



Centro de Investigación
en Métodos de
Producción de Software

From Requirements to Code: a Full Model-Driven Approach

Óscar Pastor



UNIVERSIDAD
POLITECNICA
DE VALENCIA



Centro de Investigación en Métodos de Producción de Software (ProS)
Universidad Politécnica de Valencia
Camino de Vera s/n, 46071 Valencia, España (Spain)
opastor@pros.upv.es
Phone: +34 96 387 7000, Fax: +34 96 3877359

- Communication Analysis: a Requirements Engineering method for information systems
- Deriving Conceptual Models from Requirements Specifications
- A model-driven framework to support organisational evolution



Centro de Investigación
en Métodos de
Producción de Software

Communication Analysis: a Requirements Engineering method for information systems

Óscar Pastor
Ingeniería de Sistemas de Información



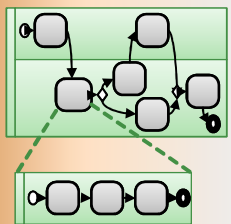
UNIVERSIDAD
POLITECNICA
DE VALENCIA



Centro de Investigación en Métodos de Producción de Software (ProS)
Universidad Politécnica de Valencia
Camino de Vera s/n, 46071 Valencia, España (Spain)
sergio.espana@pros.upv.es
Phone: +34 96 387 7000, Fax: +34 96 3877359

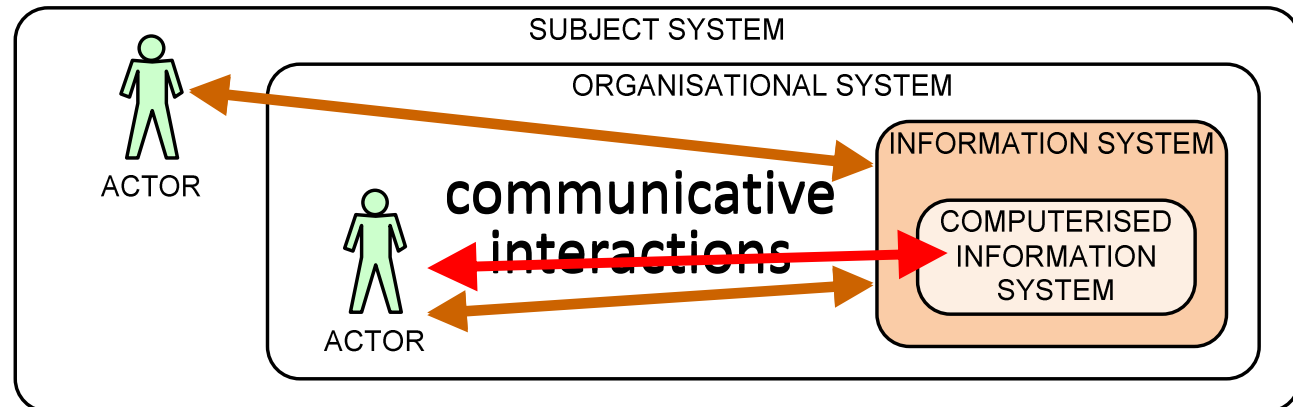
MODELLING TECHNIQUES OFFER!!!
TAKE 3, PAY 2

NOTATION

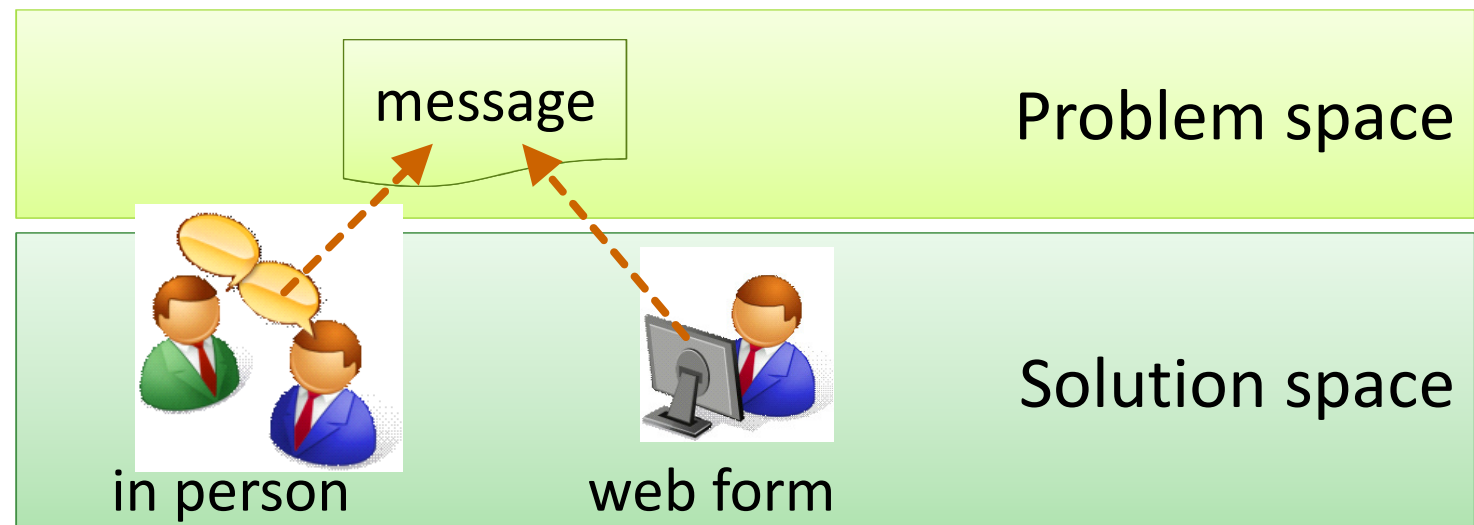


YET ANOTHER
METHOD
NICE & CHEAP

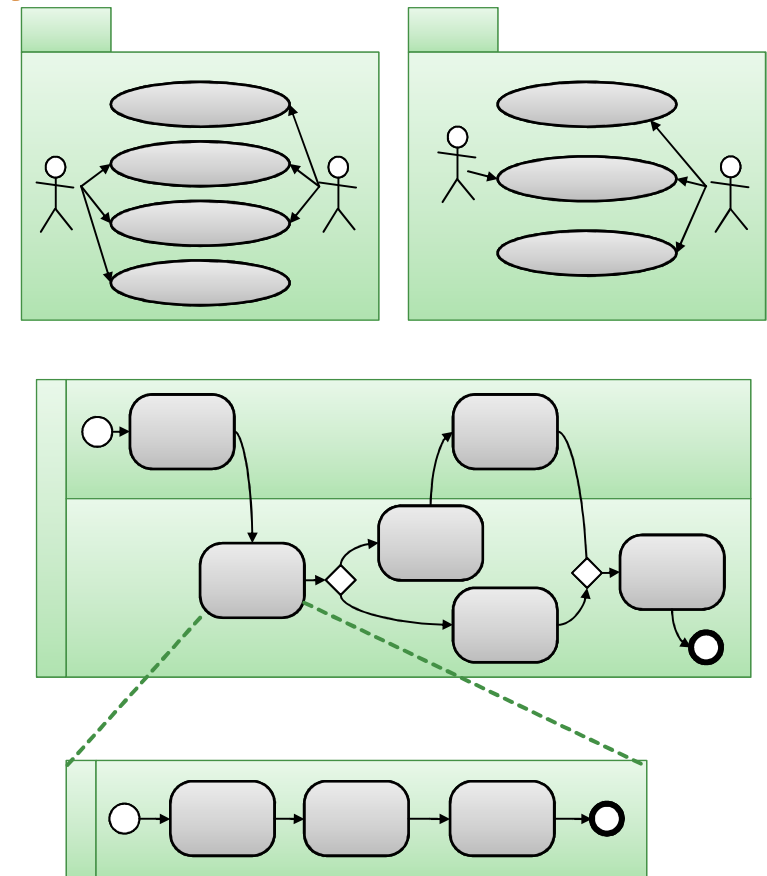
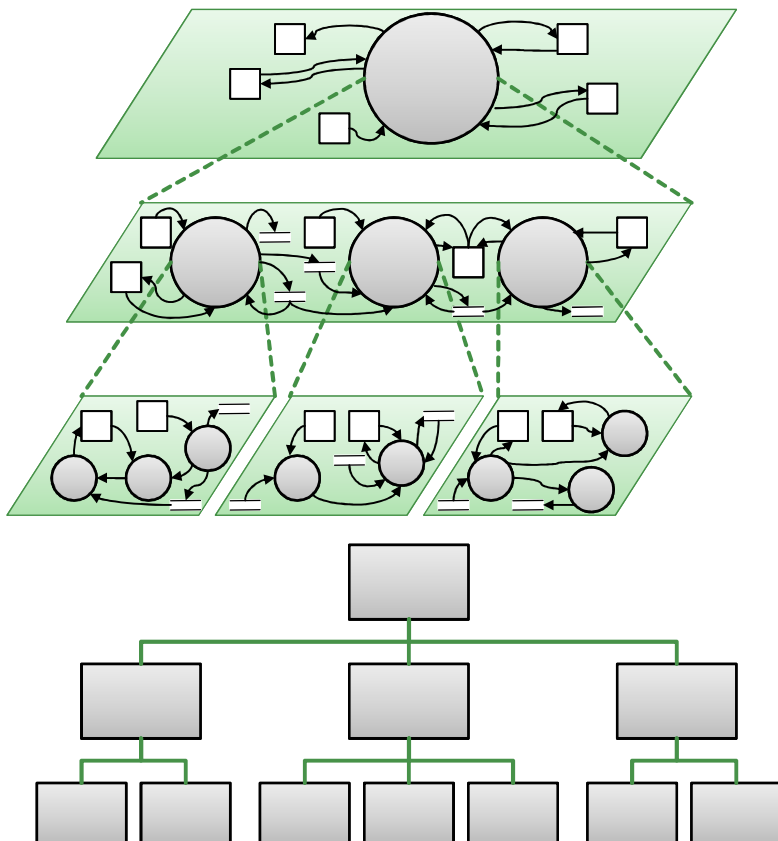
- Good practices in IS requirements Engineering:
 - Offer external view of the IS.
 - A communicational approach to IS analysis.



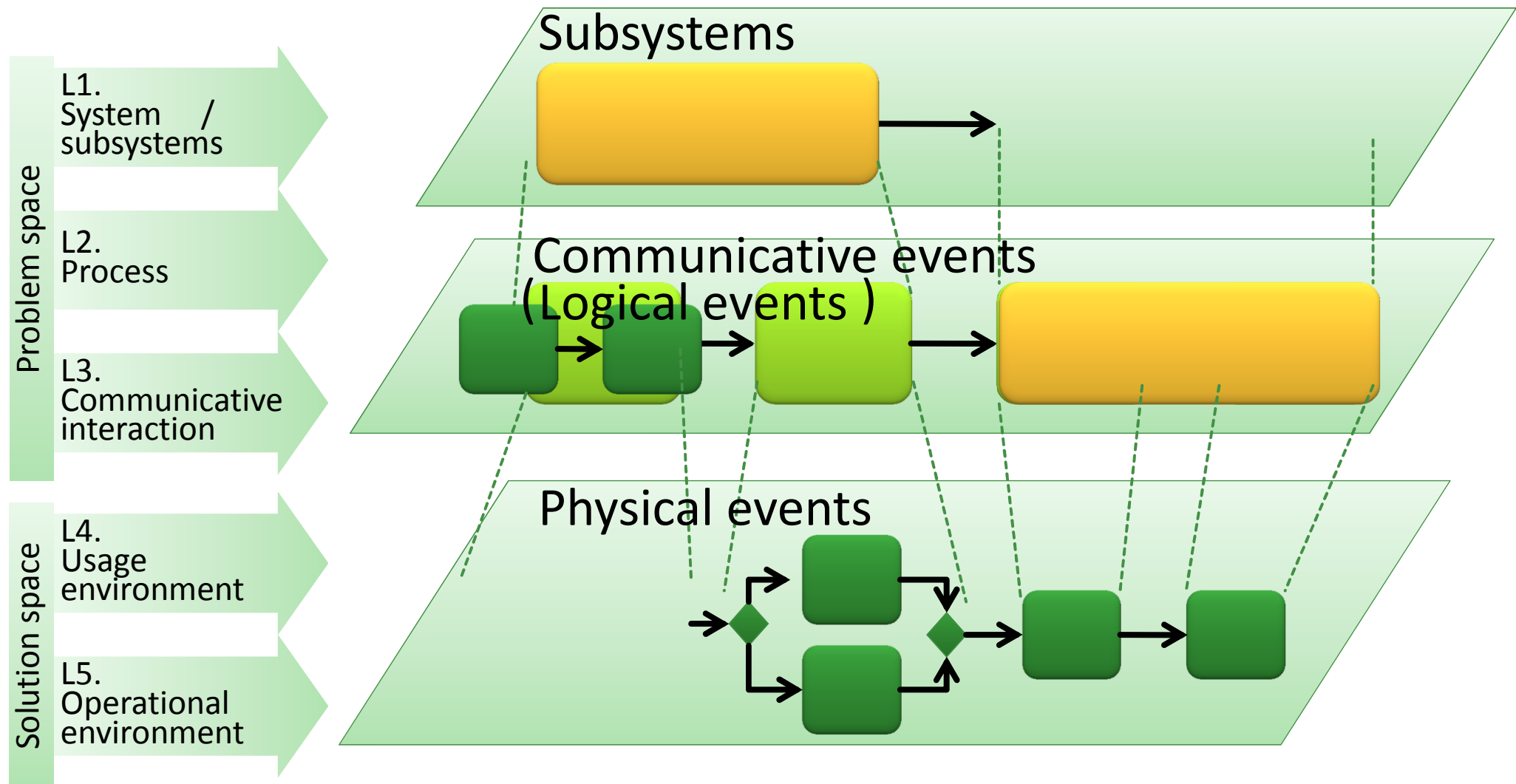
- Good practices in IS requirements Engineering:
 - Offer external view of the IS.
 - A communicational approach to IS analysis.
 - **Differentiate problem space vs. solution space.**



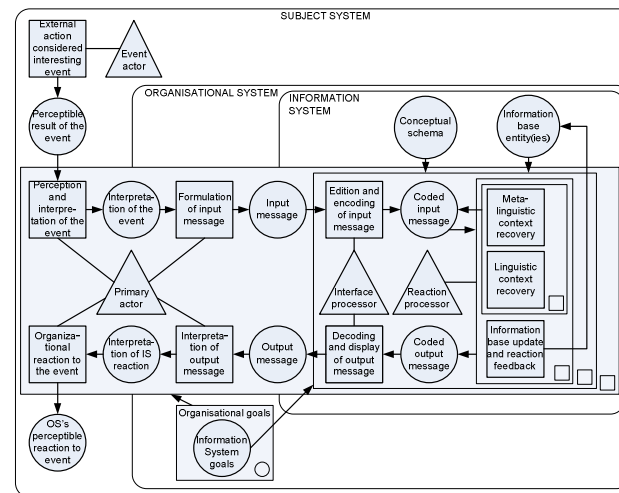
- Good practices in IS requirements Engineering:
 - Offer external view of the IS.
 - A communicational approach to IS analysis.
 - Differentiate problem space vs. solution space.
 - **(Stepwise) refinement of complex systems.**



- **Wise** (stepwise) refinement of complex systems

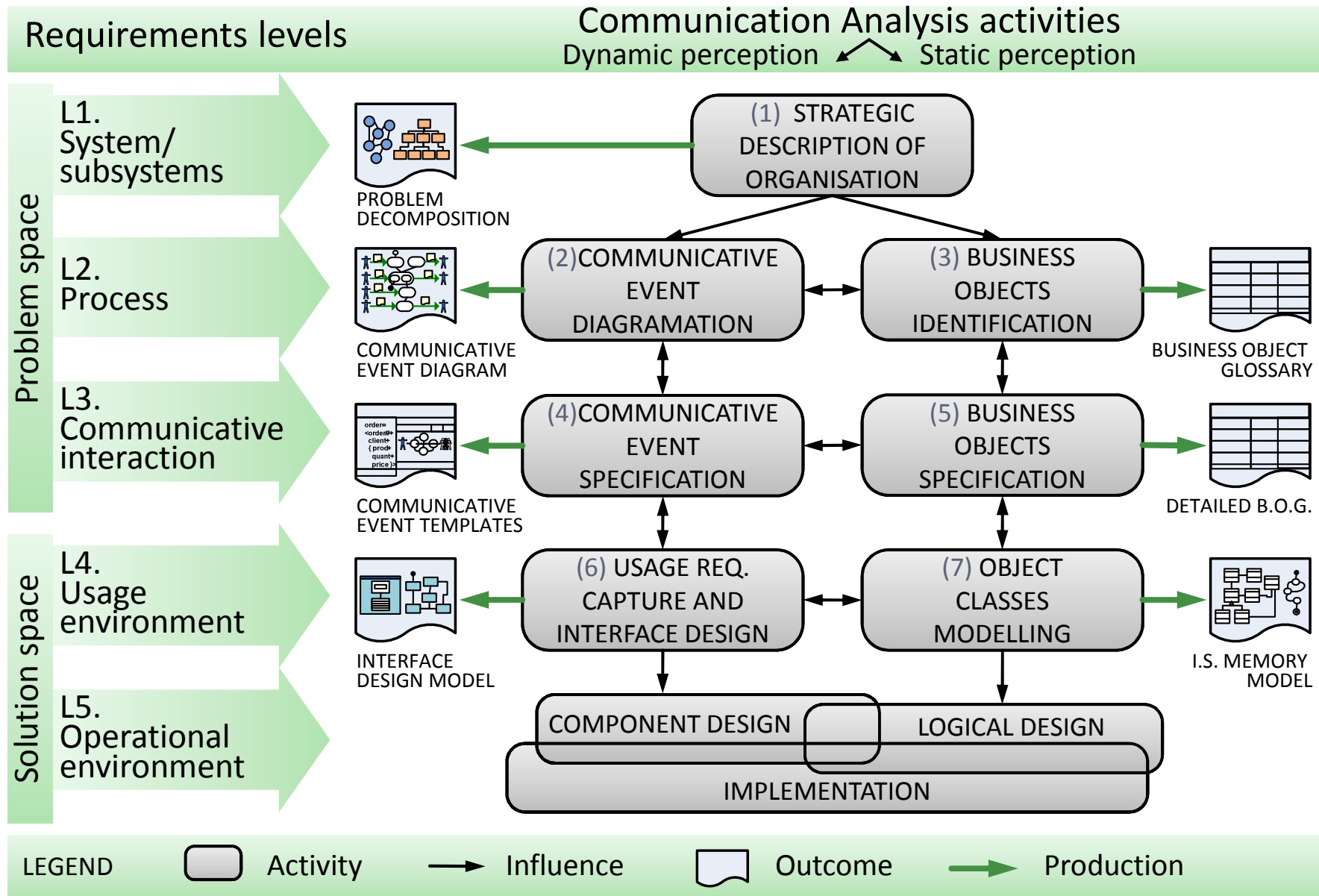


- Conception of Communication Analysis
 - Stems from research on IS fundamental concepts
 - Extension of the FRISCO report.

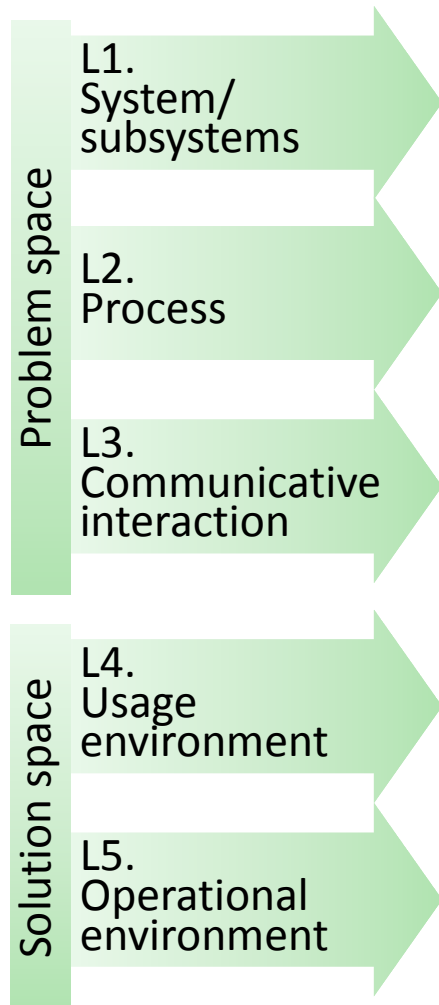


- Evolves in collaboration with industry
 - Valencia Port Authority
 - Infrastructure and Transport Ministry of the Valencian Regional Government
 - Anecoop S. Coop. (2nd grade cooperative that aggregates +100 agricultural cooperatives)

■ Requirements structure and method activities



■ Activity 1. Strategic description of organisation.



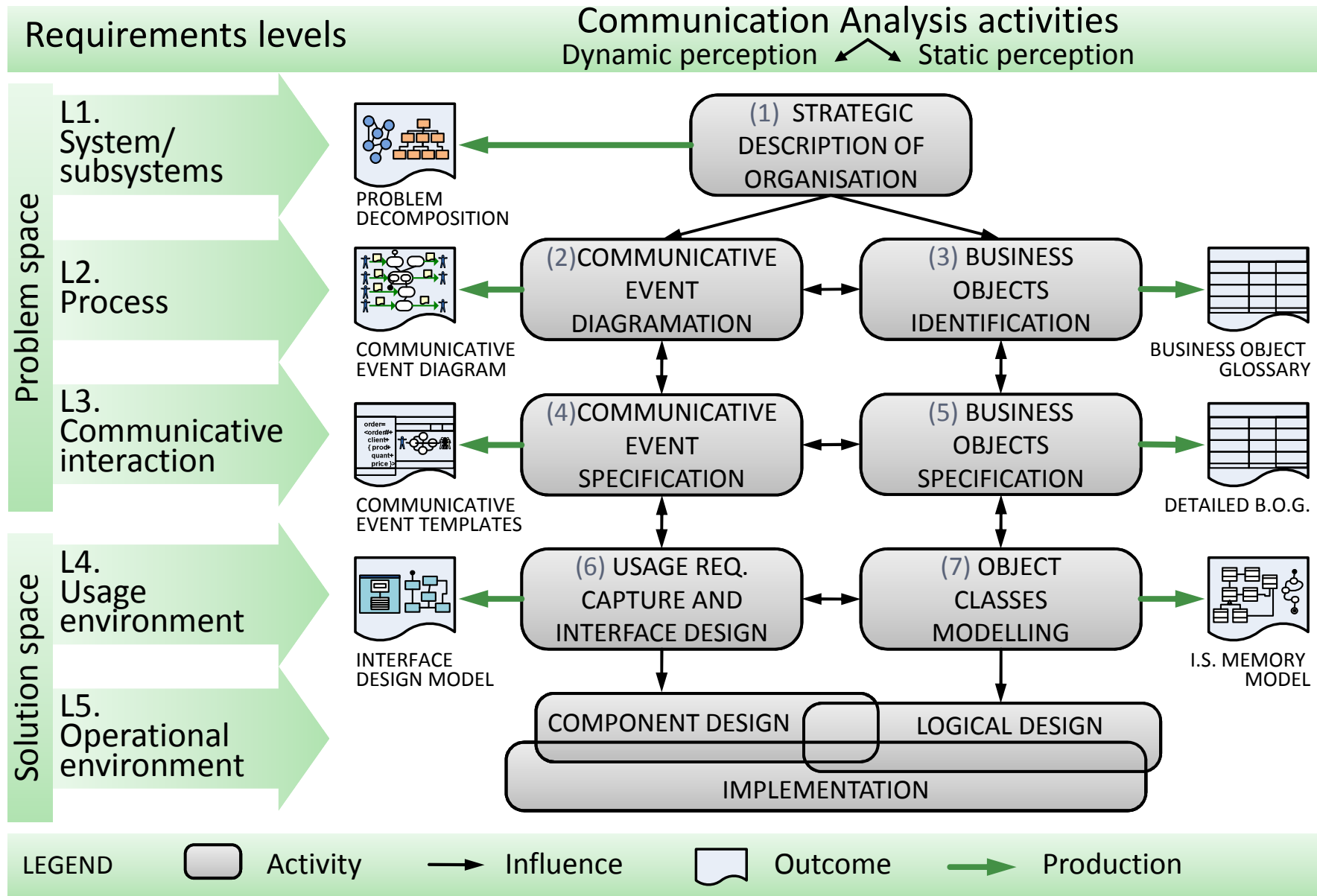
- Describe the Organisational System from a strategic p.o.v
- Decompose the problem

- Customer Service Departments (salesmen)
- Production Department (clerks)
- Accounting Department (accountant)
- Management Board

- Strategic business indicators

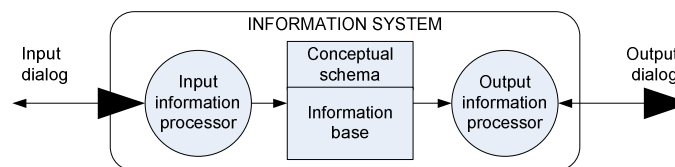
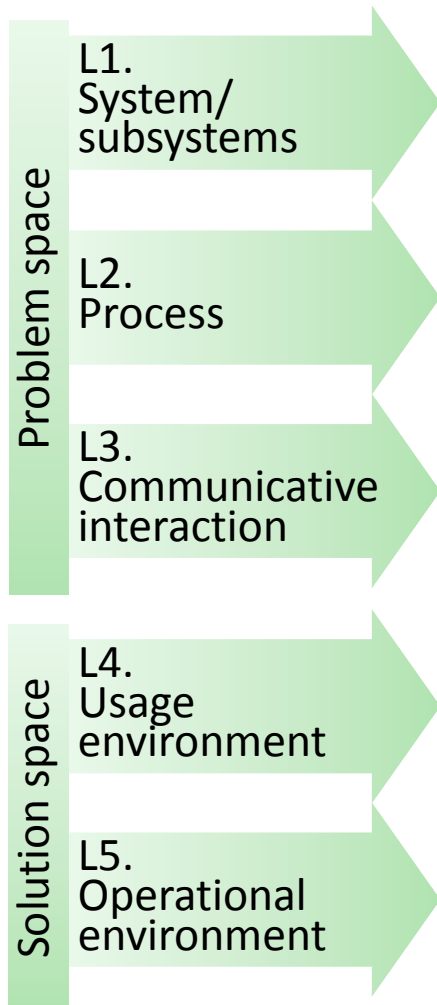
- Increase in the number of photographers
- Increase in the number of exclusives
- Cash flow
- etc.

Requirements structure and method activities

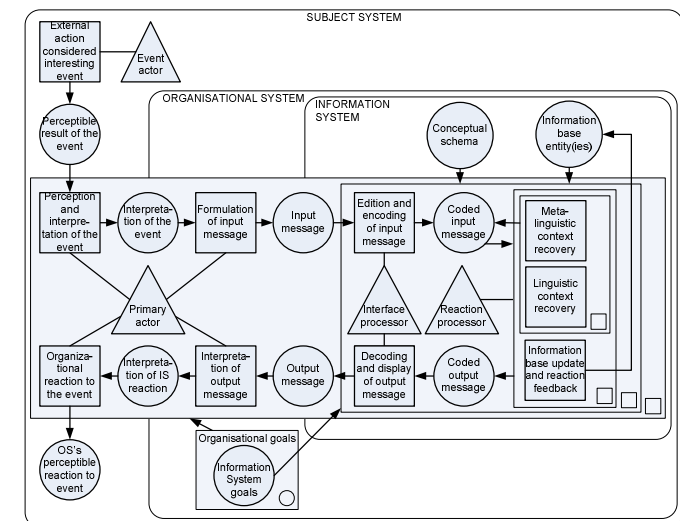


Activity 2. Communicative event diagramation

- **Communicative interaction.** Interaction between actors in order to exchange information.
 - **Ingoing communicative interaction** primarily feed the IS memory with new meaningful information.
 - **Outgoing communicative interaction** primarily consult IS memory.
- **Communicative event.** An ingoing communicative interaction that fulfils the following unity criteria.



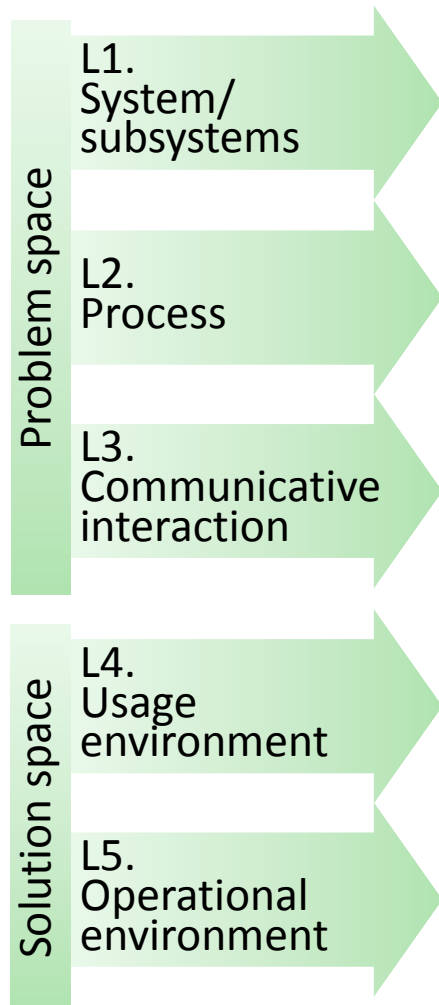
[ISO 1982]



Extended from [FRISCO 1998]

■ Activity 2. Communicative event diagramation

- **Communicative event.** An ingoing communicative interaction that fulfils the following unity criteria.



UNITY CRITERIA FOR BUSINESS PROCESS MODELLING

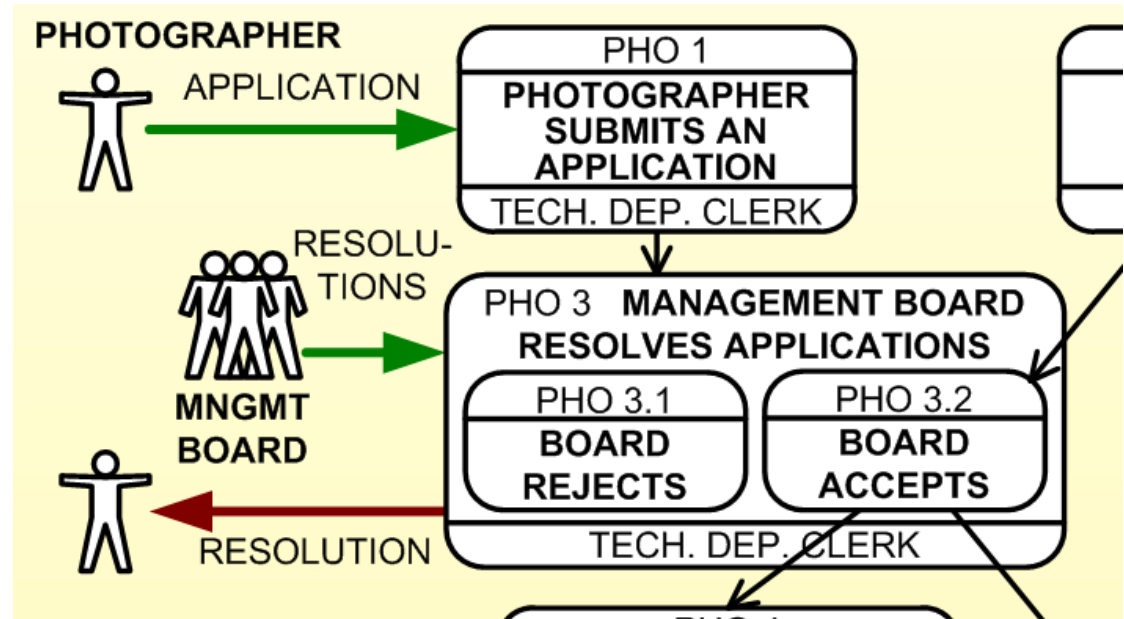
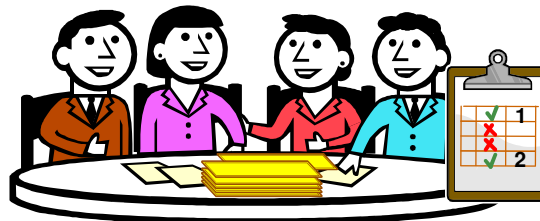
TRIGGER UNITY	Trigger responsibility is external. The event occurs as a response to an external interaction. Some actor establishes contact with the IS and triggers organisational reaction.
COMMUNICATION UNITY	Each and every event involves providing new meaningful information. Input messages are representations of something that happens in the IS environment.
REACTION UNITY	The event triggers IS reaction, which is a composition of synchronous activities. Events are asynchronous among each other.

- Illustrative example

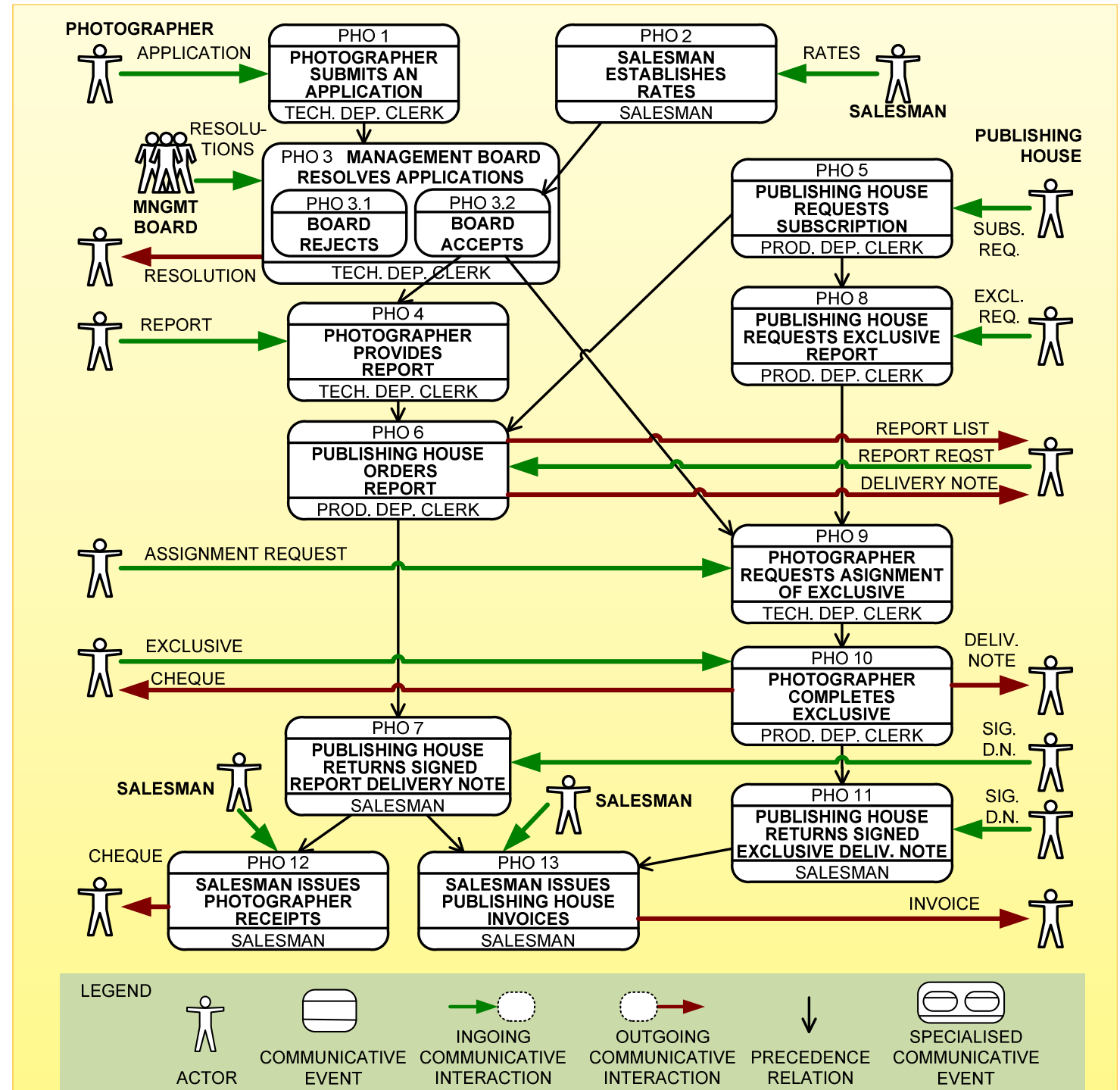
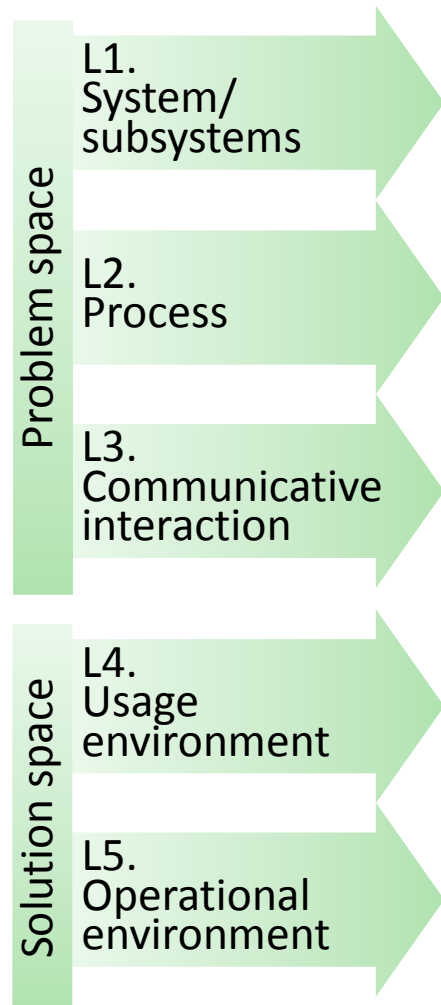
Photographer



Photography
Agency, Inc



■ Communicative event diagram of *Photography Agency, Inc.*



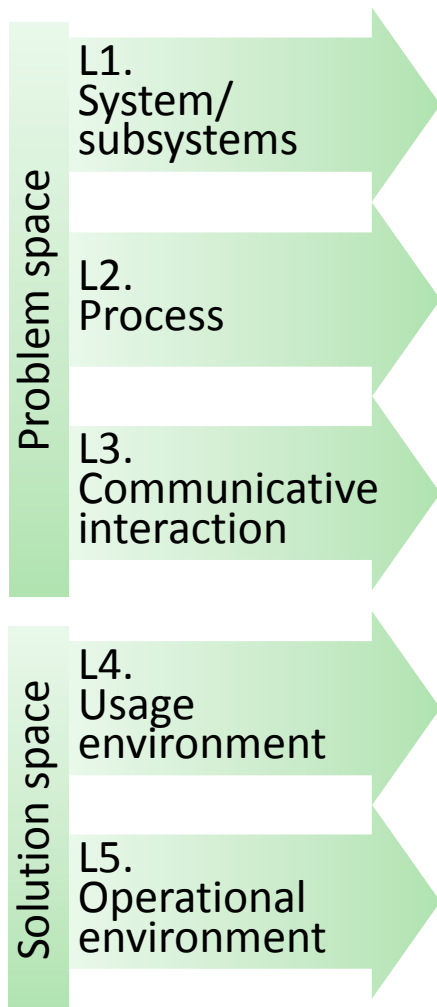
■ Activity 3. Business objects identification.

■ **Business Object Glossary.** Structure that specifies business objects.

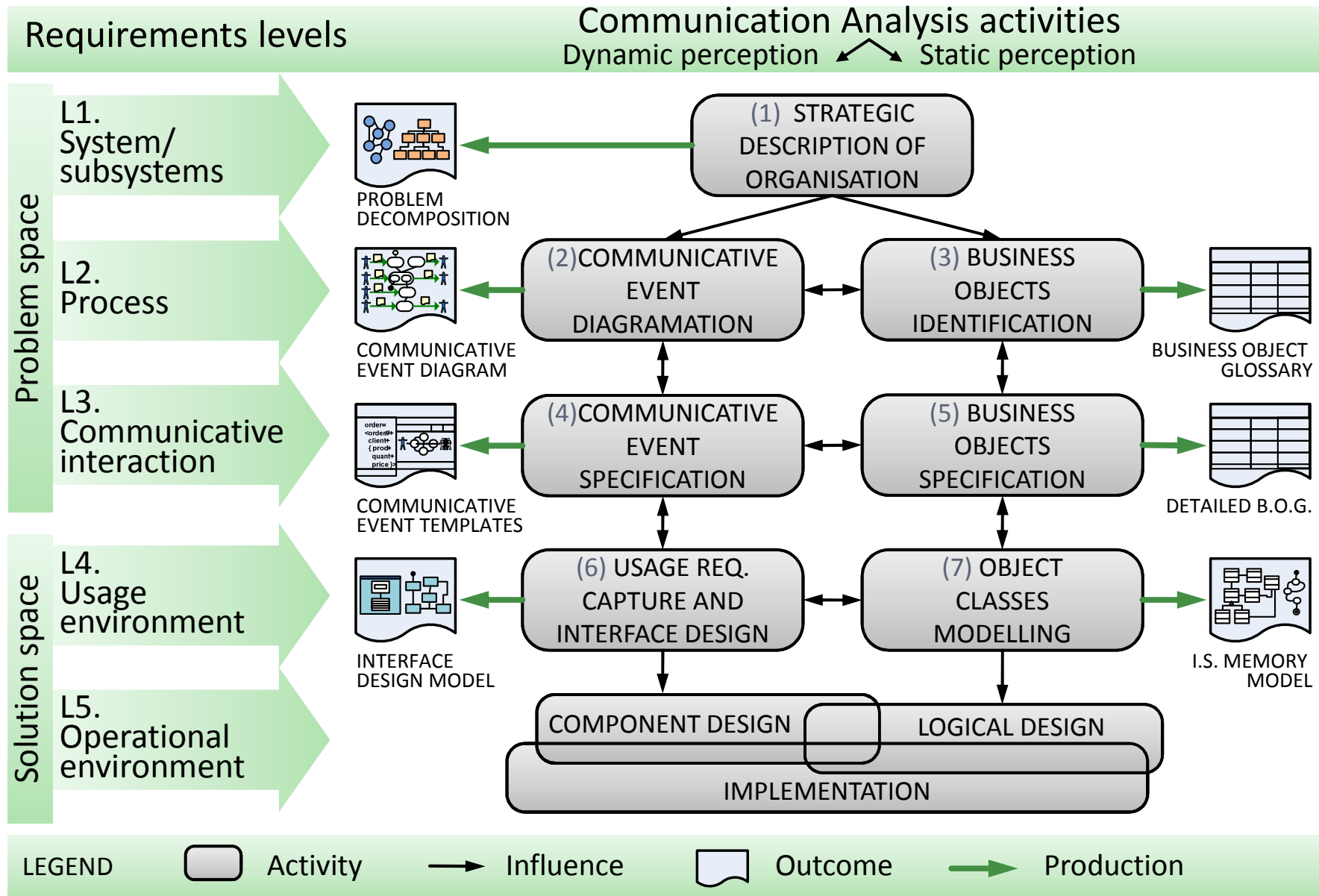
- Business objects are conceptions of entities of the Subject System in which the Organisational System is interested.
 - Complex aggregates of properties (not o-o fragmentation)
 - Report record
 - Photographer record
 - Report delivery note
- Business forms are catalogued.

■ Business indicators at the process level.

- Production department: productivity and profitability indicators
 - Delivery performance to customer
 - Photographer productivity

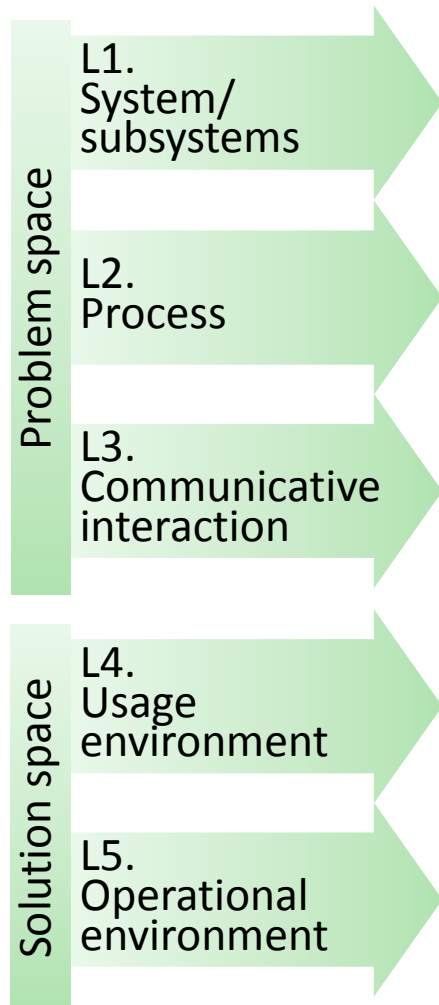


- Requirements structure and method activities



■ Activity 4. Communicative event specification.

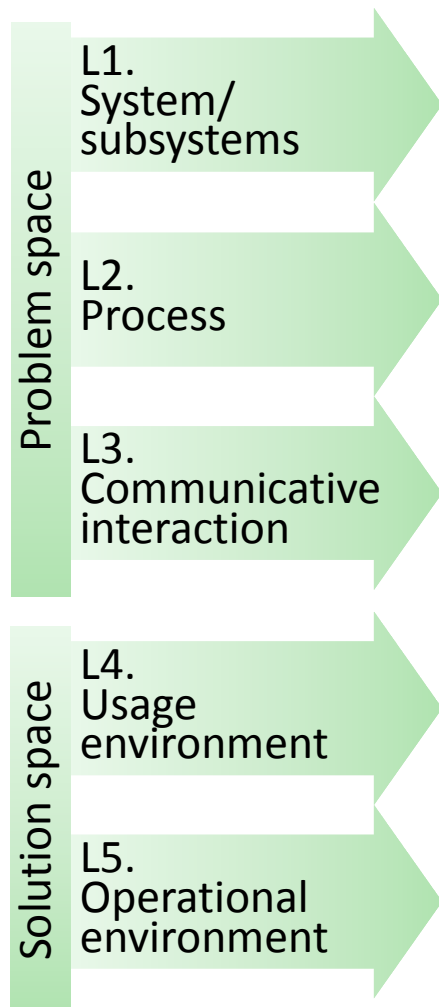
■ Template structure



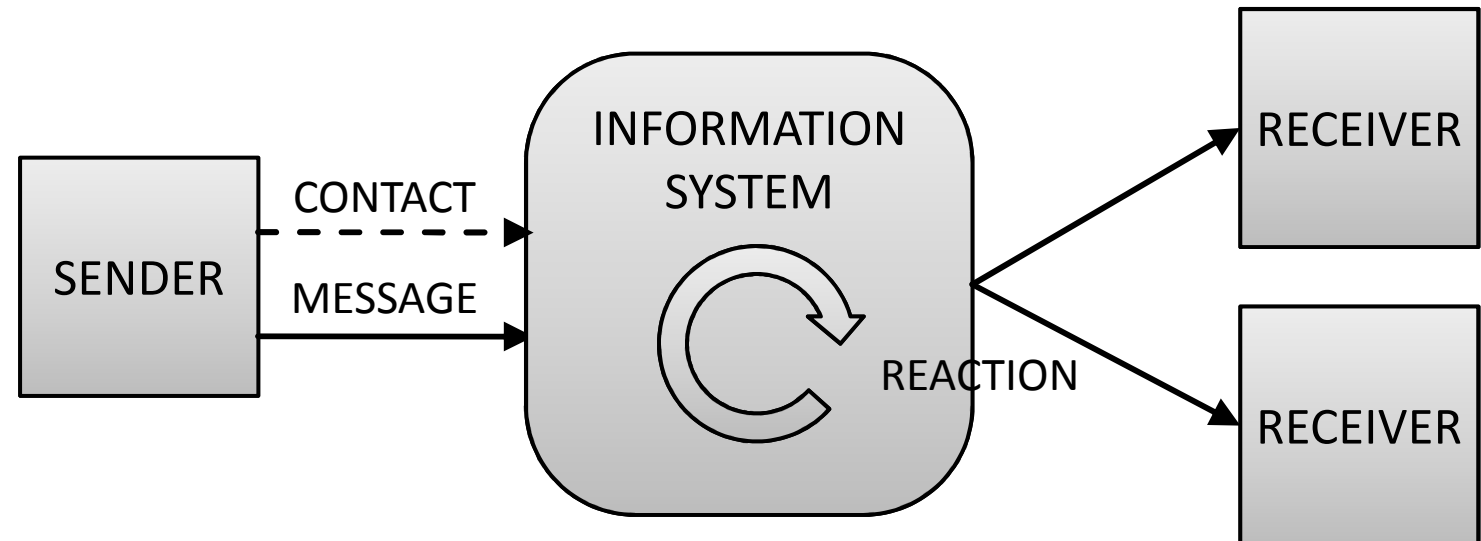
Header
Contact requirements
Communicational content requirements
Reaction requirements



Activity 4. Communicative event specification.

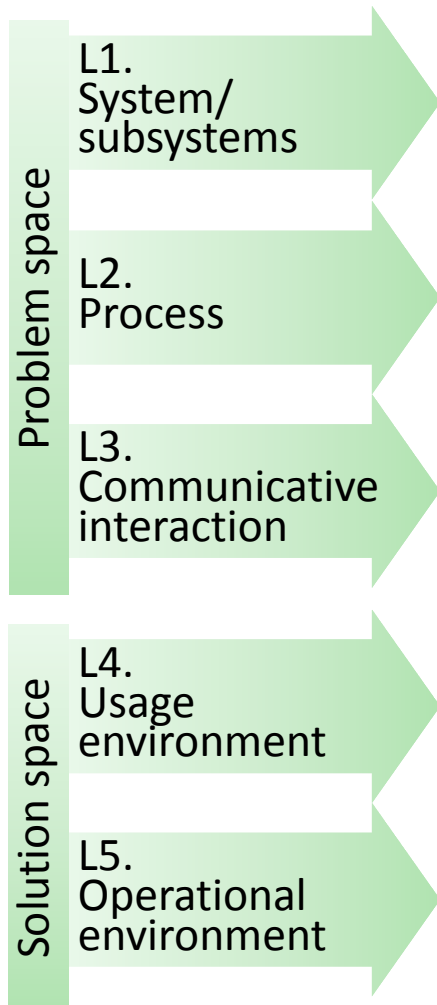


Header
Contact requirements
Communicational content requirements
Reaction requirements



■ Activity 4. Communicative event specification.

Header
Contact requirements
Communicational content requirements
Reaction requirements

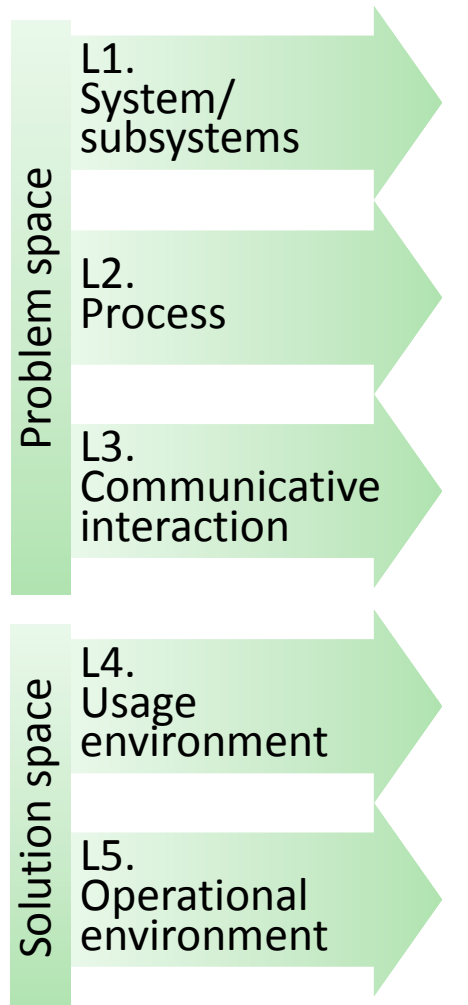


PHO 3. Management board resolves applications

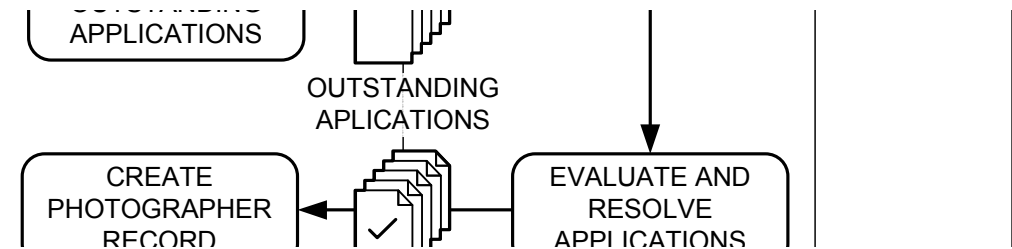
Goals: The IS aims to obtain a response to outstanding photographer applications.

Description: Monday mornings, the management board holds a meeting. A member of each department is present. A Production Department clerk has prepared a list of outstanding (pending) photographer applications and a résumé of each applicant. Management board proceeds to evaluate and resolve each application. Depending on the documentation, a photographer is either accepted or rejected. Accepted photographers are classified into a quality level (this level will determine their rates). After the meeting, the list of resolved applications is returned to Production Department.

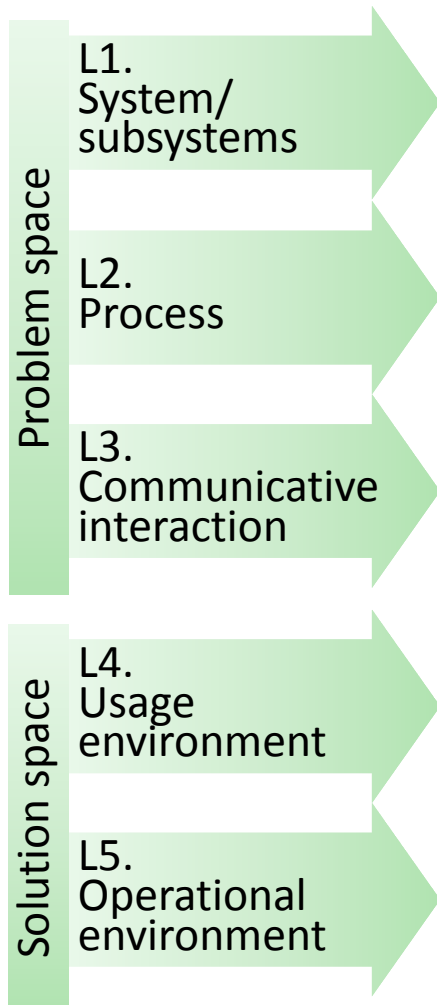
Activity 4



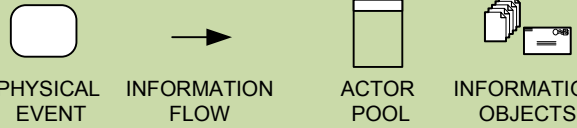
Header
Contact requirements
Communicational content requirements
Reaction requirements



Activity 4



Header
Contact requirements
Communicational content requirements
Reaction requirements

LETTER														
LEGEND  PHYSICAL EVENT INFORMATION FLOW ACTOR POOL INFORMATION OBJECTS														
Contact requirements														
Primary actor: Management board. Communication channel: In person. Temporal restrictions: This communicative event occurs Monday mornings. Frequency: Of the 10-20 monthly applications, around 5 are accepted.														
Communicational content requirements														
Support actor: Production Department clerk Communication Structure: <table> <tr> <th>FIELD</th><th>OP</th><th>DOMAIN</th><th>BUSINESS OBJ.</th><th>EXAMPLE VALUE</th></tr> <tr> <td>DESCRIPTION</td><td></td><td></td><td>ACTOR NAME</td><td></td></tr> </table>					FIELD	OP	DOMAIN	BUSINESS OBJ.	EXAMPLE VALUE	DESCRIPTION			ACTOR NAME	
FIELD	OP	DOMAIN	BUSINESS OBJ.	EXAMPLE VALUE										
DESCRIPTION			ACTOR NAME											
				LEGEND										

- Activity 4. Communicative event specification.
 - Communication Structure of event PHO 3

Header
Contact requirements
Communicational content requirements
Reaction requirements

FIELD	OP	DOMAIN	BUSINESS OBJ.	EXAMPLE VALUE
RESOLUTIONS = { Application()= < ID card # + Name + Address + Postcode + City + Phone # + Equipment + Experience + Portfolio + Resol. date + Decision + [Accepted = < Level >] > }	 i d d d d d d d d i i i	 text text text text text text text text document date [acc rej] Decision=acc Rate<level>	PHOTOGRAPHER (ID card #)= < resol date + decision + level >	 19.345.631-Q Sergio Pastor González Camino de Vera s/n 46022 Valencia 9638700000 ext 83534 Canon A1 w. telemacro Worked for Mangum Ph N/A (sample of work) November 21, 2008 acc 1 (highest quality level)

LEGEND

CSs Primitives

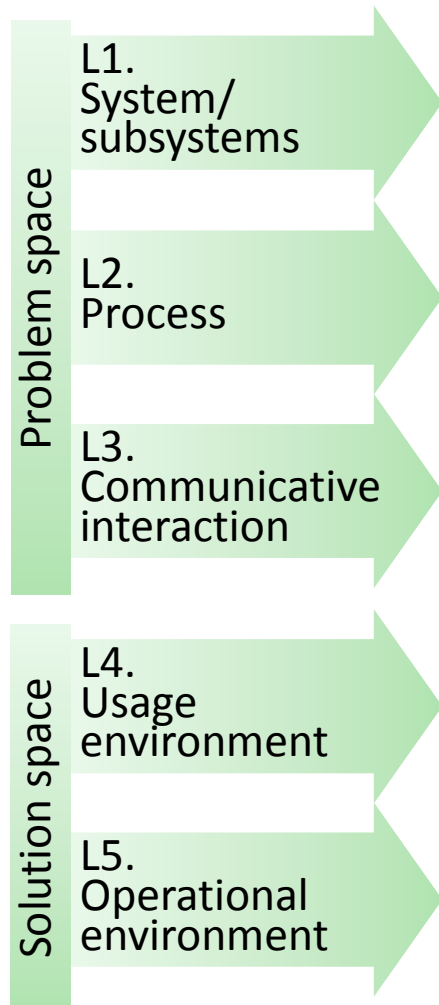
<+> aggregation
 { } iteration
 [|] alternative
 () selection

Information

aquisition
operations

d derivation
 i input

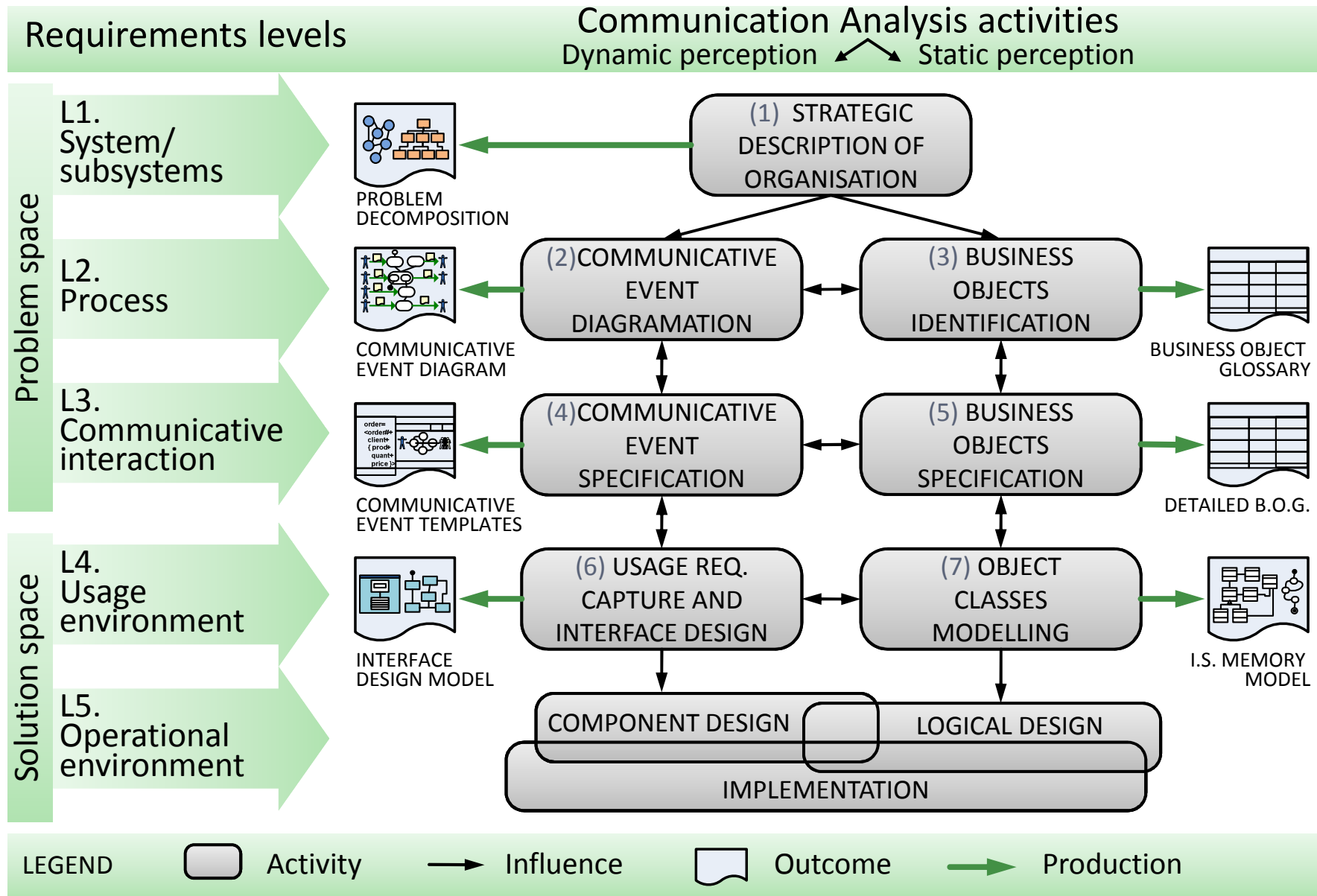
Header
Contact requirements
Communicational content requirements
Reaction requirements



FIELD	OP	DOMAIN	BUSINESS OBJ.	EXAMPLE VALUE
RESOLUTIONS = { Application() = < ID card # + Name + Address + Postcode + City + Phone # + Equipment + Experience + Portfolio + Resol. date + Decision + [Accepted = < Level >] }			PHOTOGRAPHER (ID card #)= <	19.345.631-Q Sergio Pastor González Camino de Vera s/n 46022 Valencia 9638700000 ext 83534 Canon A1 w. telemacro Worked for Mangum Ph N/A (sample of work) November 21, 2008 acc
	i	text		
	d	text		
	d	text		
	d	text		
	d	text		
	d	text		
	d	text		
	d	text		
	d	document		
	i	date	resol date +	
	i	[acc rej]	decision +	
		Decision=acc		
	i	Rate<level>	level	1 (highest quality level)
>			>	

- d derivation
- i input

Requirements structure and method activities



- Communication Analysis offers a systemic way to structure requirements
- Specific techniques for IS analysis
 - Communicative Event Diagram.
 - Communicational perspective on business process modelling
 - Unity criteria to deal with encapsulation (granularity of processes)
 - Communication Structures
 - Specifies messages related to communicative events
 - Derivation of IS memory from communication structures
- Future work
 - Propose precise guidelines to derive IS memory
 - Design user interface from communication structures
 - Report industrial case studies in the use of Communication Analysis
 - Take advantage of MDD and code generation frameworks
 - Extremely long etcetera (I hope)



Centro de Investigación
en Métodos de
Producción de Software

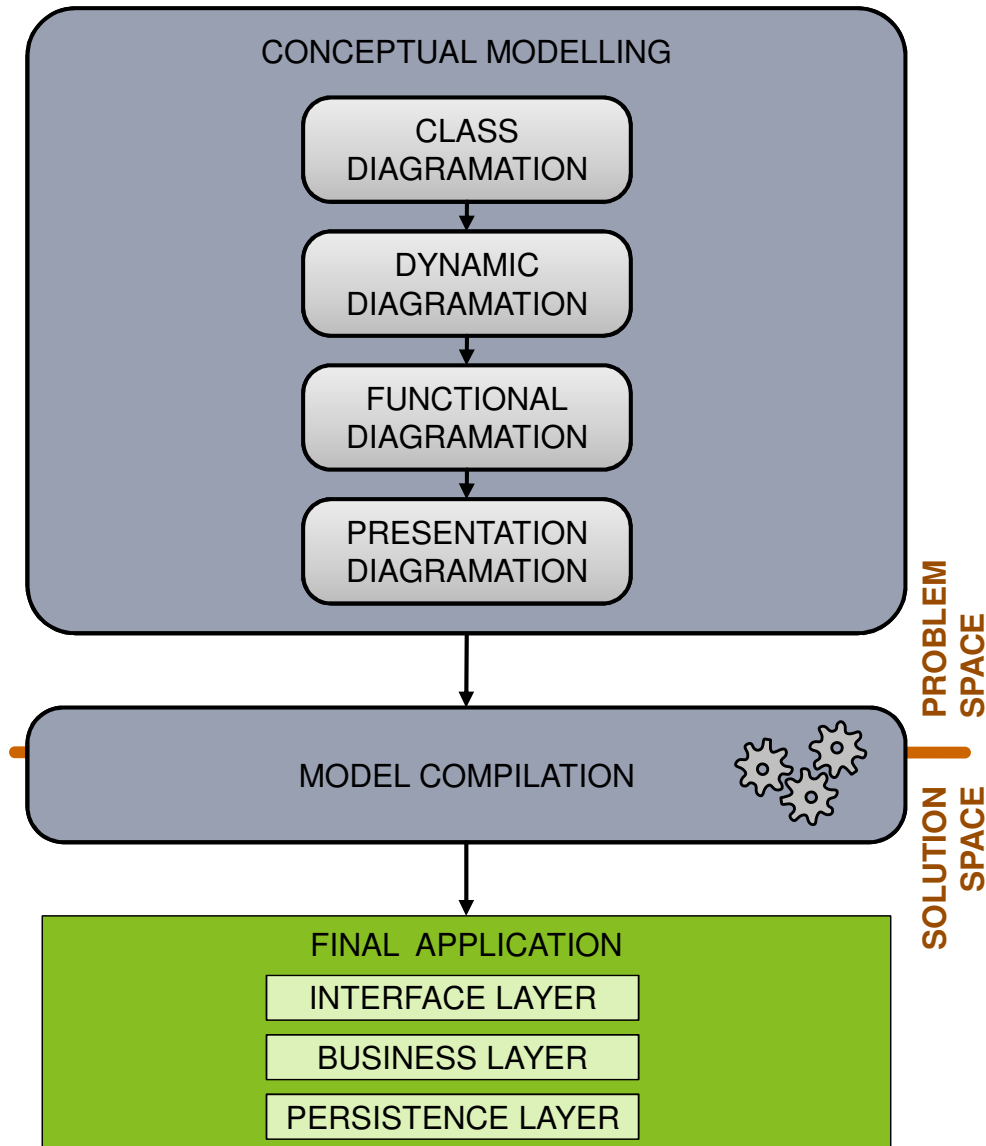
Deriving Conceptual Models from Requirements Specifications

Óscar Pastor, Sergio España



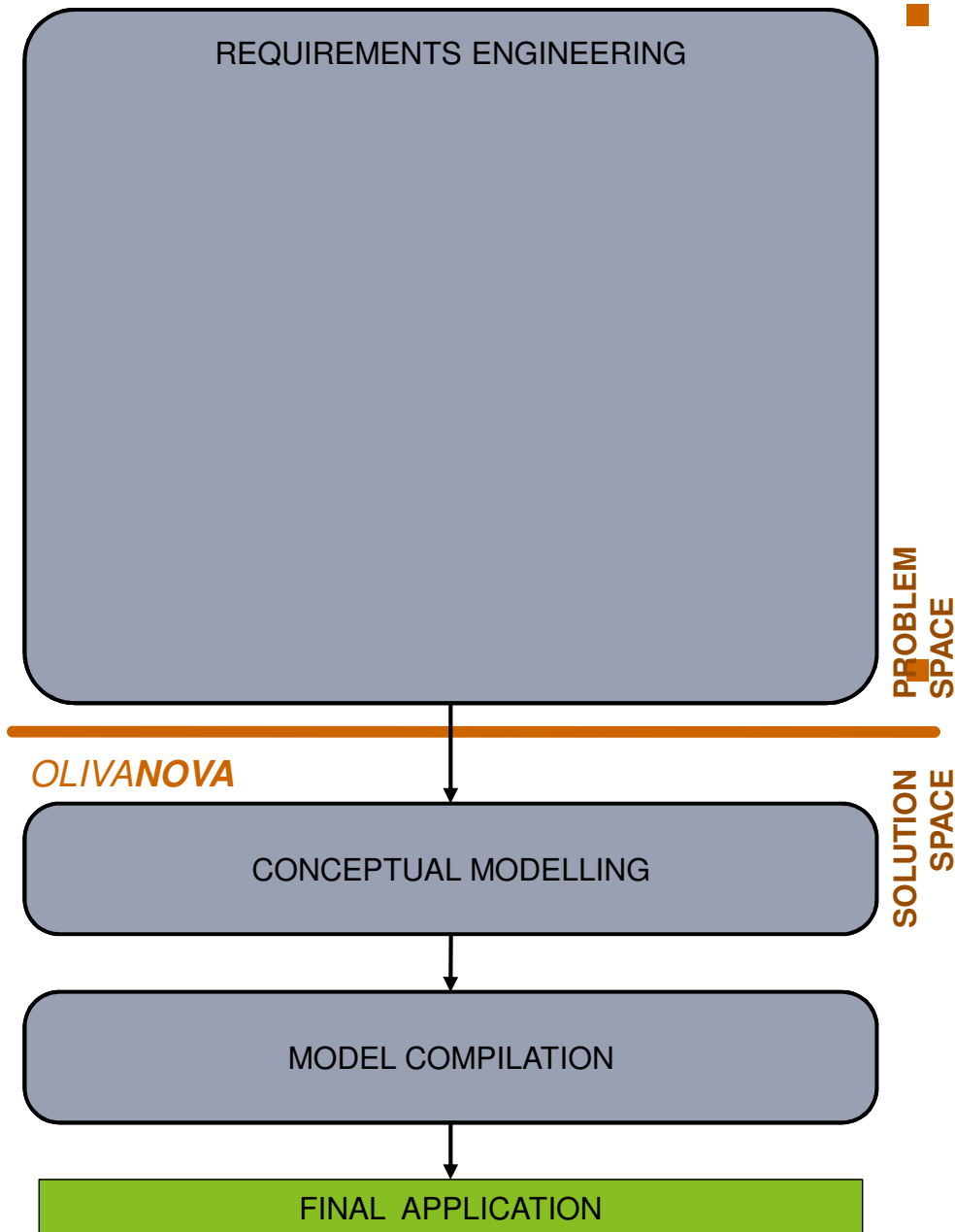
UNIVERSIDAD
POLITECNICA
DE VALENCIA

OLIVANOVA



- The OO-Method/*OLIVANOVA* approach:
 - Conceptual modelling
 - Object Model
 - Dynamic Model
 - Functional Model
 - Presentation Model
 - Model compilation

Communication Analysis



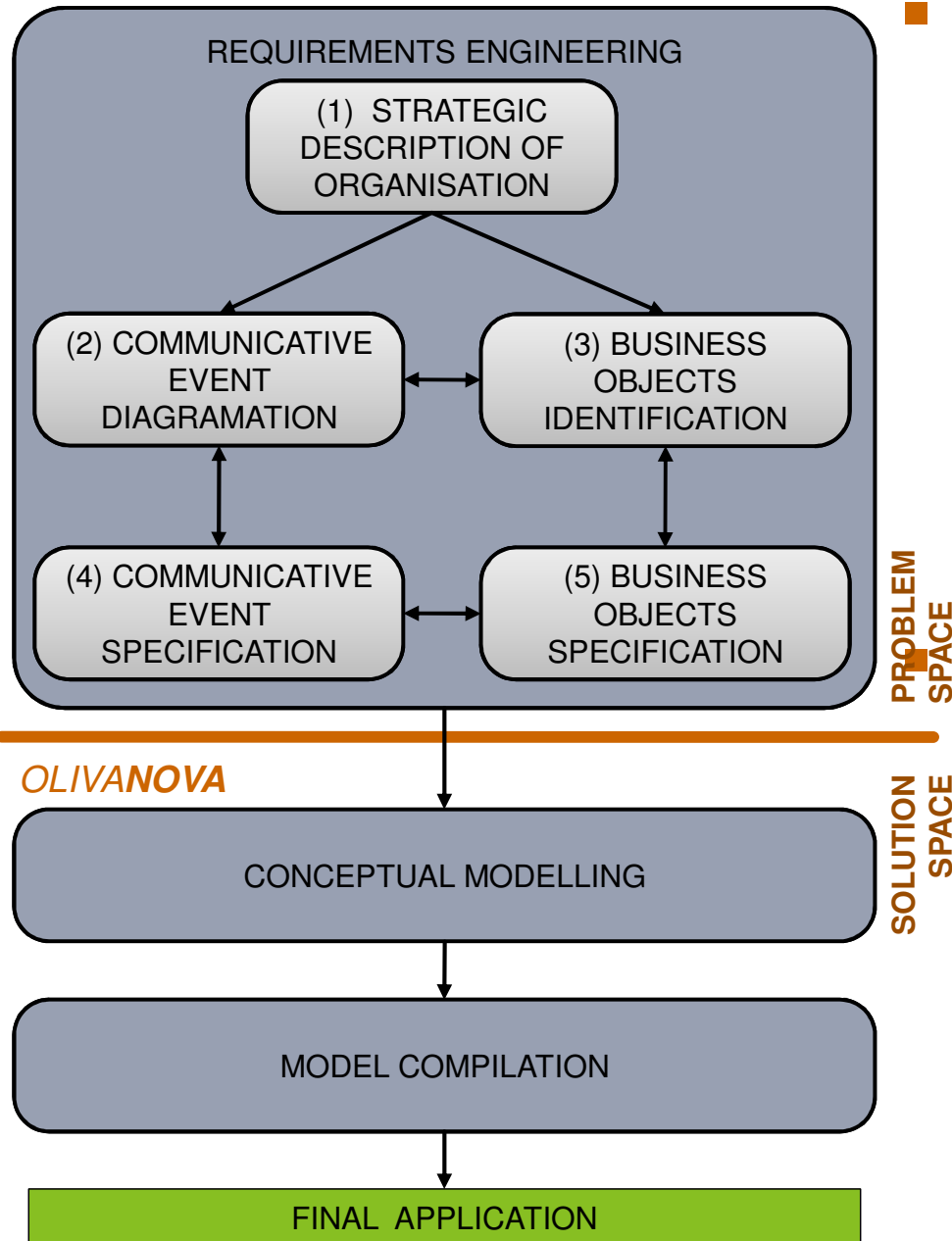
■ Communication Analysis

The OO-Method/*OLIVANOVA* approach:

- Conceptual modelling
 - Object Model
 - Dynamic Model
 - Functional Model
 - Presentation Model
- Model compilation



Communication Analysis



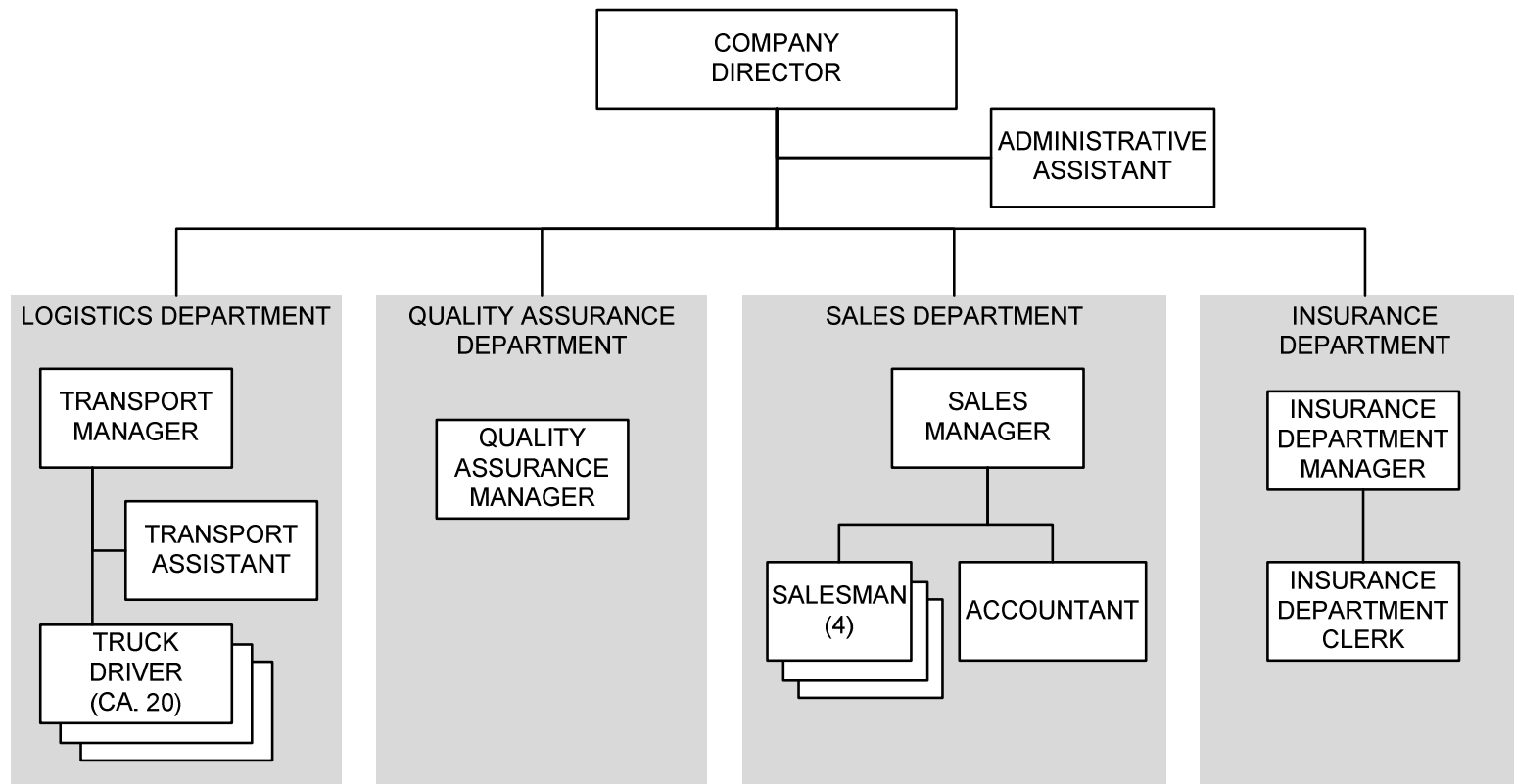
■ Communication Analysis:

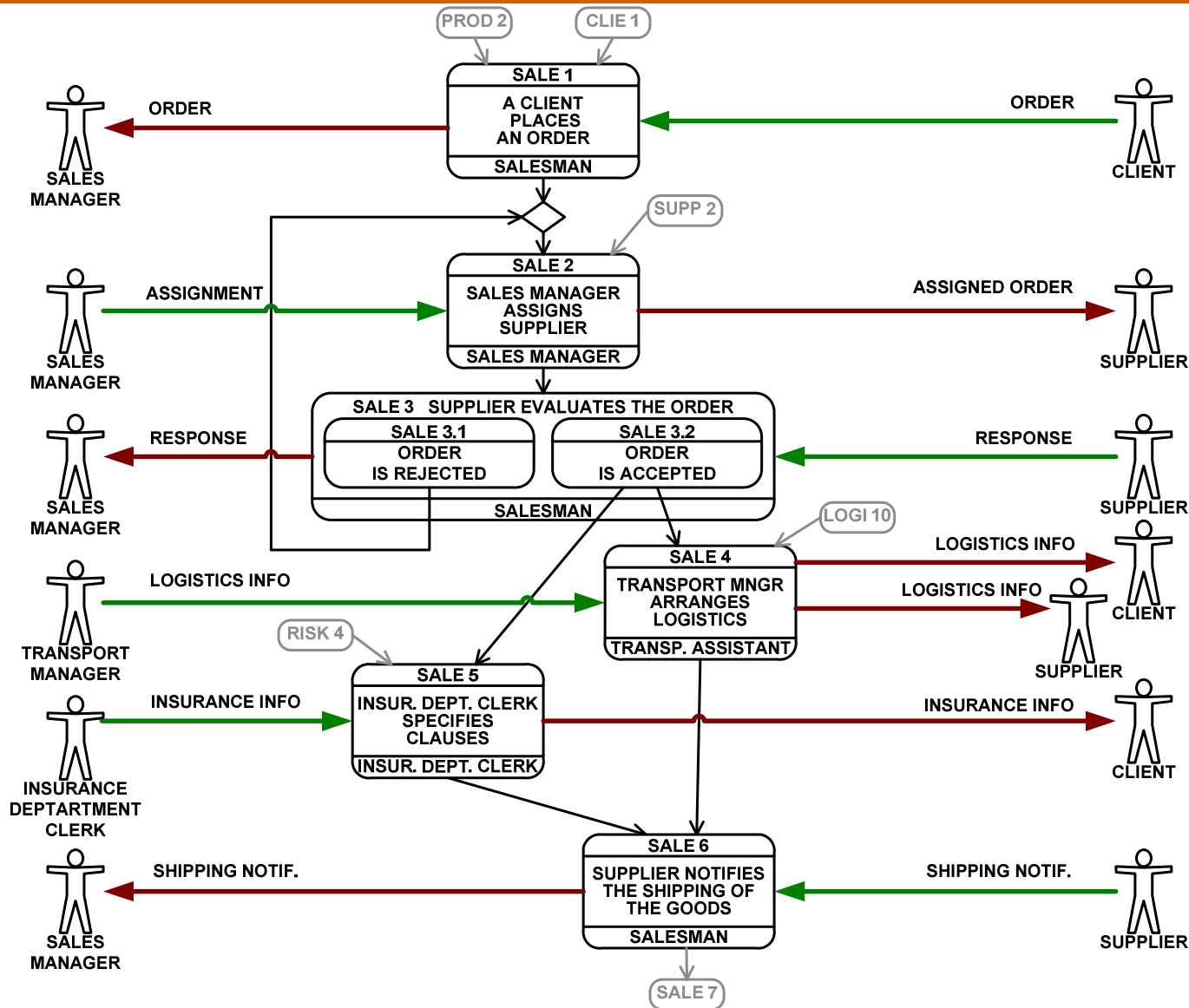
- Requirements engineering approach for information systems that provides:
- a **requirements structure**
- a **flow of activities**
- **methodological guidance** and **criteria**
- some notations

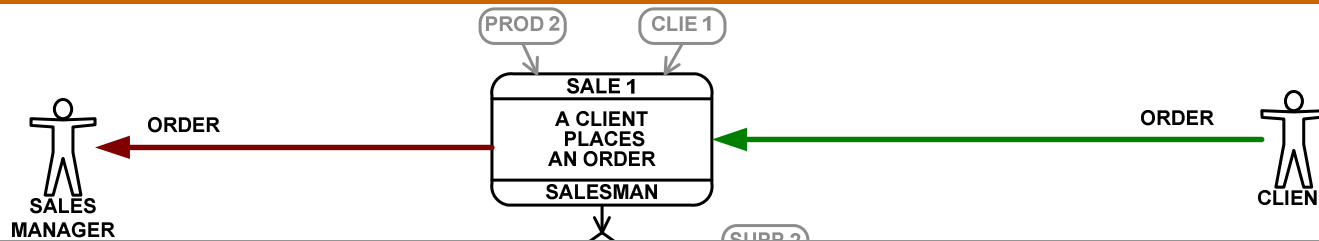
The OO-Method/*OLIVANOVA* approach:

- Conceptual modelling
 - Object Model
 - Dynamic Model
 - Functional Model
 - Presentation Model
- Model compilation

- First of all, let me introduce a running example:
 - **SuperStationery Co.** is a company that provides stationery and office material to its clients.
 - The company acts as a intermediary.
How does the sales management occur?





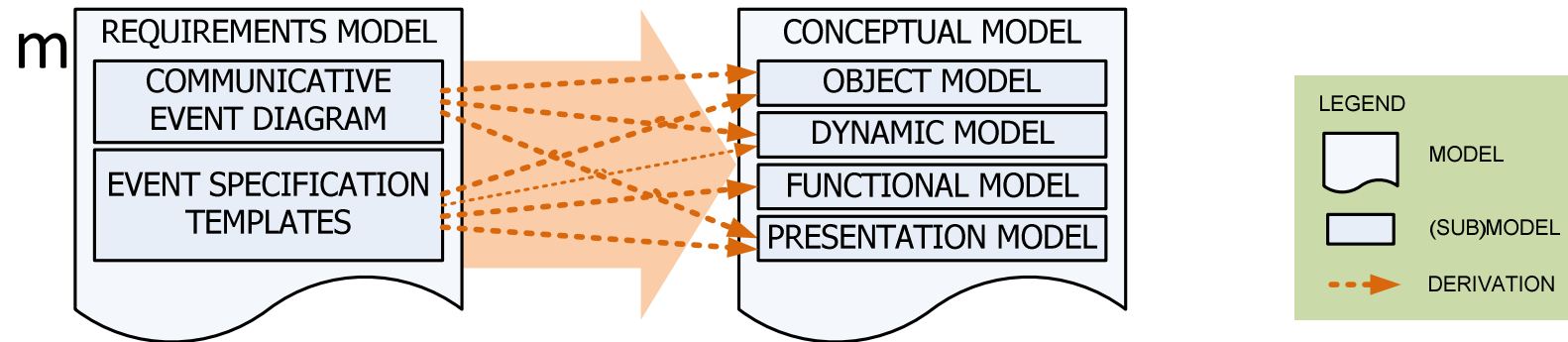


FIELD	OP	DOMAIN	EXAMPLE VALUE
ORDER = < Order number + Request date + Payment type + Client + DESTINATIONS = { DESTINATION = < Address + Person in charge + LINES = { LINE = < Product + Price + Quantity > } }> }> >	g i i i i i i i i	number date text Client Client address text Product money number	10352 31-08-2009 Cash 56746163-R, John Papiro Jr. Blvd. Blue mountain, 35-14A, 2363 Toontown Brayden Hitchcock ST39455, Rounded scissors (cebra) box -100 25,40 € 35

LEGEND

GRAMMATICAL CONSTRUCTS		INFORMATION ACQUISITION OPERATIONS	
< + > AGGREGATION SUBSTRUCTURE	{ } ITERATION SUBSTRUCTURE	[] SPECIALISATION SUBSTRUCTURE	g GENERATION i INPUT

- The conceptual model is derived from the requirements

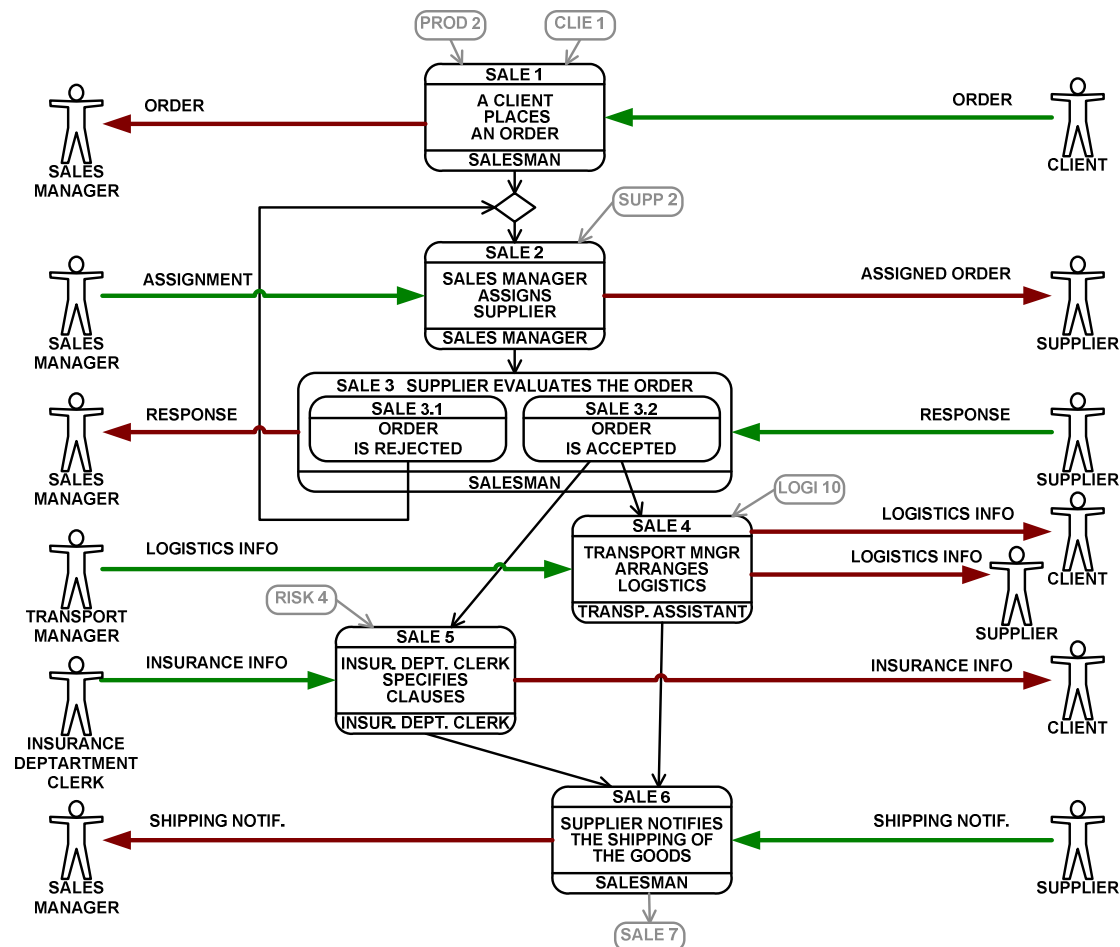


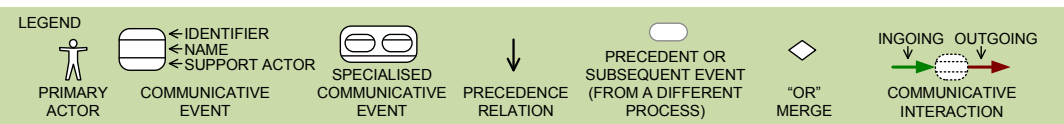
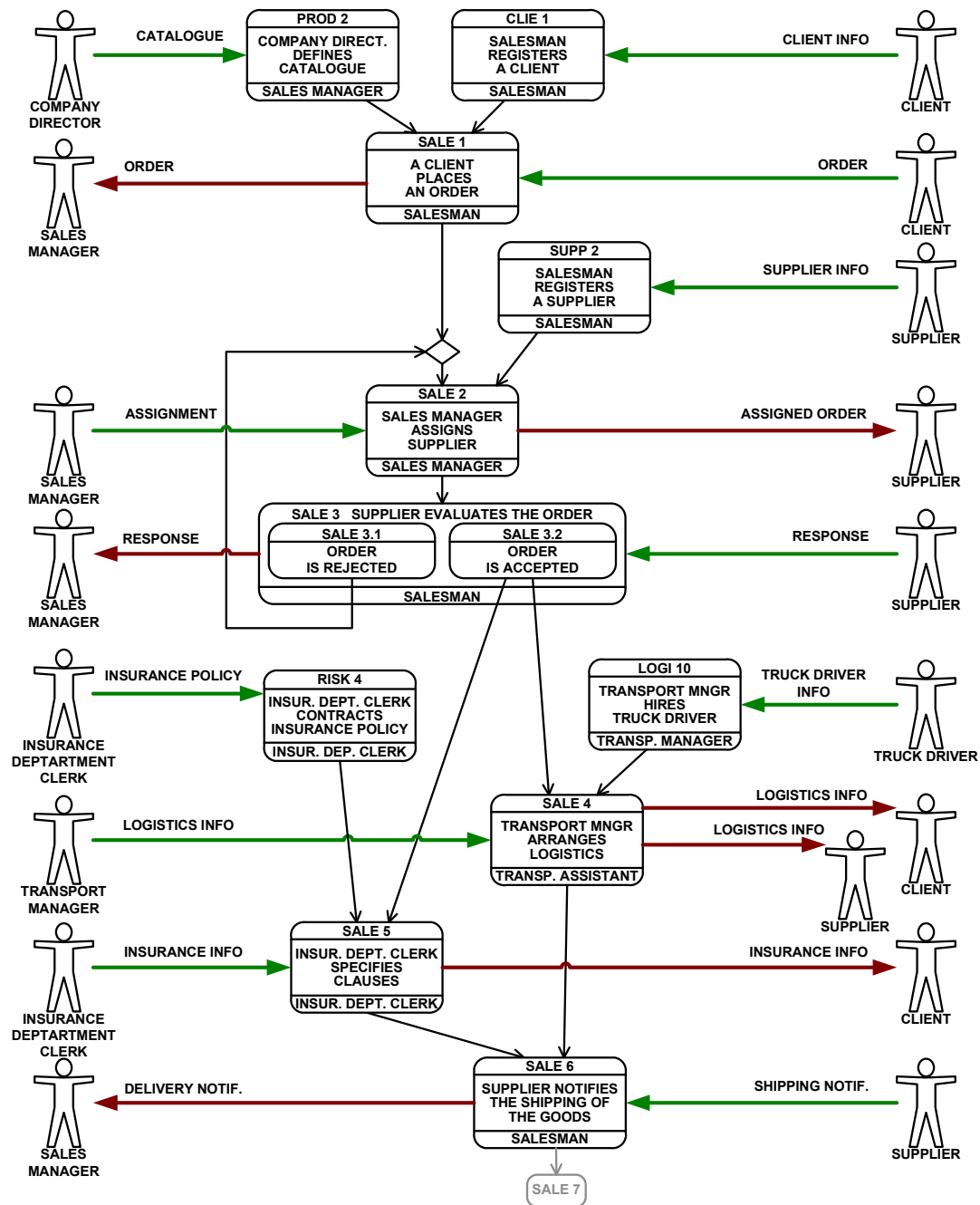
- The derivation procedure, in short.
 - **Extend** the communicative event diagram.
 - **Sort** (order) the communicative events.
 - **Process** the communicative events in order, one by one.

- **Extend** the communicative event diagram.
 - Include the communicative event diagram with all the needed out-of-scope precedent communicative events until there are non left.

I'll do a small example in the whiteboard first

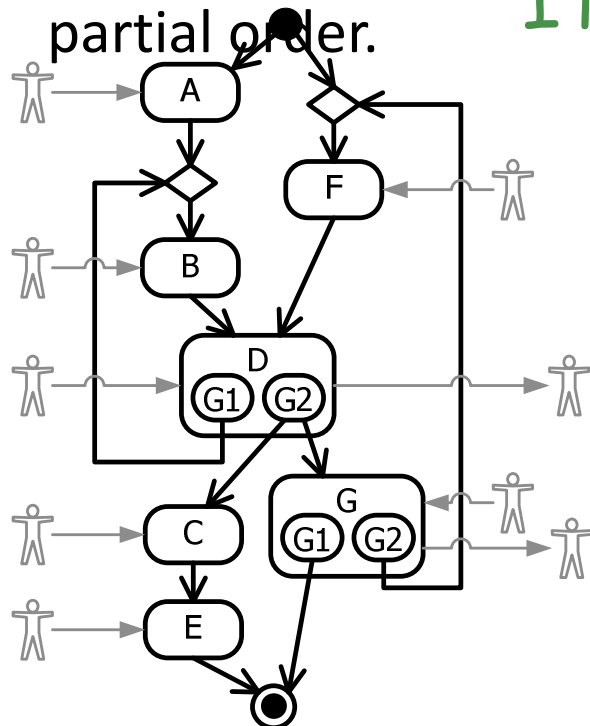
Now it's your turn...



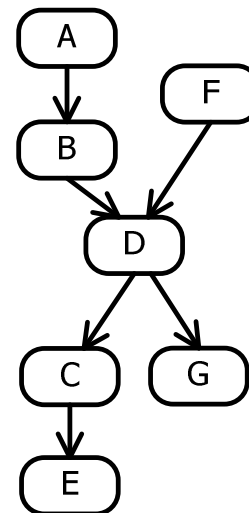


- **Sort** (order) the communicative events.
 - Remove any loopback precedence relationships from the extended communicative event diagram.
 - The diagram now defines a rooted directed tree → a partial order.
 - Obtain an ordered list of communicative events that fulfils the partial order.

I'll do a small example first



a) Initial communicative event diagram



b) Simplified diagram without loopbacks

A, B, F, D, C, E, G

A, F, B, D, C, E, G

F, A, B, D, C, E, G

A, B, F, D, C, G, E

A, F, B, D, C, G, E

F, A, B, D, C, G, E

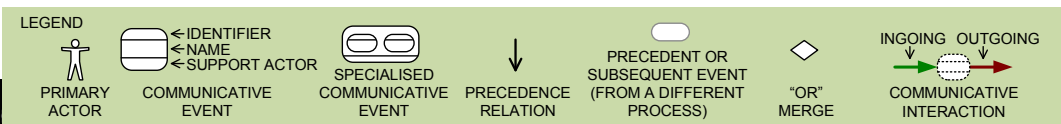
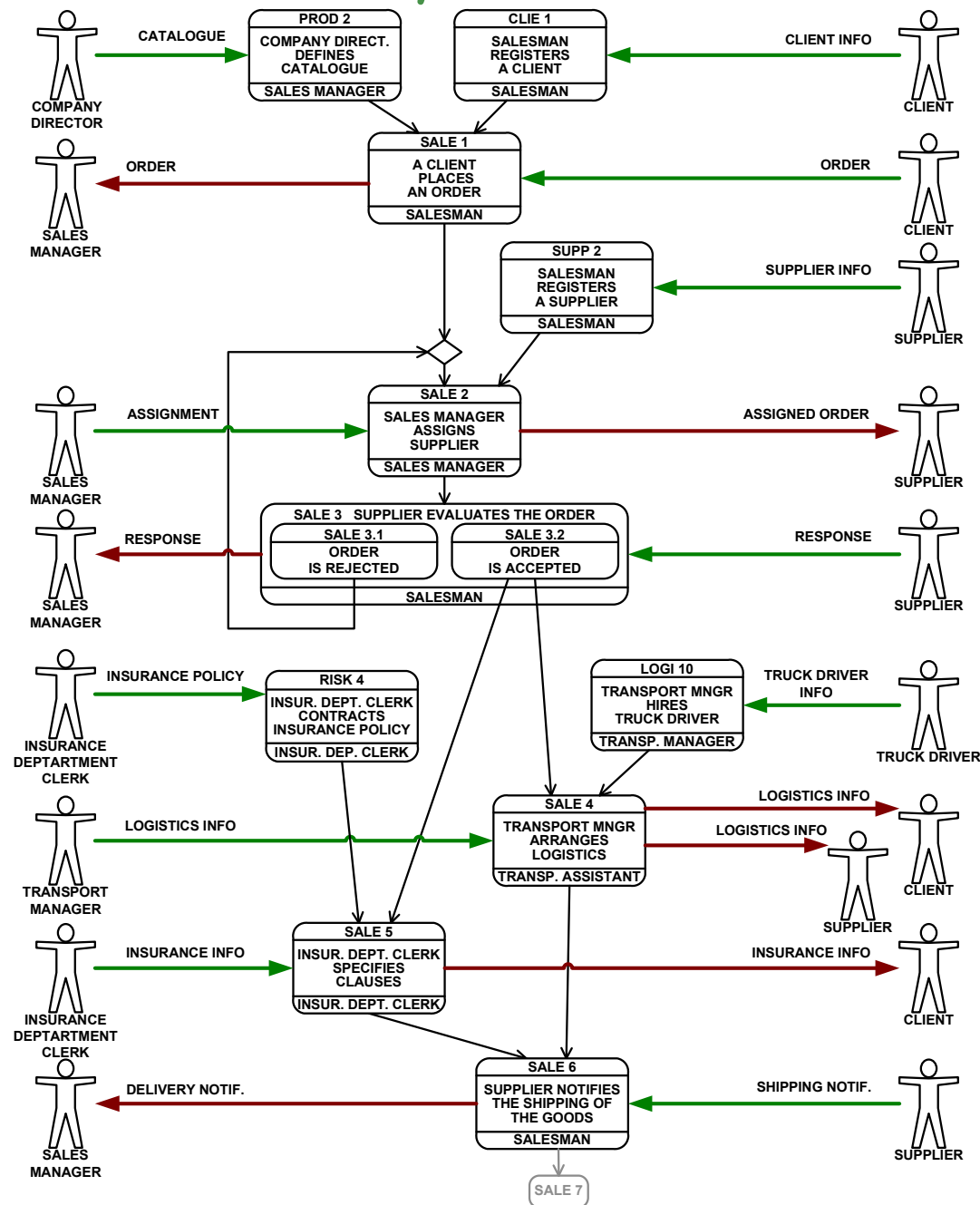
A, B, F, D, G, C, E

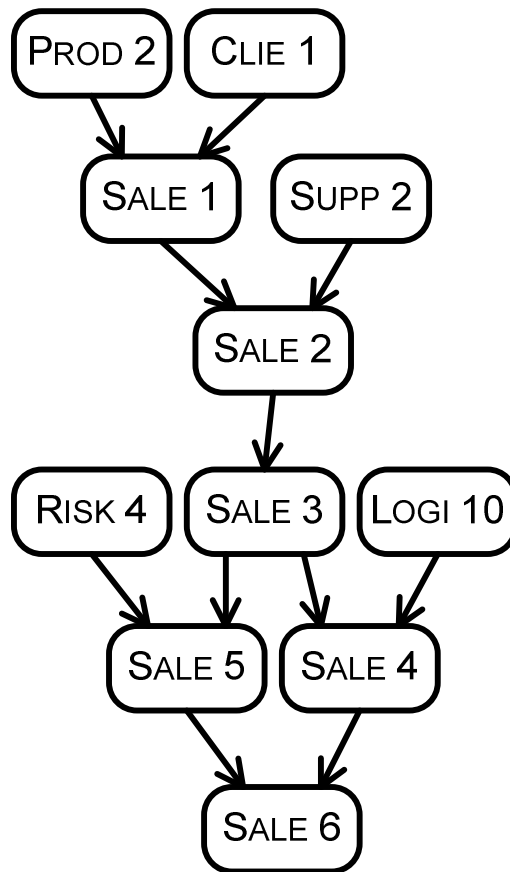
A, F, B, D, G, C, E

F, A, B, D, G, C, E

c) All possible solutions

Now it's your turn...

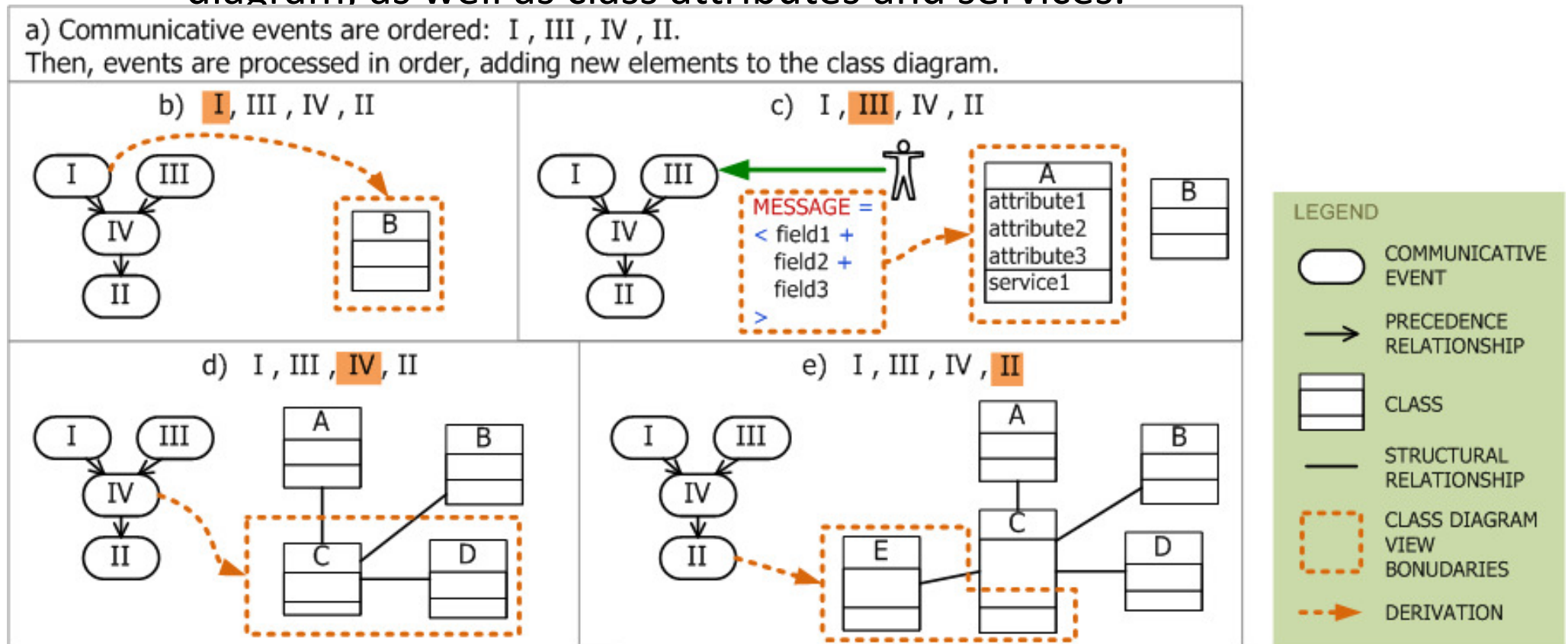




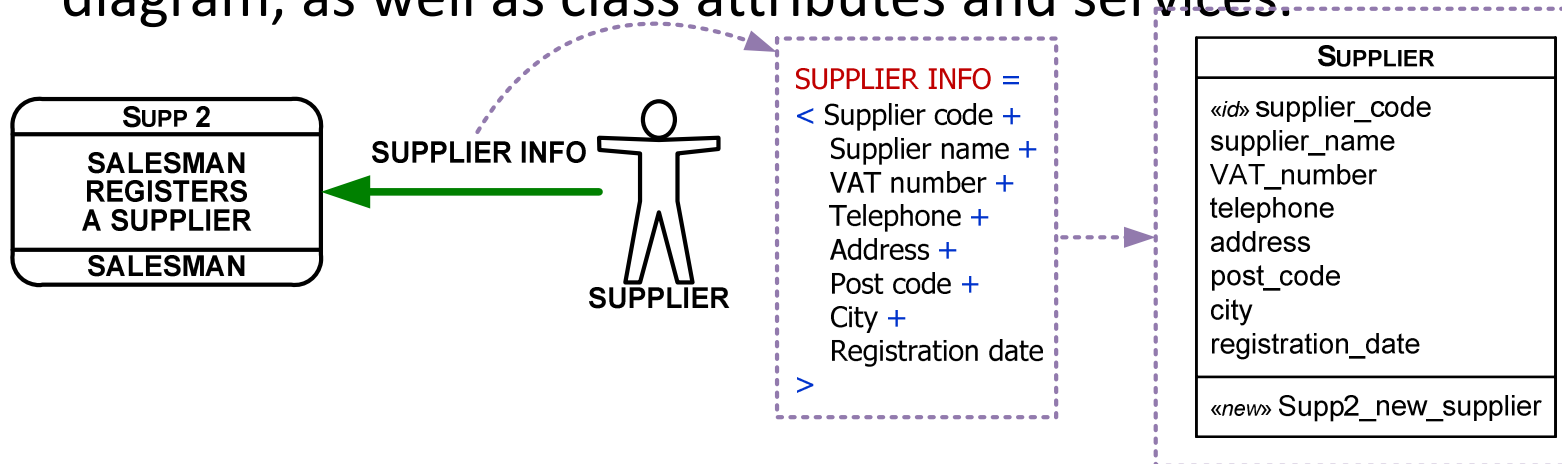
PROD 2, CLIE 1, SALE 1, SUPP 2, SALE 2, RISK 4, SALE 3, LOGI 10, SALE 5, SALE 4, SALE 6
 CLIE 1, PROD 2, SALE 1, SUPP 2, SALE 2, RISK 4, SALE 3, LOGI 10, SALE 5, SALE 4, SALE 6
 PROD 2, CLIE 1, SUPP 2, SALE 1, SALE 2, RISK 4, SALE 3, LOGI 10, SALE 5, SALE 4, SALE 6
 CLIE 1, PROD 2, SUPP 2, SALE 1, SALE 2, RISK 4, SALE 3, LOGI 10, SALE 5, SALE 4, SALE 6
 PROD 2, SUPP 2, CLIE 1, SALE 1, SALE 2, RISK 4, SALE 3, LOGI 10, SALE 5, SALE 4, SALE 6
 CLIE 1, SUPP 2, PROD 2, SALE 1, SALE 2, RISK 4, SALE 3, LOGI 10, SALE 5, SALE 4, SALE 6
 SUPP 2, PROD 2, CLIE 1, SALE 1, SALE 2, RISK 4, SALE 3, LOGI 10, SALE 5, SALE 4, SALE 6
 SUPP 2, CLIE 1, PROD 2, SALE 1, SALE 2, RISK 4, SALE 3, LOGI 10, SALE 5, SALE 4, SALE 6
 PROD 2, CLIE 1, SALE 1, SUPP 2, SALE 2, SALE 3, RISK 4, LOGI 10, SALE 5, SALE 4, SALE 6
 CLIE 1, PROD 2, SALE 1, SUPP 2, SALE 2, SALE 3, RISK 4, LOGI 10, SALE 5, SALE 4, SALE 6
 PROD 2, CLIE 1, SUPP 2, SALE 1, SALE 2, SALE 3, RISK 4, LOGI 10, SALE 5, SALE 4, SALE 6
 CLIE 1, PROD 2, SUPP 2, SALE 1, SALE 2, SALE 3, RISK 4, LOGI 10, SALE 5, SALE 4, SALE 6
 PROD 2, SUPP 2, CLIE 1, SALE 1, SALE 2, SALE 3, RISK 4, LOGI 10, SALE 5, SALE 4, SALE 6
 CLIE 1, SUPP 2, PROD 2, SALE 1, SALE 2, SALE 3, RISK 4, LOGI 10, SALE 5, SALE 4, SALE 6
 SUPP 2, PROD 2, CLIE 1, SALE 1, SALE 2, SALE 3, RISK 4, LOGI 10, SALE 5, SALE 4, SALE 6
 SUPP 2, CLIE 1, PROD 2, SALE 1, SALE 2, SALE 3, RISK 4, LOGI 10, SALE 5, SALE 4, SALE 6
 PROD 2, CLIE 1, SALE 1, SUPP 2, SALE 2, SALE 3, LOGI 10, RISK 4, SALE 5, SALE 4, SALE 6
 ...

SUPP 2, PROD 2, CLIE 1, SALE 1, SALE 2, SALE 3, LOGI 10, SALE 4, RISK 4, SALE 5, SALE 6

- **Process** the communicative events in order, one by one.
 - The event specification template is processed (especially the message structure) to obtain a class diagram view.
 - New classes and structural relationships are added to the class diagram, as well as class attributes and services.



- **Process** the communicative events in order, one by one.
 - The event specification template is processed (especially the message structure) to obtain a class diagram view.
 - New classes and structural relationships are added to the class diagram, as well as class attributes and services.



Attribute name	Id	Attribute type	Data type	Size	Requested	Null allowed
supplier_code	yes	Constant	Autonumeric		yes	no
supplier_name	no	Variable	String	120	yes	no
VAT_number	no	Variable	Nat		yes	no
telephone	no	Variable	String	12	yes	yes
address	no	Variable	String	300	yes	yes
post_code	no	Variable	String	12	yes	yes
city	no	Variable	String	100	yes	yes
registration_date	no	Variable	Date		yes	yes

Class

Attributes Derivations [Attribute value expressions] Services Transactions Constraints Agents Relationships General

Attributes

Name	Attribute type	Data type	Id	Size	Default v...	Request ...	Nulls	
supplier_code	Constant	Autonumeric	Yes			Yes	No	
supplier_name	Variable	String	No	120		Yes	No	
VAT_number	Variable	Nat	No			Yes	No	
telephone	Variable	String	No	12		Yes	Yes	
address	Variable	String	No	300		Yes	Yes	
post_code	Variable	String	No	12		Yes	Yes	
city	Variable	String	No	100		Yes	Yes	
registration_date	Variable	Date	No			Yes	Yes	

Name: Attribute type:

Alias: Data type:

Help Message

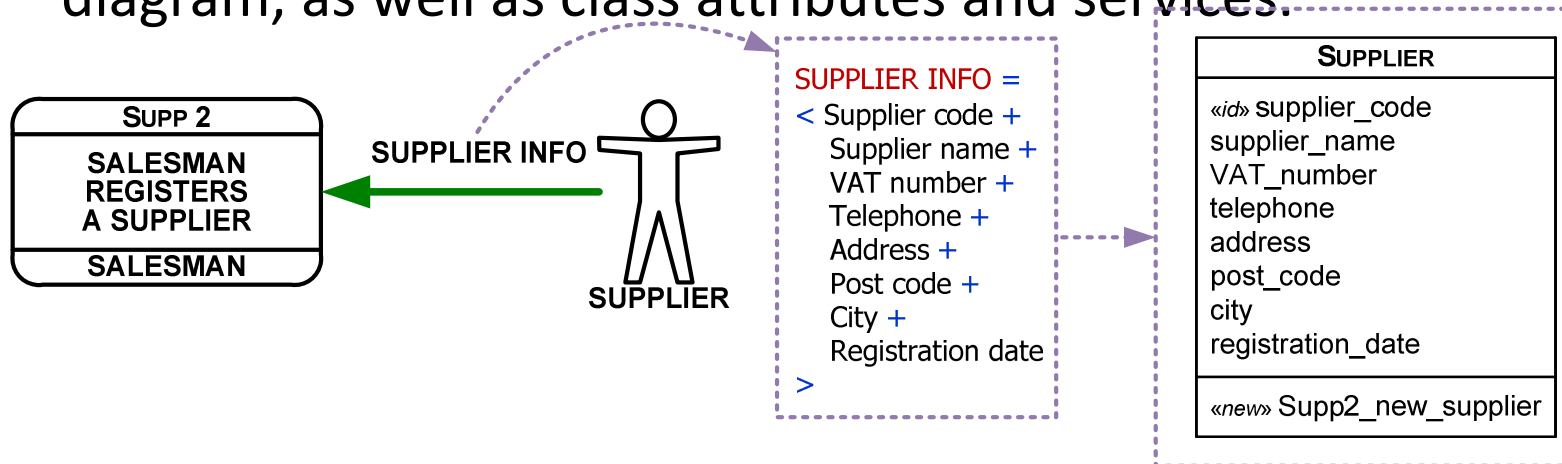
Comments

Class: Supplier

OK

Cancel

- **Process** the communicative events in order, one by one.
 - The event specification template is processed (especially the message structure) to obtain a class diagram view.
 - New classes and structural relationships are added to the class diagram, as well as class attributes and services.



Argument name	Data type	Size	Null allowed
p_atrsupplier_code	Autonumeric		no
p_atrsupplier_name	String	120	no
p_atrVAT_number	Nat		no
p_atrtelephone	String	12	yes
p_atraddress	String	300	yes
p_atrpost_code	String	12	yes
p_atrcity	String	100	yes
p_atrregistration_date	Date		yes

Class

Attributes Derivations [Value expressions] **Services** Transactions Constraints Agents Relationships Alternate Id. General

Events & Transactions

Services:

Name	Features
 Supp2_new_supplier	New

- ☒ Event
☐ Transaction
☐ Operation

- ☒ New ☐ Internal use
☐ Destroy

Name:
 Alias:
 Help message:
 Comments:

Inbound Arg. Outbound Arg.

Name	Data type
 p_atrsupplier_code	Autonumeric
 p_atrsupplier_name	String
 p_atrVAT_number	Nat
 p_atrtelephone	String
 p_atraddress	String
 p_atrpost_code	String
 p_atrcity	String
 p_atrregistration_date	Date

Name:
 Data type:
 Alias:
 Default value:
 Help message:
 Comments:

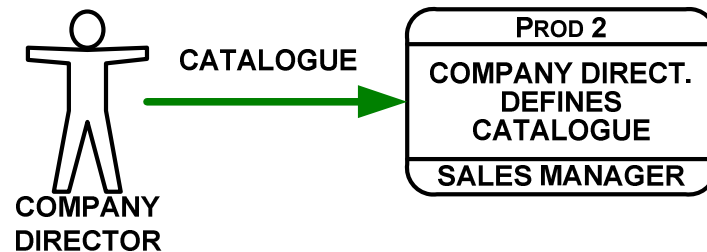
Class:

Aceptar

Cancelar

- **Process** the communicative events in order, one by one.
 - The event specification template is processed (especially the message structure) to obtain a class diagram view.
 - New classes and structural relationships are added to the class diagram, as well as class attributes and services.

Your turn...

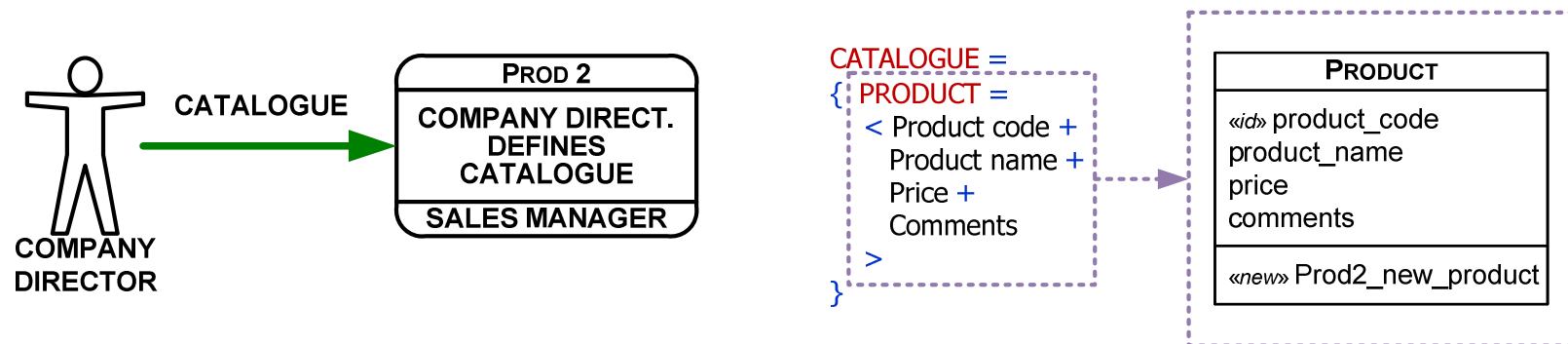


```

CATALOGUE =
{ PRODUCT =
  < Product code +
  Product name +
  Price +
  Comments
  >
}
    
```

- **Process** the communicative events in order, one by one.
 - The event specification template is processed (especially the message structure) to obtain a class diagram view.
 - New classes and structural relationships are added to the class diagram, as well as class attributes and services.

Your turn...



Class

Attributes Derivations [Attribute value expressions] Services Transactions Constraints Agents Relationships General

Attributes

Name	Attribute type	Data type	Id	Size	Default v...	Request ...	Nulls	
◆ product_code	Constant	Autonumeric	Yes			Yes	No	
◆ product_name	Variable	String	No	300		Yes	Yes	
◆ price	Variable	Real	No			Yes	Yes	
◆ comments	Variable	String	No	300		Yes	Yes	

Name: Attribute type:

Alias: Data type:

Help Message

Comments

Class: Product

OK

Cancel

Class

Attributes

Derivations

Value expressions

Services

Transactions

Constraints

Agents

Relationships

Alternate Id.

General

Events & Transactions

Services:

Name	Features
Prod2_new_product	New

☒ Event

☐ Transaction

☐ Operation

☒ New

☐ Destroy

☐ Internal use

Name: Prod2_new_product

Alias:

Help message:

Comments:

Inbound Arg.

Outbound Arg.

Name	Data type
p_atrproduct_code	Autonumeric
p_atrproduct_name	String
p_atrprice	Real
p_atrcomments	String

Name:

Data type:

Alias :

Default value :

Help message:

Comments:

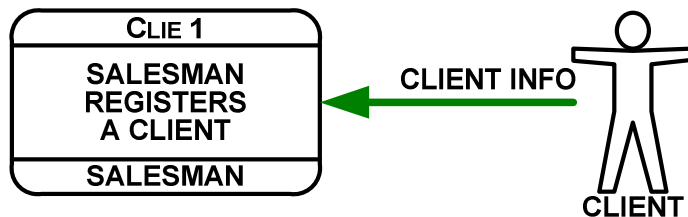
☐ Null

Class: Product

Aceptar

Cancelar

- Process the communicative events in order, one by one.
Your turn again...



CLIENT INFO =

< VAT number +
Client name +
Telephone +
Registration date +

ADDRESSES =

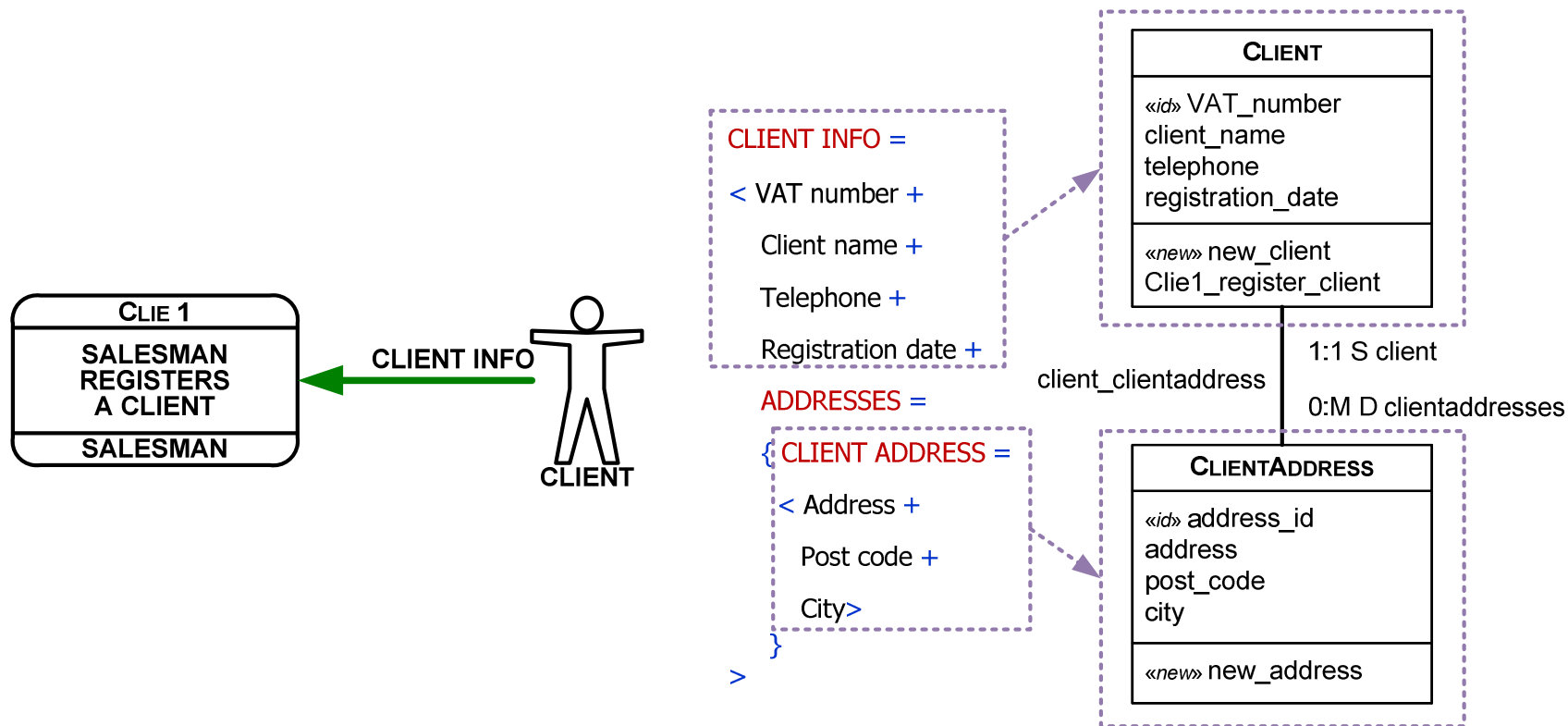
{ CLIENT ADDRESS =

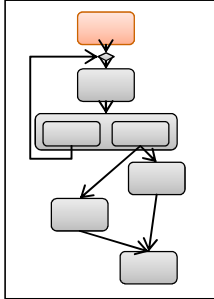
< Address +
Post code +
City>

}

>

- Process the communicative events in order, one by one.
Your turn again...





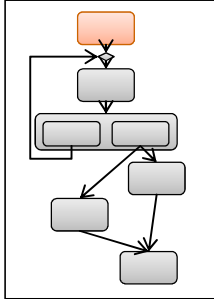
Integration with the OO-Method



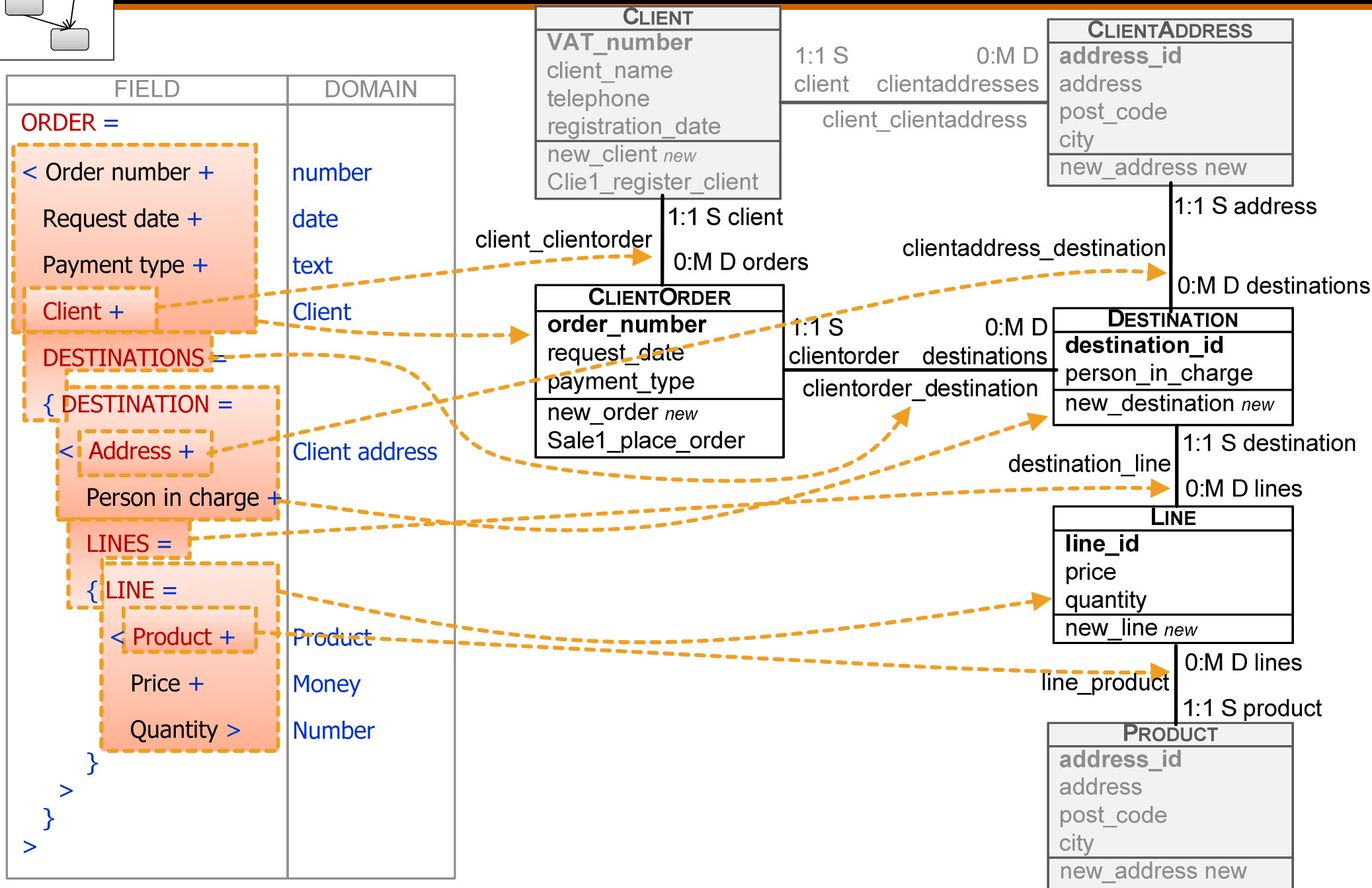
UNIVERSIDAD
POLITECNICA
DE VALENCIA

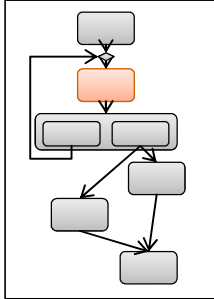
Your turn again...

FIELD	DOMAIN
ORDER =	
< Order number +	number
Request date +	date
Payment type +	text
Client +	Client
DESTINATIONS =	
{ DESTINATION =	
< Address +	Client address
Person in charge +	
LINES =	
{ LINE =	
< Product +	Product
Price +	Money
Quantity >	Number
}	
>	



Integration with the OO-Method





Integration with the OO-Method

FIELD	DOMAIN
ASSIGNMENT=	
< Order +	
Assignment date+	date
Supplier+	
>	

SUPPLIER
supplier_code
supplier_name
VAT_number
telephone
address
post_code
city
registration_date
Supp2_new_supplier <i>new</i>
ins_supplier <i>shared int</i>
del_supplier <i>shared int</i>

CLIENT
VAT_number
client_name
telephone
registration_date
new_client <i>new</i>
Clie1_register_client

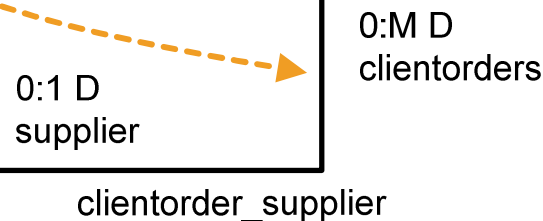
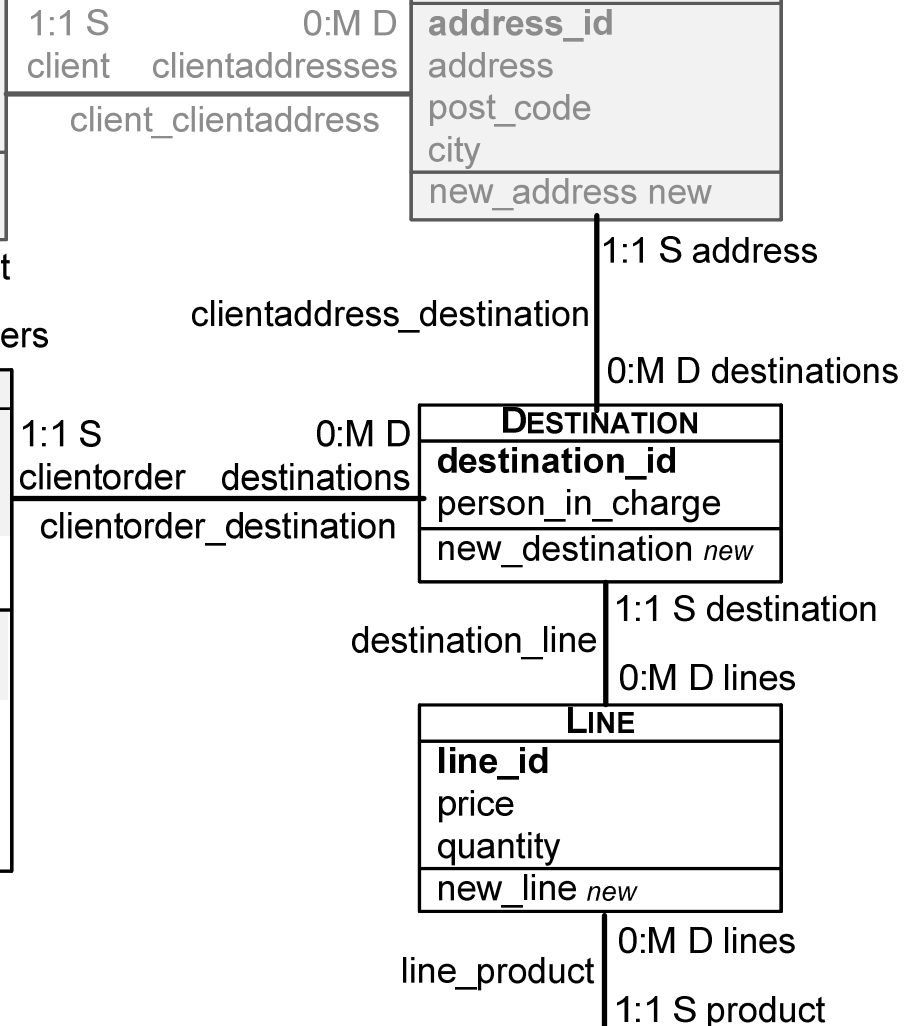
CLIENTORDER
order_number
request_date
payment_type
assignment_date
new_order <i>new</i>
Sale1_place_order
set_assignment_date <i>int</i>
ins_supplier <i>shared int</i>
del_supplier <i>shared int</i>
SALE2_ASSIGN_SUPPLIER

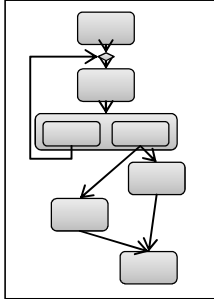
CLIENTADDRESS
address_id
address
post_code
city
new_address <i>new</i>

DESTINATION
destination_id
person_in_charge
new_destination <i>new</i>

LINE
line_id
price
quantity
new_line <i>new</i>

PRODUCT
address_id
address
post_code
city
new_address <i>new</i>

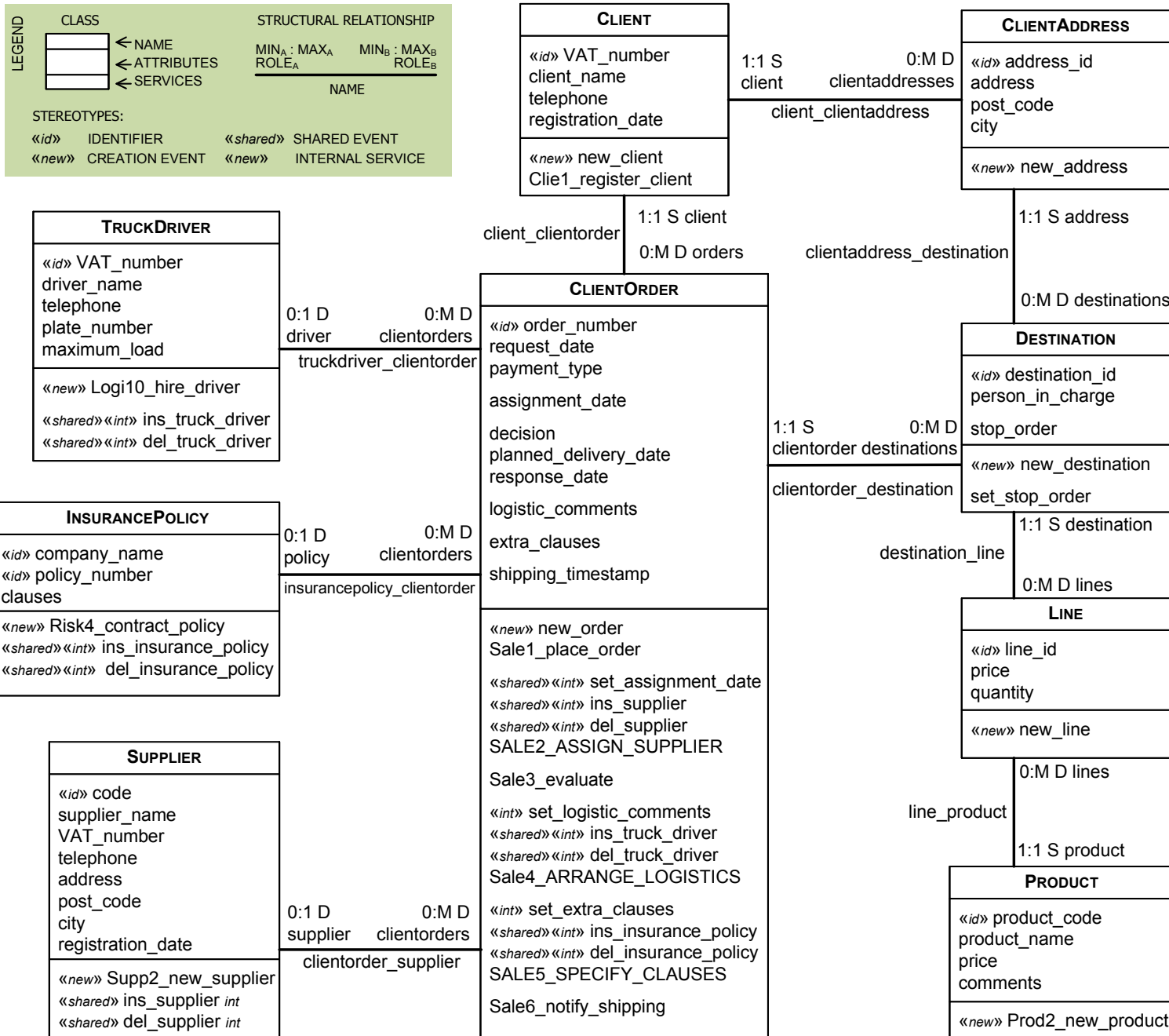


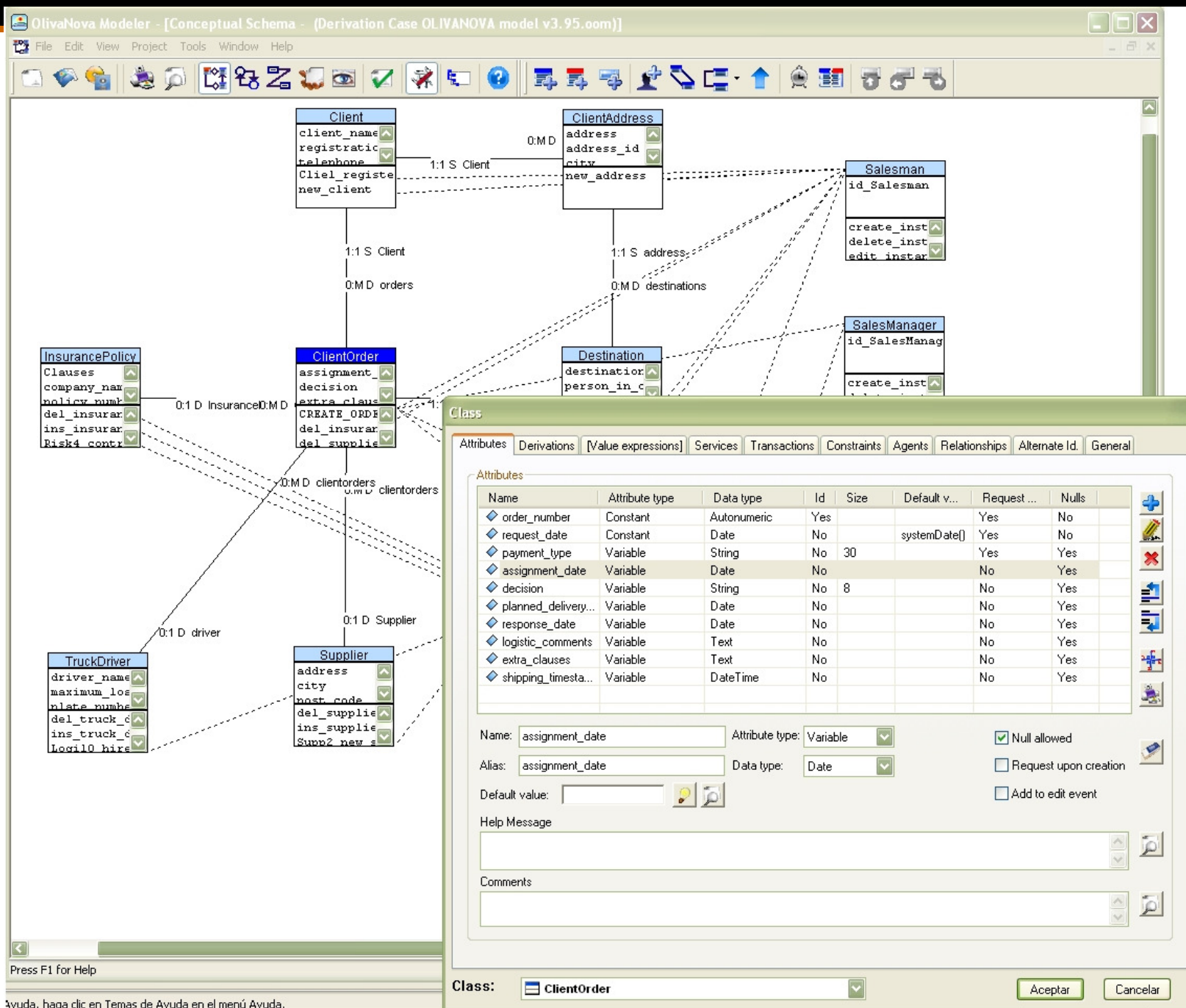


Integration with the OO-Method



UNIVERSIDAD
POLITECNICA
DE VALENCIA





ClientOrder 10352

Name	Value
Order number	10352
Request date	8/31/2009
Payment type	Cash
Planned delivery date	
VAT number	56746163
Client name	John Papiro Jr.
Client telephone	030 81 48 31
Supplier code	1
Supplier name	Office Rapid Ltd.
Supplier address	Brandenburguen street, 46
Total	1,587.4

Destination Client Supplier TruckDriver InsurancePolicy

Address	Person in charge
Bld. Blue mountain, 35-14	Brayden Hitchcock
Greenhouse street, 23	Luke Padbury

2/2

#	Code	Product name	Price	Q	Amount
1	39455	Rounded scissors (cebra) b...	25.4	35	889.00
2	65399	Staples cooper 26-22 blister...	5.6	60	336.00
3	4799	Stereofam cups box-50 (pac...	18.75	10	187.50

3/3

Close

ClientOrder - Windows Internet Explorer

http://localhost/SuperStationary/InteractionToolkit/ClientOrder/IU

CLIENTSUPERSTATIONARY

Client Address ClientOrder Destination InsurancePolicy Line Product Supplier TruckDriver

CLIENTORDER

CLIENTORDER

ClientOrder 10352

Order number	10352
Request date	8/31/2009
Payment type	Cash
Planned delivery date	
VAT number	56746163-R
Client name	John Papiro Jr.
Client telephone	030 81 48 31
Supplier code	1
Supplier name	Office Rapid Ltd
Supplier address	Brandenburguen street, 46
Total	1,587.40

DESTINATION

DESTINATION

Elements per page 40

Address	Person in charge
☒ Bld. Blue mountain, 35-14 A	Brayden Hitchcock
☐ Greenhouse street, 23	Luke Padbury

1,2/2 elements

LINE

Elements per page 40

#	Code	Product name	Price	Q	Amount
☐ 1	39455	Rounded scissors (cebra) box-100	25.40	35	889.00
☐ 2	65399	Staples cooper 26-22 blister 500	5.60	60	336.00
☐ 3	4799	Stereofam cups box-50 (pack 120)	18.75	10	187.50

1,3/3 elements

Close

Listo Intranet local | Modo protegido: desactivado 100%



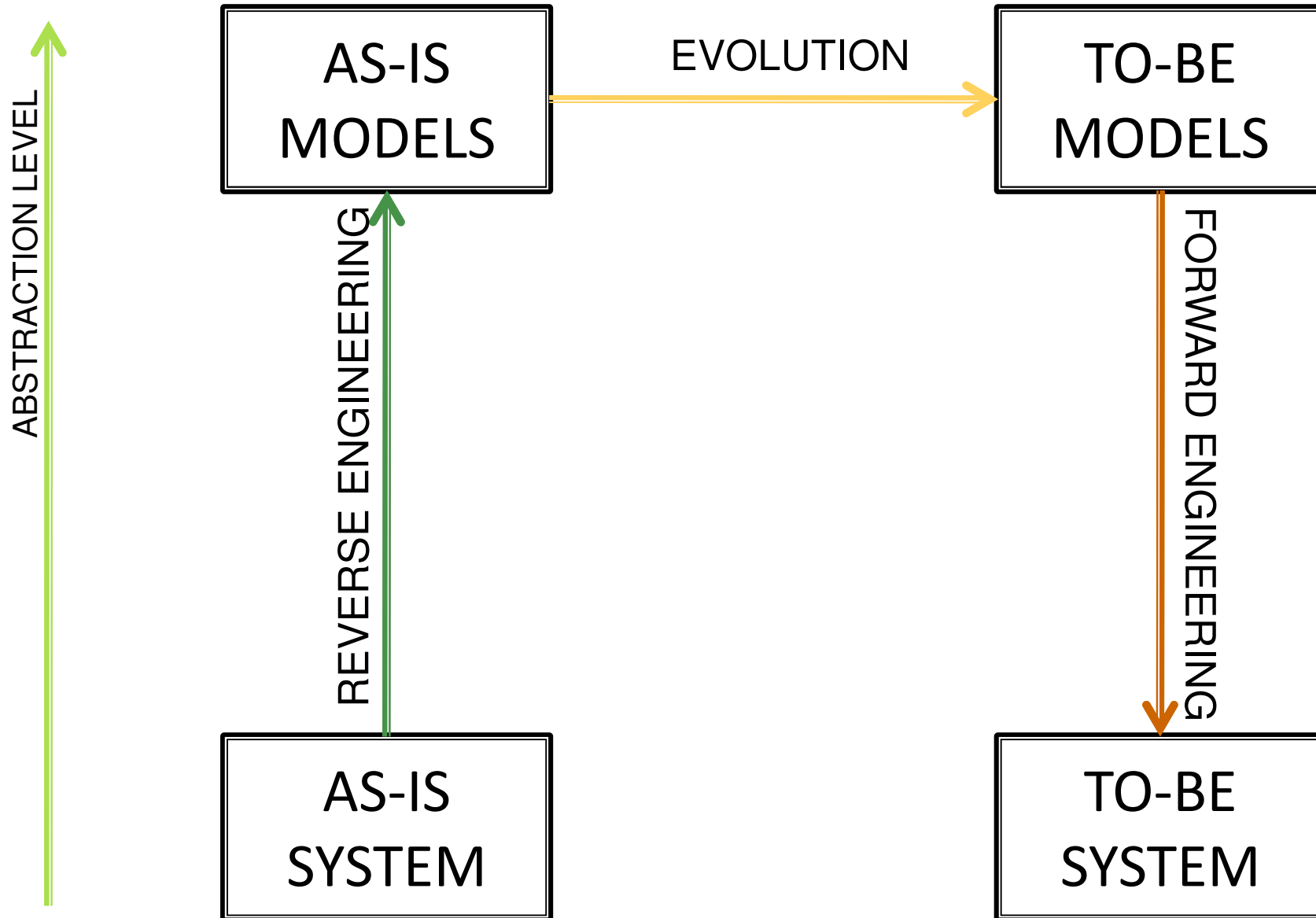
Centro de Investigación
en Métodos de
Producción de Software

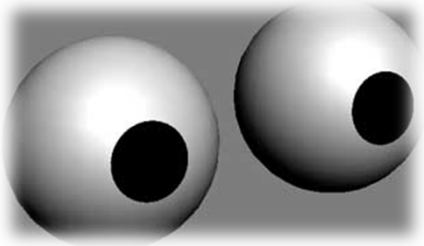
A model-driven framework to support organisational evolution

Óscar Pastor, Sergio España, Marcela Ruiz



UNIVERSIDAD
POLITECNICA
DE VALENCIA

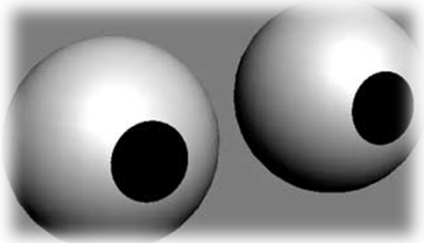




Communicative
Process
Behavioural
Goal
Interaction

Production of alternatives

Adoption of innovative practices

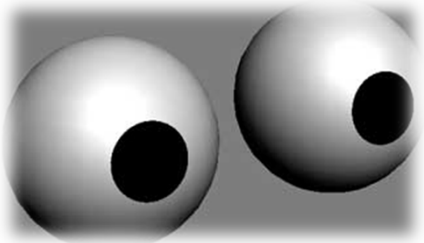


Communicative

Which organisational
communications occur
between the organisation and
users

Production of alternatives

Adoption of innovative practices

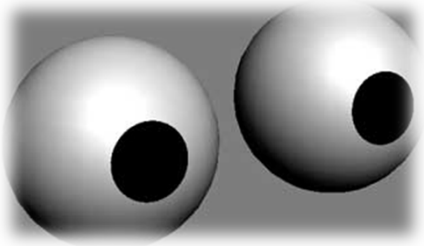


Process

Which is the flow of control of the business services, which activities are undertaken, etc.

Production of alternatives

Adoption of innovative practices

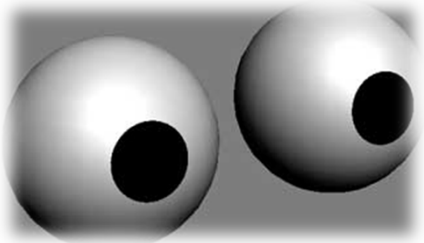


Behavioural

How fast, reliable, secure,
safe, etc., is the produced
system

Production of alternatives

Adoption of innovative practices

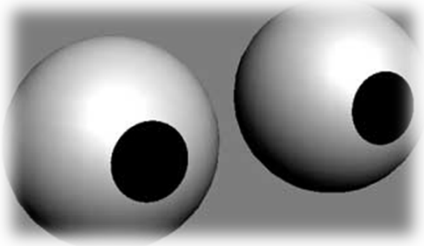


Goal

Why decisions are taken,
where do they come from,
which alternatives have been
considered

Production of alternatives

Adoption of innovative practices



Interaction

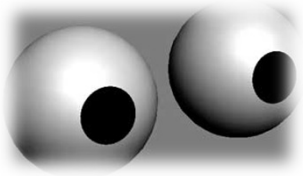
Which are the interactions
among the system and its
users, when do they take
place

Production of alternatives

Adoption of innovative practices

OO-Method
Behavioural Perspective
Model Execution Model-driven Development Traceability Support
Communication Perspective Computational/Independent Model Interaction Perspective
Information System Analysis High Level Of Abstraction Communication Analysis
Macromodelling Techniques i-Star Models Process Of Process Modelling Process Perspective
Platform Specific Model Code Generation Techniques Model 2 Text Transformation
Business Process Modelling Metamodeling Techniques Rationale Perspective
Transformation Engine Platform/Independent Model Model-driven Tools
Model-driven Architecture
Goal Perspective Model 2 Model Transformation

We are aiming at *providing a reengineering framework that gets the most out of the existing proposals in **MDD**, in order to support organisational improvement and information system **evolution***

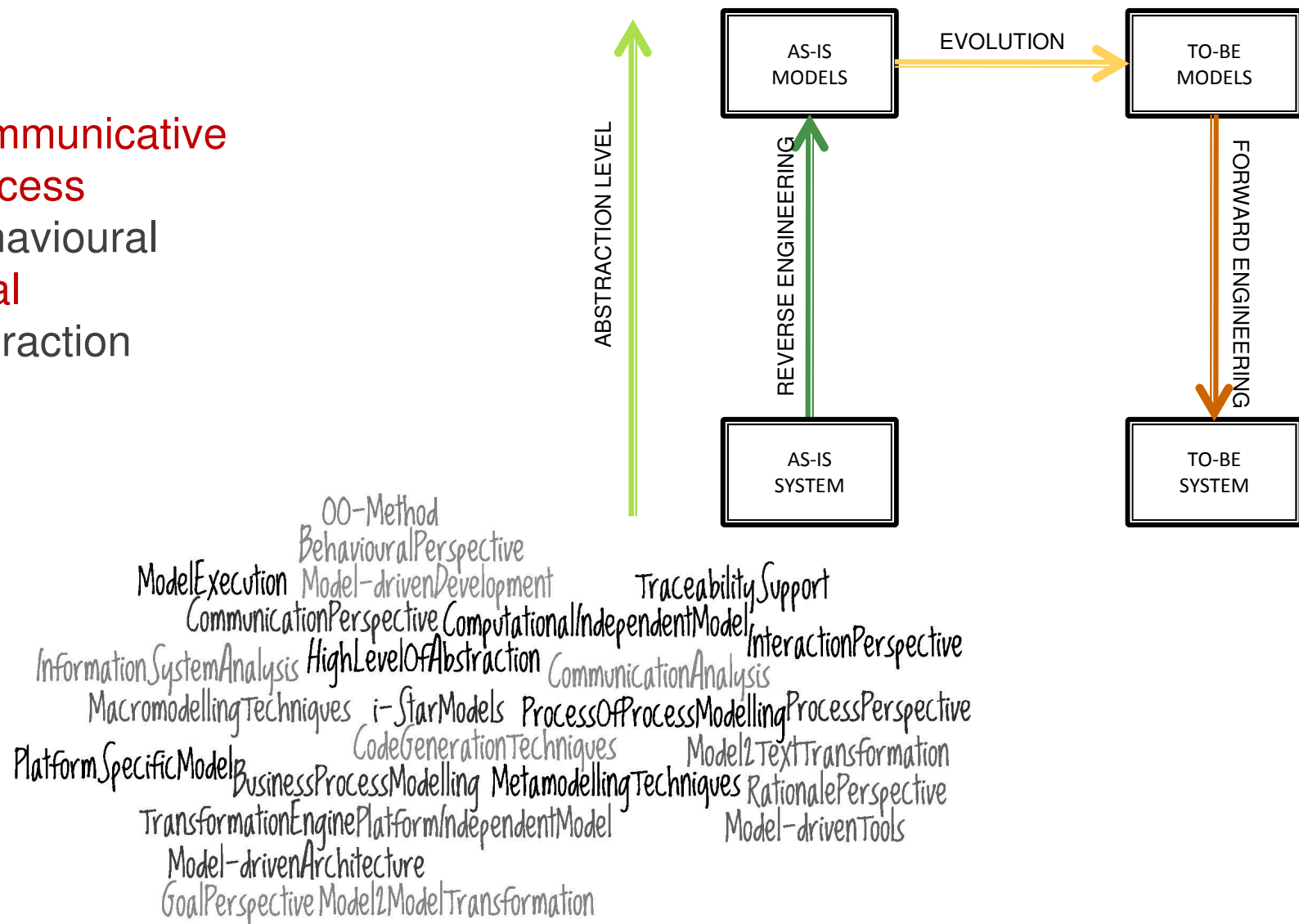


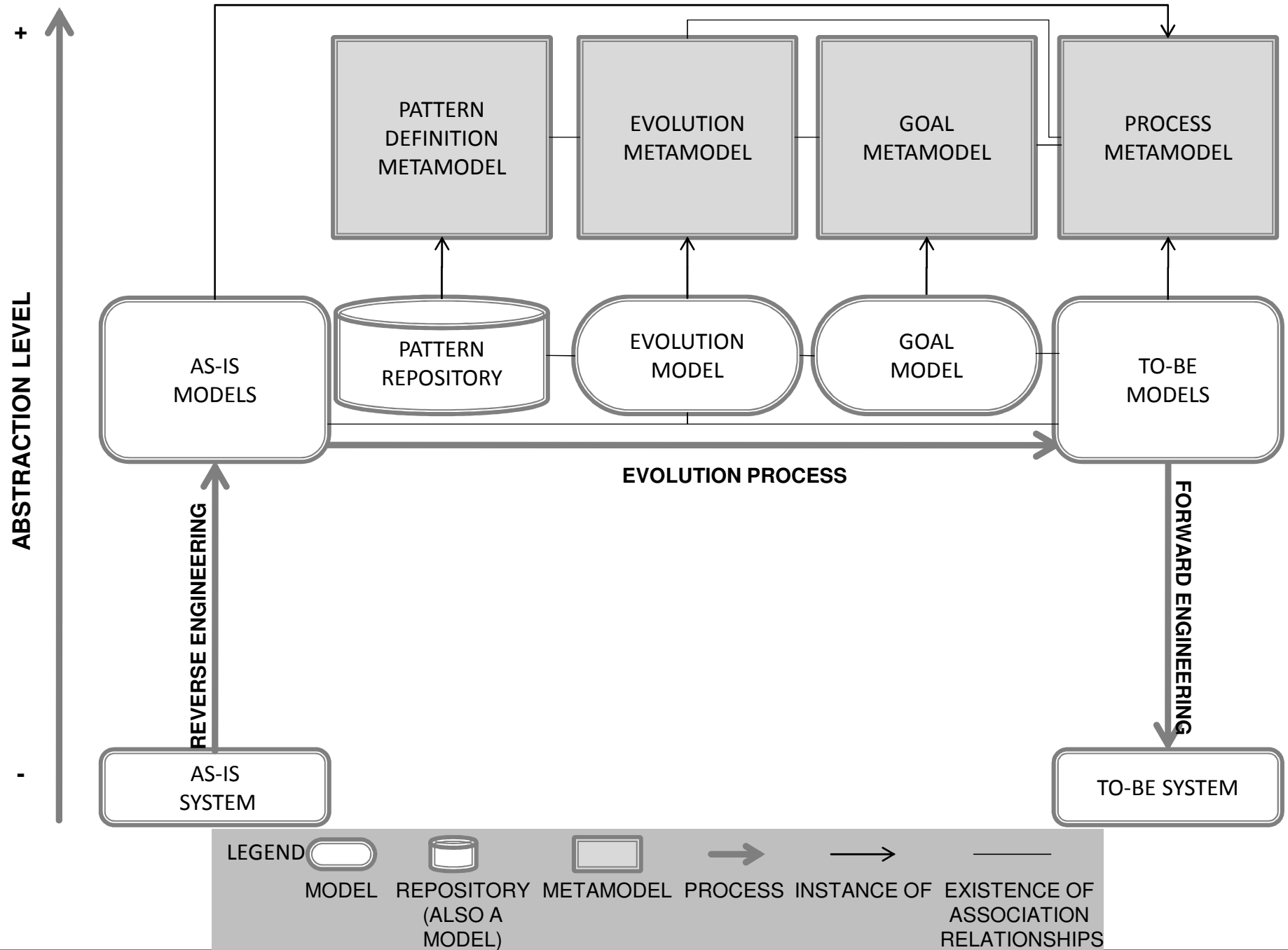
Communicative
Process

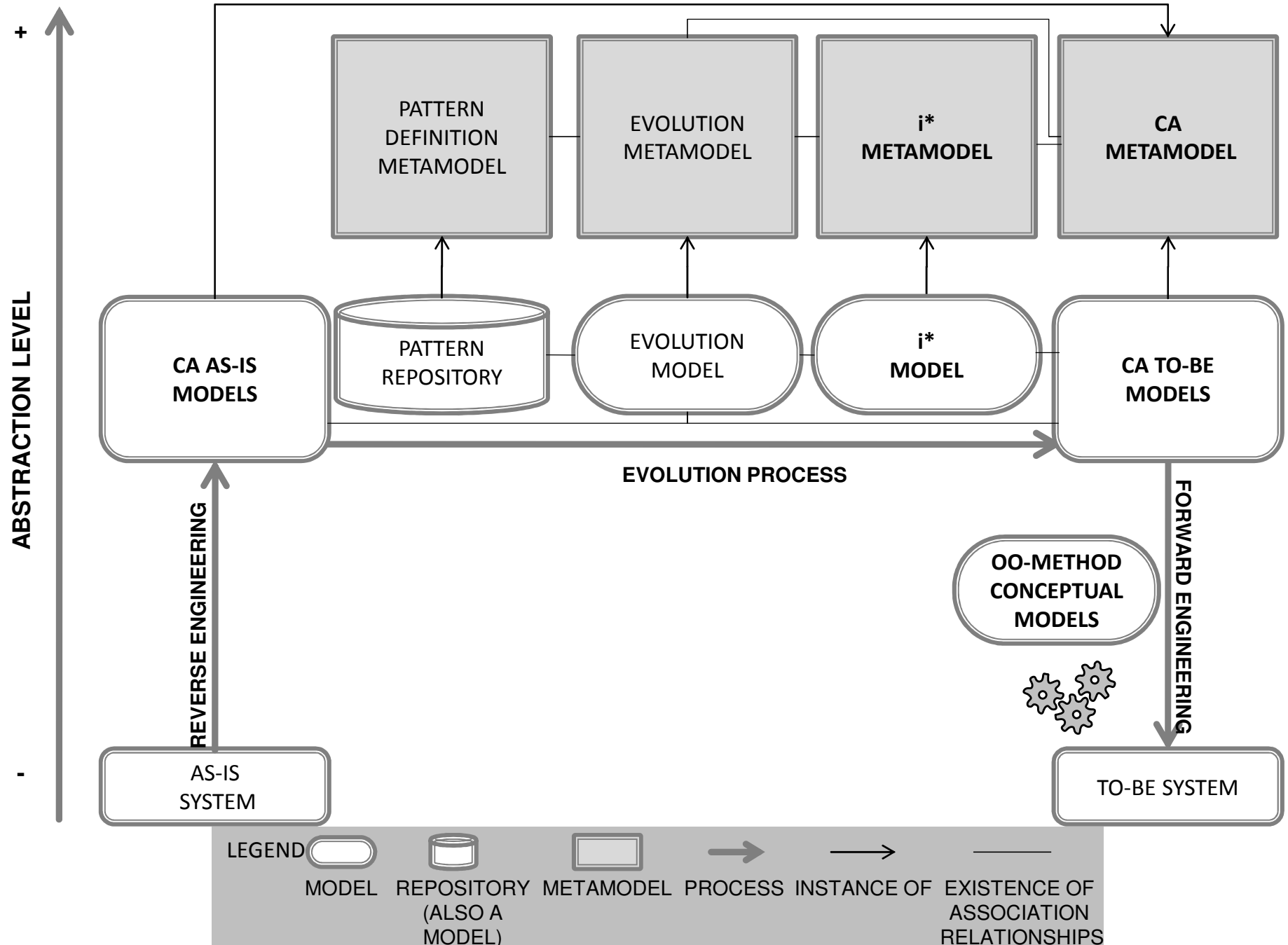
Behavioural

Goal

Interaction









Centro de Investigación
en Métodos de
Producción de Software

Thanks for your attention

Óscar Pastor



UNIVERSIDAD
POLITECNICA
DE VALENCIA



Centro de Investigación en Métodos de Producción de Software (ProS)
Universidad Politécnica de Valencia
Camino de Vera s/n, 46071 Valencia, España (Spain)
opastor@pros.upv.es
Phone: +34 96 387 7000, Fax: +34 96 3877359