



Lean Supply Chain Basics

Impact of Supply Chain Management

“Only 7% of companies today are effectively managing their supply chain. However, these companies are 73% more profitable than other manufacturers.”

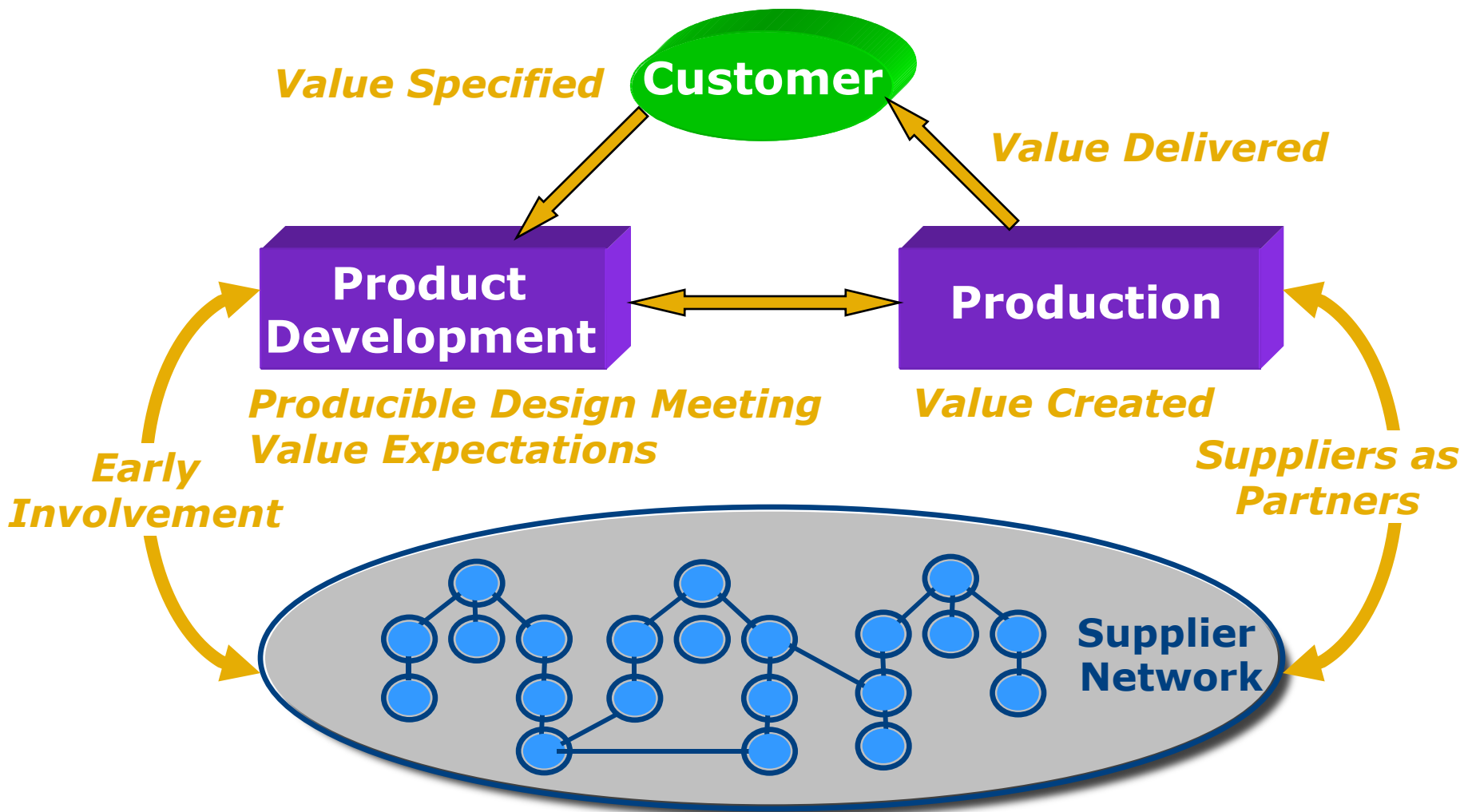
Deloitte & Touche Study, October 2003

Learning Objectives

At the end of the module, you will be able to:

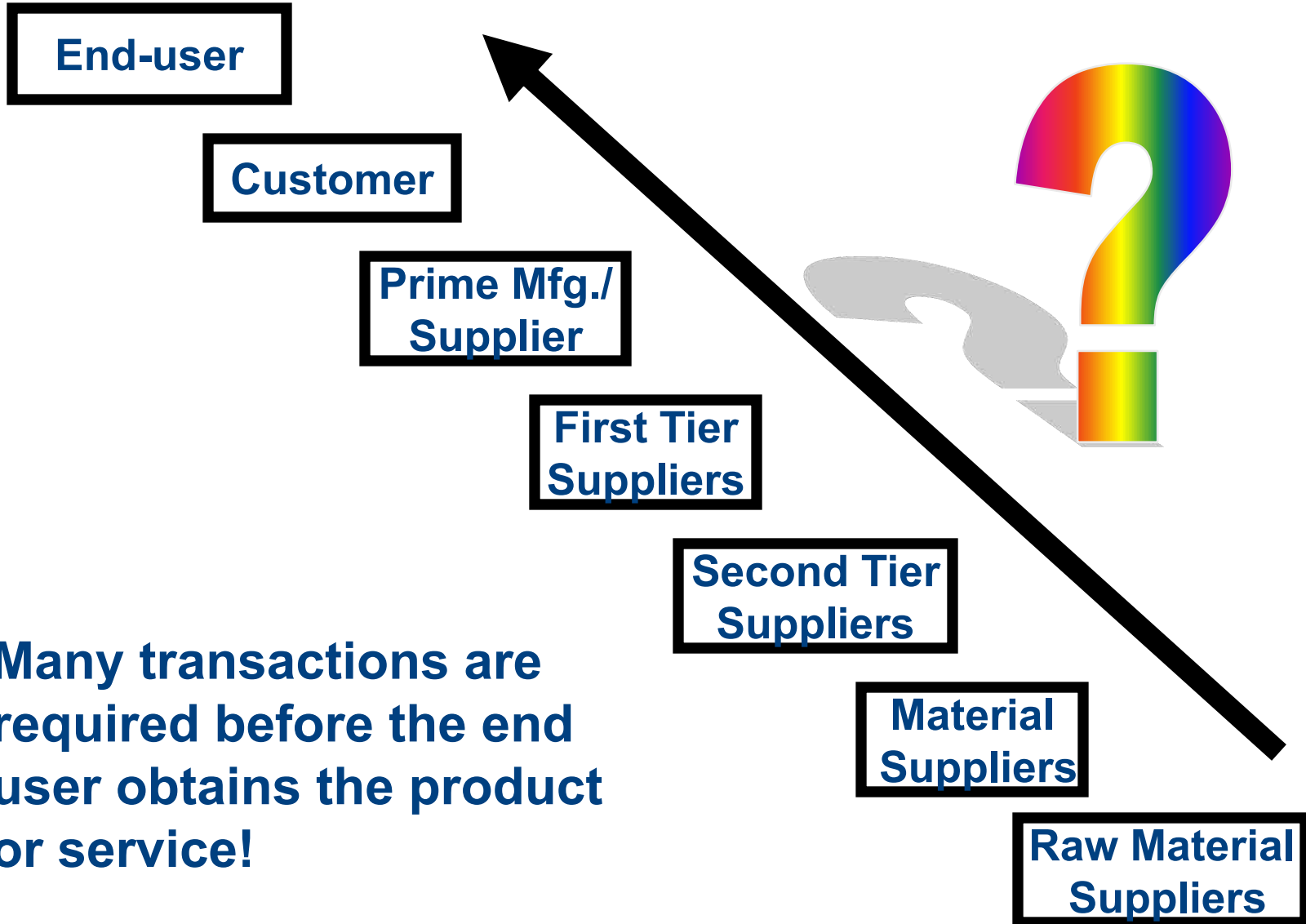
- **Recognize the importance of suppliers in the enterprise**
- **Describe key attributes of a lean supply chain**
- **Discuss methods for the improvement of existing supply chains**

Suppliers Are Critical In The Value Chain



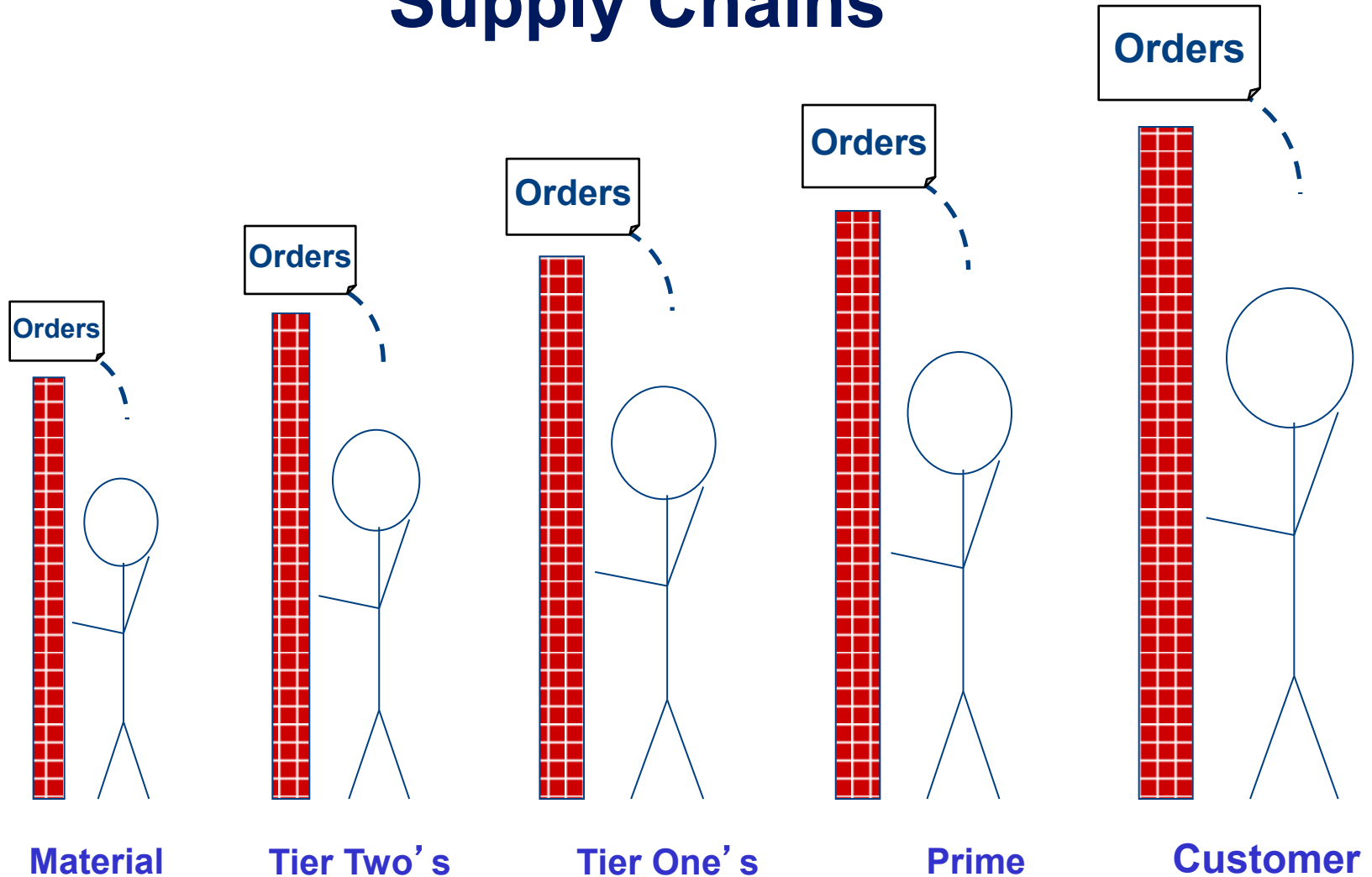
Typically, 60-80% of Value Added by Suppliers

What Does a Supply Chain Look Like?



Many transactions are required before the end user obtains the product or service!

Current State of Many Supply Chains



Communications across the supply chain is like tossing orders over a brick wall!

Lean Supply Chain Exercise

- 1. Gather your team around easel paper or a chart.**
 - 2. Discuss each concept on the list below.**
 - 3. On your chart, write a prioritized list of concepts that would best create a lean supply chain.**
- **Collaboration**
 - **Efficient supply chain with little flexibility**
 - **Limited communication**
 - **Localized focus on continuous improvement**
 - **Responsive and agile**
 - **Based on product characteristics**
 - **Enterprise approach**
 - **Long lead times**
 - **One supply chain for all products**
 - **Supplier commitment to long term relationship**
 - **Internal corporate focus**
 - **Build to print**
 - **Visibility of demand**
 - **Continuous improvement activities that include suppliers & customers**

Key Attributes of a Lean Supply Chain

- 1. Alignment of supply chain design with product characteristics**
- 2. Supplier participation in material flow and logistics**
- 3. Supplier involvement in design and development**
- 4. Seamless information flow**

1 - Matching Supply Chains with Products

- “Push” supply chain is focused on *efficiency* for meeting predictable demand at lowest cost.
 - Typically for long product lifecycle and mature or commodity items
- “Pull” supply chain is focused on *responsiveness* for unpredictable demand to avoid inventory & stock outs.
 - Typically for shorter product life cycle, custom items
- The reality is that a given product may have components of both the efficient and responsive supply chain designs. This approach has been labeled the Hybrid Supply Chain.

2 - Supplier Participation in Material Flow and Logistics

- **Just-in-time deliveries**
Eliminates inventory - but parts *must* show up on time!
- **Kitting for point-of-use**
Eliminates unpacking, looking for parts - requires supplier involvement in production system design
- **Vendor-Managed Inventory**
Vendor owns it, keeps track of it, until it is used
- **Third Party Logistics**
Have FedEx handle these?

*Different supply chain designs
require different practices*

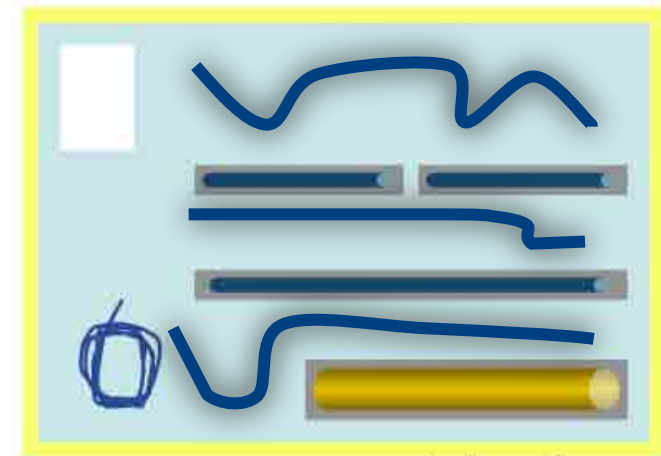
Atlas V Launcher Tubing

Old Method

- Parts individually ordered
- Shipped in bubble wrap and peanuts
- Unpacked at dock – wrapping discarded
- Shelved (using good 5S)
- Fetched when needed – often missing or damaged
- Reordered by schedule or when stock-outs discovered

New Method

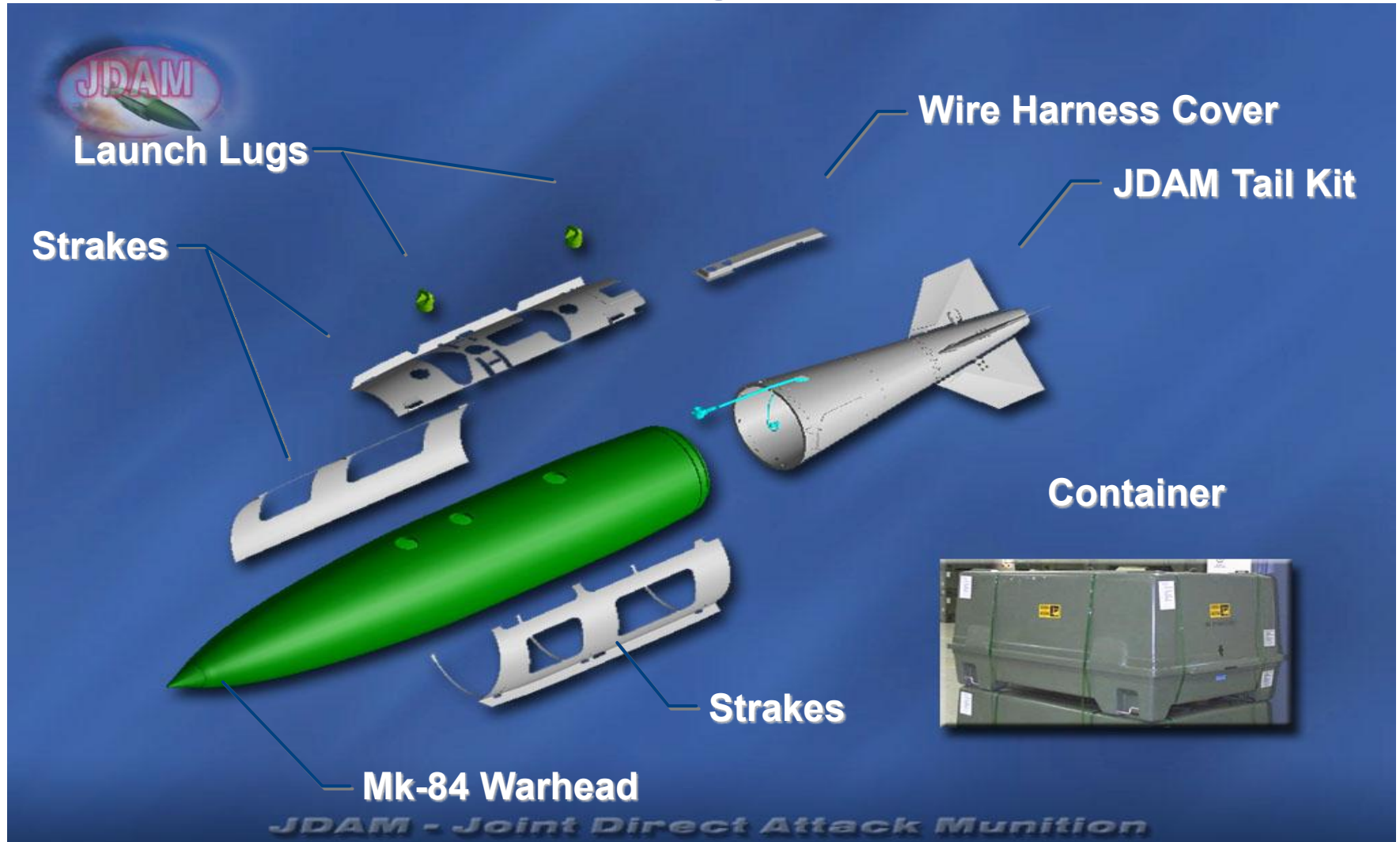
- Parts shipped in re-usable shadow boxes direct to point-of-use
- Empty box returned, triggers re-order



Parts, fasteners, tools, instructions

Category	Reduction
Inventory Carrying Cost	\$35,000 per ship-set
Internal Handling Cost	\$12,000 per ship-set
Cycle-Time	20 weeks to 14 weeks

3 - Supplier Involvement in Design and Development



Courtesy of Boeing. Used with permission.

Early Supplier Integration



Courtesy of Boeing. Used with permission.

SUPPLIER INTEGRATION

- Part of *proposal* team
- Understood project goals - **GOAL CONGRUENCY**
- Understood requirement for low cost, seamless assembly

SUPPLIER VALUE CREATION

- Major modification to system architecture
 - From “partitioned architecture” to “integrated architecture”
- Reduced Wiring / Connectors
 - Reduced unit cost
 - Improved reliability
- Re-allocated “Work Share”

PRODUCT VALUE CREATION

- Original cost est. - \$68+ K
- Final actual cost - \$15 K
- Unit costs reduced > 75%
- Total savings > \$2.9 B

4 - Seamless Information Flow

Requires communication on many levels

Customer

Supplier

Enterprise Management



Enterprise Management

Program Management



Program Management

Procurement & Contracts



Procurement & Contracts

Engineering



Engineering

Manufacturing Operations



Manufacturing Operations

Integrated Information Technology Environment

Exostar Offerings



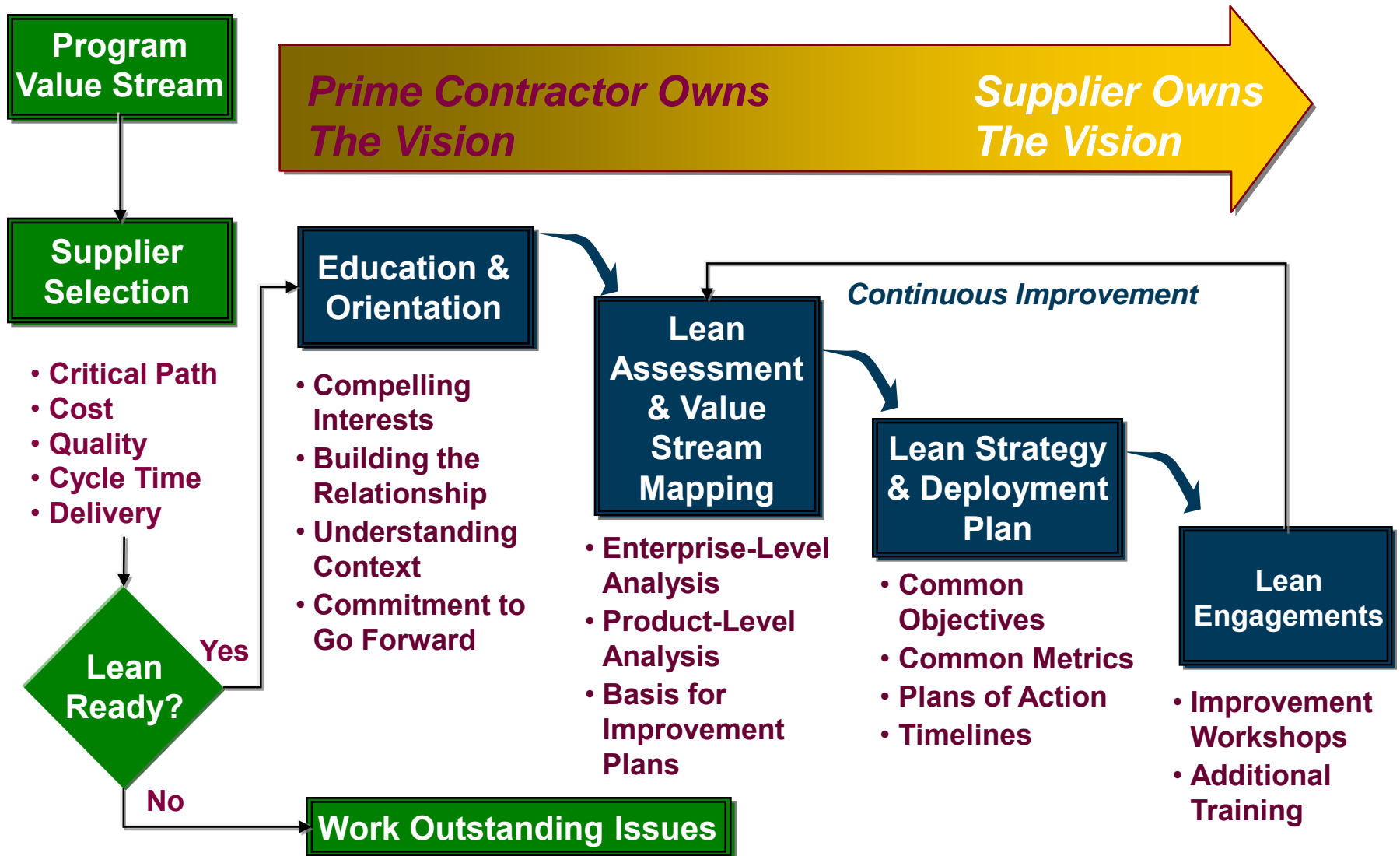
Courtesy of Boeing. Used with permission.

EXOSTAR Facilitates Supply Chain Management Streamlining

At Rolls-Royce the eProcurement implementation has produced a number of quantitative and qualitative benefits, including:

- **Rationalizing the direct supplier base from more than 5,000 to several hundred**
- **Reduction in cost of goods of up to 20%;**
- **Reduction in inventory value levels as much as 80%;**
- **Reduction in errors due to the elimination of manual re-keying of buying data;**
- **Reduced cycle time, in some cases by up to 80%;**
- **Near-elimination of paper and fax processes.**
- **Improved relations with suppliers, who have benefited from reduced transaction costs and improved efficiency.**

Improving Supply Chains



Example: Hicksville Machine Works Corp.

- Supplier worked with prime to implement lean
- Prime (Boeing) provided expertise and training for 5S, Statistical Process Control, and Set-up Time Reduction
- Savings shared, plus many additional benefits:

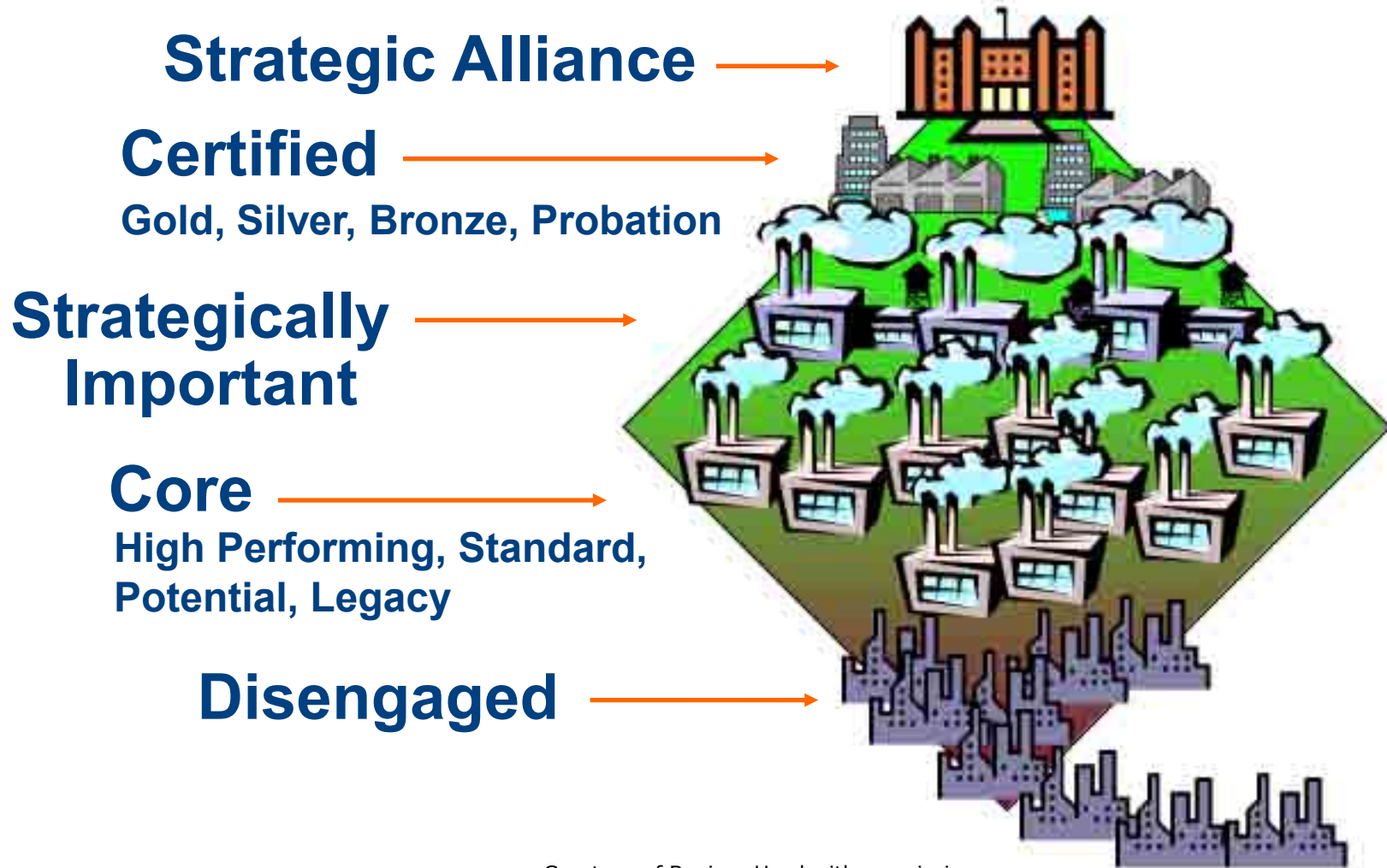
“... a good example of what good team work between a vendor and sincere Boeing personnel, ... can do. ... my Company is much more competitive than ever before. Following are some of parts we were able to reduce the unit prices on:

<u>P/N</u>	<u>Previous Unit Price</u>	<u>New Unit Price</u>
17P2A5224-1NC	\$1815.00	\$751.68
17P2A5821-1	\$1992.00	\$639.33
17P2A5829-1NC	\$2531.72	\$1024.00

These types of savings will apply to all parts we manufacture.”

-Jack Spezio, President

Supply Base Stratification - Five Levels

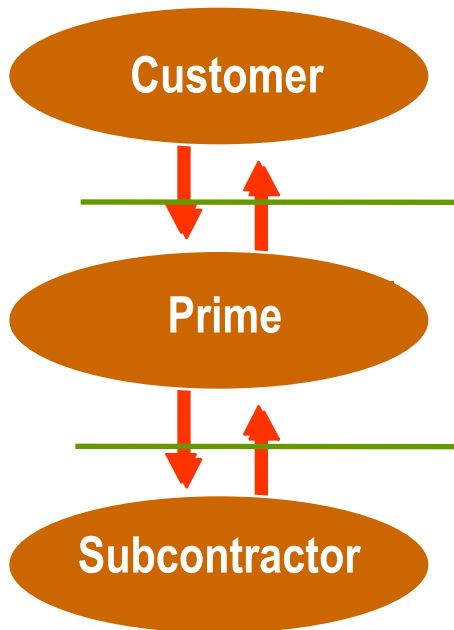


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Future State in Lean Relationships

“Old” Approach

Rigid vertical interfaces and control



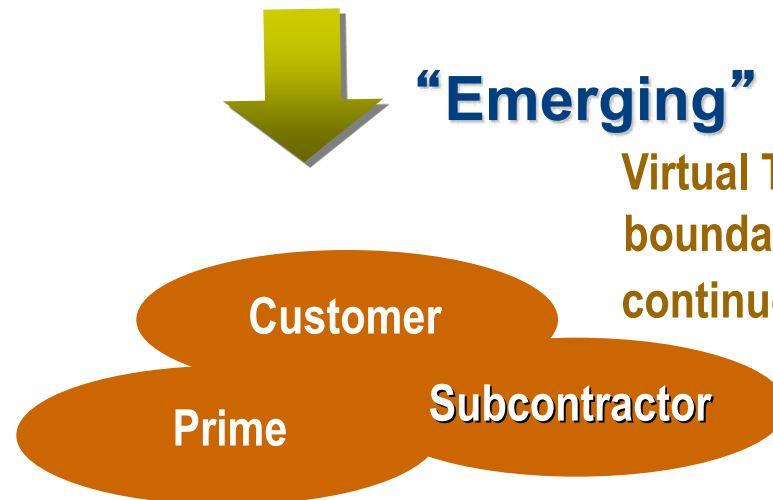
“Current” Lean

Collaborative with rigid organizational interfaces



“Emerging” Lean

Virtual Team without boundaries enabling continuous innovation



Lean Supply Chain Wrap Up

- **Suppliers are critical to lean enterprise success**
- **Supply chains need to be understood and designed to meet the needs of the product enterprise needs**
- **Legacy supply chains can be improved through win-win customer-supplier teamwork.**

Supply Chain Management is a lean enterprise core competency

Exercise

- **What aspects of a Lean Supply Chain can you implement today to improve your enterprise's performance?**
- **Spend the remaining time capturing these on an easel chart for your team's use.**

Reading List

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Acknowledgements

Contributors

- **Kirk Bozdogan - MIT LAI**
- **Tom Callarman - ASU**
- **Al Haggerty - MIT, Boeing (ret.)**
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- **Earl Murman - MIT**
- **Sue Siferd – ASU**

Collaborators

- **Tim Mead - DAU**
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