

Electronic Commerce: What Does It Mean for Manufacturing?

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Outline

- Manufacturing Business Drivers
- Traditional View: Manufacturing Systems
- Accounting Centric Supply Chains
- Another Context:
Execution-Based Supply Chains
- Impact on Manufacturing

Manufacturing Business Drivers

- Newtonian vs Quantum Manufacturing
- Forecasting vs Agility-based Planning
- Fixed vs Dynamic Resources
- Traditional IT vs UCC Appliances

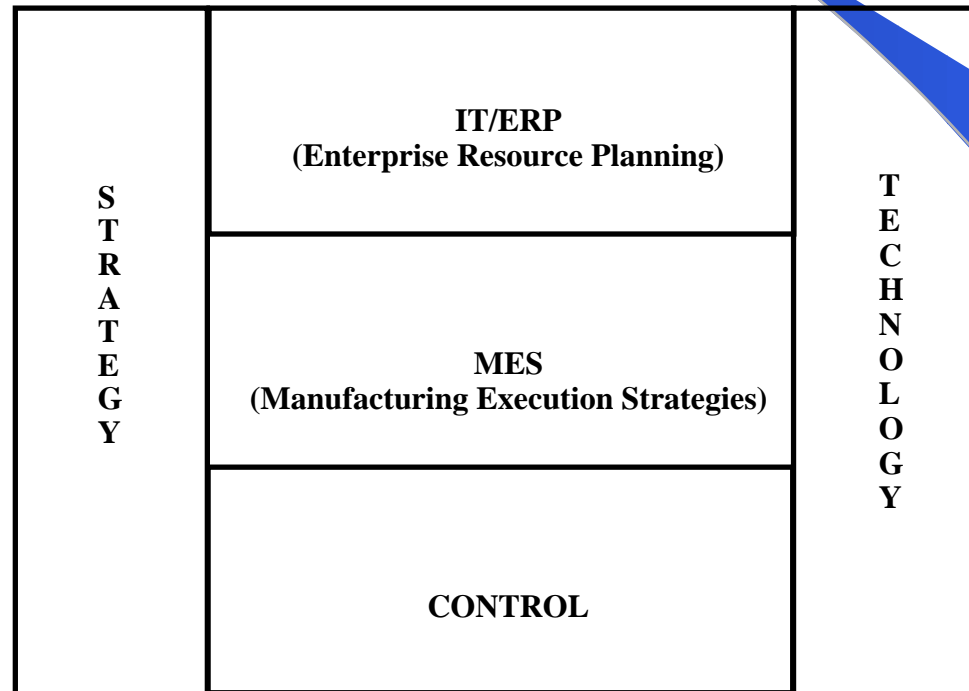
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Execution-Based Supply Chains
- Electronic Commerce Challenges for
Manufacturing

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- **Manufacturing Business Drivers**
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Traditional Manufacturing Systems Model



Traditional IT View

- **Priority**
Cost And Resource Optimization
- **Orientation**
Technology-Centric, *Not* Business-Centric
- **Organization**
Central Resources, Central Control
- **User View**
Non-Agile, Slow To Non-Responsive, Little Sensitivity To Downtime
- **Outcome**
CIO = Career Is Over

Traditional Plant Ops View

- **Priority**
Ship Product
- **Orientation**
Get It Done/Hide From & Block IT
- **Organization**
Loosely-Coupled, Redundant, Crisis-Driven
- **User View**
Multiple Point Solutions
- **Outcome**
Operations Critical, But Not Well Understood Or Valued

Traditional Controls View

- Priority

Real Time, 7x24 Equipment And Process Control

- Orientation

“We Don’t Want *No* Data In Our Controls Systems”

- Organization

Engineering For Design, Plant Electrical And/Or Instrumentation For Maintenance

- User View

Largely Invisible

- Outcome

Electrical And Instrumentation Merged; Engineering And IT Struggle Over Controls Layer

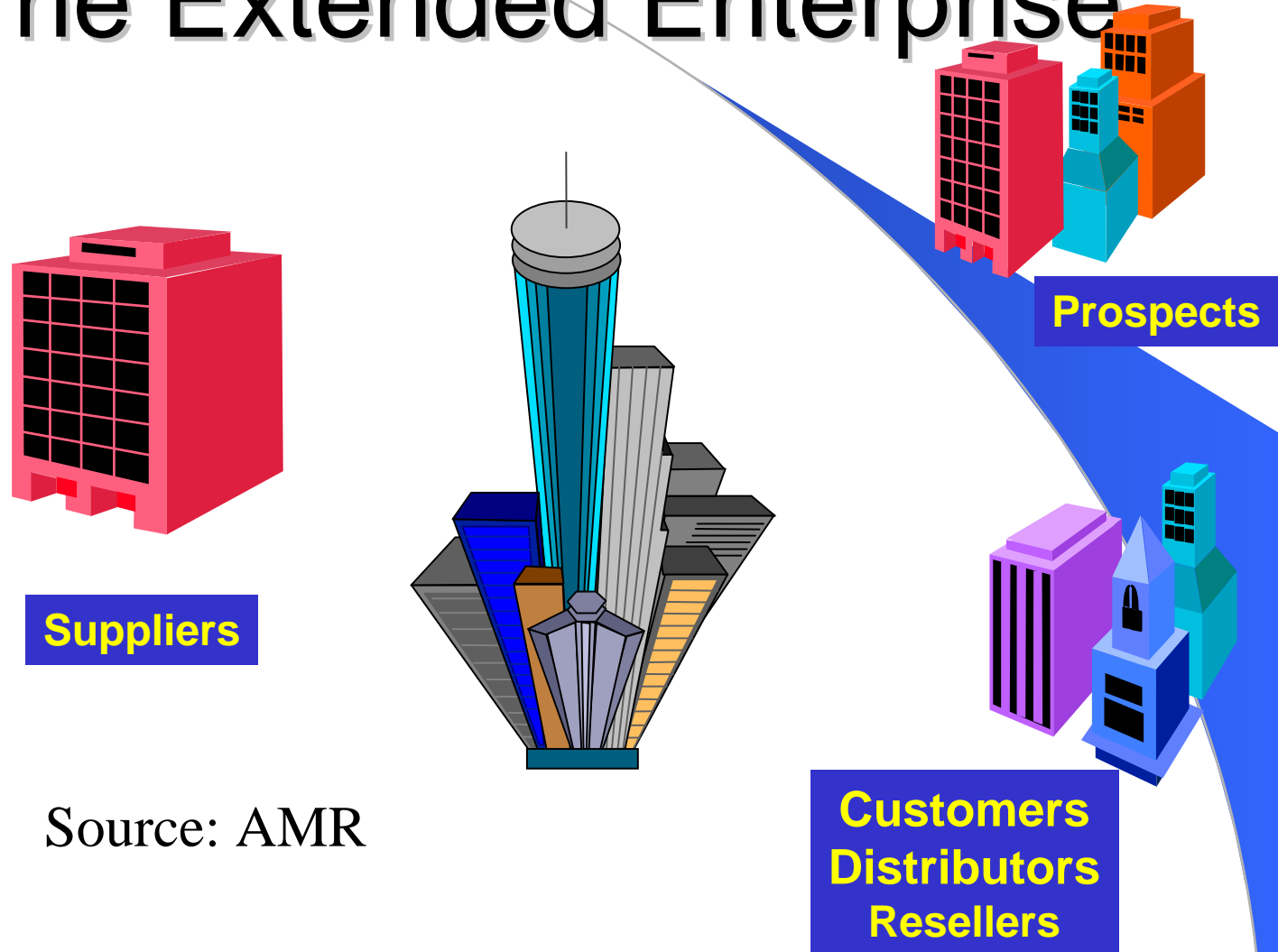
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Accounting-Centric Supply Chains

- Electronic Data Interchange (EDI)
- Enterprise Resource Planning (ERP)
- Advanced Planning and Scheduling (APS)
- Outsourced Service Providers
- Internet Specialists

The Extended Enterprise



Source: AMR

Electronic Document Interchange

- Traditional focus on cost reduction
- Internet enabled translators
 - Web forms for smaller spokes
 - Product catalogs
- Application Integration
 - Merchant Servers
 - Commerce Service Providers

IBM
GEIS
Sterling
Harbinger
Premenos
TSI

Source: AMR

Enterprise Resource Planning

- Internet ERP
- Electronic Procurement
 - Maintenance, Repair, Operations
 - Requisitioning / Collaboration
 - Direct Material
- Design Engineering / Configuration
 - Sales / Marketing
 - Field Service
- Self Service Applications

SAP
Oracle
JD Edwards
Peoplesoft
Baan
SSA
Intentia
QAD

Source: AMR

Advanced Planning and Scheduling

- Supply Chain Optimization
 - Change to channel focus
 - Collaborative demand planning
 - POS based replenishments
 - VMI services
- Multi company coordination
 - Real time POS data
 - Broadcast data

Manugistics
I2
Numetrix
Logility
Chesapeake
Red Pepper
Berclain
Fygir

Source: AMR

Outsourced Service Providers

- Increase in outsourcing
 - Third Party Logistics
 - Third Party Warehousing
 - LTL and Small Pack shipping
 - VMI Services
- Enable Virtual resellers
- EDI based integration

McHugh-
Freeman
HK Systems
Catalyst
Exeter
Manugistics
Metasys
Roadshow
CAPS Logistics
Encompass

Source: AMR

Internet Specialists

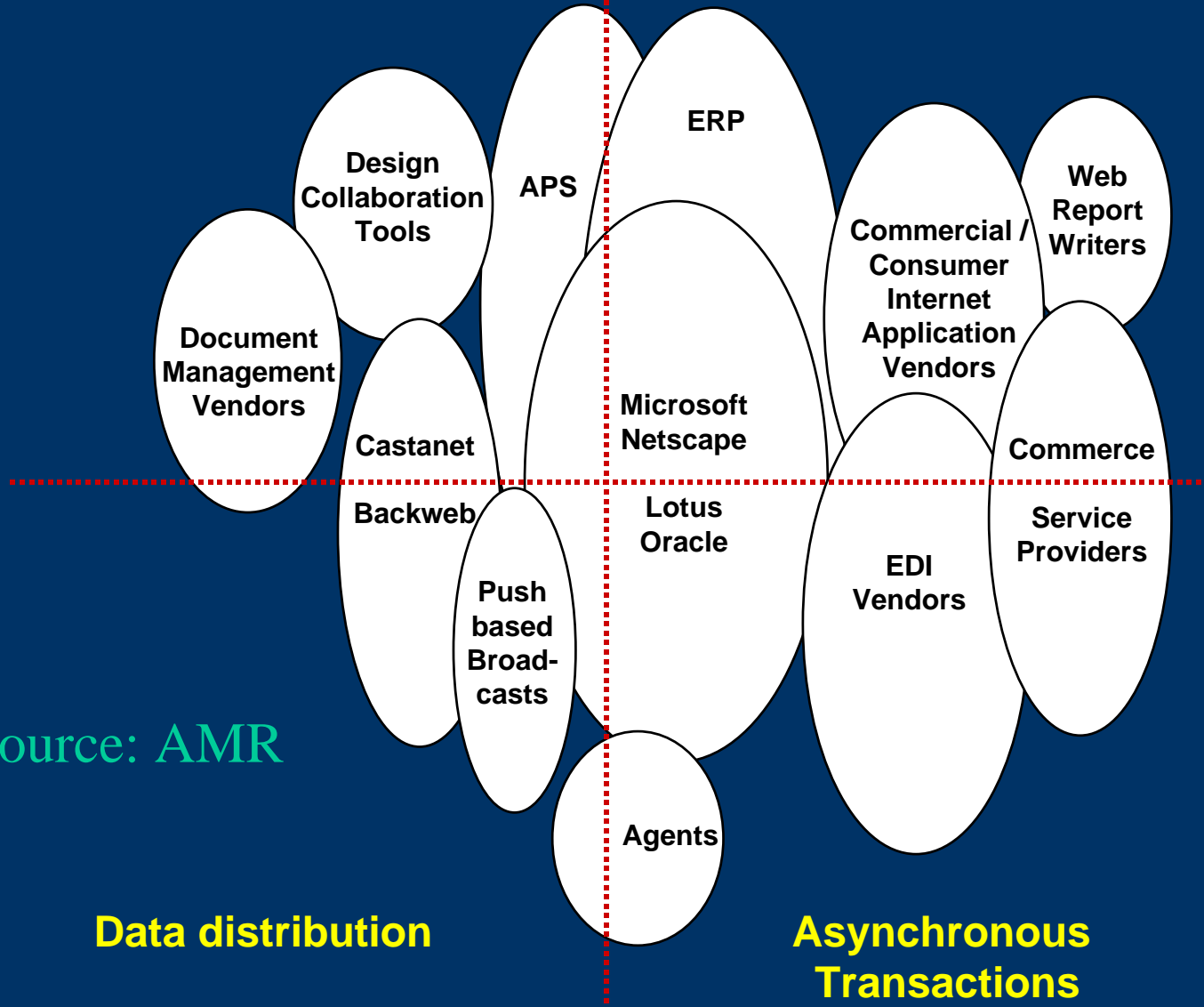
- Product Catalogs / Merchant Servers
- Customer Order Management
- Configurator / SFA
- Commerce Service Providers

Source: AMR

The Electronic Commerce Landscape

Collaboration

User Transactions



Source: AMR

Data distribution

Asynchronous Transactions

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- Manufacturing Business Drivers
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- **The New Context:**
Execution-based supply chains
- Electronic Commerce Challenges for Manufacturing

The New Context: Execution-Based Supply Chains

- Environment
- Views

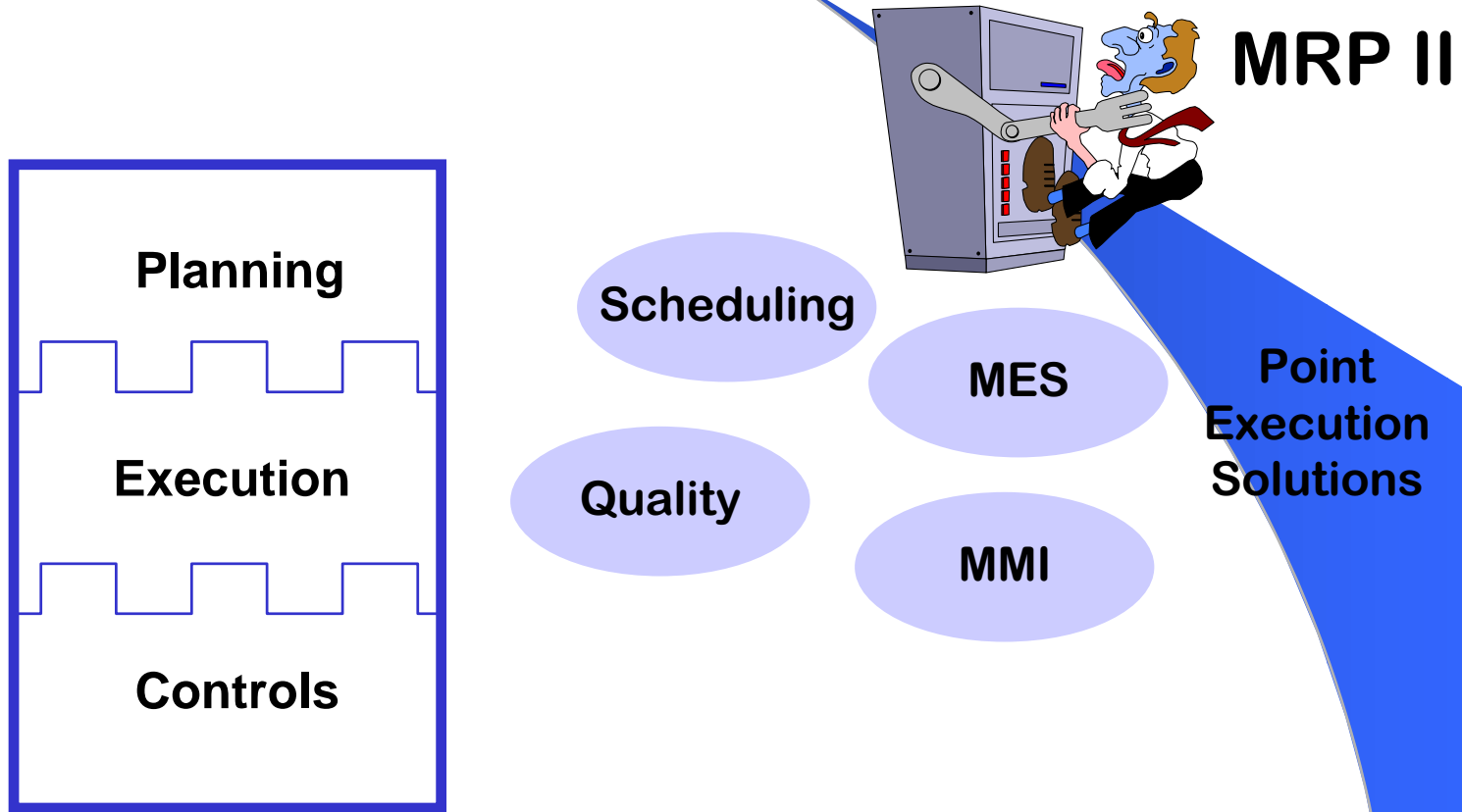
The New Context Environment

- The New Manufacturing Environment
- Patchwork of Plant Systems
- MES Model
- ERP - Plant Disconnect
- MES II Plugs Into ERP
- Plant Infrastructure

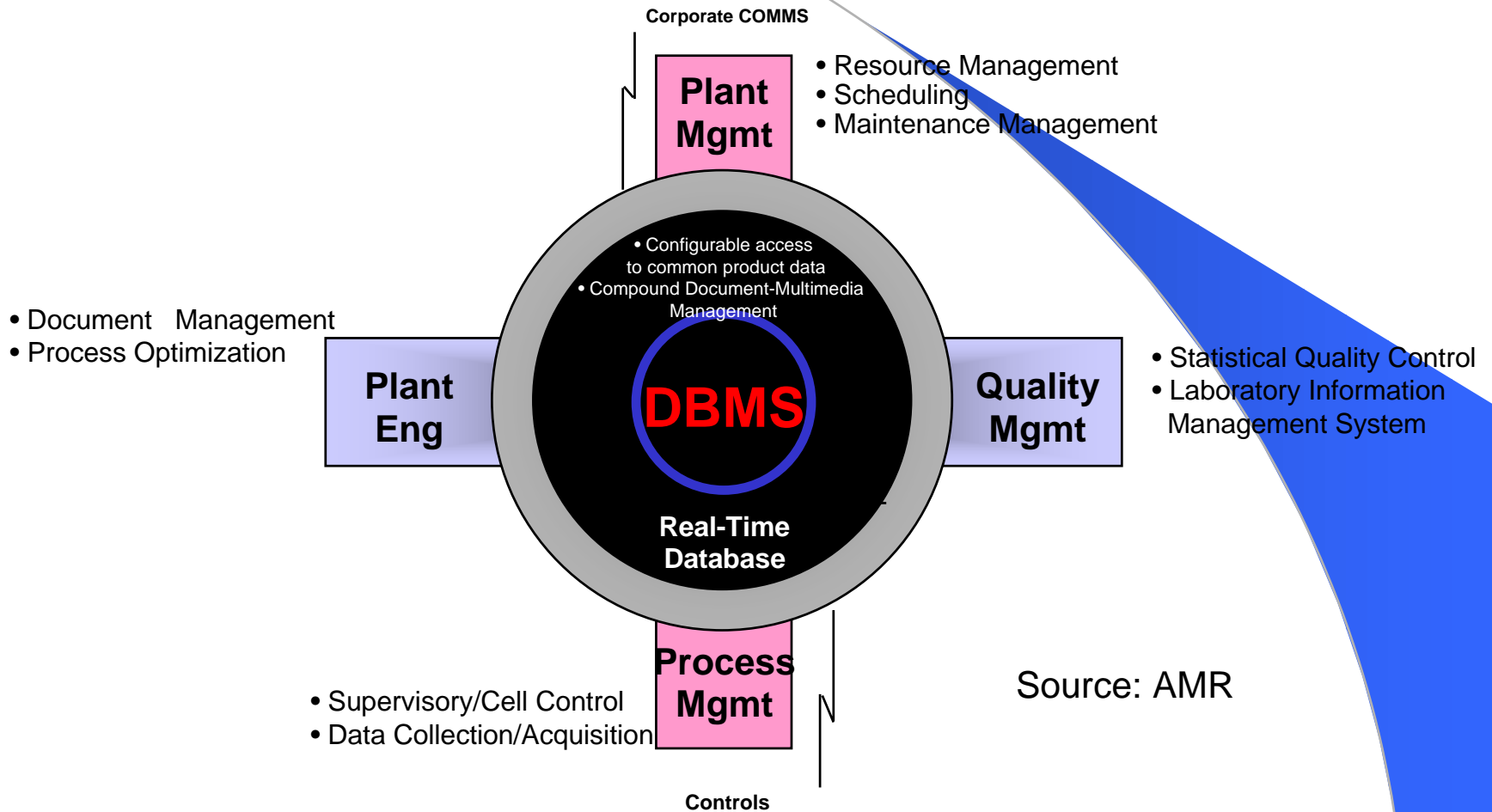
The New Manufacturing Environment

*Plants As Poker Chips
Require
Autonomous Plants*

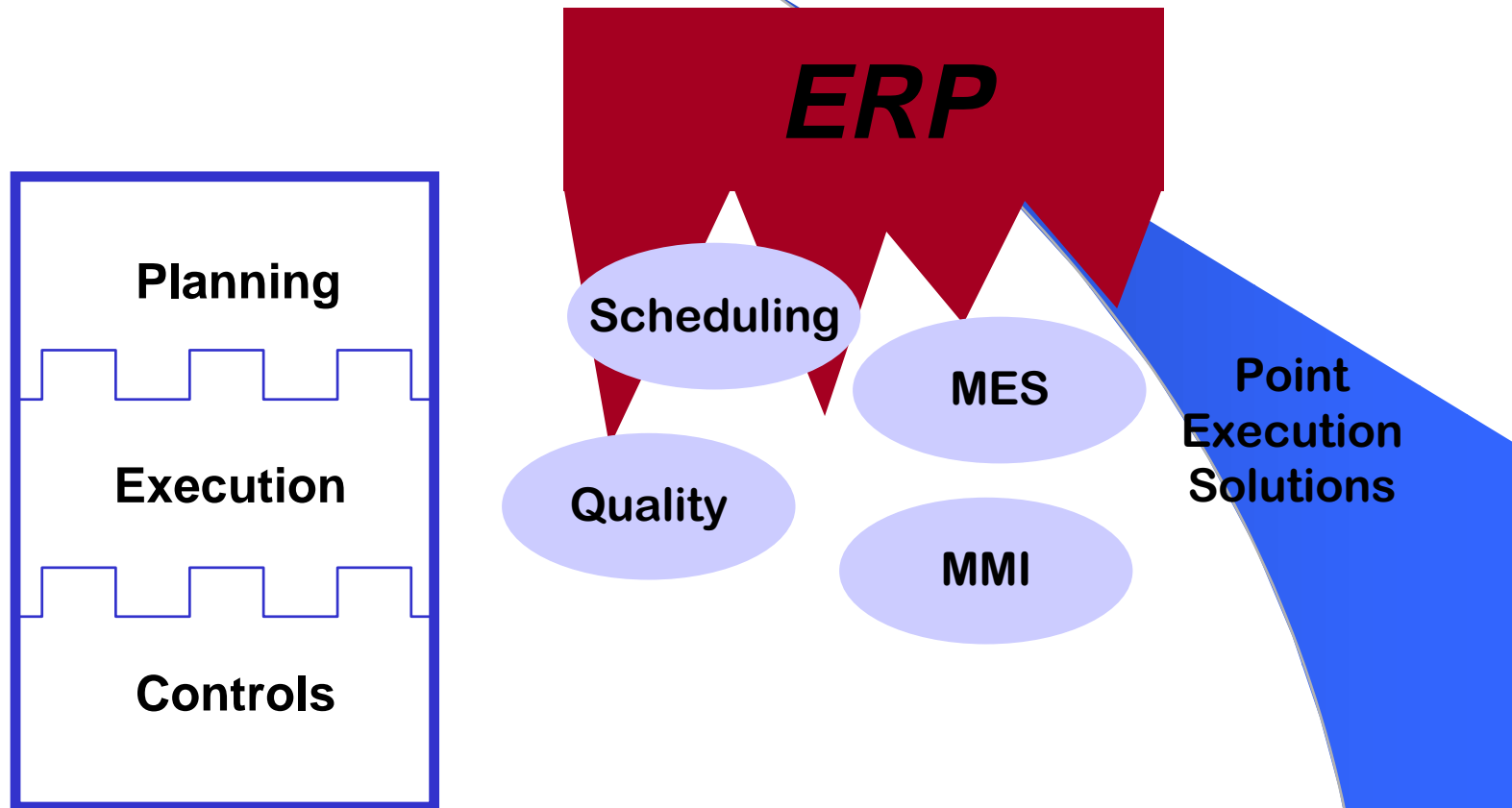
Patchwork Of Plant Systems



AMR's Original MES Model



ERP - Plant Disconnect



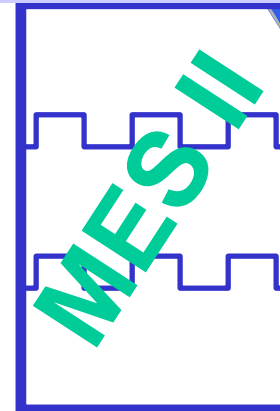
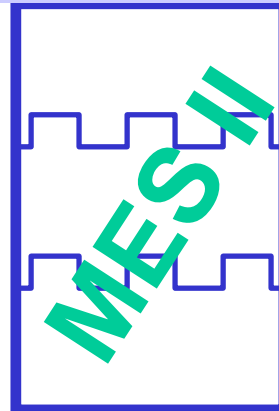
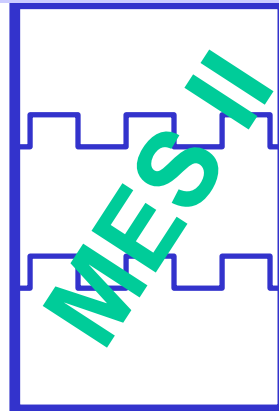
MES II Plugs Into ERP

Enterprise Resources Planning (ERP)

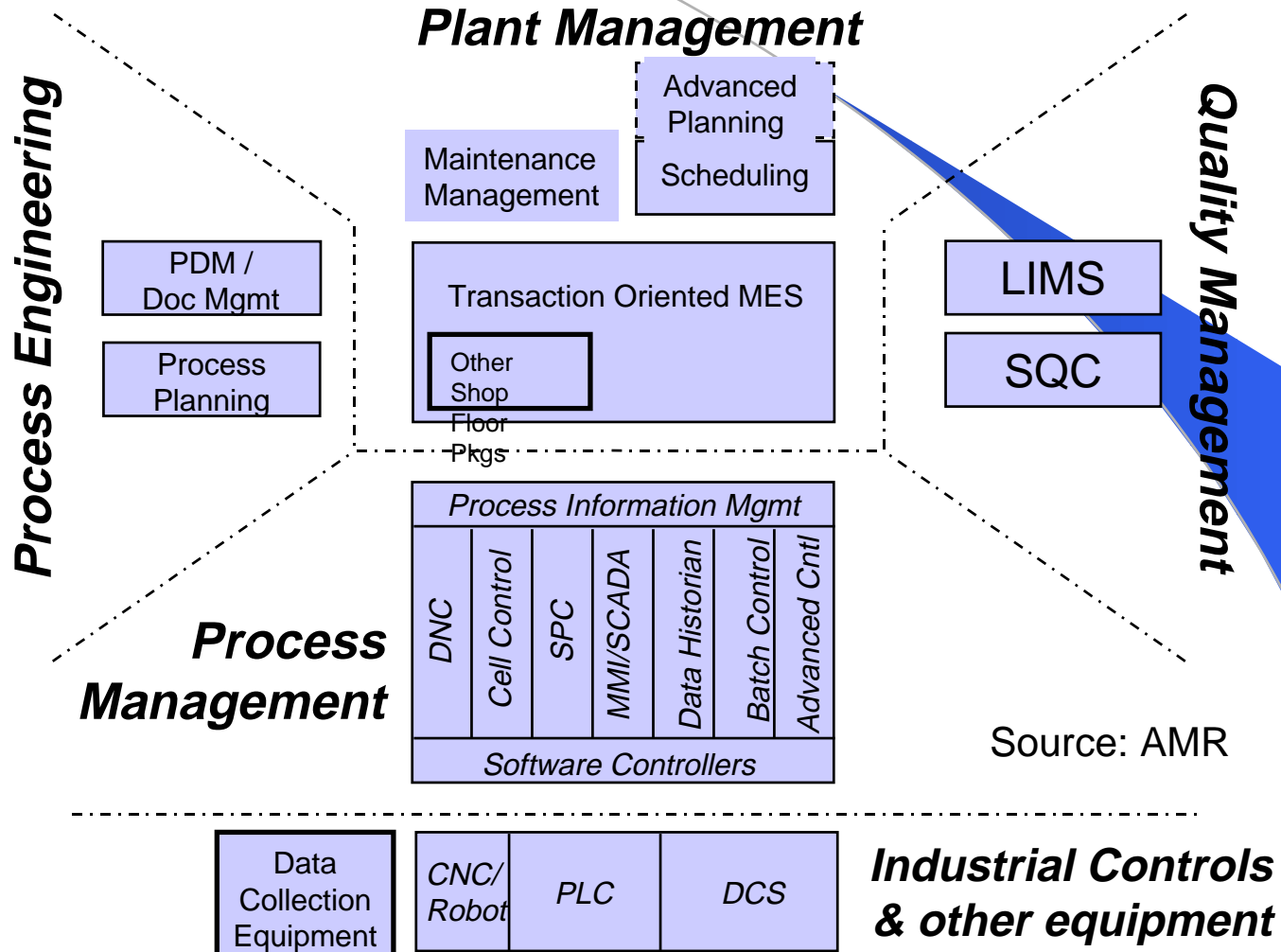
- *Global Financials*
- *Global Sales, Distribution, Demand Planning*
- *Multiple Plants (or other suppliers)*

DEMAND LEVEL INTERFACE

**Manufacturing
Execution
Solutions (MES II)**
Short Term Planning
Production Control
Order Execution
Plant Inventory
Process Control



Plant Infrastructure



New Context Views

- IT View
- Plant Ops View
- Controls View

IT View

- **Priority**
Responsive To The CEO Initiative Of The Week
- **Orientation**
Business-Centric, *Not* Technology-Centric
- **Organization**
Distributed Resources, Central Architecture, Central Infrastructure Management
- **User View**
Essential Business Partner
- **Outcome**
CIO = Essential Strategic and Operations Executive

Plant Ops View

- **Priority**
Ship Product
- **Orientation**
Implement Within IT Architecture
- **Organization**
Split Between Semi-Autonomous IT Plant Ops Group And Engineering
- **User View**
Seamless Integration With IT And Controls
- **Outcome**
Agile Empowerment Of Re-Engineered Operations

Controls View

- **Priority**
Real-Time, 7x24 Equipment And Process Control
- **Orientation**
The Seamless Inter-Operation Of Controls And IT
- **Organization**
Engineering And IT For Design, Plant Electrical And/Or Instrumentation And IT For Maintenance
- **User View**
Seamless Integration With IT And Controls
- **Outcome**
Controls Layer Is Part Of Enterprise ICT Architecture

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Electronic Commerce Challenges

- Business
- Engineering & Controls
- An Example

Business Challenges

- Broaden Perspective To Include Enterprise And MES II
- Develop Architectures And Select Products In Context Of All Requirements
- Help Analyze And Classify MES II Requirements
- Help Achieve Valid Requirements And Discard Out-Of-Date Ones

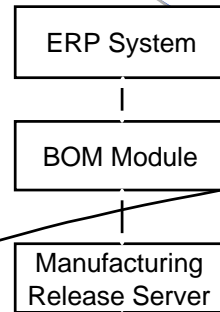
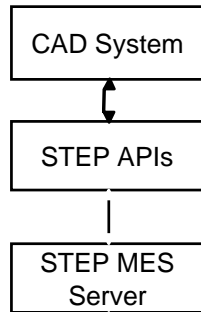
Engineering & Controls Challenges

- Broaden Perspectives To Include Enterprise And MES II
- Assist IT In Developing Architectures And Selecting Products In The Context Of All Requirements
- Help Analyze And Classify MES II Requirements
- Help Achieve Valid Requirements And Discard Out-Of-Date Ones

Virtual Enterprise Example

Source:
NIIP SMART Scenario

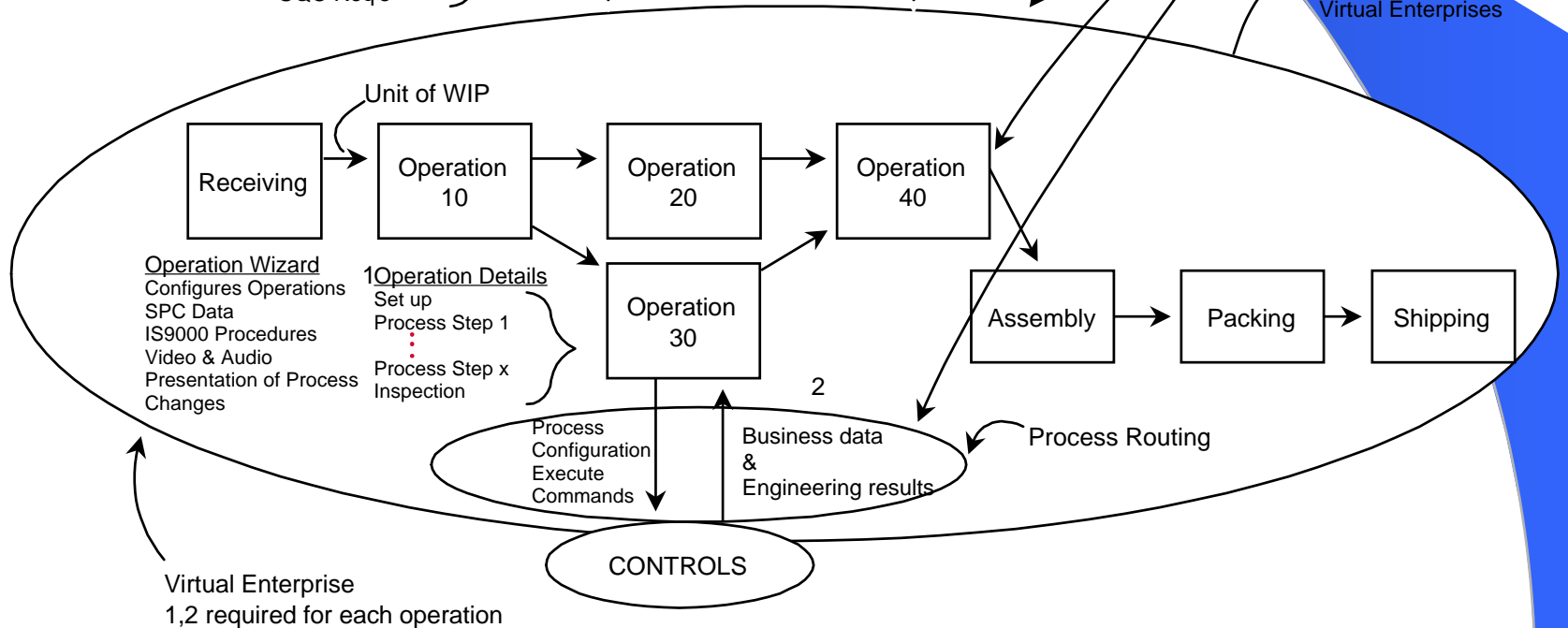
- Instructions
- Test
- Graphics
- NC Data
- 3D Models
- Annotated Drawings
- SQC Req's



Browser Interface

CIMPLEX
OAG Models

Process Routing
Each Operation Could
Occur at Different
Virtual Enterprises



Operation Wizard
Configures Operations
SPC Data
IS9000 Procedures
Video & Audio
Presentation of Process
Changes

1 Operation Details
Set up
Process Step 1
...
Process Step x
Inspection

2

Process Routing

Virtual Enterprise
1,2 required for each operation

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