



**Istituto di Tecnologie Industriali e Automazione**  
Consiglio Nazionale delle Ricerche

from research .... to market



## European Research on Manufacturing Business Model innovation and recent industrial trends

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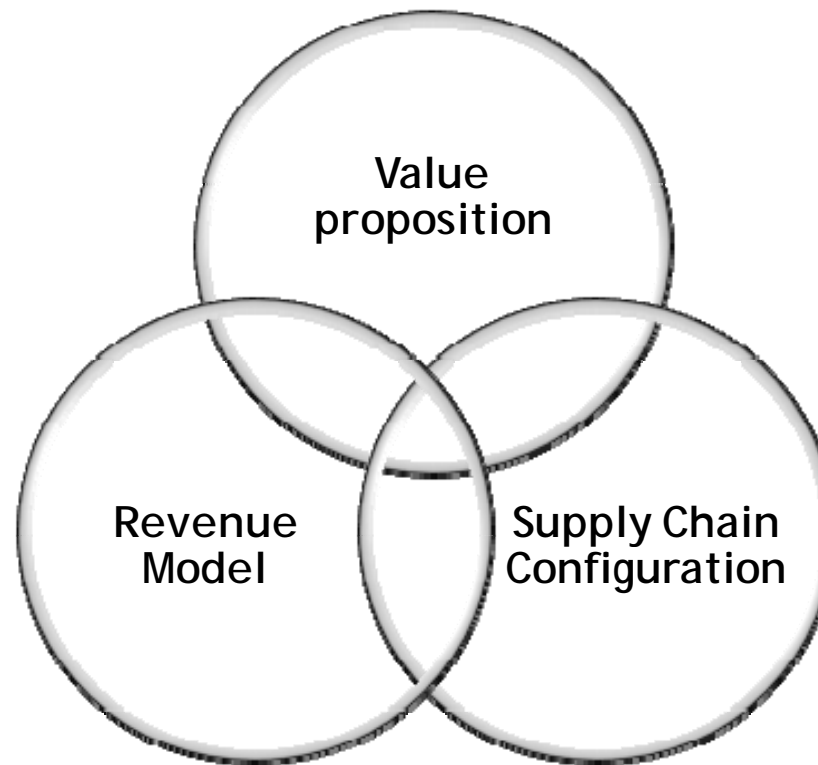
*MUSP, 06 March 2012*



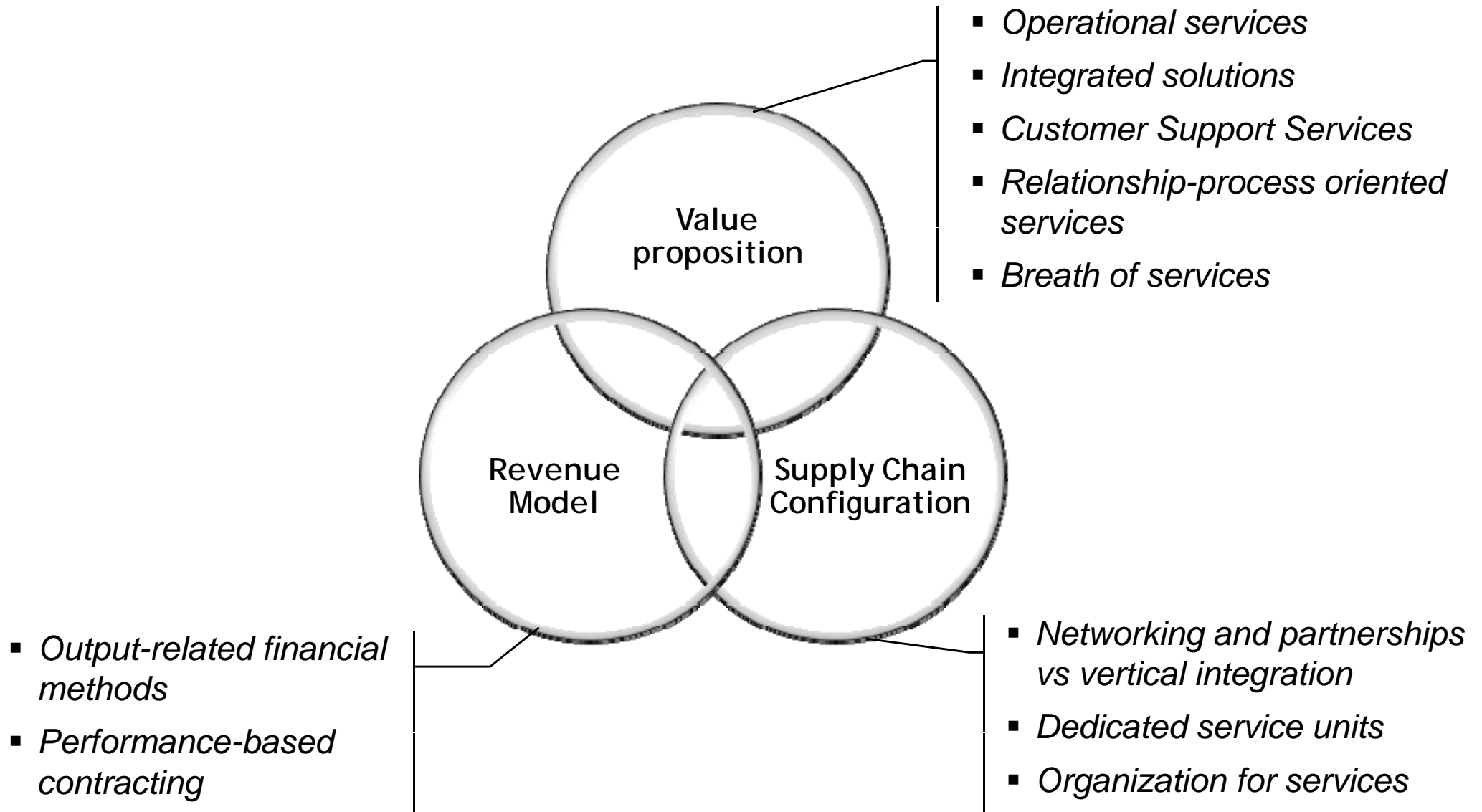
- What is Manufacturing Business Model
- European research on new business models for machinery
- Empirical evidence on the diffusion of new business models
- Conclusions

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## Business Model



## Innovative Service-oriented Business Model



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- Conclusions



**Mantys FP5**  
**Manufuture**

2001-2005

**Next FP6**  
**SMERobot FP6**

2005-2009

**Demat FP7**  
**KTRM FP7**

2010-2013

## Next

### Thematic network on manufacturing technologies

Growth FP5

Number of participants: 20

Budget: 2 million euro

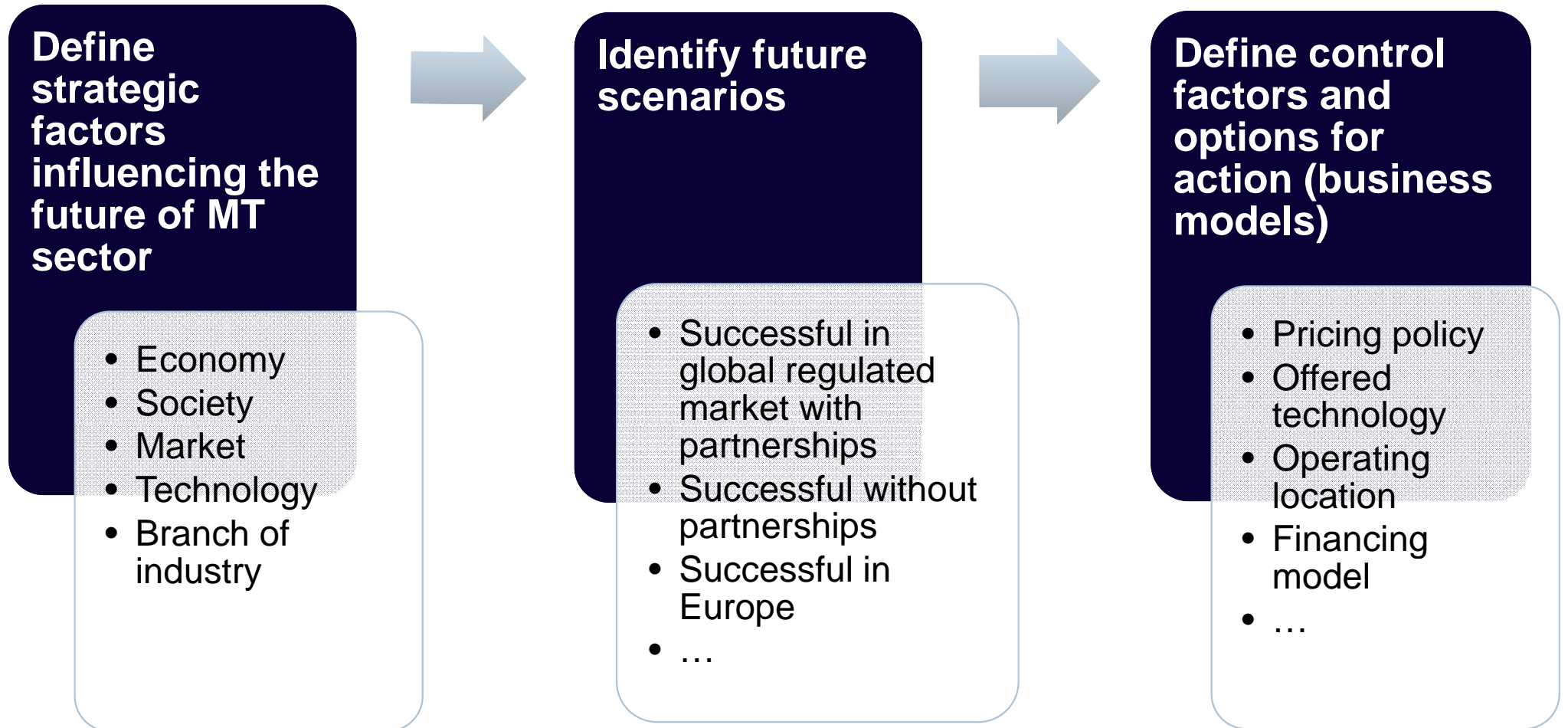
Time frame: 2001-2005

#### Three pillars:

- **Technology Watch** in technological areas (Reliability, Process monitoring & Control; "Agility - Flexibility"; Process ECO-Efficiency; Precision Engineering; Virtual Manufacturing)
- **Understanding the Socio-Economic Aspects** of the machine tool business
- **Foresight Exercises** to look into the future of manufacturing technologies (Technology Roadmaps; New Business Models; etc.)

<http://www.mantys.org/>





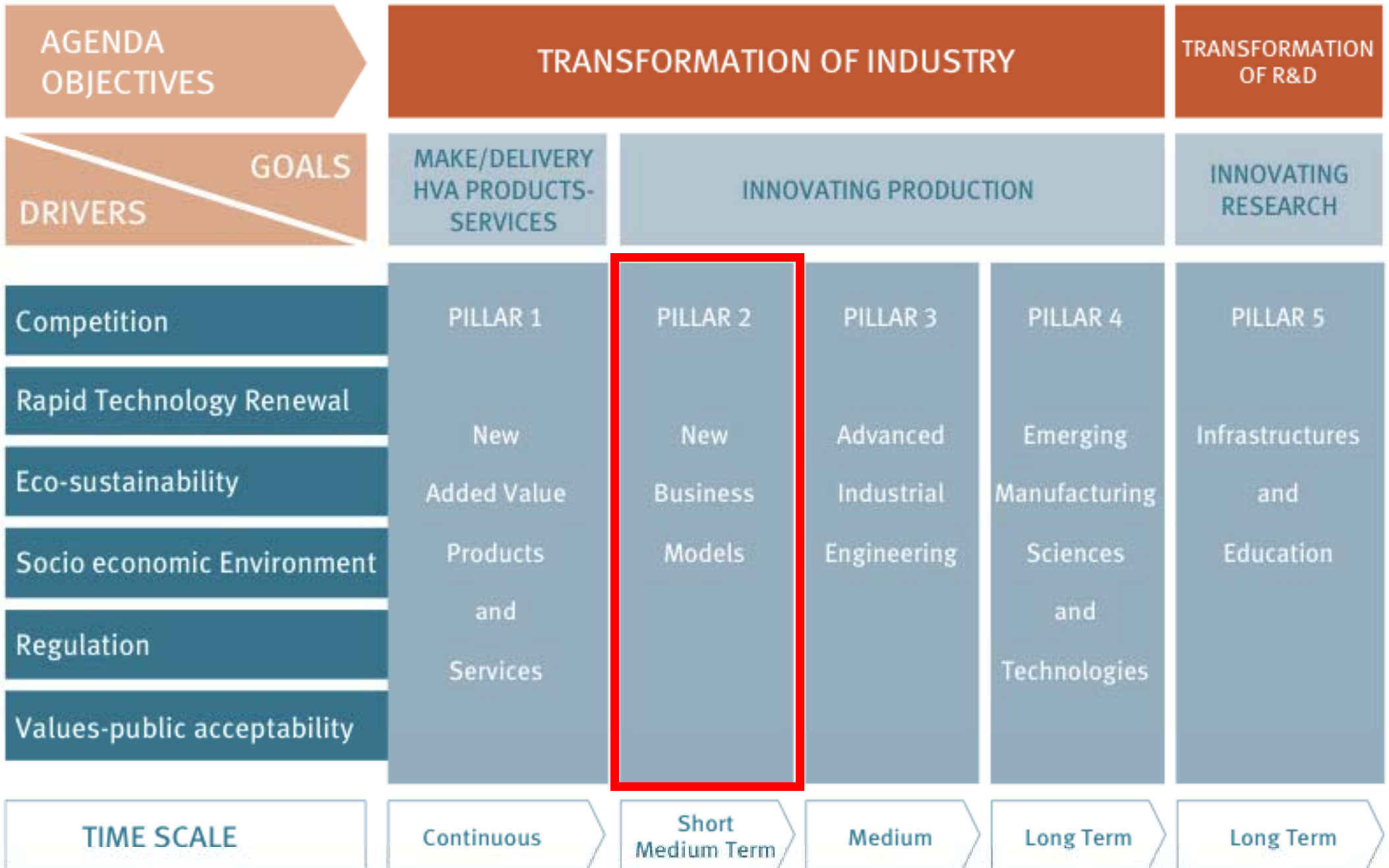


# Business Models in Mantys

Control Factors
1 Volume and added value of solution (as agreed by customer and supplier)
2 Systems integration Capability
3 Innovation Strategy of MT-builder
4 Pricing policy of MT-builder
5 Offered Technologies
6 Service/Maintenance
7 Operating location
8 Financing Models
9 Development Process
10 Single/multi customer operation
11 Payment
12 Operating Personnel (Manufacturing)
13 Ownership (during phase of use)
14 Ownership (after phase of use)
15 Life-Cycle-Management

Options for Action			
High volume high value production	Low volume high value production	High volume low value production	Low volume low value production
Offering complex machinery/systems		Offering single machine tool	
Innovative Leader		Follower	
Competition on performance		Competition on price	
High-tech machinery with smart usage properties		High tech machinery with sophisticated usage properties	
Only Service on demand	Collaborative Service Model	Full-Service Offer	
Job-order manufacturing	Pre-Production proving	Operation at users location only	3rd party manufacturing
Manufacturers bank	3rd Party Financing	Investment of the user	
Sharing of selected information	Complete information sharing	Secluded Development	
Simultaneously operation for multi customers		Operation for a single customer	
Pay on production	Pay for availability	Minimum quantity guarantee	Pay for equipment
Equipment Producer	Operating Agency	Customer	
Equipment Producer	Leasing Bank	Operating 3rd party	Customer
Equipment Producer		Customer	
Competence of Machine-Producer	LCM-Joint Venture	Competence of Customer	3rd party competence

Source: Mantys Final Report, "Development of a Generic Business Model for the European Machine Tool Industry", 2005



Source: Manufuture Strategic Research Agenda, Report of HLG, 2006

## Next

## Next Generation Production Systems

NMP FP6

Number of participants: 23

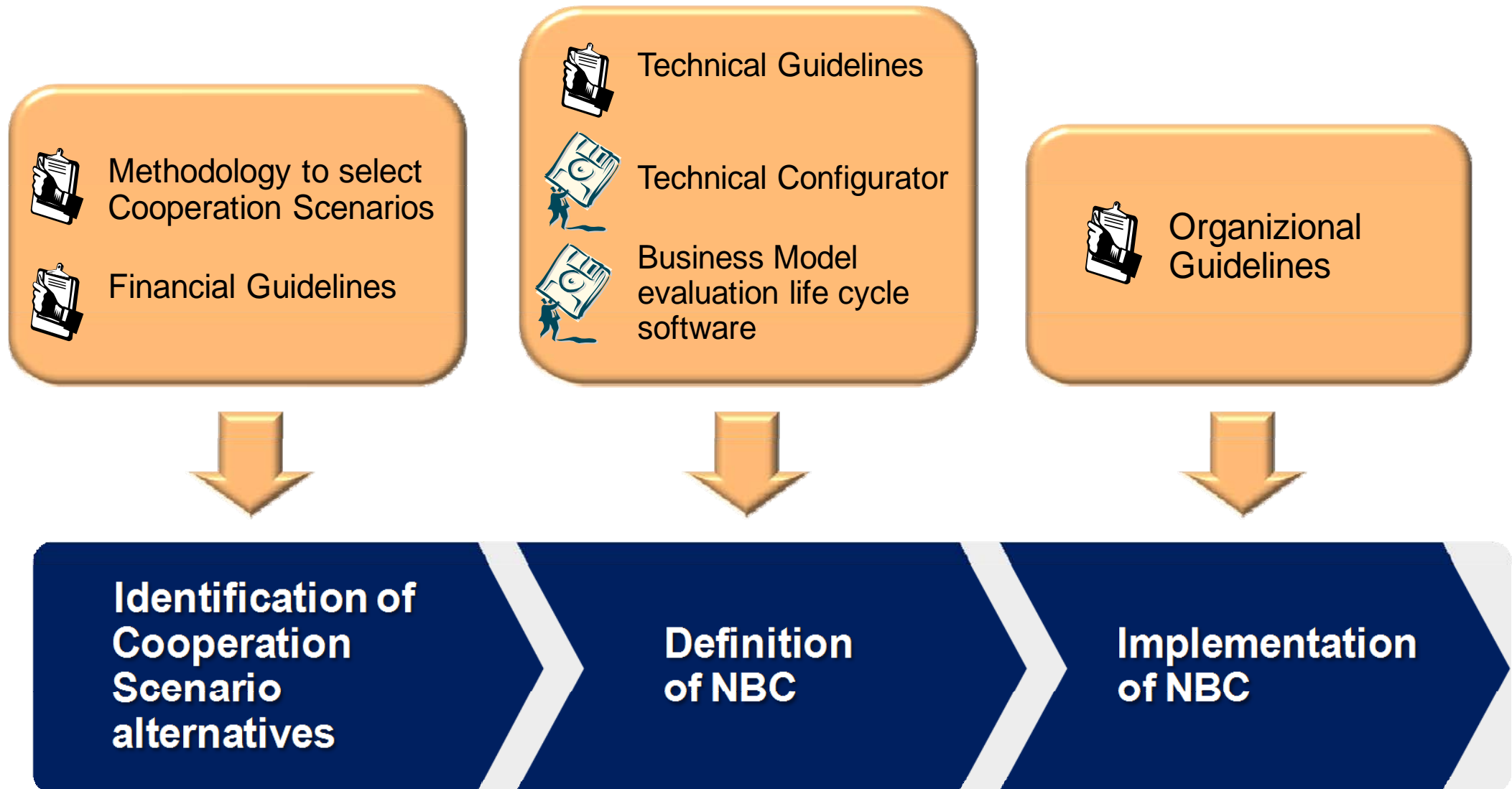
Budget: 21 million euro

Time frame: 2005-2009

The biggest EU research initiative in the machine tool sector in FP6

One of the 40 most successful projects in whole FP6 funded research (selected to launch Horizon 2020 and to be presented at the EU Industrial Technologies conference 2011)

WP4: “New Business Concepts for Machinery”  
(ITIA-CNR)



Availability/TCO guarantee

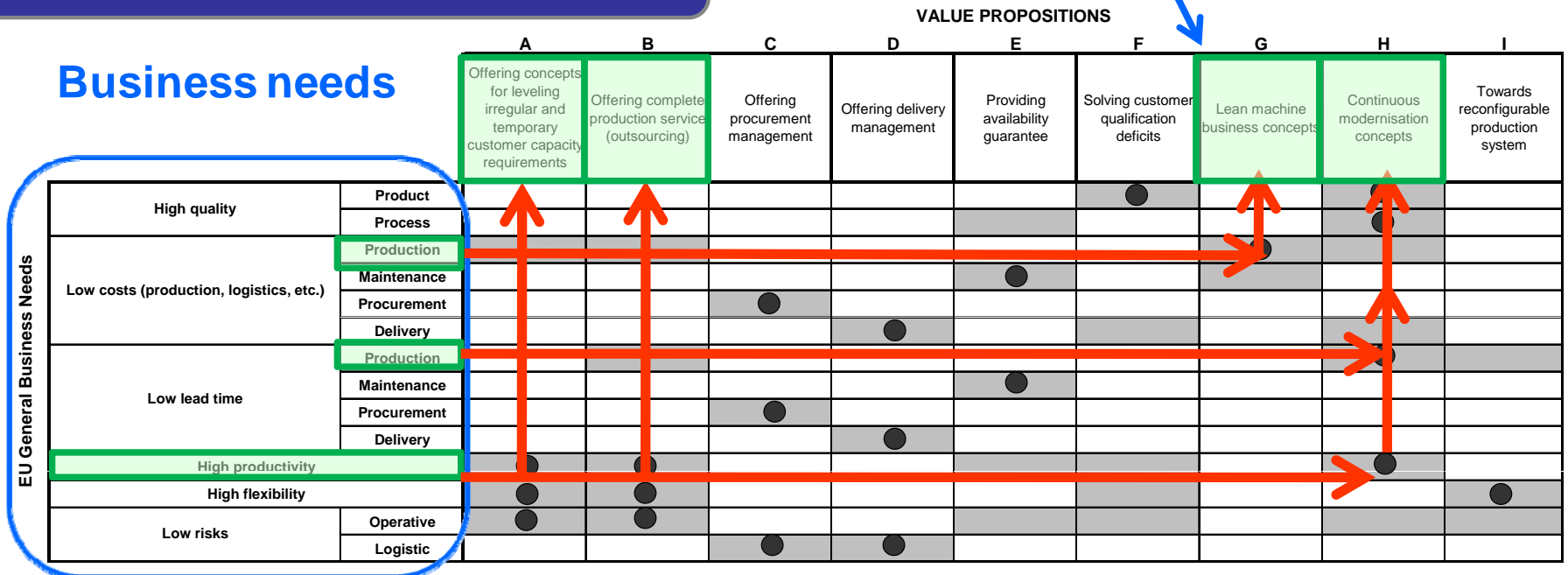
Providing personnel assistance for customer operations

Production service to cover peaks/spot demands

Build - (operate) - own business model

Lean machine adaptation service

## Value propositions



Guide for potential financing mechanisms for machine builders, suggesting which options are suitable for different industrial and organizational situations

### Decision Drivers

- Availability of internal funds
- Firm size
- Firm legal form
- Firm age
- EU rating
- Export
- Financial skills
- Availability of commercial credits
- Investment value
- Market predictability
- Periodicity
- Multi-product machine
- Machinery reconfigurability
- Existence of balance sheet constraints/fiscal benefits
- Desired payment time horizon

Delete All  
(Double Click)

### Financial Models Suggested

Name	Capital Type
Bank loan	Debt capital
Trade credits	Debt capital
Overdraft	Debt capital
Operating Leasing	Debt capital
Financial Leasing	Debt capital
Factoring	Debt capital
Forfaiting	Debt capital
Commercial paper	Debt capital
Bank advances	Debt capital
Project financing	Debt capital
Bonds	Debt capital
Stand-by lines of credit	Debt capital
Syndicated lending	Debt capital
Venture leasing	Service capital
Self-funding	Risk capital
Capital call Internal funds	Risk capital
Barter, Comp. deal, Counter-purch., Buy back	Counter trade
Pay per Part	New instruments
Pay per Use	New instruments
Pay for Availability (exclusive right)	New instruments

```

graph TD
    Start([Enter the first filter]) --> Q1{Has the market demand peaks?}
    Q1 -- no --> End4([End 4])
    Q1 -- yes --> Q2{Is the machine multi-product?}
    Q2 -- yes --> Selection[Selection from transitional list of available financial instruments]
    Q2 -- no --> End4
    Selection --> End4
    
```

Additional labels in the flowchart: "Branch 2", "Yes long term", "transitional list of financial instruments", "End 4", "Pay per Part", "Pay per Use", "Pay for Availability".

Software to configure production systems technology for new business models

The screenshot displays the 3DCreate 2009 SP2 software interface. The main window shows a 3D model of a Soraluze Milling Machine. The interface is divided into several sections:

- Configuration Panel (Left):** Contains various settings for the machine, including:
  - Cost: 155 655.40 €
  - MTBF: 102.85 h
  - MTTR: 19.52 h
  - Mass: 29 578.00 kg
  - Longitudinal traverse (X) [mm]: 8000
  - Vertical traverse (Y) [mm]: 2000
  - Cross traverse: 1250
  - Feed / Rapid traverse [mm/min]: 5,000 / 15,000
  - CNC: Fidia C10-S, flat screen TFT
  - Automatic indexing head: 1 5 $\phi$  x 5 $\phi$  / 30 kW / 1,240 Nm / 3,000 rpm
  - Fixed boring head: 1 3,000 rpm / 28 kW
  - Fixed head with automatic rotary head: 1 4,000 rpm / 30 kW
  - Orthogonal head: 1 1 $\phi$ x1 $\phi$  / 30 kW / 1,140 Nm / 4,000 rpm
  - High frequency spindle: 4.5 kW / 3 Nm / 30,000 rpm
  - Coolant / Lubrication system(s): Coolant systems with low-pressure pump (3 bar)
- 3D Model (Right):** Shows a 3D rendering of the milling machine with a yellow frame and a green workpiece. The model is set against a blue background with a coordinate system (x, y, z).
- Manufacturing System Attributes (Bottom Right):** A list of key performance indicators:
 

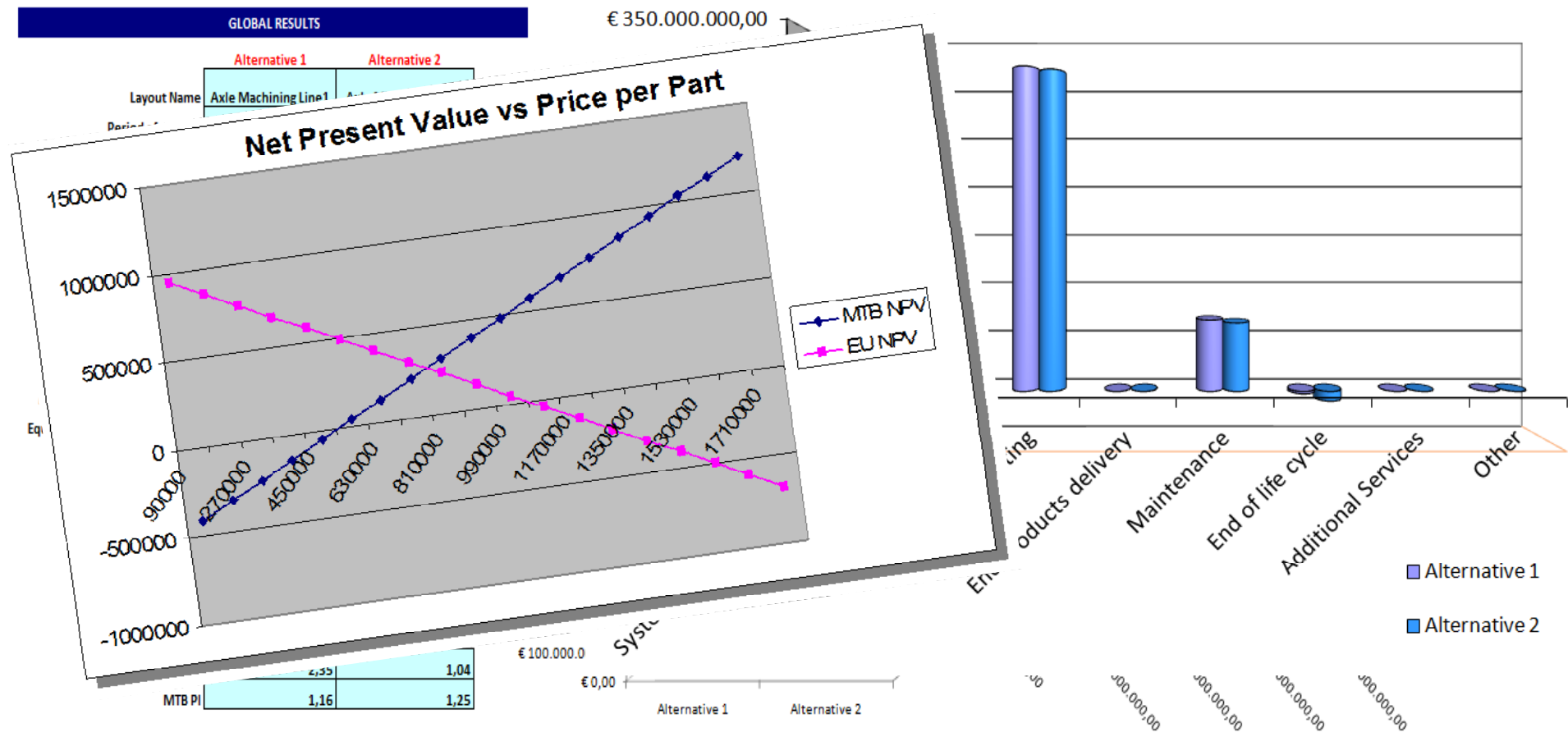
Cost [€]:	1 769 420.00
Price [€]:	0.00
MTBF [h]:	123.65
MTTR [h]:	24.67
Mass [kg]:	336 509.00
Waste rate [%]:	3.94
Throughput [part/min]:	0.60
Numb. of operators:	5.00
Skill level of oper.:	1.71
Energy cons. [kW/h]:	1 144.00
Water cons. [m3/h]:	0.00
Gas cons. [m3/h]:	0.00
Air cons. [m3/h]:	1.70
Oil cons. [l/part]:	0.17
Fluid cons. [l/part]:	230.00
Tools cons. [€/part]:	17.00
- Navigation and Tools (Top):** Includes a menu bar (File, Edit, View, Simulation, Tools, Help) and a toolbar with icons for New, Open, Save, Orbit, Pan, Zoom, Fill, Select, Trans, Rot, PrP, and Interact. A timer shows 00:00:00.



Catalogue and guidelines to select suitable organizational forms to implement the business model (new company, new department, project structure, etc.)

Criteria			Weight (%)
<b>Results</b>			20%
			0%
Rank	Organisational Structure	Assessment	40%
<b>1</b>	<b>Subsidiary Company</b>	<b>7,75</b>	40%
2	Separate Division	6,95	0%
3	Project Organisation	5,80	
4	Joint Venture	5,80	0%
5	Integration into existing divisions	4,65	
6	Network	3,80	
7	Subcontracting	2,50	
			<b>100%</b>

Software to economically and environmentally compare the performance of different business model options for machine builder and customers



## SMERobot

### The European Robot Initiative for Strengthening the Competitiveness of SMEs in Manufacturing

NMP FP6

Number of participants: 21

Budget: 25 million euro

Time frame: 2005-2009

Business Models studied in WPs “Socio-economics” and “Exploitation”  
(Faunhofer ISI)

<http://www.smerobot.org/>

## DEMAT

### Dematerialised Manufacturing Systems: A new way to design, build, use and sell European Machine Tools

NMP FP7

Number of participants: 16

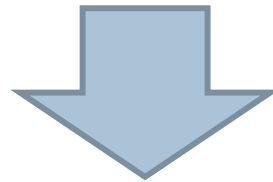
Budget: 4,7 million euro

Time frame: 2010-2013

WP4: “Sustainable and innovative business models”  
(Fraunhofer ISI, ITIA-CNR)

<http://www.dematproject.eu/>

- **Dematerialized production systems: higher flexibility**
- **Methods for focused-flexibility design: optimal flexibility**



New business models for focused-flexibility production systems

- New service-based business models
- New methods for financial assessment and risk management

## KTRM

# Knowledge Transfer of Rapid Manufacturing

LdV FP7

Number of participants: 7

Budget: 310.000 euro

Time frame: 2010-2012

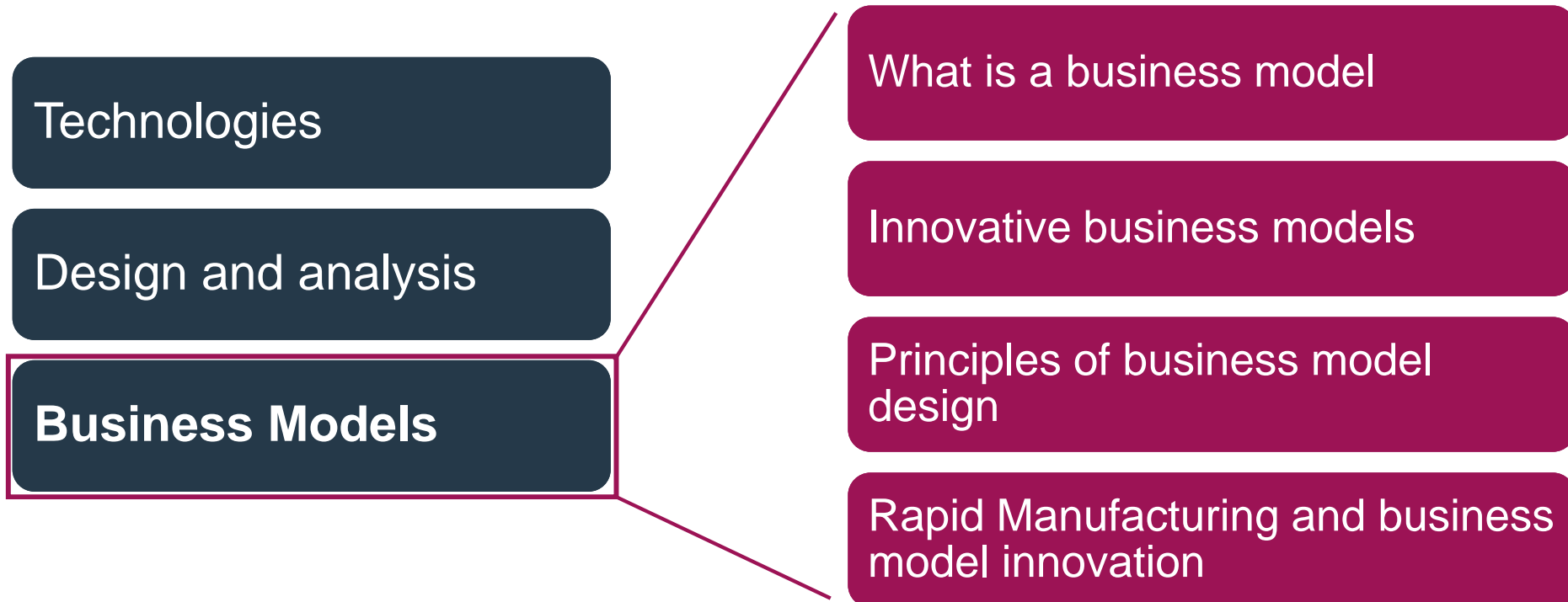
## Rapid Manufacturing Business Models

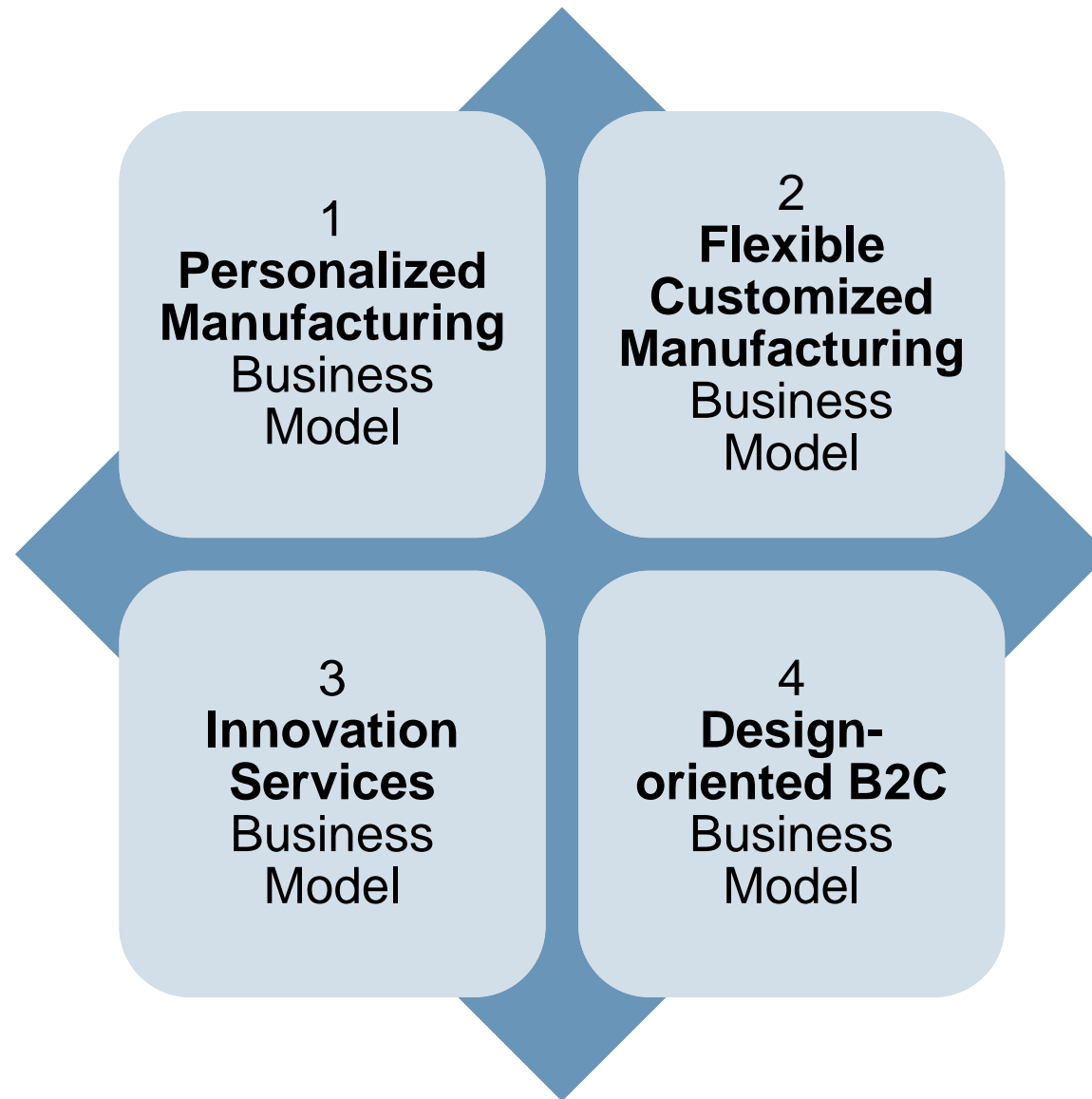
*<http://www.rapidmanufacturing-training.eu/>*

## Scope

To transfer companies the state of the art and latest research results on Additive Manufacturing:

- e-learning addressed to companies (especially SMEs)
- text book

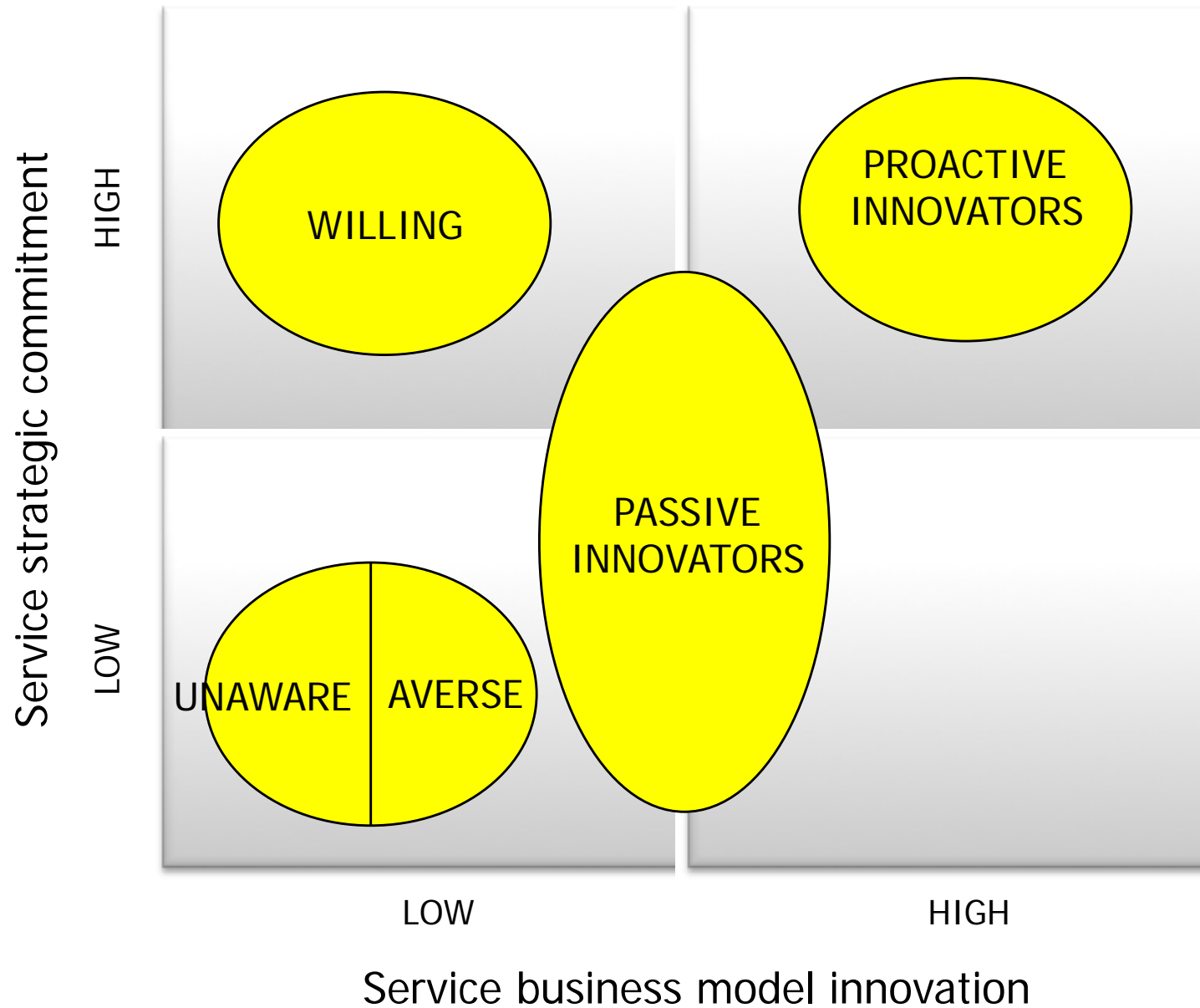




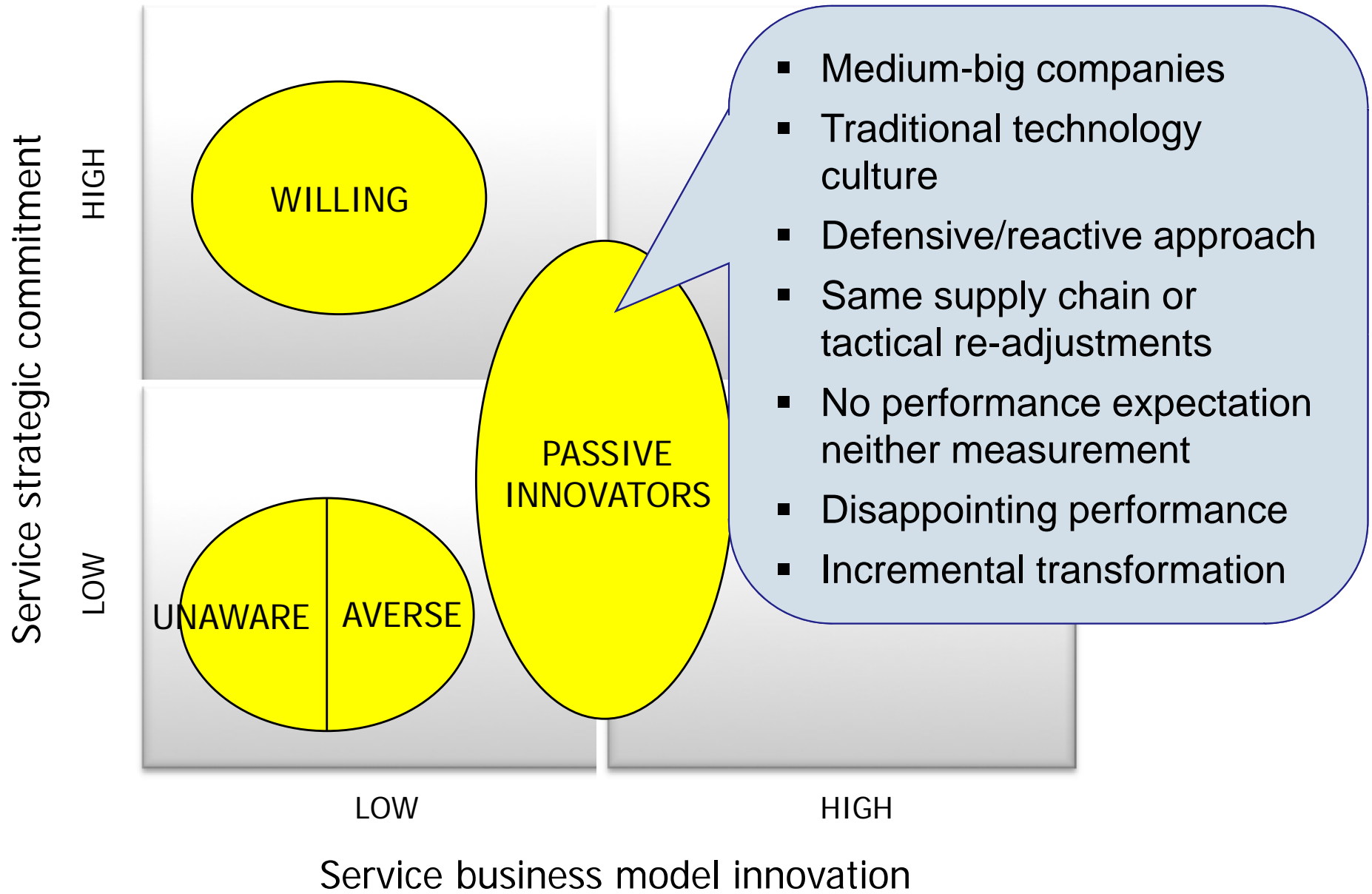


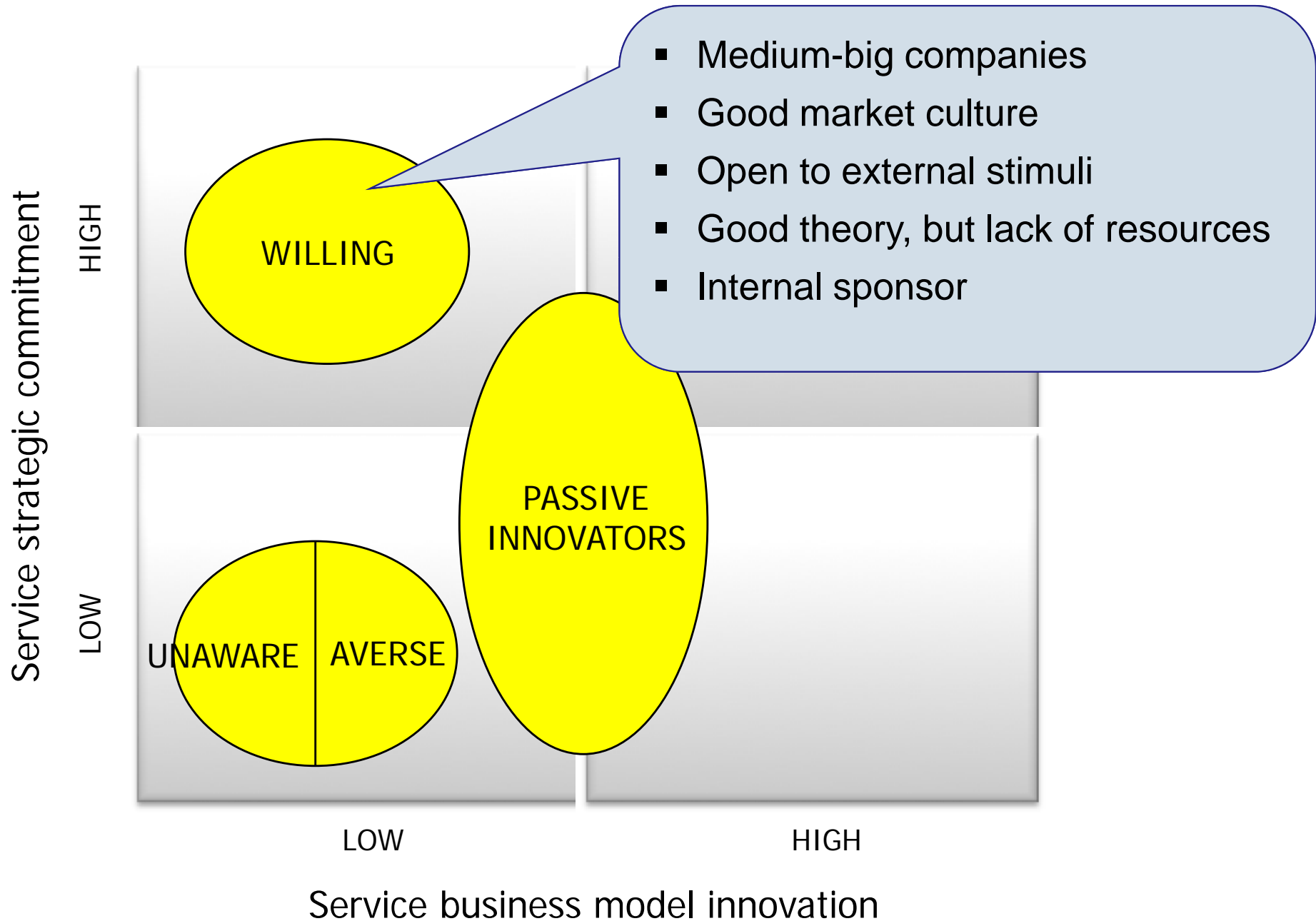
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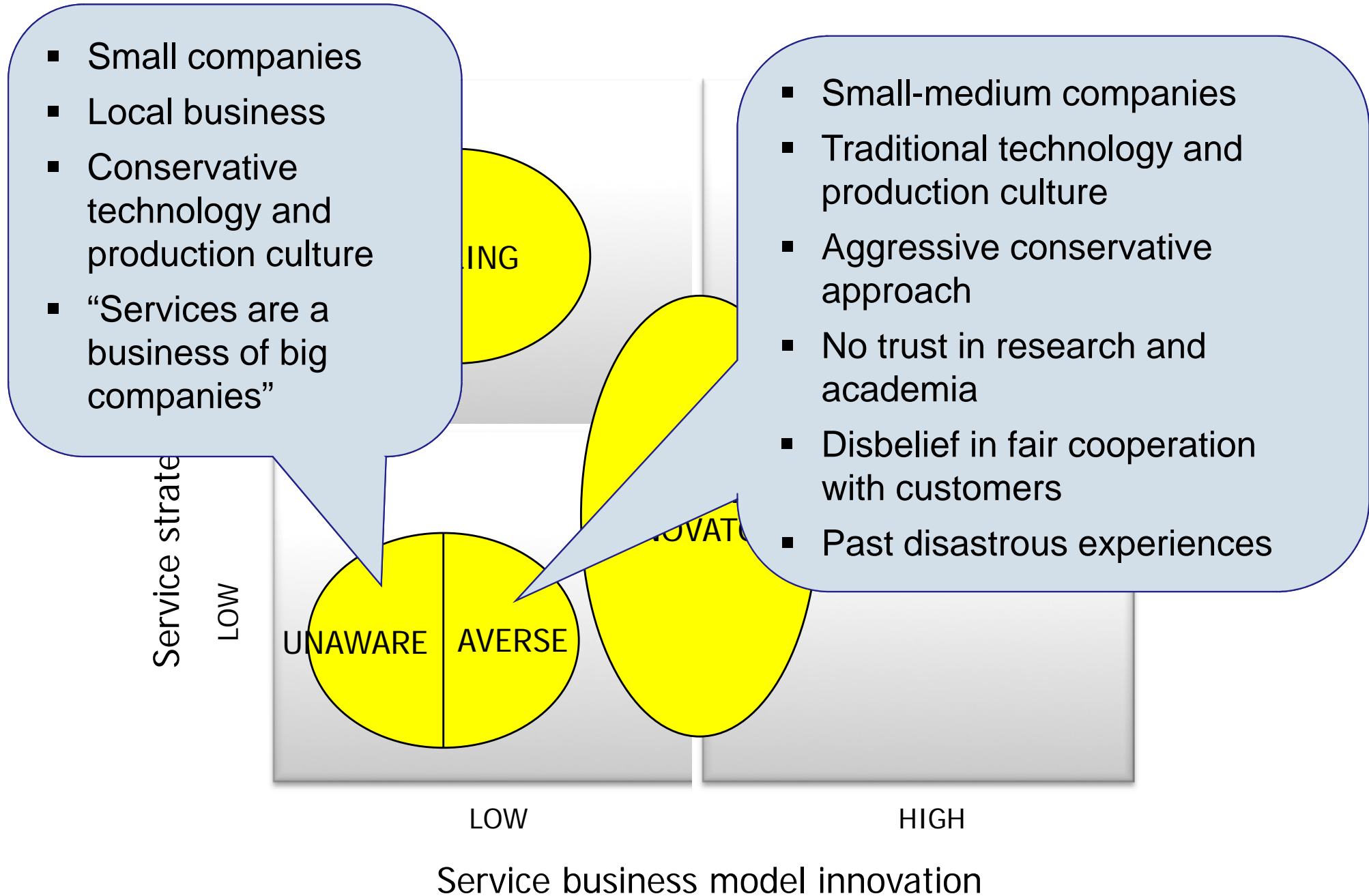
- **15 case studies** of machine tool companies:
  - OEM and key-components suppliers
  - Large, medium and small companies
  - Countries: Germany, Italy, Spain, UK, Finland, Sweden
- **16 case studies** of machine builders customers:
  - Automotive, aeronautics, mechanicals
  - Large, medium and small companies
  - Countries: Italy, Germany, France
- **Focus groups at “Cecimo Spring meeting 2009”**
  - Business models focus groups
  - 15 European Associations of machine builders
- **Econometric analysis** on “European Manufacturing Survey” data:
  - International survey on manufacturing innovation lead by Fraunhofer Institute ISI (ITIA-CNR is Italian partner)
  - 80 machine tool companies from Germany, Austria, Switzerland, Spain, France

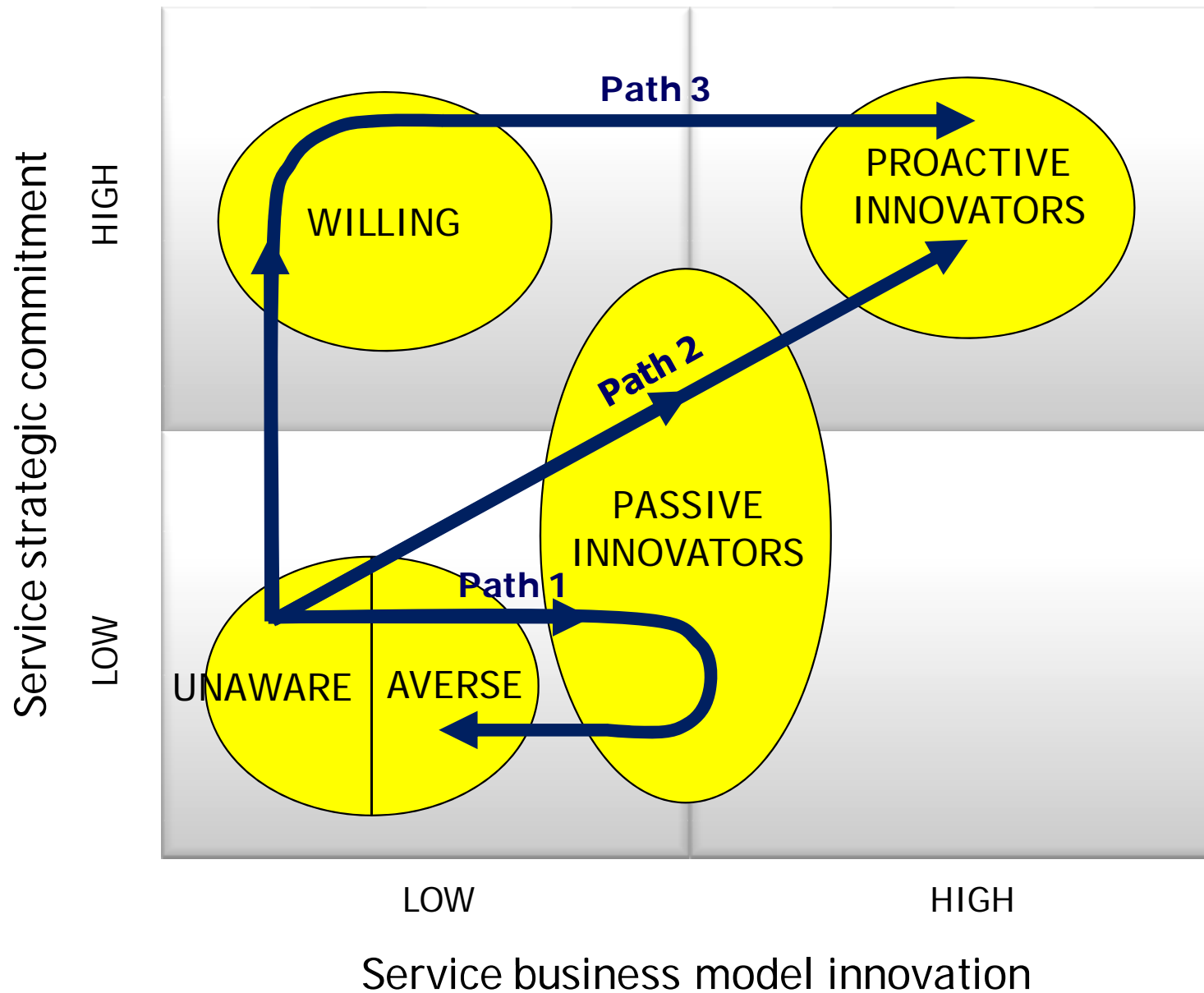




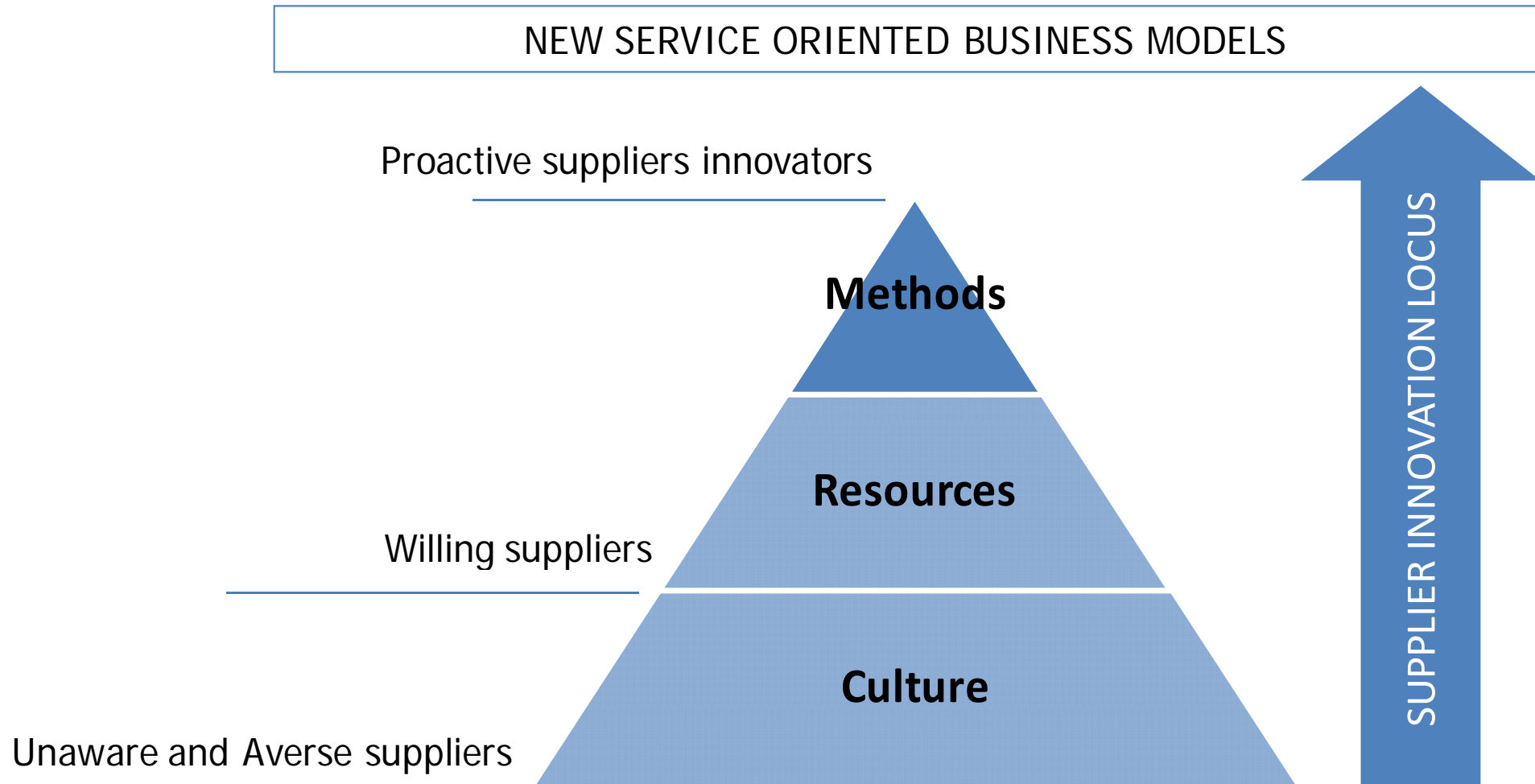


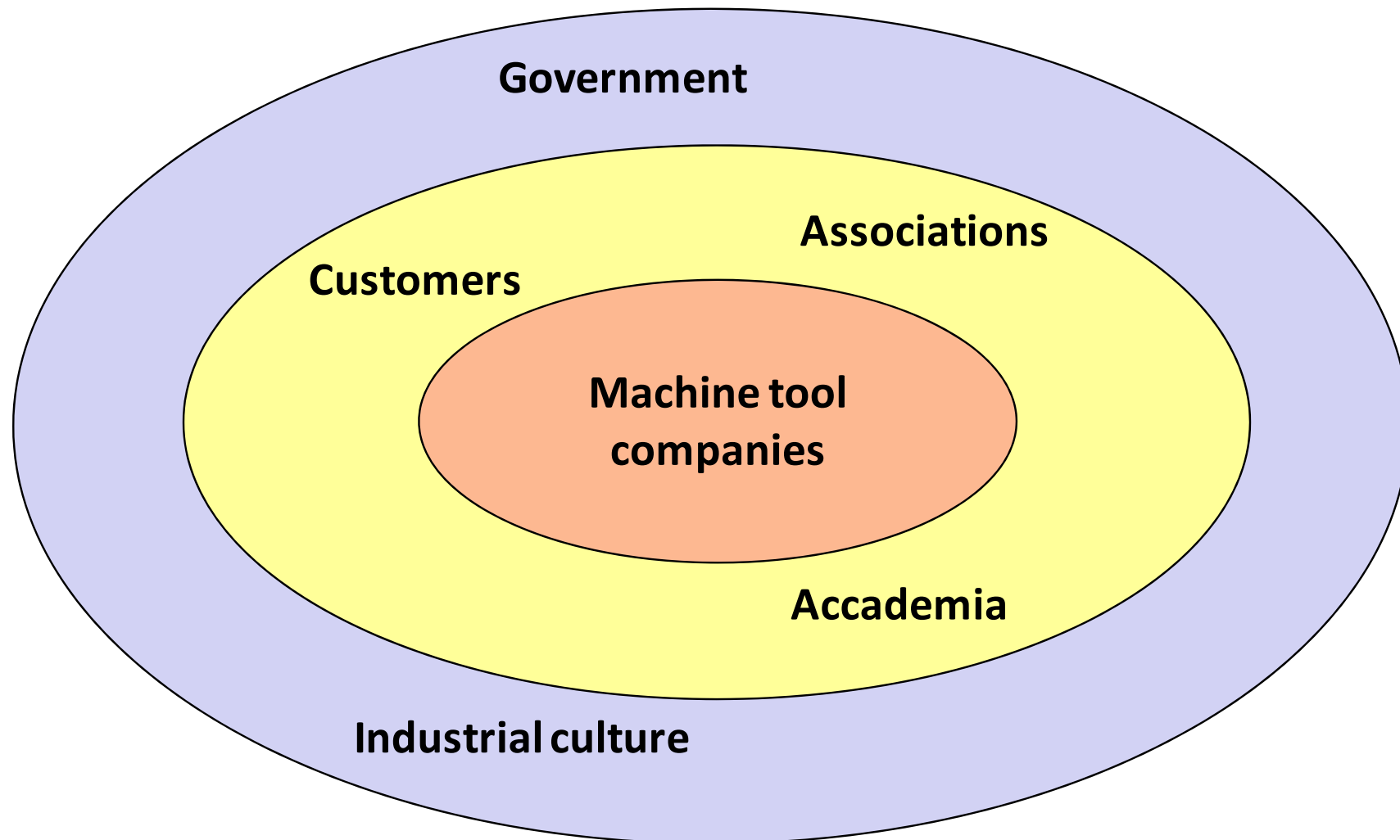


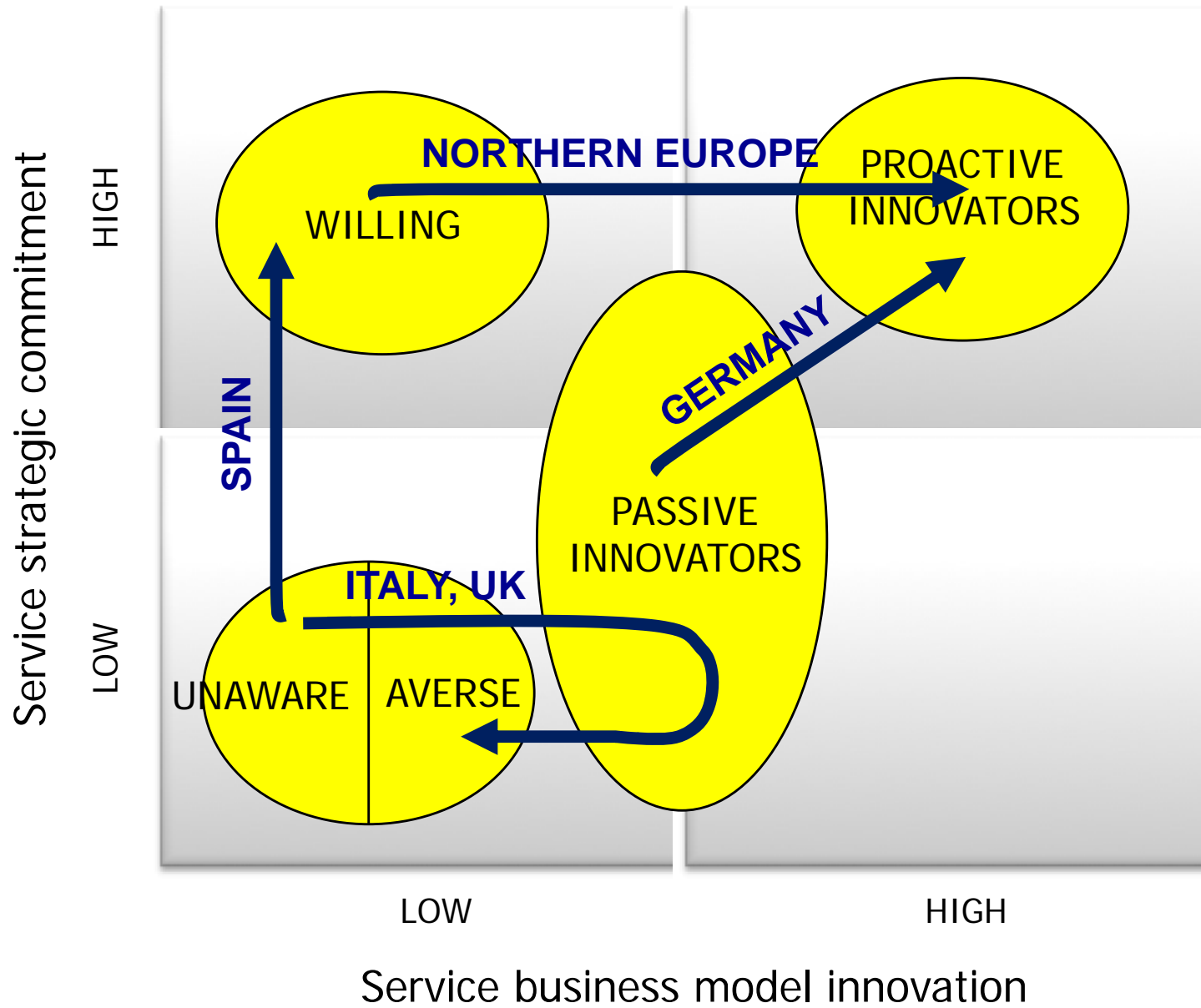


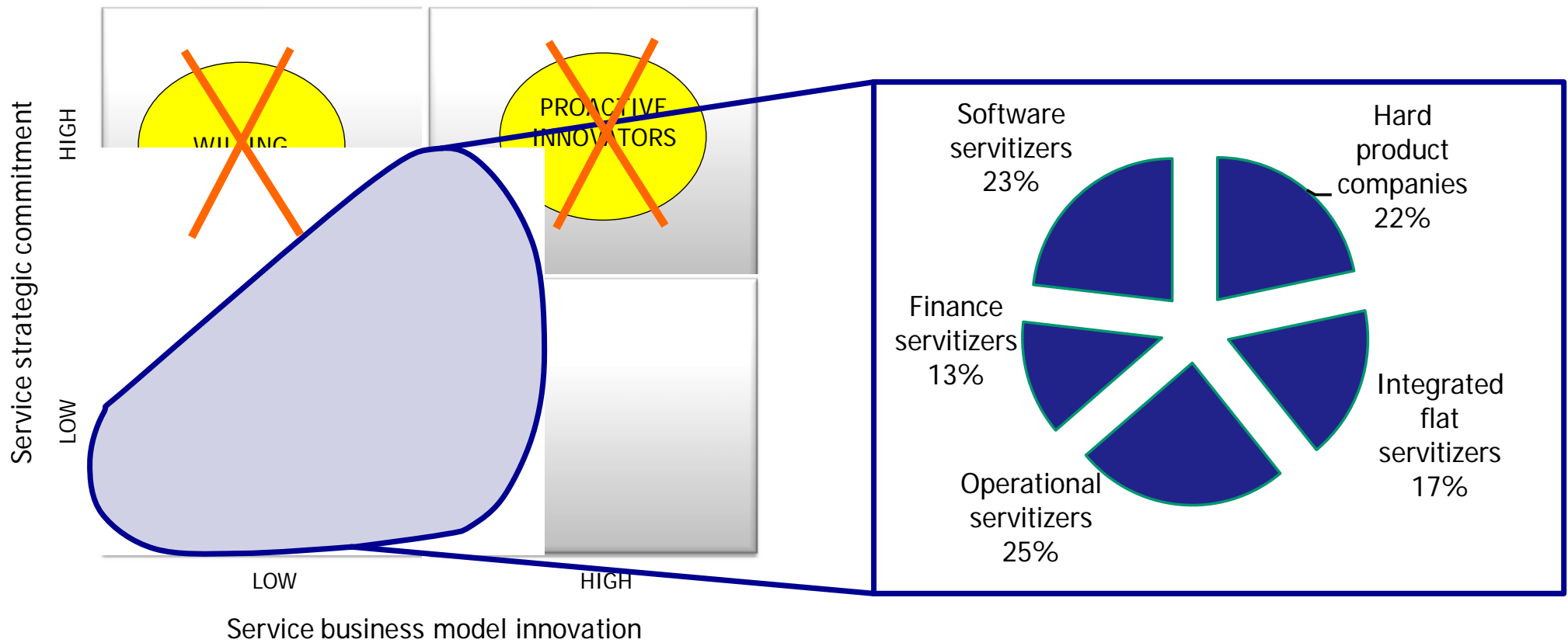












## Poor service business model innovation:

- Service offerings are spread, but companies rely on traditional services
- No joint innovation of the three business model pillars
- No flexibility-oriented business models and performance-based contracting
- Specialization in some value-added services

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- **EU has invested and is investing significantly** in new machinery business models research
- Past and ongoing research made **available results and new competences** companies might use
- However, **business model innovation in the machine tool sector seems to be in an early stage**
- Different **cultural and environmental conditions** in Europe
- **SMEs are currently out of the game**
- The transition is **very complicated**



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Thank you for your attention!

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