A Mediation Information System to help to coordinate the response of a crisis

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Interoperabilité des Systèmes en situation de Crise

Agenda

- Project scope
- Mediation based approach of interoperability solutions as a generic framework
- Mediation Information System Engineering (MISE) for crisis management
- MIS Engineering versus MISE RE-engineering

Project scope

A crisis is a unwanted critical phenomena characterized

by an abnormal situation, the effects of which have to be mitigated.

Let us consider here the transient organization in charge of crisis management

Project scope :Interoperability is required !!

A crisis cell is a decision making center.

Cell efficiency is based on information quality and supported by communication resources

But both crisis cell composition and/or partner's missions could be changed *wrt* time

The crisis cell must perform optimally in a unstable, uncertain and critical environment

It should be considered as an open collaborative organization where partners may enter, leave, and interact seamlessly

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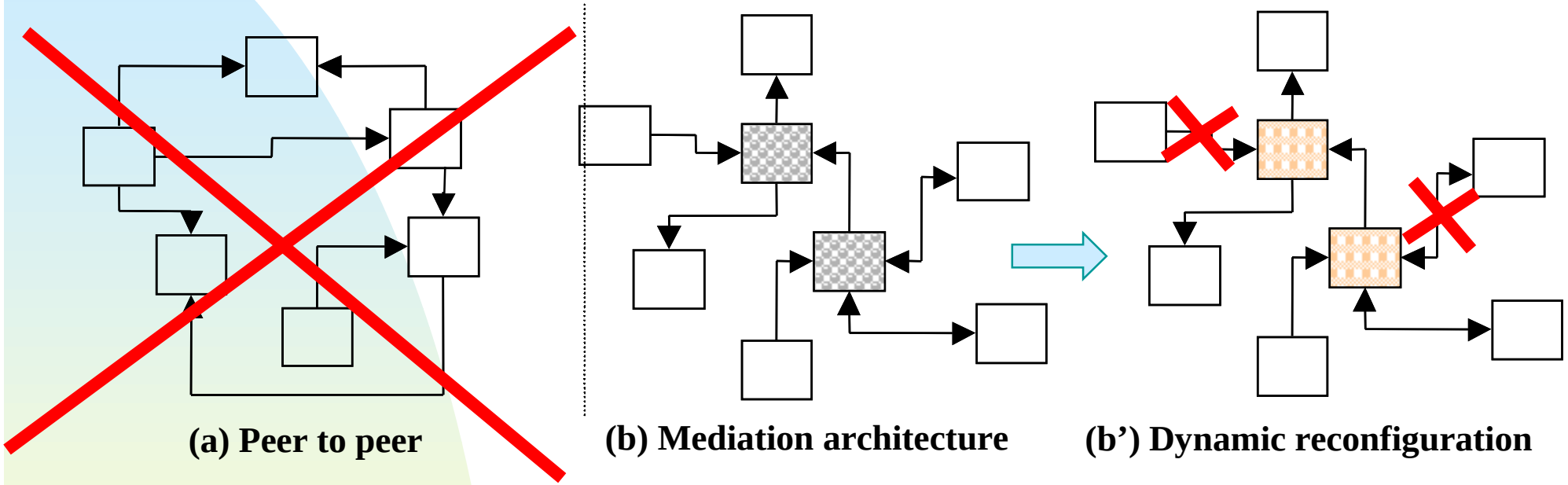
Mediation based approach : a simple system perspective



(a) Peer to peer **(b) Mediation architecture** **(b') Dynamic reconfiguration**

Partner information system

Information exchange

Mediation tool as a non functional utility : a facilitator for interoperability purpose

Reconfigured mediation tool for business continuity

A very efficient solution to promote system flexibility and agility

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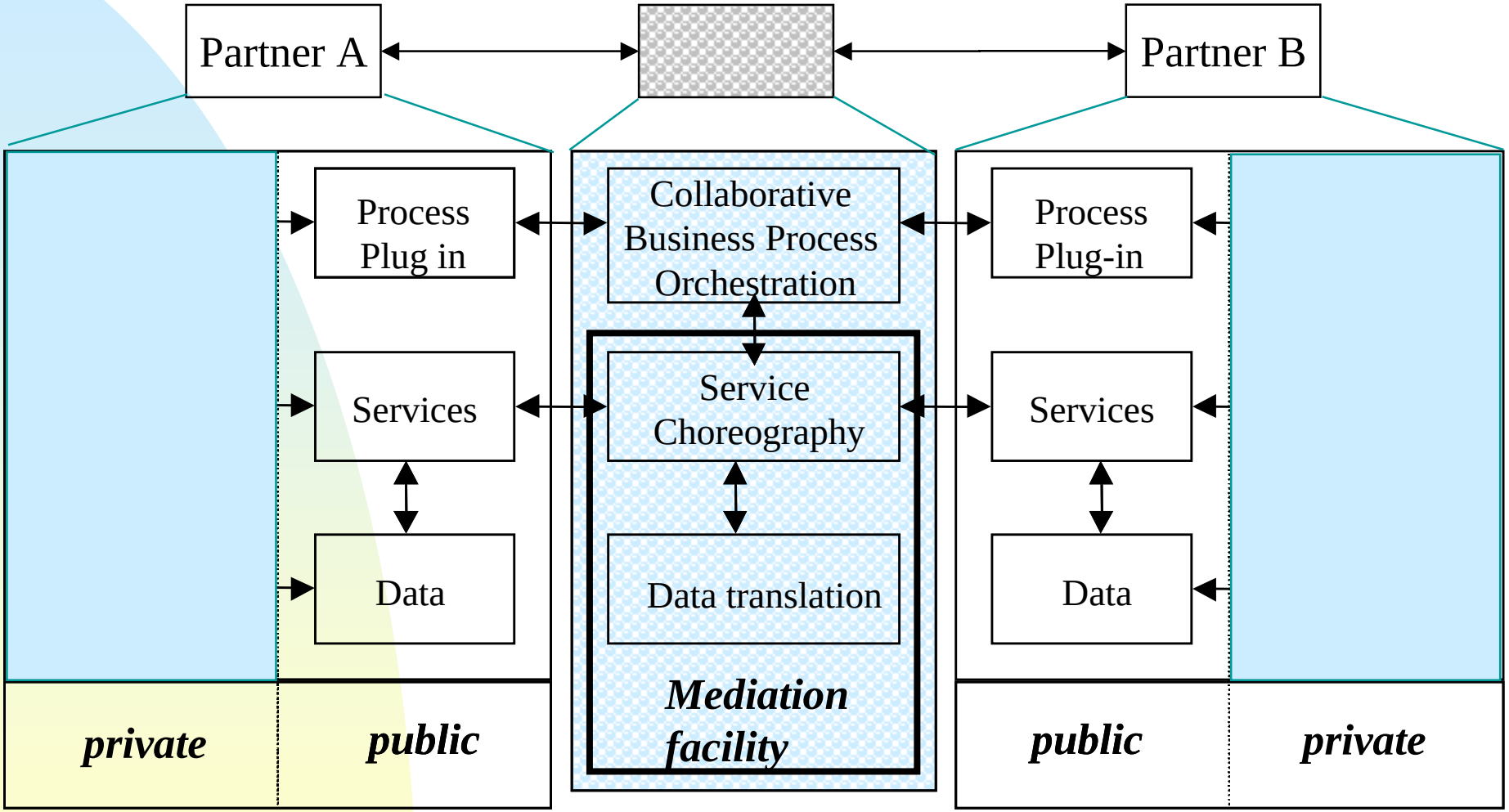
Structural representation of a Mediation Based Solution



Predefined knowledge - To be engineered - Predefined Knowledge

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Mediation Information System Engineering (MISE) applied to crisis management (1)

A first phase of the engineering process must fulfill the following three requirements in order to begin system design and configuration

1- How to define specific features of a given crisis ?

2- How to specify a mitigation of crisis effects ?

Which actors shall be involved ? To do what ?

3- How to control the activities of partners and provide coordination means ?

4- How to react to evolutions ?

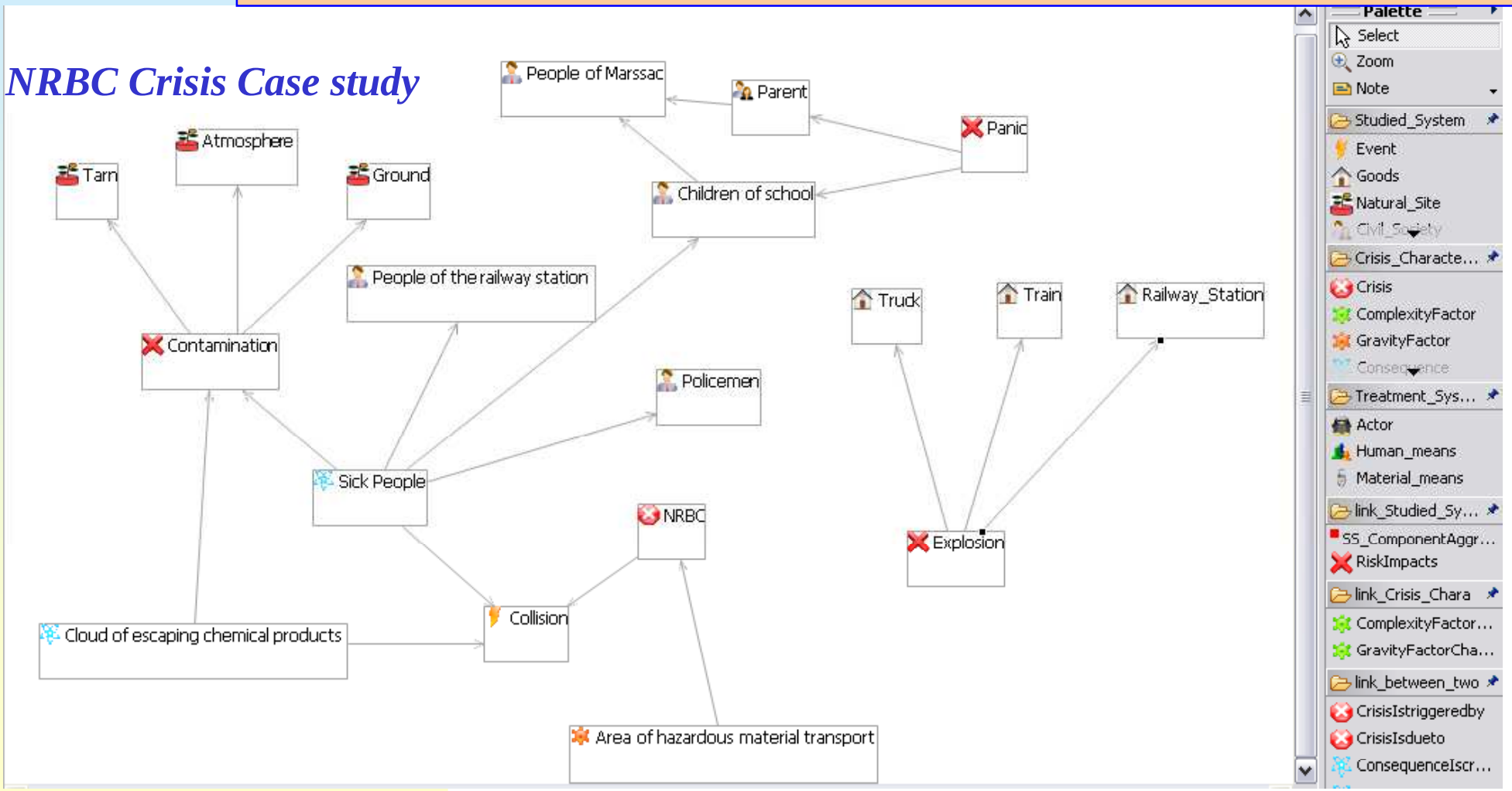
MISE is based on very specific Model Driven Architecture principles (MDA)

1- How to define specific features of a given crisis ?

A Domain Specific Language (DSL) for crisis characterization

Truptil S, Bénaben F, Couget P, Lauras M, Chapurlat V, Pingaud H (2008) Interoperability of Information Systems in Crisis Management: Crisis Modeling and Metamodeling. IESA'08, BerlinGermany.

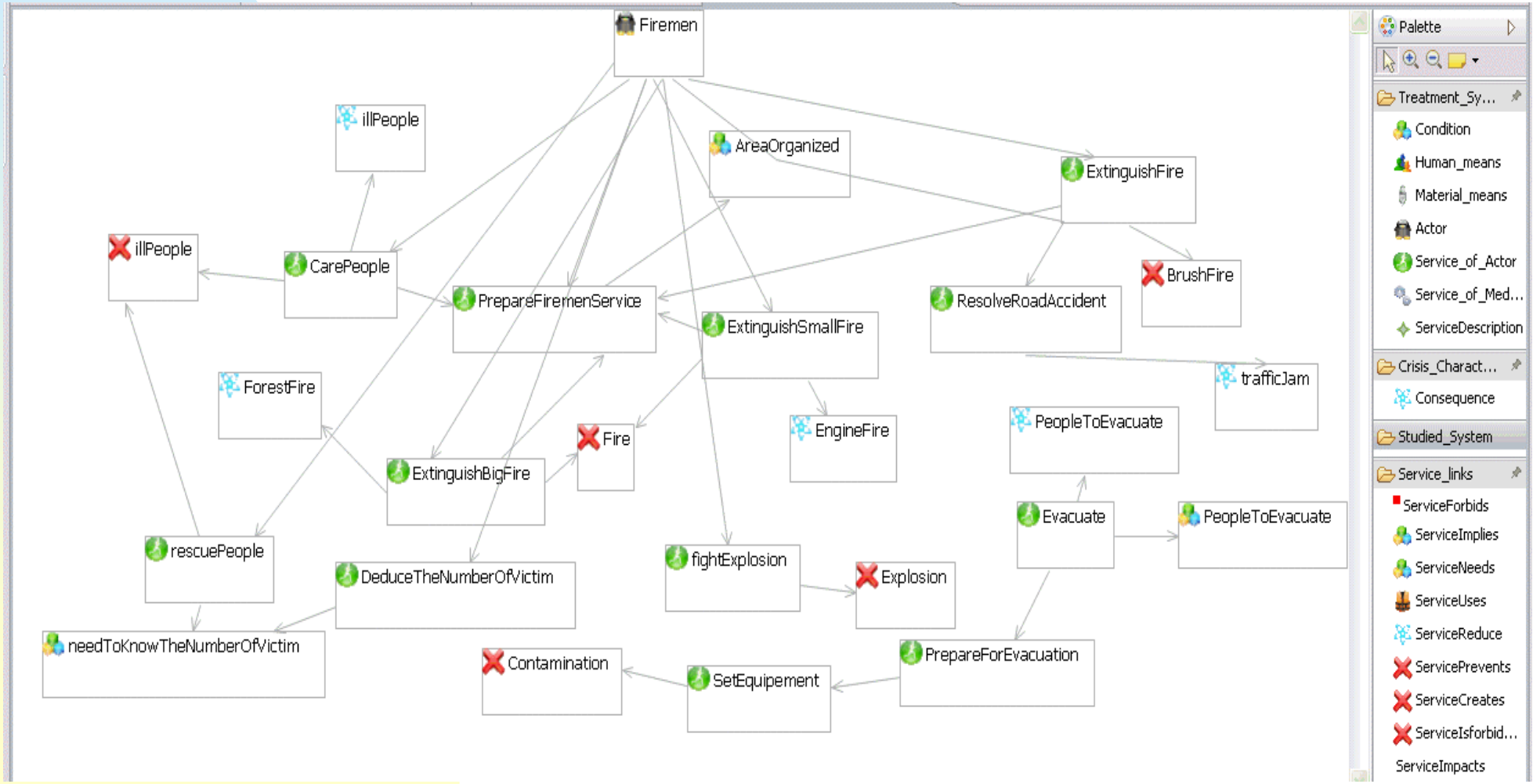
NRBC Crisis Case study



2- How to specify a mitigation of crisis effects ? Which actors shall be involved ? To do what ?

Knowledge about actor abilities

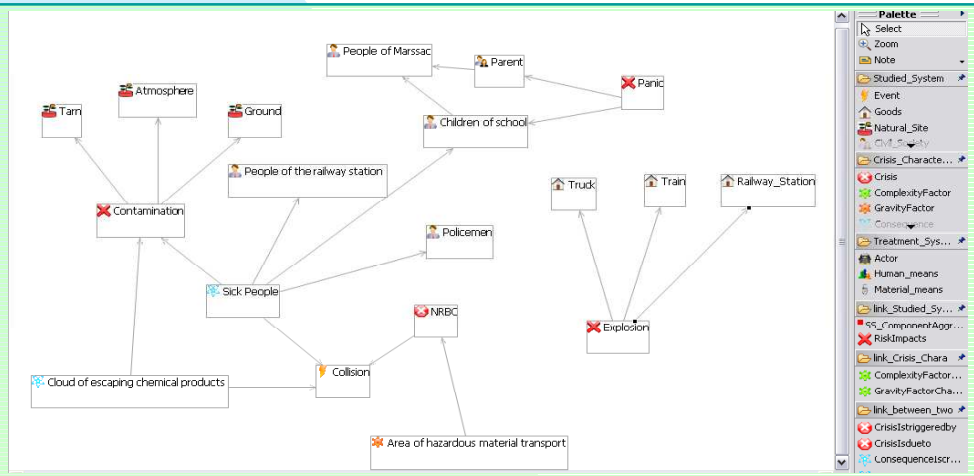
Rajsiri V., Lorre J.P, Benaben B. Pingaud H. Prototype of an Ontology-based Approach for Collaborative Process Specification, IESA'09, Beijing, China



Mediation Information System Engineering applied to crisis management (2)

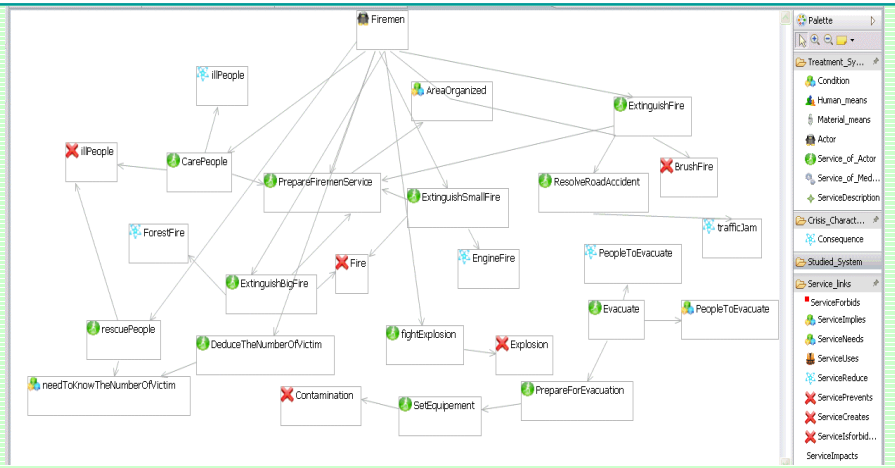
Mediation Information System Engineering for Interoperability Support in Crisis Management

Truptil S., Bénaben F. & al., IESA 10 conference, Coventry, April 2010



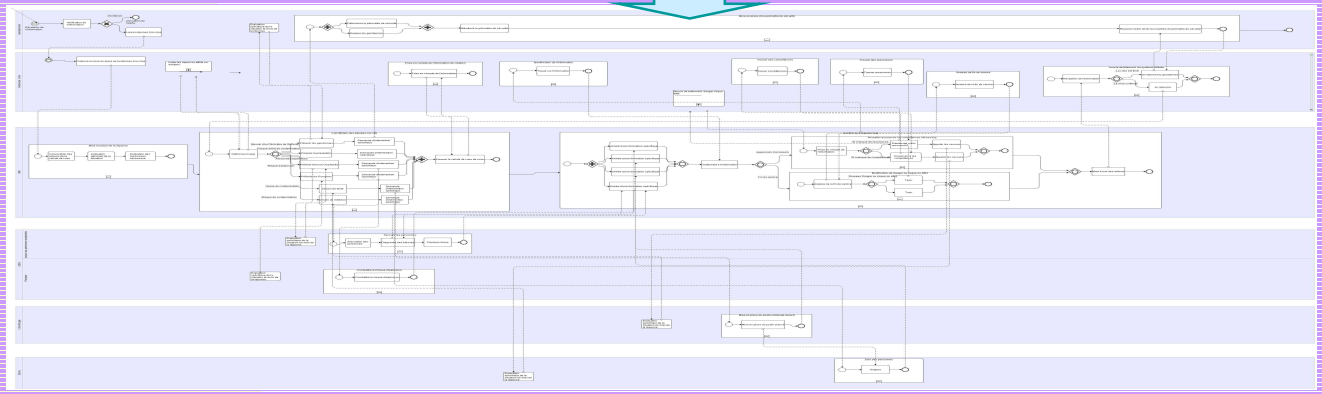
1- A DSL for Crisis Representation (mitigation business service customers)

?



2- Knowledge about actor abilities (mitigation business service providers)

?

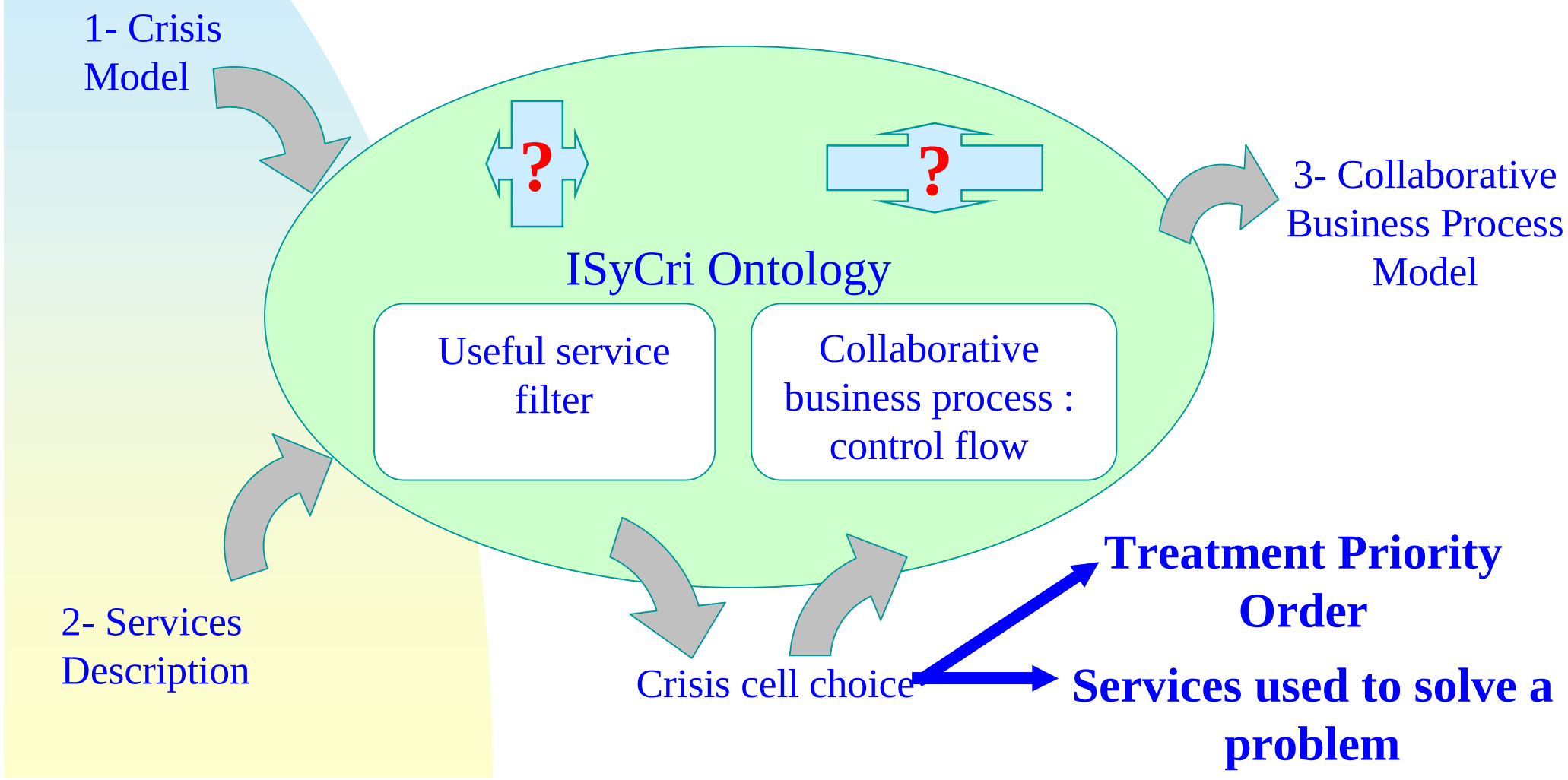


3- A Collaborative Business Process as an answer for crisis mitigation (BPMN)

Mediation Information System Engineering applied to crisis management (3)

A two step algorithm for CBP model design

Truptil S. PhD thesis [2007, 2010]



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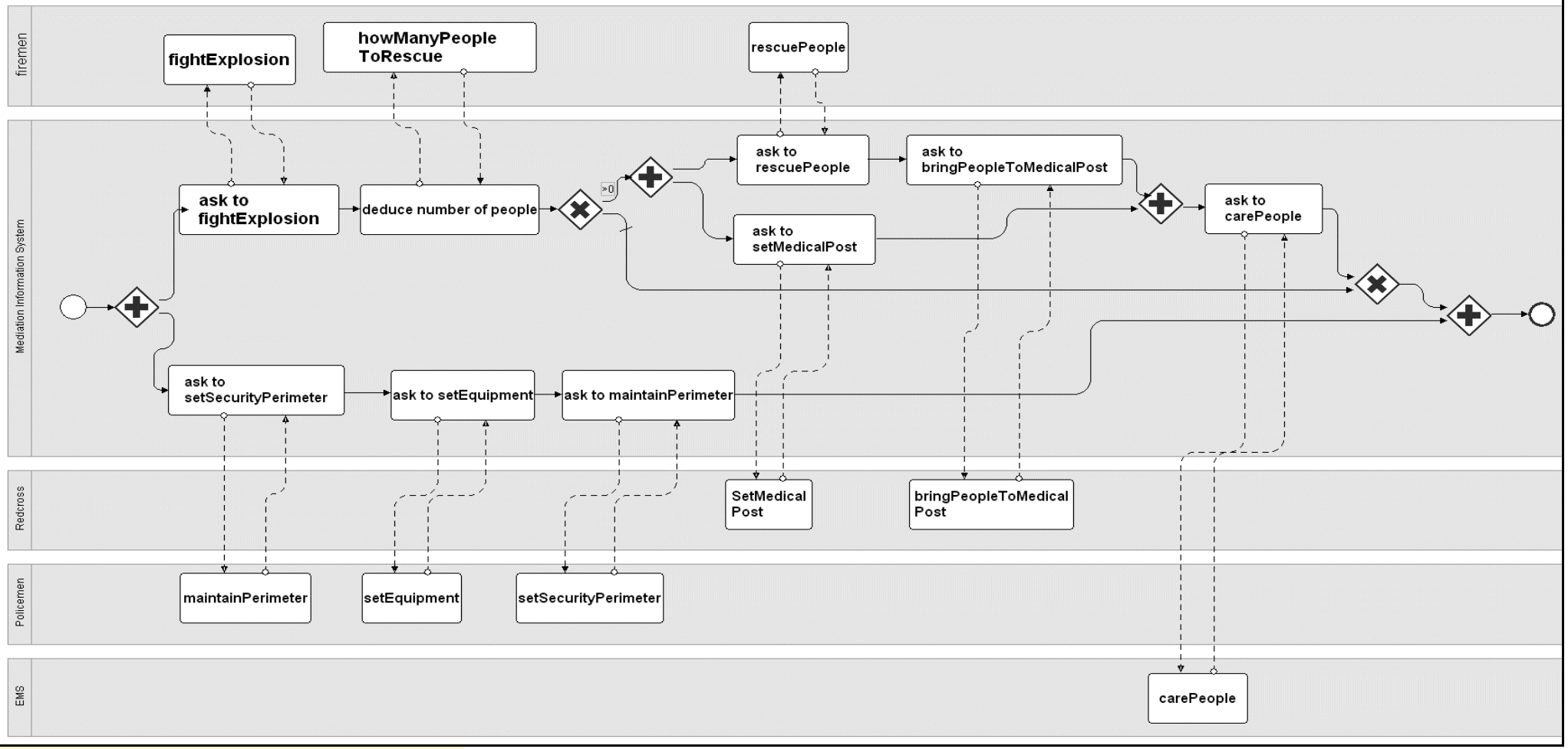
3- How to control the activities of partners and provide coordination means ?

CBP as an answer for coordination of cell crisis (compliant with MISE meta-model)

Touzi J., Benaben B. Pingaud H. Prototype to support morphism between BPMN CBP and collaborative SOA model, IESA'06, Bordeaux



4- How to react to evolutions ?

Evolutions can be classified in 3 categories :

1. **situation intrinsically evolves**
2. **pool of involved organizations in charge of crisis response evolves**
3. **dysfunction can happen during the crisis response**

I. Help the crisis cell to detect signs of evolution (1)

II. Adapt the MIS (2,3)

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I. Help the crisis cell to detect signs of evolution

Main courante : Suivie caracteristiques de la crise

Information about Crisis situation

Nom	Etat_choisi	Priorite	Etat_deduit	Etat_reel	Commentaire
risque_ince...	okcan	4	Nontraite	Present	
risque_bles...	okcould	5	Nontraite	Present	
risque_cont...	okcan	2	Nontraite	Present	
risque_inter...	ko	7	Nontraite	Present	
risque_eng...	okcan	8	Nontraite	Present	
risque_fuite...	okcould	9	Nontraite	Present	

Nom	Etat_choisi	Priorite	Etat_deduit	Etat_reel	Commentaire
personnes_b...	okcould	1	Nontraite	Present	
engorgement	okcan	3	Nontraite	Present	
interruption_tr...	okcould	6	Nontraite	Present	
incendie_res...	okcan	0	Nontraite	Present	

Main courante : Suivi des caracteristiques de la reponse

Information about Crisis response

Service	Present_reponse	Ordre	Selectionne	utilise_pour	Etat	Acteur	Commentaire
GIE_Organiser_zone...	oui	1	deduce	SDIS_Soigner_victim...	EnAttente	GIE	
SDIS_Adapter_dispo...	oui	3	deduce	SDIS_Soigner_victim...	EnAttente	SDIS	
DDE_Determiner_nat...	oui	1	advisable	risque_contamination	EnAttente	DDE	

Main courante : Suivi des caracteristiques de la reponse

Information about Crisis cell

Acteur	NbServices	Etat	Commentaire
GIE	2	EnAttente	
SDIS	3	EnAttente	
SAMU	4	EnAttente	
Mediator	1	EnAttente	
DDE	1	EnAttente	

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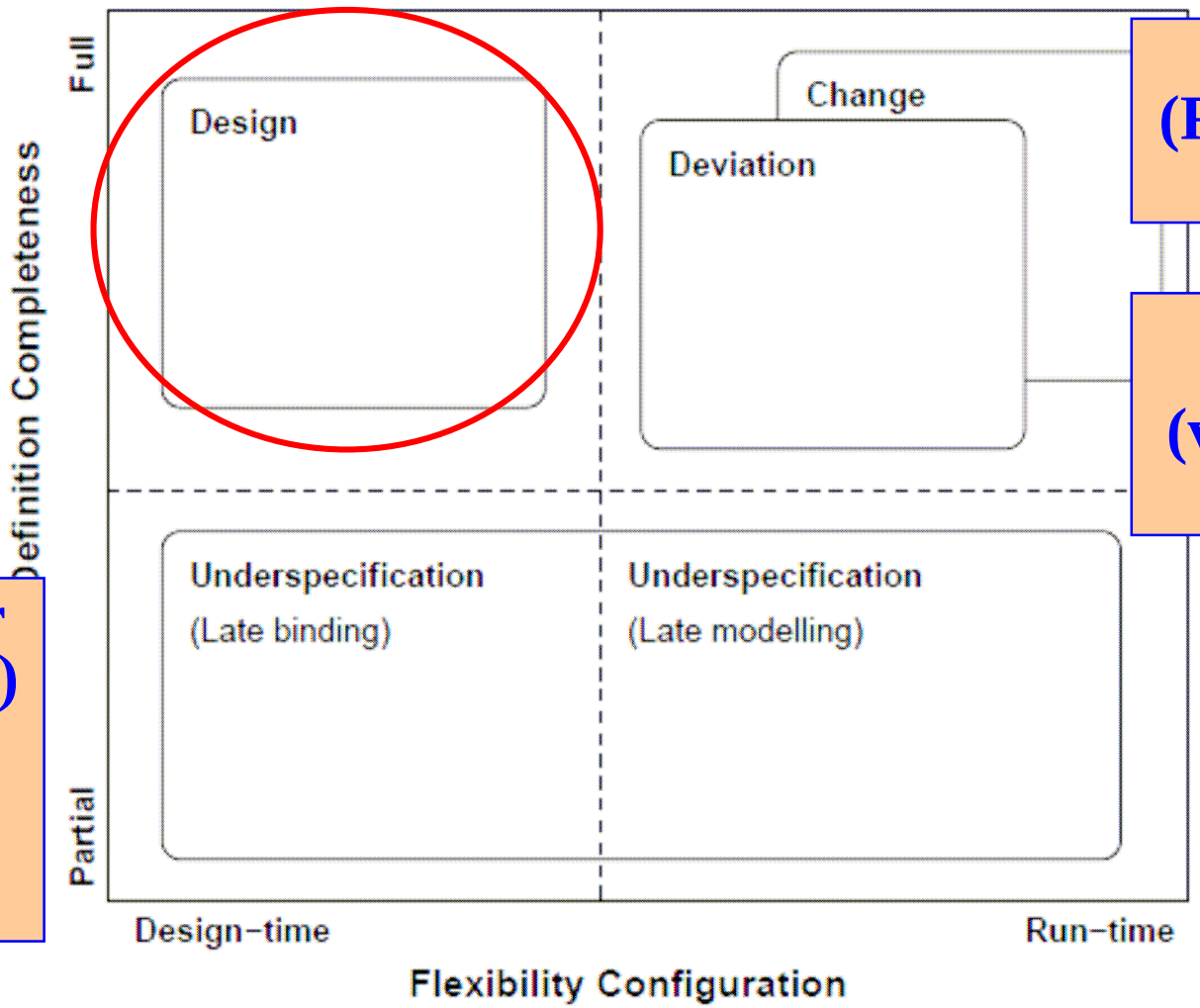
II. Adapt the MIS



Apdet$_{flex}$ (Reichert et al, 1998)

Flow$_{er}$

(van der Aalst et al, 2005)

YAWL (van der Aalst et al., 2004)

ContractNet (Faure et al, 2010)

- Kind of Flexibility according to (Schonenberg et al, 2008)

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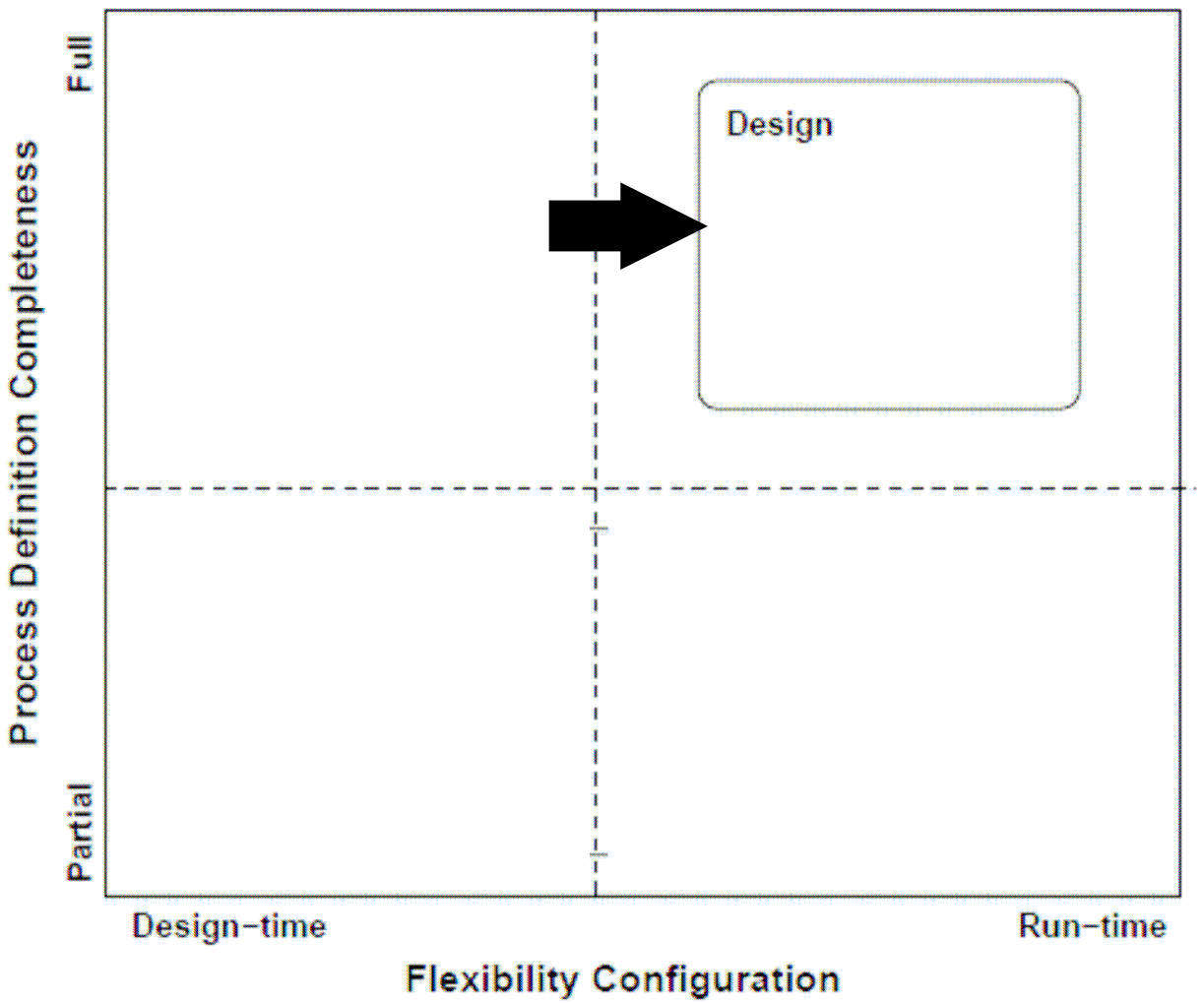
II. Adapt the MIS



- Position of design flexibility for ISyCri Project

Flexibility by design

Depending on the evolution, the MIS Design can be restarted at several level :

1. **The Crisis Modelling**
2. **the set of Service Modelling**
3. **Treatment Priority Order definition**
4. **The choice of the service for each Crisis problem**
5. **The Collaborative Process deduction**

So it is required for the MIS design approach to be manageable at those several levels

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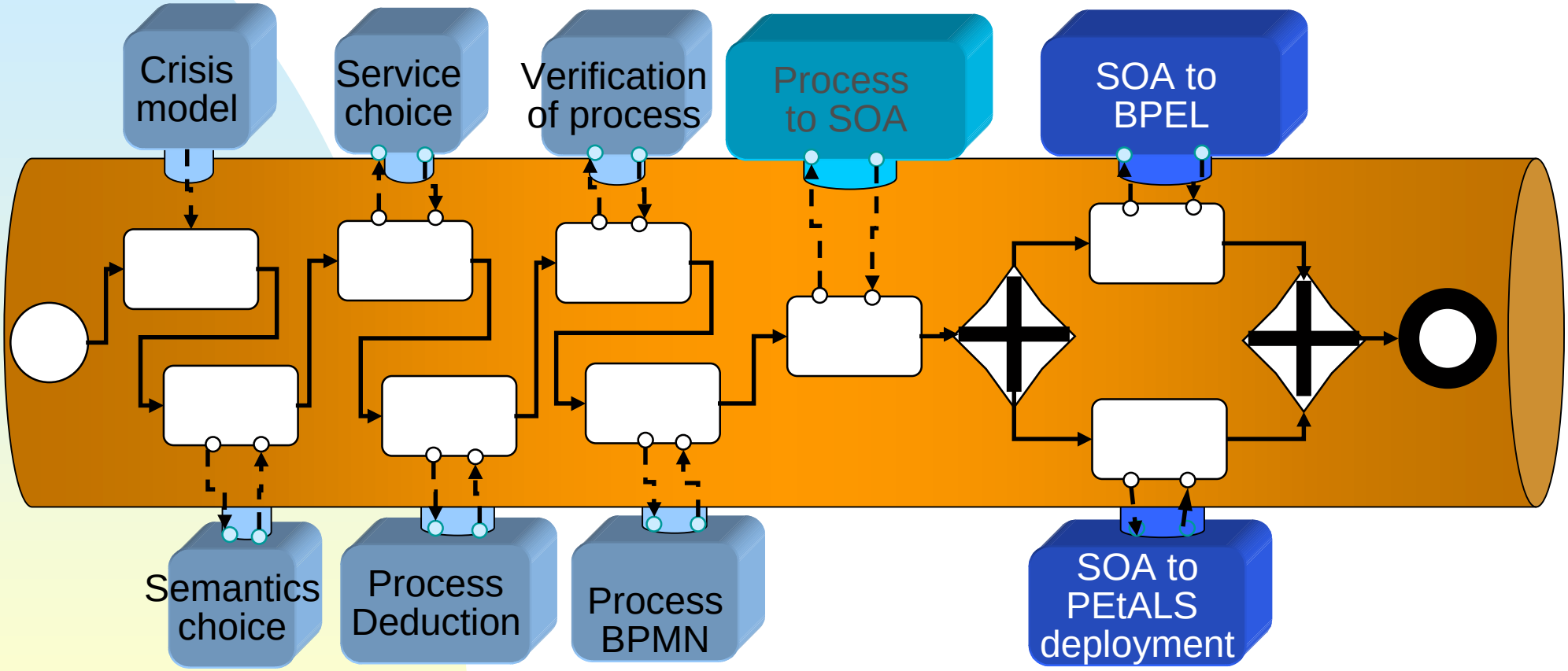
Flexibility by design



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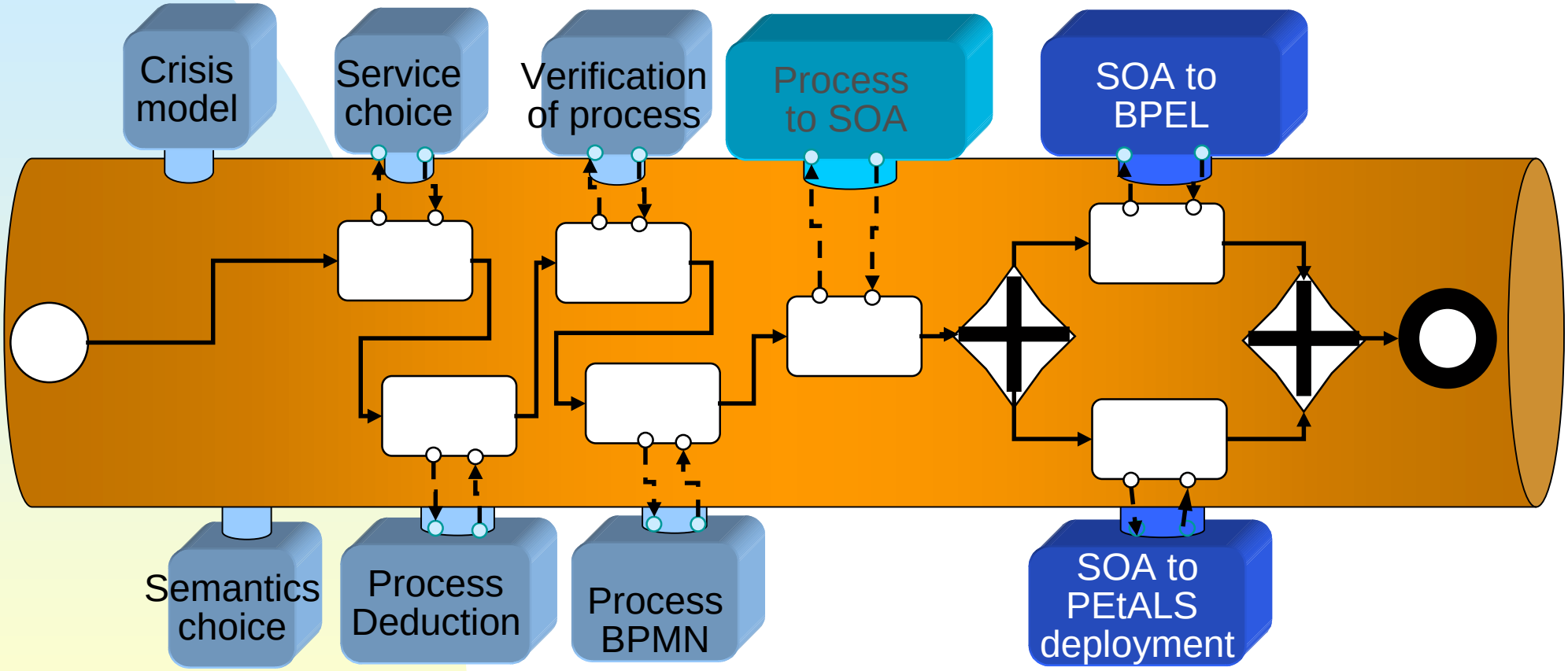
Flexibility by design



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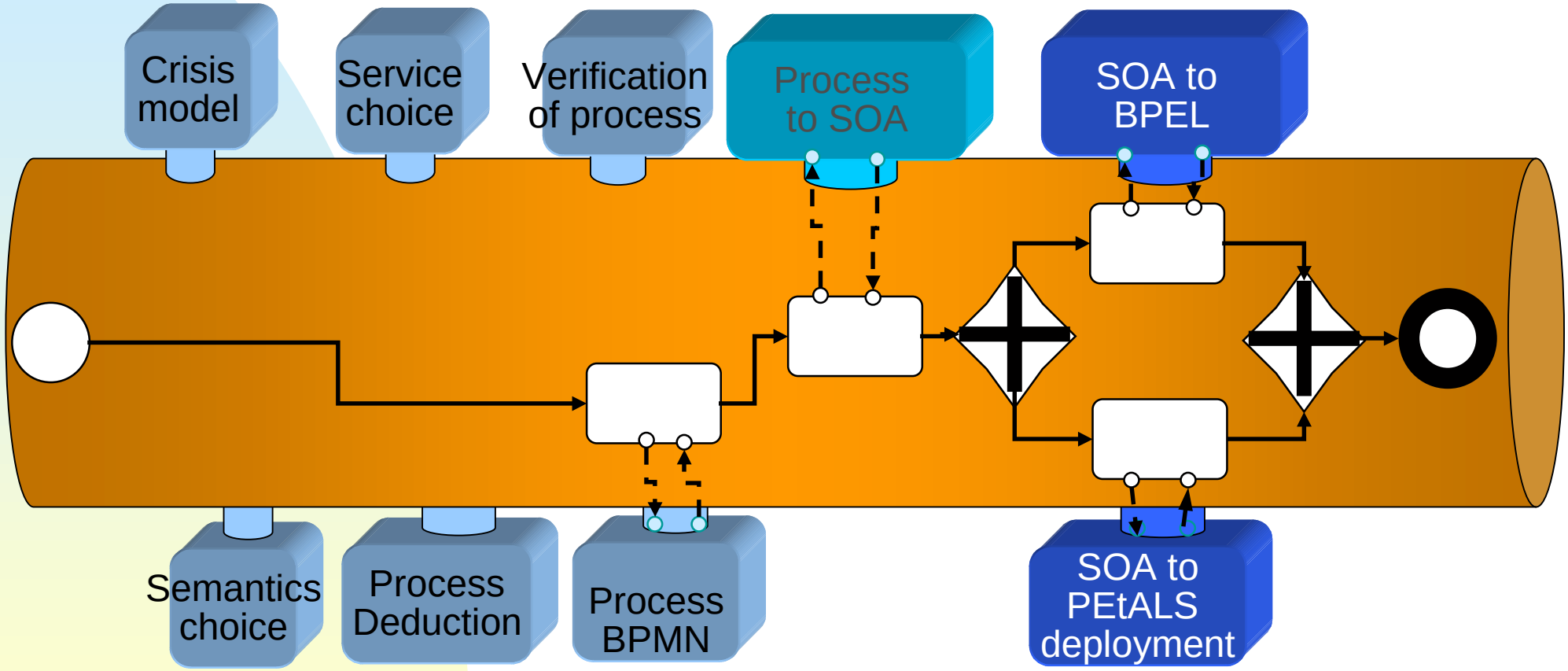
Flexibility by design



Thanks a lot for your attention