IDM Exchange Requirements

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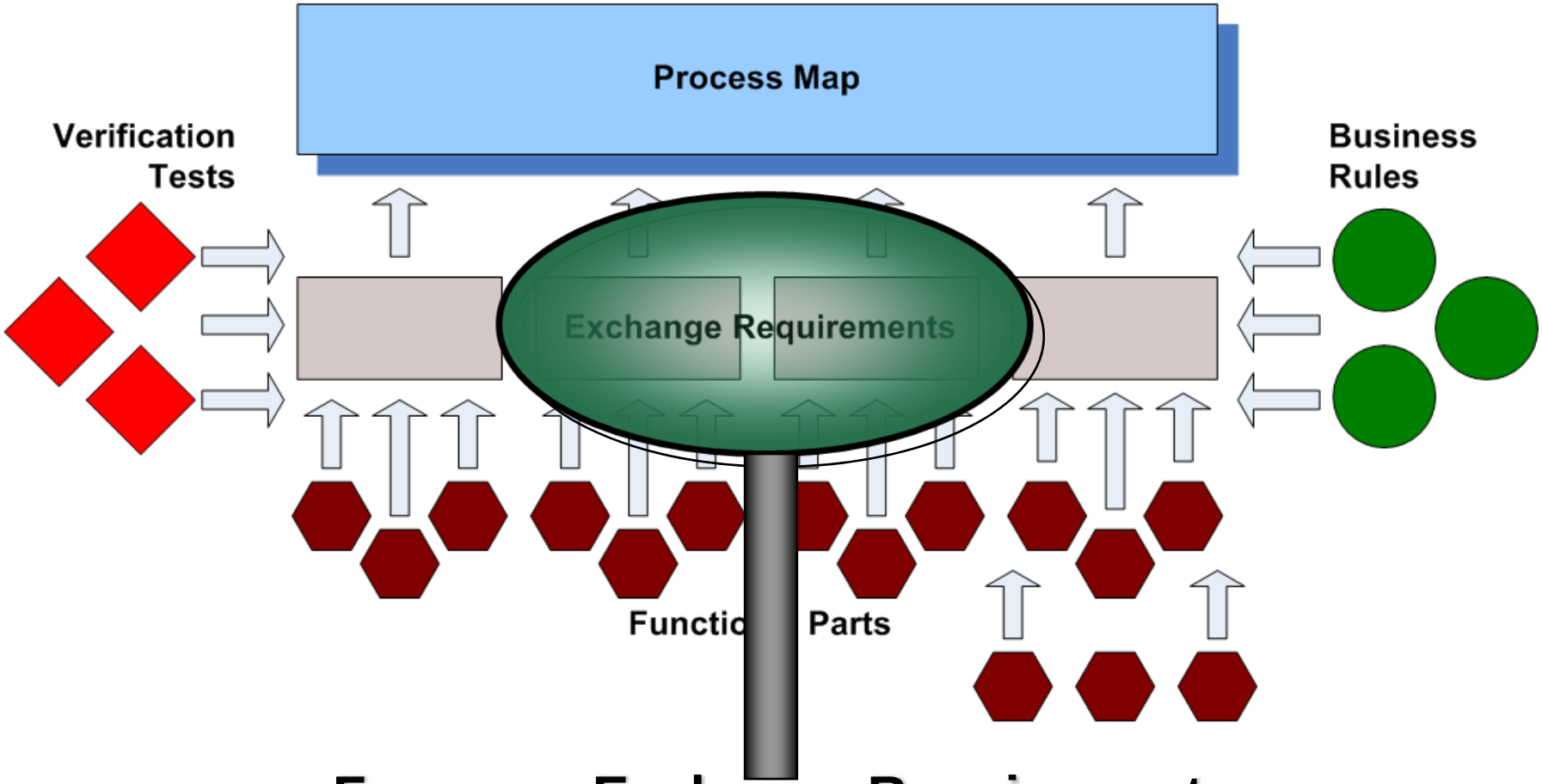
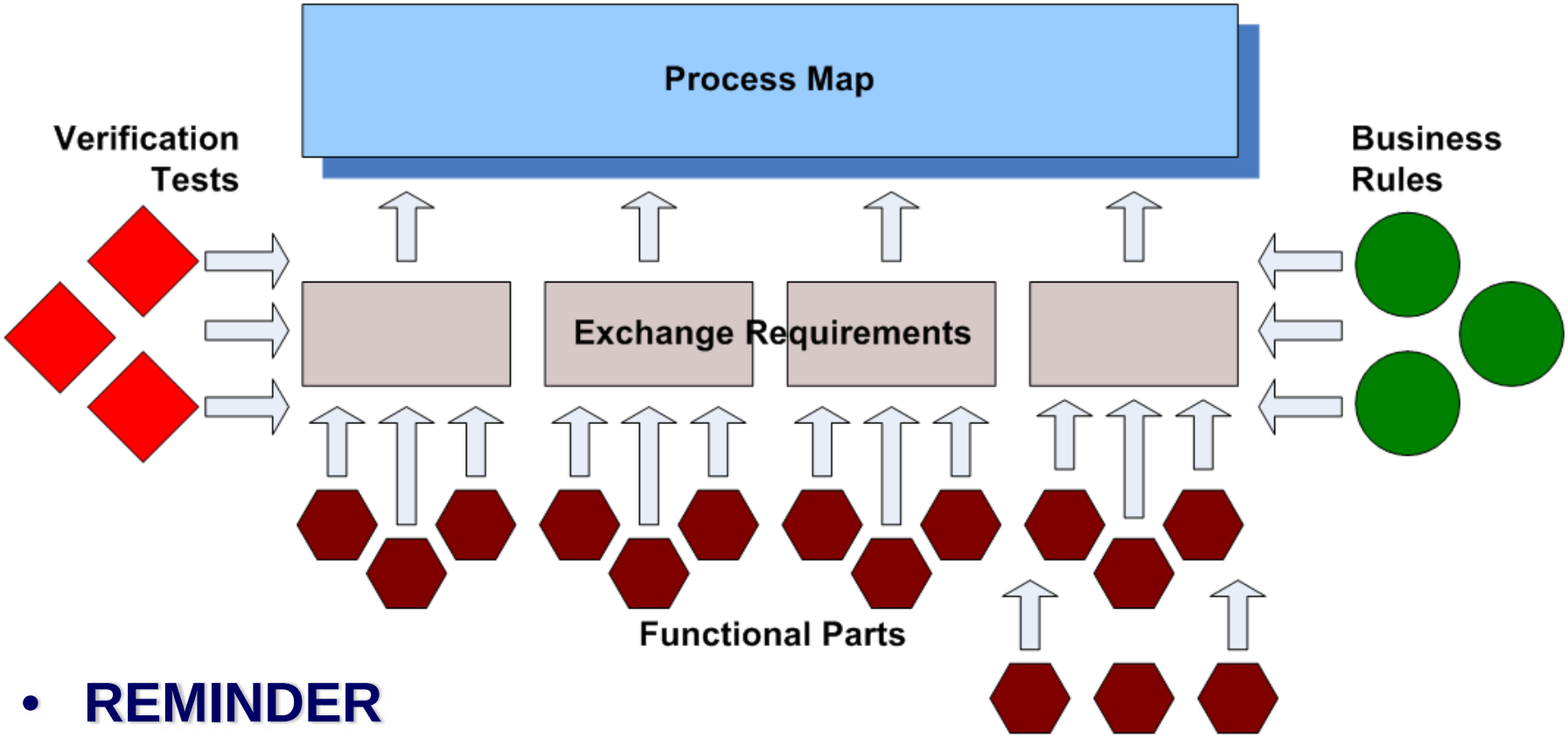
IDM Technical Architecture



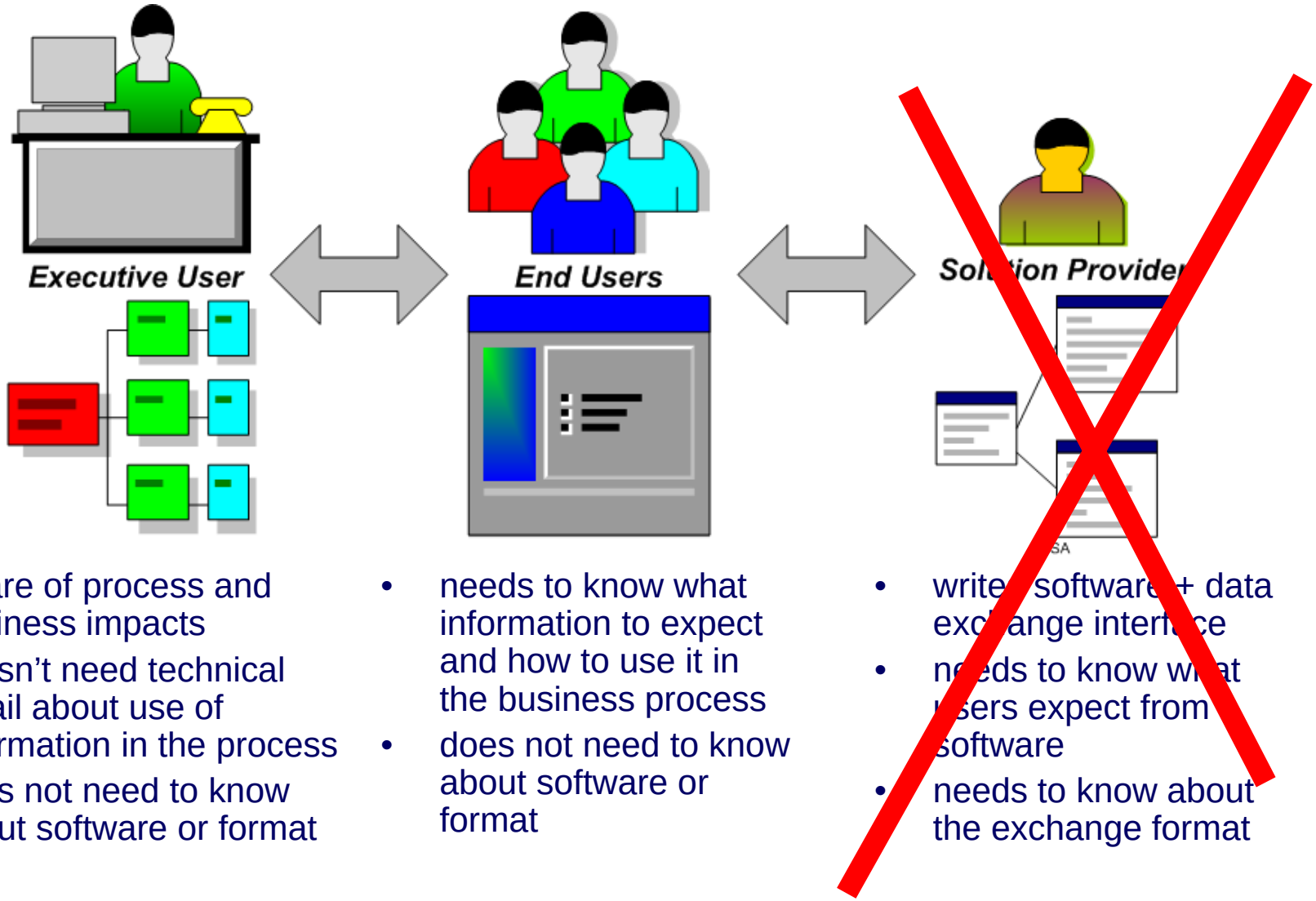
Focus on Exchange Requirements

IDM Technical Architecture



- **REMINDER**
- A set of information that needs to be exchanged to support a particular business requirement at a particular stage of a project
- provides a description of the information in non technical terms

Users



- aware of process and business impacts
- doesn't need technical detail about use of information in the process
- does not need to know about software or format

- needs to know what information to expect and how to use it in the business process
- does not need to know about software or format

- write software + data exchange interface
- needs to know what users expect from software
- needs to know about the exchange format

Exchange Requirement

Business Case Development

1 WHO (is requesting)

Actor Requesting Information to Support a Process or Decision
(Authoritative Reference OMNI CLASS – Table 33 & 34)

2 WHY (project/process use or benefit)

Why is this information important for a project activity
(Authoritative Reference OMNI CLASS- Table 32)

3 WHEN (stage in project)

(Authoritative Reference OMNI-CLASS-Table 31) Table 31 is tied to Ifc Phases (Project Lifecycle) Table 22 for Construction Phasing

4 WHAT

Dataset in BIM that supports the request and benefit)
Because BIM use aggregates Information Several Tables Support this activity.

Authoritative Reference OMNI-CLASS Tables 14, 21, 23, 41, 49.

5 To WHOM

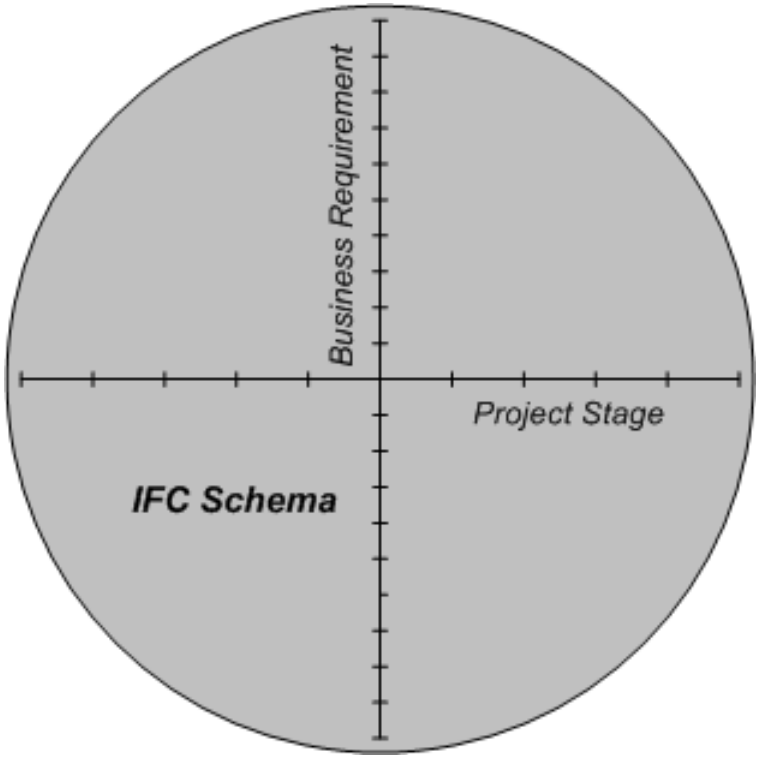
Group/Actor that provides/fullfills the information need OMNI-Class 33. 34

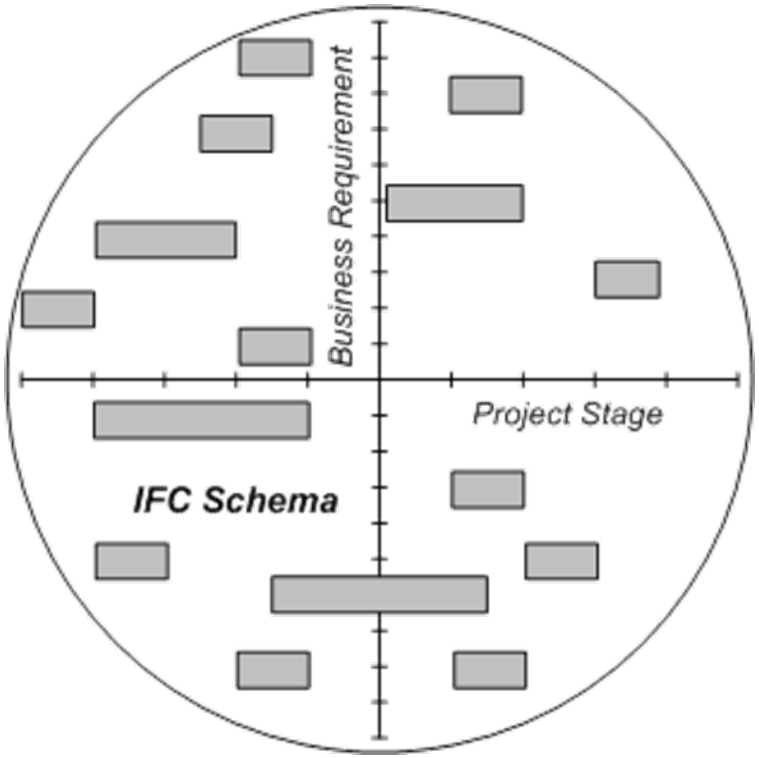
Courtesy: Dianne Davis, AEC Infosystems

WHAT

- A set of information that needs to be exchanged to support a particular business requirement at a particular stage of a project.
- An exchange requirement is independent of the format in which data will be shared.
  - It can be used to support requirements in any situation
    - Industry Foundation Classes (IFC)
    - Geographic Markup Language (GML)
    - CIMsteel Integration Standards
    - etc.
- An exchange requirement is intended to provide a description of the information in non technical terms.
- The principal audience for an exchange requirement is the user (architect, engineer, constructor etc.).

WHY

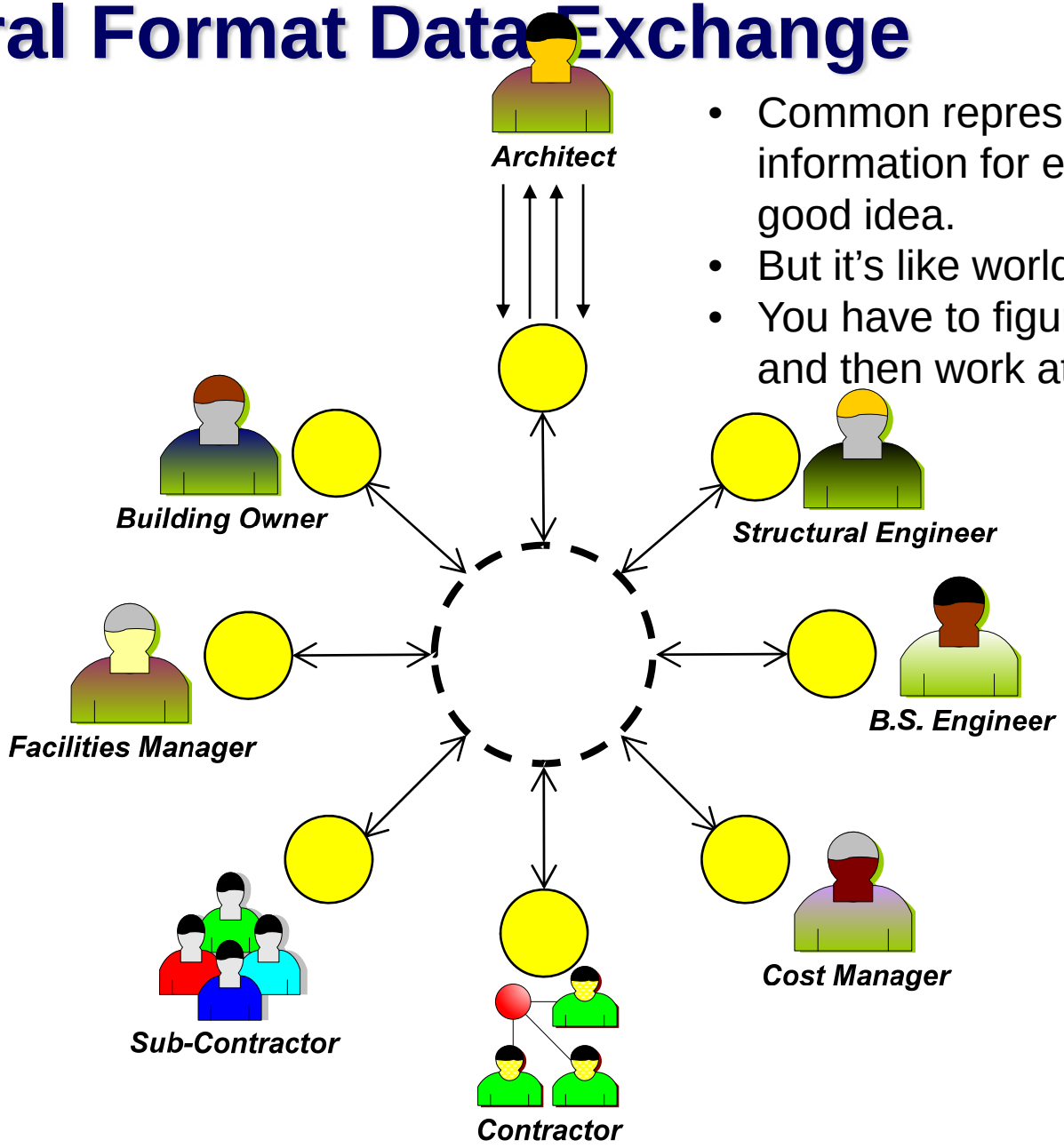




- IFC supports all business requirements at all project stages.
- used to capture all project information
- does not capture day to day transactions

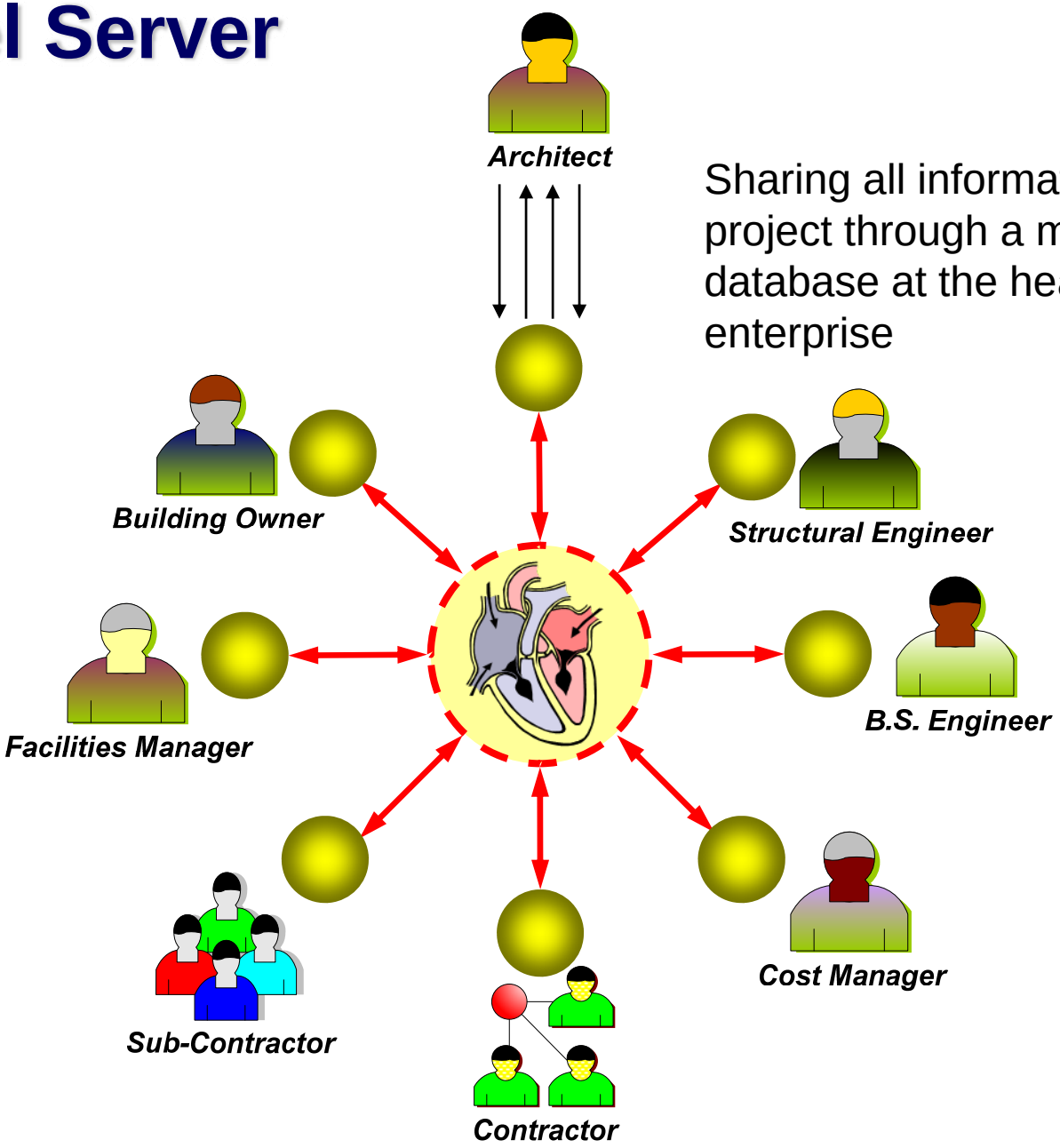
- support for one business process over multiple project stages
- capture day to day transactions
- consistent with IFC
- support what solution providers need to implement

Neutral Format Data Exchange



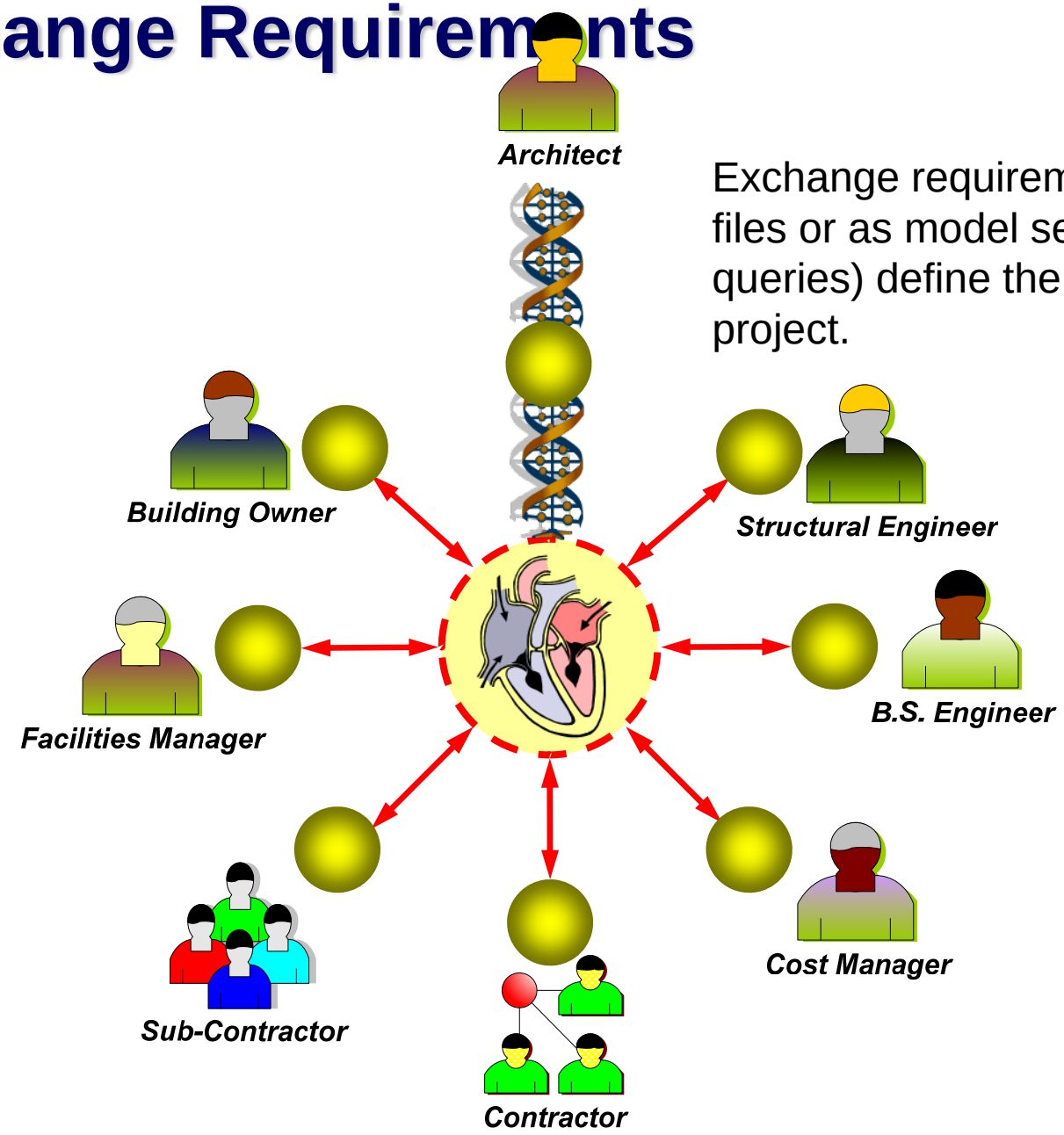
- Common representation of information for exchange is a good idea.
- But it's like world peace
- You have to figure out what it is and then work at it

Model Server



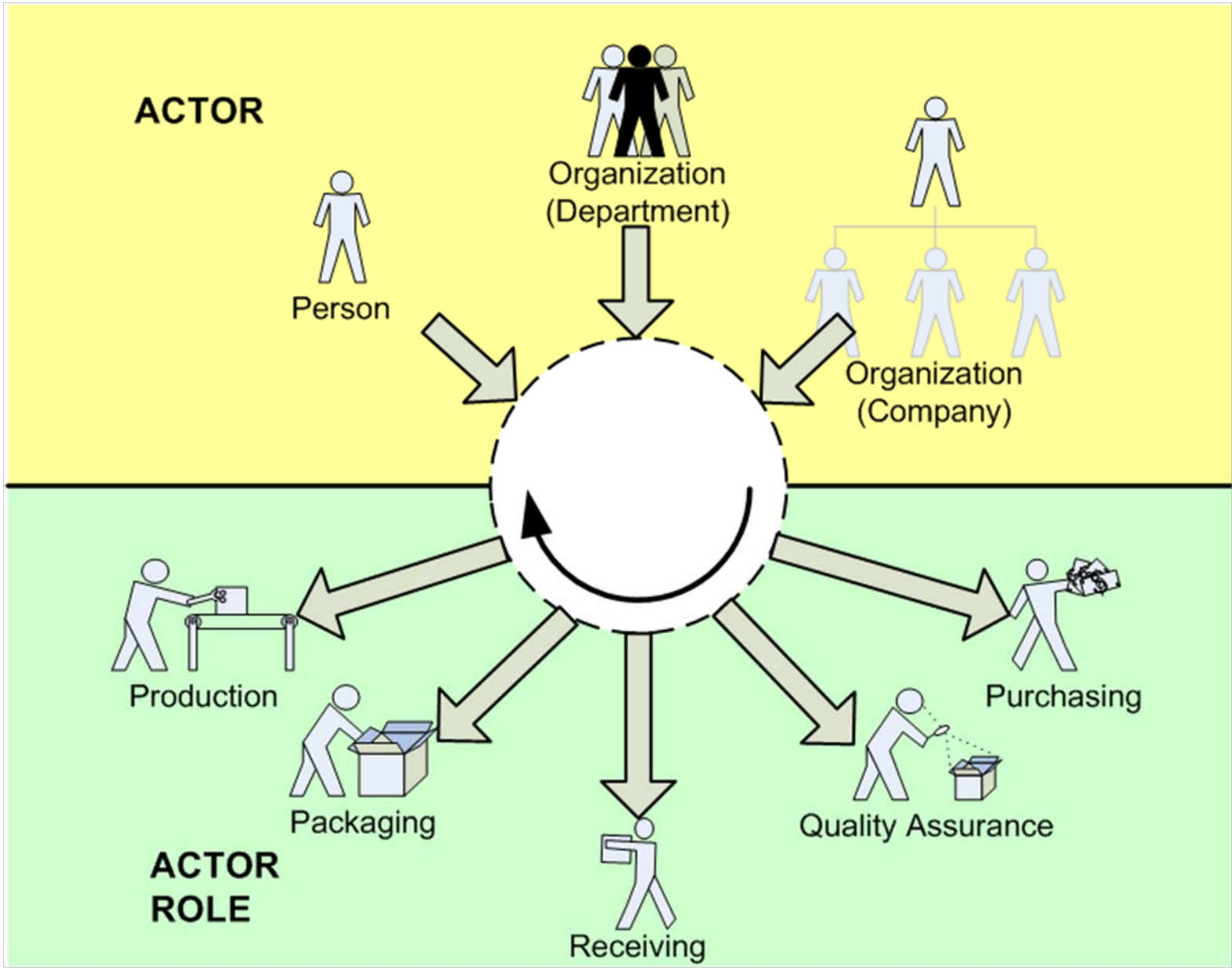
Sharing all information on a project through a model server or database at the heart of the enterprise

Exchange Requirements

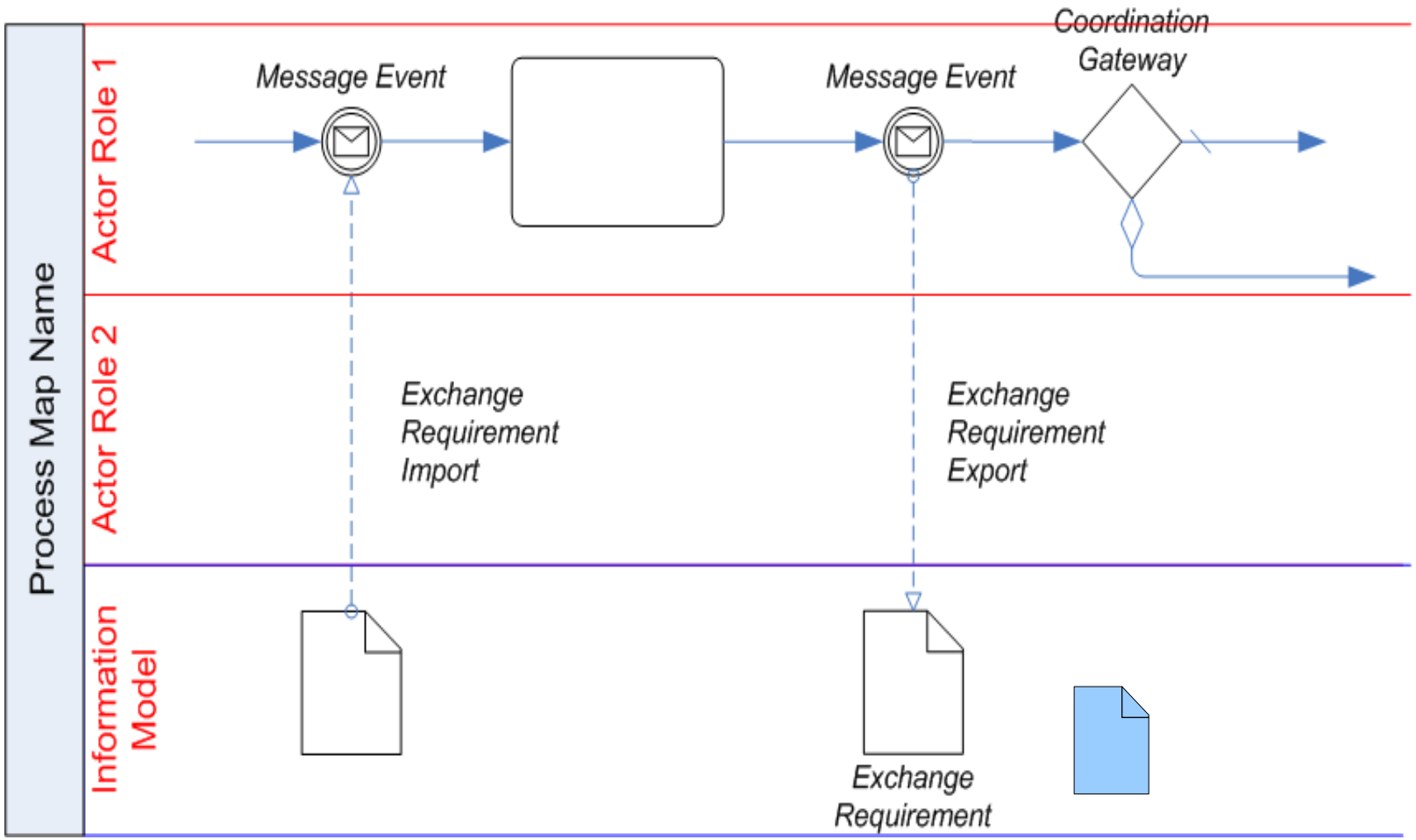


Exchange requirements (either as files or as model server/database queries) define the anatomy of a project.

WHO

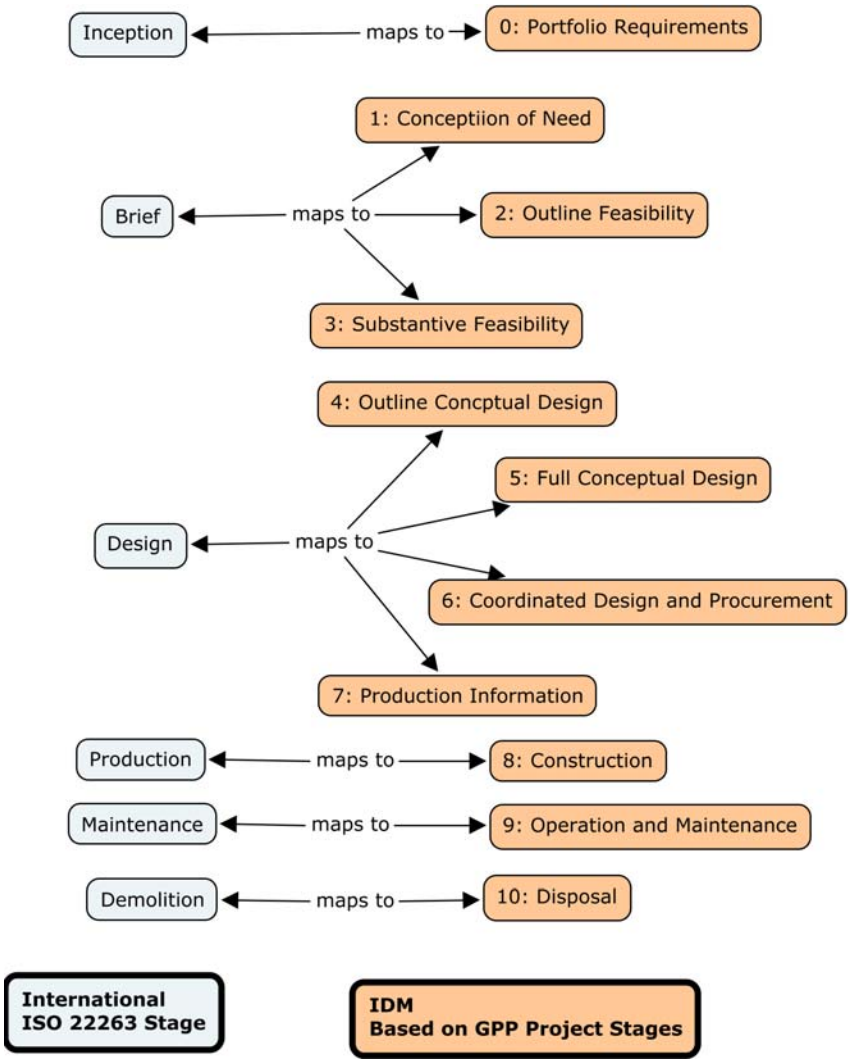

ACTOR
Organization
(Department)
Person
Organization
(Company)
Production
Purchasing
Packaging
Quality Assurance
ACTOR
ROLE
Receiving

WHEN



An ‘Exchange Requirement’ is always shown in a process map as a data object within the Information Model swimlane.

Standard Project Stages



- Exchange requirements developed by:
  - different people
  - in different places
  - at different times,
- Need consistency in the identification of the stages in a project
- Without consistency, it is not possible to bring exchange requirements together in an information framework.
- Standard exchange requirements in IDM use project stages from the Generic Process Protocol (GPP).

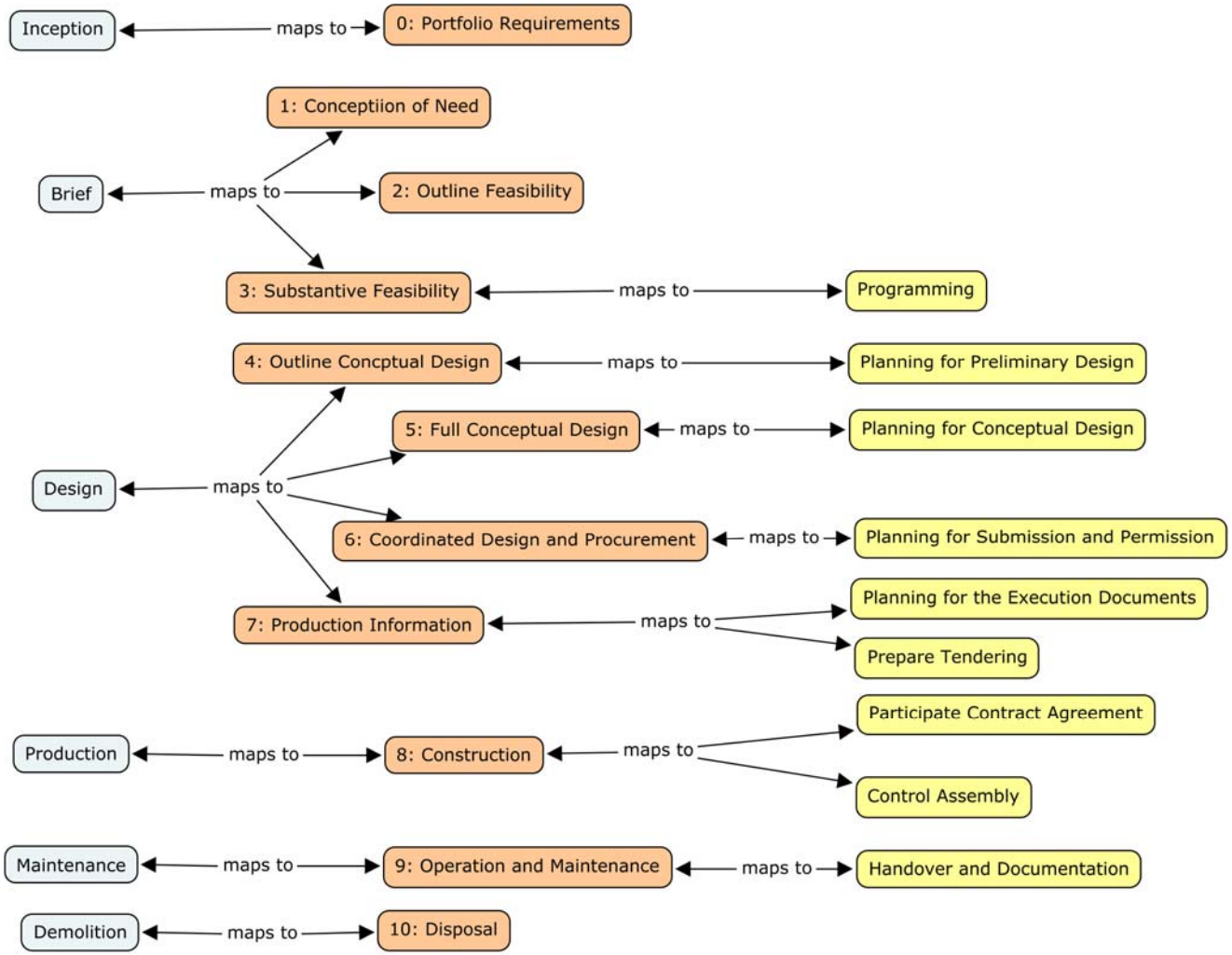
GPP Project Stages

Stage	Description	Definition
Pre-project stages		
0	Portfolio requirements	Establish the need for a project to satisfy the clients business requirement
1	Conception of need	Identify potential solutions to the need and plan for feasibility
2	Outline feasibility	Examine the feasibility of options presented in phase 1 and decide which of these should be considered for substantive feasibility
3	Substantive feasibility	Gain financial approval
Pre-Construction stages		
4	Outline conceptual design	Identify major design elements based on the options presented
5	Full conceptual design	Conceptual design and all deliverables ready for detailed planning approval
6	Coordinated design (and procurement)	Fix all major design elements to allow the project to proceed. Gain full financial approval for the project
Construction stages		
7	Production Information	Finalise all major deliverables and proceed to construction.
8	Construction	Produce a product that satisfies all client requirements. Handover the building as planned.
Post-construction stages		
9	Operation and maintenance	Operate and maintain the product effectively and efficiently.
10	Disposal	Decommission, dismantle and dispose of the components of the project and the project itself according to environmental and health/safety rules

Localizing Project Stages

- Generic project stages are useful for creating a global standard
- But they are not useful for real projects in real places
- Generic project stages need to be mapped to local standard stages
- **RULES**
  - Standard stages and local protocol stages should always conform to boundaries such that there is a 1:1, 1:many or many:1 relationship between them.
  - Project stages must not cross boundaries such that a stage in a local protocol starts part way through one standard stage and ends part way through another standard stage.

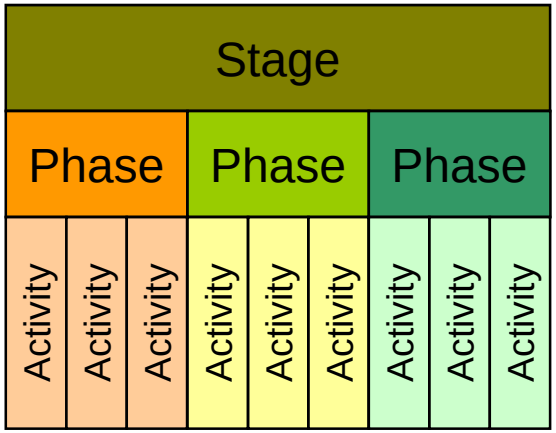
Localizing Project Stages (1)



Localizing Project Stages (2)

15 00 00	Project Delivery Selection Stage		
	15 10 00	Project Delivery Evaluation Method Phase	
	15 20 00	Team Assembly Phase	
		15 20 11	Design Team Selection Phase
		15 20 14	Project Team Selection Phase
		15 20 17	Design/Builder Selection Phase
		15 20 21	Construction Manager Selection Phase
		15 20 24	Request for Qualifications (RFQ) Phase
		15 20 27	Request for Qualifications (RFQ) Evaluation Phase
		15 20 31	Request for Proposals (RFP) Phase
		15 20 34	Request for Proposals (RFQ) Evaluation Phase
		15 20 37	Interview Phase
20 00 00	Design Stage		
	20 10 00	Preliminary Project Description Phase	
		20 10 11	Preliminary Engineering Phase
		20 10 14	Conceptual Design Phase
		20 10 17	Schematic Design Phase
		20 10 21	Preliminary Design Phase
	20 20 00	Design Development Phase	
		20 20 11	Detailed Design Phase
		20 20 14	Final Design Phase
		20 20 17	Prototype Design and Testing Phase
		20 20 21	Engineering Analysis Test Phase
		20 20 24	Product Selection Phase
		20 20 27	Material Selection Phase
		20 20 31	Equipment Selection Phase
		20 20 34	Estimating Phase
		20 20 37	Value Analysis Phase
25 00 00	Construction Documents Stage		
	25 10 00	Construction Documents Preparation Phase	
		25 10 11	Construction Data Preparation Phase
		25 10 14	Drawing Preparation Phase

Omniclass Table 31



Make sure that the depth of project stage identification does not become unreasonable and unworkable

Localizing Project Stages (3)

Exchange Requirements

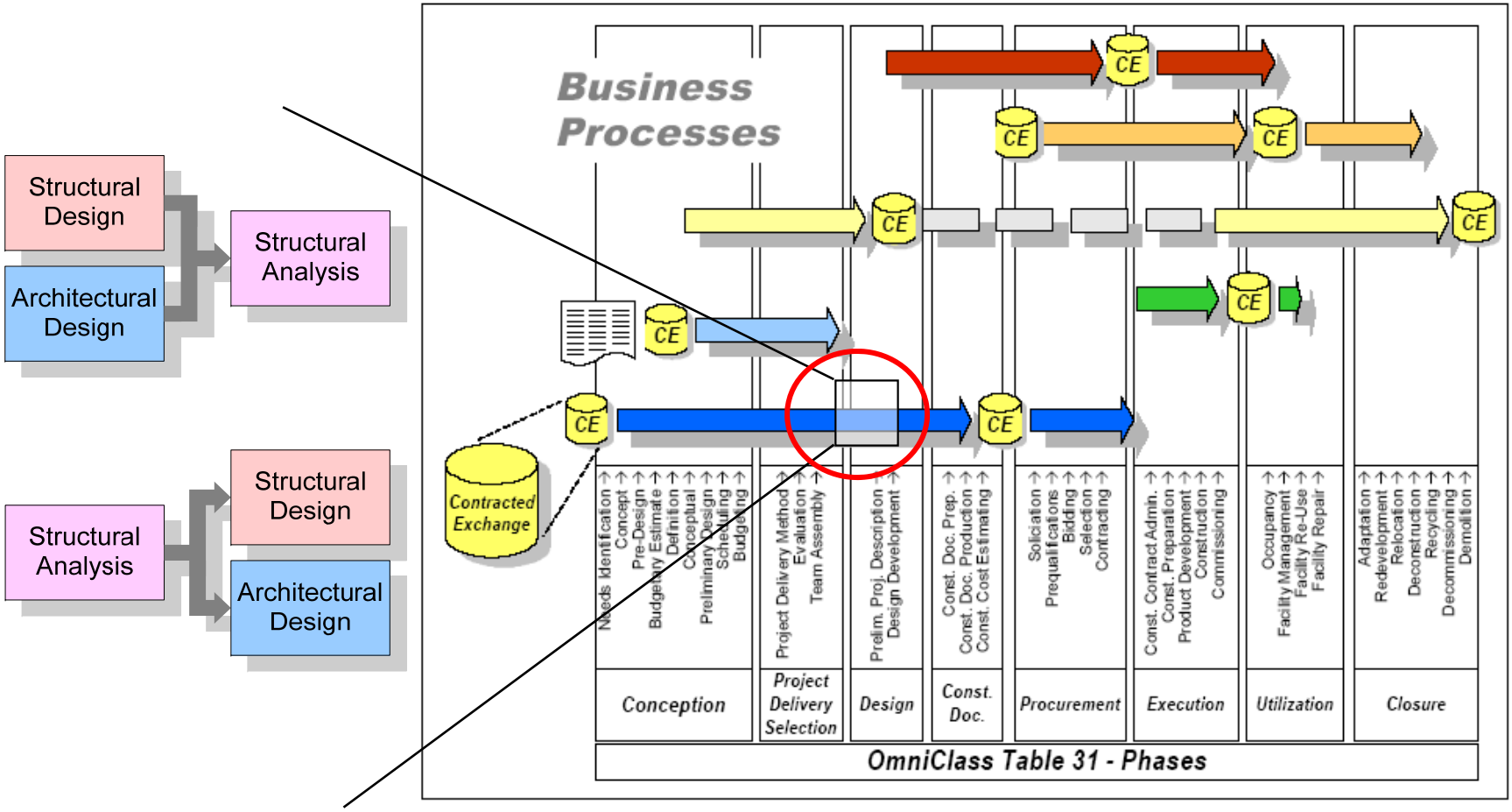
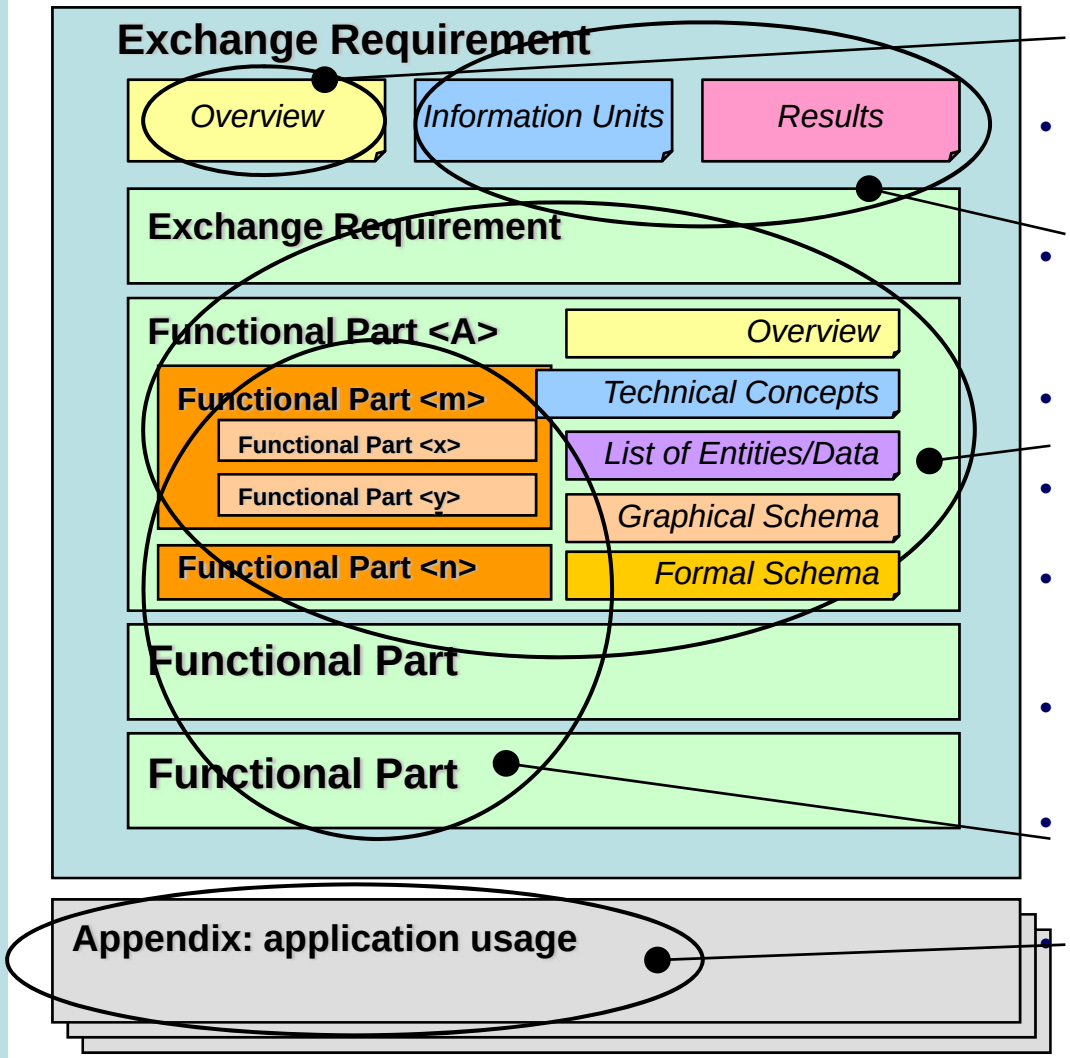


Illustration from the North American NBIMS development

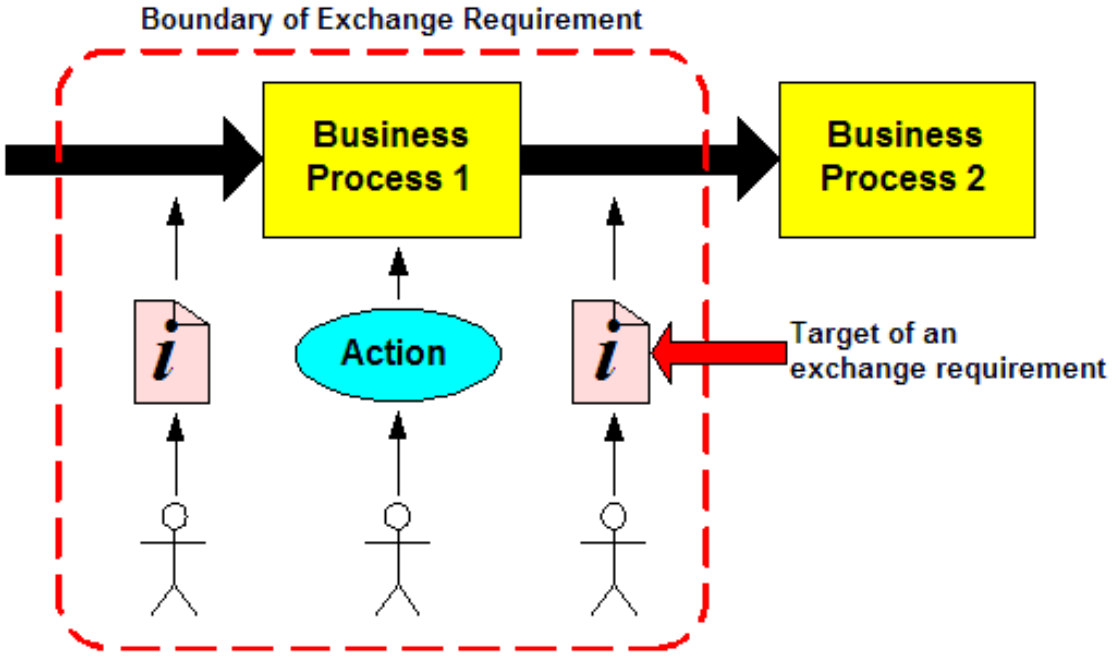
Courtesy of:
Chuck Eastman – Georgia Univ. of Technology

IDM's Exchange Requirement definition



- Plain language description to make it easy to understand for different groups (managers, project participants, software developers
- Building professional terminology – No deep technical detail or references to data format.
- Identifies the information needing to be exchanged at a point in the business process
- One or several "groups" of information required to perform a certain process.
- Possibility to define separate exchange requirements for each "group".
- This applies to the both to the Information delivered to the process and from the process (the result).
- Identifies the functional parts to be used in a Exchange Requirement
- Recursive, enabling re-use and re-combination at many levels
- Appendix contains information on how applications should be used to ensure correct IFC export and/or import

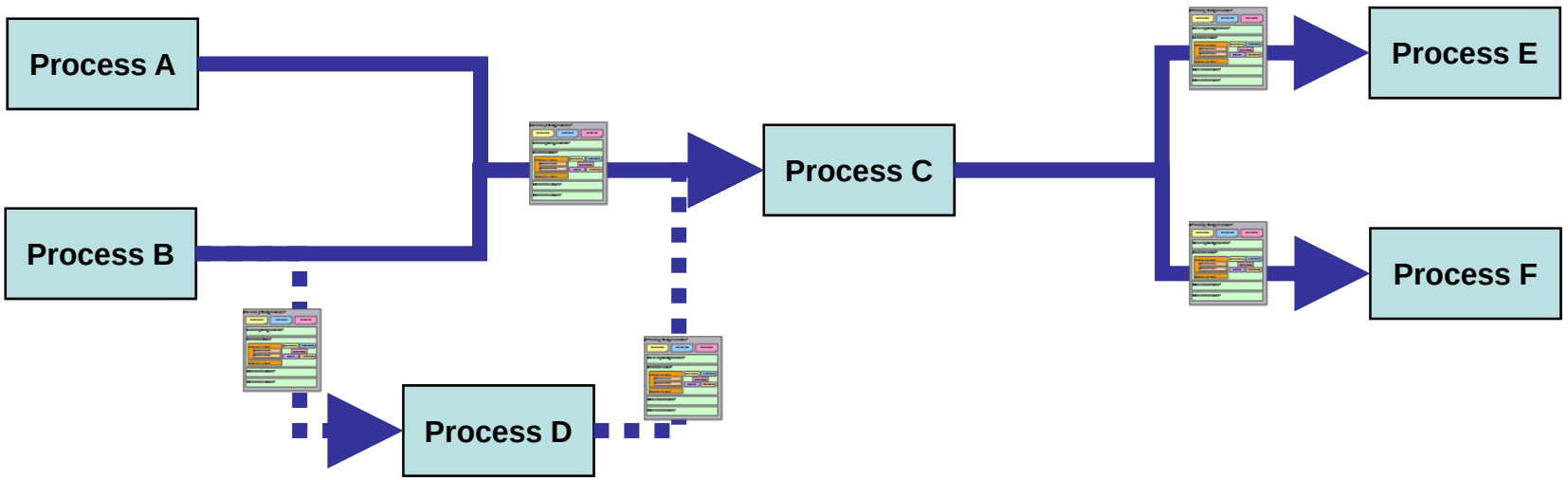
Exchange requirement - basics



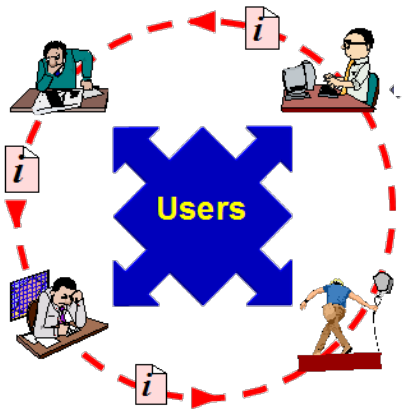
- An ER captures the role of actors
  - performing an action
    - set the value of an item of information
  - providing the input
  - benefiting from the output
- The target of an ER is the resulting output information

Exchange Requirements in the process

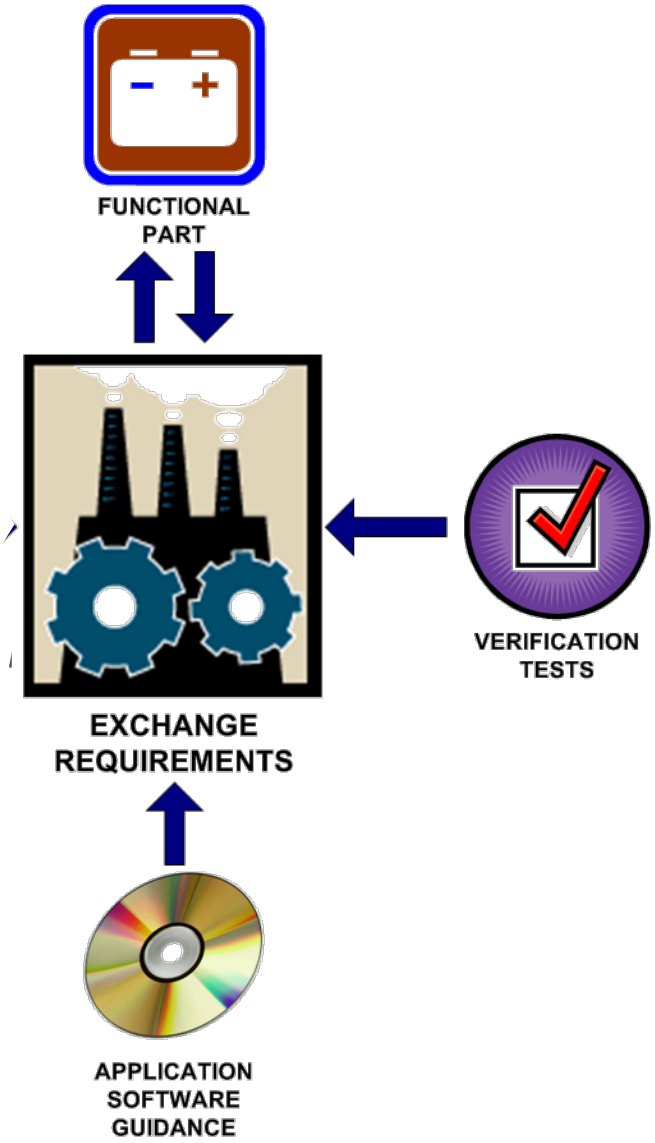
Exchange requirement (ER)



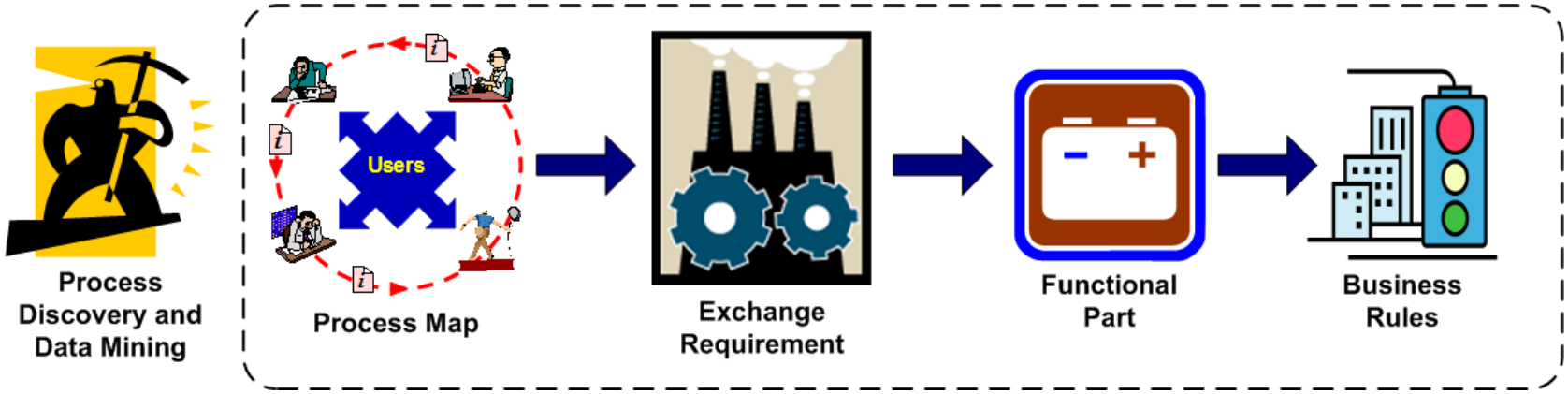
Routes to Exhange Requirements



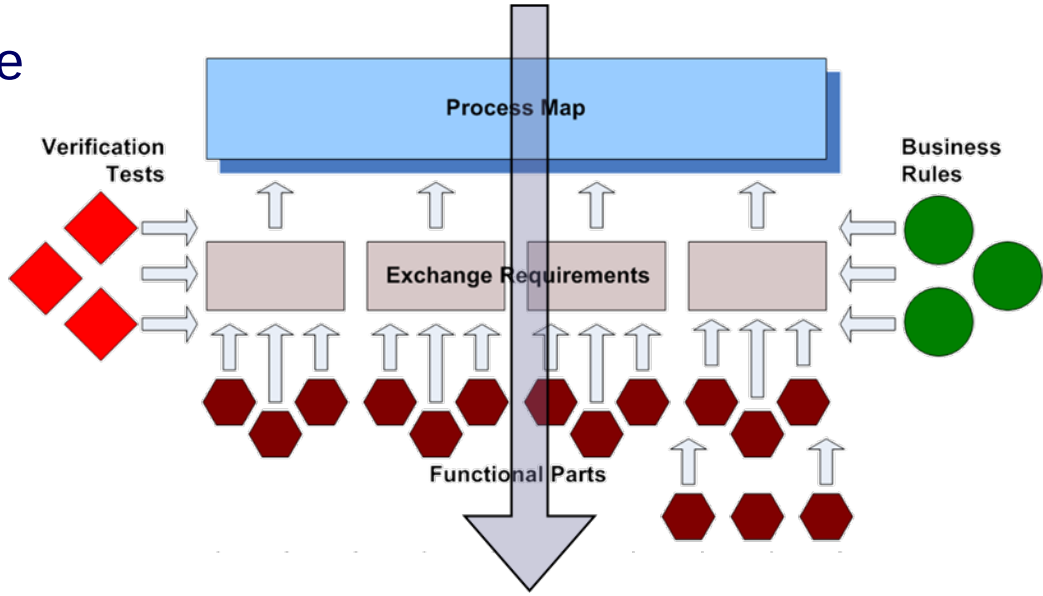
PROCESS MAP



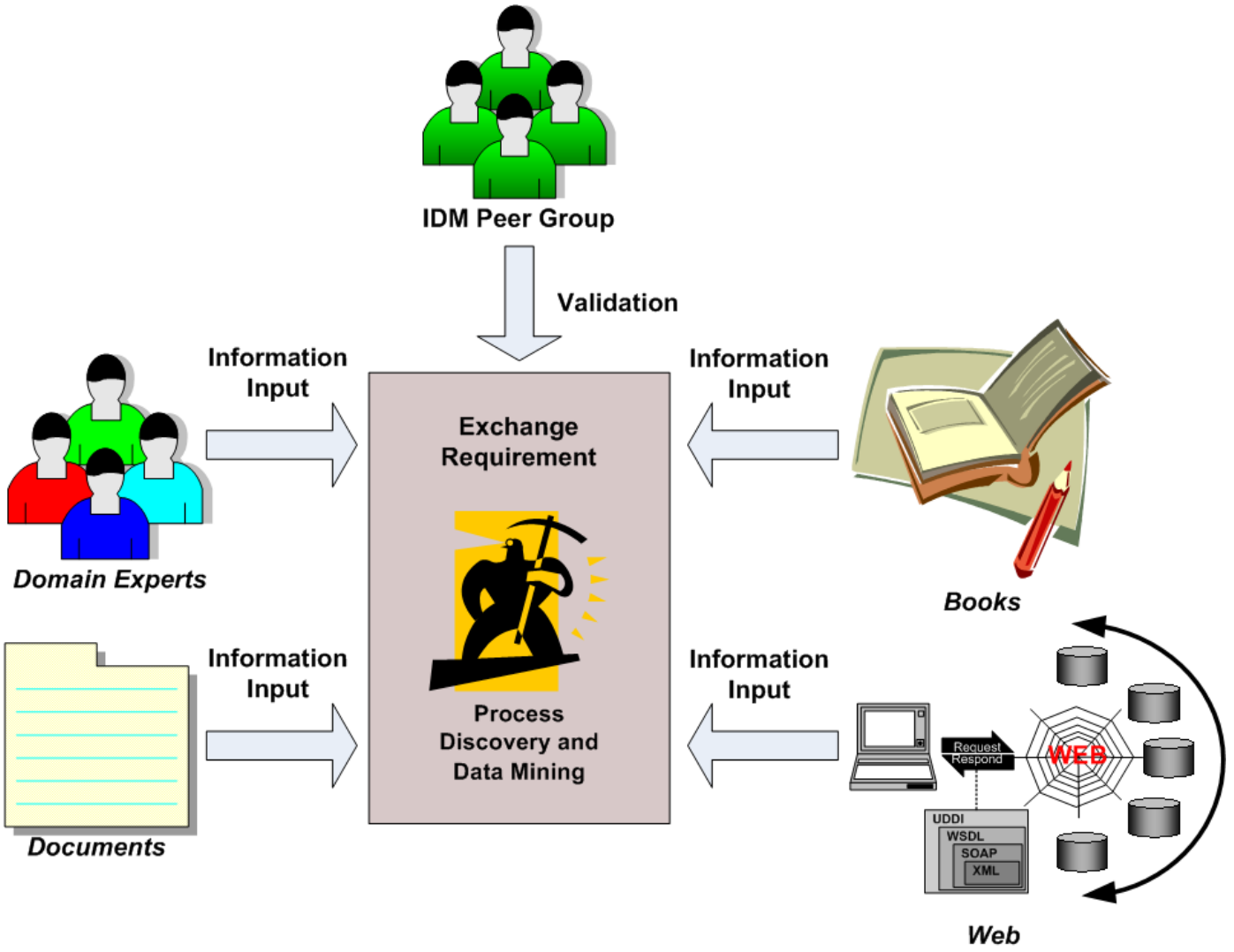
Process Discovery - Method



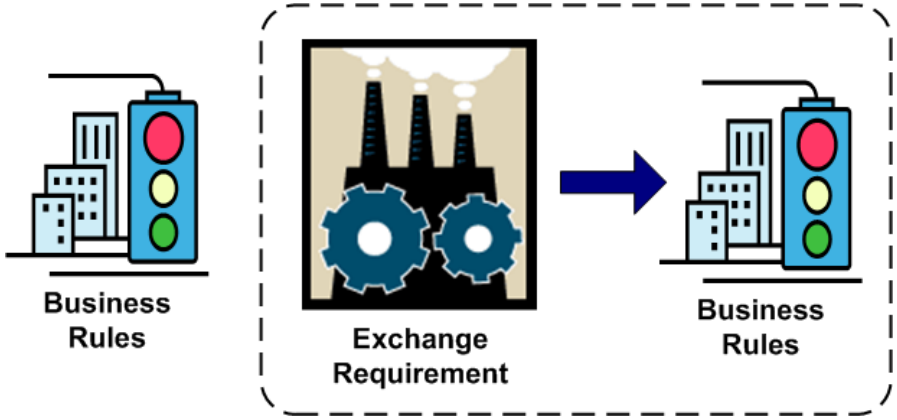
- ‘Conventional’ process where development starts with no prior content
- Allows ordered development that ‘trickles’ down the IDM technical architecture



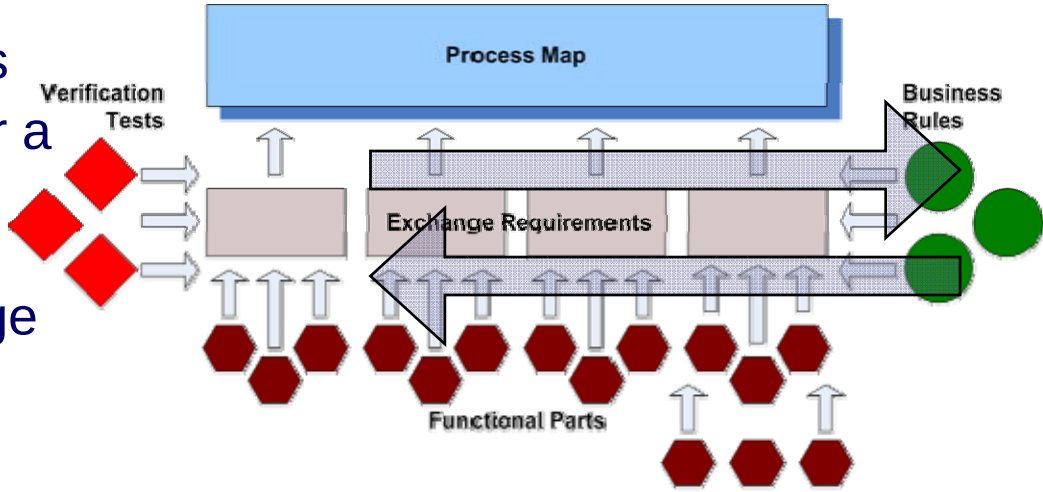
Process Discovery – Input Sources



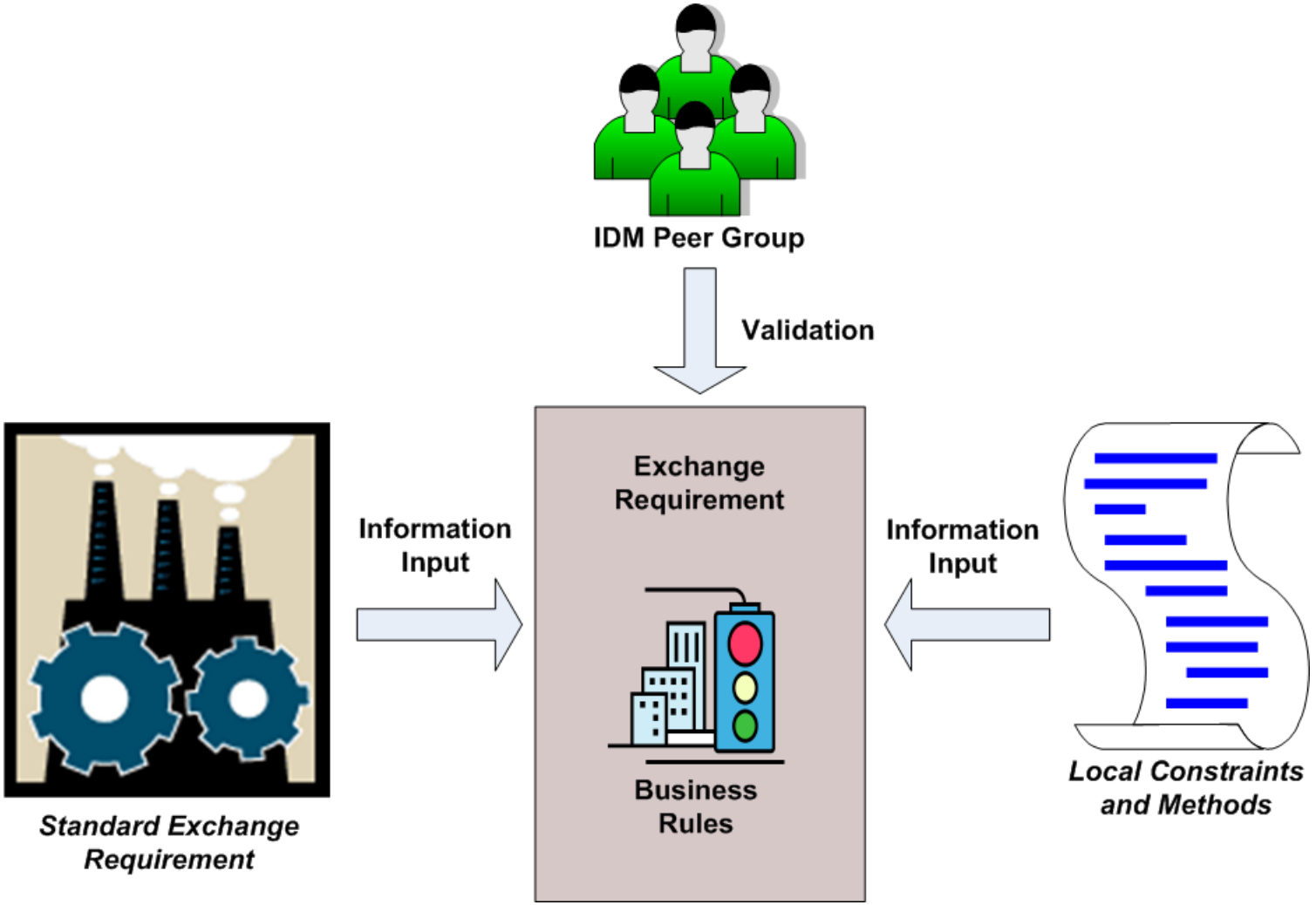
Business Rules - Method



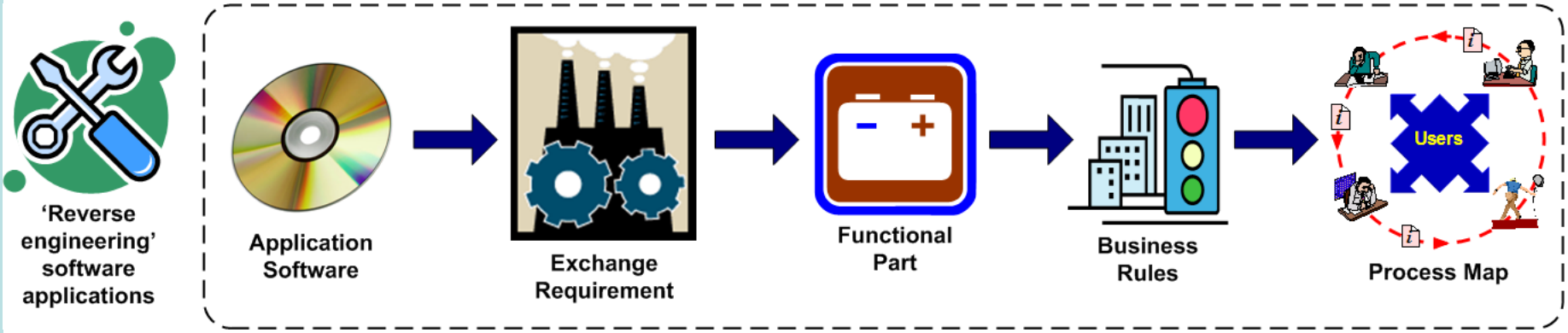
- Assumes that a ‘standard’ exchange requirement exists
- It does not meet the need for a particular location
- Business rules that may be applied to make the exchange requirement specific to that location



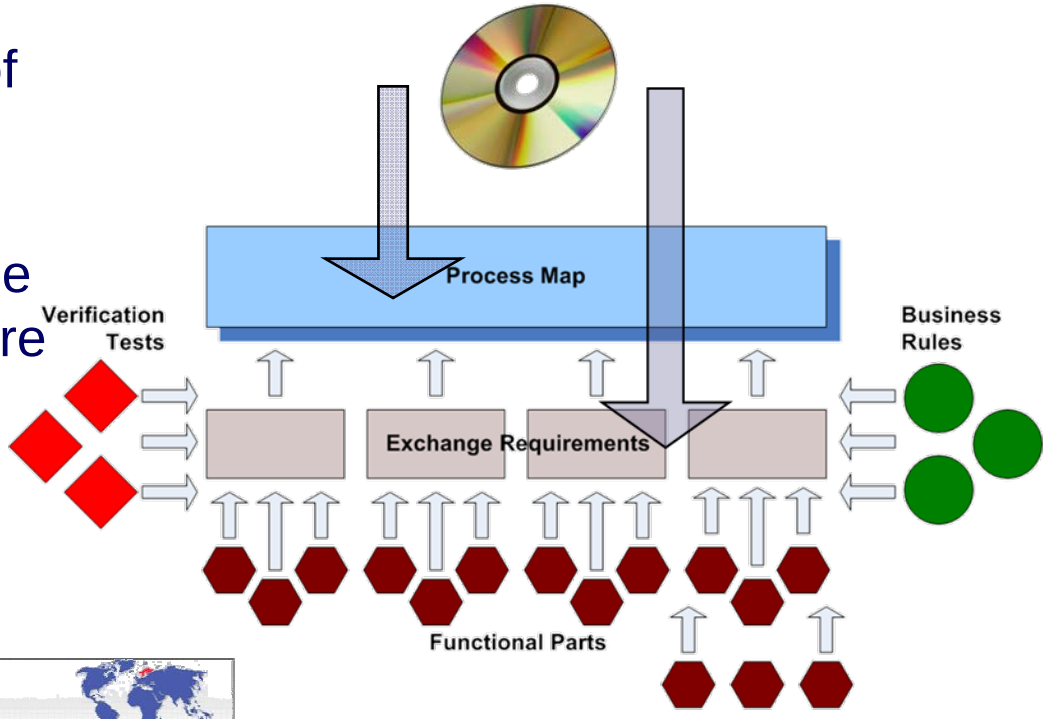
Business Rules – Input Sources



Reverse Engineering - Method



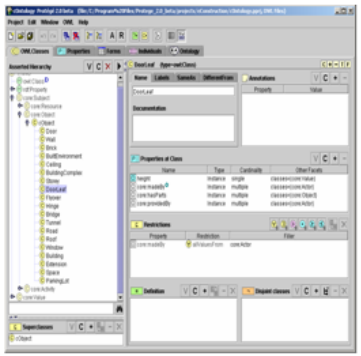
- assumes software capable of dealing with the information exchange(s) exists
- need to capture the exchange requirements that the software can support.



Reverse Engineering – Input Sources

IDM Peer Group

Validation



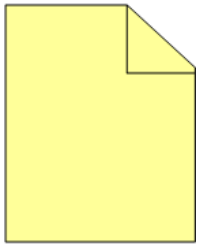
Dialog Box

Information Input

Exchange Requirement

'Reverse engineering' software applications

Information Output



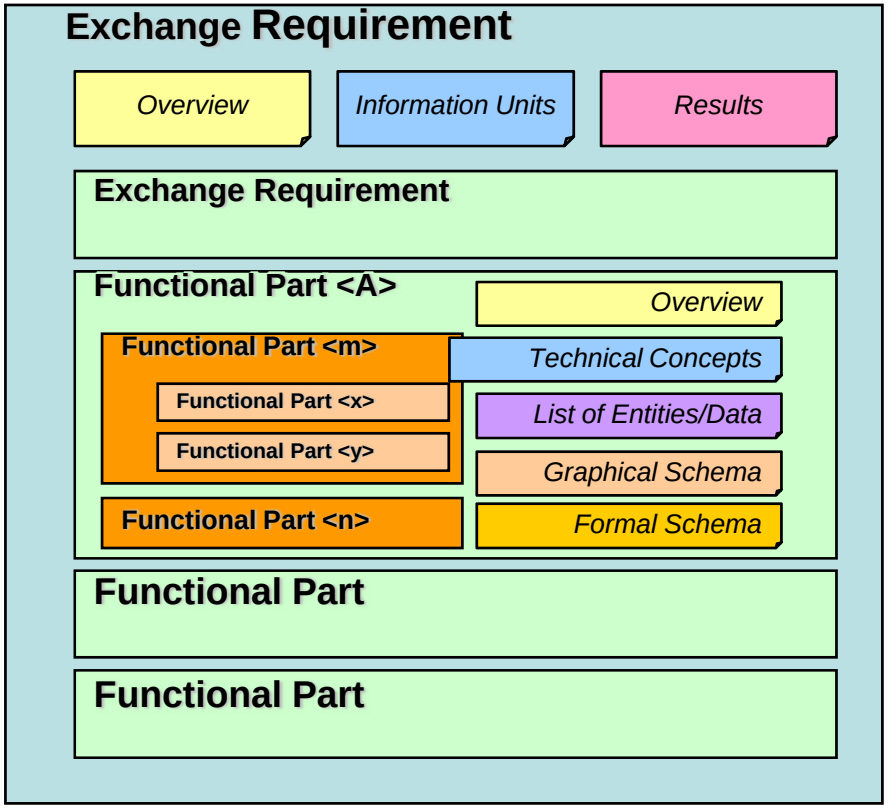
Reports

Information Storage

Database

Exchange Requirement Development

- An exchange requirement contains the following sections:
  - header section
    - administrative information
  - overview section
    - short description for the executive user
  - information section
    - detailed non-technical description
  - results section
    - outcome of the exchange requirement



Header Section

Name	Exchange HVAC Model (Equipment)		
Identifier	xxx		
Change Log			
2007-07-07	Created	jdw@aec3.com	
Project Stage	0	Portfolio requirements	
	1	Conception of need	
	2	Outline feasibility	
	3	Substantive feasibility	
	4	Outline conceptual design	✓
	5	Full conceptual design	
	6	Coordinated design and procurement	
	7	Production information	
	8	Construction	
	9	Operation and maintenance	
	10	Disposal	

- name or title of the exchange requirement.
- conform to the IDM naming rules
- unique identifier (not used)
- will provide link between standard and local exchange requirements
- creation of and changes made to the exchange requirement.
- include date, person identifier and a description of the changes made.
- project stage (s) for which the exchange requirement is used.
- should be consistently applied to all exchange requirements.

Naming Rules

- Why do we have naming rules?
  - Consistency in naming
  - Grammatical rules
  - Progressive development of a ‘scripting’ language
- An exchange requirement name has three parts
  - the prefix ‘er’ identifies that this component is an exchange requirement
  - an action (or activity) required expressed as a verb
    - All exchange requirements have the action ‘exchange’; thus the first part of the name of an exchange requirement will always be ‘er_exchange_’
  - the subject of the exchange requirement expressed as a noun
- Parameters can be added that enable further qualification.
  - Parameters are expressed as a list within parentheses ( )
  - [ ] and { } are interpreted as being the same as ( )
  - Parameters typically restrict the exchange requirement by project stage or actor role or purpose e.g. er_exchange_HVAC_model (equipment)

Overview Section

The scope of this exchange requirement is the exchange of information to enable coordination of equipment with other technical design roles, building design and structural design. It includes the need for shape, size and location of components and also for weight to be included.

This exchange requirement allows for the provision of information at various stages during the design process including outline conceptual or sketch design, full conceptual design and coordinated design. The information provided at each stage is essentially the same. However, the level of certainty regarding equipment and components used will increase at each stage allowing greater certainty in space provision.

It is assumed that the information provisions outlined in the exchange requirement er_exchange_HVAC_model (space) have been satisfied. This provides an initial assessment of spaces from the perspective of building design and HVAC design as well as project details.

Information provided through this exchange requirement includes:
- HVAC component type and size
- Shape representation of component type
- Weight of component type
- Location and orientation of occurrences of component type

- states aims and content of in terms familiar to the user
- should be understood by a user aware of what is to be achieved
- first part is an 'excerpt'
  - abbreviated description of the exchange requirement for web sites, Wiki site
- remainder extends the discussion and makes clear the intended content and purpose
- no deep technical discussion, use of computer terms, reference to format etc

Information Section

- Describes a set of information units needed to satisfy the requirement.
  - An information unit typically deals with one type of information or concept of interest such as the overall project, walls, windows

Information Units (Preconditions)

Space programming will have been carried out and the area requirements for each space determined. This is so that the total calculated area of the space after configuration can be tested against the space requirement

Precondition: er_exchange_space_program (outline)

- Actions (other exchange requirements) that must have been completed prior to the execution of the current exchange requirement.
- Define the minimum state of a model prior to which the exchange requirement cannot be performed
- Define a (potential) contractual obligation
- Quality statement #1

Information Units (Technical)

- Each information unit is broken into parts.

Building

Provides relevant information about the building

For technical detail, refer to fp_model_building

✓	***Placement*** This is the placement and orientation of the building relative to the datum point (0, 0, 0) established
✓	***Building shape*** This is strictly optional since it is not a specific requirement for energy analysis but should be available via the same mechanism as the geometry provided for spaces (q.v.). It may however be useful to provide an overall visual context for the space model and is therefore recommended.
✓	***Composition Type*** Every building must be defined in terms of its composition type (COMPLEX, ELEMENT, PARTIAL).

Name of the information unit

Description of the information that is exchanged

Functional part providing detailed technical support on this information unit

Attributes/properties that must be exchanged for the provisions of this exchange requirement to be satisfied.

Results

- Identify the form of output of the exchange requirement and for whom it is provided

Form in which the information is provided (always assumed to be digital)

Relevance of information to the receiving actor

Description of the information provided

Role of receiving actor

Result type (FP/ ER/ Document/ PSet/ Specification etc.)	**Information Provided**	**MAN**	**REC**	**OPT**	**Actor Receiving**
Model	Building model updated for component information. Shape and location of components may have been provided previously or may be specified through this exchange requirement.	√			Building Design
		√			Electrical Design
		√			Piping Design
		√			Structural Design