

Enterprise Integration for Value Creation

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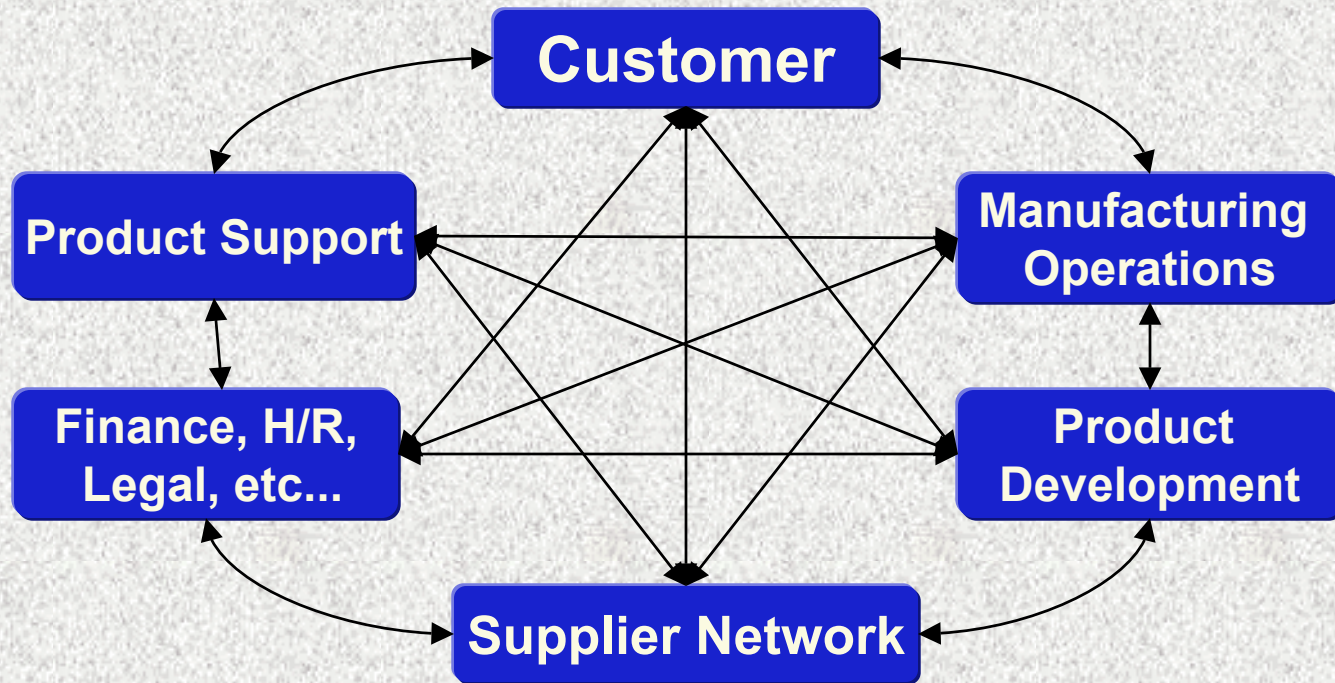
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Define Enterprise in a Lean Context

“A lean enterprise is an integrated entity that efficiently creates value for its multiple stakeholders by employing lean principles and practices.”

Source: Murman et al., *Lean Enterprise Value*, Palgrave, 2002

Integrated Enterprise



Lean Enterprise System

A Lean Enterprise Requires the Integration of


- Processes
- People / Organization
- Information
- Technology
- Products

Holistic View


Enterprise as a System

What Does It Mean to Integrate?

 Why Integrate?

 Where in the enterprise should integration take place?

 How much integration?

 Who needs to be involved in the integration process?

Enterprise System Issues

Standardization

- Across products, processes, technology and information management

Integration

- Within and across enterprise boundaries






Leadership

- Required for complex transformation

“Enterprise Engineering”

- New expanded tool set required

Leadership Issues

-  Optimization across multiple stakeholder objectives
-  Global communication and seamless information flow
-  Change management and enterprise transformation
-  Enterprise “value metrics”
-  Organizational effectiveness

Multi-program Enterprises add Value beyond that Created by Programs in Isolation

Multi-program enterprises can:

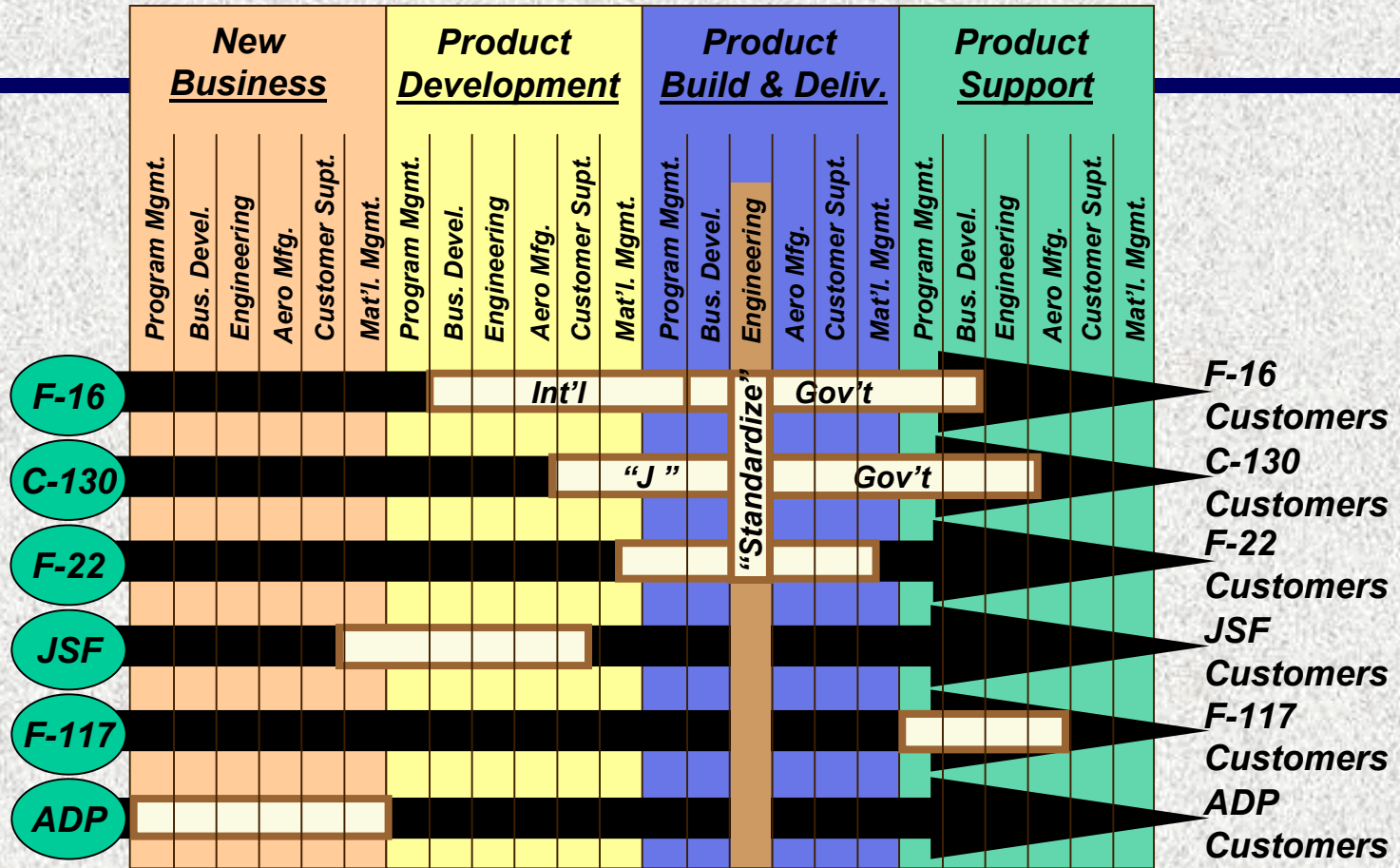
- Increase scope of possible value creation activities by allowing specialization and integration of expertise
- Enhance productivity through coordination and creation of enabling infrastructures
- Manage knowledge creation and reuse to achieve economies beyond those found in markets

A Key Issue in Multi-Program Enterprise Design is Balancing Demands of Local Performance with Enterprise Integration/Capability

- ☞ Program enterprises typically generate revenue streams
- ☞ Multi-program enterprise typically provides enabling infrastructure as a service
- ☞ Overhead policy provides support for enterprise infrastructure
 - Dilemma: how to prioritize allocation of enterprise resources between “direct” and “indirect” functions
- ☞ Important multi-program enterprise value creating activity is integrating knowledge and processes across multiple enterprise boundaries

Example of One Challenge.....

Value Streams, Processes & Program Phases




Enabling Processes
 Financial Integrity
 Staffing, On-Boarding & Retention
 Information Management, ...

3 Approaches to Enterprise Integration

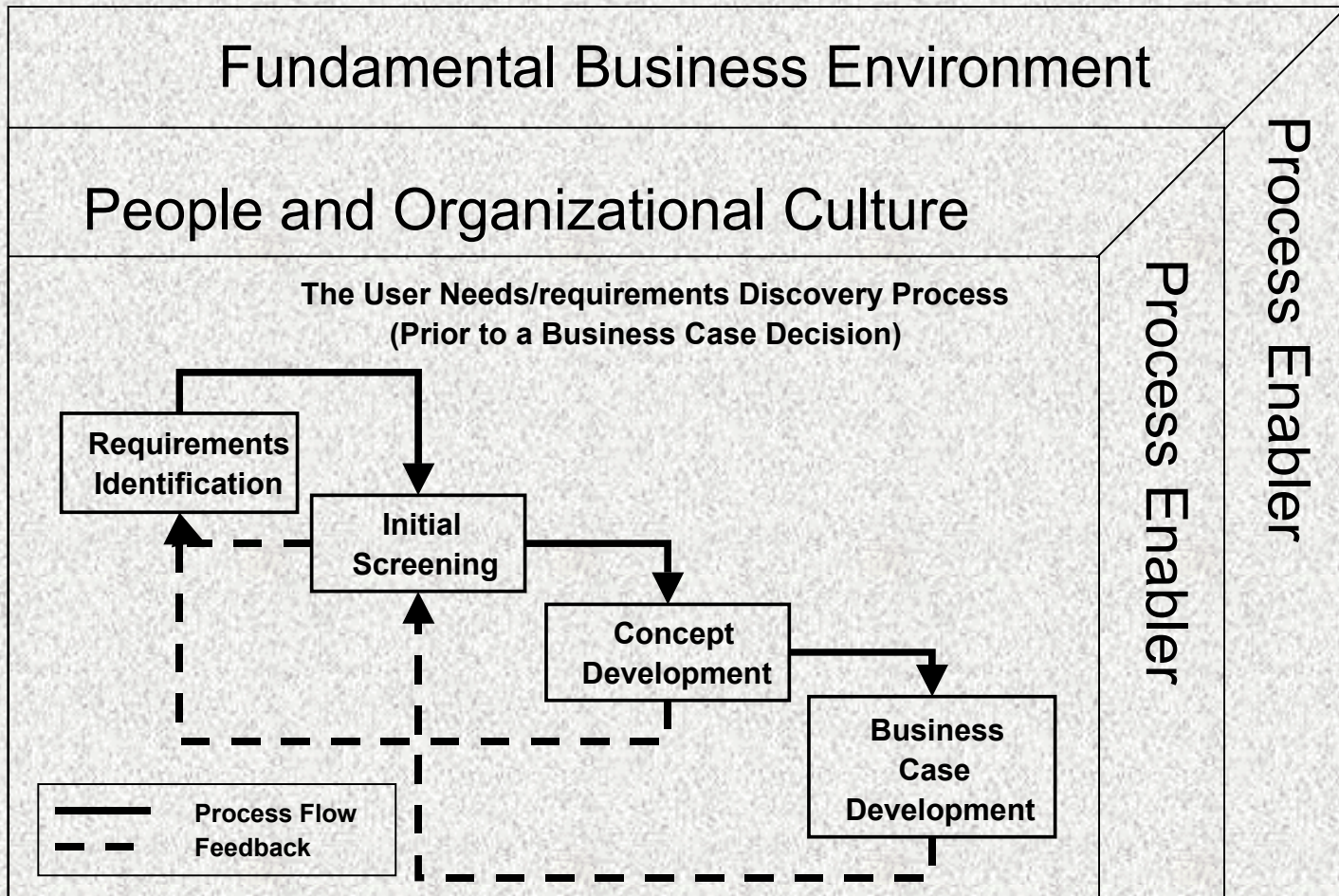
- ☰ Directive control: prescribe enterprise behavior by policies, rules, and resources
- ☰ Managing the architecture: direct enterprise behavior when a few but not all stakeholders are under direct control
- ☰ Collaboration: influence key stakeholders' behavior when they are outside direct control

Source: "Lean Enterprise Value", Murman et al., Palgrave, 2002

Directive Control is Used when Key Enterprise Stakeholders are Under a Single Management Structure

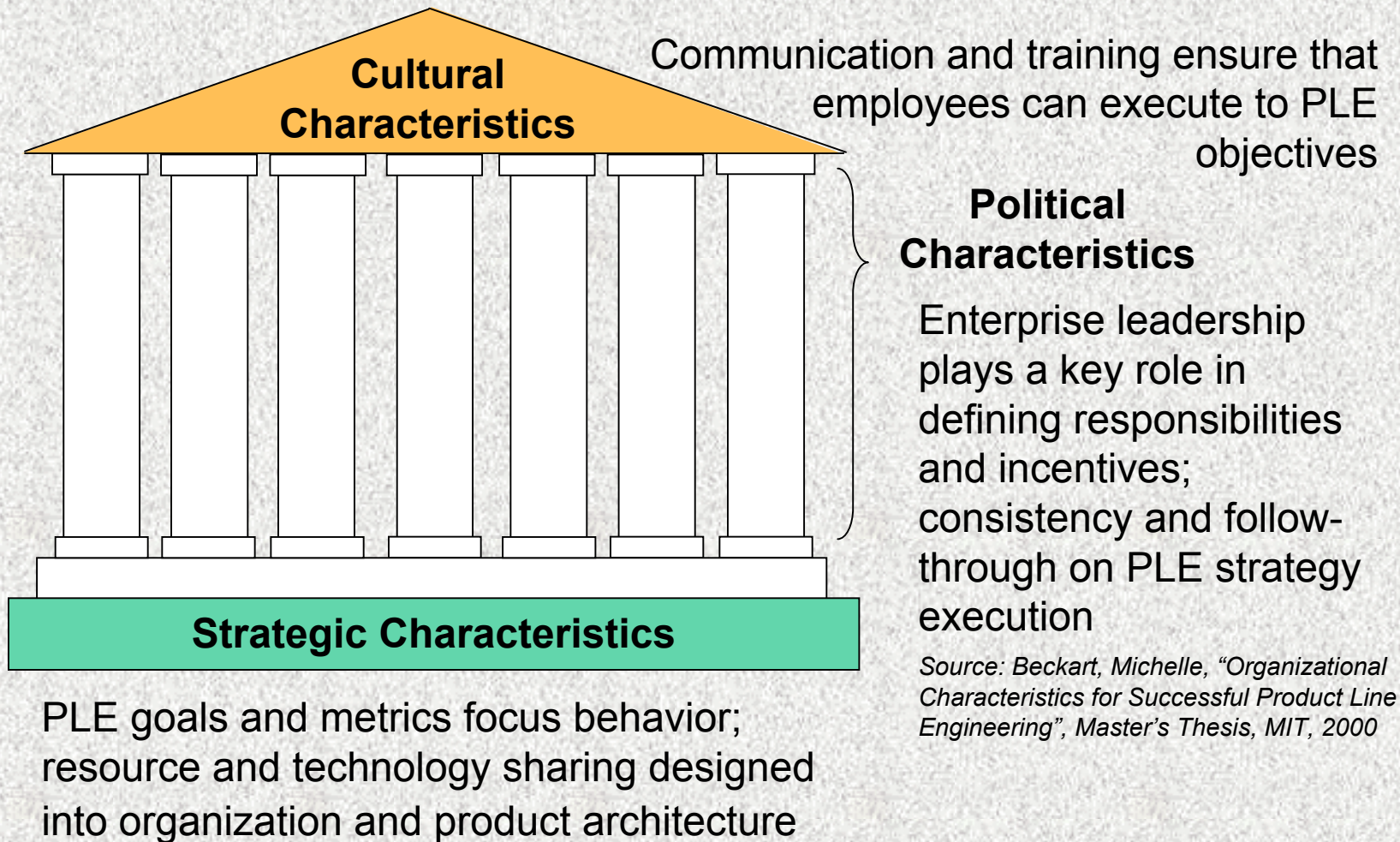
- Have direct control over organizational and aspects of enterprise and technology architecture
- Classic hierarchy structure
- Top-down definition of roles, responsibilities, policies and procedures, and incentives
- Examples from product development starting with the front end and running through design

A High-Performing PD Front End Relies on Deliberate Analysis Embedded in Organizational Capabilities



Source: Wirthlin, J.R., "Best Practices in User Needs/Requirements", Master's Thesis, MIT, 2000

Building Product Line Engineering (PLE) Capability in Enterprises



Source: Beckart, Michelle, "Organizational Characteristics for Successful Product Line Engineering", Master's Thesis, MIT, 2000

Co-Location Improves Integration

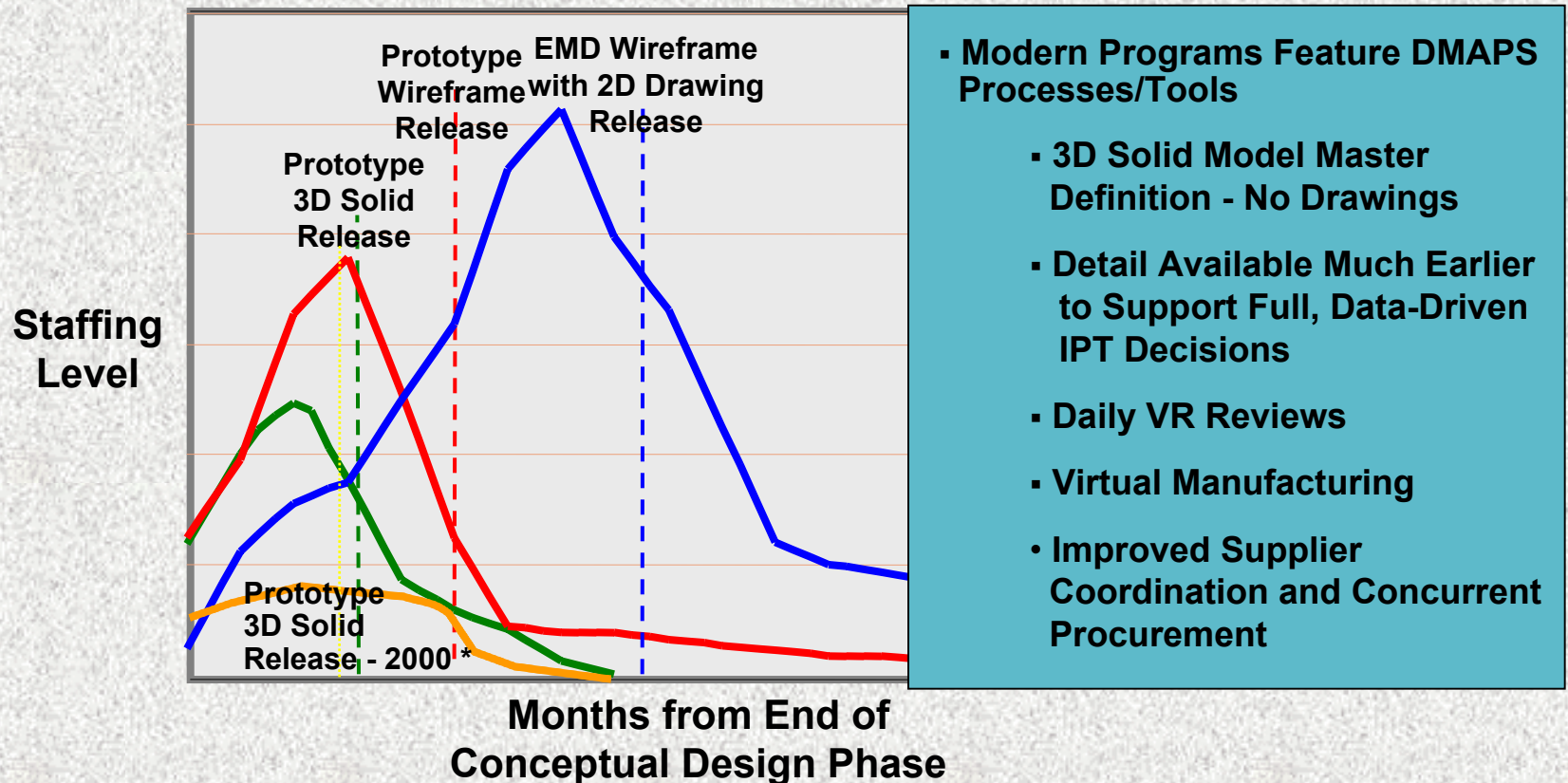
- Scope: *Class II , ECP Supplemental, Production Improvements, and Make-It-Work Changes Initiated by Production Requests*
- Value stream simplified, made sequential/concurrent.
- Single-piece flow implemented in co-located “Engineering cell”
- Priority access to resources

849 BTP packages from 7/7/99 to 1/17/00

Category	% Reduction
Cycle-Time	75%
Process Steps	40%
Number of Handoffs	75%
Travel Distance	90%

Modern Tools Improve Cycle Time

Forward Fuselage Development Total IPT Labor

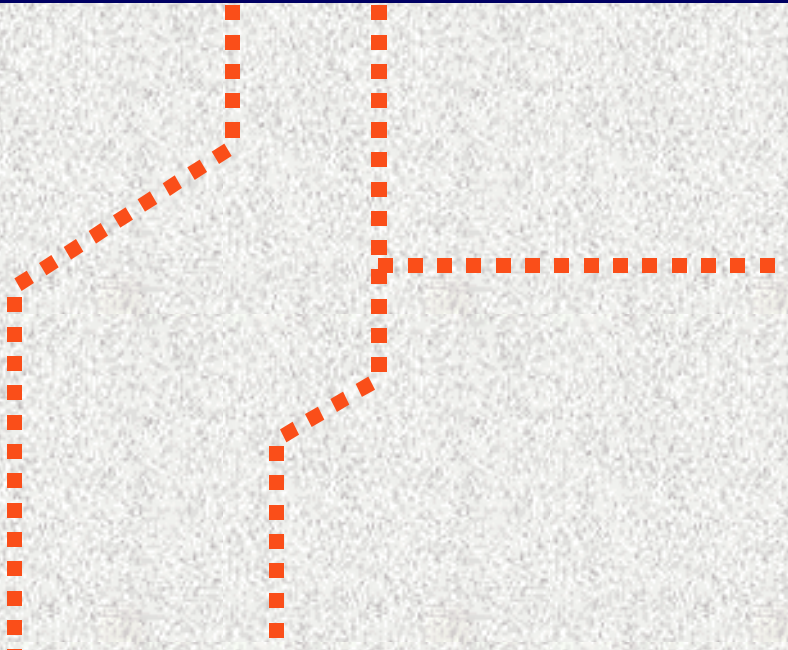


Modern Programs Feature DMAPS Processes/Tools

- 3D Solid Model Master Definition - No Drawings
- Detail Available Much Earlier to Support Full, Data-Driven IPT Decisions
- Daily VR Reviews
- Virtual Manufacturing
- Improved Supplier Coordination and Concurrent Procurement

* Indicates results from vehicle of approximate size and work content of forward fuselage

Implementation of Shared Services



- **Map the HR&A Value Stream**
- **Identify & Eliminate Redundant Processes, Procedures and Shadow Organizations**
- **Standardize HR&A Processes Across the Sector**
- **Establish Pull by Providing Those Services on Demand**
- **Level-Load Processes**
- **Lower Costs**

Source: Ellis, R. Northrop Grumman, "Lean Enabled HR&A" Presentation at LAI Executive Roundtable, Dec 13, 2001.

Observations on Directive Control Approaches to Enterprise Integration

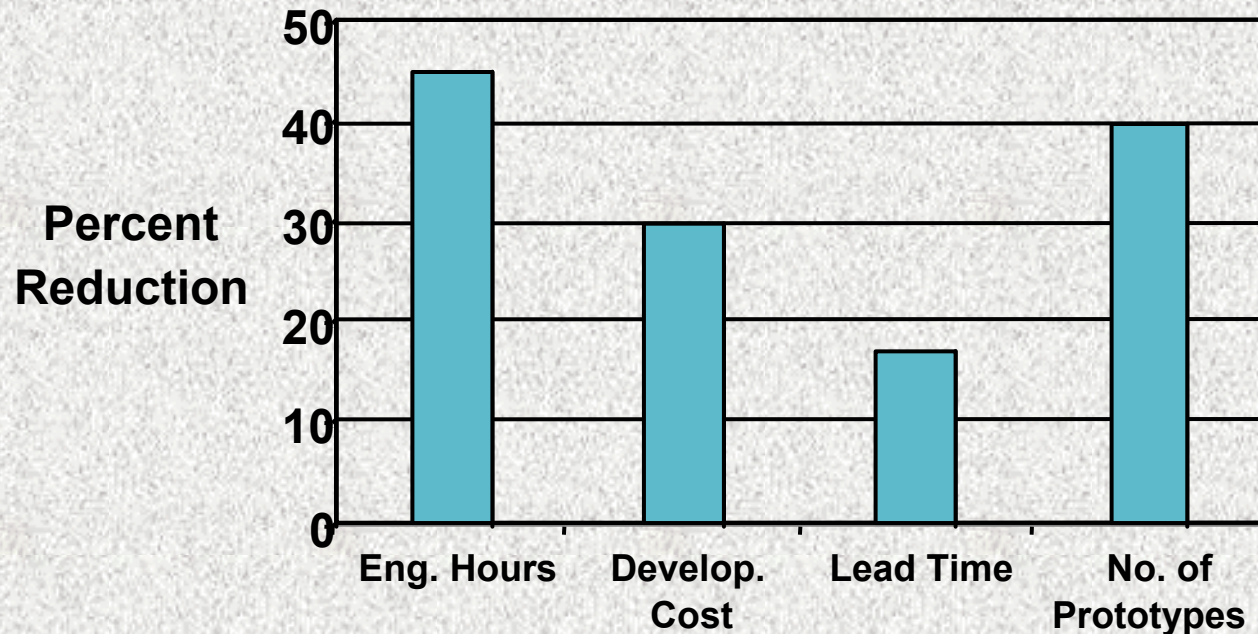
- 📄 Senior management buy-in to phase gate or PLE process essential
- 📄 Continuous review of how projects line up against enterprise strategy
- 📄 Discipline required to ensure new products fit within strategic plan
- 📄 Formal product development processes defined
- 📄 Formal portfolio management processes in place
- 📄 High performance using directive control involves deliberate organizational and product design

Source: Beckart, op. cit.

Manage the Architecture when Key Enterprise Stakeholders are outside Hierarchical Influence

- ☞ Key stakeholders (product line managers, risk-sharing partners, etc.) fall outside the domain of control of enterprise leaders
- ☞ Limited control over organizational dynamics compensated by emphasis on control over product architecture
- ☞ Ex: Toyota product centers
- ☞ Focus is to re-use knowledge, verified designs, existing infrastructure, and enterprise relationships
- ☞ Tradeoff is efficiency (enabled through reuse) with performance (in meeting a specific customer's demands)

Concurrent Technology Transfer in the Auto Industry Demonstrates NRE Savings



Cusumano and Nobeoka, "Thinking Beyond Lean," 1998 Data based on 6-year MIT IMVP study of 17 auto manufacturers, 103 new programs .

Improvements a result of concurrent technology transfer and multi-project management

Taking a Lifecycle View Requires Perspective Across Multiple Enterprises and Stakeholders
