A Unified Framework for Modeling Cooperative Design Processes and Cooperative Business Processes

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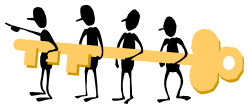

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Introduction and context of work

Old focuss of methods : **Product** - desired result

New focuss of methods : **Process** - the route followed to reach the result

Methods need to propose **PROCESS GUIDANCE**
Provide advice on what to do, why and how to do it

Method EKD : Enterprise Knowledge Development
- a set of models (Goal, Process, Object and Rule)
- **A way-of-working**
- A set of tools supporting the way-of-working

ESPRIT Project **ELEKTRA** (EEC founding) : Designing a tool set for re-organising electricity companies (e.g. towards EEC deregulation rules)

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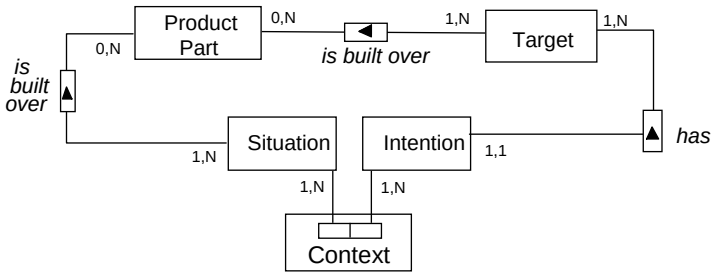
A meta-model for cooperative processes

☞ Meta-model : *basis for process model definition*

Knowledge required to design ways-of-working	⇨ Process meta-model	
Ways-of-working	⇨ Process model	
Traces	⇨ . Process execution . Instance of procedure	⇨ Output : **product**

The concept of context



• A **situation** is a part of the product it makes sense to make a decision on.

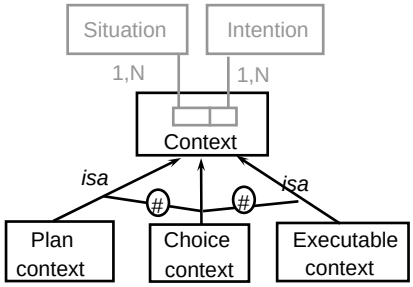
• A decision reflects a choice that a user can make at a given moment in the process. A decision refers to an intention.

• An **intention** expresses what the user wants to achieve, it is a goal.

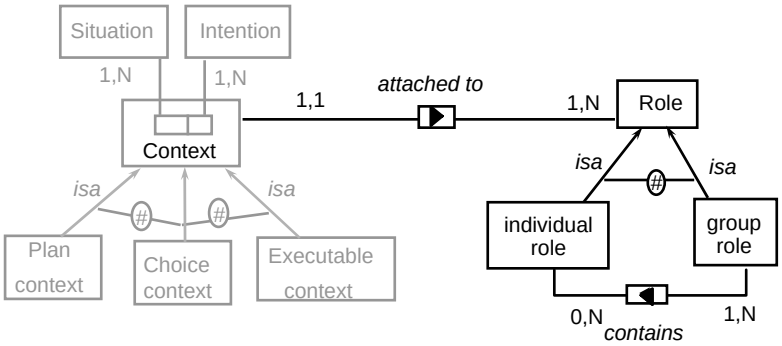
Different types of contexts

• Decisions have consequences which differ from one granularity level to another.

• The different contexts are classified according to their consequences.



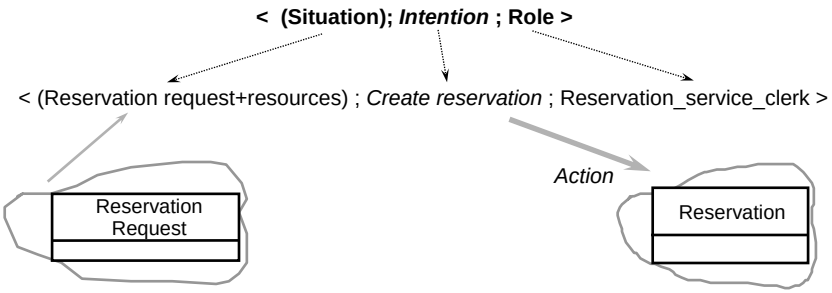
The concept of role



In a given situation, a user has an intention (according to his/her **role** in this process), that makes him/her progress in the cooperative process.

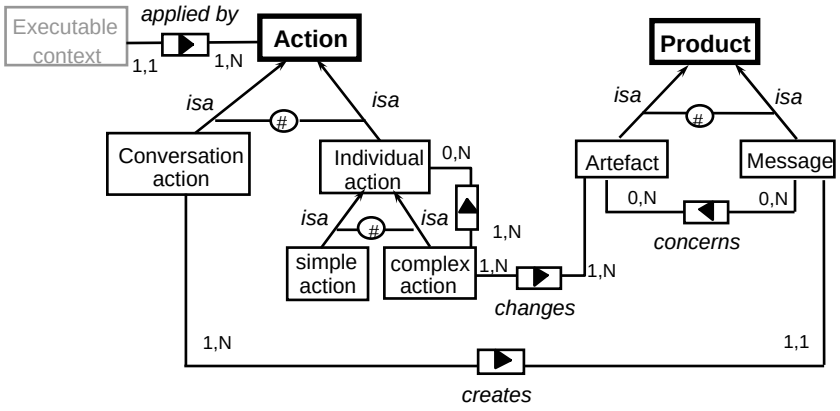
Executable context

At the most detailed level, the execution of any process can be seen as a set of transformations performed on the product.



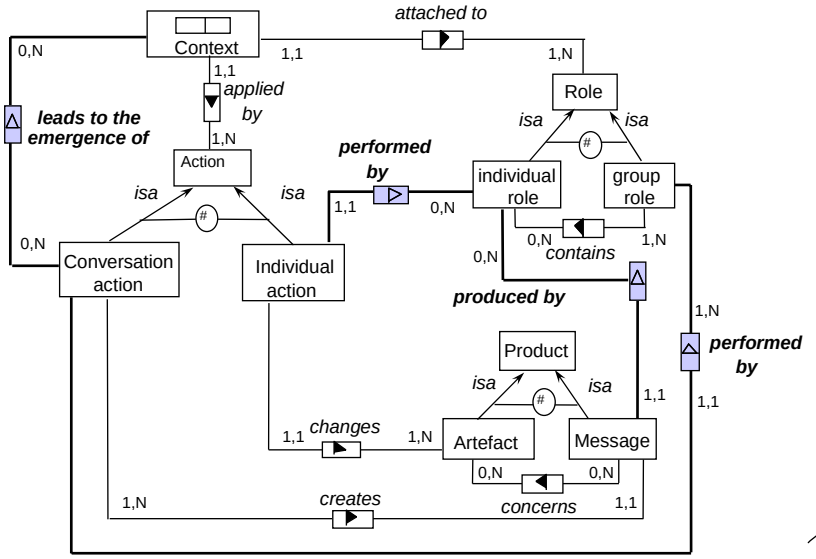
☞ An **executable context** implements a decision, its intention is realised by an action

The concept of action



☞ Performing an action changes the product and may generate **new situations**.

The cooperative processes meta-model



The choice context

- A **choice context** corresponds to a situation which requires the exploration of alternatives in decision making.
- A choice context offers a choice among a set of strategies, all of them achieving the same purpose.

<(Request + Resources); *Adapt_request ;* Reservation_Service_Manager>

C1: resort and date can not be changed

<(Request + Resources); *Change_hotel_category* ; Reservation_Service_Manager >

C3: hotel category and date can not be changed

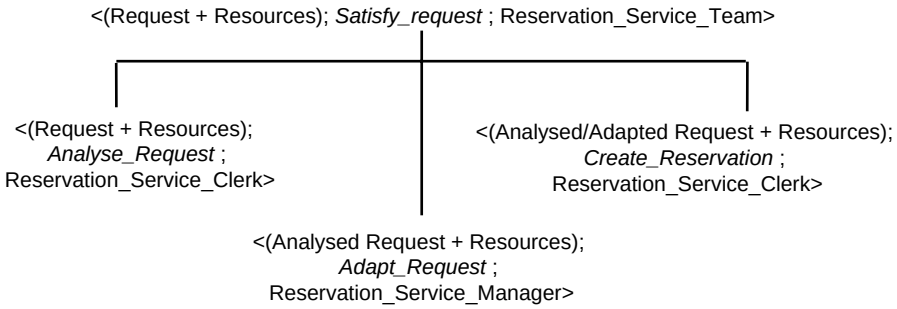
C2: resort and hotel category can not be changed

<(Request + Resources); *Change_dates* ; Reservation_Service_Manager >

<(Request + Resources); *Change_resort* ; Reservation_Service_Manager >

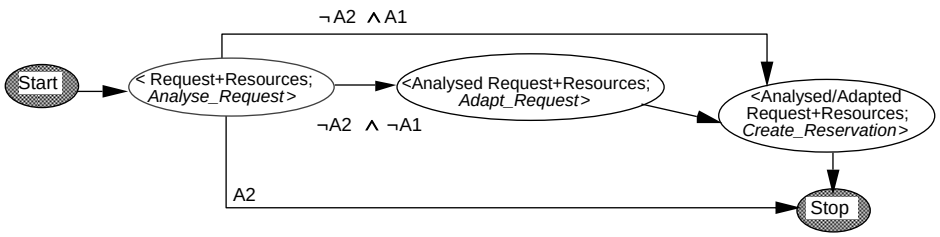
The plan context

A **plan context** is an abstraction mechanism by which a context viewed as a complex issue can be decomposed in a number of sub-issues.



The plan context

The ordering of the contexts, within a plan, is defined by a **precedence graph**.



A1: the request can be immediately satisfied

A2: the request is not appropriate

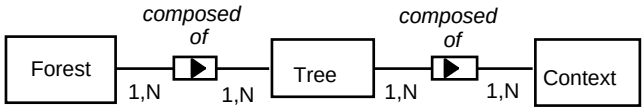
The concept of way-of-working

• The basic building block of a way-of working is an instance of context.

• Contexts in the meta-model have hierarchical relationships of two different types: decomposition and refinement**.**

• A way-of-working, is a grouping of contexts based upon these links.
The modules resulting from this grouping are hierarchies of contexts called **trees**.

• A way of working can be composed of several trees: a **forest** of trees.

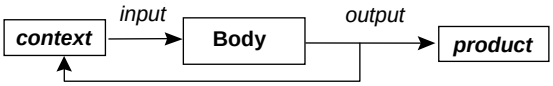


The EKD way-of-working for participative design

A participative design process is a *decision making process*
i.e. a non deterministic process

A participative design process cannot be an ad-hoc and chaotic process

A participative design process can follow a *pattern for decision making*



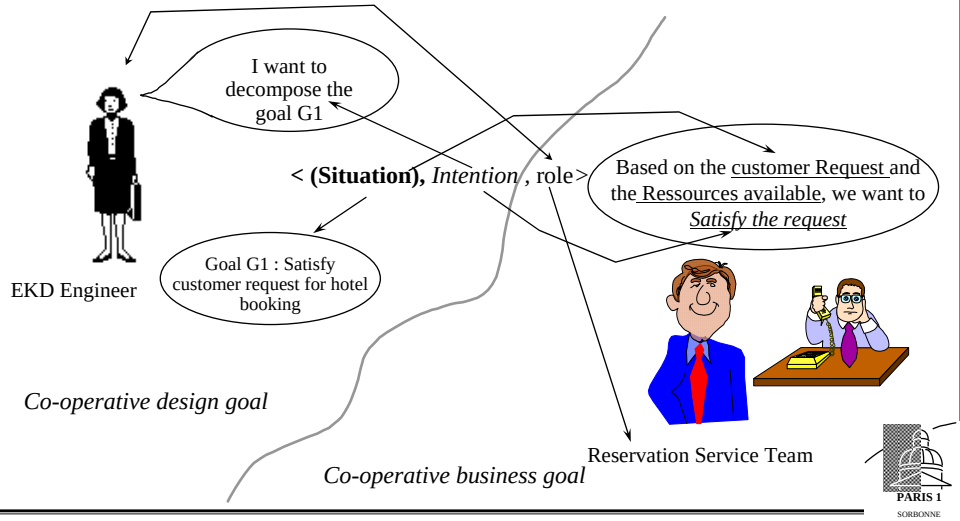
The EKD process is guided using a repository of contexts wich acts as guidelines

A guideline supports decision making, proposing different alternatives and argumented ways to fulfil a given intention in a given situation

The EKD process is guided

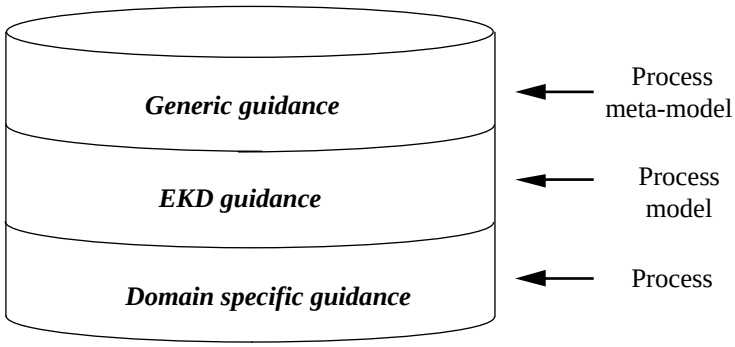
An intention and situation driven process

A context : <situation, intention, role> is either a plan, a choice or an executable



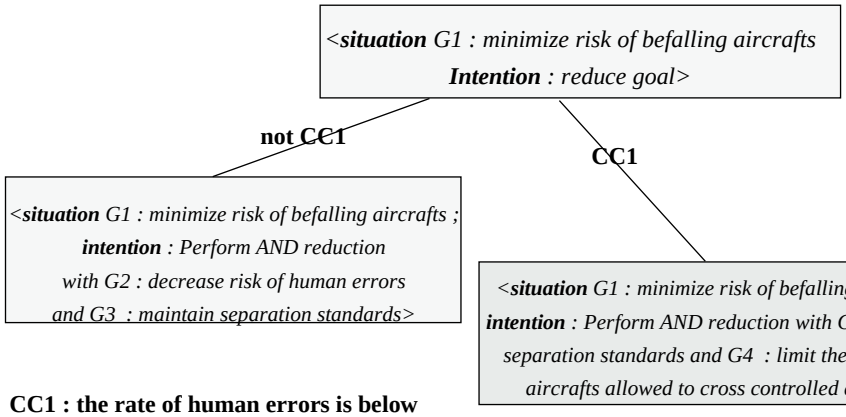
Guidance in the EKD process

The repository of contexts is structured in three layers, corresponding to three types of guidance



Domain specific guidance

- Grounded on experience, to reuse and/or to adapt concrete and tested solutions in the same domain



CC1 : the rate of human errors is below the international norm N° 1234

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EKD guidance

- based on EKD knowledge used specifically for models construction :

Context / Technique	(1) Model the current enterprise state	(2) Acquire goal								(3) Operationalize goal			(4) Generate design model			(5) Validate design model	
		2.1 Analyse the context of change	2.2 Find Goals	2.3 Situate Goal	2.4 Classify Goals	2.5 Prioritize goal	2.6 Detect goal conflict	2.7 Solve goal conflict	2.8 Relate goal	3.1 Reduce goal	3.2 Argument reduction	3.3 Identify business rule	4.1 Identify design model	4.2 Detail design model	4.3 Argument alternative design models	5.1 Evaluate design	5.2 Select design options
EM construction strategy	•			•					•								
SWOT analysis		•									•				•		
Categorizer			•					•									•
Goal typology					•												
Pair-Wise comparison						•											
Theorem proof							•										
Do/Choose/Plan strategies										•	•	•	•		•		
Goal template										•							
Brainstorming strategy							•	•			•				•		
Graph construction strategy														•			
View models														•		•	
Scenario																•	
Argument based reasoning																•	
Cost /resource evaluation																•	
Agent Dependency model																•	
Process trace																•	•

- to represent the current enterprise state,
- the goals for change
- the future enterprise state implementing the goals for change

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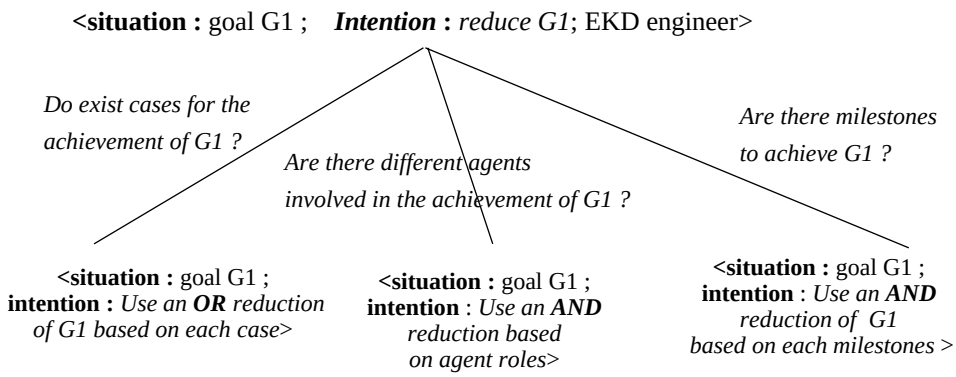
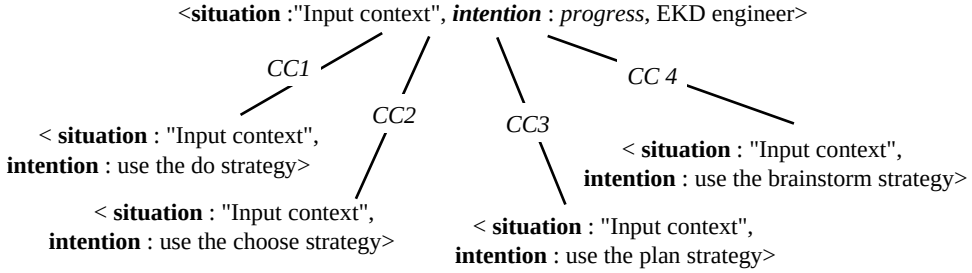
EKD guidance

Example of a guideline supporting the process of goal operationalization



Generic guidance



Pro argument for CC1:
- Fulfilling the input context's intention is possible by specifying design action(s) to be performed on the product

Pro arguments for CC2:
- It exists several alternative ways to fulfil the input context's intention

Cons arguments for CC2:
- Fulfilling the input context's intention is possible by specifying design action(s) to be performed on the product

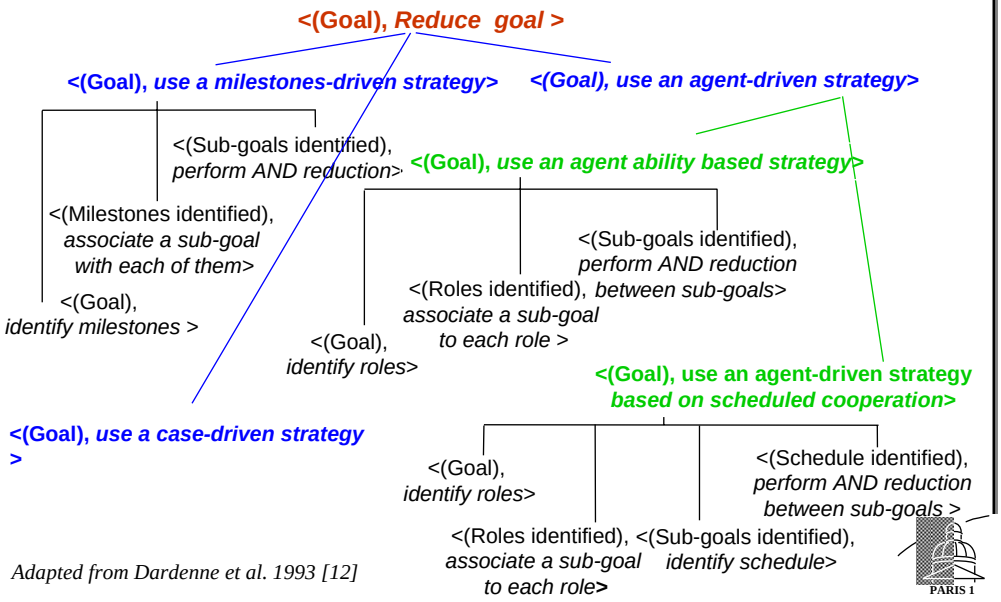
Pro arguments for CC3:
- The achievement of the input context's intention requires a composite decision making process to take place

Cons arguments for CC3:
- Fulfilling the input context's intention is possible by specifying design action(s) to be performed on the product
- It exists several alternative ways to fulfil the input context's intention

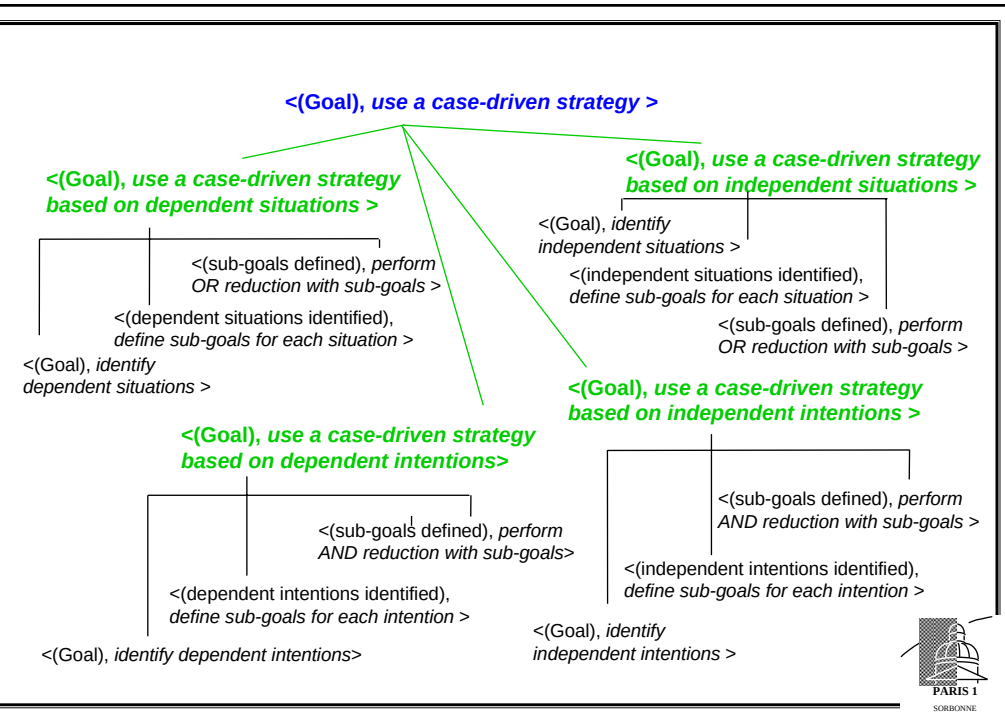
Pro arguments for CC4 :
...

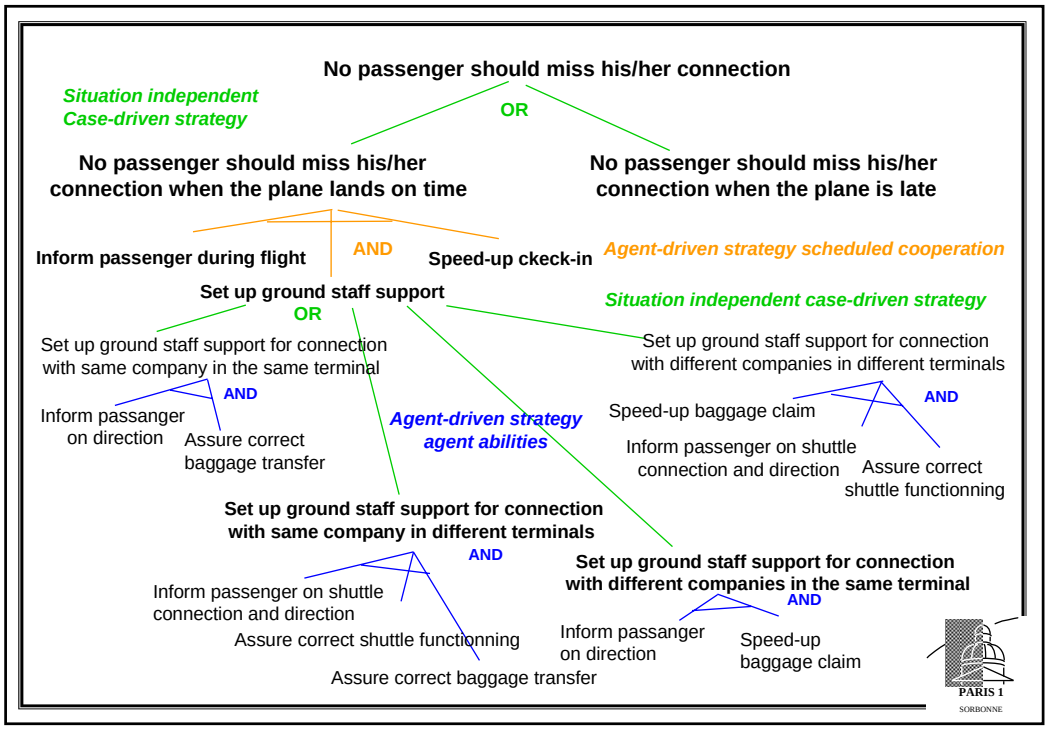
It is the «default» option used when no over type of guidance applies

An example of EKD guidance



Adapted from Dardenne et al. 1993 [12]




No passenger should miss his/her connection
Situation independent
Case-driven strategy
OR
No passenger should miss his/her connection when the plane lands on time
No passenger should miss his/her connection when the plane is late
Inform passenger during flight
AND
Speed-up ckeck-in
Agent-driven strategy scheduled cooperation
Set up ground staff support
OR
Situation independent case-driven strategy
Set up ground staff support for connection with same company in the same terminal
AND
Inform passanger on direction
Assure correct baggage transfer
Agent-driven strategy agent abilities
Set up ground staff support for connection with different companies in different terminals
AND
Speed-up baggage claim
Inform passenger on shuttle connection and direction
Assure correct shuttle functionning
Set up ground staff support for connection with same company in different terminals
AND
Inform passenger on shuttle connection and direction
Assure correct shuttle functionning
Assure correct baggage transfer
Set up ground staff support for connection with different companies in the same terminal
AND
Inform passanger on direction
Speed-up baggage claim
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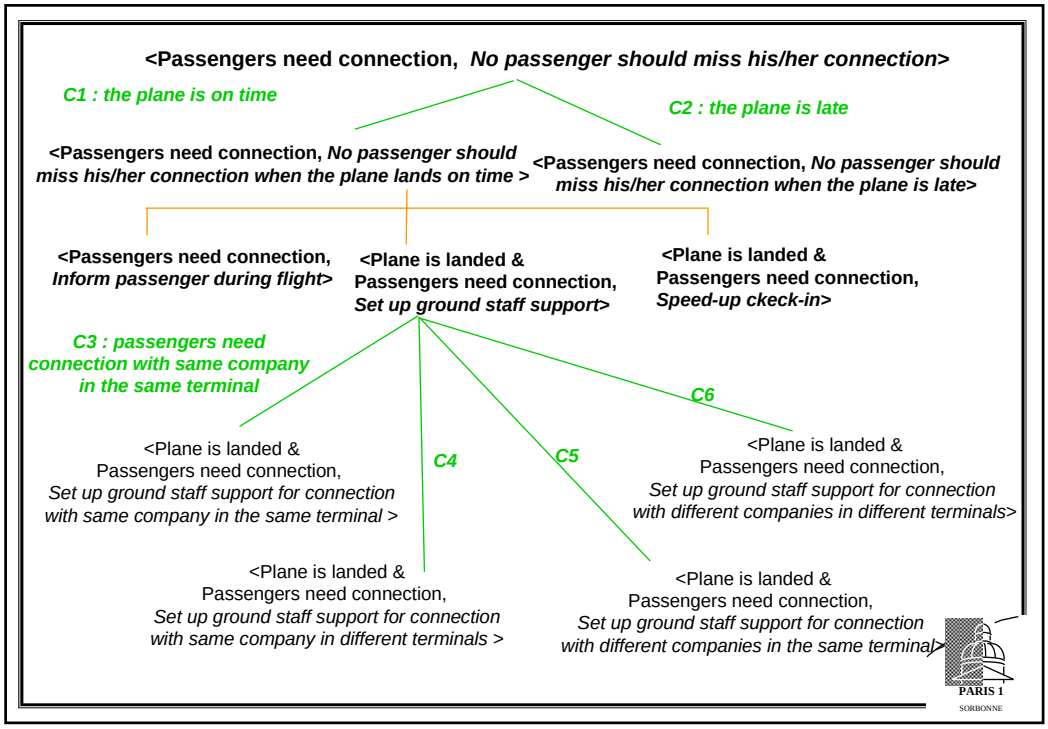
<Passengers need connection, No passenger should miss his/her connection>
C1 : the plane is on time
C2 : the plane is late
<Passengers need connection, No passenger should miss his/her connection when the plane lands on time >
<Passengers need connection, No passenger should miss his/her connection when the plane is late>
<Passengers need connection, Inform passenger during flight>
<Plane is landed & Passengers need connection, Set up ground staff support>
<Plane is landed & Passengers need connection, Speed-up ckeck-in>
C3 : passengers need connection with same company in the same terminal
C6
C4
C5
<Plane is landed & Passengers need connection, Set up ground staff support for connection with same company in the same terminal >
<Plane is landed & Passengers need connection, Set up ground staff support for connection with different companies in different terminals>
<Plane is landed & Passengers need connection, Set up ground staff support for connection with same company in different terminals >
<Plane is landed & Passengers need connection, Set up ground staff support for connection with different companies in the same terminal>
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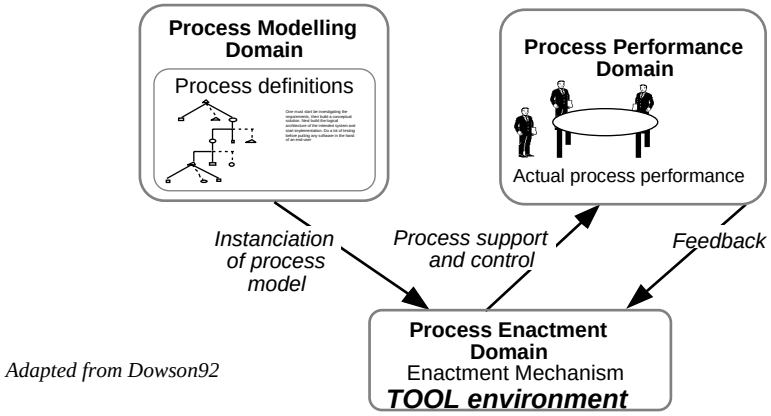
Other properties of the EKD process

The EKD process is **incremental** and **dynamic** in nature

The EKD process is **supported by software tools**



Adapted from Dowson92

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Conclusion

The EKD decision making pattern is :

- a reasoning mechanism
- supporting decision making
- using a repository of guidelines
- for guiding the participative design process

The repository contains :

- domain specific guidelines
- EKD specific guidelines
- One generic guideline

The cooperative process meta-model allows :

- to represent cooperative design processes
- to represent cooperative business processes

using a single notation

Current work :

- Development of a WEB based tool allowing :
  - to use the guidelines
  - to trace the process

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