

Topology for culture: metaphors and tools

29-30 November 2007

INDIRECT NETWORK ANALYSIS:

TYOLOGIES, TOPOGRAPHIES ... ?

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Contents

- ▶ The method of indirect network analysis
... and its limitations
- ▶ Stark & Vedres combination of social networks analysis and sequential analysis
... and its limits
- ▶ Where to go?



TACTICS

TELEMATICS AND COMMUNICATIONS TECHNOLOGY INDUSTRIAL COMPARATIVE STUDY

- ▶ A social sciences analysis of the supply and use of Advanced Communication Technology and Telematics (ACT&T) in Bulgaria, Romania and Macedonia
- ▶ ACT&T effect on the transformation process and restructuring of the traditional industries under the conditions of adaptation to, and integration with, the European and world market



SAMPLES

Country	Updated Database	Sample
BULGARIA	3 081	306
ROMANIA	1 758	280
MACEDONIA	426	138

**STATISTICAL ERRORS FOR THE VARIOUS RELATIVE
SHARES WITH PROBABILITY OF 95% ARE AS
FOLLOW:**

Country	10%	20%	30%	40%	50%
BULGARIA	3,55	4,73	5,42	5,79	5,91
ROMANIA	3,43	4,57	5,24	5,60	5,71
MACEDONIA	4,45	5,93	6,79	7,26	7,41



Specifying the subject of study:

To study the supply and use of Telematics and Advanced Communication Technology in the three Balkan countries means to identify specific *configuration of relations between the different kinds of agents* (individuals, institutions, technologies, standards, systems of laws and rules). These agents build different kinds of networks which when interacting, *evolve around distinct patterns*.

The key problem is to delimit an **end number of processes and phenomena** (*relational variables*) that suffice to describe the *evolution of this specific configuration*.



TACTICS relational variables

Technology-driven variables

- technology profile;
- dominant activity
- R&D

Key economic & legal variables

- Execution of property rights
- Financial partners
- Legal partners (law services, tax, customs, licensing bodies)
- Contacts with public bodies

Human capital variables

- IT network (employees coming from former IT industry)
- Telecom network (employees coming from former PTT)
- membership in branch associations
- recruitment of human capital (universities, research centers, etc.)



TACTICS relational variables

Business partnerships

- domestic partners
- foreign partners
- competition / collaboration

Type of customers

- by size
- by ownership
- by sectors
- by type of computer network they possess

Technology-driven variables

- technology profile;
- dominant activity
- R&D
- Export



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INDUSTRIAL COMPARATIVE STUDY

Typologies ...



TYOLOGY OF THE FIRM ACCORDING TO THE SUBJECT OF THEIR ACTIVITIES

1. Design and building of computer networks & inter-network communications (selling system software as auxiliary activity)
2. Internet provider (incl. multimedia on Internet)
3. Industrial automation
4. Telecommunication (incl. cable TV and production & services of telephone equipment)
5. Telematics & telematic services (incl. security systems)
6. Trade and services of hardware (trade of software as auxiliary activity)
7. Production and trade of software (trade of hardware as auxiliary activity)
8. Computer/information services (text processing, printing, Internet café, game-clubs, etc.)

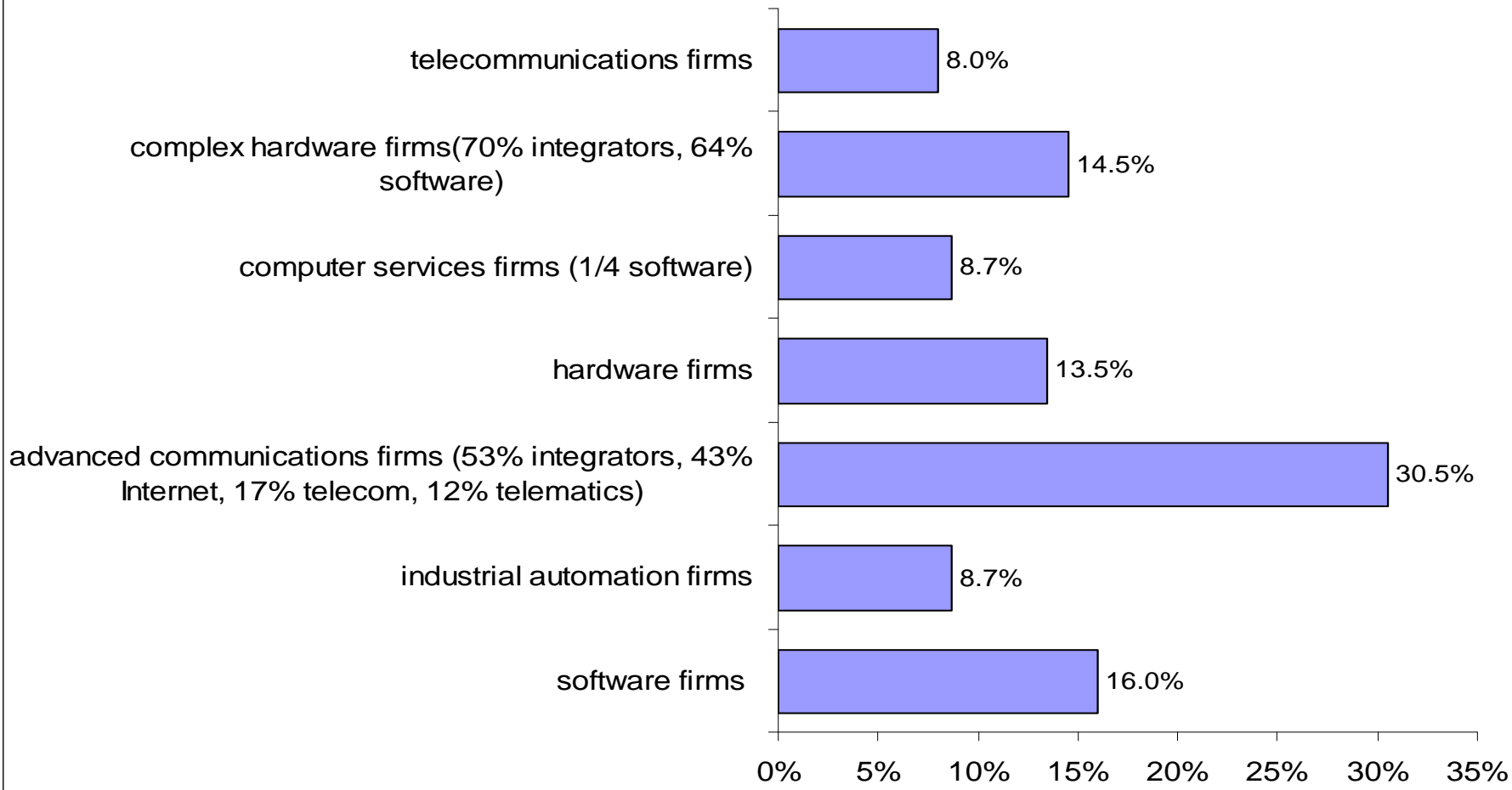
Technology profile (BG, RO & MK)

Ward method, SqED, ascending

Cluster	net & internet communications	Internet	industrial automation	telecommunications	telematics	hardware (software suppl.)	software (hardware suppl.)	computer services	Total
1				1			132	64	180
2	19	5	114	4	23	26	25	5	124
3	169	82	10	22	2	178	124	47	251
4						98			98
5		6	3	67			3	1	67
Total	188	93	127	94	25	302	284	117	720
1							116		116
2	19	5	114	4	23	26	25	5	124
3	169	82	10	22	2	178	124	47	251
4						98			98
5				1			16	64	64
6		6	3	67			3	1	67
Total	188	93	127	94	25	302	284	117	720
1							116		116
2	19	5	114	4	23	26	25	5	124
3	32	69	3	13	1	36	22	4	75
4						98			98
5	137	13	7	9	1	142	102	43	176
6				1			16	64	64
7		6	3	67			3	1	67
Total	188	93	127	94	25	302	284	117	720
1							116		116
2	19	5	114	4	23	26	25	5	124
3	32	69	3	13	1	36	22	4	75
4						98			98
5	101	13	7	9	1	75	35	43	109
6				1			16	64	64
7	36					67	67		67
8		6	3	67			3	1	67
Total	188	93	127	94	25	302	284	117	720



Technology profile
(Clusters - Ward, Euclidean distance)





TYOLOGY OF THE FIRM ACCORDING TO THE EXECUTION OF THEIR PROPERTY RIGHTS

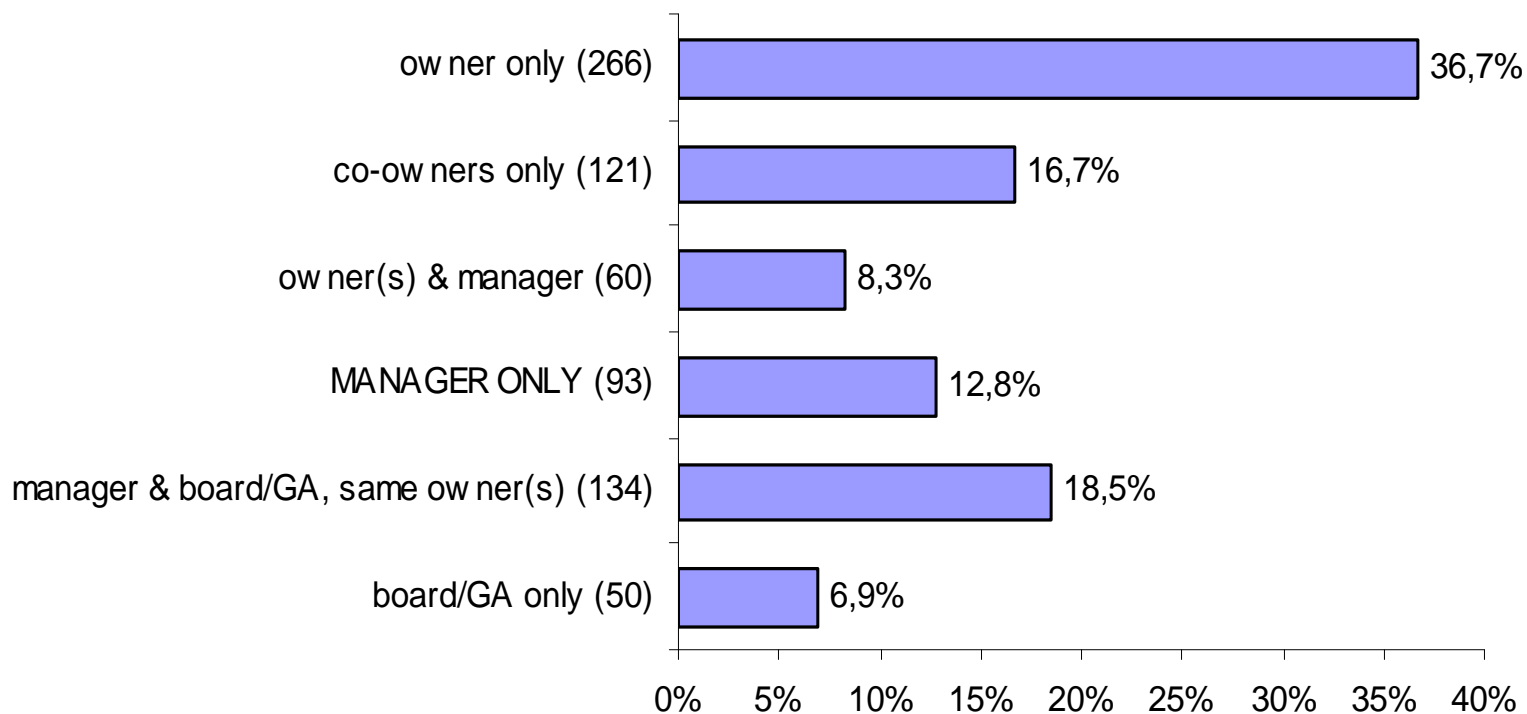
Initial set: owner (yes/no), co-owners (yes/no), manager (yes/no), board / general assembly (yes/no)

for the management of the following liabilities:

- *management of personnel & product/services (incl. prices, staff wages, appointment/discharge of employees);*
- *management of investments (investments in tangible assets, in staff training, in R&D, etc.)*
- *Strategic management, residual revenue & residual control (venturing into new business, signing strategic contracts, offering credits, selling shares, acquiring share in other firms, net-profit distribution).*

Execution of property rights

(Clusters - Ward, Euclidean distance)

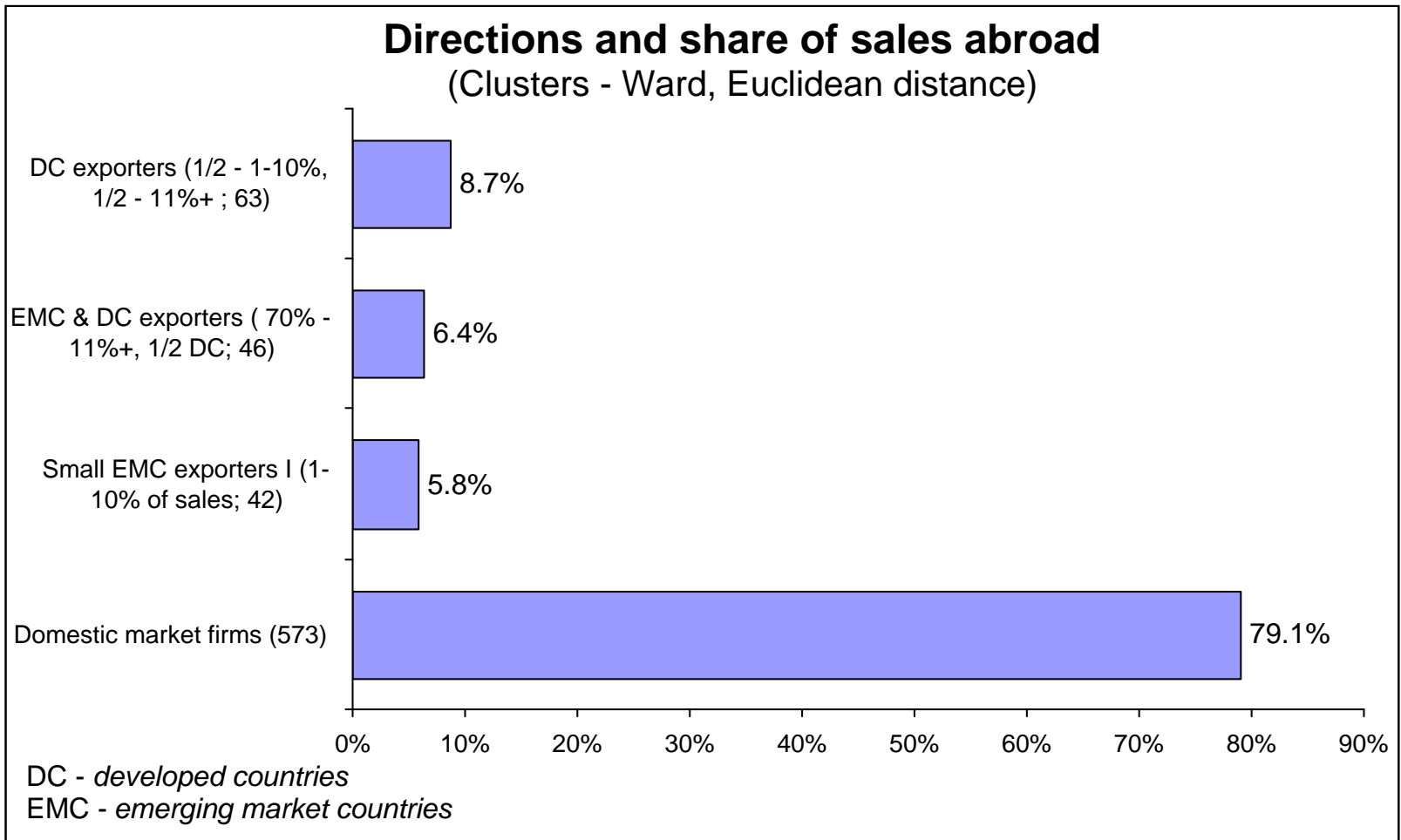




TYOLOGY OF THE FIRM ACCORDING TO THEIR SALES ABROAD

Initial set:

- Share of export in three ranges - no export, up to 10%, above 10% of turnover.
- Directions of export
 - emerging market countries (Balkans, former COMECON and Middle East);
 - developed countries (EU, North America, Israel and Far East).





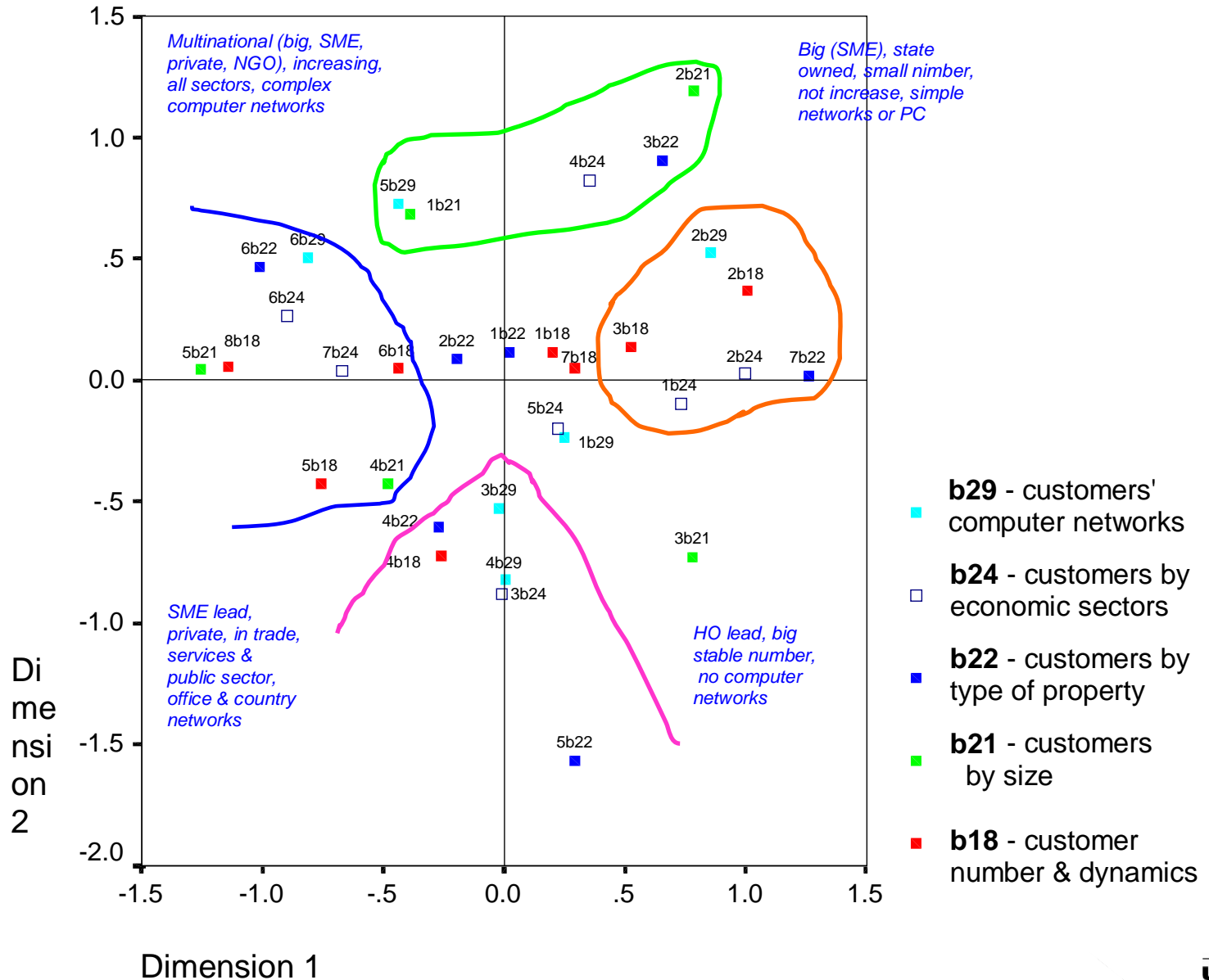
TACTICS

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Typographies ...

Customers relationships

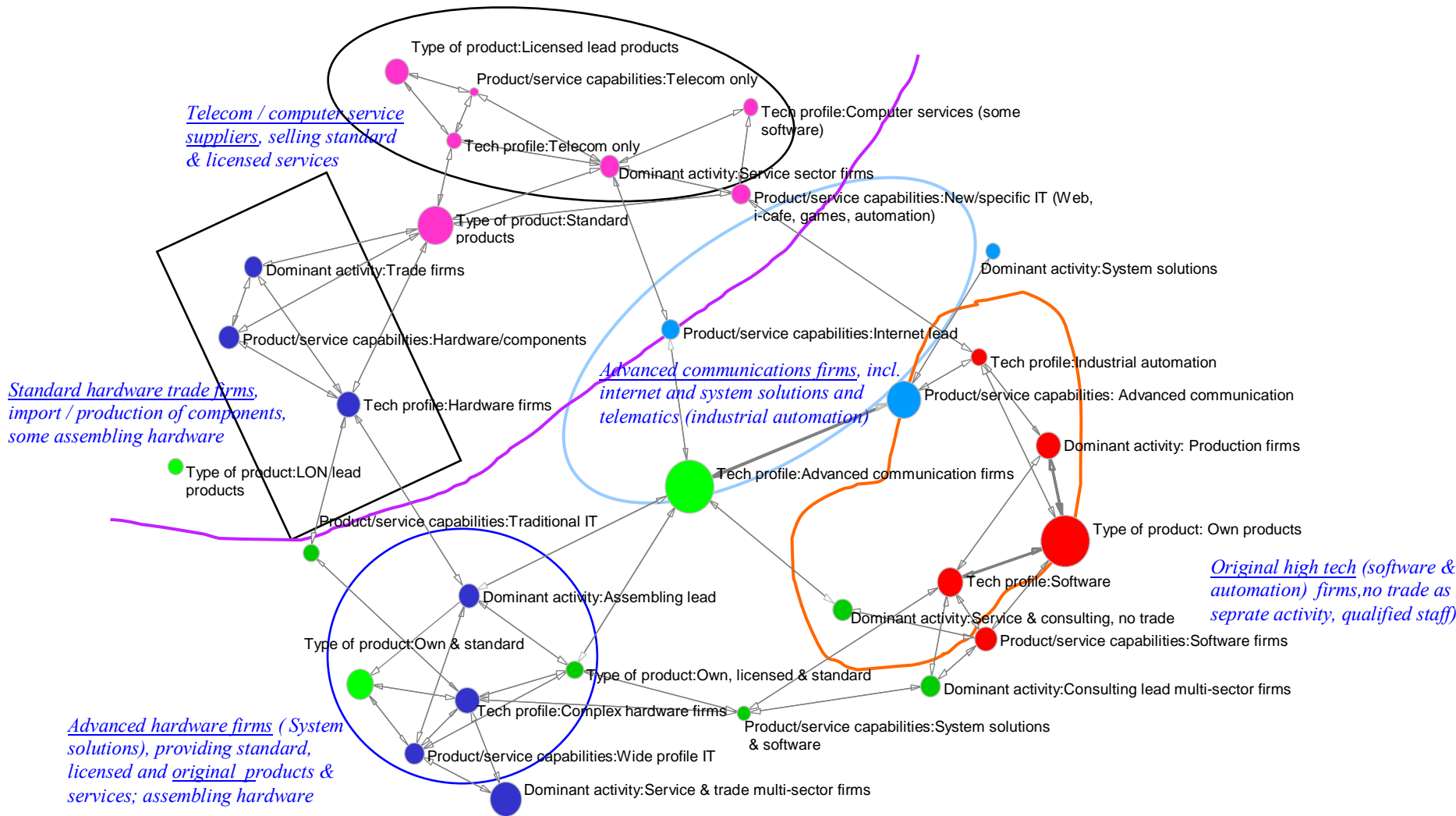
(HOMALS multiple nominal, category quantifications)



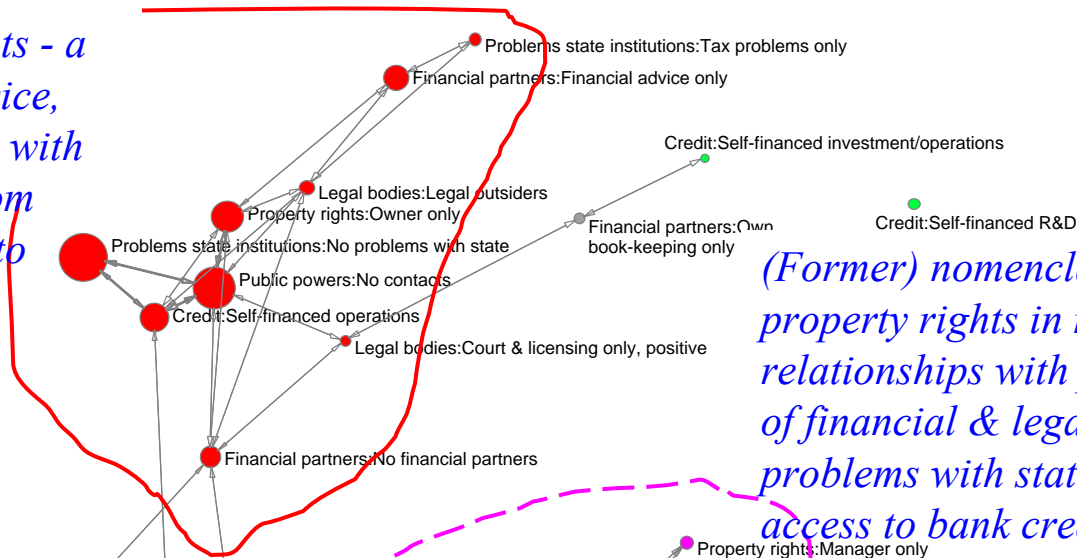
Techno-economic profiles of ACT&T firms

(Réseau Lu - 20% cut of significance), superimposed with HOMALS Analysis

(HOMALS poles- **Positive I dimension**; **Negative I dim**; **Positive II dim**; **Negative II dim**)



Centralized property rights - a few finance and legal advice, self-financed, no contacts with public power, tax & custom problems, limited access to bank credit



(Former) nomenclature's firms -all property rights in managers, relationships with parliament, use of financial & legal advice, no problems with state institutions, access to bank credit

Non ACT&T sector partners

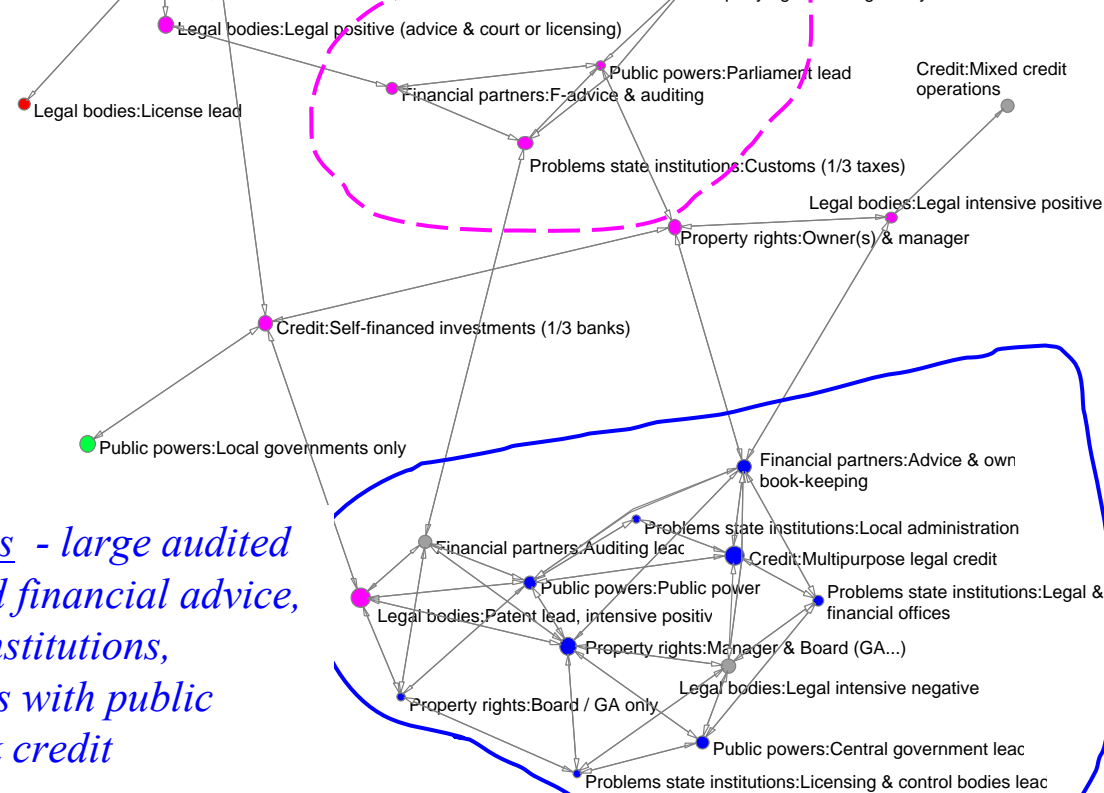
Réseau Lu - 15% cut of significance, superimposed on

HOMALS Analysis poles - **Positive I dimension**;

Negative I dim;

Positive II dim;

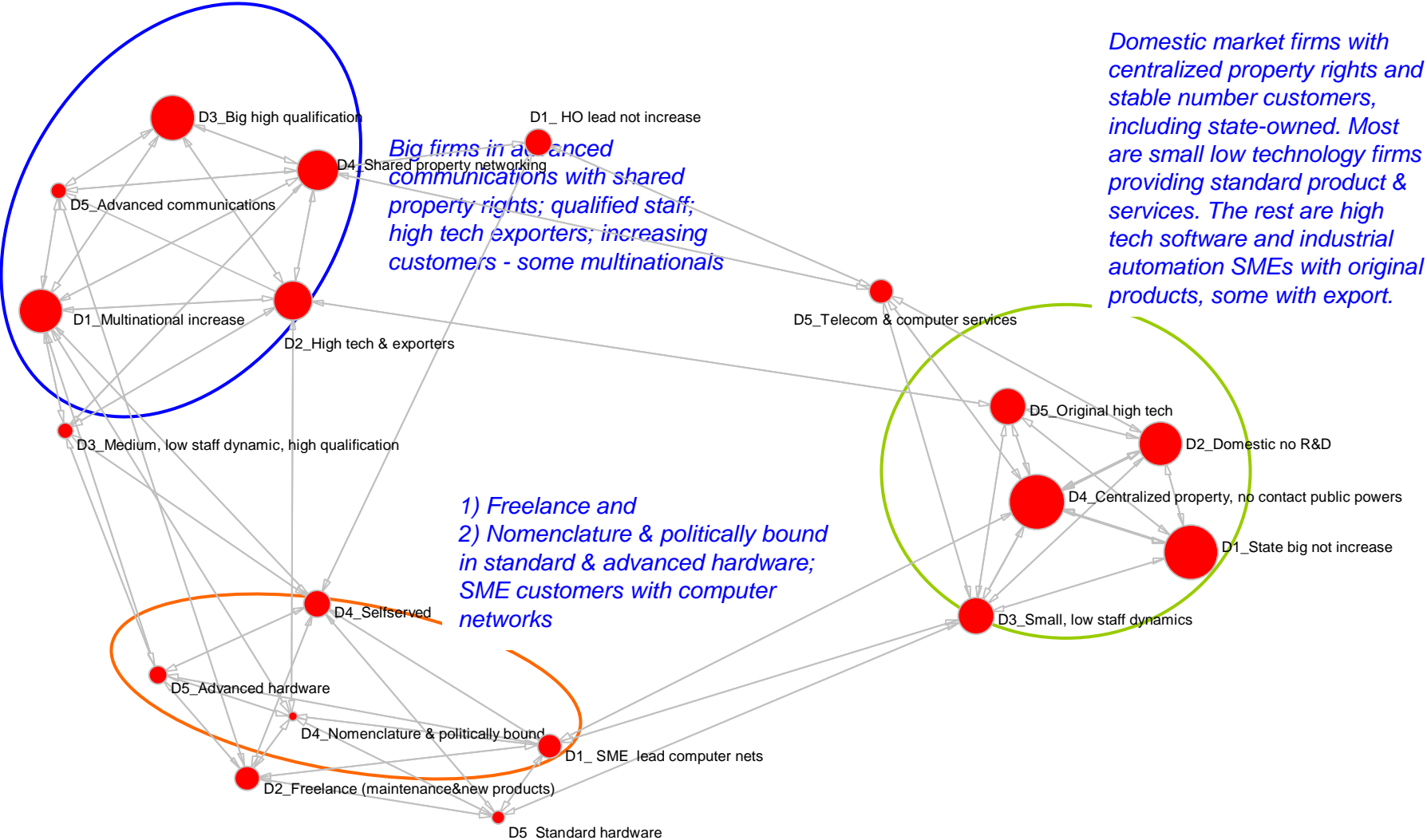
Negative II dim)



Shared property rights - large audited firms, use of legal and financial advice, problems with state institutions, intensive relationships with public power, access to bank credit

Relationships between five domains' profiles (second level)

(Réseau Lu 40% cut of significance)



Big firms in advanced communications with shared property rights; qualified staff; high tech exporters; increasing customers - some multinationals

Domestic market firms with centralized property rights and stable number customers, including state-owned. Most are small low technology firms providing standard product & services. The rest are high tech software and industrial automation SMEs with original products, some with export.

*1) Freelance and
2) Nomenclature & politically bound in standard & advanced hardware; SME customers with computer networks*



TACTICS

TELEMATICS AND COMMUNICATIONS TECHNOLOGY
INDUSTRIAL COMPARATIVE STUDY

Typologies ... ?

David Stark and Balázs Vedres (2003)

Pathways of property transformation: Enterprise network careers in Hungary, 1988-2000

The goal: to chart the pathways of property transformation, conceptualized as *the patterned sequences of change that firms undergo*

- 1) in the composition of their ownership structure and
- 2) in their position within network structures of ties to other enterprises.

The landscape and topography of the socioeconomic field are given shape and repeatedly transformed by the interaction of the *multiple strategies* of firms attempting to survive in the face of variable *political, institutional, and market uncertainties*.

For several decades, the methodology of social network analysis was almost exclusively applied to static snapshots of relational systems. *Our study is a turning point in economic sociology (1)...*

The methodological innovation at the heart of our study is *to combine the tools of sequence analysis and network analysis to yield a sequence analysis of changing network positions*.

David Stark and Balázs Vedres (2003)

Methodology (1) - *sequence analysis*

a new research tool that makes it possible to study historical processes in an eventful way similar to historiography while retaining social scientific abstraction (Abbott 1990, 1992, 1995).

Instead of collapsing time to before-after dichotomies, sequence analysis reveals the variable structuring of time: the varying paces of change, path dependencies, turning points, lock-ins, and contingencies – in ways that differ from simple calendar time.

To study the unfolding of multiple, parallel processes, *sequence analysis provides a methodology to follow events at the socially meaningful level of action*. These events, changes within a state-space that is *not assumed in advance* but emerges from the analysis, are the building blocks of sequences.

David Stark and Balázs Vedres (2003)

Methodology (2)- *cluster analysis*

At the level of the firm, we gather data about attributes with a resolution of *one-month intervals* - the firm's owners, its directors, its managers, its major lines of product activity, capital, revenues, profitability, etc.

From the data we construct the *state-space for each of the relevant dimensions of the study, using clustering algorithms to identify the set of possible states (types)*.

These events, changes within a state-space that is not assumed in advance but emerges from the analysis, are the building blocks of sequences.

Applying an algorithm to the distinct sequences of all of the firms in our study, *we cluster sequences to identify the relatively discrete career pathways*.

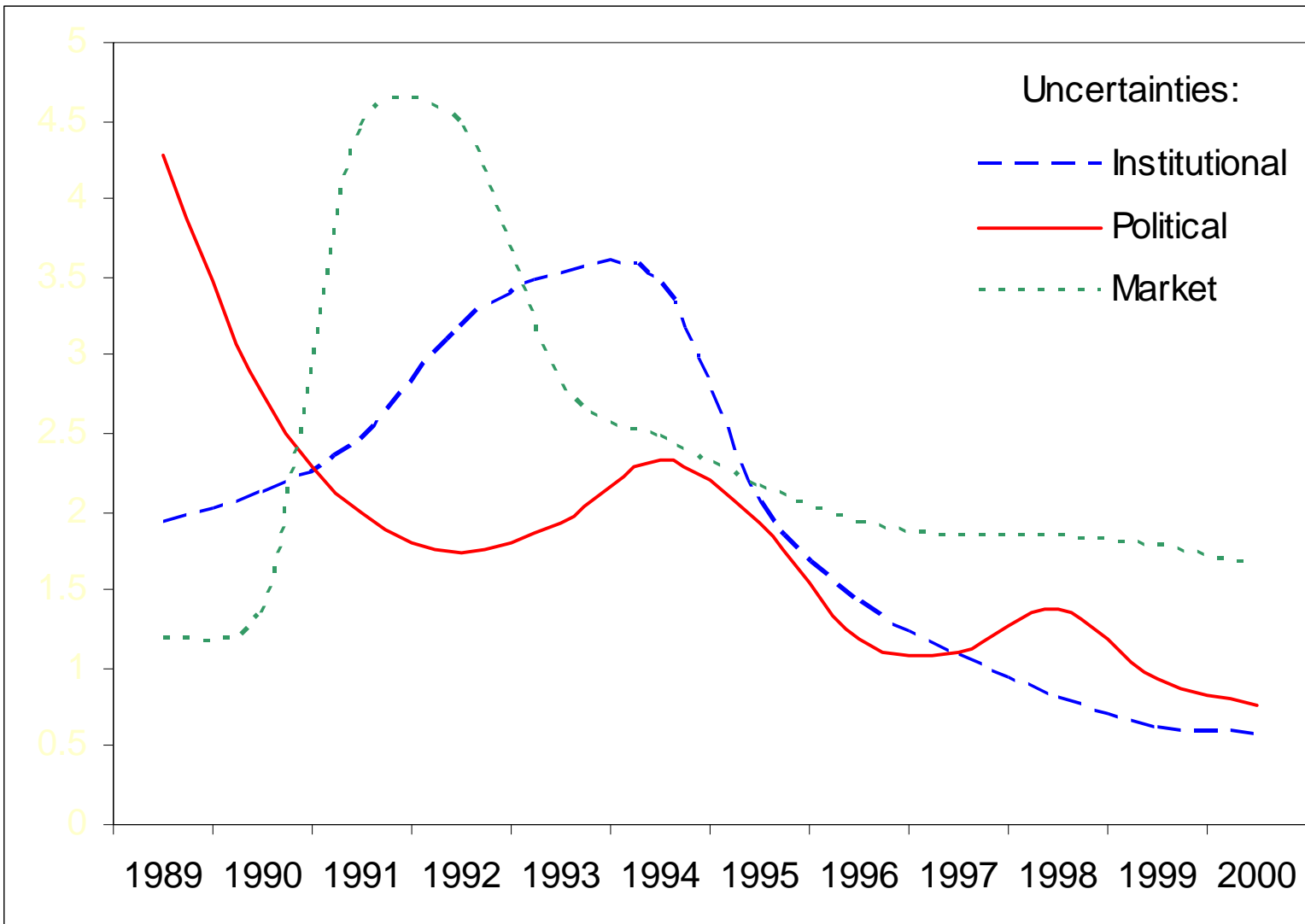
David Stark and Balázs Vedres (2003)

Methodology (3)- *matching pathways and 'contexts'*

Although our units of observation are firms, *our units of analysis are pathways*. Pathways can have diverse as well as uniform phases. Moreover, the temporality of firm careers can vary. Whereas some pathways exhibit clearly marked turning points in which all firms experience a shift in the direction of their careers, other pathways exhibit no turning points as firms make similar moves but with different timings.

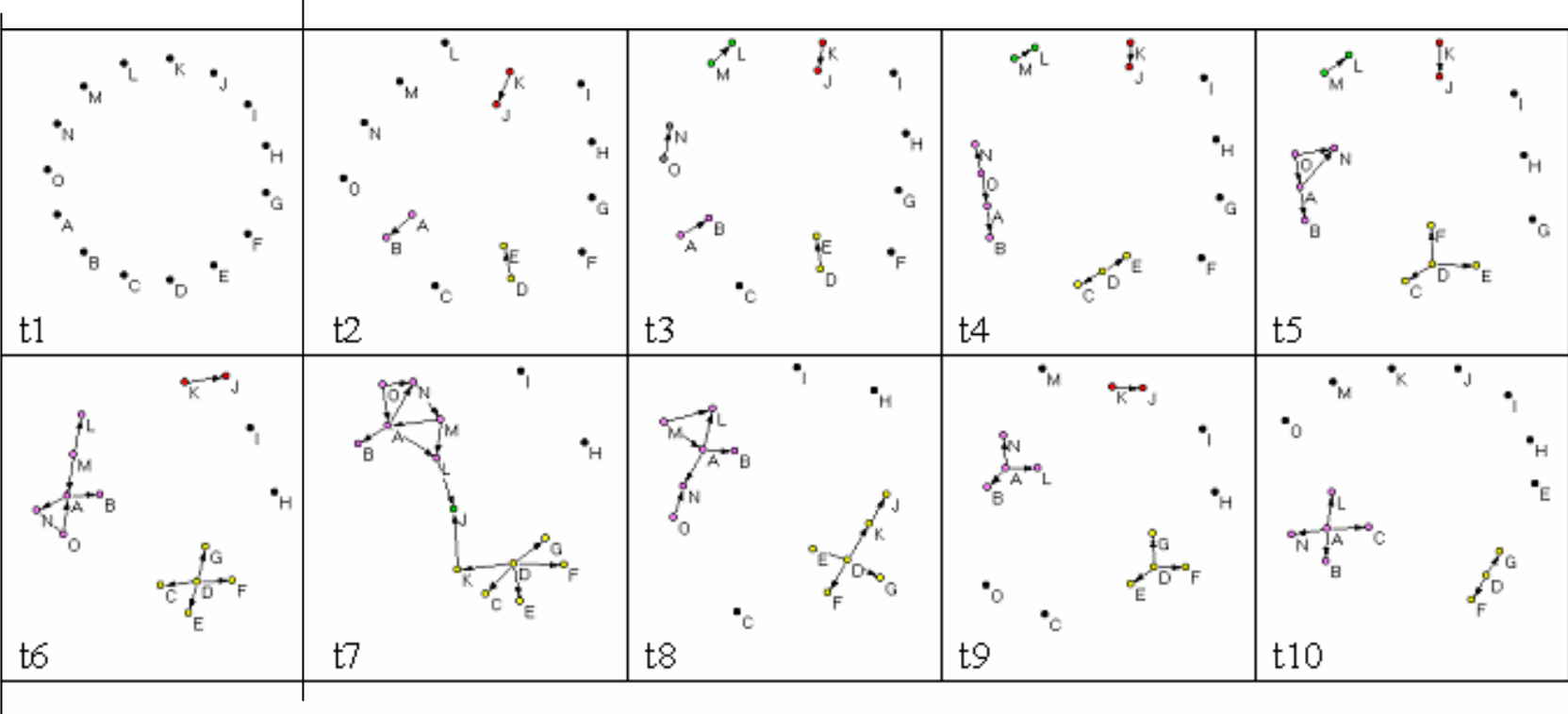
From the analysis of the careers of these firms we can address how firms respond to uncertainty – which we will differentiate as institutional, political, and market uncertainties.

David Stark and Balázs Vedres (2003)



David Stark and Balázs Vedres (2003)

Graph representations of the network changes in our hypothetical dataset.



Comments on Stark and Vedres (2003)

Could sequential analysis of entities' relationships bring us to topology?

Answer: What we have is rather to topography of changes, and *not* to topology

Few arguments:

- entities and contexts stay apart;
- 'flat' notion of action...

Key problems:

- What is usually given (but not always) are the units of observation. The entities (the actors, intermediaries, the nodes), the links and the mediators/intermediaries are to be mutually defined
- There is not 'contexts', 'landscapes', etc. 'external environment that influence the networks. They all are either in the network (node, intermediary, link, etc.) and its behaviour, or are non-existent
- To understand a network we should not stick to ne notion of causal action ...

Thank you!

(1) The present critiques of the modern notion of action and activity, including ANT critique, are still in the basic frame of *actus* – the old Latin translation of Aristotle’s notion of **ἐνέργεια**, which relates it to *movement* (κατά κίνησιν) and has completely lost the other meaning - *ἐνέργεια ἐπί πλέον*.

The movements – the first and more multitudinous kind comprises actions, which today we can call ‘*causal actions*’, while Aristotle calls them simply ‘*movements*’. Aristotle does not introduce any radical difference between the *movements* of humans, animals or physical bodies – they all have a beginning and an end, they have a limit (πῶρᾱ) and cause, whether this is an ‘external’ cause or internal goal (τῆλοϱ).