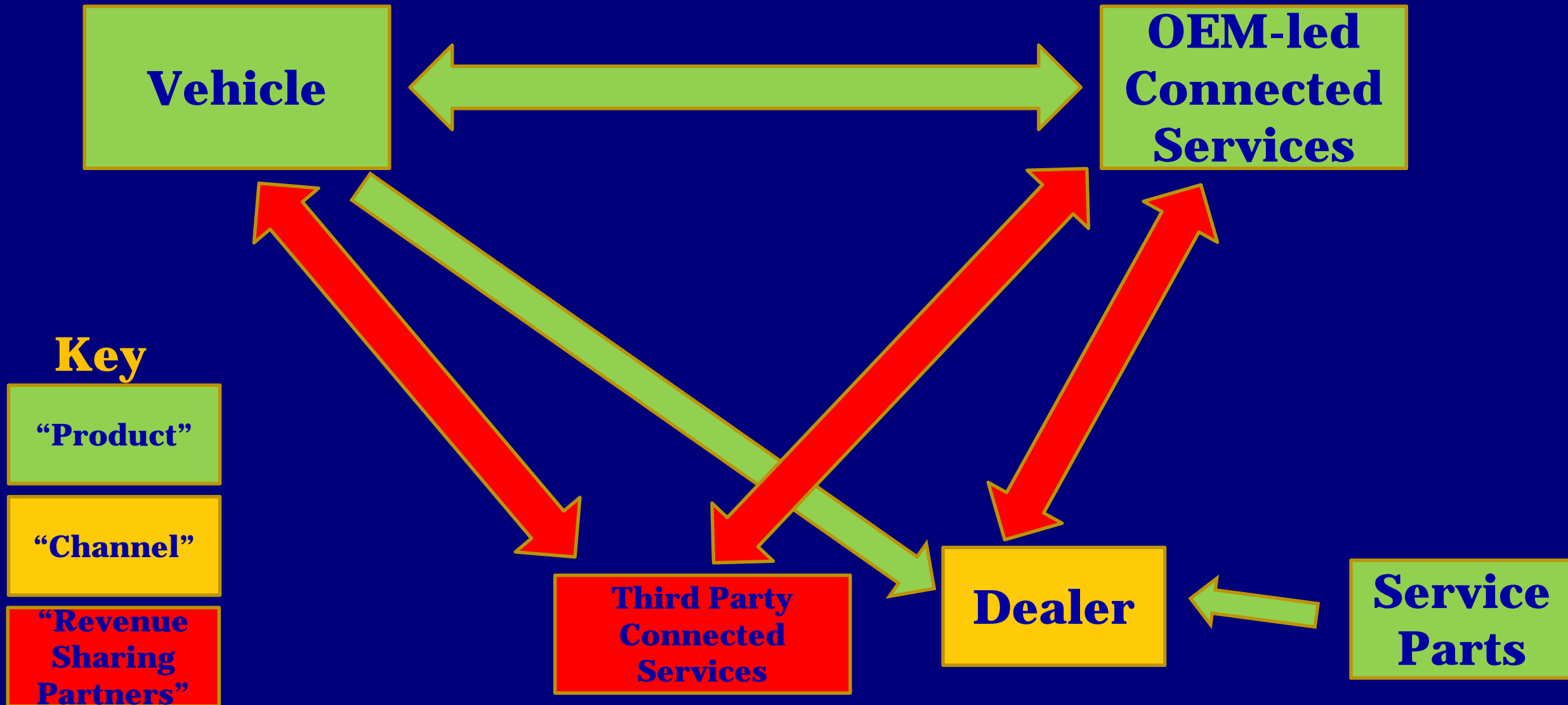
# Connected Vehicle and Connected Consumer: New models, new capabilities

	Drive to the office	Vehicle identifies service is required	Service options presented to driver	Driver parks the car	Service provider picks up vehicle	Vehicle is serviced	Vehicle is returned to spot	Owner drives back home
Customer	<ul style="list-style-type: none"> <li>• Driver identification</li> <li>• Driver preferences: Route and Vehicle Dynamics</li> </ul>		<ul style="list-style-type: none"> <li>• Customer driving behavior</li> </ul>		<ul style="list-style-type: none"> <li>• Customer preferences for update on vehicle being picked up</li> </ul>	<ul style="list-style-type: none"> <li>• Customer preferences for updates on vehicle service</li> <li>• Update customer</li> </ul>	<ul style="list-style-type: none"> <li>• Customer preferences for updates</li> <li>• Update customer on vehicle location</li> </ul>	<ul style="list-style-type: none"> <li>• Driver identification</li> <li>• Driver preferences: Route and Vehicle Dynamics</li> </ul>
Vehicle	<ul style="list-style-type: none"> <li>• Vehicle health check</li> </ul>	<ul style="list-style-type: none"> <li>• Vehicle fault detection</li> </ul>	<ul style="list-style-type: none"> <li>• Repair prediction</li> </ul>	<ul style="list-style-type: none"> <li>• Vehicle location</li> </ul>	<ul style="list-style-type: none"> <li>• Vehicle unlock</li> </ul>	<ul style="list-style-type: none"> <li>• Repair diagnostics</li> </ul>	<ul style="list-style-type: none"> <li>• Vehicle location</li> </ul>	<ul style="list-style-type: none"> <li>• Post-repair diagnostics confirming normal state</li> </ul>
Environm.	<ul style="list-style-type: none"> <li>• Traffic</li> <li>• Travel time prediction</li> </ul>		<ul style="list-style-type: none"> <li>• Area dealership/ service appointment availability</li> </ul>	<ul style="list-style-type: none"> <li>• Location-specific practices (garage, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Location-specific practices (garage, etc.)</li> </ul>		<ul style="list-style-type: none"> <li>• Location-specific practices (garage, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Traffic</li> <li>• Travel time prediction</li> </ul>

# The Legacy Automotive Business



# The New Automotive Business

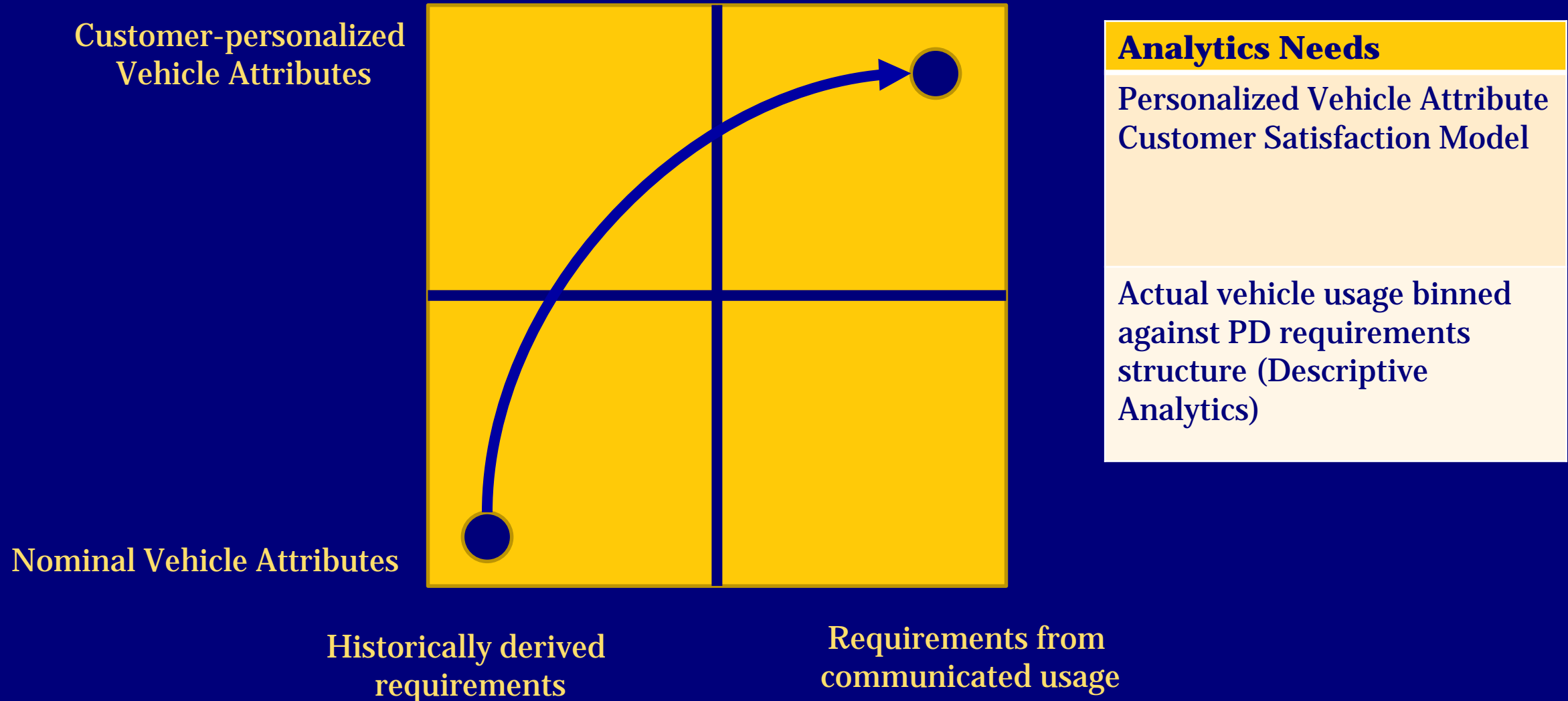




# How are companies changing?

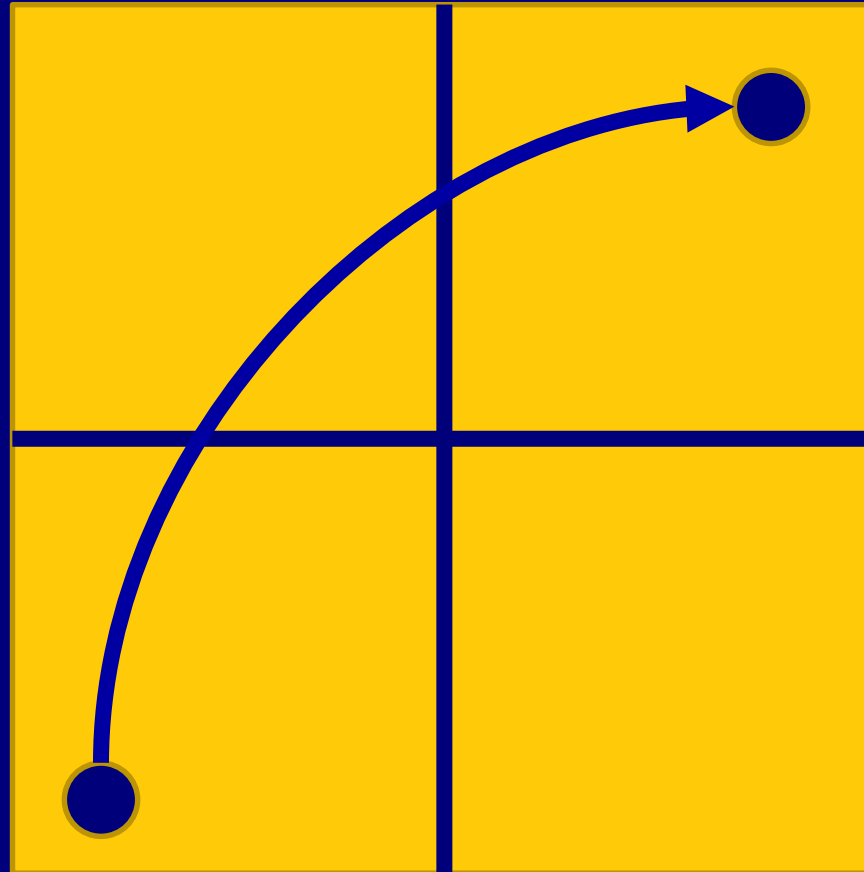
- Re-examining business relationships
- Re-examining business processes
- Putting in place change initiatives
- Putting in place new infrastructure

# New Paradigm for Product Development



# New Paradigm for Vehicle Service

Service is predictive  
and preventative



Service is reactive

Service is Owner  
Initiated

Service is  
Vehicle/OEM Initiated

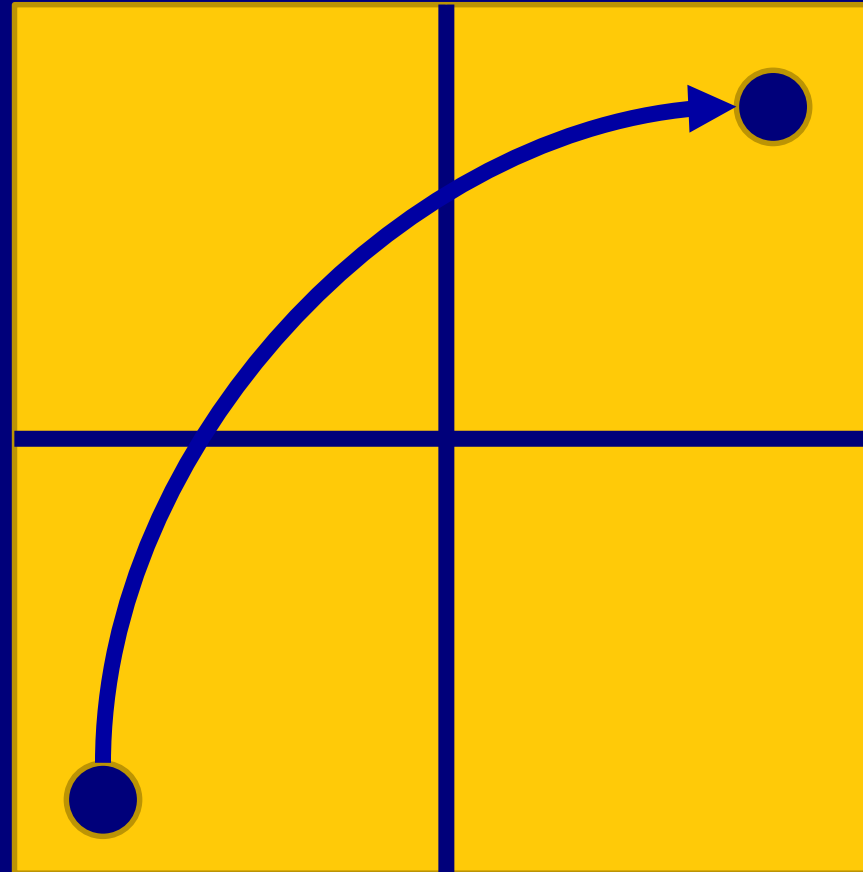
## Analytics Needs

Predictive failure / predictive  
maintenance

Customer interaction  
propensity models

# New Paradigm for Customer Service

OEM analytics drive  
Dealer actions



Dealer Centric

Walk in Service

Concierge Service

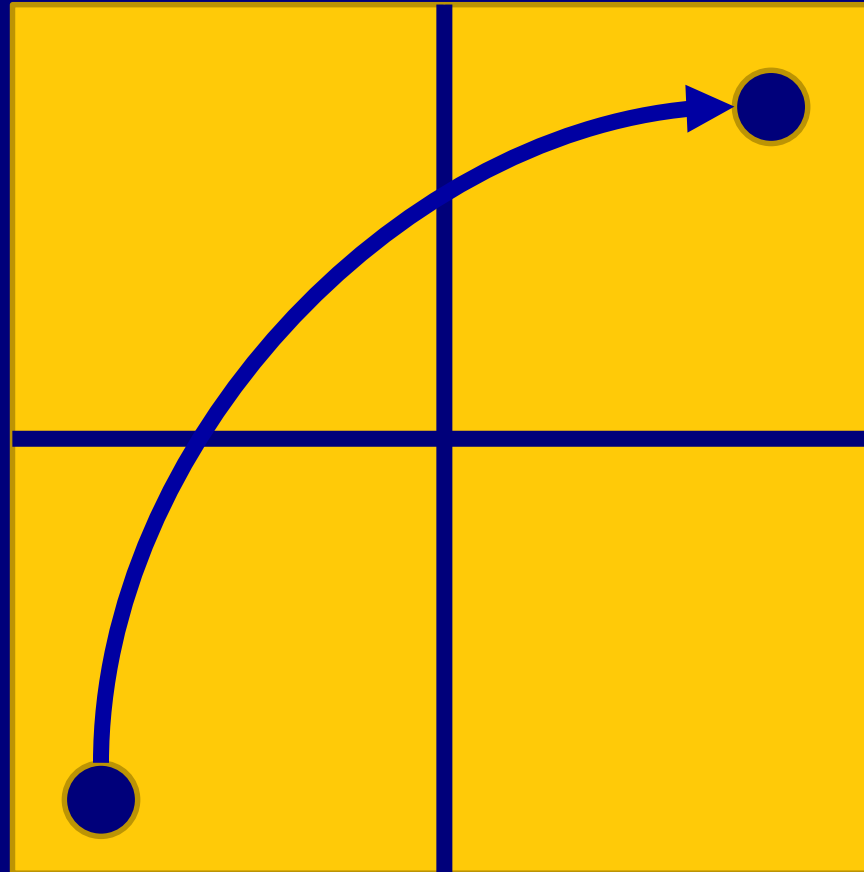
## Analytics Needs

Dealer action optimization  
models

Customer service engagement  
propensity models

# New Paradigm for Dealer ↔ OEM interaction

Customer-centric  
decisions



Dealership-centric  
decisions

Isolated Customer  
Data in DMS

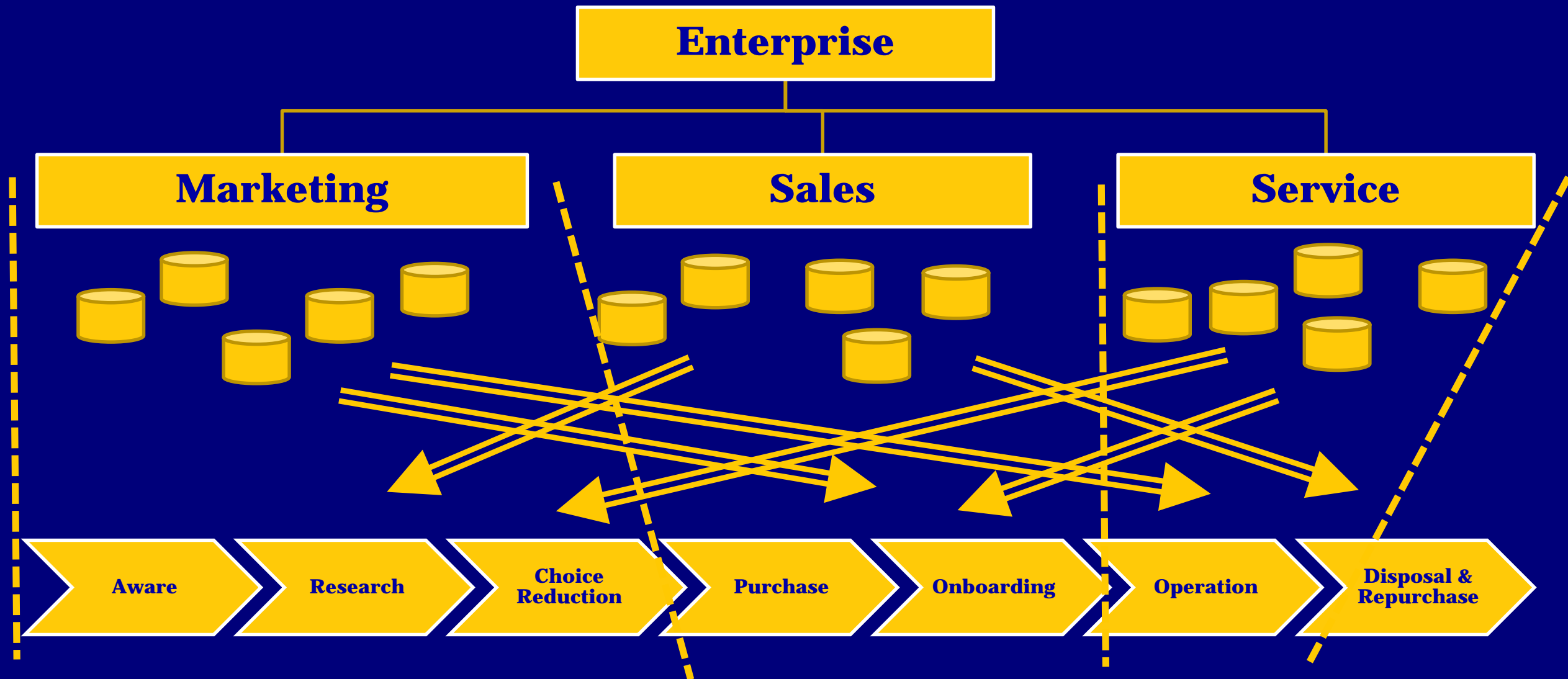
Shared customer and  
vehicle data assets

## Data and Analytics Needs

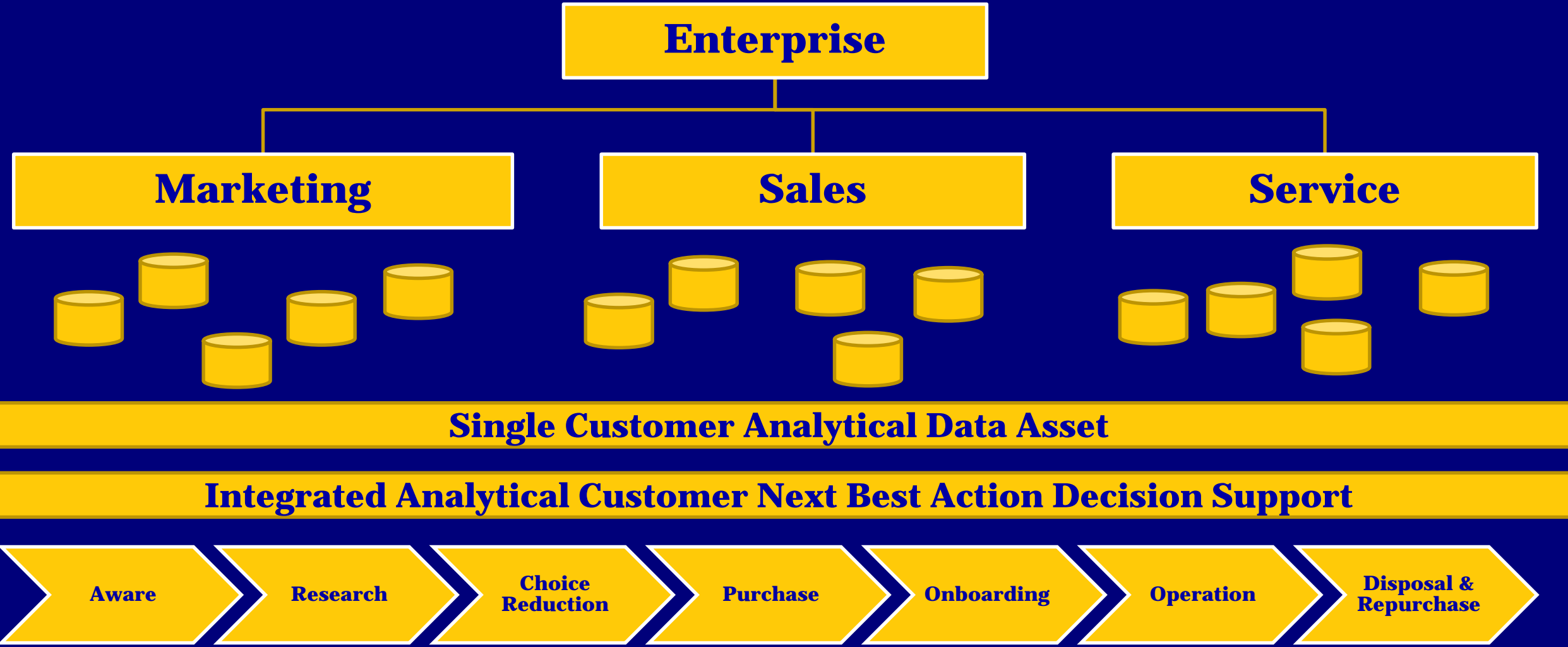
Decision support maximizing value to the customer, OEM, and dealer

Sharing of customer-in-dealership information with OEM

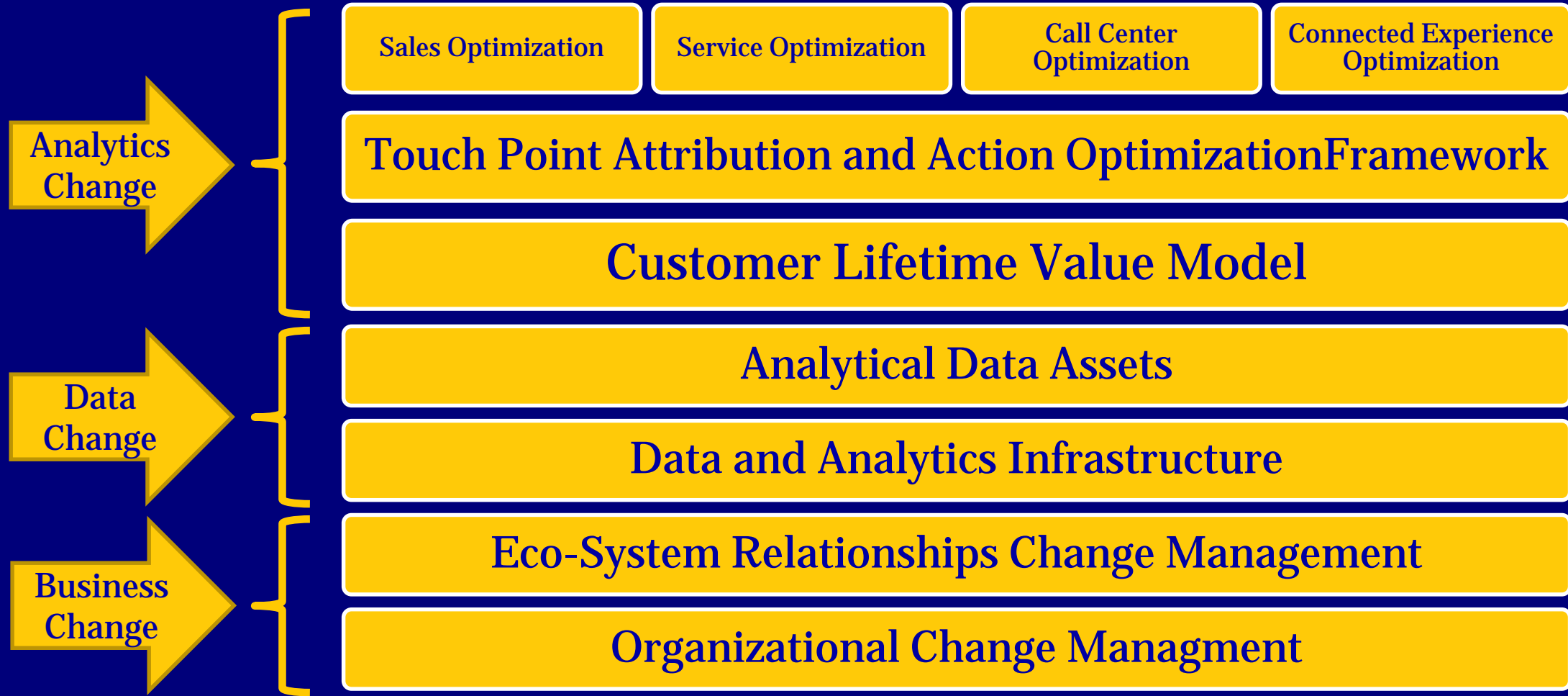
# Current State Customer Journey: Plagued by Fragmentation



# Integrate Customer Journey maximizes value to customer and profitability to OEM – a win-win

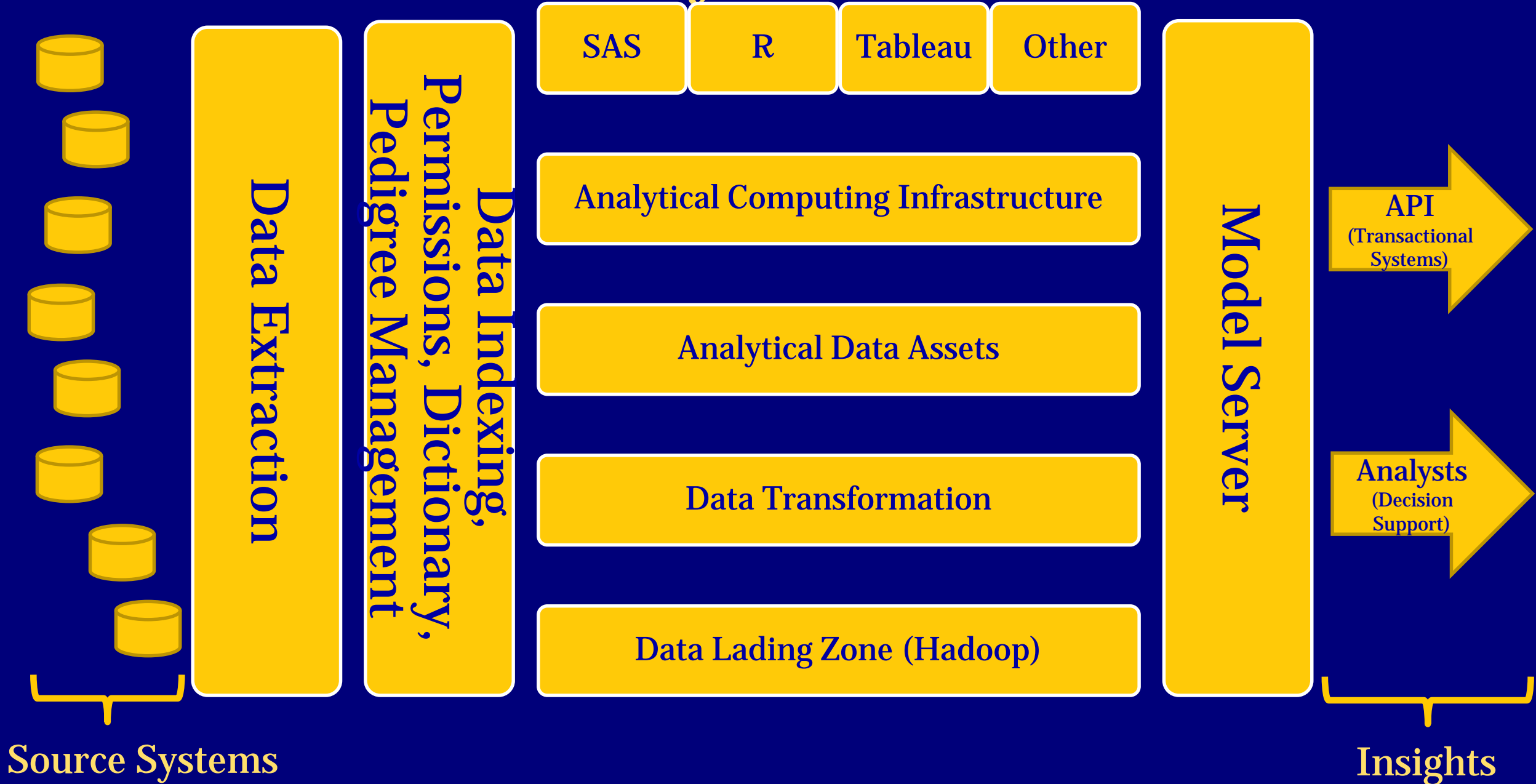


# Enterprise Strategy





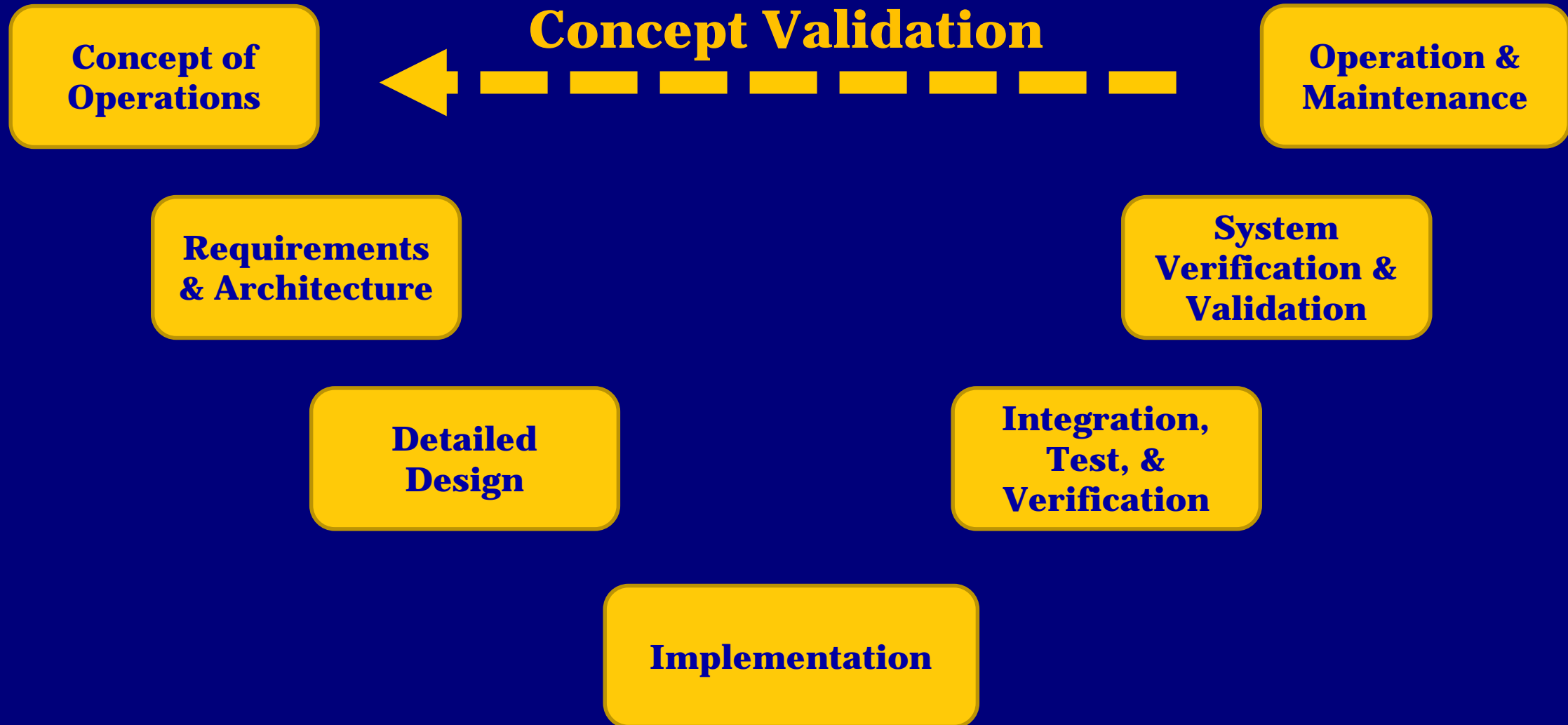
# Data and Analytics Infrastructure



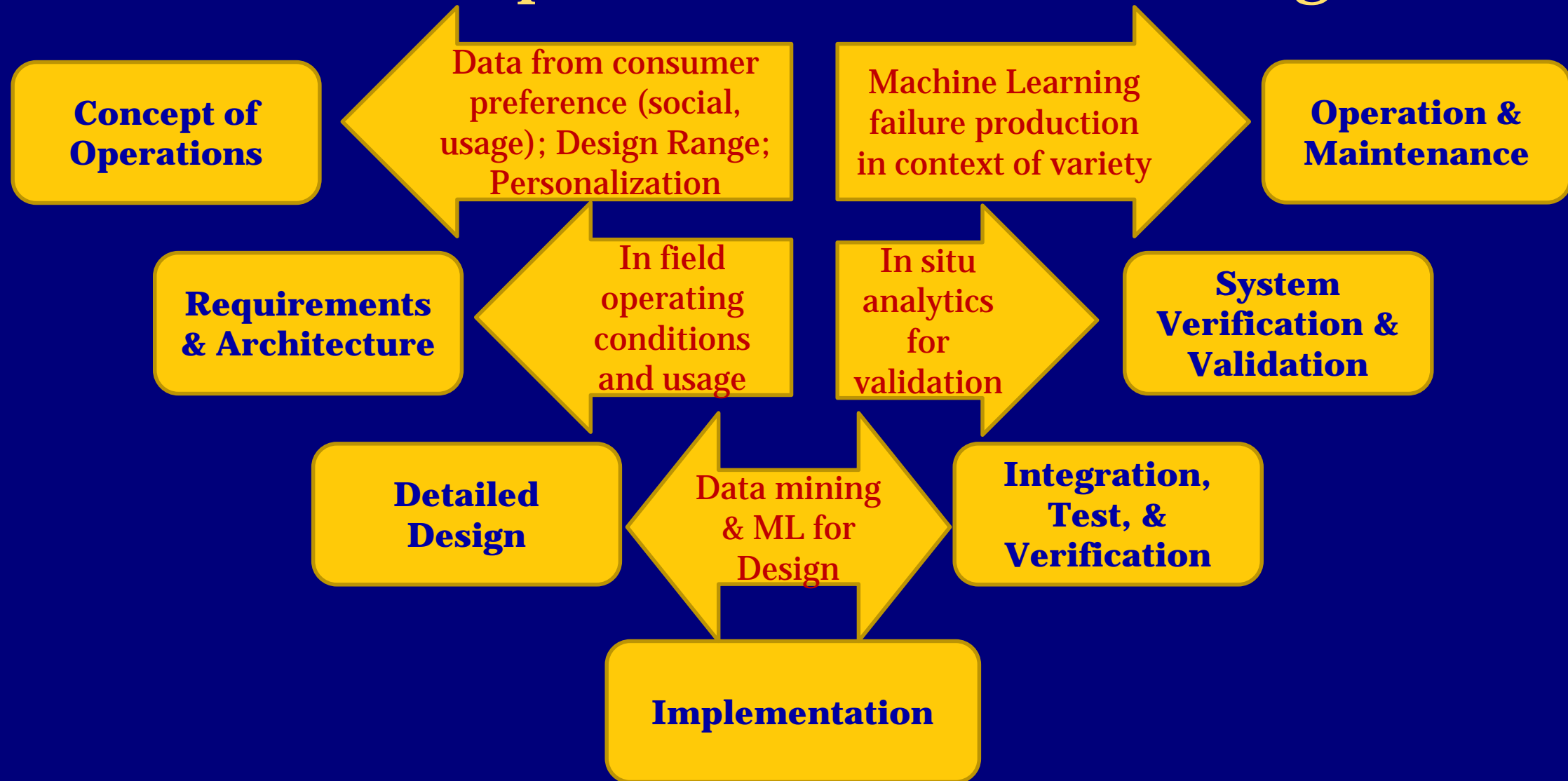
# So What??

- How Broad is ALM – Application Lifecycle Management?
- What does it all mean to Product Development?
- What does it mean to PLM?
  - More and more Systems Engineering?
- Should PLM leaders do anything different?

# Current State: Product Development Process



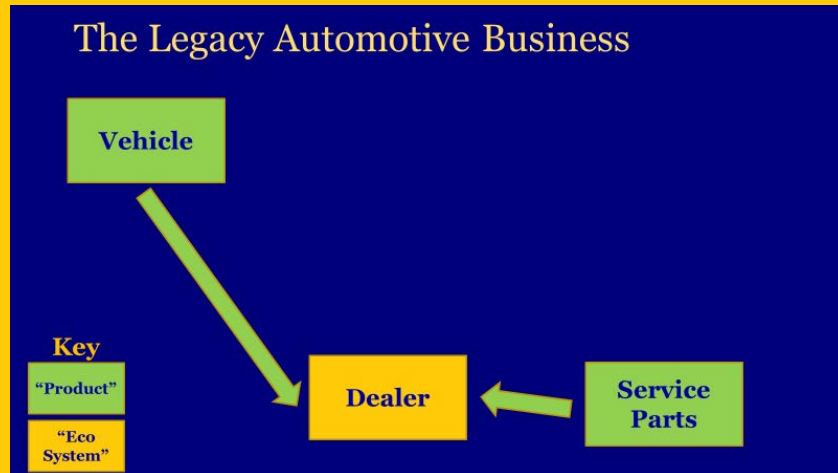
# Product Development Process: Challenges



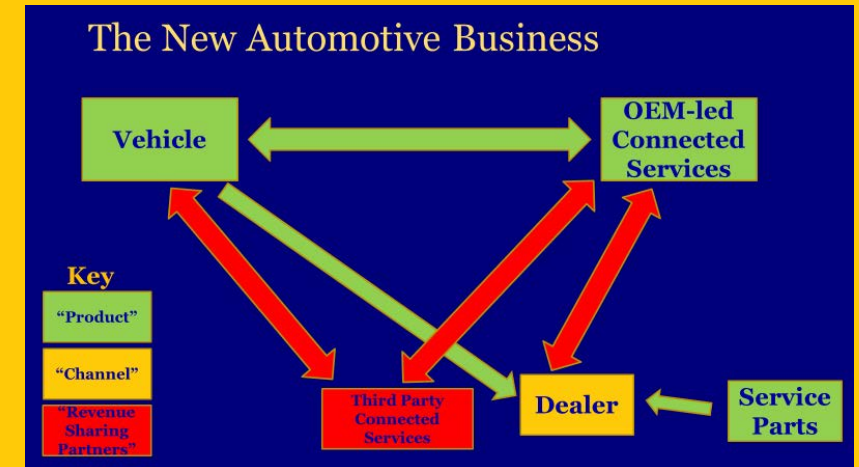
# Top Five PLM Predictions

- Companies will export PLM data to the corporate data and analytics infrastructure, creating a new dynamic around PLM data.
- There is a window of opportunity to leverage PLM knowledge to organize product information in the D&A environment (as designed, as built, as maintained) – but it is closing.
- There is a window of opportunity to leverage CAE and simulation models, before pure Machine Learning methods completely take over – rapidly closing.
- Data from the connected customer and connected product will test PLM environments and may present an entry point for new vendors.
- Opportunities to improve the core electrical and mechanical products using D&A techniques are emerging and may present an entry point for new vendors.

# Whither PLM?



**“PLM is just for the stuff that comes out the plant door”**



**“PLM is the master of the company’s products, services, and their interdependencies”**

# Imperatives for PLM Leaders

- Engage in your company's data and analytics initiatives – you have valuable data to bring to the table.
- You are an expert in organizing product information – work with the data and analytics team to leverage that expertise for the betterment of the company.
- You know a lot about product behavior – get that knowledge to be re-used in the data and analytics initiatives instead of being recreated.
- Your PD customers will be asked to leverage new information as they design the product – get ahead of it and figure out how to make it available in the PLM environment.
- Upskill your team on analytics methods and how they can improve the product and PD process.
- Don't wait for the PLM vendors to do your job leading through this change.