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# An innovative framework supporting SME networks for complex product manufacturing

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Saint-Etienne, 12 October 2010

Luís Carneiro

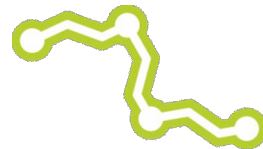
INESC Porto



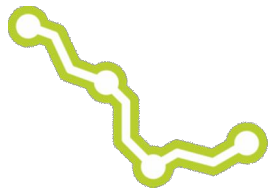
**NET-CHALLENGE**

INNOVATIVE NETWORKS OF SMEs FOR  
COMPLEX PRODUCTS MANUFACTURING

- Context
- Proposed objectives
- Identified requirements
- The Net-Challenge Framework
  - Methodology
  - Reference Business Processes
  - Decision support tools
- Conclusions and future developments



- European SMEs need to increase the added value of their products and services
- They should target segments characterized by:
  - low volume
  - large variety
  - **complex** and
  - **customer centered production**



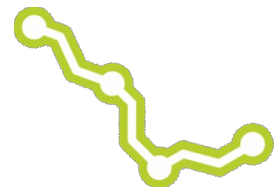
- They will need to establish **dynamic and non-hierarchical networks for complex products design and manufacturing**, able to assure:
  - quick response
  - fast time to market
  - differentiated offerings
  - competitive prices



- Complex products:
  - Large number of components and/or
  - Customized products
- Non-hierarchical networks:
  - No single organization dictating or defining the rules
  - Collaborative decision making
  - (in this case, mainly composed of SMEs)

**The Net-Challenge Framework aims to support SMEs in creating and managing successful non-hierarchical networks for complex products design and manufacturing, including:**

- **a methodology to help SMEs in the formation and operation of dynamic and non-hierarchical networks.**
  - explain and define approach on how to create and manage Networks
- **reference collaboration processes**
  - for the relevant business processes
- **distributed decision support tools, including**
  - collaborative planning with dynamic capacity management and real-time order promising
  - real-time monitoring with event management and
  - performance management



## 1. TEXTILE and APPAREL (Portugal)

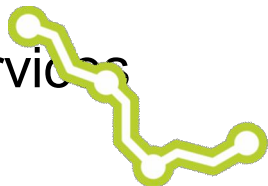
- RPB develop collections, promote brands and manage a network of specialized companies to respond to market demands
- RIOPELE produces high quality fabrics

## 2. Fashion and customized FOOTWEAR (Italy)

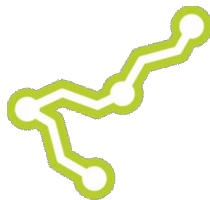
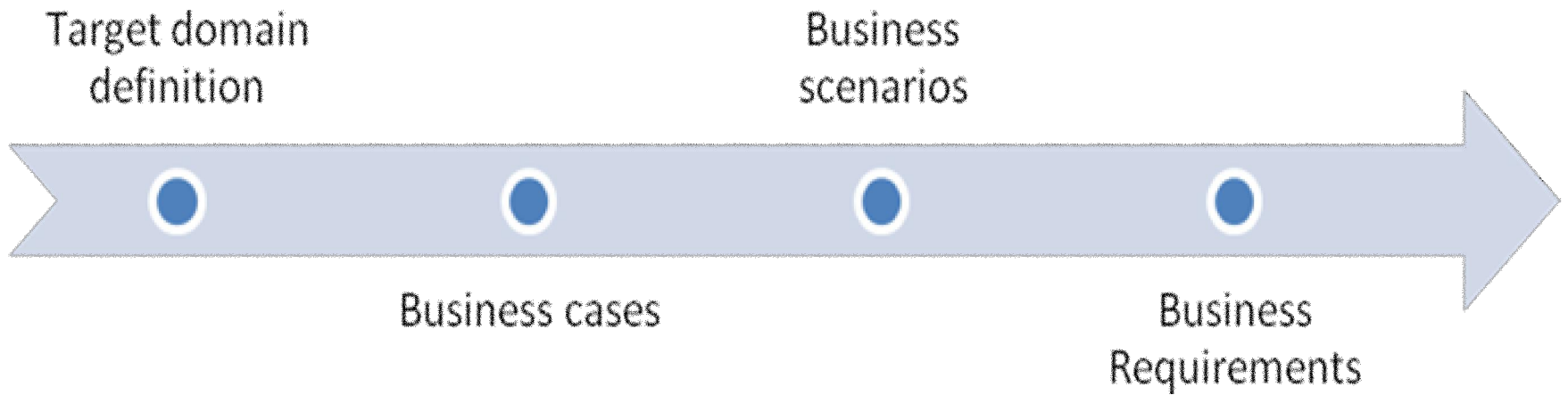
- Synesis: shoe design and manufacturing
- Italian Converter: supplier of high tech and fashion textile materials

## 3. MACHINE TOOLS (Spain)

- ONA is a builder of electro-erosion (EDM) machines
  - ROBOCONCEPT is a company providing automation services
- 7 | mainly based on high speed pick-and-place robots



# Approach to requirements analysis





# Business requirements

## Business community management and networking promotion

- Setup and enlargement of the business community
- Community management
- Continuous knowledge sharing
- Standardize and improve communication with the partners
- Enhance customer's loyalty
- Managing need for changing capacity

## Partner qualification

- Partner's competencies and capabilities
- Criteria definition for business line

## Virtual Organization formation

- Selection of partners for a specific Business Opportunity
- Subcontracting
- Lead-time calculation of a business opportunity
- Enable mass-customization

## Virtual Organization operation

- Creating schedule for an specific sales order
- Updating production statuses
- Simple template-based control system
- Event Management
- Event Monitoring

## Virtual Organization dissolution

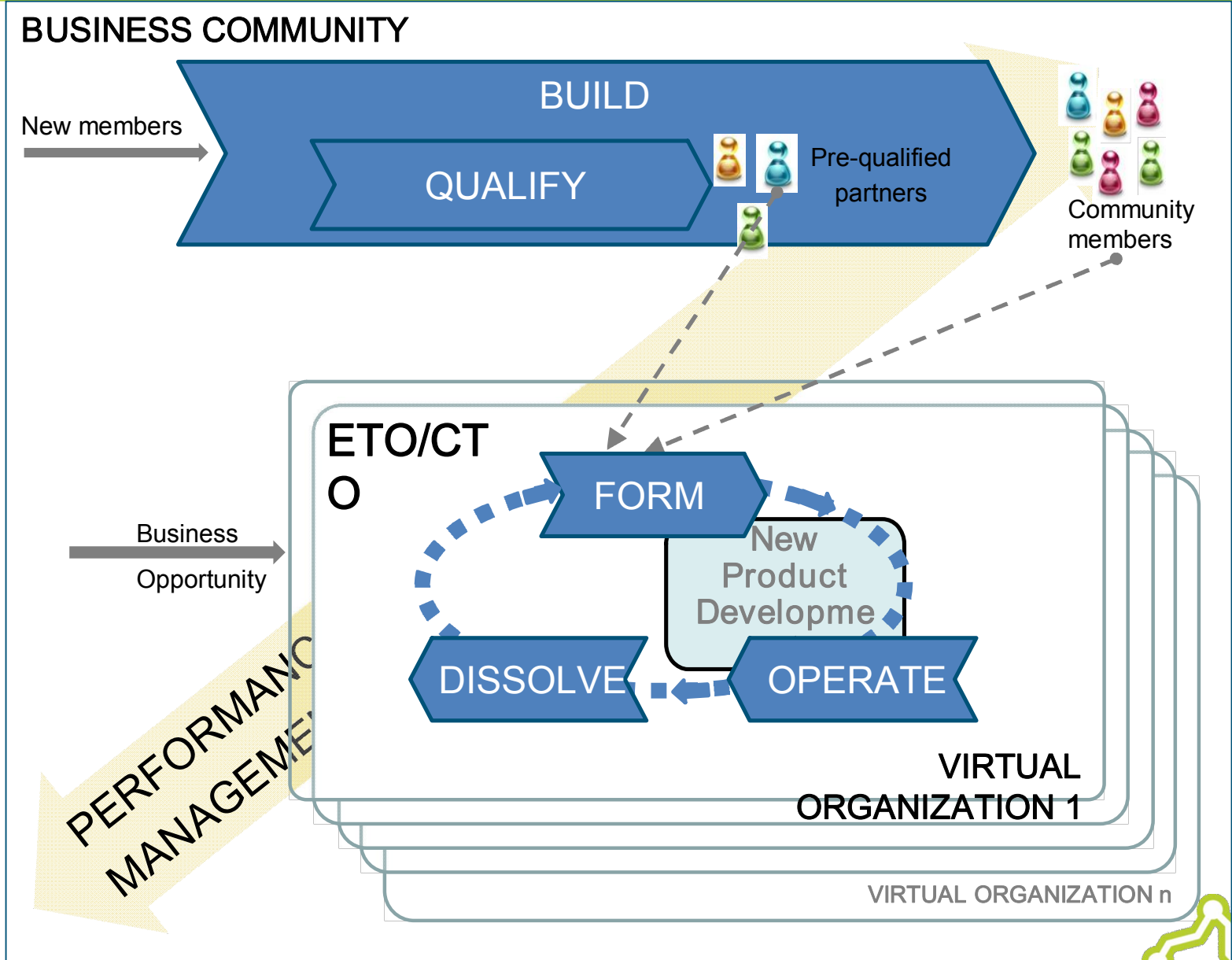
- Virtual Organization dissolution
- Manage network performance



# Highest priority requirements for case companies

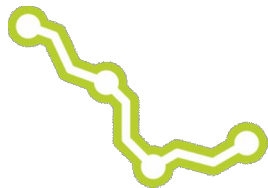
- 1) Updating production status,
- 2) Selection of partners for a specific business opportunity,
- 3) Lead-time calculation of a business opportunity,
- 4) Setup and enlargement of the business community,
- 5) Standardize and improve communication with the partners.

# The Net-Challenge Methodology

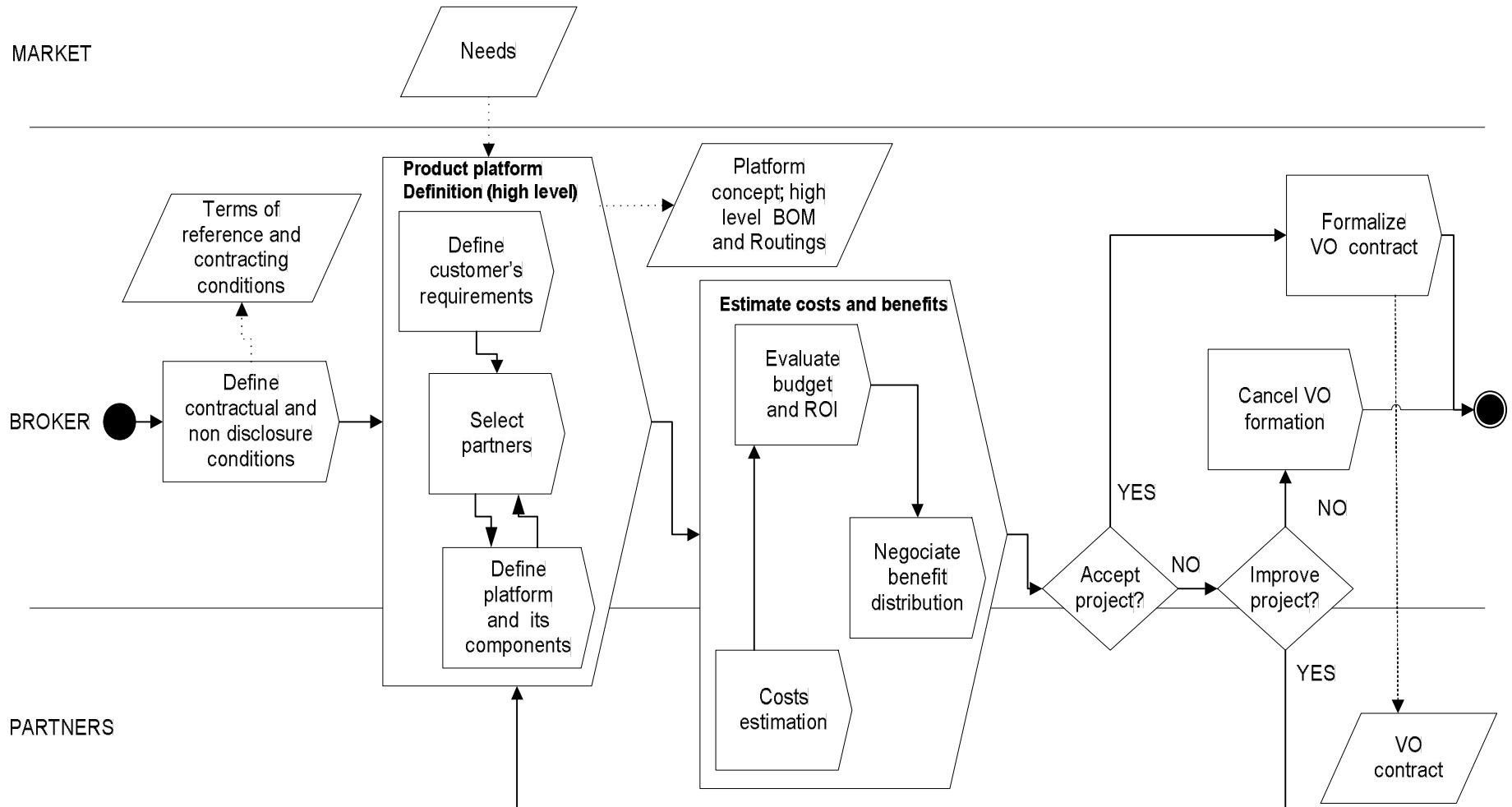


# Networking scenarios for complex and customer driven products

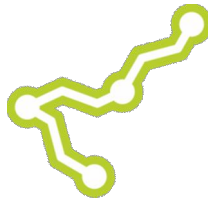
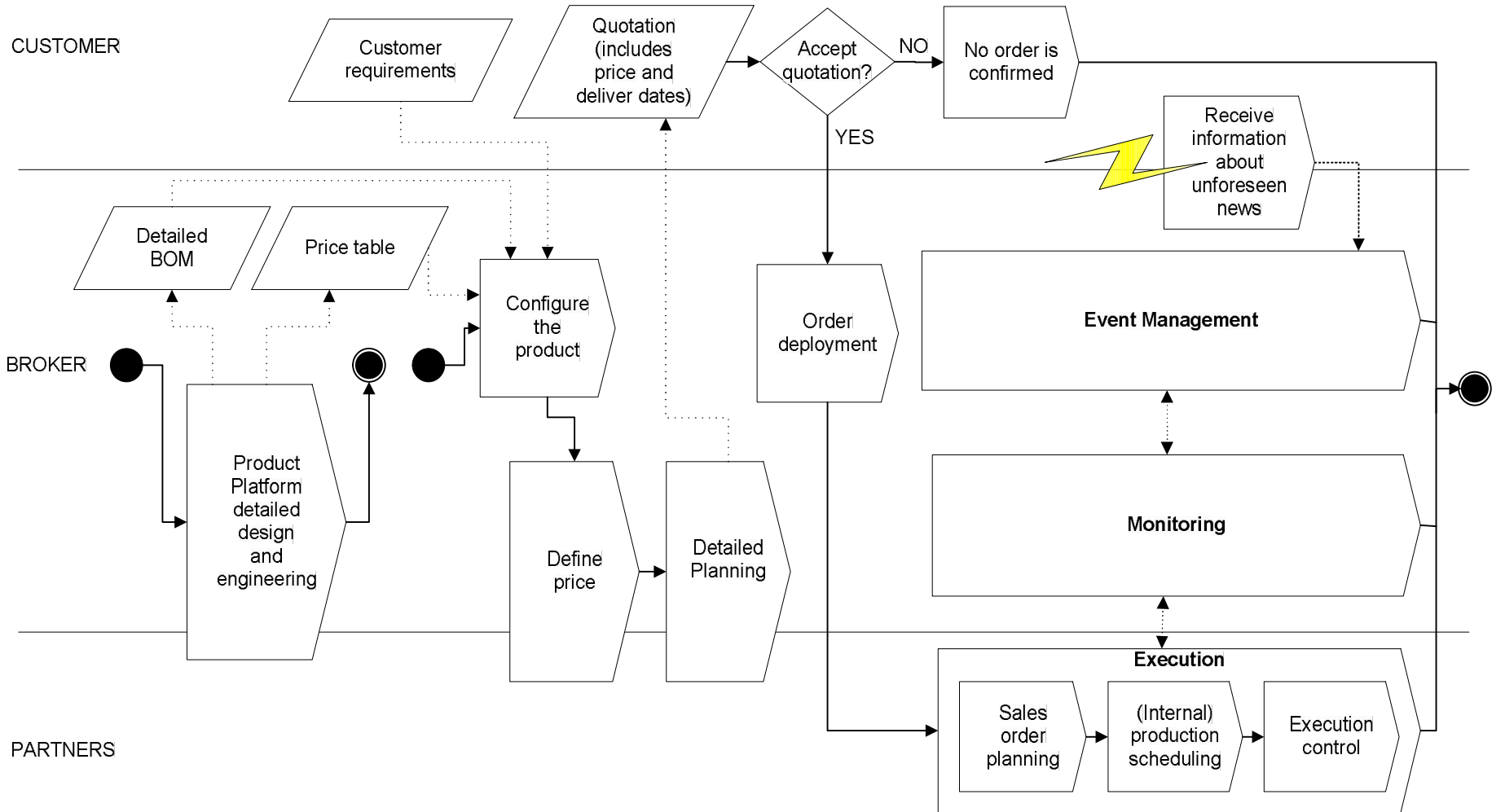
- Customer driven (One of a kind product)
  - >>> Engineering to Order (ETO) Strategy
  
- Customized products (product platform that may be configured for different customers)
  - >>> Customize to Order (CTO) Strategy



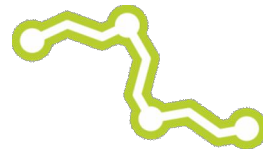
# VO Formation in CTO Strategy



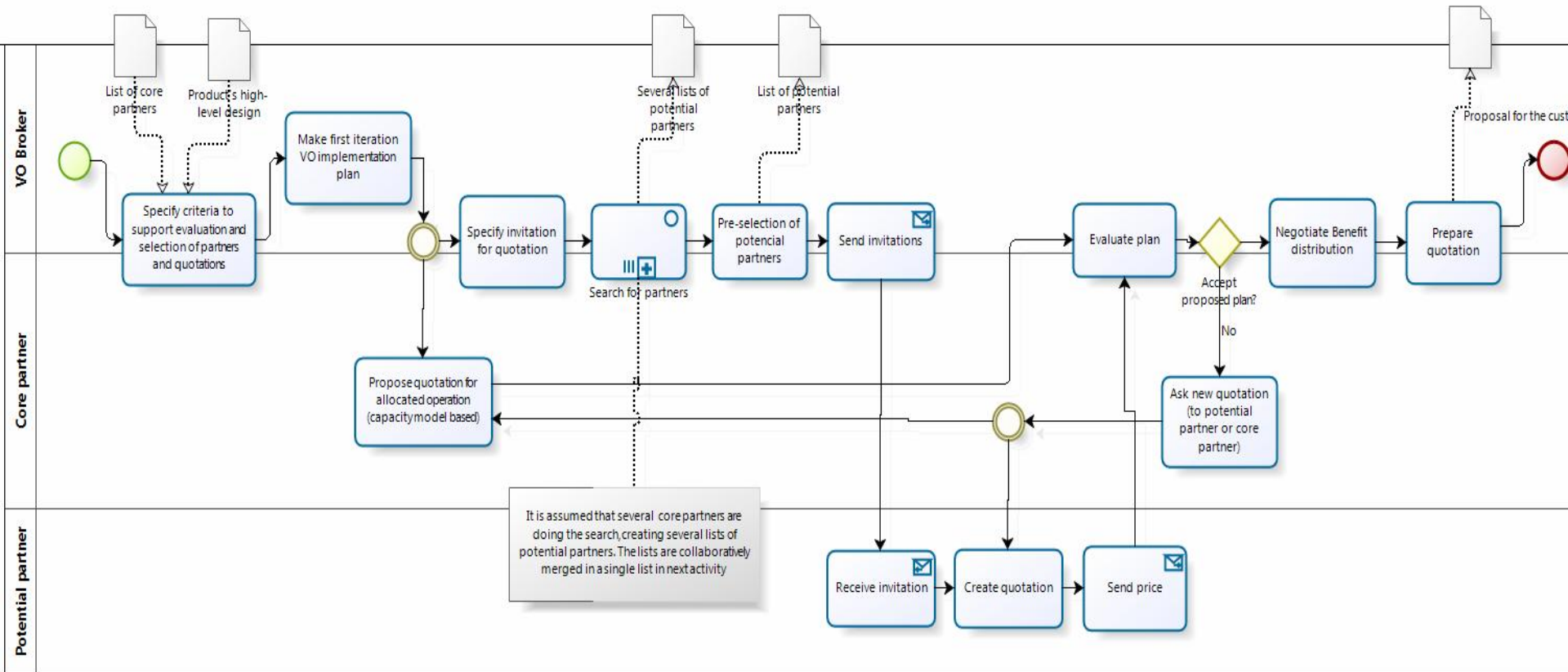
# VO Operation in CTO Strategy



- Reference Collaboration Processes for the main phases of **non-hierarchical business networks** life cycle, including:
  - capacity planning
  - partner qualification
  - collaborative order planning and management,
  - event management and
  - performance management (promoting strategic and operational business alignment within the network)



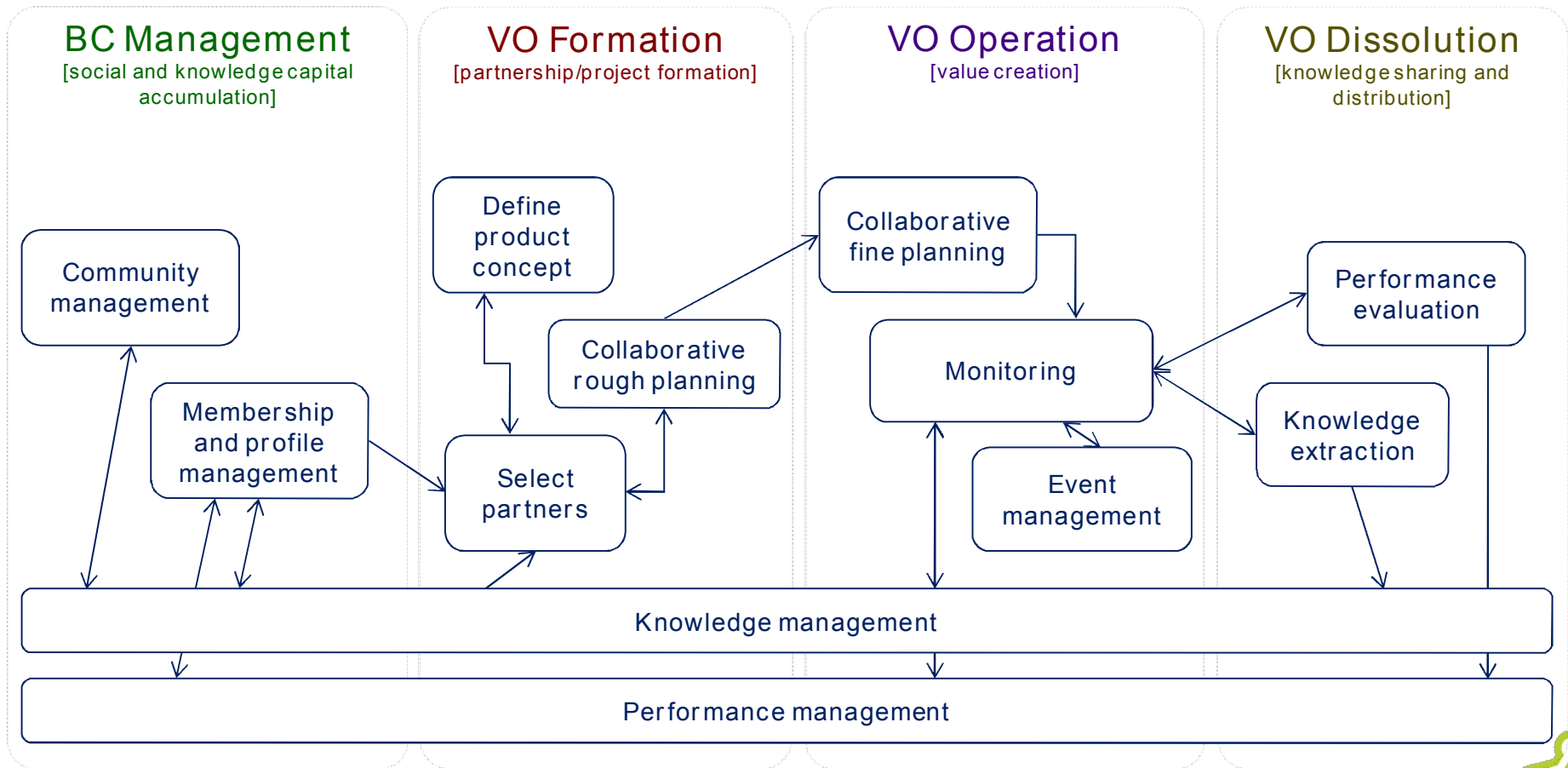
# Aggregate collaborative planning for NHN





# WP3. Decision Support Tools: System concept

- IT support tools for the complete lifecycle of enterprise networks:



# Manage shared view of a business opportunity

Net-Challenge Portal Welcome

Choose VO: Star T-shirt Calendar view: Week

← Year 2010 →

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52

- Star T-shirt**
- Wapice
- Make stars
- INESC Porto
- Make buttons
- VaasaUniversity
- Make zipper
- Ceni
- Make fabric

Right click the name on the left to edit it.

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OPEventManagementView

Choose VO: All

**Unconcluded events**

PRIORITY	NAME	TIME OF OCCURRENCE	VO	SOURCE	STATUS	MANAGE
<span style="color: orange;">●</span>	Employee strike	2010-09-15 12:01:41.0	Car manufacturing	INESC Porto	<span style="color: red;">✘</span>	<span>⚙️</span>
<span style="color: green;">●</span>	Ran out of material 3	2010-09-15 12:01:41.0	Car manufacturing	INESC Porto	<span style="color: red;">✘</span>	<span>⚙️</span>
<span style="color: green;">●</span>	Delay of material 1	2010-09-15 12:01:41.0	Big boots	TIE Nederland	<span>⏸️</span>	<span>⚙️</span>

**Concluded events**

NAME	TIME OF OCCURRENCE	VO	SOURCE	STATUS
Electricity problems	2010-09-15 12:01:41.0	Star T-shirt	Wapice	<span style="color: green;">✔️</span>
Machine breakdown	2010-09-15 12:01:41.0	Star T-shirt	Wapice	<span style="color: green;">✔️</span>
Employee strike	2010-09-15 12:01:41.0	Car manufacturing	INESC Porto	<span style="color: green;">✔️</span>

**Online Friends (1)**

👤 Sami Rintala

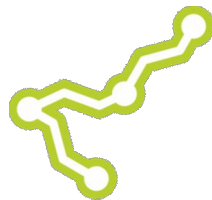
[Settings](#) [Online Friends \(1\)](#)

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## Conclusions and future developments

- **Dynamic and non-hierarchical business networks for complex products design and manufacturing is proposed as key contribution for European SMEs economic sustainability**
- **Initial results** related with the design and development of a framework to support SMEs in creating and managing Non-hierarchical networks for complex products design and manufacturing **were presented**
- **Next steps will include the validation** of the proposed methodologies, processes and ICT solutions on pilot companies, in real business scenarios **and corresponding improvement**



Thank you!

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