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ISA95 : La norme, la réalité, le futur

MES et B2M*,

Gestion des activités sur le plancher de l'usine

Intégration Production / Planification

Séminaire Psynapses

Paris 1er décembre 2004

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Agenda

Vue d'ensemble de la norme ISA95

- parties 1, 2 et 3
- XML + B2M = B2MML
- Les développements en cours, futurs et complémentaires

Discussion

- La position des acteurs du marché
- Pour quelles industries ?
- Pour quelles tailles d'entreprise ?
- Pour quels systèmes ?
- Pourquoi un tel succès ?
- Les risques d'un engagement ISA95

Qu'est-ce que l'ISA ?

ISA–The Instrumentation, Systems, and Automation Society

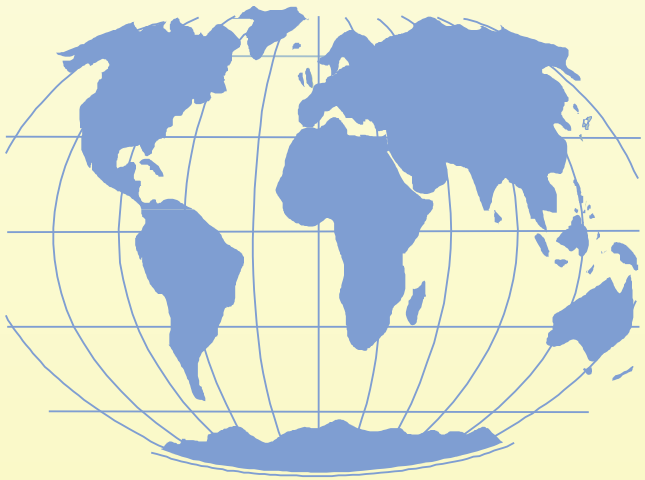
The Instrumentation, Systems and Automation Society

Autrefois « The Instrumentation Society of America »

Association professionnelle fondée en 1945

38 000 membres

14 districts
110 pays
300 sections
20 divisions techniques



Couvre

Instrumentation et Automation
Dans toutes les industries

www.isa.org **www.isaeur.org** **www.isa-france.org**

L'offre ISA

ISA–The Instrumentation, Systems, and Automation Society

Réseau professionnel

- Sections locales régulières et étudiants
- Division techniques Industries / Technologies

Information technique

- Conférences
- Sites WEB
- Livres, Magazines
- Lettres d'information
- Répertoire de l'instrumentation

Normes et Guides

ISA95 parmi > 100 normes

Formation

Expositions : ISA Show

Présentateur

Expérience

Process control, Integration Production/ERP, Ordonnancement, MES, LIMS, historians.

Industries : Papier, bois, textile, metallurgie, chemie, pharmacie, agro-alimentaire, electronique…

Conseil auprès des utilisateurs finaux, fournisseurs de solutions, integrateurs and universitaires

Veille technologique, associations professionnelles

Membre du comité ISA SP88 Batch Control Systems

Member du comité ISA SP95 Enterprise-Control System Integration,

Vice président ISA District 12 - EMEA 2003-2004

Président ISA France 2000-2001,

Membre de l'APICS,

Chairman du WG World Batch Forum, "Flow Analysis"

Fondateur Forum Batch Francophone

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1ère partie
Vue d’ensemble de la norme

ISA95 : La norme, la réalité, le futur

Fondements de la presentation

La présentation qui suit est dérivée des cours ISA basés sur des contributions des membres du comité SP95, et plus particulièrement

Dennis Brandl, Dave Emerson, Keith Unger, Jean Vieille, …

Pour une information complète, voir les cours ISA IC55C, ISA 60C, IC55 et IC61

Délivrés en France par Psynapses http://www.psynapses.net

Cette présentation est en Anglais

Les diapositives seulement…

Toutes nos excuses !

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Section10: ISA88-ISA95 convergence

What is ISA 95?

A US and International standard "Enterprise - Control System Integration"

ISA SP95 committee develops the standards

US standard	INTL Standard	Sub Title
ANSI/ISA95.00.01: 2000	**IEC/ISO 62264-1: 2003**	**Part 1: Models and Terminology"**
ANSI/ISA95.00.02: 2001	**IEC/ISO 62264-2: 2004**	**Part 2: Data Structures and Attributes"**
ISA draft 95.00.03: D19 10/2004		**Part 3: Activity Models of Manufacturing Operations Management**
ISA draft 95.00.04: D2 10/2004		**Part 4: Object Models and Attributes of Manufacturing Operations Management**
ISA draft 95.00.05: D2 10/2004		**Part 5: Business to Manufacturing Transactions**

SP95 Committee Voting Members

Users

Schering-Plough	Lyondell Equistar
Dow Corning	DuPont

Vendors

Siemens	Wonderware-Invensys	Emerson
ABB	Rockwell	Aspen Tech
Honeywell	Yokogawa	GE Fanuc

General

Fluor Enterprise	Accenture	ProsCon Ltd
Purdue University	Lund University	

Consultants

William H. Bosler, Gary Rathwell, David Kravitt, Jean Vieille, Dennis Brandl, Baha Korkmaz, Chris Monchinski

Other Involved Groups

NAMUR

European Batch Forum

MESA

PDXI - Process Data Exchange Institute

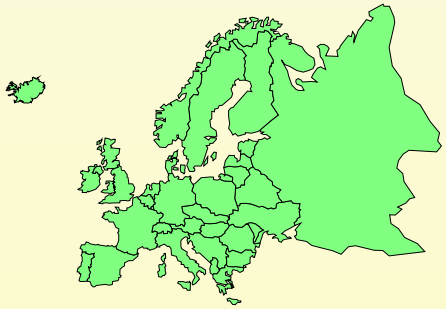
Purdue University

OMG - Object Management Group

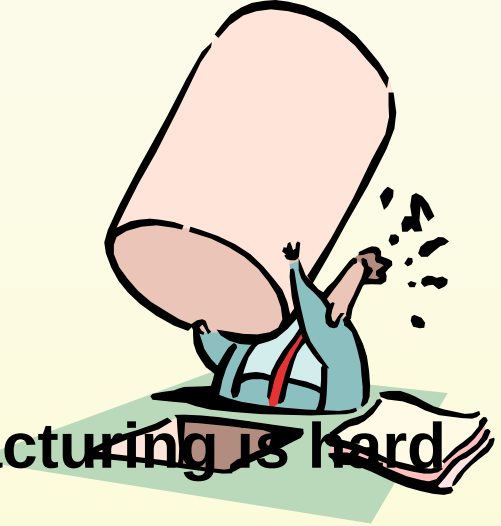
OAG - Open Applications Group

MIMOSA

IEC/ISO JWG15 (ISO/IEC62264)



Why Did We Start ISA95 ?



A sharp increase in the needs of B2M integration

Integration of logistics systems to manufacturing is hard to do

Different systems, cultures, terminology,...

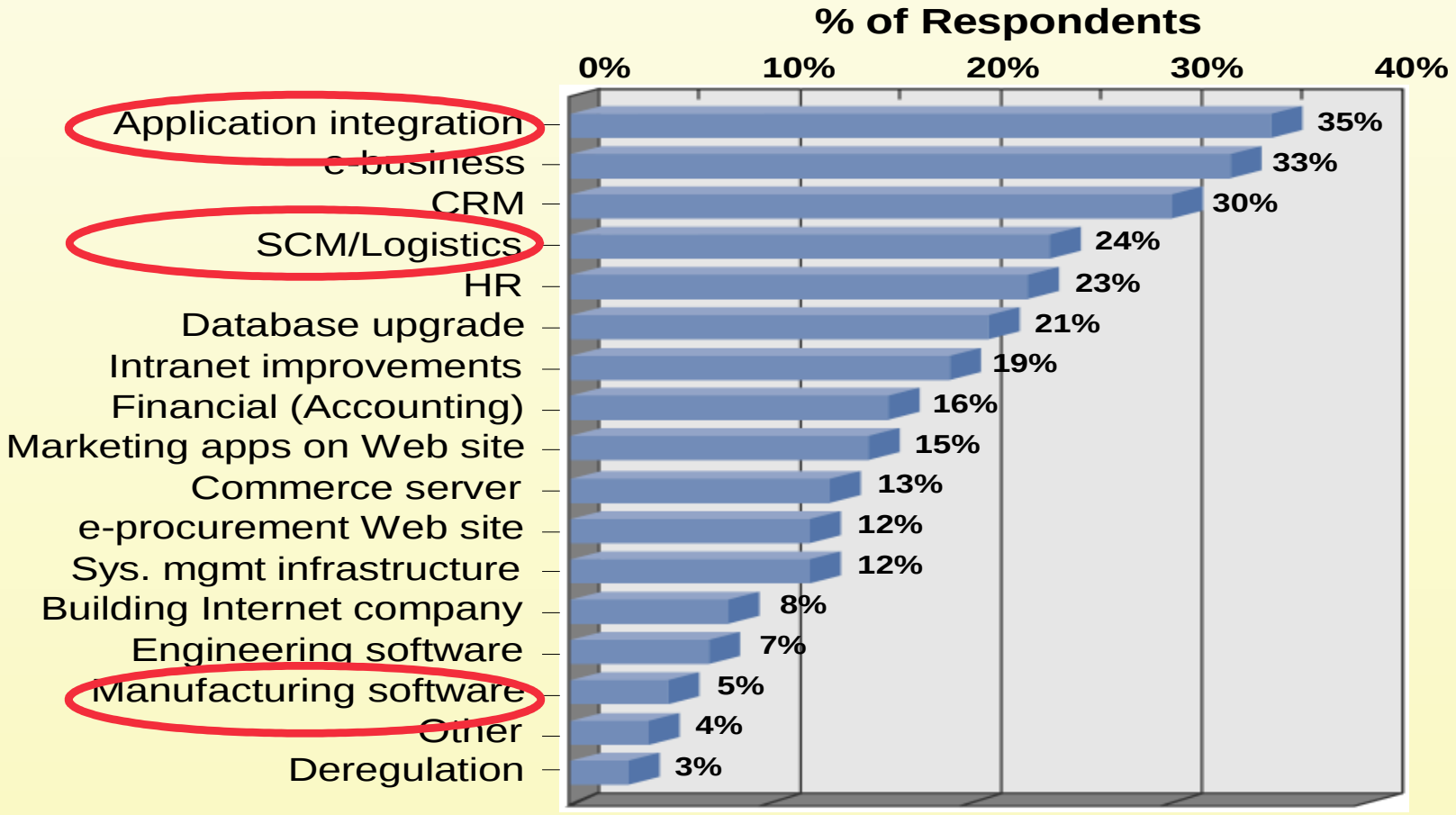
Effective operations of manufacturing is hard to do

MES solutions are too related to processing methods and too industry specific

Many benefits expected from standardization and documentation of “best practices”

Integration is HOT!

Customers' top strategic software platform project over the next year



Source: Morgan Stanley CIO Survey, May 2001
Note: Multiple responses permitted

How Does ISA95 Help?

Separate the business processes from the manufacturing processes

- Allow changes in production processes without requiring unnecessary changes scheduling and logistics processes

Provide a clear demarcation of responsibilities and functions

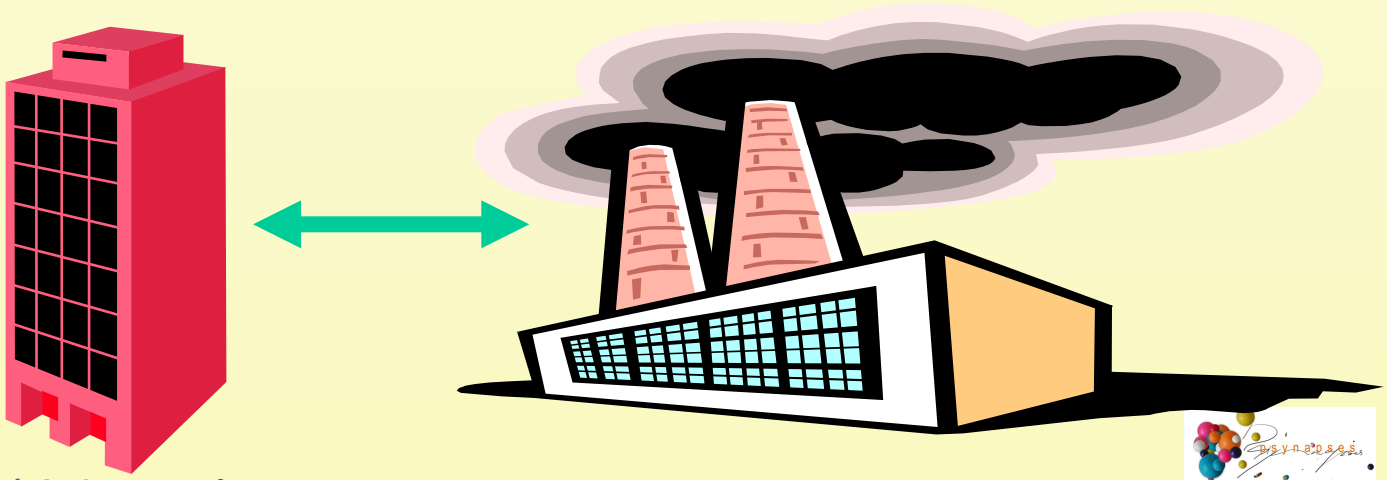
Provide a clear description of exchanged information

Purpose of the ISA95 Standard

Improved integration of manufacturing through communication by defining:

- A common terminology
- A consistent set of models

Emphasize good practices for integration of control systems with other enterprise systems



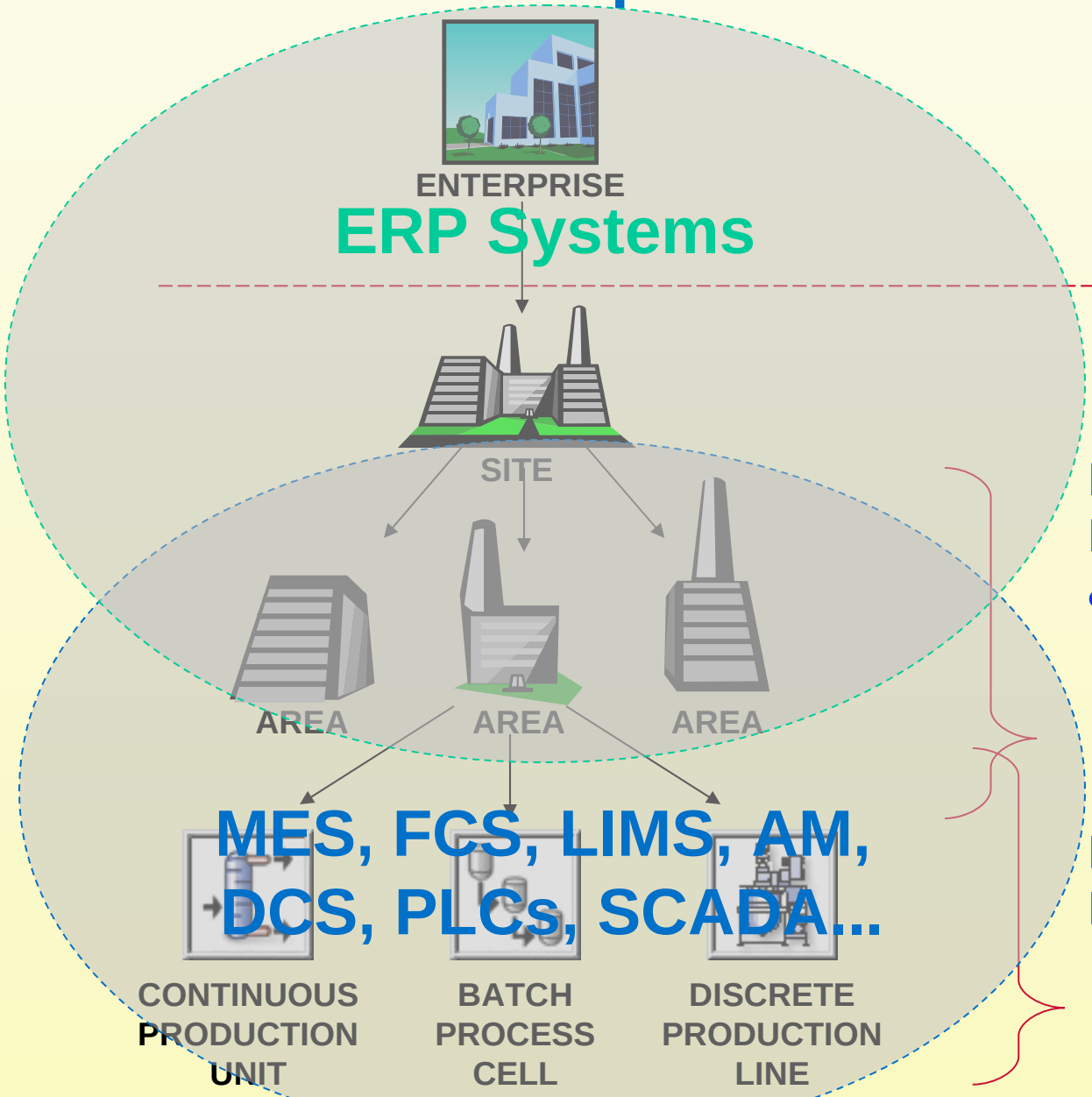
Benefits of ISA95 Standard

Reduce cost and difficulty of integration of business logistics systems with manufacturing systems

Expected benefits

- Better planning and scheduling through better information
- Support for “capable to promise” strategy
- Support for agile manufacturing and flow manufacturing strategies
- Reduced errors in optimized supply chain operations

ISA95 Standard Scope



PRM level 4
Business Planning & Logistics

Interface addressed in the ISA95.01/02

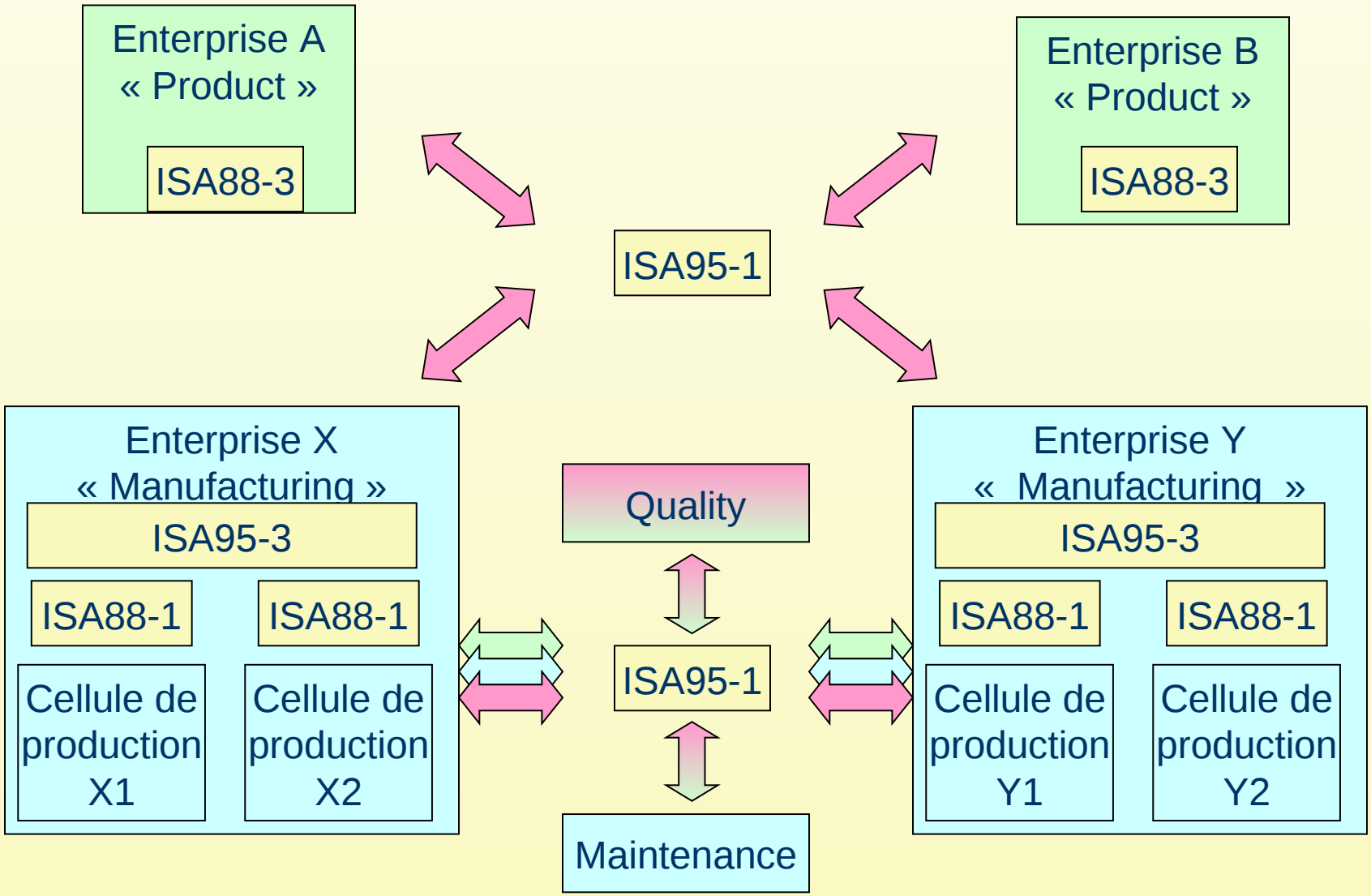
PRM level 3
Manufacturing Operations & Control

addressed in the ISA95.03

PRM level 0, 1, 2
Manufacturing execution

addressed in the ISA88

ISA88 & ISA95



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2 categories of Manufacturing Systems

Manufacturing Planning Systems

Defines the mission of manufacturing facilities

Part of ERP (Enterprise Resources Planning)

Including MRP planning loop (Manufacturing Resources Planning) or APS (Advanced Planning Systems)

Manufacturing Execution Systems

Execute the mission of a manufacturing facility

Include Control System (DCS, PLC, SCADA…)

- Still generally implemented separately

Manufacturing Planning Systems

The production control part of ERPs

- Planning & forecasting
- Material & Inventory control
- Purchasing
- Cost accounting
- Shop floor control

Mainly open loop systems regarding manufacturing operations

- Actual manufacturing capacity and work in progress are not tightly linked to planning process.
- Efficient business processes rely on appropriately summarized and validated data

Manufacturing Execution Systems

3 levels of MES achievements

- Visibility: data collection, performance monitoring
- Control: Specification, quality, operation conformance
- Optimization, anticipation: process, resource usage improvement

MES systems

- manage and control the personnel, equipment, and material resources in a production facility for effective and efficient manufacturing.
- deliver information that enables the optimization of production activities from order launch to finished goods.
- Using current and historical data, it initiates, responds to, and reports on plant activities as they occur.
- MES defines a diverse set of functions that operate above traditional control system functions, but are local to a site or area and reside below the level of enterprise systems.

Control System: an MES component

Execute production functions

- DCS or PLC Based Systems
- Control Valves, Process sensors
- Scanners
- QC test station
- CNC machine
- Material handling systems

Include supervisory functions

- HMI, SCADA, production information history

Generally implemented separately

- However, control systems vendors are expanding their solution coverage toward integrated MES solutions
- Control begins to be implemented from a broader perspective

Manufacturing Environments

Production typology

- Discrete part manufacturing
- Repetitive discrete part manufacturing
- Batch process
- Continuous process

Industry typology

- MES is not the same for all industries
- Each type of company, and in many cases each company within an industry, will have vastly different ideas of what MES is can do

Beyond Production

Other operation domains have to be considered:

- Tooling
- Cleaning
- Maintenance
- Lab/Quality control
- Inventory control
- Internal / External Logistics
- Distribution, Transportation

It's all about execution!

Modern MES solution take care of all aspects of product manufacturing and handling

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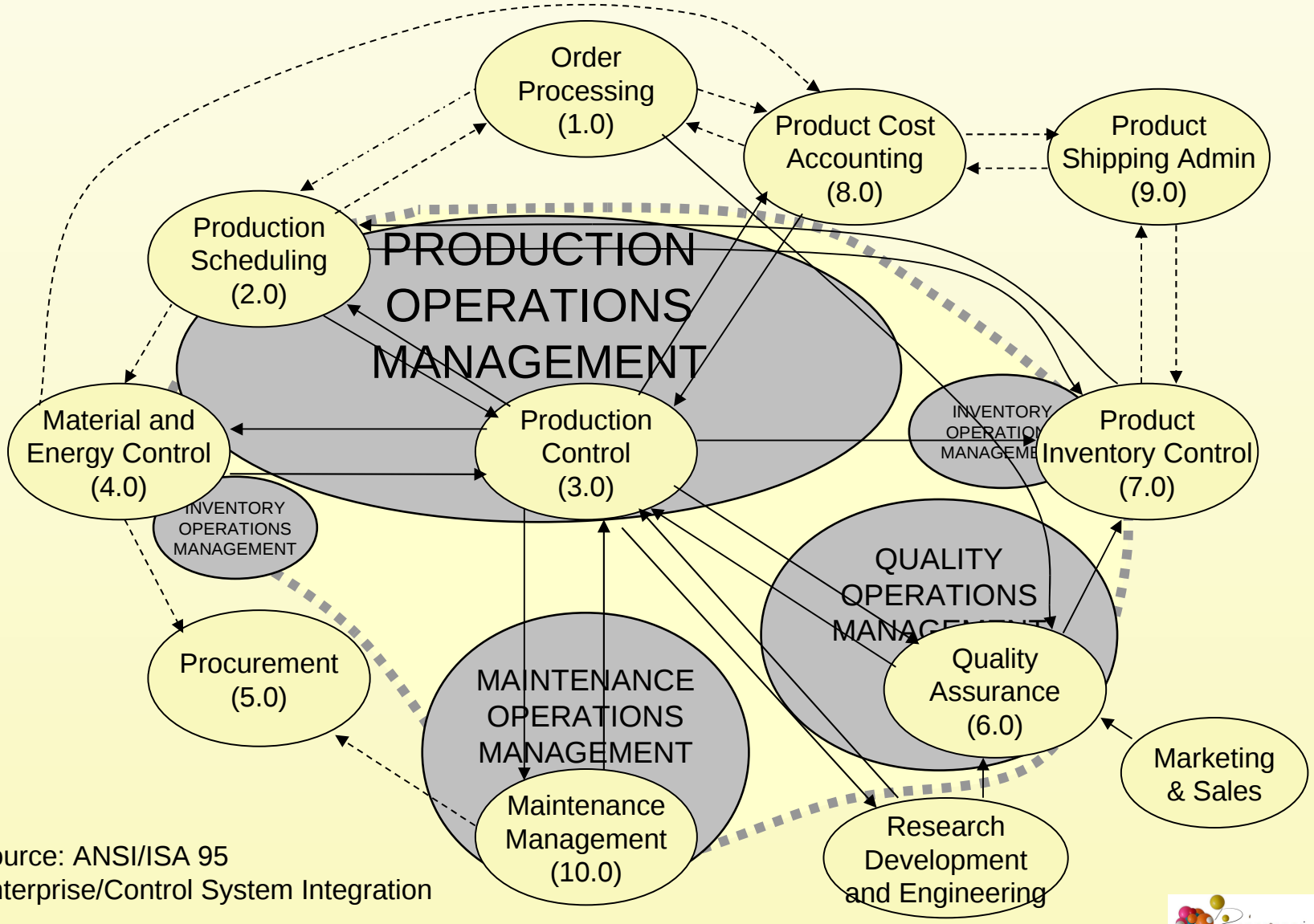
MES Domains and Functions



Source: ANSI/ISA 95
Enterprise/Control System Integration

Manufacturing Operation Categories

ISA95 Part 3 defines the following MOCs:

- Production
- Quality
- Maintenance
- Inventory

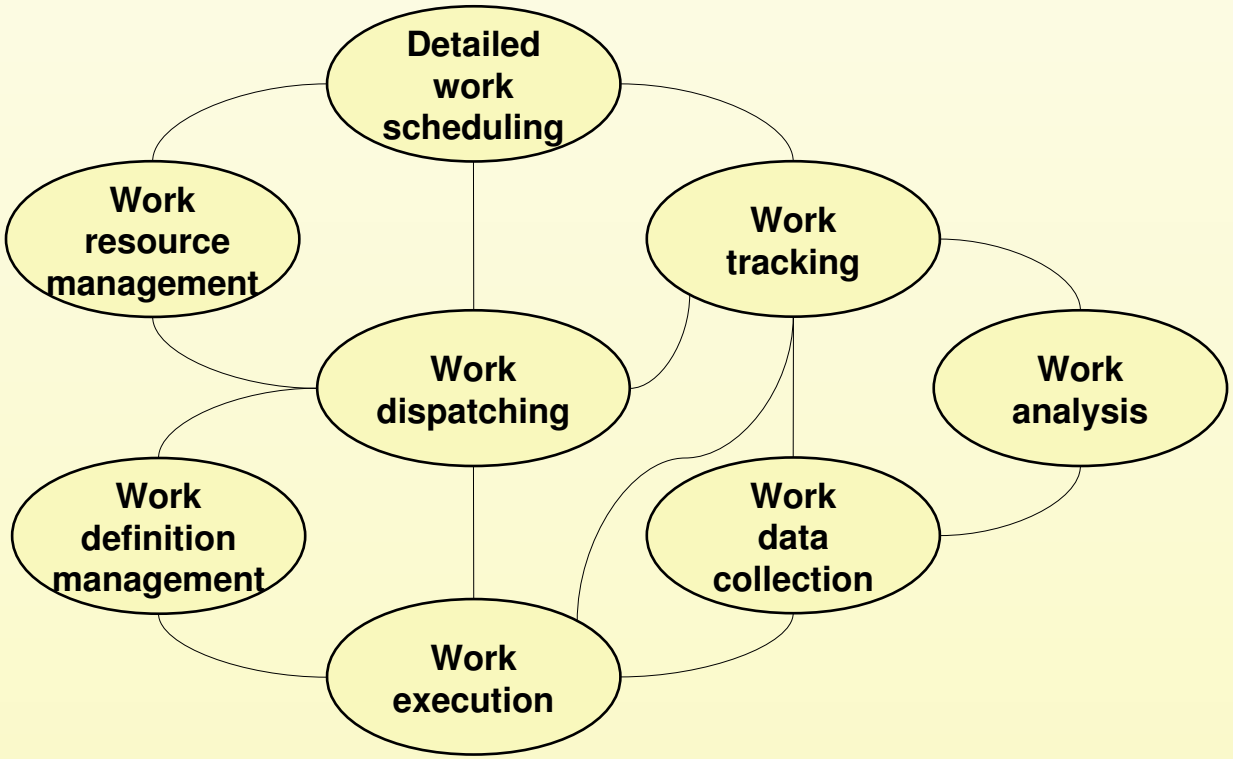
Other or different MOCs can be defined. Example:

- Inbound logistics
- Internal transfers
- Inventory control
- Outbound logistics
- Tooling
- Cleaning
- …

MES Core Functions

1. **Work Scheduling**
2. **Work Dispatching**
3. **Work Execution**
4. **Work Data Collection**
5. **Work Tracking**
6. **Work Analyzis**
7. **Work Definition Management**
8. **Work Resources Management**

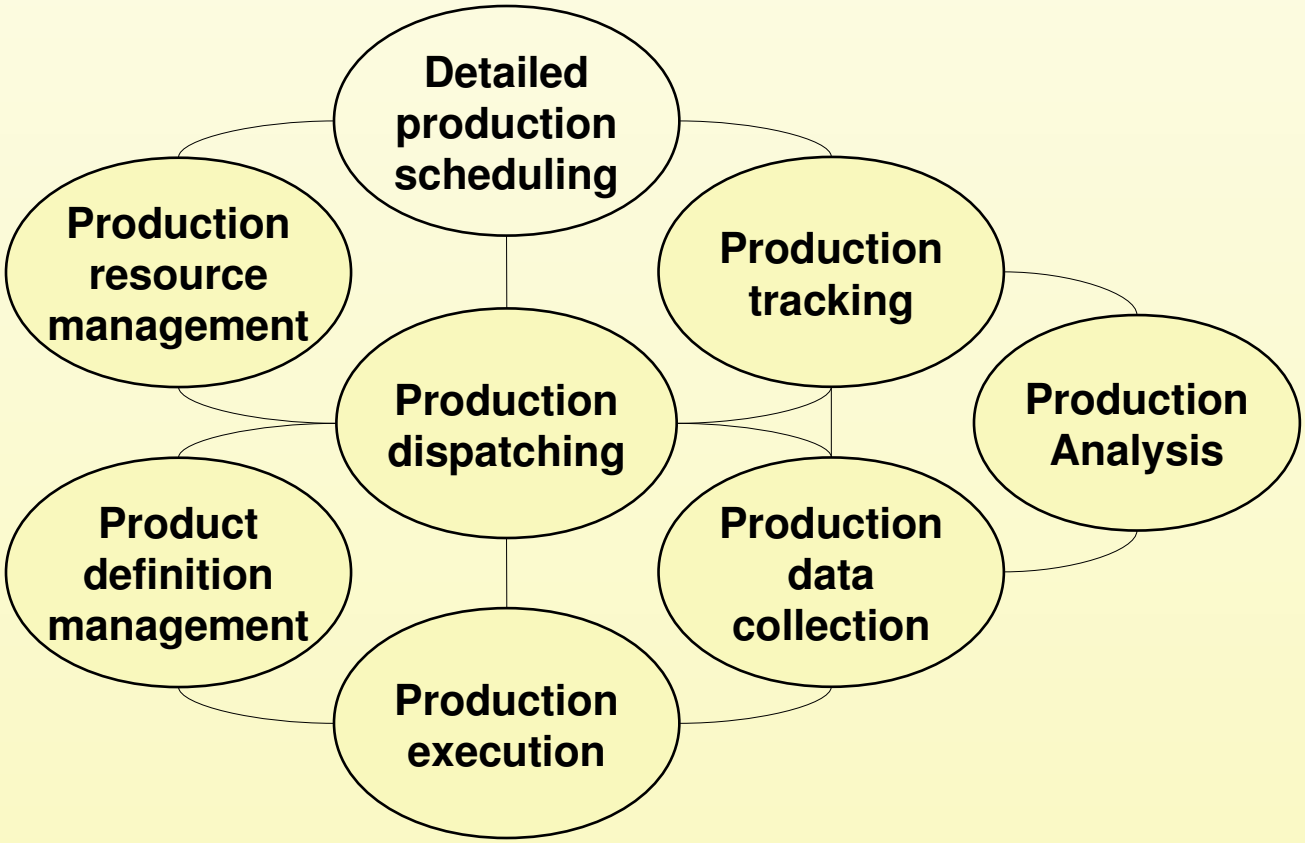
A Generic Activity Model

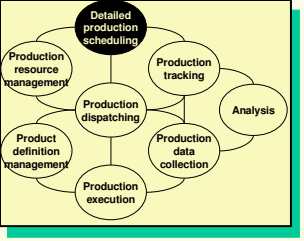


A general model for defining many work activities, including production, maintenance, quality, inventory

Source: ANSI/ISA 95
Enterprise/Control System Integration

Applying the Generic Activity model to Production MOC





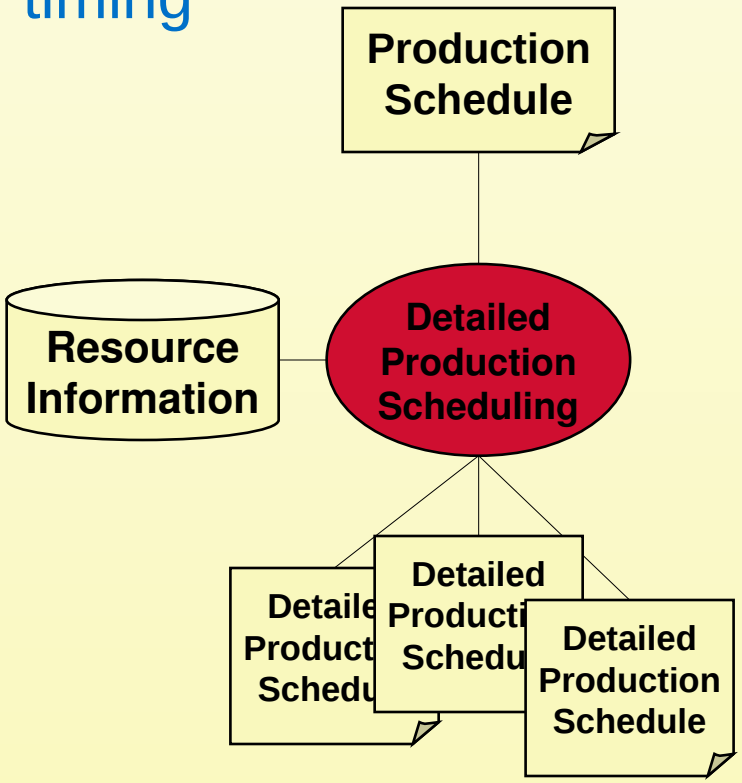
1. Detailed Production Scheduling

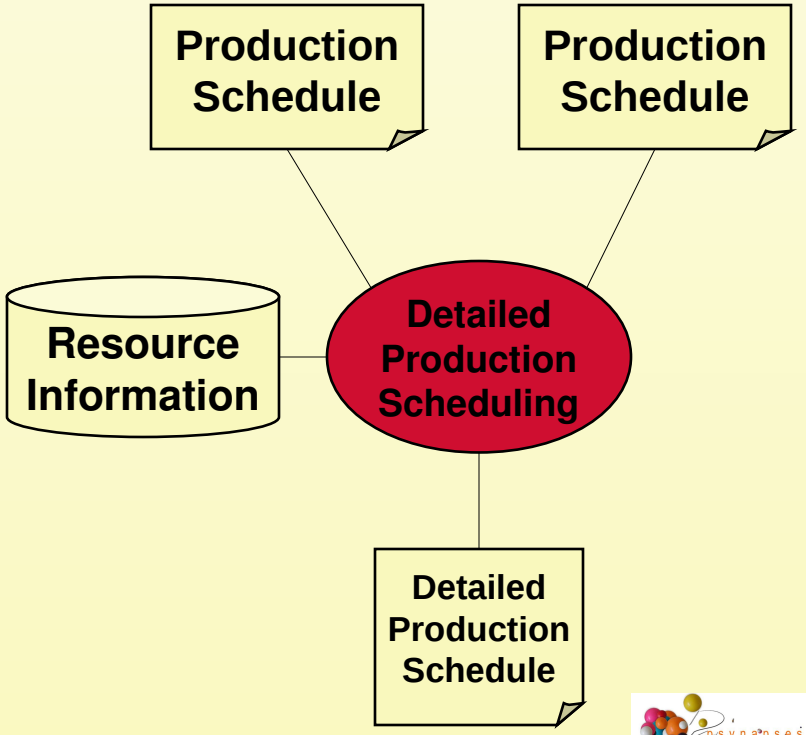
Production Plan Generation

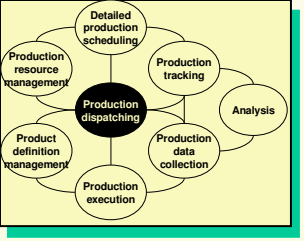
At detail below the level of corporate planning

Finite capacity scheduling

Recognize alternative and parallel operations & exact timing







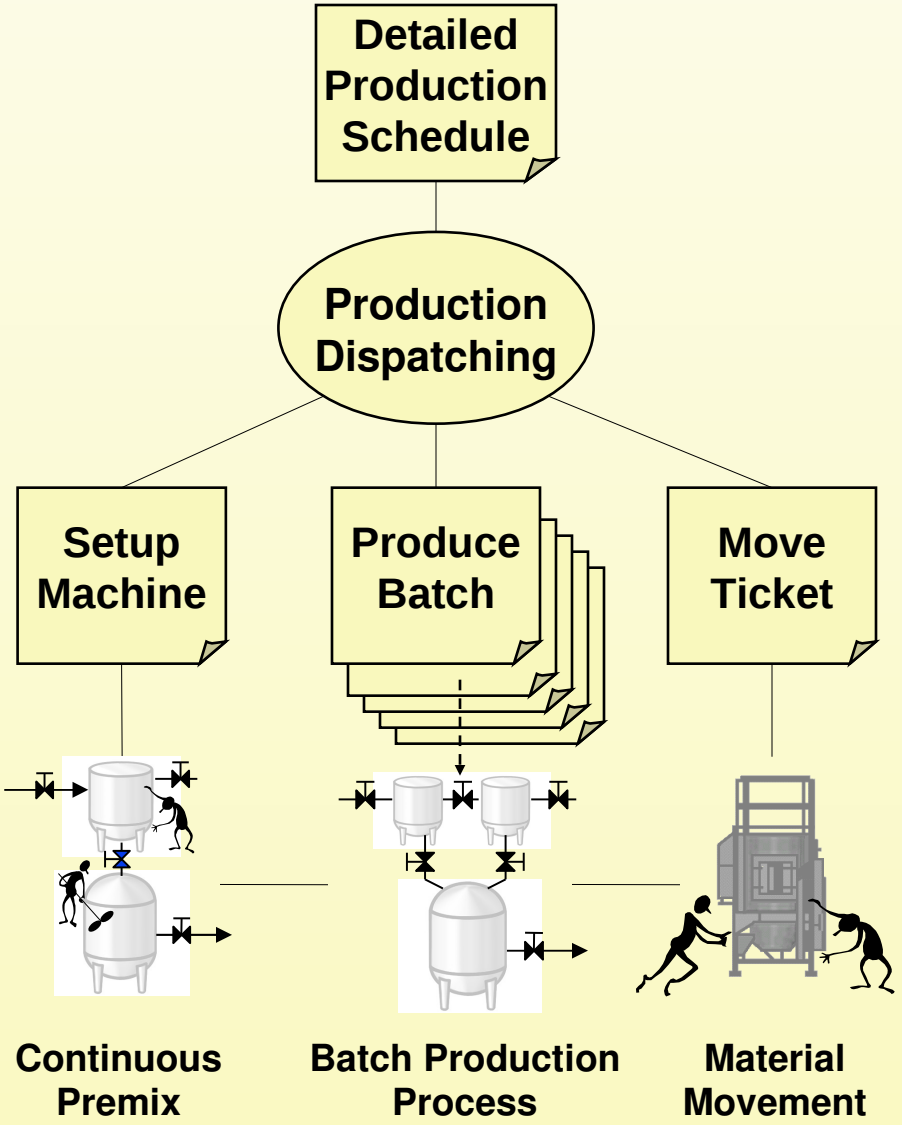
2. Production Dispatching

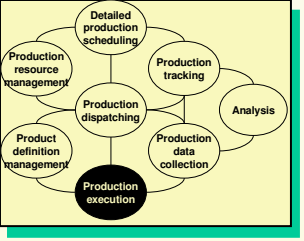
Managing flow of production by dispatching work

jobs, orders, batches, lots, and work orders

May involve starting batches, sending work orders, initiating material movement, or starting production

Controlling amount of work in progress





3. Production Execution

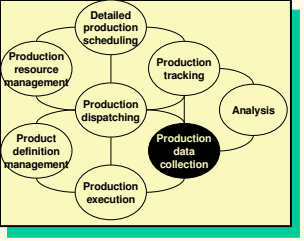
May be manual or automated

Includes

- operator actions based on instructions dispatched to operators
- automated control systems

Execution is split between level 2 and 3

- Level 3 : product related execution rules
- Level 2 : equipment related execution rules
- Refer to ISA88 Recipe/Equipment separation



4. Production Data Collection

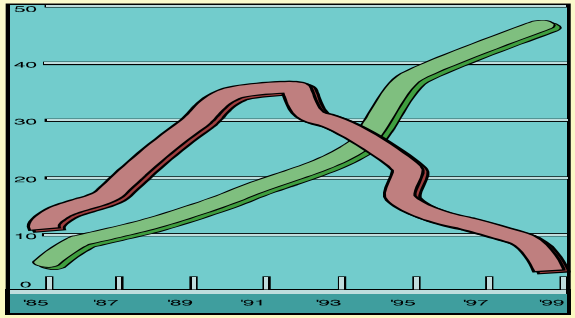
Collecting operational data

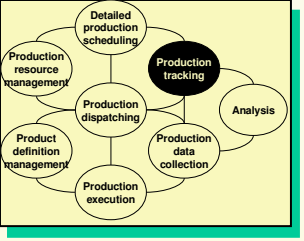
- Production and parametric
- Associated with production equipment and production processes

May include

- sensor readings, equipment states, event data, operator entered data, operator actions, and everything of importance in the making of a product or analysis of products, processes, or production

Addressed in ISA88 part 4





5. Production Tracking

Track actual production and performance to the production plan

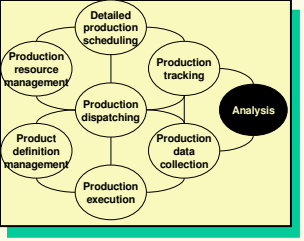
Information provided back to scheduling so that plans & schedules can be updated

Monitor and track the status of production

Data reconciliation

Consolidate production information

Genealogy/Product Traceability



6. Production Analysis

Product analysis

product quality control, SPC / SQC tracking

off-line inspection operations, analysis in laboratory information management system (LIMS)

Mainly addressed by Quality Operation MOC

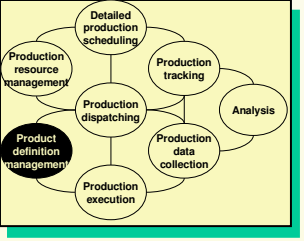
Process analysis

Providing feedback about manufacturing processes to optimize or modify specific production processes

May include analysis of bad / high quality production runs

Production analysis

Analysis to optimize production and use of resources: Production unit cycle times, Resource utilization, Procedure efficiencies, and Production variability



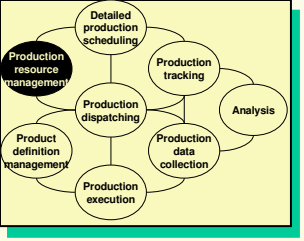
7. Product Definition Management

Transmit drawings or electronic data to work stations on request or in response to the schedule

Automate document updating for production

Manage recipes and work instructions

Download process recipes to equipment automatically or on request



8. Resource Management

Personnel management

Maintain personnel Attendance, availability, status, location, exposure qualification information …

Material management

Inventory operations, relationship with MM systems

Mostly addressed by Inventory Operation MOC

Equipment management

Maintain equipment status,location, availability

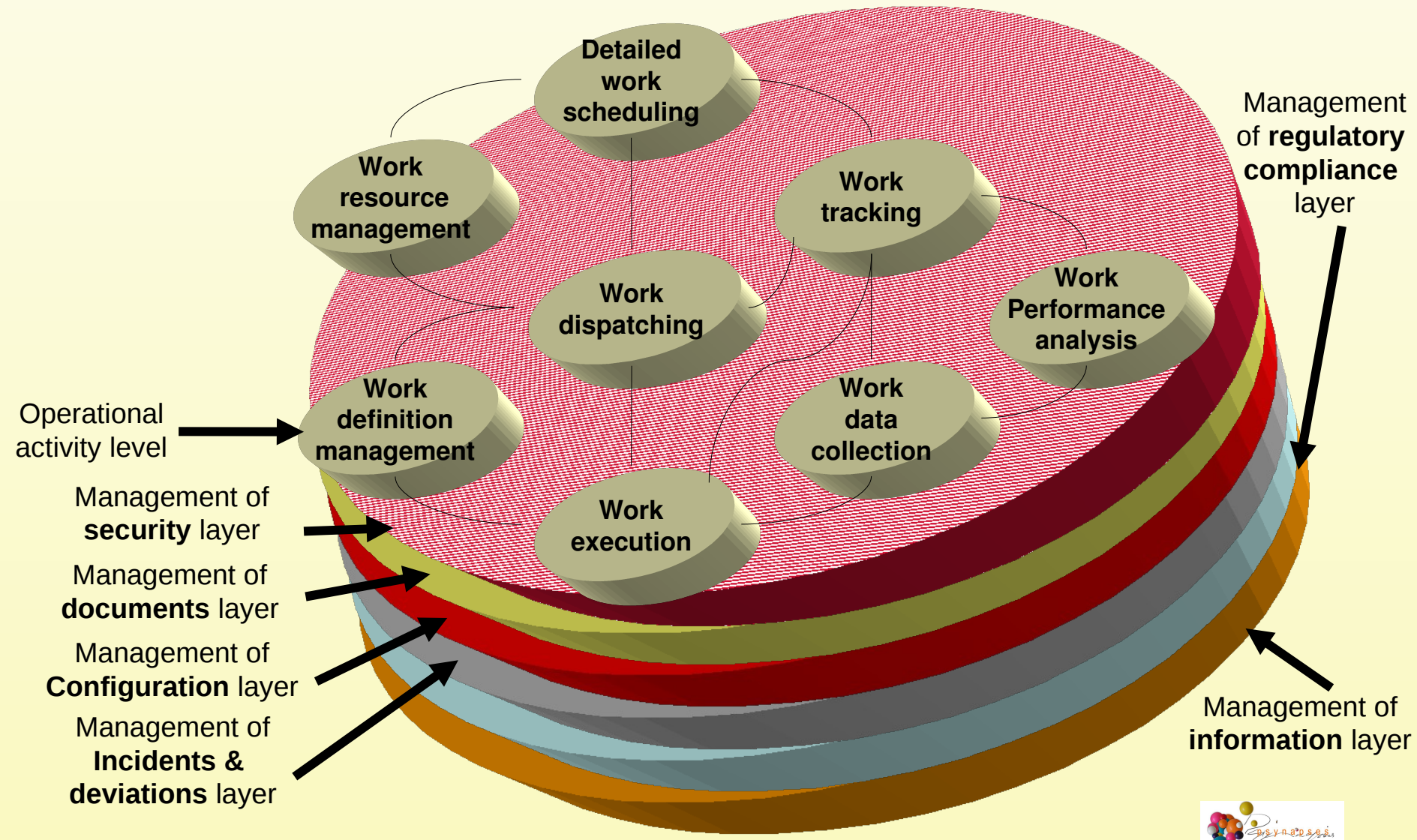
Relationships with LIMS, Asset Management, Maintenance Management, Production Planning, Mostly addressed by Maintenance Operation MOC

Process Segment management

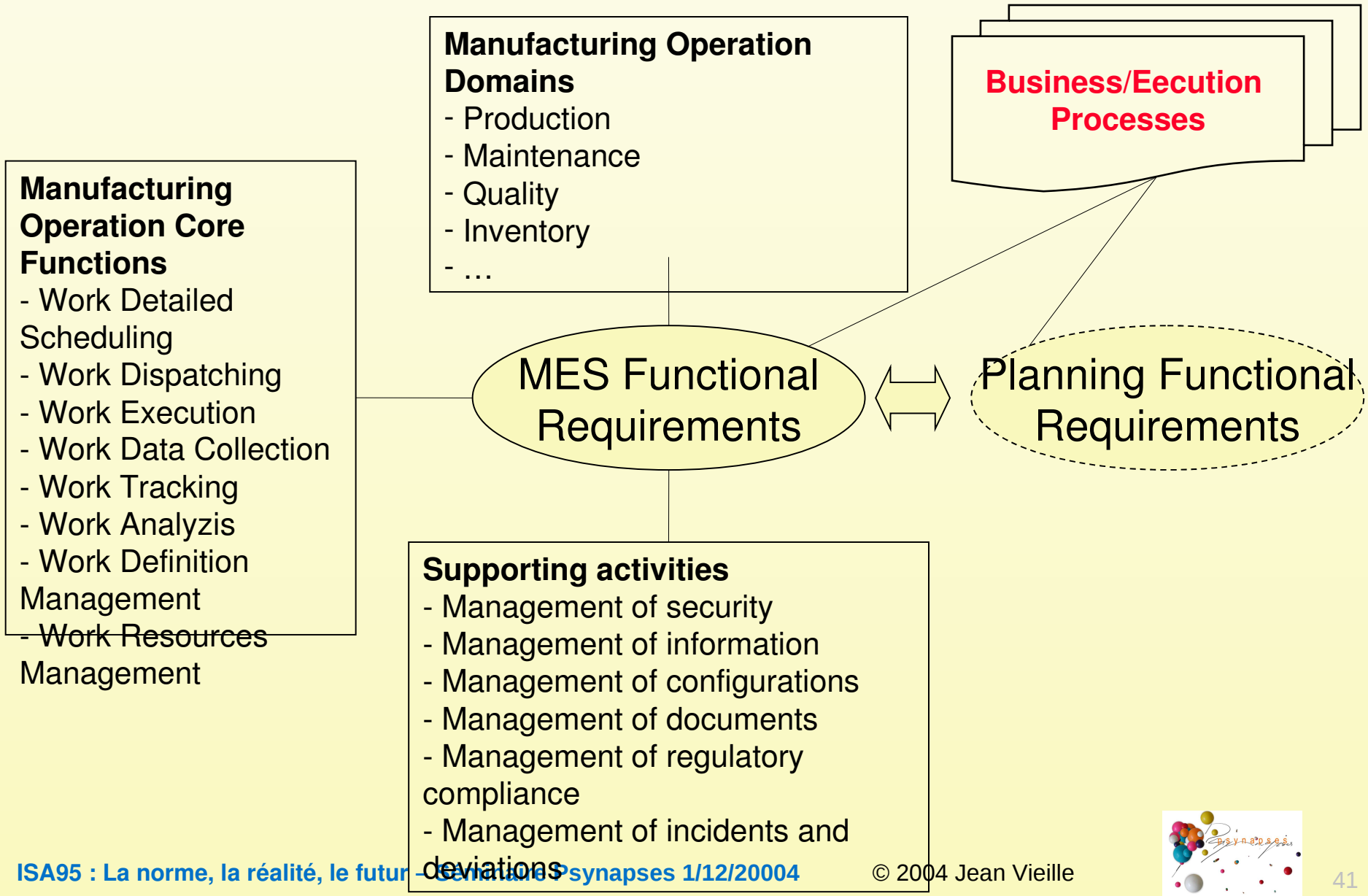
Product / Process segment mapping

Production capability

Supporting Functions: McDo model



A Tri-dimension functional framework



Compared to the old, flat, partial MESA model

Operations and Detailed Scheduling

Production Tracking

Dispatching Production

Resource Allocation and Control

Data Collection and Data Acquisition

Quality Management

Process Management

Performance Analysis

Interface to

- Document Control
- Labor Management
- Maintenance Management

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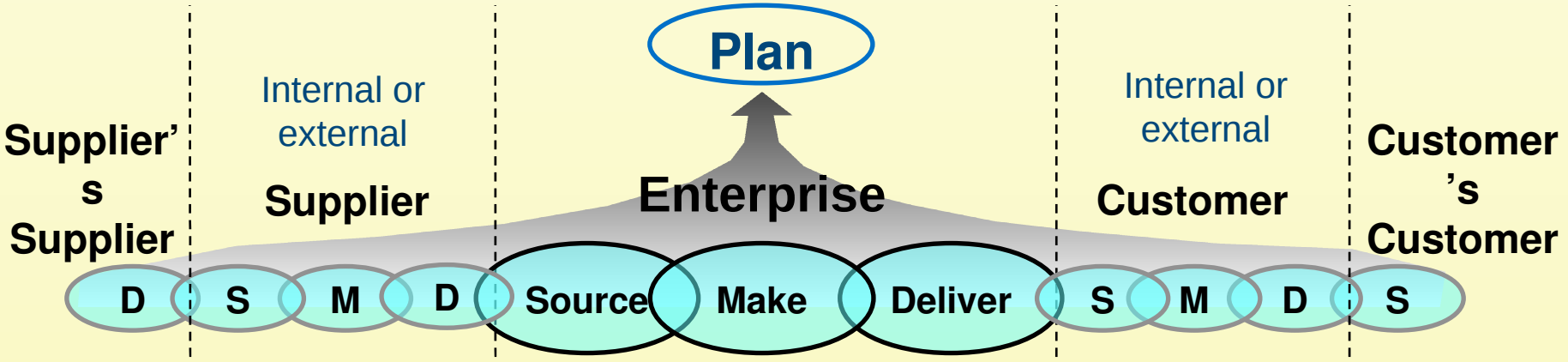
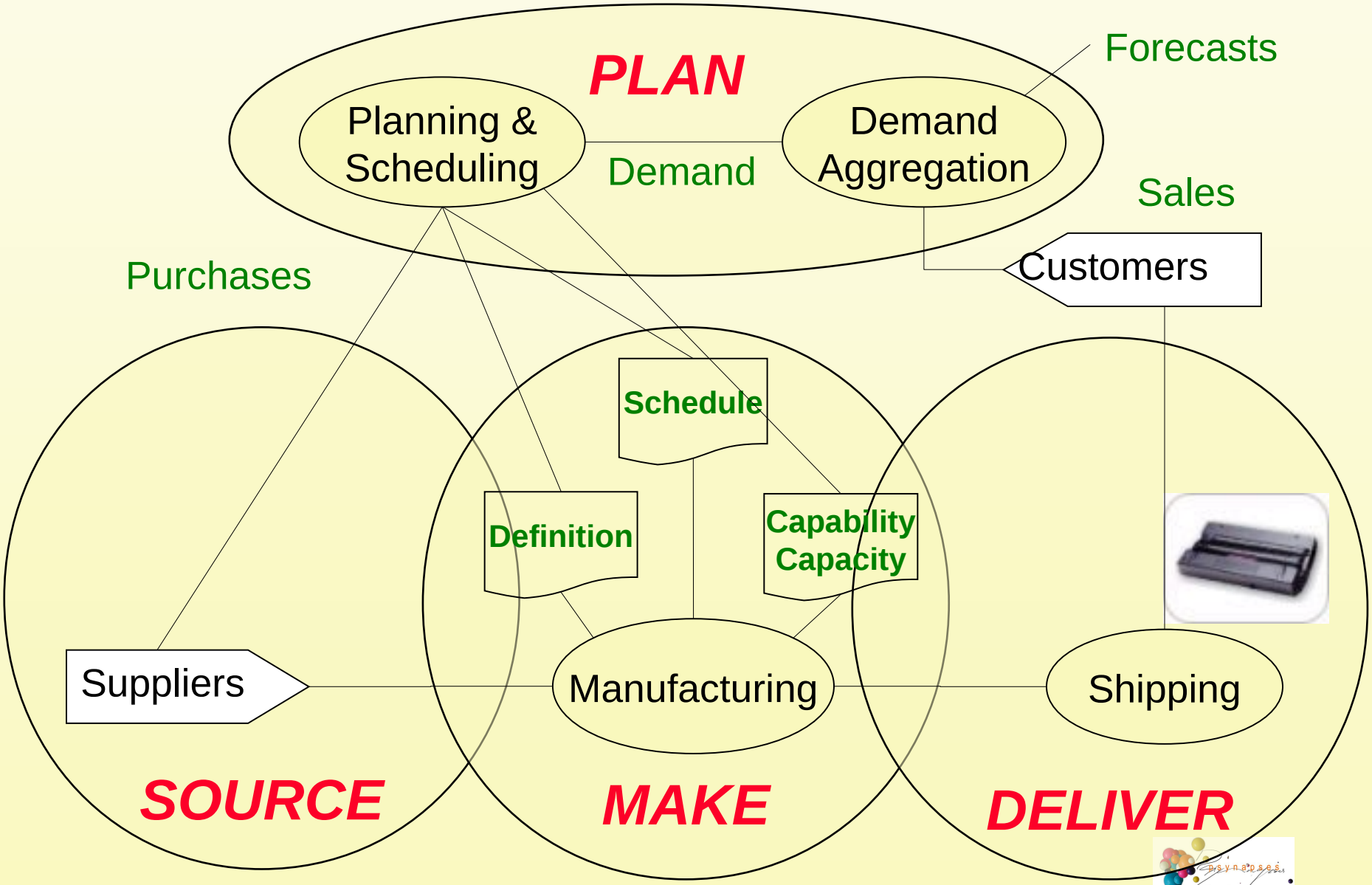
Supply Chain SCOR Model

Each occurrence of Source-Make-Deliver process is a "link" in the supply chain.

MES is a large part of the "Make" process, but also addresses part of Source and Deliver processes.



Manufacturing in The Supply Chain



Financial, Material, Information Flows

Financial Flow : The Slowest

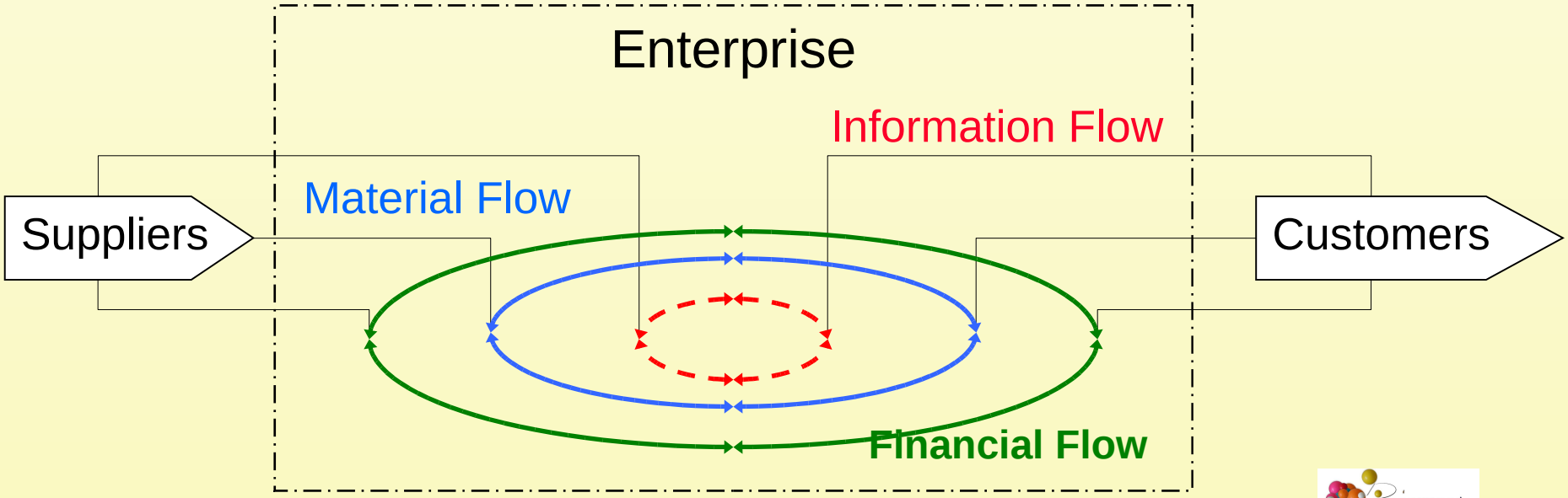
Constrained by material and information flows

Material Flow :

Constraining financial flow

Information Flow : Must be the Fastest

Constraining both material flow AND financial flow



Business Drivers

Key business drivers are the areas of performance that are most critical to the organization's success.

Capable to promise: Being immediately able to commit to reliable delivery dates

Cycle time: Time it takes to produce a product from the time the order is placed: Reduced CT => more inventory turns, => more throughput => better assets usage

Asset efficiency : Focus on maximizing the effectiveness and cost-effective use of the assets in production

Agile Manufacturing : The ability to reconfigure production assets to quickly meet market demand

Operator Empowerment: Financial impact of operator decisions are directly measurable

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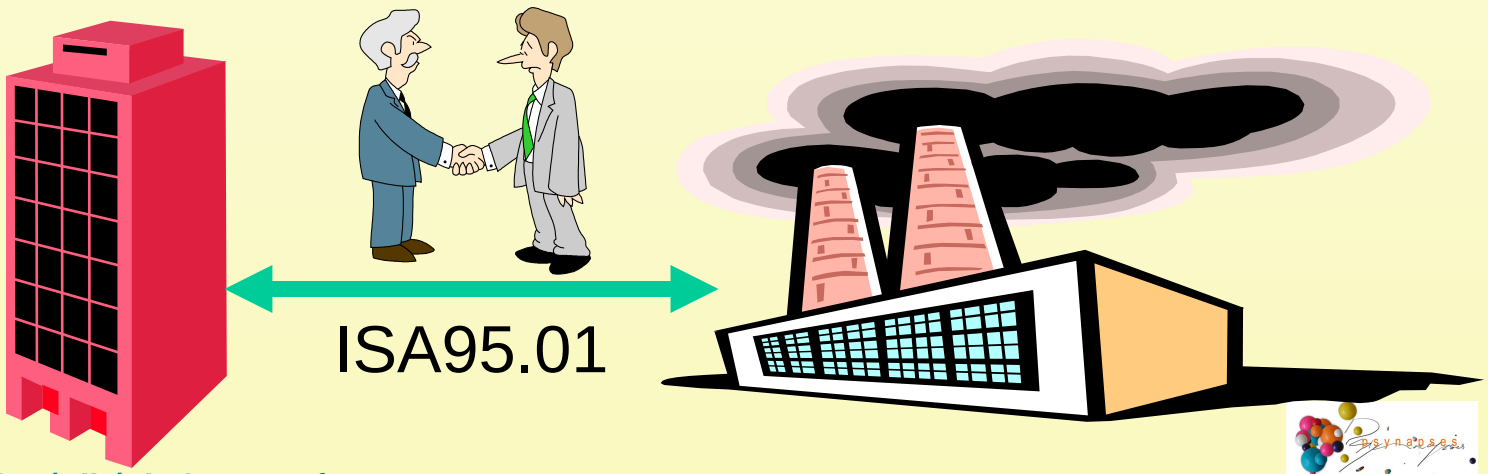
Scope of ISA95.01

ISA95.01 defines the interface content between manufacturing control functions and other enterprise functions

- Based upon the Purdue Reference Model for CIM (hierarchical form) as published by ISA
- The interfaces considered are the interfaces between levels 3 and 4 of that model



Elements of ISA95.01

Definitions of

- Scope of manufacturing control domain
- Physical assets of a manufacturing enterprise
- Interface functions between control and enterprise
- Shared information between control functions and enterprise functions

3 structural models

ISA95 started from 3 models:

- **PRM functional model**
- **PRM scheduling model**
- **ISA88 physical model**

Model 1: PRM Enterprise functional model

From the Purdue model

Theodore J. Williams, The Purdue Enterprise Reference Model, A Technical Guide for CIM Planning and Implementation, 1992, ISA, ISBN 1-55617-265-6

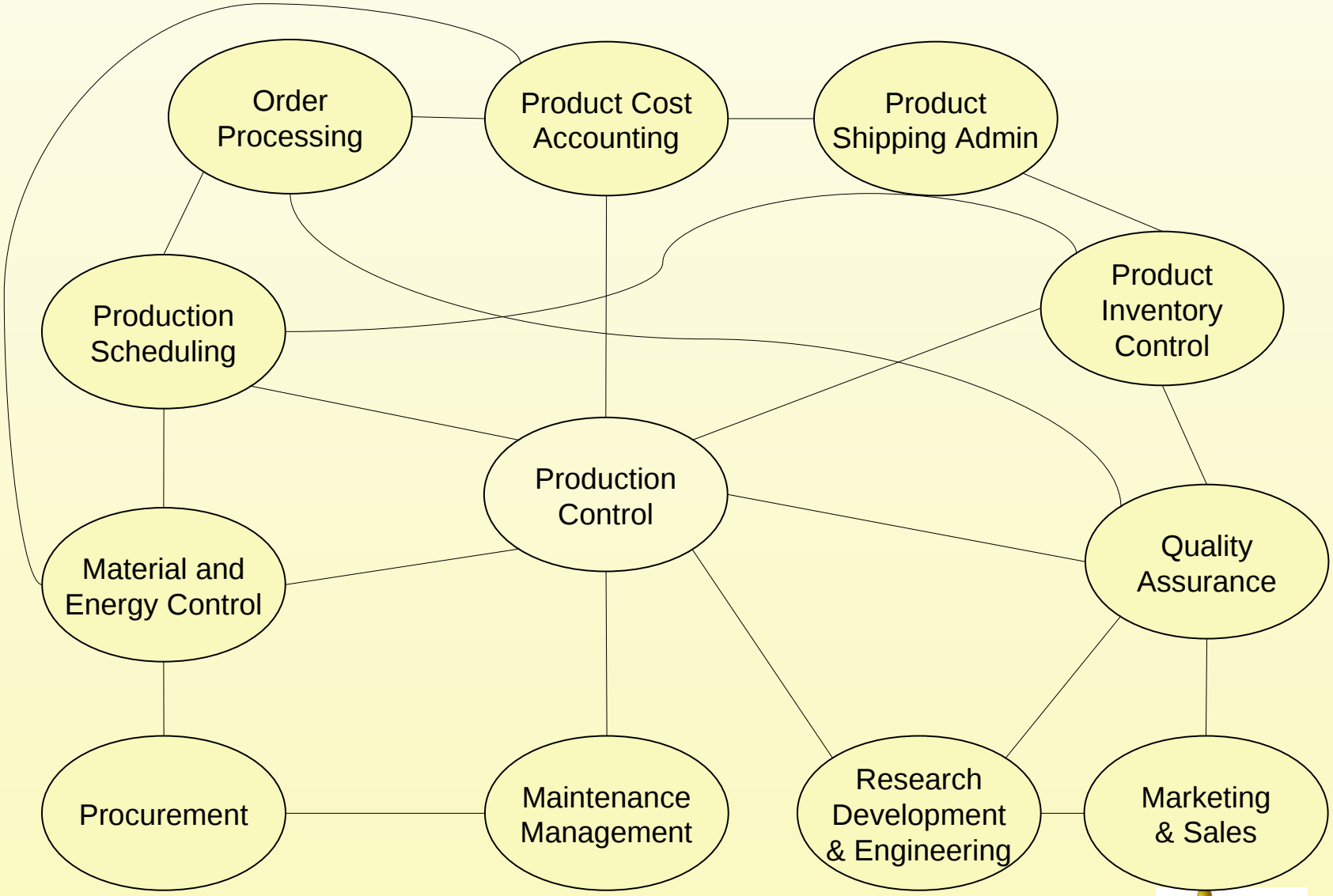
Defines the summary of the functions in an enterprise

Includes details of functions in the control domain

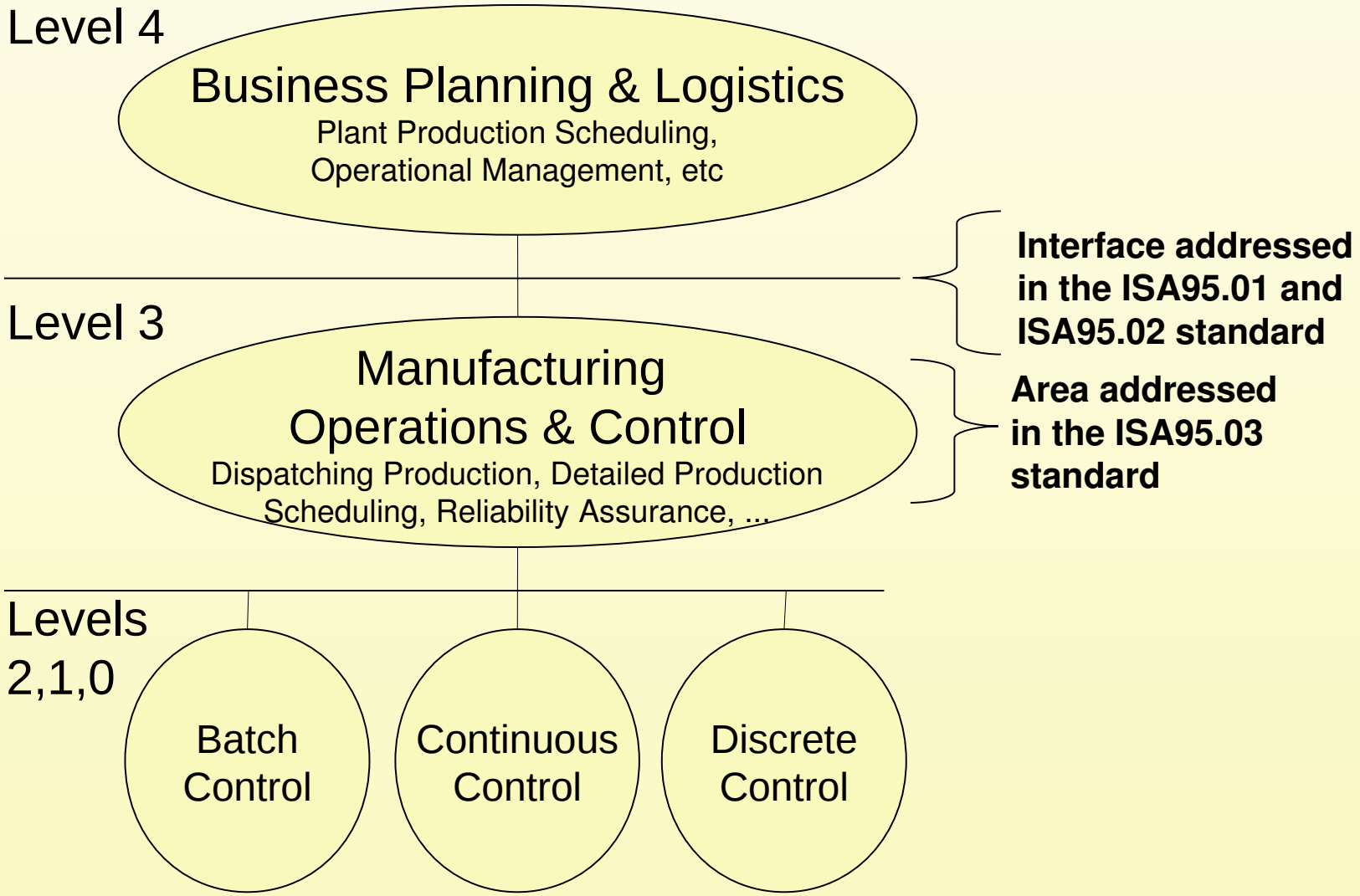
Other comprehensive enterprise models could have been used

The object model shall be based on a realistic and comprehensive data flows set

Top Level PRM Functional Model



Model 2: PRM scheduling model



Model 3: enhanced ISA88 physical model

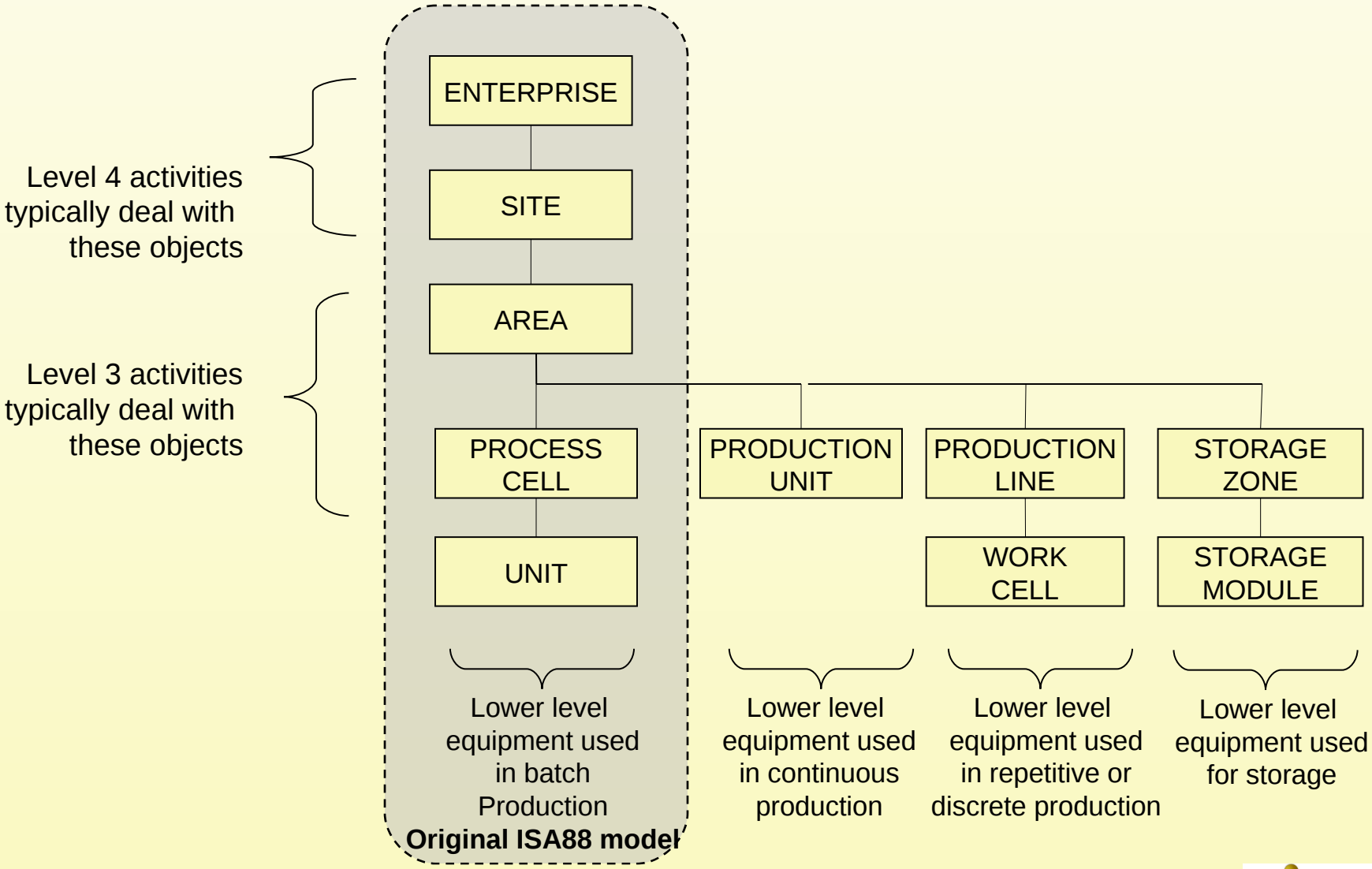
Describes in a hierarchical fashion the physical assets of an enterprise involved in manufacturing

An expansion of the model in IEC 61512 and ISA S88.01 is proposed to include the definition of assets for discrete and continuous manufacturing

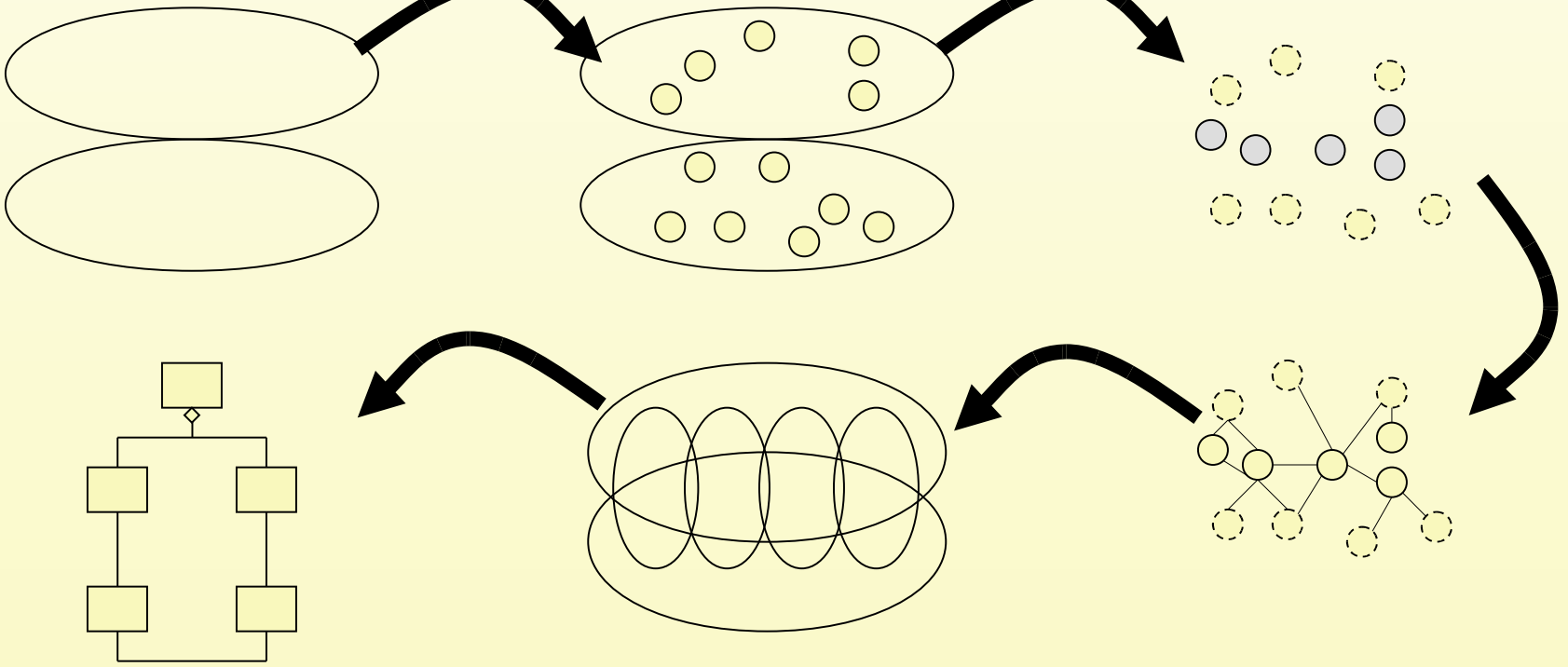
Just defines some common terminology

This model may be used if no physical model is already defined: other models in ISA95 work with any given equipment hierarchy

Equipment Model (part 3 enhanced)



ISA95 information definition approach



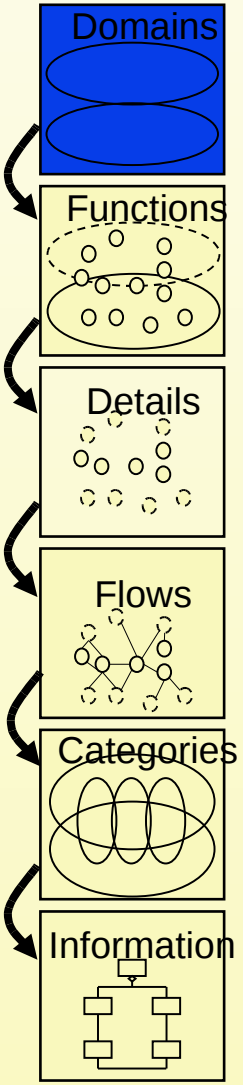
1. Domain definition

Control domain

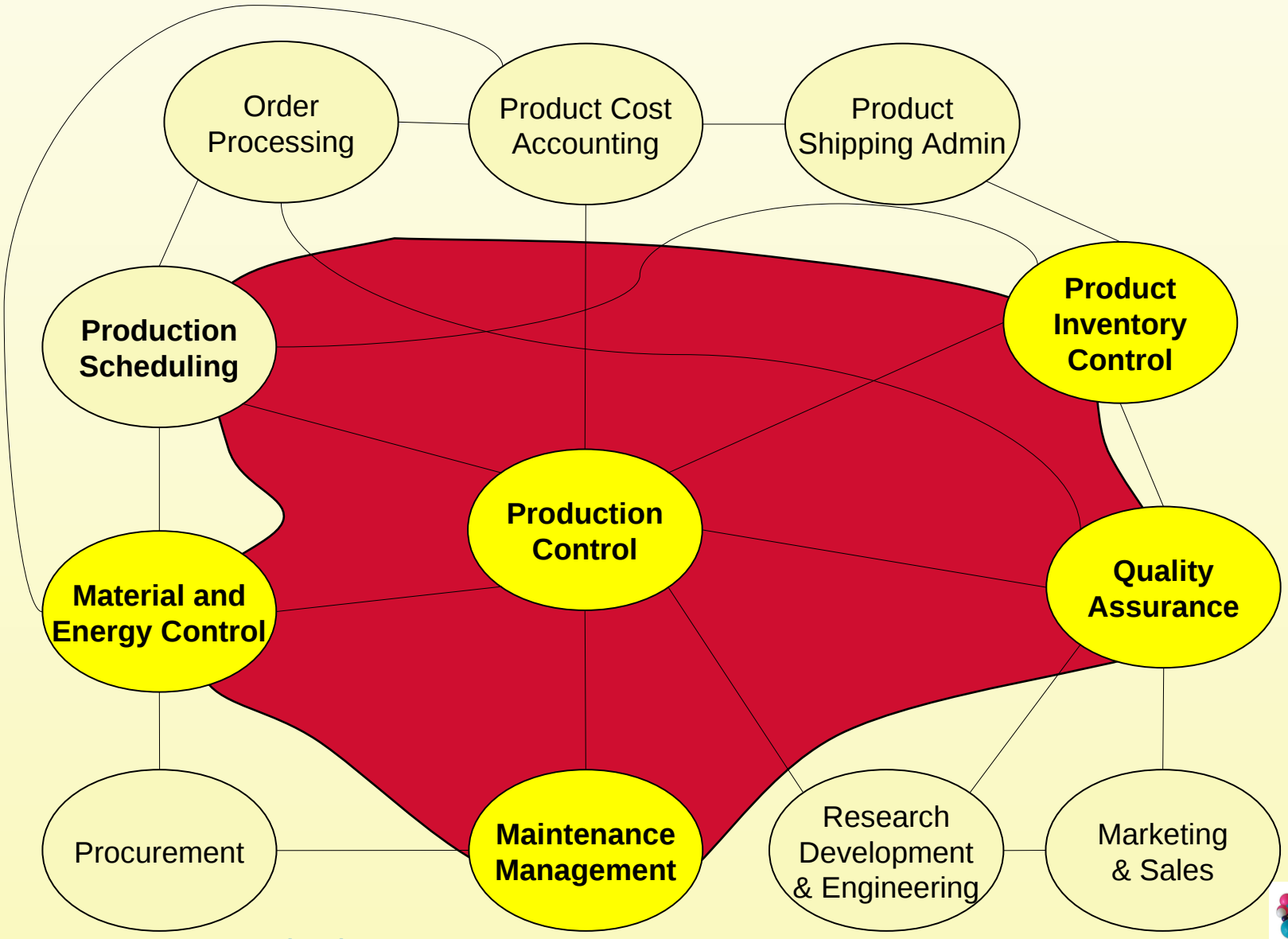
The first and most abstract

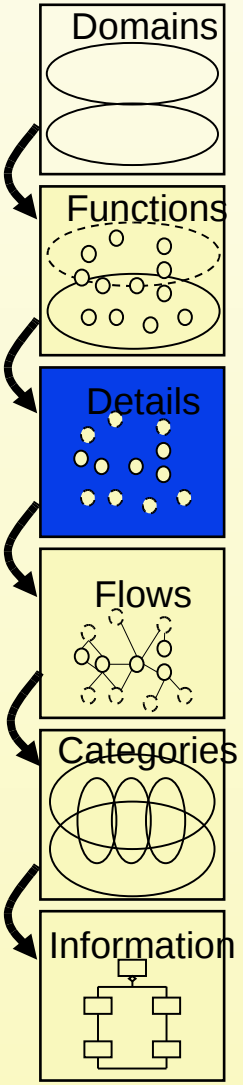
Answers the question;

“What is in Business/planning and What is in Manufacturing operations?"

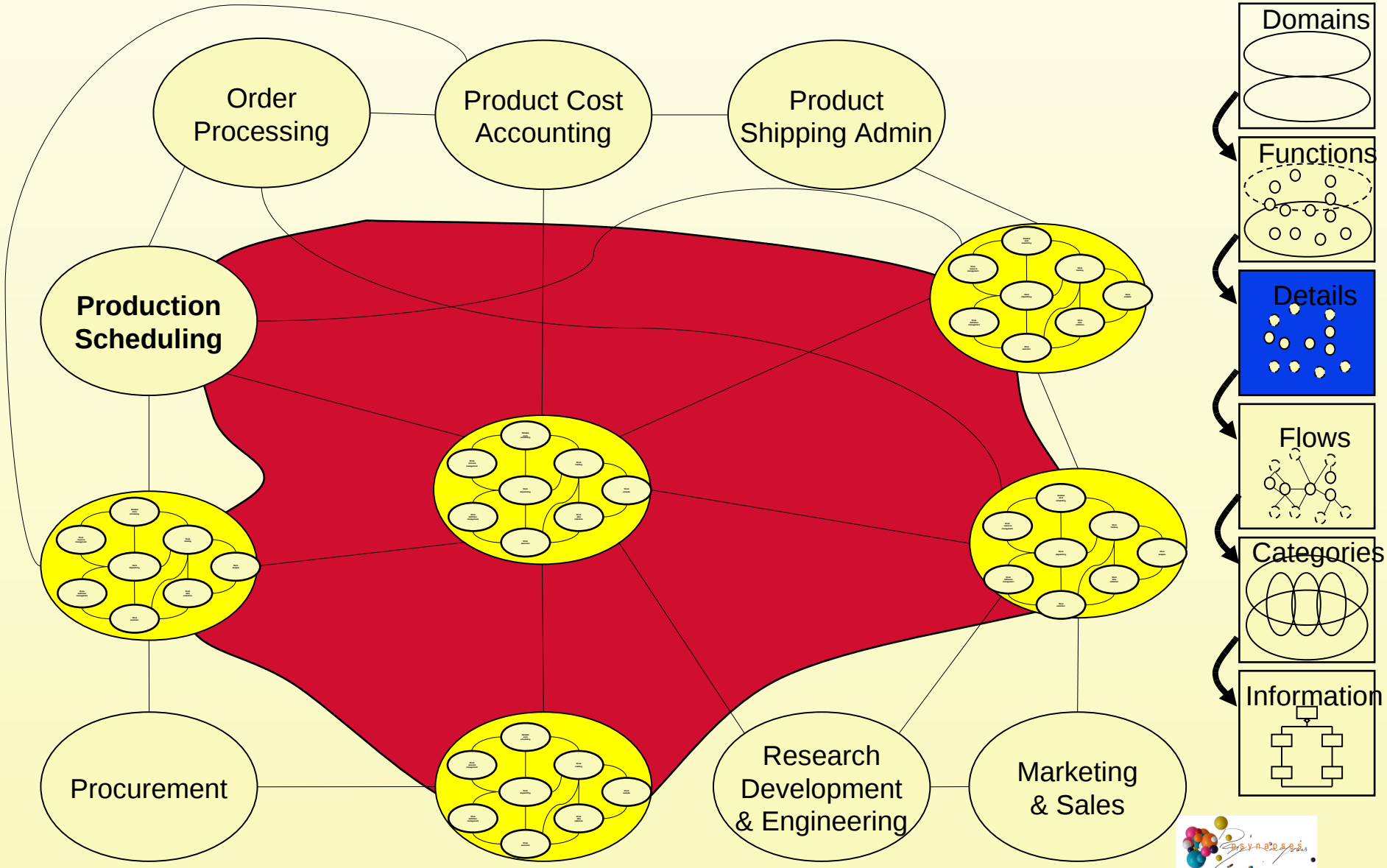


2. Functions in domains

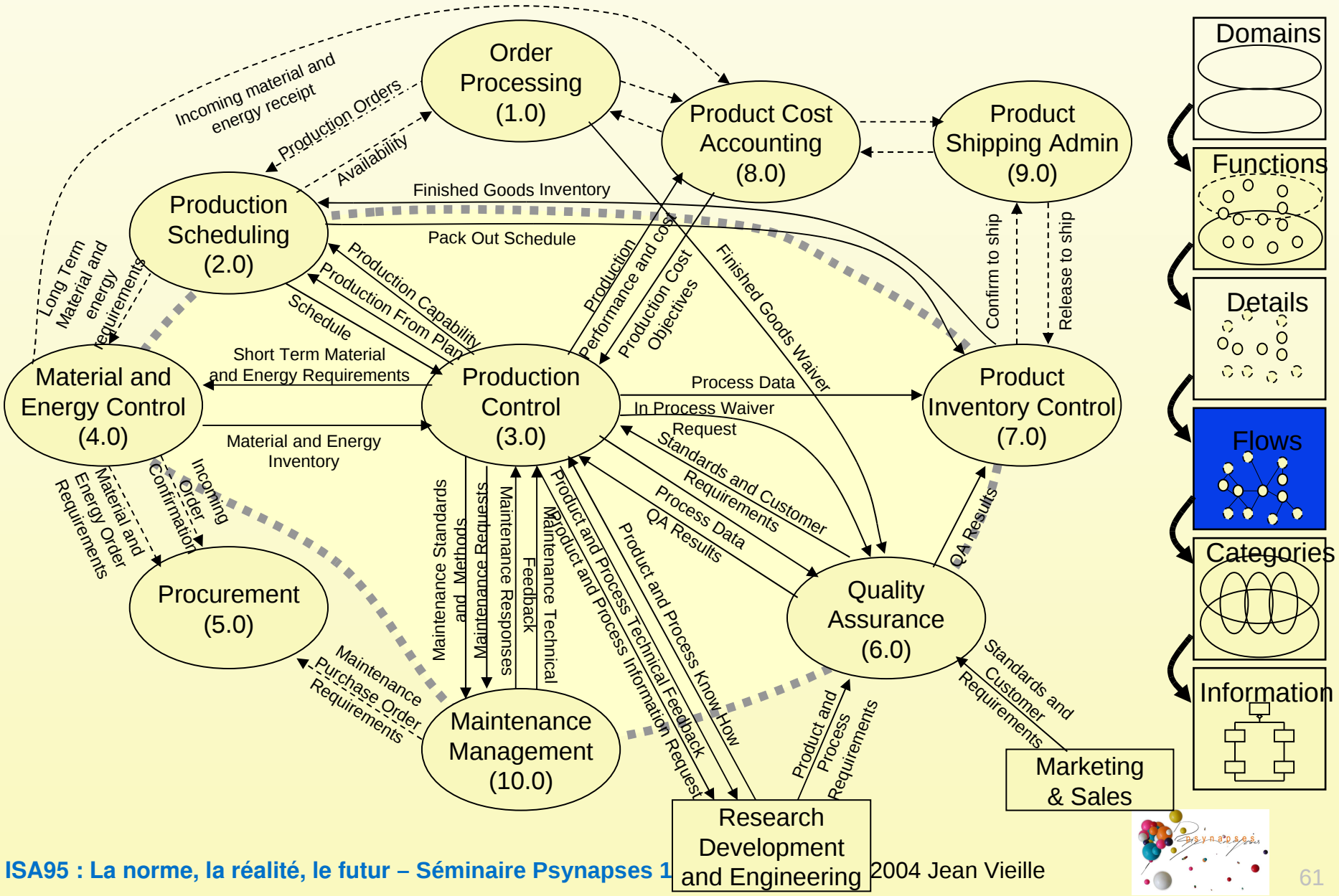




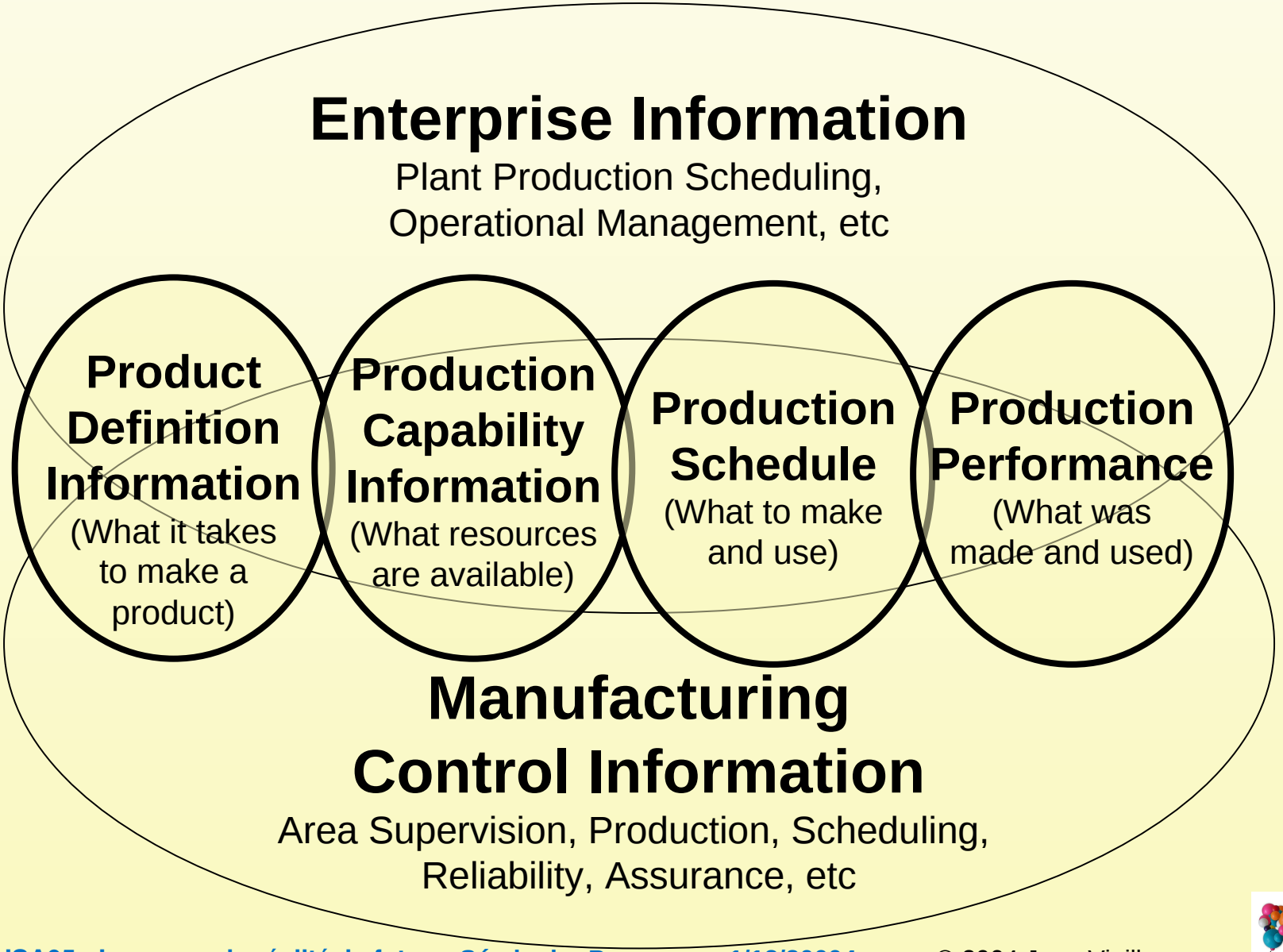
3. Functions of interest

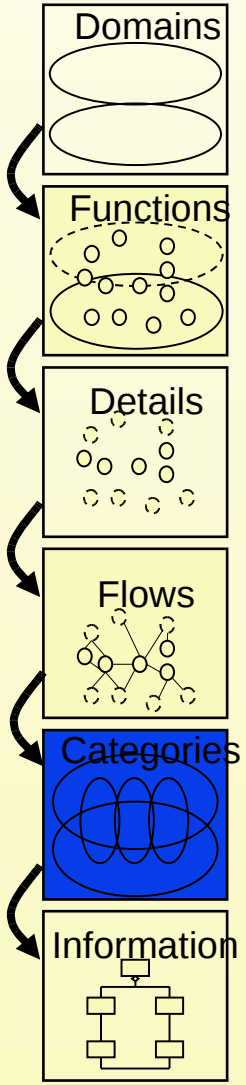


4. Information flows of interest



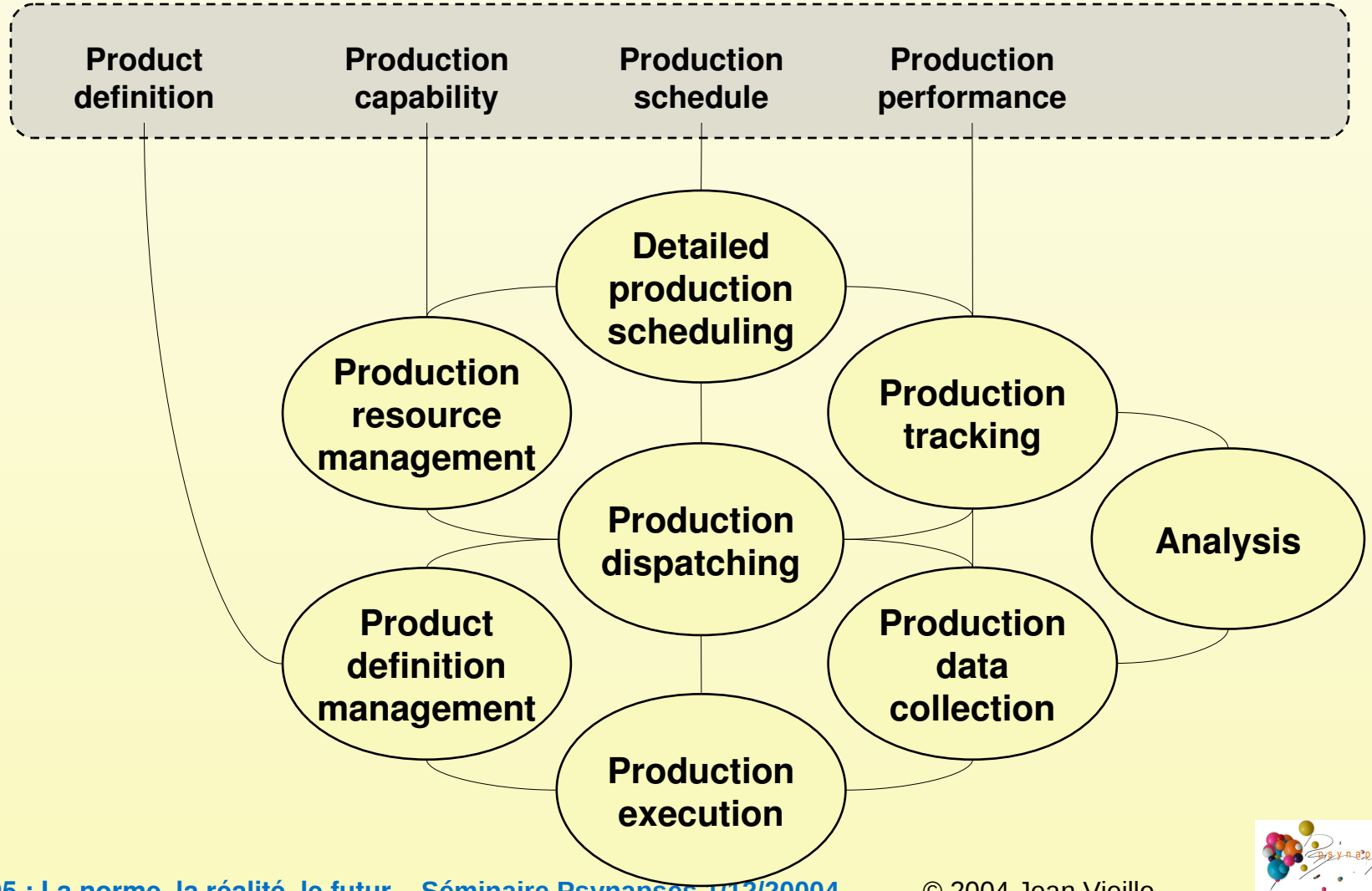
5. Categories of information





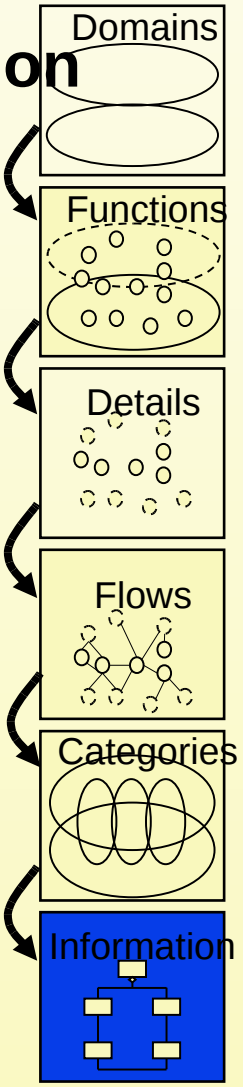
5. Categories of information

Relationship with Activity model



6. Information definitions

The actual object model explained in the next section



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Section10: ISA88-ISA95 convergence

Major Object Definitions

Three categories of resources

1. Personnel
2. Equipment
3. Material (and Energy)

Combined resources (logical view)

4. Process Segments

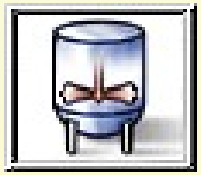
Four Models / Process-Product-Production

5. Capability Definition (by time & by segment)
6. Product Definition
7. Production Schedule
8. Production Performance

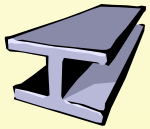
Major Object Definitions

Resources

1. Personnel



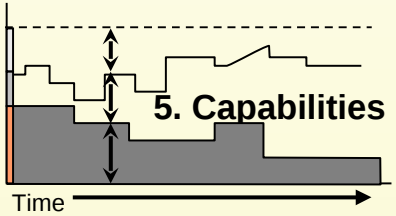
2. Equipment



3. Materials

4. Segments

Capability, Product, Production



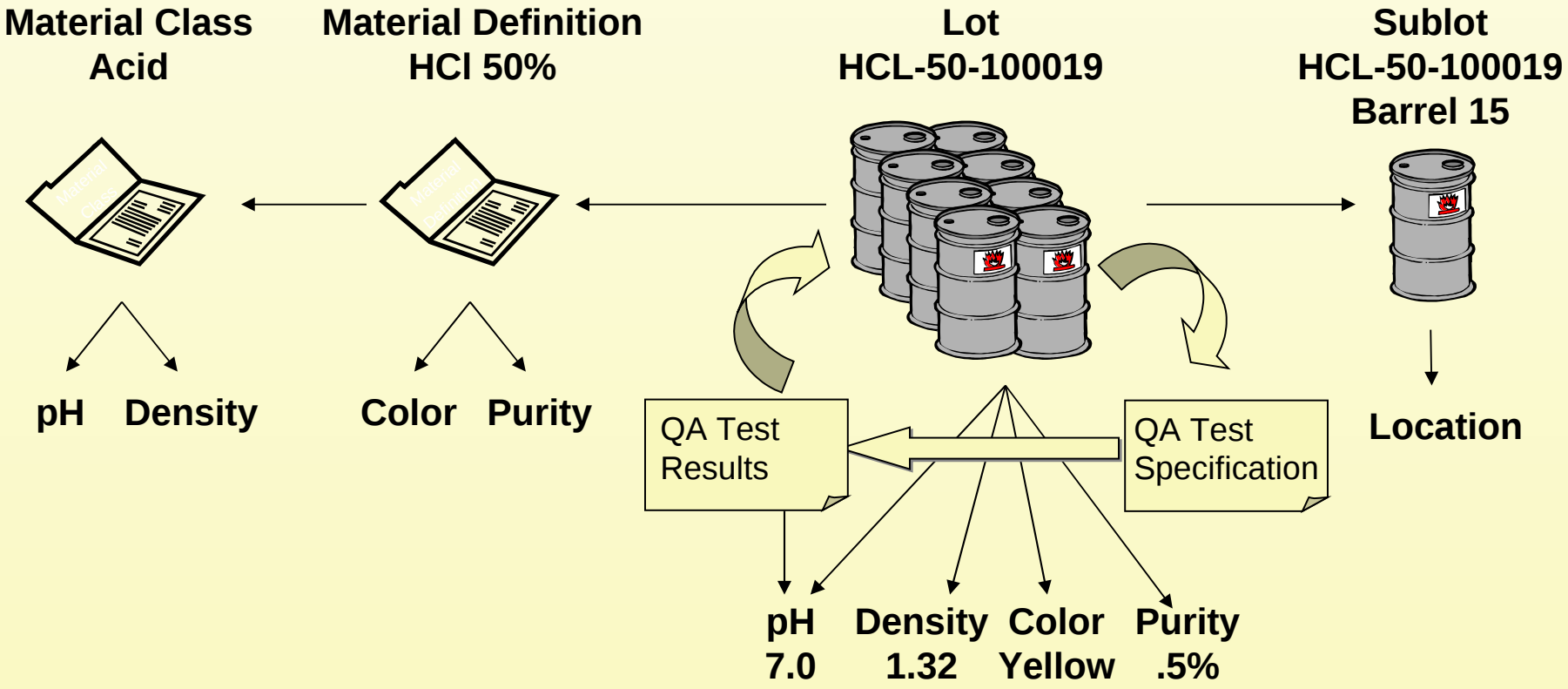
6. Product Definitions

7. Production Schedule

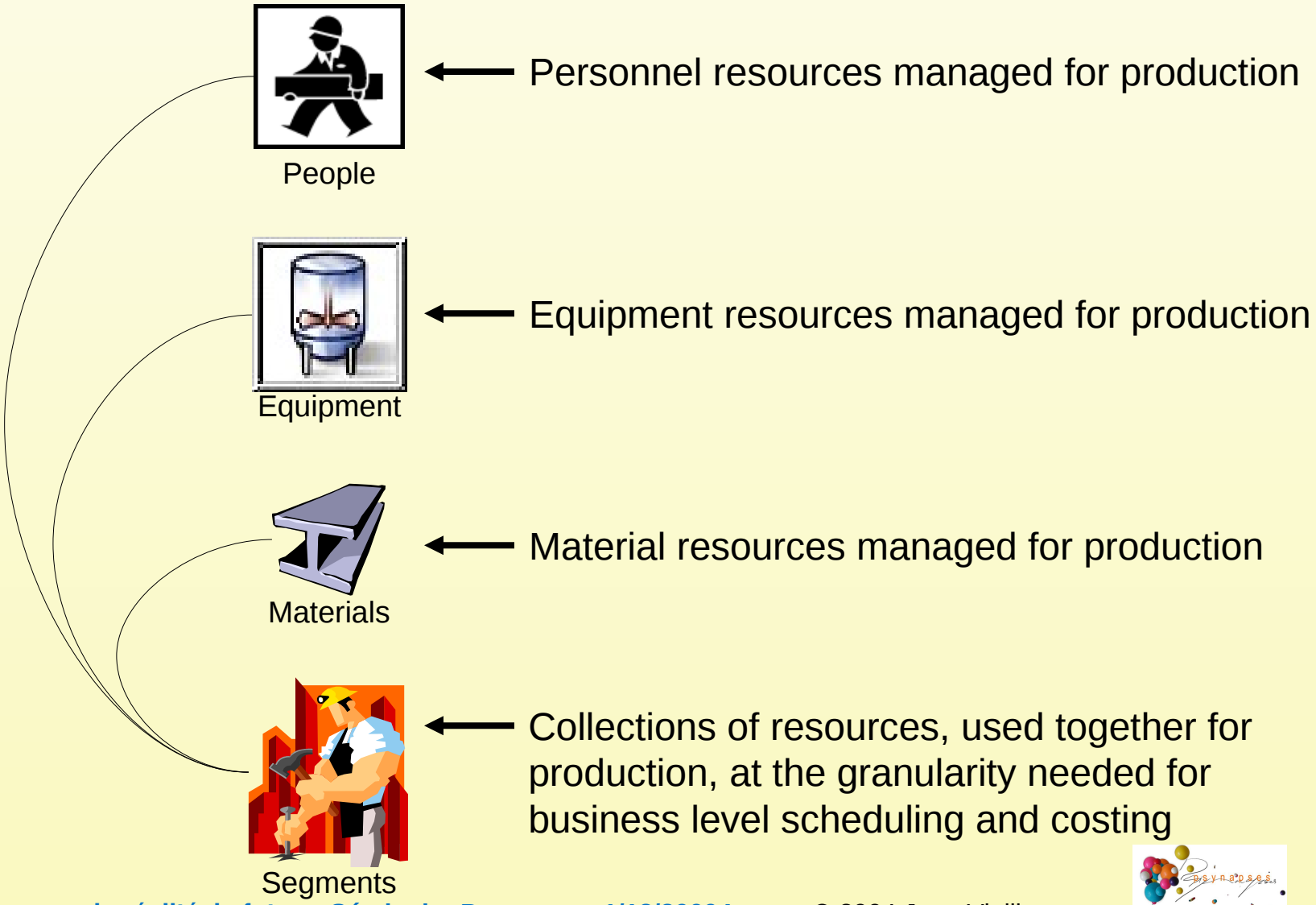
8. Production Performance

1-2-3 Example: Material Definitions

The picture below represents the material information modeled in ISA95.01.

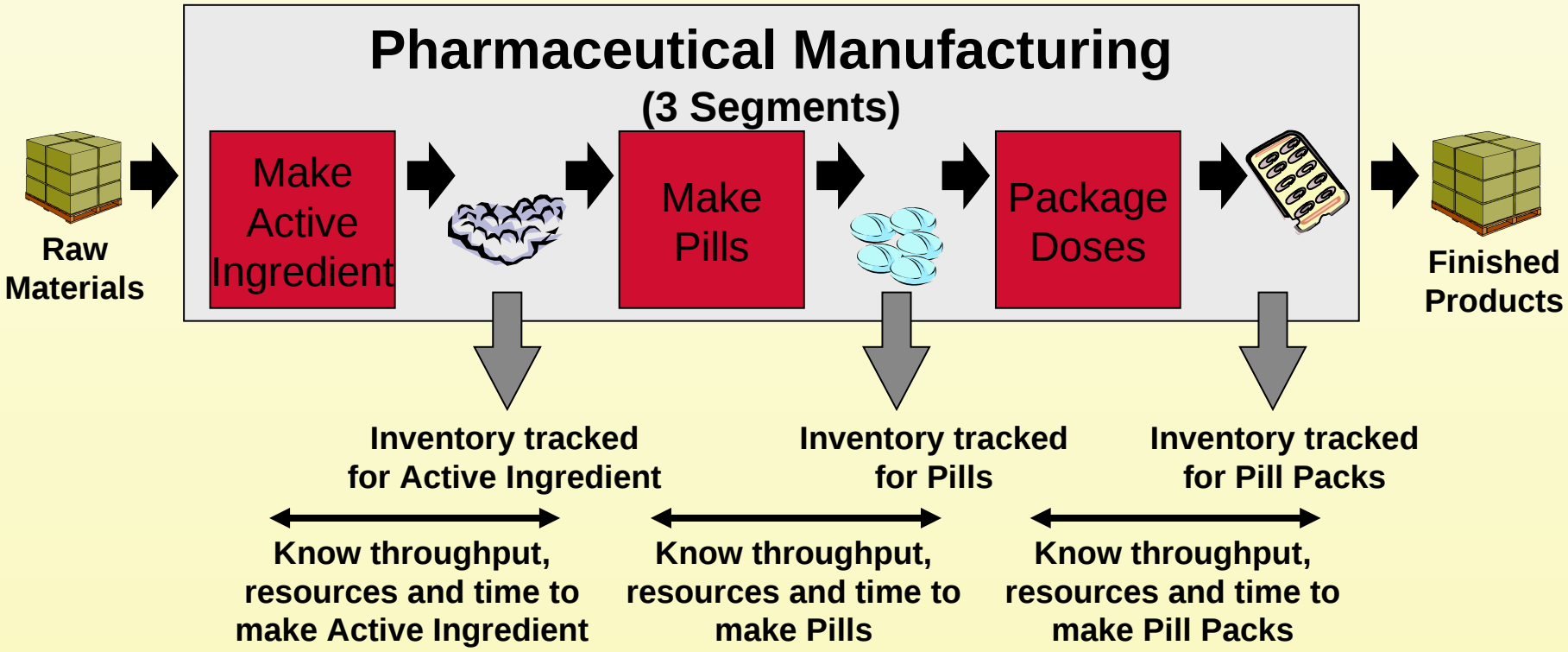


4. Process Segment Model



4. Process Segments

Business view of production



4. Process Segment

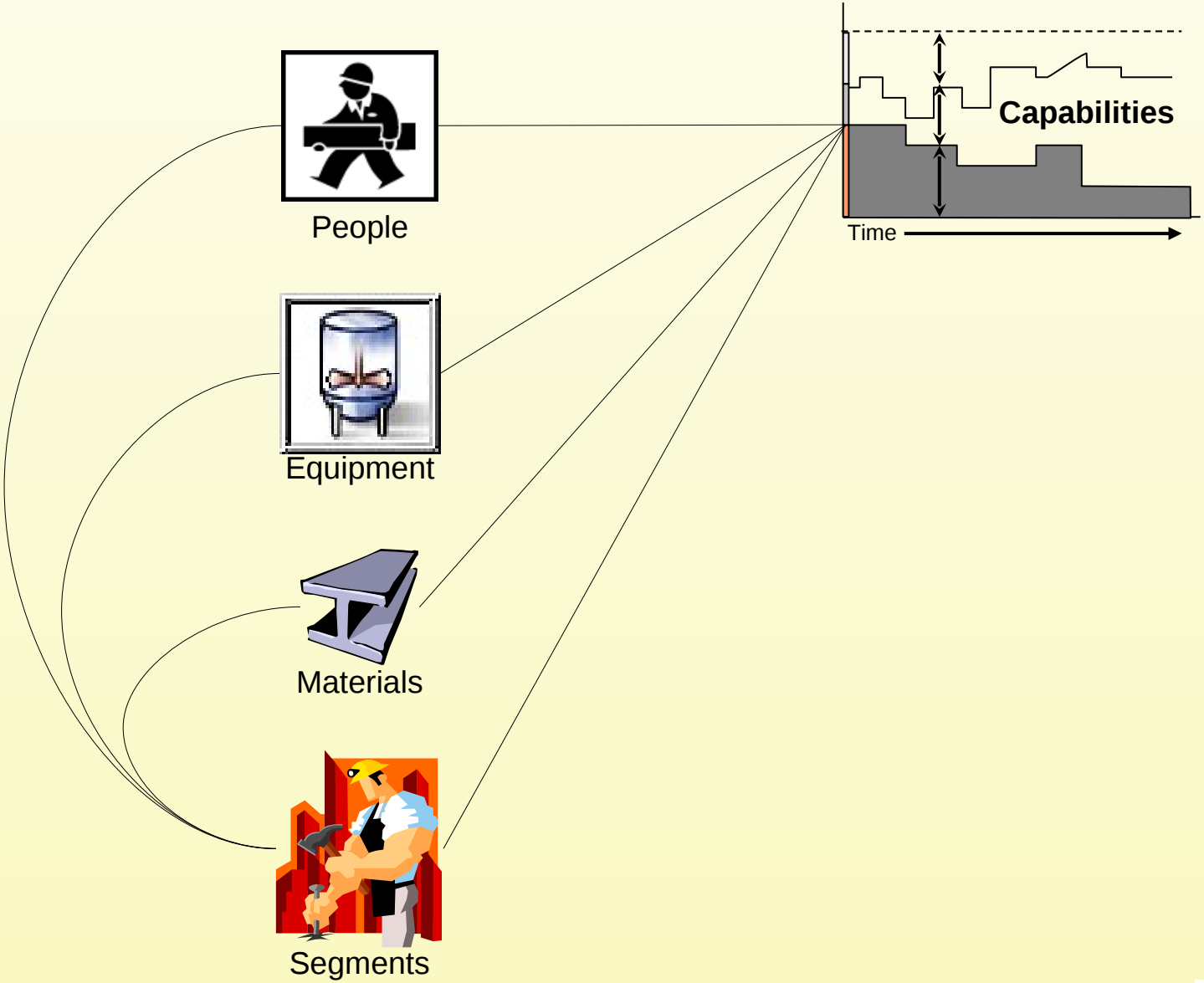
A process segment:

- Is a view of process for the business system to control the regarding resource usage, cost, and quality
- can be more or less detailed and self contained providing a “telescopic” view of manufacturing capabilities of a given facility

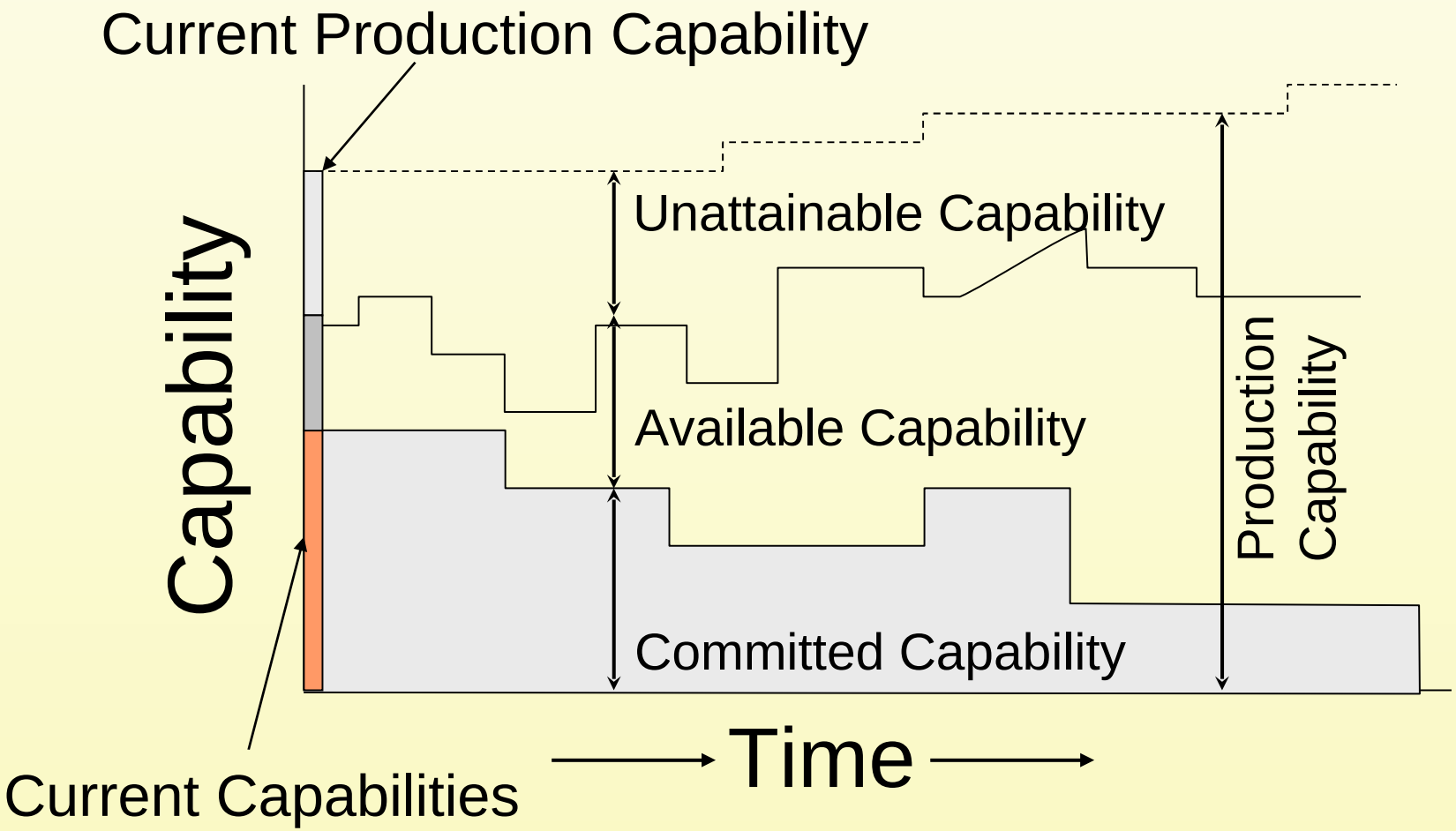
Depending on production typology and industries, Process segment can correspond to:

- Procedure, Unit Procedures, Operation or phases in Batch processes
- Unit operations in continuous processes
- Assembly steps and assembly actions in discrete processes

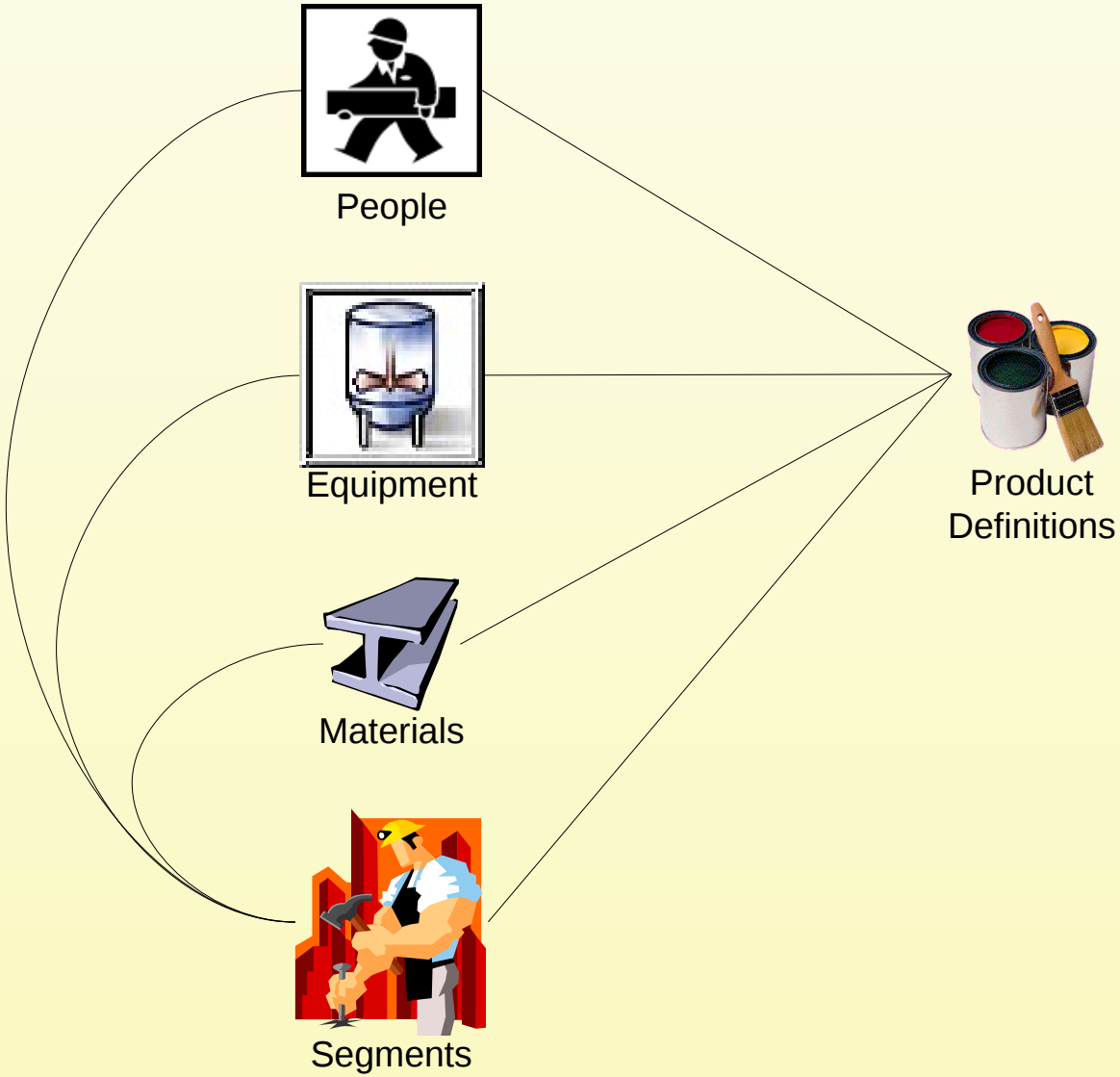
5. Capability Model



5. Capability model (cont'd)



6. Product Definition Model



6. Product Definition Information

For any specific product defines

The production segments required to produce the product and any:

- Specific parameters
- Equipment requirement
- Personnel requirements
- Material specifications

The production visible part of the bill of material

All of these elements must relate to definitions in the capability models

6. Product Segments

Product Segment: manufacturing requirements

Defines the product specifications per production segment

Details the required resources for this production segment

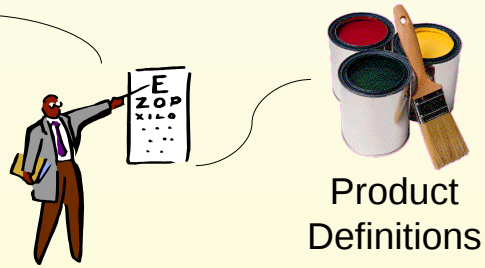
- Personnel (ex:3 operators)
- Equipment (ex:1 packing machine)
- Materials (ex: 1500 bottles)
- Parameters (ex: shape, size)

May correspond to ISA88.01 Process elements :

Process, Process stage, Process Operations (used in General/Site recipes)

7. Production Schedule

Production Schedule



Segments requirements

People

Equipment

Materials

What to make and what to use

- **A Production Schedule**
  - Is a collection of Production Requests
- **A Production Request**
  - Defines Production for a specific product
  - Is a collection of Segment Requirements
- **A segment Requirement**
  - Must correspond to an existing product or process segment
  - Defines specific Equipment, Personnel, Material requirements and Production parameters
  - There may only be one production segment,
    - But at least one!

7. Back to Segments

Process segment: manufacturing capability

- Defines the manufacturing process available per segment
- Gather the required resources to execute the defined production segments

Product Segment: manufacturing requirements

- Defines the product specifications per production segment
- Details the required resources for this production segment

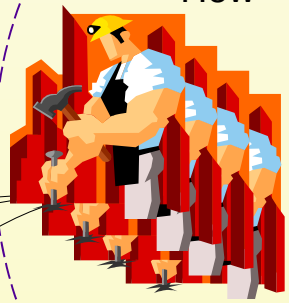
7. Production Schedule - Segments

Production Schedule

Production requests

Product Definitions

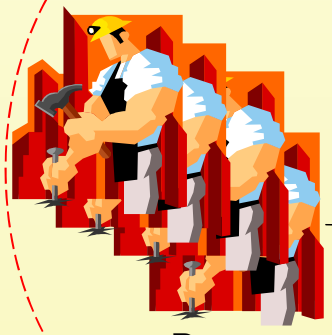
Product design Know How



Product Segments Specification

Segments Requirements

Facility Manufacturing Know How



Process Segments Specification

People

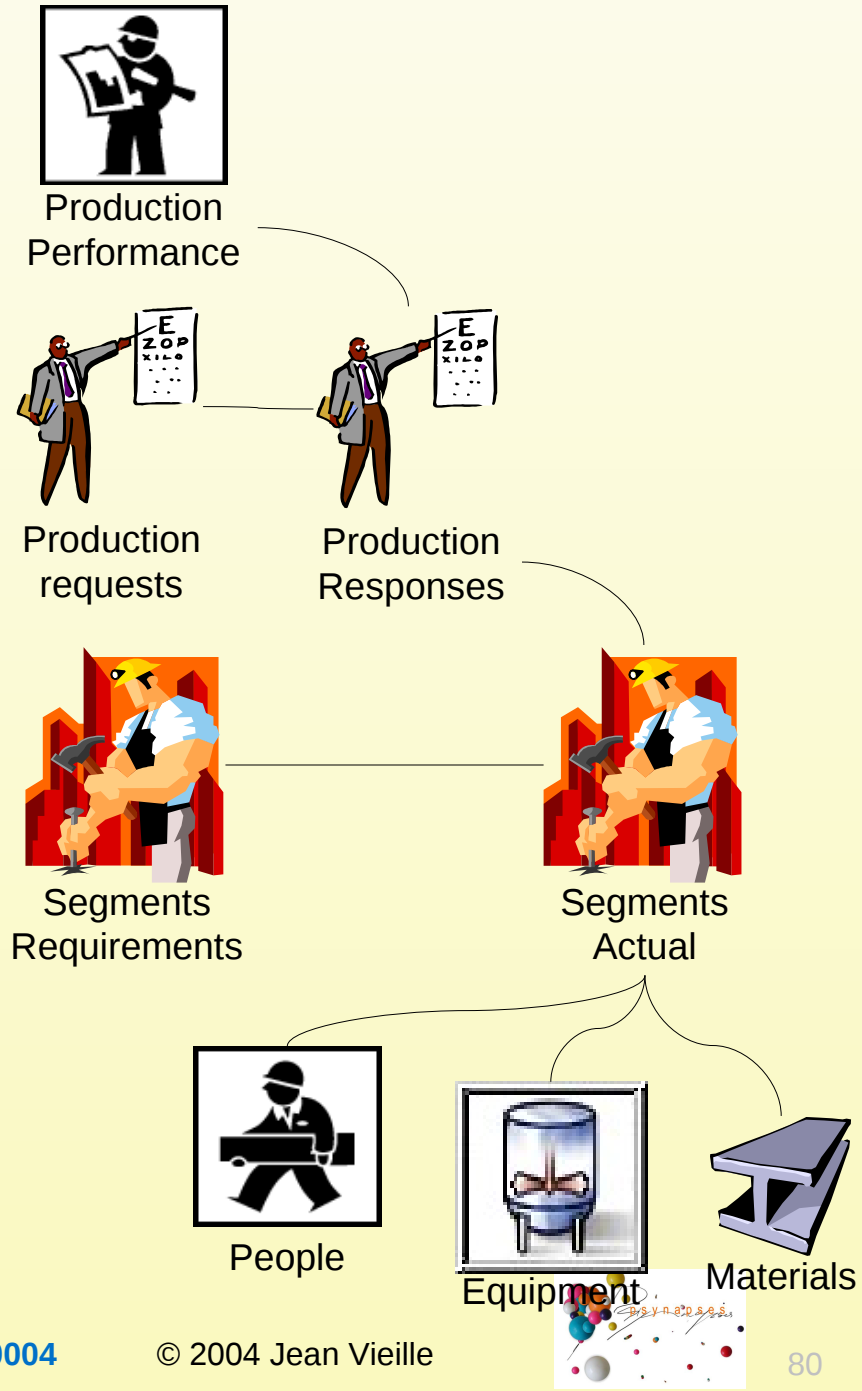
Equipment

Materials

8. Production Performance

What was made and what was used

- **A Production Performance**
  - Is a collection of Production Responses
- **A Production Response**
  - Is a collection of Segment Response
  - Corresponds to a specific Production Request
- **A segment Response**
  - Correspond to a specific segment requirement
  - Reports What resources were actually used, consumed, produced and other production data



Summary: Object Model

Formal object definitions

3+1 Resource Models

- Personnel
- Material
- Equipment
- Segments

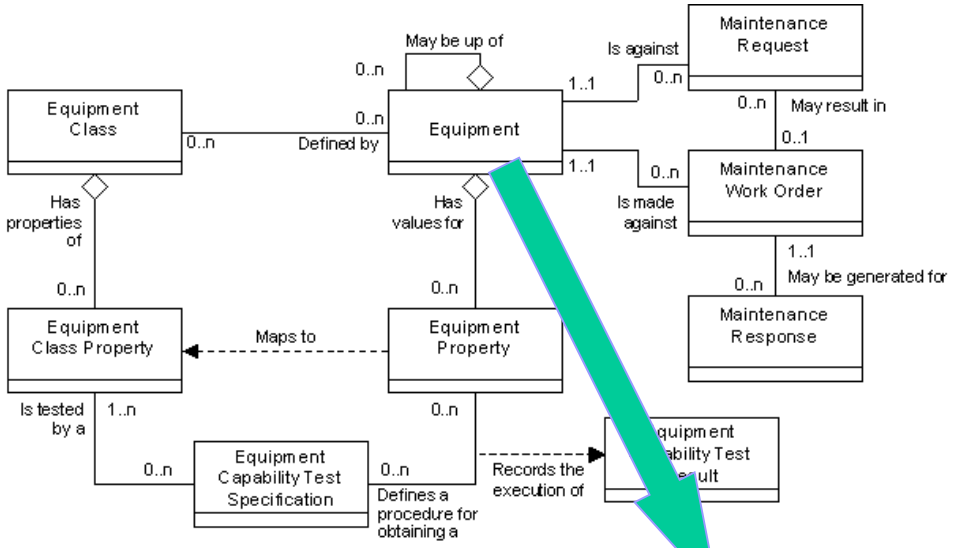
4 Interactive Models

- Capability Information
- Product Definition
- Production Schedule
- Production Performance

The object model may be used as the basis for formalized information exchange protocols

Such as SQL tables or XML internet files

ISA95.02



ISA95.01 Equipment model

ISA95.02 Equipment Attributes

Attribute Name	Description	Examples
ID	A unique identification of a specific piece of equipment, within the scope of the information exchanged (Production Capability, Production Schedule, Production Performance, …) The ID is used in other parts of the model when the equipment must be identified, such as the *production capability* for this person, or a *production response* identifying the equipment.	R7726 Reactor 101 Lathe machine 33
Description	Additional information about the equipment.	

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ISA95 part 4 issue

Part 1 and 2 focused on Production

- Maintenance and Quality vaguely addressed as equipment model appendice and operation activity
- Inventory operations are not mentionned

Part 3 reveals the full scope of the standard

- Addressing all manufacturing related activities, including Maintenance, Quality, Inventory and other possible Manufacturing Operation Domains

Part 3 refined the execution functions

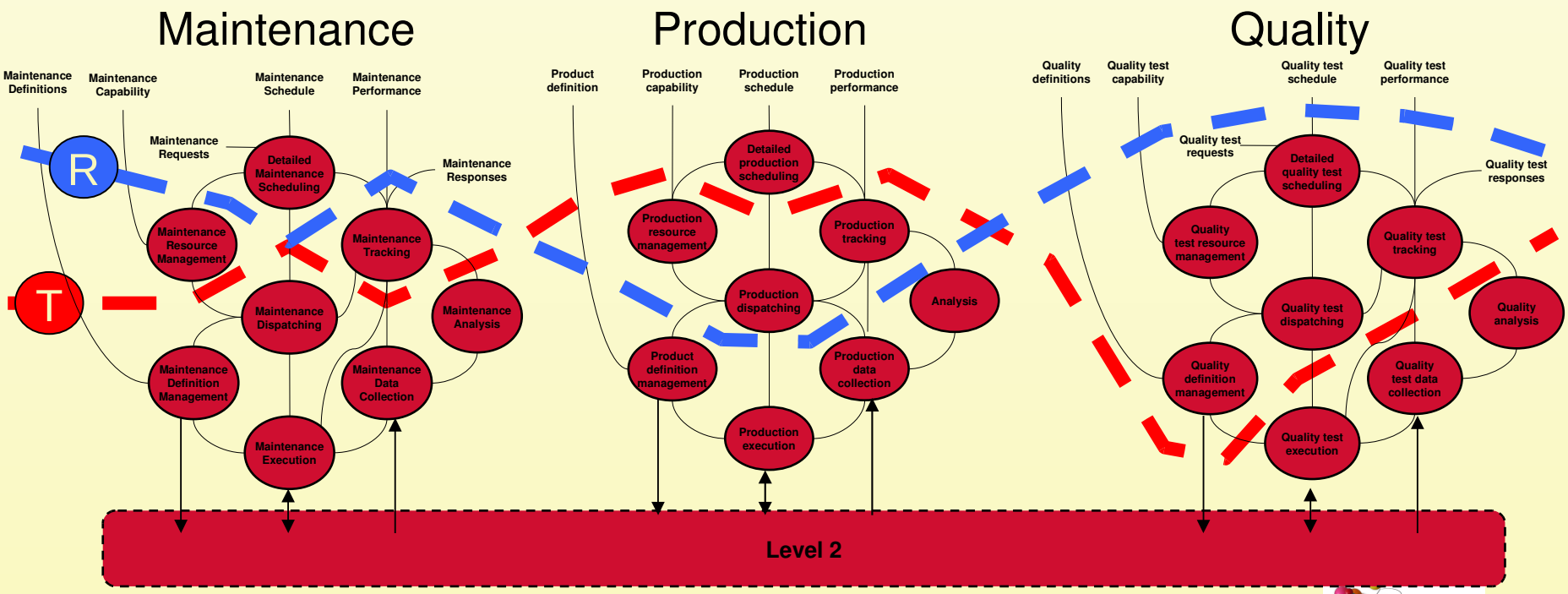
- B2M boudary can cross anyware between those functions

Lines of Integration

line of responsibility,

line of technical integration

The two may not, probably will not, be the same



Part 4 scope and status

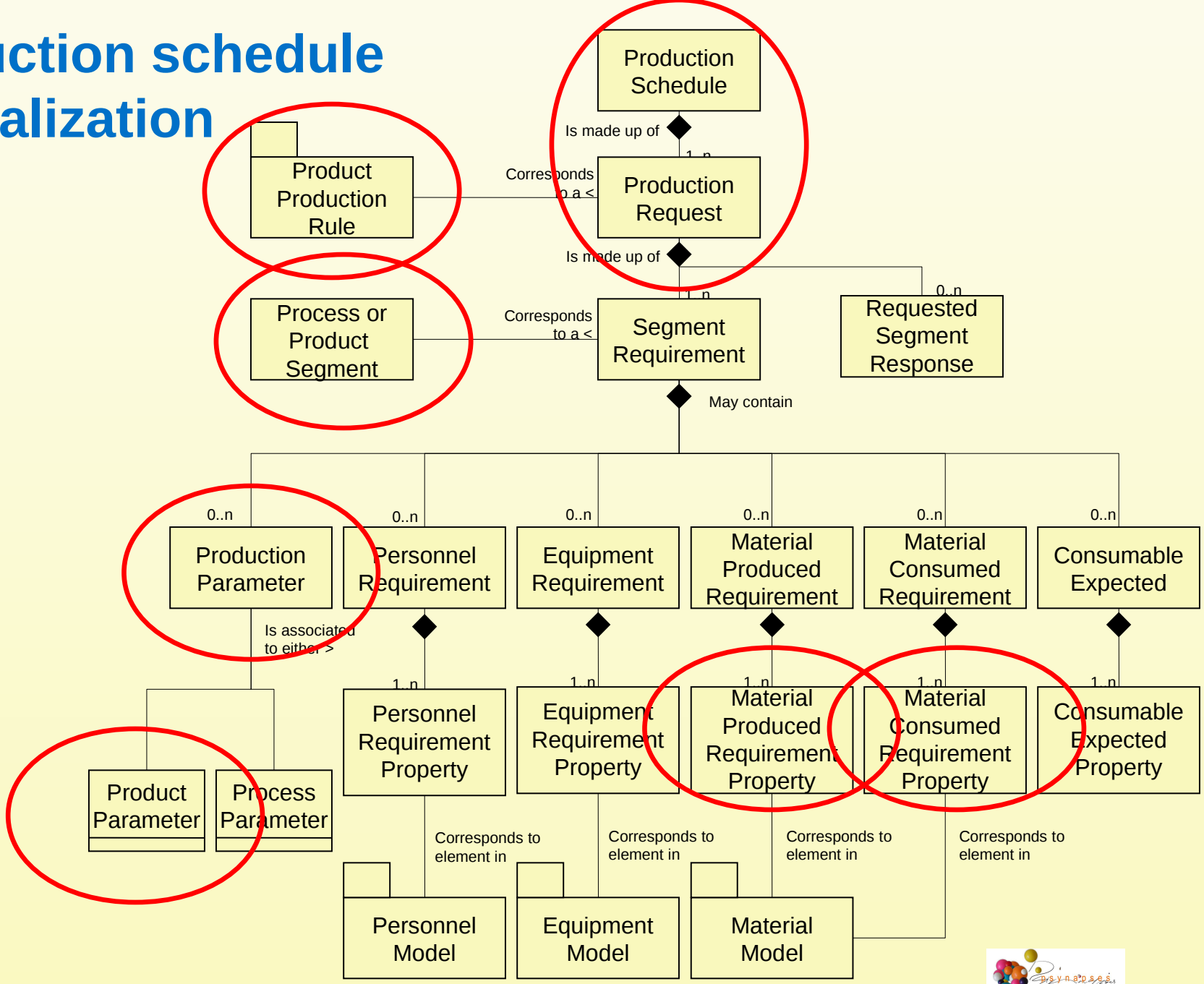
This part of the standard must reconcily previous work with actual standard extend

- Extra-production manufacturing operation domains
- Refined execution functional model

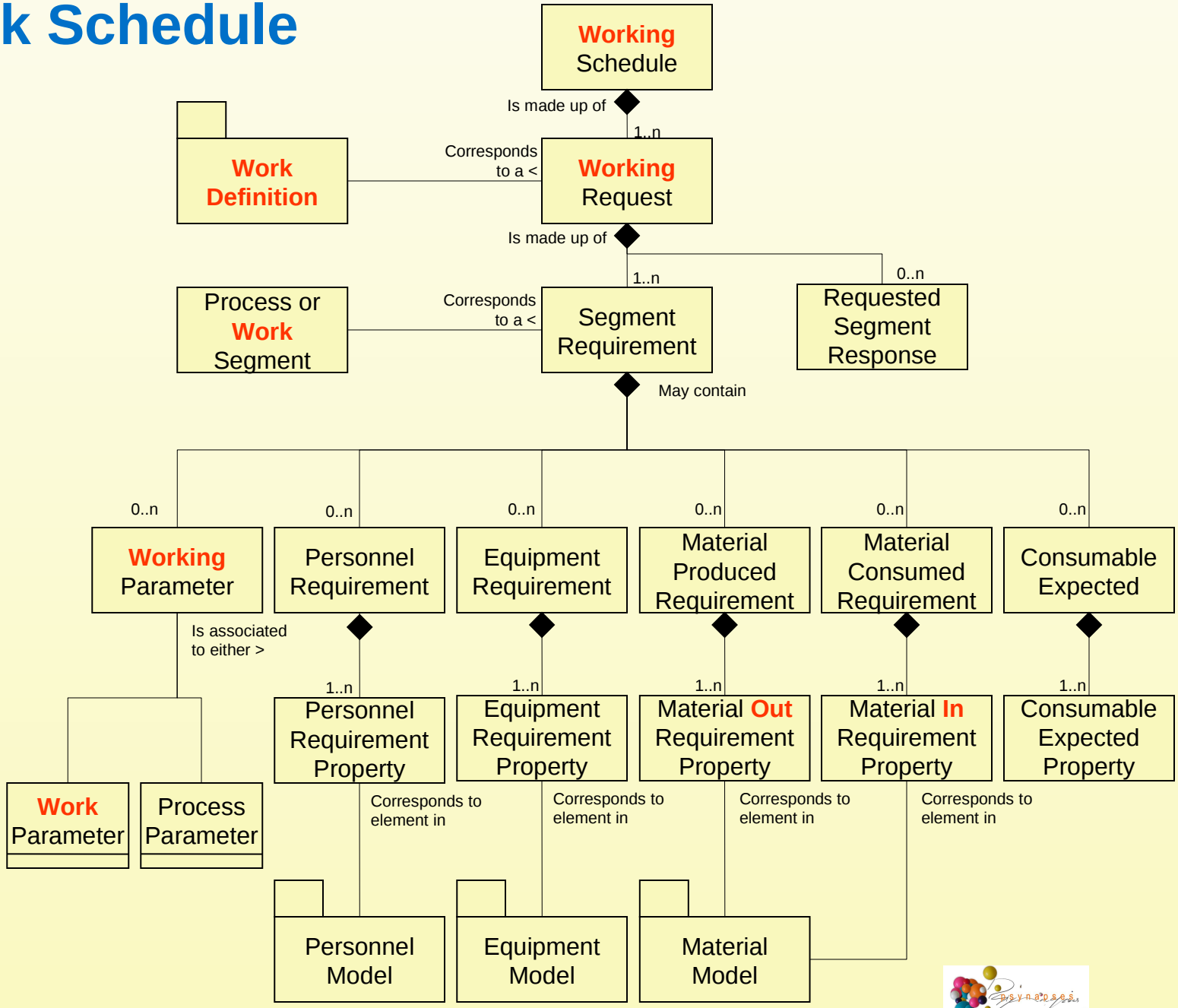
Actual implementations already addressed this issue by generalizing Part 1&2 models – See following pages.

Note: This part is just kicking off at the time of this presentation release.

Production schedule generalization



…=> Work Schedule



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What is XML?

eXtensible Markup Language

a subset of SGML

World Wide Web Consortium (W3C)
REC-xml-19980210
Extensible Markup Language (XML) 1.0

Language that:

- Describes data, not its presentation
- Text based
- Can be used to create other markup languages

Platform independent

A mainstream technology

Domain Specific Vocabularies

Sets of domain specific tags

Permits validation of XML documents

Supports data exchange and interoperability

Defined using XML Schema Definitions (XSDs)

Vocabularies are themselves markup languages

HTML 4.0	Hypertext Markup Language
MathML	Mathematical Markup Language
CML	Chemical Markup Language
OAGIS Specification	Open Applications Group Integration
B2MML Language	Business To Manufacturing Markup

XML Schemas

The allowable tags, the allowable ordering, and the allowable hierarchy is defined in a schema

A schema defines the rules for valid XML documents

Schemas are agreements on the meaning of words and on the hierarchy of relationships

A schema is a dictionary

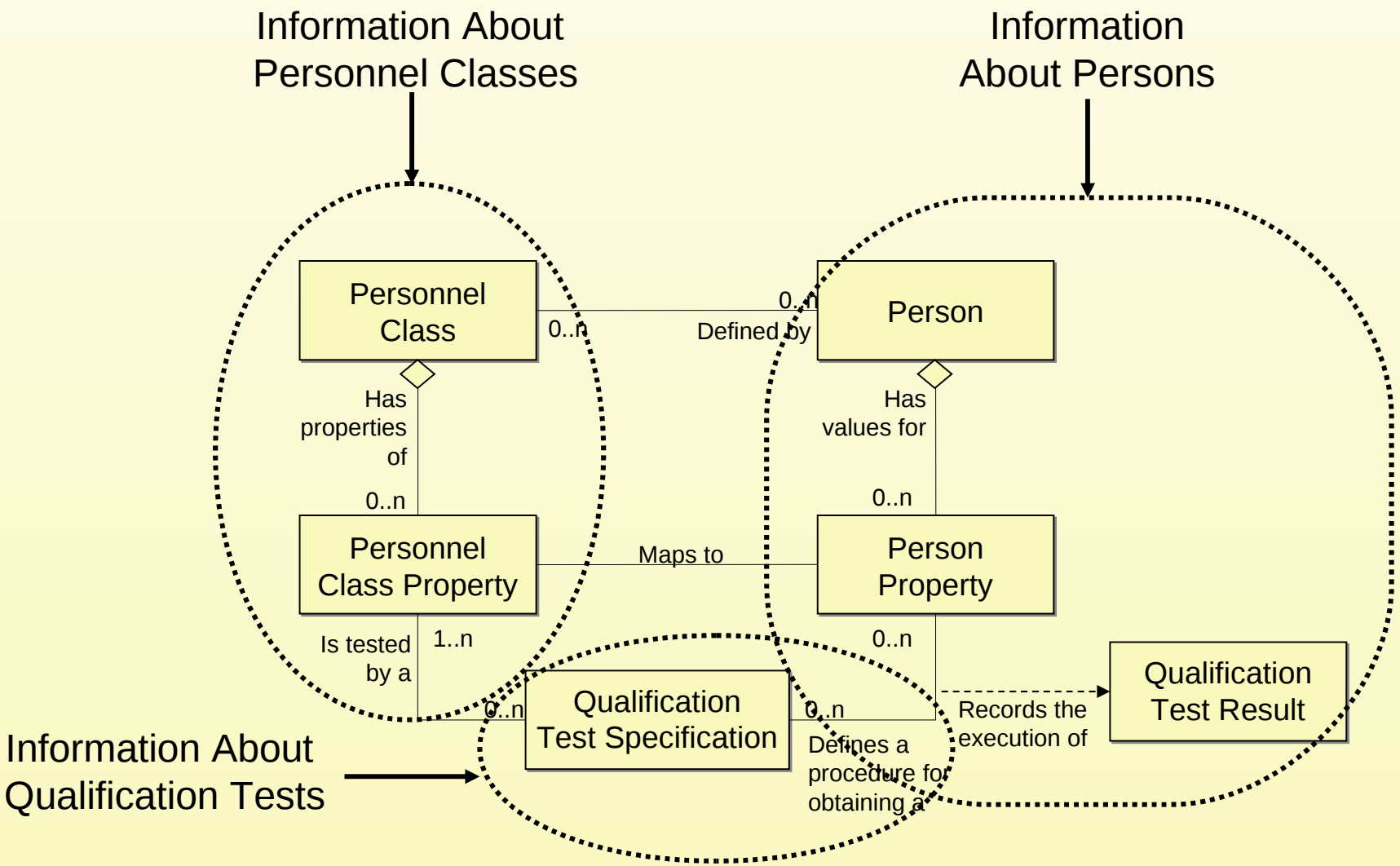
B2MML Schemas

“WOODCLIFF LAKE, NJ (April 7, 2002) – The World Batch Forum (WBF), the leading organization dedicated to the advancement of batch process manufacturing, today released two XML schema based on the ANSI/ISA S88 and S95 standards for batch control and business to manufacturing data exchange/”

- BatchML – Objects in batch control and recipe management
- B2MML – Objects in business to manufacturing integration “Business To Manufacturing Markup Language”

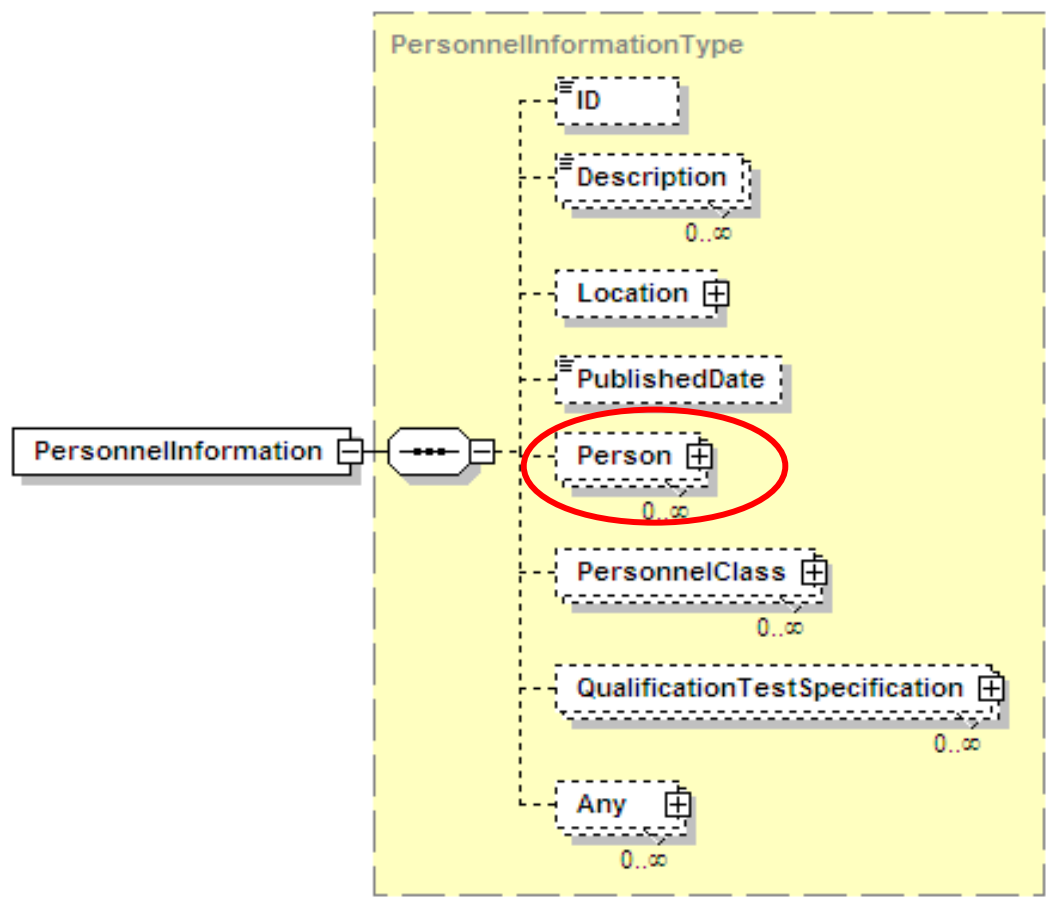
The schemas available, free-of-charge, to all vendors and users that wish to use them.

Example on Personnel Model



Personnel Information Schema

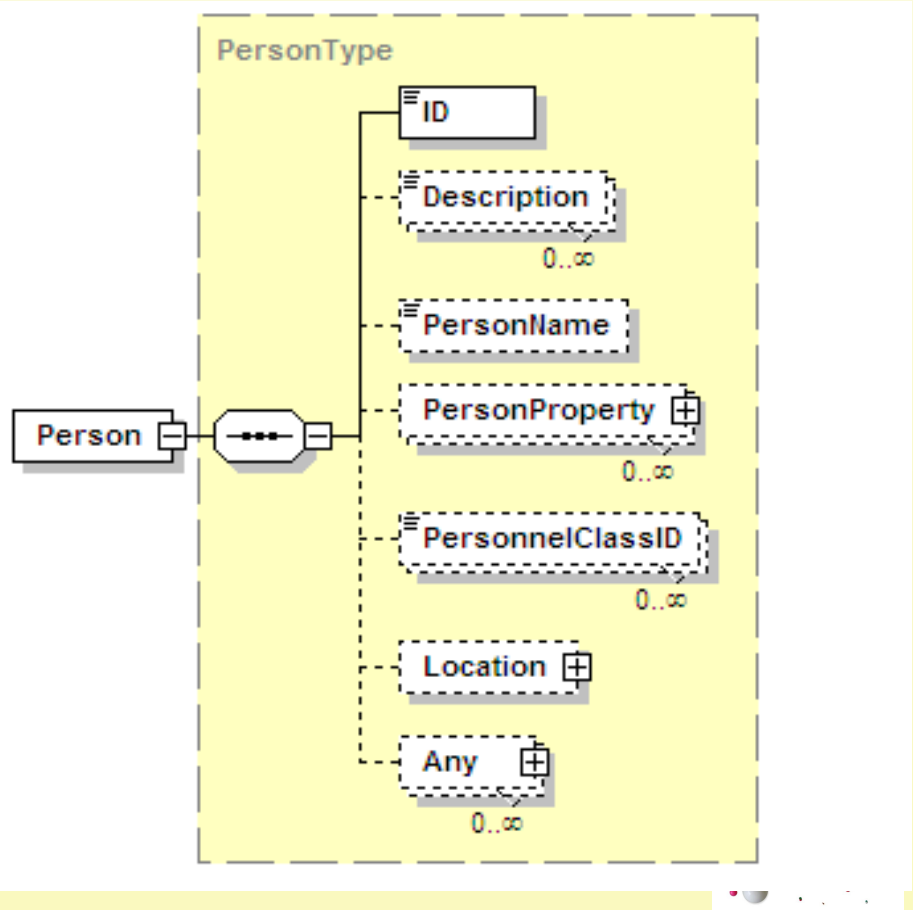
Contains the top level definition of persons, personnel classes, and qualification test specifications.



Person Schema

Contains a definition of a person resource, including the ID, name, properties of persons, and the list of personnel classes the person is a member of.

May be a top level object.



Example Person Schema - PersonType

```
<xsd:complexType name="PersonType">
  <xsd:sequence>
    <xsd:element name="ID" type="IDType"/>
    <xsd:element name="Description" type="DescriptionType" minOccurs="0"
maxOccurs="unbounded"/>
    <xsd:element name="PersonName" type="PersonNameType" minOccurs="0"/>
    <xsd:element name="PersonProperty" type="PersonPropertyType" minOccurs="0"

maxOccurs="unbounded"/>
    <xsd:element name="PersonnelClassID" type="PersonnelClassIDType"
minOccurs="0"

maxOccurs="unbounded"/>
    <xsd:element name="Location" type="LocationType" minOccurs="0"/>
    <xsd:element name="Any" type="AnyType" minOccurs="0"
maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

Example Person message - Person

```
<?xml version="1.0" encoding="UTF-8"?>
<!--Sample XML file generated by XMLSPY v2004 rel. 4 U (http://www.xmlspy.com)-->
<PersonnelInformation xmlns="http://www.wbf.org/xml/b2mml-v02"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.wbf.org/xml/b2mml-v02 C:\Personnel.xsd">
        <ID>xBoYz</ID>
        <Description> This is an example of Personnel Information </Description>
        …
        <Person>
          <ID>#00001</ID>
          <Description/>
          <PersonName>Jean Vieille</PersonName>
          <PersonProperty/>
          <PersonnelClassID>ISA95 Guru</PersonnelClassID>
          <Location>
                <EquipmentID/>
                <EquipmentElementLevel
                OtherValue="String">Enterprise</EquipmentElementLevel>
          </Location>
         </Person>
        …
        </PersonnelInformation>
```

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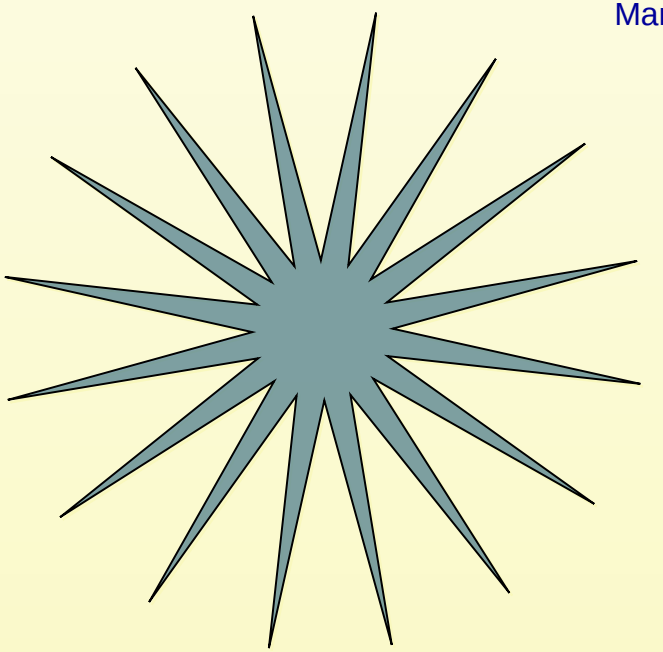
ISA95 Exchange Examples



APS
Advanced Planning and Scheduling

PP
Production Planning

HR
Human Resource

AMS
Asset Management System

PLM
Product Lifecycle Management

MMS
Material Management System

QM
Quality Management

PMS
Plant Maintenance System

LIMS
Laboratory Information Management System

PTS
Production Tracking System

PDM
Product Definition Management

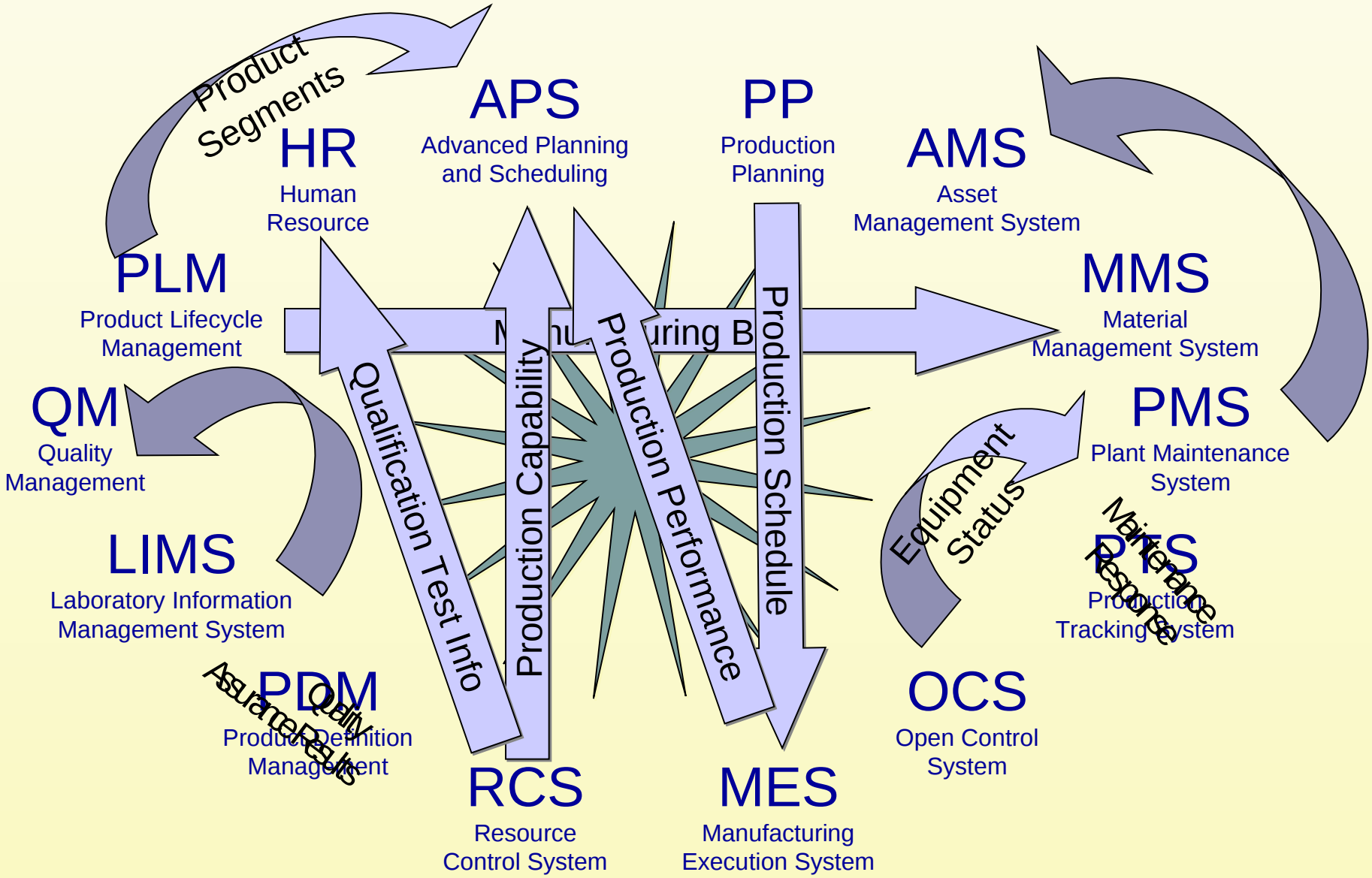
OCS
Open Control System

RCS
Resource Control System

MES
Manufacturing Execution System

Source : WBF WG XML

ISA95 Exchange Examples



Business Processes and Transactions

Improvement of enterprise metrics

Imply to automate business process execution, justifying integration need

Business processes:

sequence of information gathering and processing involving one or several systems or parts of a system.

Examples :

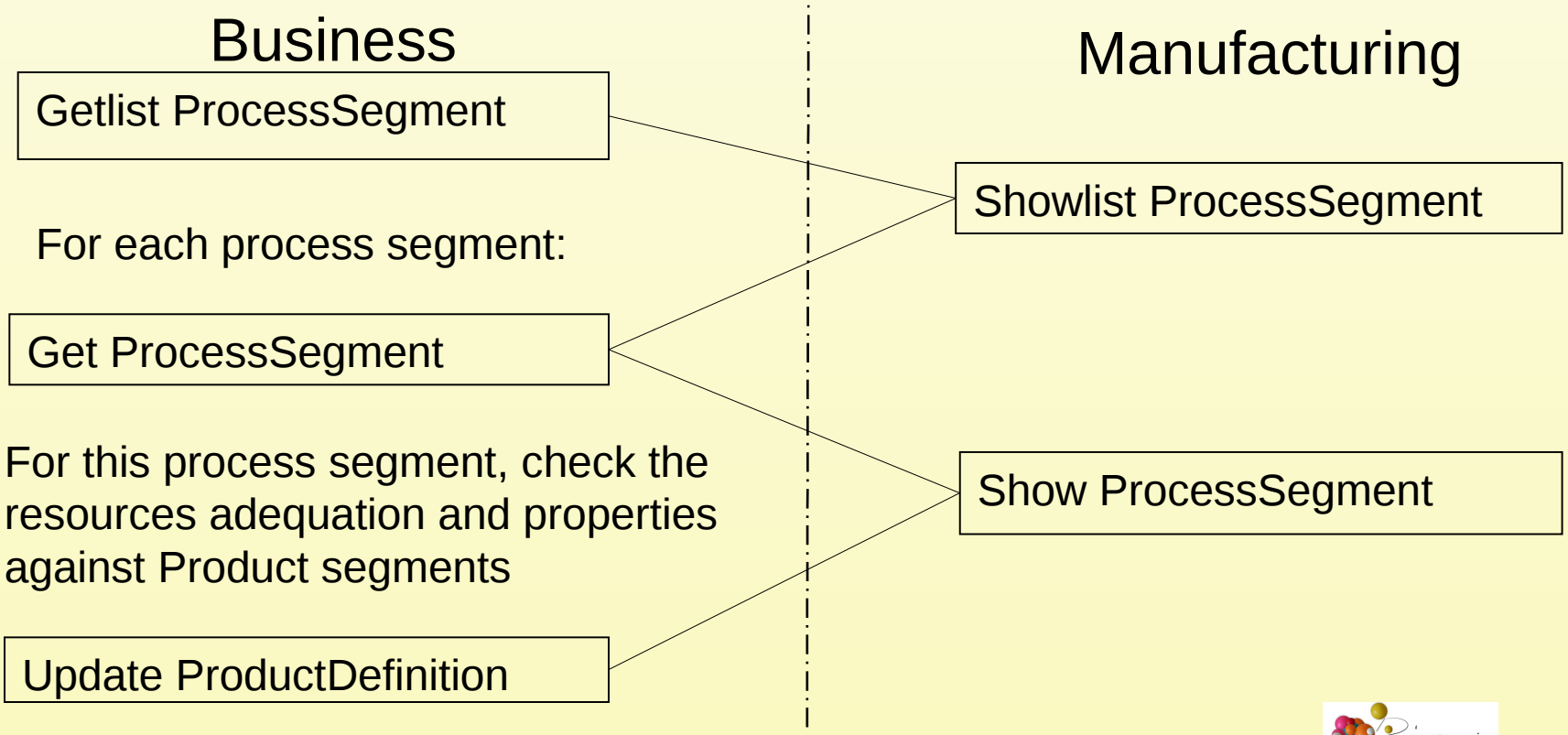
- simulation a planning (sending a bunch of production requests to the detail scheduling system to verify the impact of forecast on production)
- Download a production schedule, Generate and dispatch a Production report, Target process segment lookup

Business processes are based on Transactions (information + action request)

A transaction is achieved by one or more exchanged messages

Example: OAG Style Segment Lookup

This business process is used to identify the production resources that may satisfy all or part of the product definition.



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Many questions about ISA88/95

SP88 initial scope included Enterprise-Control integration

- Then the scope focused on Process Cell control and execution

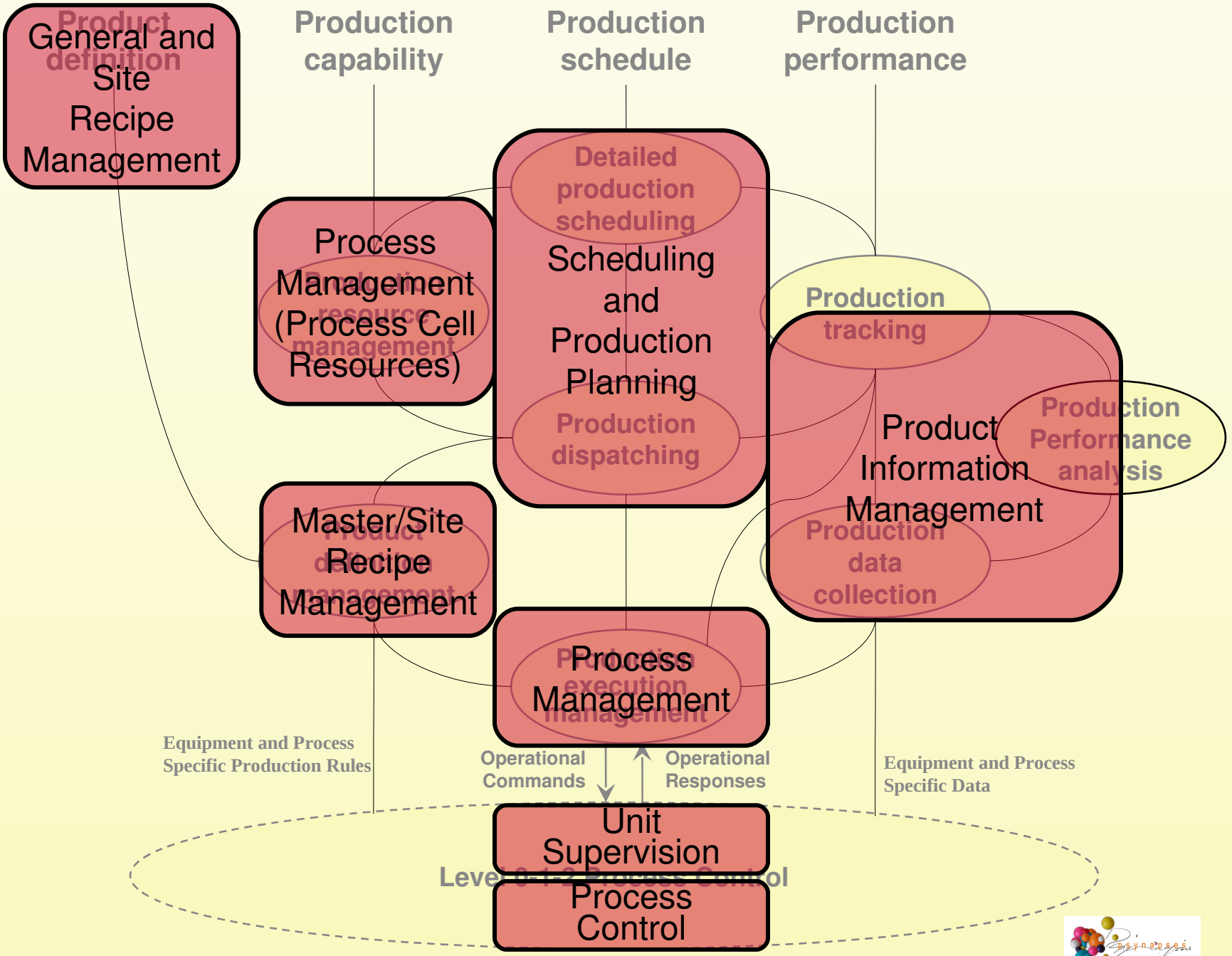
Many overlaps

- Scheduling models
- Product/process segment vs General/Master recipes
- Physical model evolved in ISA95

ISA88 generalization is awaited

- ISA88 is the only control system functionnal requirements organization standard

SP88-SP95 joinded WG launched in October 2004



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2ème partie
Discussion

ISA95 : La norme, la réalité, le futur

AGENDA

La position des acteurs du marché

Pour quelles industries ?

Pour quelles tailles d'entreprise ?

Pour quels systèmes ?

Pourquoi un tel succès ?

Les risques d'un engagement ISA95

Position des acteurs du marché

Industriels

Fournisseurs Contrôle Commande

Editeurs MES

Editeurs ERP

Intégrateurs - Ingénierie

Universitaires

Position Industriels

Les industriels sont les premiers bénéficiaires

- Réduction des coûts de l'interopérabilité
- Réduction des coûts du cycle de vie des systèmes
- Recherche de la performance

Grands comptes

- Les plus actifs, les plus matures: Nestlé, P&G,
- Perception logique des directions informatiques

Autres industriels

- Encore isolés du mouvement
- Seront probablement poussés par les intégrateurs

Position Fournisseurs Contrôle commande

Le CC s'est approprié le MES, domaine de l'exécution
Après quelques tiraillement ERP / CC,

- Besoin d'étendre l'offre CC,
- Moindre intérêt du côté des ERPs

Participation majoritaire dans les travaux du groupe

- Yokogawa, Siemens, Rockwell, ABB sont les plus actifs…

Un certain attentisme dans la concrétisation de l'offre

- Encore peu de contenu concret
- Consolidation prioritaire de l'offre construite par acquisition externe

Position Editeurs MES

De moins en moins d'éditeurs MES indépendants

- Disparition ou acquisition par les vendeurs CC (généralement)

La plupart les acteurs majeurs MES ont rejoint le mouvement

- Sauf pour certaines solutions verticales

Collaboration ISA-MESA

- Dictionnaire MES
- Guide de bonnes pratiques d'application de la norme

(Re)Conception autour de la norme

- Dans certains cas, bien que ce ne soit pas l'objectif de la norme

Editeurs ERP

L'intérêt des éditeurs ERP est essentielle pour justifier pleinement l'application de la norme

Jusqu'au début 2004, la norme est totalement ignorée par les vendeurs ERP

SAP franchit le pas en Mai 2004

- Aiguillonné par les réalisations P&G, NESTLE, ARLA FOODS
- Partenariat avec l'ARC pour l'animation d'un workshop

Voir http://public.arcweb.com/isa95/default.aspx

- Connecteur ISA95 NetWeather en production, livraison ramping accounts en Mai 2005.

Pas encore d'écho chez les autres éditeurs,

- A suivre

Intégrateurs

Pris entre les demandes des industriels et la réalité des solutions

L'occasion pour beaucoup de clarifier leur perception du MES et la réalité d'une interface ERP

Perçoivent la norme comme un outil efficace pour faire exprimer les besoins réels du client

Seront certainement les acteurs de la propagation de la norme

Pour quelles industries ?

Théoriquement pas de préférence sectorielle

Une connotation « Process » involontaire

Héritage « Process » SP88

Acteurs industriels impliqués dans les travaux de la norme

Enquête secteur Automobile:

- la norme est méconnue
- Des standards internes

Normes compétitives

Pas de compétition réelle: OAG, ROSETTANET

- Plutôt complémentaire

Nécessité d'une vision commune

Toutes les industries devraient pouvoir bénéficier de la norme

Pour quelle taille d'entreprise ?

Les grandes entreprise plus impliquée

Ressources dédiées à la veille technologique et à l'excellence industrielle

Structures suffisantes pour l'encadrement des projets

Les petites entreprises devraient pouvoir en bénéficier

Investissement peu important au niveau de l'entreprise

- formation, accompagnement

Coût de la maîtrise d'ouvrage?

- Devront peut-être attendre la monté en maturité des offreurs et des intégrateurs

Pour quels systèmes ?

La norme est neutre vis-à-vis de l'aspect technologique

- Communication entre humains avant tout
- Ne présuppose pas de systèmes d'information particuliers

Interopéabilité technique obtenue par des artefacts technologiques

- EAI
- XML
- Webservices

Mise en valeur, intégration, migration des systèmes existants

- Par la standardisation des structures de données échangées
- Pas toujours présenté de cette façon

Pourquoi un tel succès ?

Propagation très rapide

Partie 3 non publiée, déjà largement utilisée

Clarification magique des interfaces ERP

Développer asynchrone des interface, Evolution dissociée ERP / MES

Définition fonctionnelle structurée du MES

Une infrastructure pour la spécification exhaustive des besoins fonctionnels

Présentation simple

Comparé aux précédents travaux de normalisation dans ce domaine

Des concepts efficace pour un niveau de complexité acceptable

Un sujet très chaud

La France fait-elle encore valoir son exception ?…

Les risques d'un engagement ISA95

« compatibilité », « conformité », maîtrise ISA95

Auto proclamation - Pas de certification/évaluation officielle, (Etude en cours à l'ISA)

La norme est avant tout un recueil de bonnes pratiques

Pas d'inter-opérabilité inhérente des solutions « S95 »

Implique une compréhension intime de son contenu

Situation 1 : équipe déjà compétente

Risque de régression

- Gestion du changement, Effort de transposition du savoir-faire,
- Ne pas tout « oublier » pour appliquer la norme

Situation 2 : équipe peu mature

L'application accompagnée de la norme réduit le risque

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