

## MODELLING A BUSINESS ECOSYSTEM: A NETWORK ANALYSIS APPROACH

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#### DATA, DIGITAL BUSINESS MODELS, CLOUD COMPUTING AND ORGANIZATIONAL DESIGN

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### Agenda

- Introduction
- Theoretical background
- Research strategy
- Proposal of a methodology for business ecosystem analysis
- Field study
- Discussion and conclusions

### **BUSINESS ECOSYSTEM DEFINITION**

"A business ecosystem is an **economic community** supported by a foundation of interacting organizations and individuals - the organisms of the business world. It has a complex relational structure with a high level of reciprocal dependence.

Over time, members **co-evolve** their capabilities and roles, and tend to align themselves with the directions set by one or more central companies. Coordination and collaboration are aimed to create and share value among all the components of the network. They enable members:

- to move toward shared visions
- · to align their investments
- · to find mutually supportive roles."

Moore, 1993; lansiti and Levien, 2004

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#### VALUE CHAIN AND VALUE NETWORK VS BUSINESS ECOSYSTEM

	VALUE CHAIN	VALUE NETWORK	BUSINESS ECOSYSTEM			
	Porter, 1985	Allee, 2002	Moore, 1993; lansiti and Levien, 2004			
FOCUS	value creation pro	cess of the firm	complex inter-firms relationships form the background of the value creation process			
RELATIONSHIPS	volatile supplier/buyer relationships		network of multi-directional relationships with firms with shared values and interests			
ADVANTAGES	accumulated value generated by monetary relationships		also non-monetary advantages – social capital			
FINAL RESULT	Sustainability of th	Long term sustainabili whole community				

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#### UNDERSTANDING THE ECOSYSTEM

Static view - shape and behaviour pattern:

- Architecture: ecosystem components and technological, organizational and product boundaries
- Integration: relationships and collaborations among companies
- Market management: transitions and balance of power that guarantees their existence

#### Dynamic view:

 understanding how it can evolve by monitoring the evolutionary trends with all the variables involved



Need of methodologies to help companies in analysing and monitoring their ecosystems from a static and dynamic point of view, and investigating how it can potentially impact their businesses.

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#### MODELING APPROACHES OF VALUE NETWORKS AND BUSINESS ECOSYSTEMS

MODEL OR METHODOLOGY	INVESTIGATED OBJECT	CRITIQUES					
e3-value modeling (Gordijn et al., 2000)	Value network (theoretical basis: industrial view)	Based on agent modeling; Lack of a clear strategic focus in the model weakens its ability for prescriptive strategic insights					
c3-value model (Weigand et al., 2007)	Value network (theoretical basis: resource-based view)	Based on agent modeling; It focuses on the direct competitor and the direct customer; It neglects the inter-dependencies and the potential given by the network perspective					
Value network model of intangibles (Alee, 2002)	Value network	Analysis is mostly visual; It assumes that value is created through exchanges; It is focused on intangibles exchanges; It does not assign a purpose to the network; It assumes that the network is not manageable; It limits potential for strategic analysis					
Agent based methodology (Marin et al., 2007)	Business ecosystem	Based on agent modeling; Focused only on tangible exchanges.					
BEAM: business ecosystem analysis and modeling (Tian et al., 2009)	Business ecosystem	Based on agent modeling; Lacks of a strategic focus					

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#### **RESEARCH AIM**

# How is it possible to systematically study the structure and fluxes of a business ecosystem?

The present work is meant to help widen the knowledge basis on management of ecosystems and proposes a methodology based on network analysis and foresight for analyzing and modeling the ecosystems.

# Methodology Of Business Ecosystem Network Analysis (MOBENA)

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### **RESEARCH STRATEGY**

#### THEORETICAL PROPOSAL

Proposal of the *methodology of business ecosystem network analysis* (MOBENA)

derived from analysis and combination of literatures of Strategic Management, Network Analysis and Foresight

#### **FIELD STUDY**

The case study research design can be used to describe an intervention and its context (Yin, 2003). Some authors refer to this as a "field experiment".

In this study, the intervention is the application of the proposed methodology, and the context is the company studied and in particular one of its ecosystems (the digital image ecosystem).

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### CHOICE OF THE FIELD STUDY

#### TLC industry

- technological innovations headed by ICT and TLC go beyond the value chain where they have been originated to attract the interest of other value chains which are so far remote, with different actors, interests and market objectives
- previous business models can change and latent or even not existing markets (and consequent business models) can emerge

#### Telecom Italia

- exemplar case
- Telecom Italia Future Centre: unit focused on economical studies and investigation of the future

#### Digital imaging ecosystem

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#### METHODOLOGY OF BUSINESS ECOSYSTEM ANALYSIS

#### ECOSYSTEM PERIMETER, ELEMENTS AND RELATIONSHIPS

- Define the meaning of the ecosystem, decide what identifies it and identify what defines its boundaries.
- Detail the information to be collected as regards the constitutive elements and their relationships.

#### 2. ECOSYSTEM MODEL REPRESENTATION

Develop a representation model

#### DATA VALIDATION

Obtain criteria to validate the model

#### 4. ECOSYSTEM ANALYSIS

Evaluation of the ecosystem's behaviours (last, current, future) and relevant key indicators.

#### 5. ECOSYSTEM EVOLUTION

Simulation of different scenarios aimed to perform what-if analysis, trend analysis, classification, forecasts.

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PHASE 1: ECOSYSTEM PERIMETER, ELEMENTS AND RELATIONSHIPS								
<b>PHASE and OBJECTIVES</b>	CONTENT	DELIVERABLE						
ECOSYSTEM PERIMETER, ELEMENTS AND RELATIONSHIPS  • Define the meaning of the ecosystem, decide what identifies it and identify what defines its boundaries.  • Detail the information to be collected as regards the constitutive elements and their relationships.	<ul> <li>Identify the seed – the actors' attractor and the leverage for business.</li> <li>Identify the elements and their connections. Elements: players, technologies, products/services and environment (market, constraints and regulation forces)</li> <li>connection matrix: per each couple of variable it will be indicated: 0 - no relationship is on 1 - if a link already exists and is intangible, 2 - if a link already exists and is tangible, 3 - if a possible relation can be formed in a near future</li> </ul>	1. TECHNOLOGY WORKBOOK 2. PLAYERS INFORMATIONS 3. CONNECTION MATRIX						

## PHASES 2 AND 3: ECOSYSTEM MODEL REPRESENTATION AND DATA VALIDATION

PHASE and OBJECTIVES	CONTENT	DELIVERABLE
ECOSYSTEM MODEL REPRESENTATION  • Develop a representation model	Translate in a graphical way the connection matrix: oriented graph; links and nodes characterized in a quantitative way; weight to each kind of relationship	4. ECOSYSTEM REPRESENTATION MODEL
<ul><li>DATA VALIDATION</li><li>Obtain criteria to validate the model</li></ul>	Brainstorming; existing literature; research conducted by specialists from reference markets; official documents (budgets, communication to the financial community, business plans, etc.); direct contact with the actors that belong to the potential ecosystem; consulting experts in modeling complex systems	5. ECOSYSTEM REPRESENTATION MODEL VALIDATED

### PHASE 4: ECOSYSTEM ANALYSIS

PHASE and OBJECTIVES	CONTENT	DELIVERABLE
ECOSYSTEM ANALYSIS  Evaluation of the ecosystem's behaviours (last, current, future) and relevant key indicators.	<ul> <li>■ revenues: quantify the economic dimension of the ecosystem</li> <li>■ economic structure: understand how this value is shared among the various players: physical structure, revenues attraction, attractiveness, relationship, assets &amp; technologies</li> <li>■ Ecosystem control point analysis</li> <li>■ identification of control points ("points at which management can be applied" - business strategy, regulation, and/or technology); control points constellation: put control points in a logical sequence, represent integrated control points as joined together; check for lock-in; show multiple offering outcomes if applicable</li> </ul>	6. ECOSYSTEM ANALYSIS

### PHASE 5: ECOSYSTEM EVOLUTION

<b>PHASE and OBJECTIVES</b>	CONTENT	DELIVERABLE
ECOSYSTEM EVOLUTION		
	<ul><li>list of trends and uncertainties; early</li></ul>	
• Simulation of	signs; scenarios graph; scenarios	7. ECOSYSTEM
different scenarios	narrative; definition of possible	SCENARIOS
aimed to perform	scenarios; list of implications and	ANALYSIS
what-if analysis,	options of responses	
trend analysis,		
classification,		
forecasts.		

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### **MOBENA: SYNTHESIS**

1	Define the meaning of the ecosystem, decide what identifies it and identify what defines its boundaries.     Detail the information to be collected as regards the constitutive elements and their relationships.	TECHNOLOGY WORKBOOK     PLAYERS INFORMATIONS     CONNECTION MATRIX
2	ECOSYSTEM MODEL REPRESENTATION     Develop a representation model	4. ECOSYSTEM REPRESENTATION MODEL
3	<ul><li>DATA VALIDATION</li><li>Obtain criteria to validate the model</li></ul>	5. ECOSYSTEM REPRESENTATION MODEL VALIDATED
4	ECOSYSTEM ANALYSIS  Evaluation of the ecosystem's behaviours (last, current, future) and relevant key indicators.	<ul> <li>6. ECOSYSTEM ANALYSIS</li> <li>Physical structure</li> <li>Revenues analysis</li> <li>Relationship analysis</li> <li>Attractiveness</li> <li>Assets and technologies analysis</li> <li>Control point constellation</li> </ul>
5	ECOSYSTEM EVOLUTION Simulation of different scenarios aimed to perform whatif analysis, trend analysis, classification, forecasts.	ECOSYSTEM SCENARIOS ANALYSIS     possible scenarios
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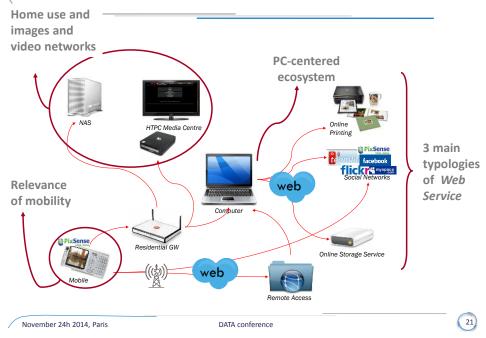
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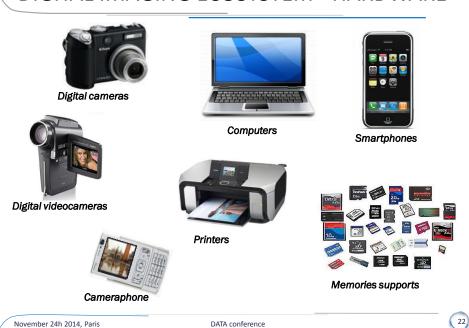
### **MOBENA: SYNTHESIS**

1	ECOSYSTEM PERIMETER, ELEMENTS AND RELATIONSHIPS     Define the meaning of the ecosystem, decide what identifies it and identify what defines its boundaries.     Detail the information to be collected as regards the constitutive elements and their relationships.	TECHNOLOGY WORKBOOK     PLAYERS INFORMATIONS     CONNECTION MATRIX
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### **DIGITAL IMAGING ECOSYSTEM - SERVICES**



### **DIGITAL IMAGING ECOSYSTEM - HARDWARE**



#### **ECOSYSTEM PERIMETER AND ELEMENTS**

#### **ACTORS**

<u>Manufacturers</u>: class of actors connected to the consumer-electronics production, in other words the hardware part of the ecosystem; they are typically constrained to obtain cost-efficiency through scale-economies and realize high production-volumes. They are: <u>camera and camcorders</u> manufacturers, storage manufacturers, printers manufacturers, cameraphone manufacturers

<u>Service Providers</u>: their offer is connected to services and not-tangible functionalities for users. They are: *on line storage providers; photoalbum providers; social network providers; on-line printing providers; mobile applications providers; software vendors providers; telco operators providers; retailers providers* 

#### **TECHNOLOGIES**

As regards the enabling technologies of the Digital Imaging Ecosystem, we identified these categories: *Computational photography, Sensors resolution and quality, Still/motion convergence, Barcode / QR Code, RFID / NFC, GPS, Wireless / Mobile, Metadata Exif, 3D, Digital pictures and video playback.* 

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### **MOBENA: SYNTHESIS**

1	Define the meaning of the ecosystem, decide what identifies it and identify what defines its boundaries.     Detail the information to be collected as regards the constitutive elements and their relationships.	2 PLAYERS INFORMATIONS
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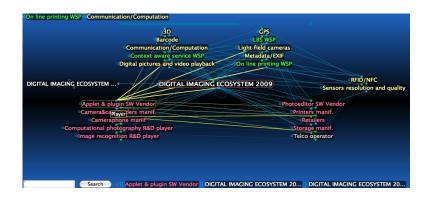
#### **ECOSYSTEM RELATIONSHIPS: CONNECTION MATRIX**

		MANUFACTURER SERVICE PROVIDER											
		Camera&camcorders manuf.	Storage manuf.	Printers manuf.	Cameraphone man	On line Storage	Photoalbum	Social Network	On line printing	Mobile apps	sw vendor (editing, applet, plug-in)	Telco operator	Retailers
MANUFACTURER	Camera&camcorders manuf.	,	2	1	2	1	1	1	1	3	1	3	2
ACT	Storage manuf.	2	-	1	2	2	2	1	1	0	0	3	2
N N	Printers manuf.	1	1	-	3	0	1	0	2	0	1	3	2
Σ	Cameraphone manuf.	2	2	3	-	1	1	1	3	2	2	2	2
	On line Storage	1	2	0	1	-	2	1	1	1	0	3	0
	Photoalbum	1	2	1	1	2		1	2	2	2	2	0
DER	Social Network	1	1	0	1	1	1	-	1	1	3	2	0
8	On line printing	1	1	2	3	1	2	1		3	1	3	2
E PR	Mobile apps	3	0	0	2	1	2	1	3	1	2	2	0
SERVICE PROVIDER	sw vendor (editing, applet, plug-in)	1	0	1	2	0	2	3	1	2	-	0	2
	Telco operator	3	3	3	2	3	2	2	3	2	0		2
	Retailers	2	2	2	2	0	0	0	2	0	2	2	-

### **MOBENA: SYNTHESIS**

#### **ECOSYSTEM PERIMETER, ELEMENTS AND RELATIONSHIPS** • Define the meaning of the ecosystem, decide what 1. TECHNOLOGY WORKBOOK identifies it and identify what defines its boundaries. 2. PLAYERS INFORMATIONS • Detail the information to be collected as regards the 3. CONNECTION MATRIX constitutive elements and their relationships. **ECOSYSTEM MODEL REPRESENTATION** 4. ECOSYSTEM REPRESENTATION • Develop a representation model MODEL **DATA VALIDATION** 5. ECOSYSTEM REPRESENTATION · Obtain criteria to validate the model MODEL VALIDATED 6. ECOSYSTEM ANALYSIS Phisical structure **ECOSYSTEM ANALYSIS** Revenues analysis Evaluation of the ecosystem's behaviours (last, current, Relationship analysis future) and relevant key indicators. Attractivity Assets and technologies analysis · Control point constellation **ECOSYSTEM EVOLUTION** 7. ECOSYSTEM SCENARIOS ANALYSIS • Simulation of different scenarios aimed to perform what- possible scenarios if analysis, trend analysis, classification, forecasts. November 24h 2014, Paris DATA conference

### **ECOSYSTEM MODEL REPRESENTATION**



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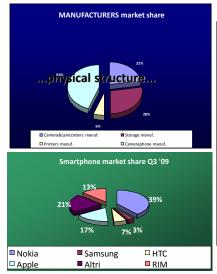
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#### ECOSYSTEM VALUE ANALYSIS – EXAMPLE OF ECONOMIC STRUCTURE



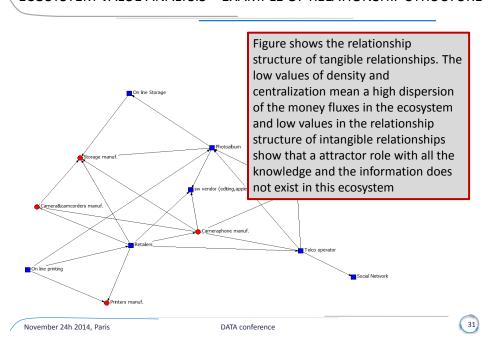
Cameraphone manuf.	Vendite (unità)	Ricavi	EBITDA	Inv.	F.c.f.
Nokia		58	9,59	(-)4.600	8.200
Samsung		24,3	10,8	(-)180	300
Motorola		10,2	(-)1,23	794	252
	econo	mic di	mensio	on	
LG Electronics		13,1	1,7	(-)738	
Sony Ericsson	56,4	10			1.200
HTC		3,2		(-)124	(-)260
Apple	20,7	6,7	8,69	(-)17.000	8.950
RIM		13,2	3,5	(-)1.820	(-)349

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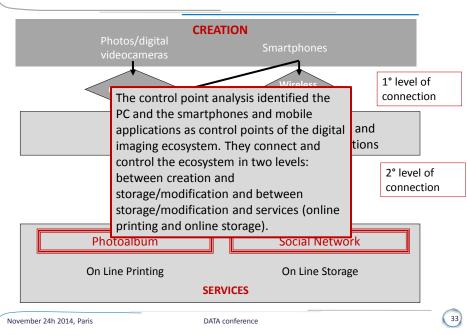
#### ECOSYSTEM VALUE ANALYSIS - EXAMPLE OF RELATIONSHIP STRUCTURE



### **MOBENA: SYNTHESIS**

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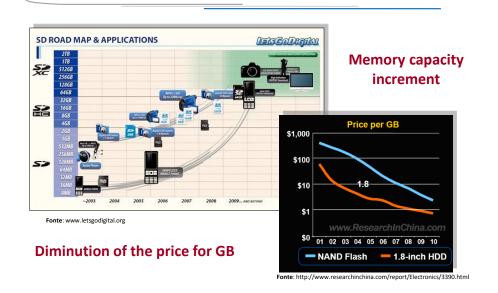
### **ECOSYSTEM CONTROL POINT ANALYSIS**



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### TRENDS AFFECTING THE ECOSYSTEM



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### **UNCERTAINTIES**

There are two main uncertainties (service ubiquity and information sources)

→ identify four main scenarios (Real Time Sharing, Image Recognition, Mobile Augmented Reality, On line backup & Sharing).

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### A NEAR SCENARIO: THE AUGMENTED REALITY



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### **CONCLUSIONS**

As businesses become more and more modularized, characterizing entity relationships and understanding how business decisions or actions taken by one entity impact all of the interrelated entities, both within and among enterprises, become a key challenge. Ignoring these interactions can lead to unexpected and potentially undesirable outcomes.

Tools that help to systematically characterize the business ecosystem (or network) and analyze the potential impact of different business decisions on each entity in the network are essential for improving business design.

The knowledge of a phenomenon is the basis of its evolution. The methodology of business ecosystem network analysis (MOBENA) is a first step to build a tool that can facilitate the knowledge about the business ecosystems, with a first improvement toward the standardization of the procedure for different contexts and the reusability of data and information.

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