

# Thanks very much for your attention!!



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SA



# Evaluating "Associative Subsystem´s" Effectiveness in Regional Innovation Systems



*A Typology for Spain*

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# *Research interests*

- Main keywords: Economic Development, Regional Innovation Systems, Innovation Policy Instrumental design & evaluation.
- Specific keywords of this paper: Regional Innovation Systems, Associative subsystem, Intermediaries, Spain, Multiple Factor Analysis (MFA).

# Evaluating "Associative Subsystem´s" Effectiveness in Regional Innovation Systems



*A Typology for Spain*

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# Motivation



# We aim at evaluating the effectiveness of certain organizations which aim at emending inner fragmentation in Spanish RISs

"...lacking interactions and knowledge flows between the organizations of an innovation system, resulting in low levels of systemic innovation activities"

(Martin and Trippel, 2013)

...to name some...

al., 2008), the *Systemic Competitiveness* (Altenburg et al., 1998), or the *Triple Helix* model (Etzkowitz and Leydesdorff, 1998) haven't faced the complexity of this growing set of organizations.

- 1 The lack of academic outlook and consensus on the issue has returned deficiencies in their *design, evaluation, coordination* and *clarity* with respect to their targets (Nauwelaers, 2011).
- 2 Their evolution has rendered the concept of "intermediation" *too narrow* to apprehend the variety of services provided, bringing up the possibility of a new "systemic" *ecosystemary* *provision* to their conceptual design and evaluation (vs a "market failure" neoclassic orientation).

## What do they do?

- 1 Rooted in a linear tradition, "secondary organizations" (simply) transferred information from research to private ends. These organizations have evolved towards much more complex and bilateral "systemic provision", and have blossomed surrounding *microscopic* (and other system problems) in ISs.

→ Build bridges across the boundaries of the subsystems.

## How do we evaluate their effectiveness?

- 1 The existence of *intermediaries* in the process and activities performed by these organizations suggests the possibility of a *systemic provision*, which requires a new *ecosystem* of the IS. We name it "ecosystemary provision".
- 2 The data the "ecosystemary provision" is captured at several organizational profiles in "clusters" that address different "systemic provision" in a specialized fashion.

# Who are these organizations?



## "INTERMEDIARIES"

(Shohert and Preverzer, 1996; Bessant and Rush 2000; Howells, 2006; Ackworth, 2008; Yusuf, 2008; Parrilli et al., 2010; Swanson, 2010; Takahashi, 2010; Cooke, 2011; Nauwelaers, 2011)

innovation intermediaries

(Howells, 2006; Dalziel, 2010; Nauwelaers, 2011)

Intermediate governance  
organizations

(Cooke, 2001)

Third parties

(Woolthuis et al., 2005)

Intermediate organizations

(Bessant and Rush, 1995)

Catalysts

(Murphy et al., 2003; Cooke, 2011;  
Parrilli, 2013)

Intermediate agents

(Parrilli et al., 2010)

Knowledge brokers

(Hargadon and Sutton, 1997; Hargadon, 1998)

Intermediate institutions

(Morgan, 1997; Altenburg et al.,  
1998; Pietrobelli and Rabellotti,  
2011)

Bridging organizations

(Sapsed et al., 2007)

Market intermediaries

(Rekers, 2010)

Bridging institutions

(OECD, 1997)

Networking partners

(Cooke, 1992; Cooke and Morgan,  
1994; Cooke and Leydesdorff, 2006)

...to name some...





(Shohert and Preverzer, 1996; Bessant and Rush 2000; Howells, 2006; Ackworth, 2008; Yusuf, 2008; Parrilli et al., 2010; Swanson, 2010; Takahashi, 2010; Cooke, 2011; Nauwelaers, 2011)

innovation intermediaries

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Intermediate governance

organizations (Cooke, 2001)

Third parties

(Woolthuis et al., 2005)

Intermediate organizations

(Bessant and Rush, 1995)

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Networking partners

(Cooke, 1992; Cooke and Morgan, 1994; Cooke and Leydesdorff, 2006)

...to name some...

# *What do they do?*

**1** Rooted in a linear tradition, "[intermediary organizations](#)" (simply) transferred information from research to private ends. These organizations have evolved towards much more complex and multilateral "[systemic practices](#)", and have blossomed surrounding [fragmentation](#) (and other system problems) in ISs.

- Build bridges accross the boundaries of the subsystems, organizations and entrepreneurs.
- Foster changes in the system (soft institutions).
- Improve the interactiveness and competitiveness of the organizations and, in aggregated terms, of the system itself.
- ...

Howells, 2006

# Why do they call our attention?

- 1 Though **Connectivity** is an essential feature of well functioning RISs, its importance has been widely **overlooked** (Asheim and Parrilli, 2012).



Essential evolutionary frameworks for regional ecosystem design and assessment such as **RIS** (Cooke and Morgan, 1998; Tödtling and Trippel, 2005; Cooke, 2011), the **GVC** construct (Gereffi et al., 2005; Morrison et al., 2008), the **Systemic Competitiveness** (Altenburg et al., 1998), or the **Triple Helix** model (Etzkowith and Leydesdorff, 1998) haven't faced the **complexity** of this growing set of organizations.

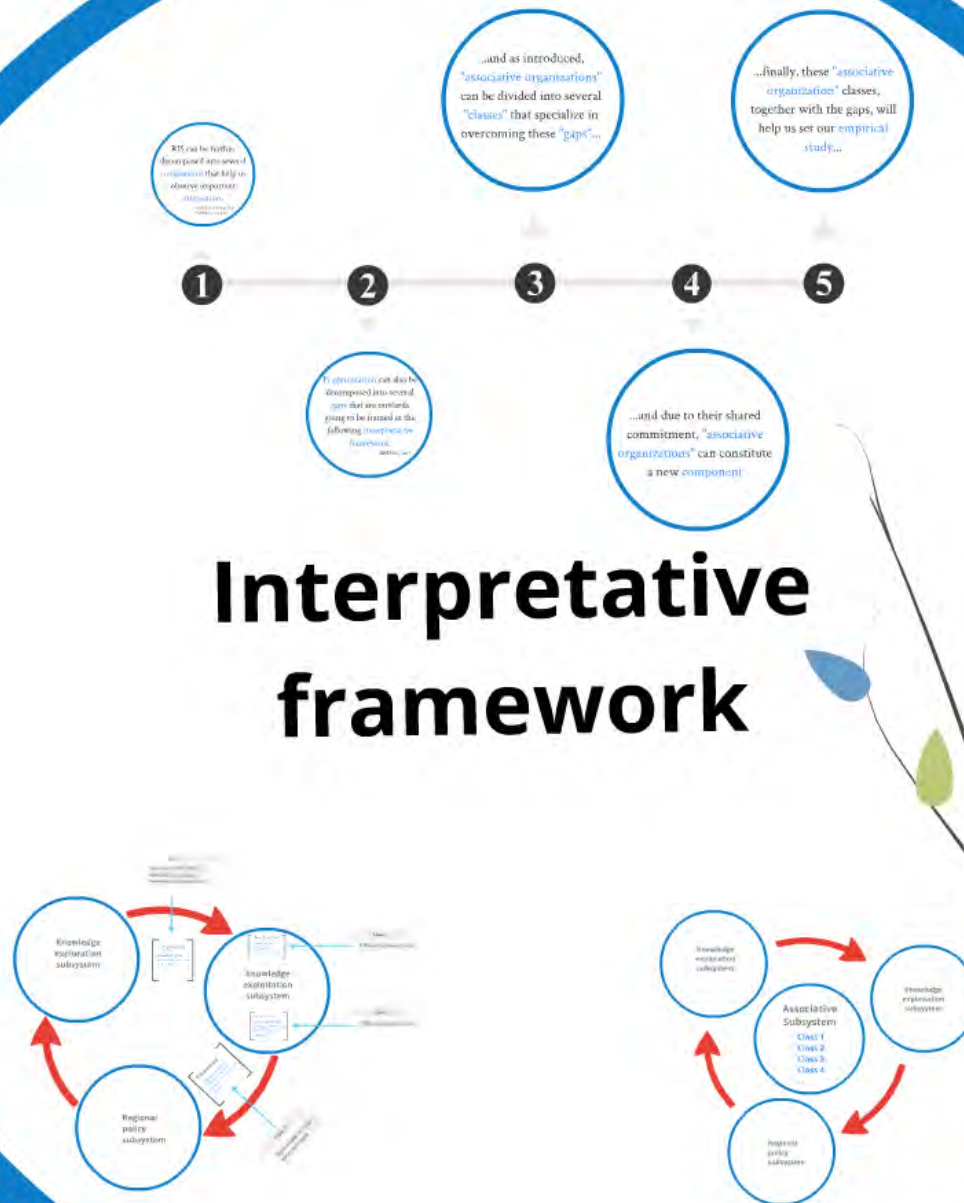
- 2 The lack of academic outlook and consensus on the issue has returned deficiencies in their **design, evaluation, coordination** and **clarity** with respect to their targets (Nauwelaers, 2011).
- 3 Their evolution has rendered the concept of "intermediation" **too narrow** to apprehend the variety of services provided, bringing up the possibility of a new "**systemic**" (**evolutionary**) **paradigm** to their conceptual design and evaluation (vs a "market failure" neoclassic orientation).



# *How do we evaluate their effectiveness?*

- 1** The existence of **commonalities** in the purpose and activities performed by these organizations suggests the possibility to arrange them around a **common framework**, which constitutes a new **component** of the RIS. We name it "**associative subsystem**".
- 2** The claim the "**associative subsystem**" is composed of several organizational profiles or "**classes**" that address different "**fragmentation gaps**" in a specialized fashion.
- 3** So, since **fragmentation** is disaggregated into several "**gaps**" that mainly relate **technological, managerial and financial** capabilities of the firms (SMEPOL, 2001), we frame these **gaps** together with the organizational "**classes**" that facilitate overcoming them.
- 4** ...and in doing so, we set an **interpretative framework** that will enable **quantitative approaches** to the **evaluation** of the functions accomplished by these organizations...lets present it

# Interpretative framework





RIS can be further  
decomposed into several  
**components** that help us  
observe important  
**interactions**

Cooke et al. 1998, Autio 1998  
Tödtling et Trippel. 2005

1



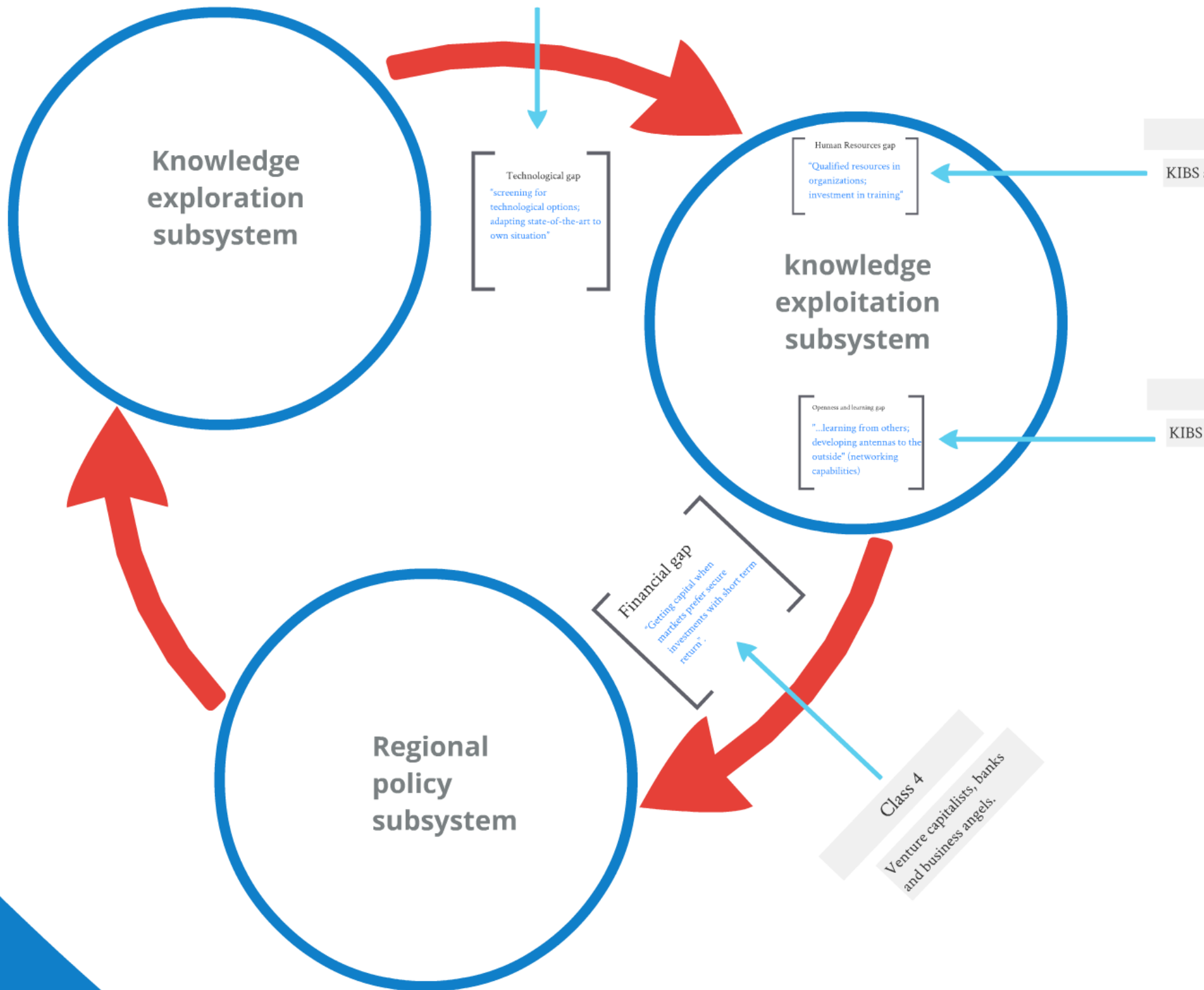
1

2

3

Fragmentation can also be decomposed into several gaps that are onwards going to be framed in the following interpretative framework.

SMEPOL, 2001



gap  
ons;  
he-art to

# knowledge exploitation subsystem

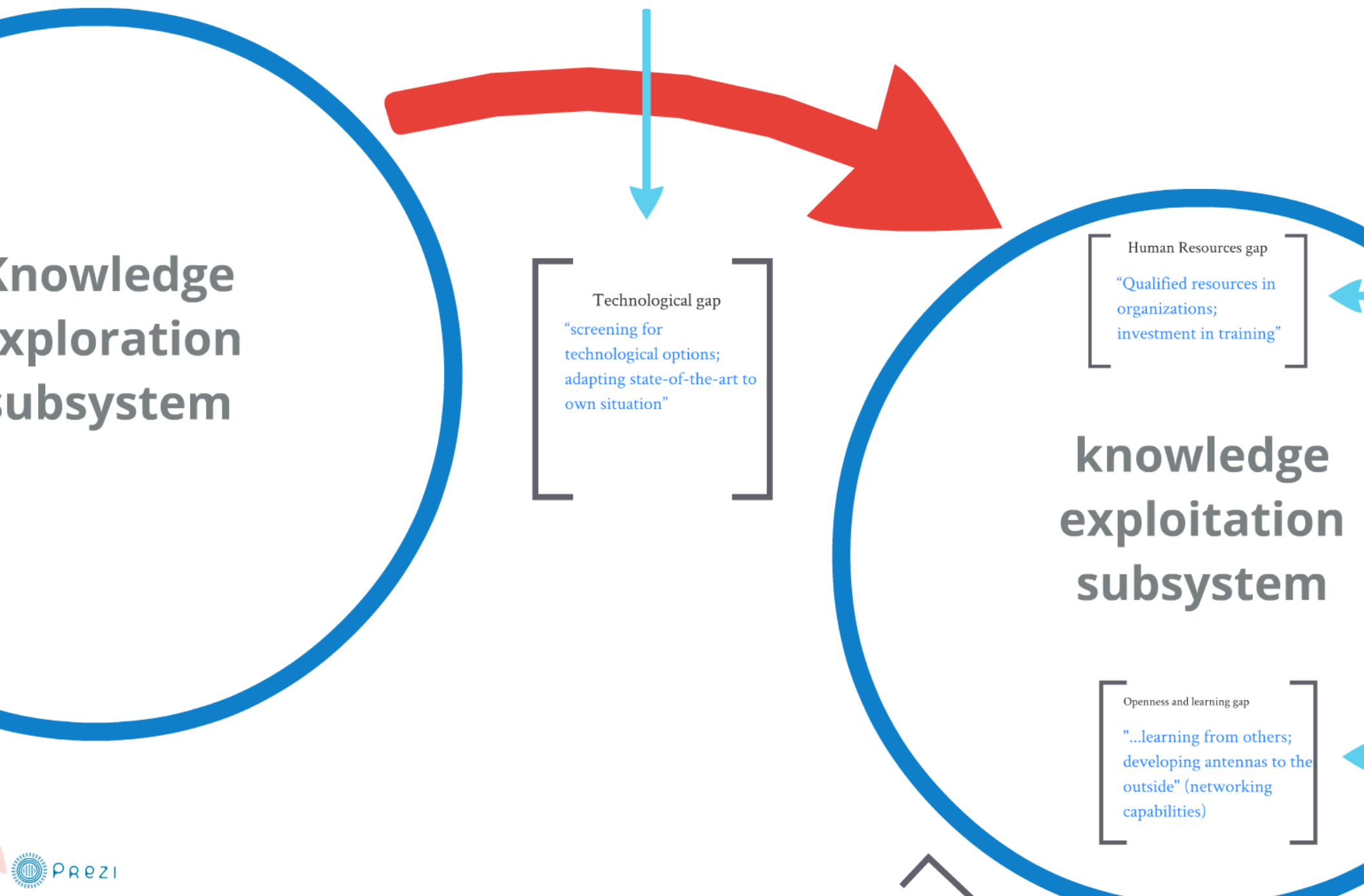
Human Resources gap

“Qualified resources in  
organizations;  
investment in training”

Openness and learning gap

“...learning from others;  
developing antennas to the  
outside” (networking  
capabilities)

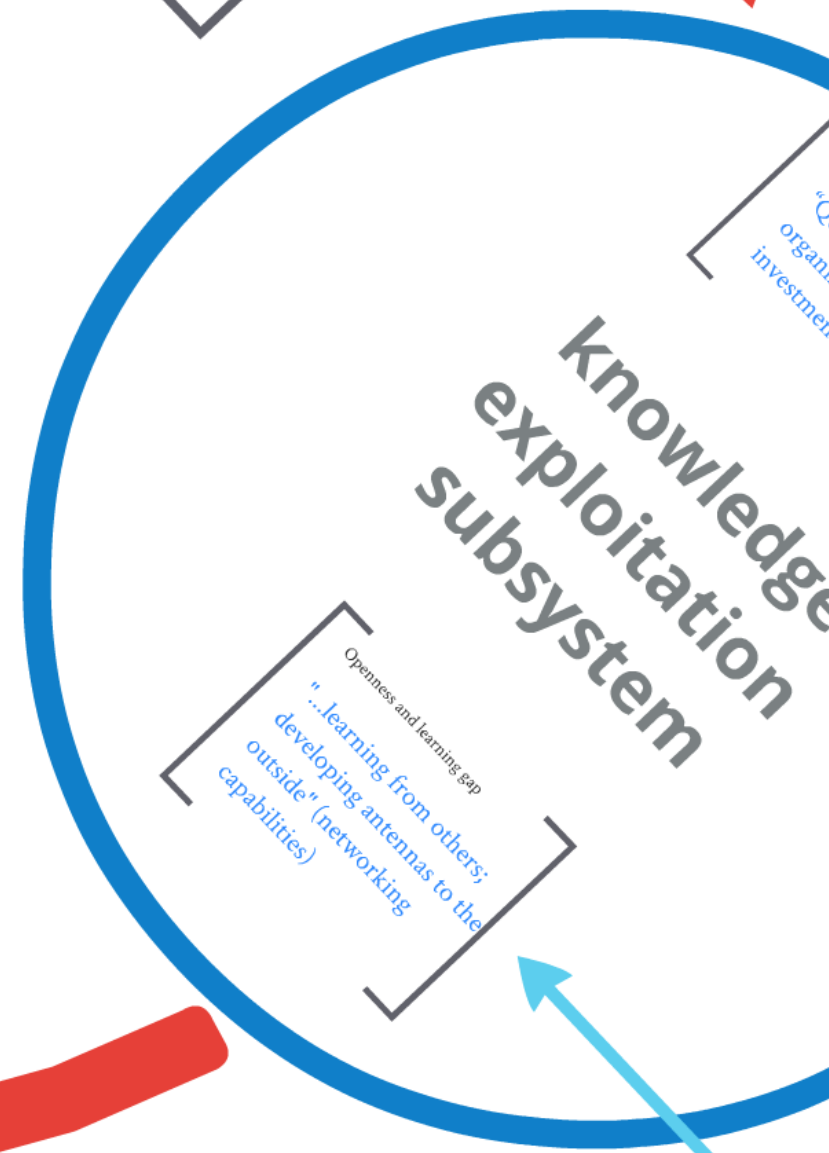
technical advisory groups,  
business and trade associations...







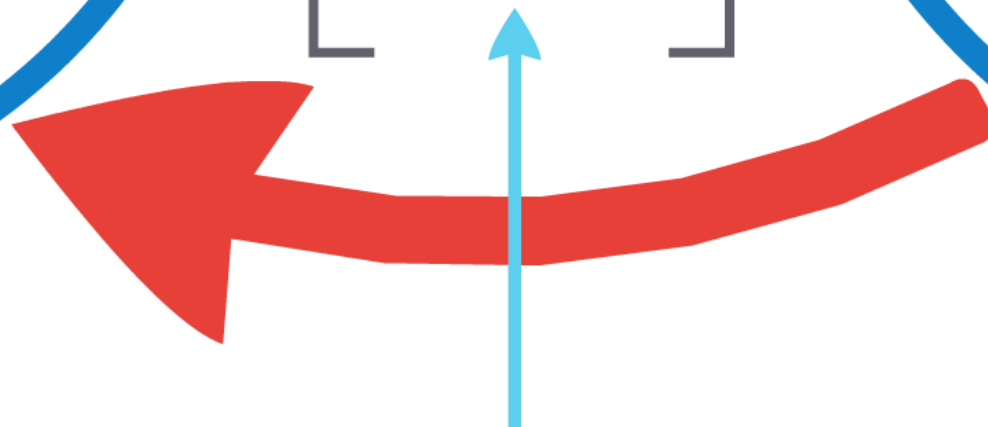
Regional  
policy  
subsystem



knowledge  
exploitation  
subsystem

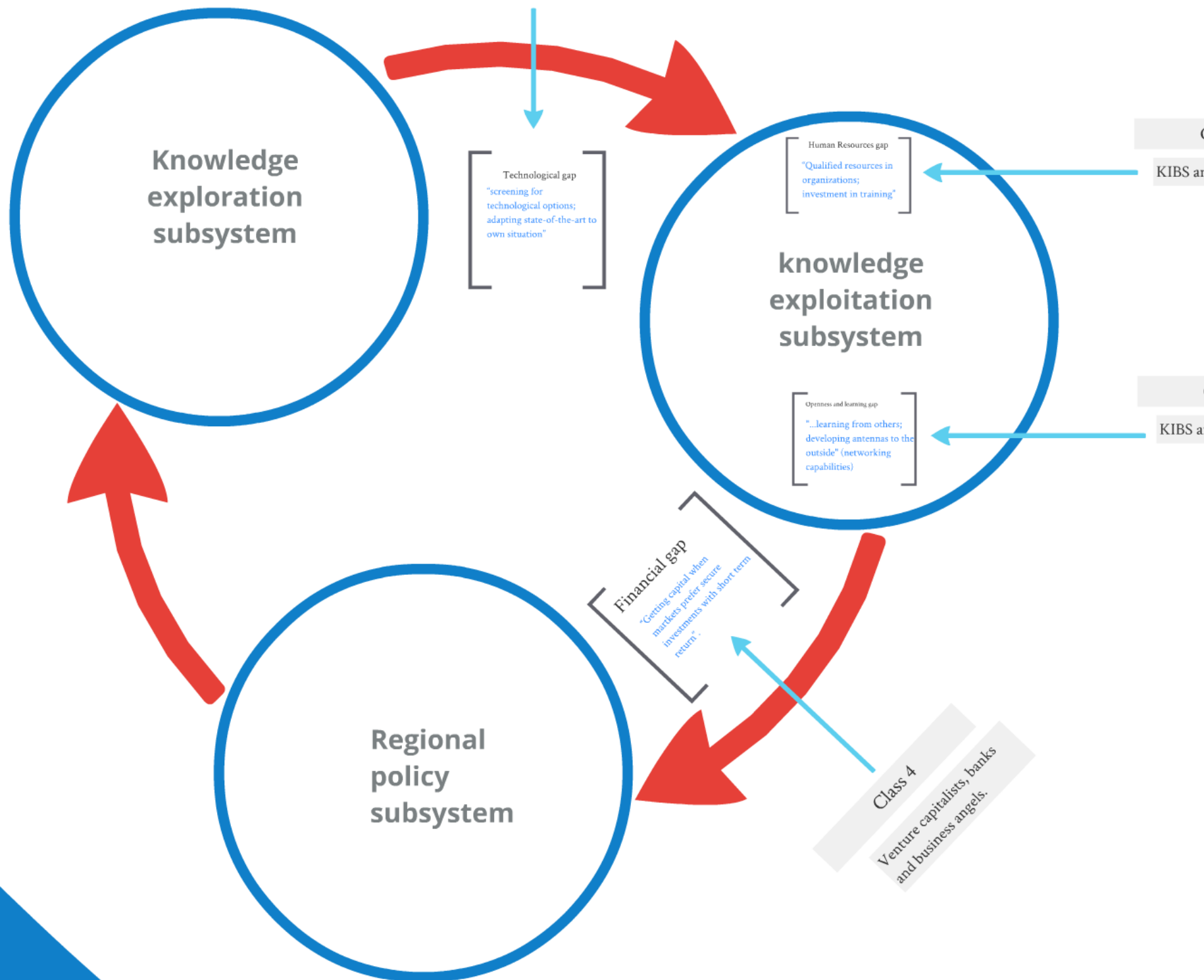
Financial gap  
"Getting capital when  
markets prefer secure  
investments with short term  
return".

Openness and learning gap  
"...learning from others:  
developing antennas to the  
outside" (networking  
capabilities)



ptions;  
ce-of-the-art to  
ation"

organ.  
investmen

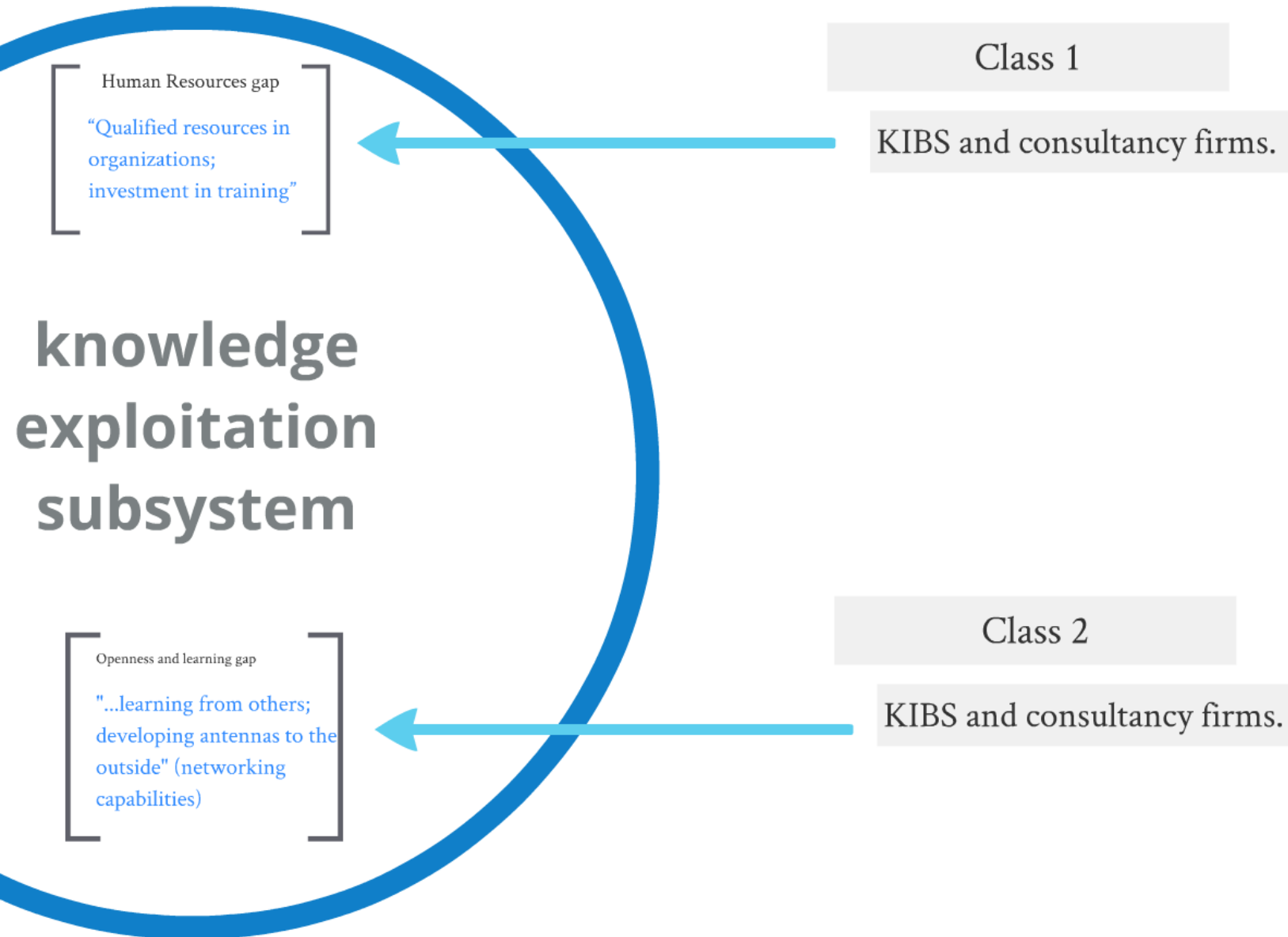


...and as introduced,  
"associative organizations"  
can be divided into several  
"classes" that specialize in  
overcoming these "gaps"...

2

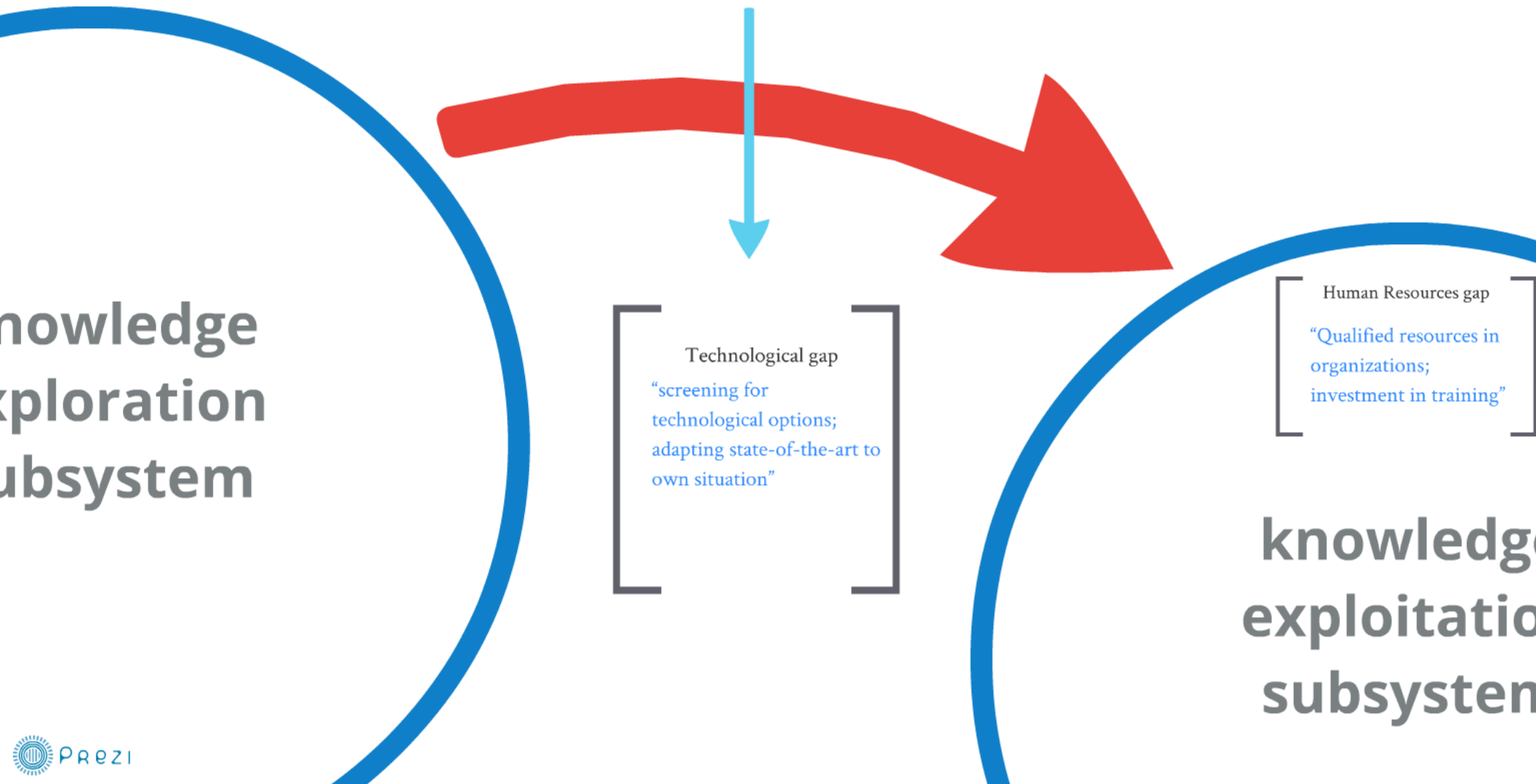
3

4

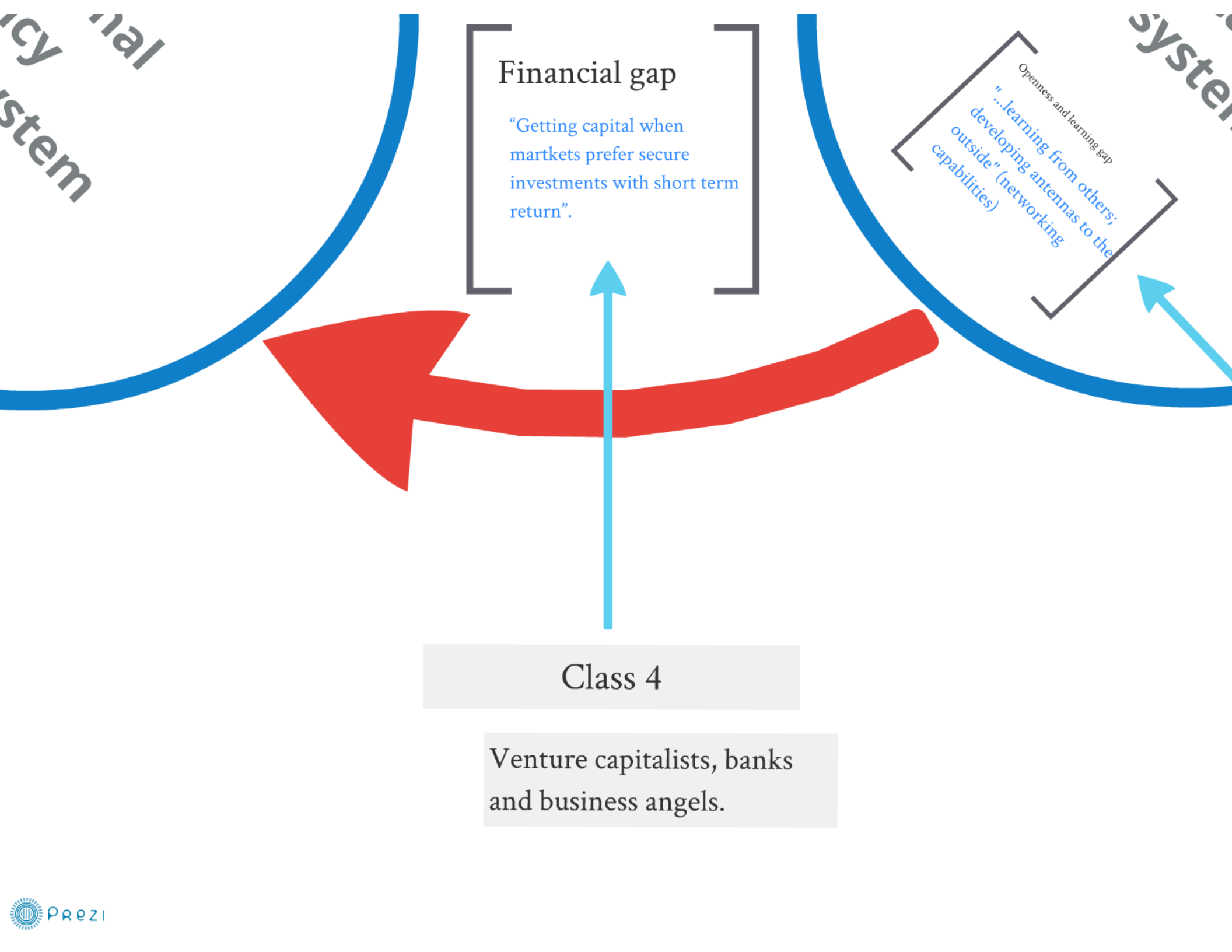


### Class 3

Technology transfer offices,  
technical advisory groups,  
business and trade associations...







3

4

5



...and due to their shared  
commitment, "associative  
organizations" can constitute  
a new component



# Associative Subsystem

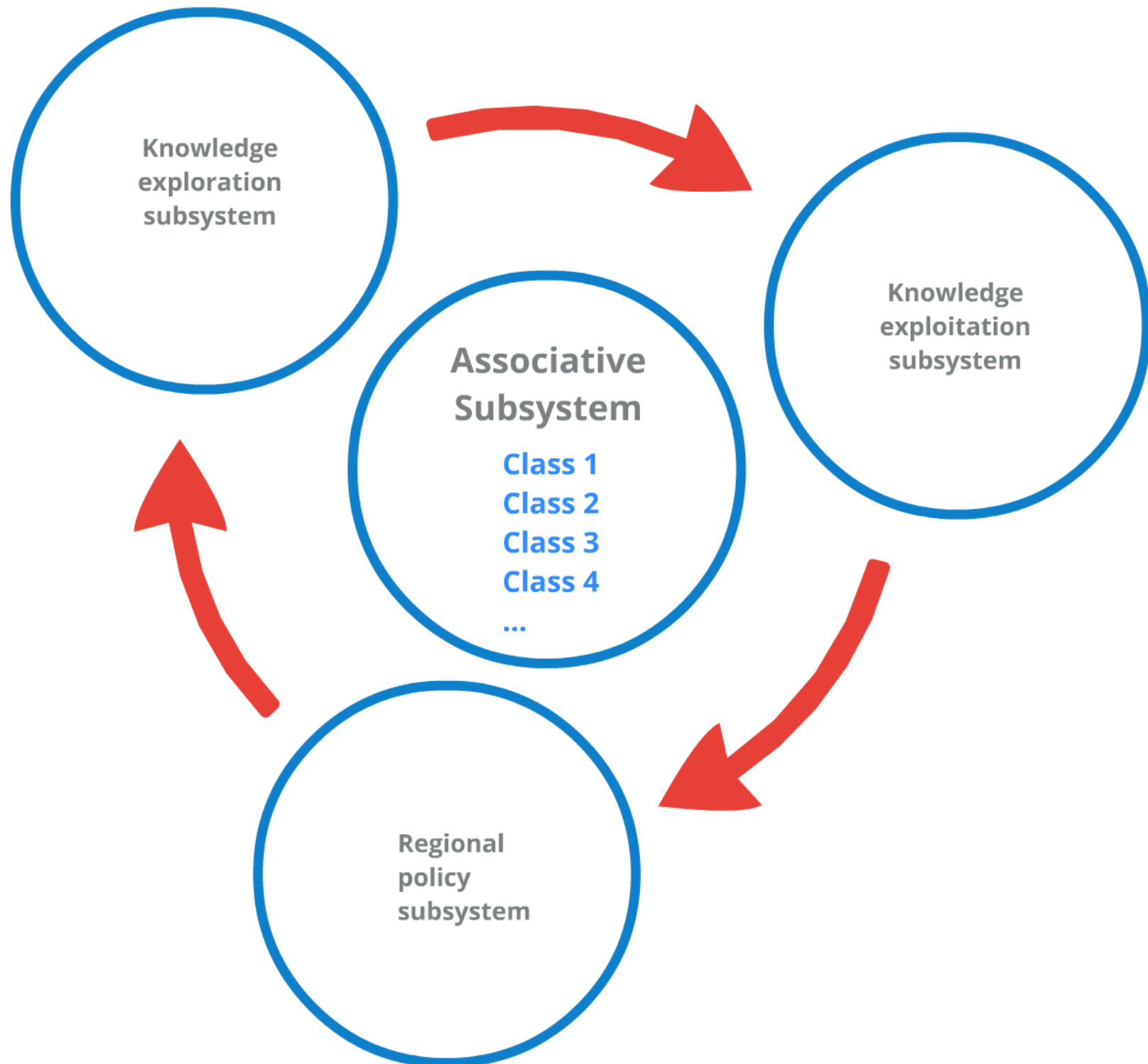
Class 1

Class 2

Class 3

Class 4

...



...finally, these "associative  
organization" classes,  
together with the gaps, will  
help us set our empirical  
study...

4

5





# Empirical study



# Main targets

1

Empirical study:

1 Setting up a **typology of regions** based on the effectiveness of the **associative subsystems**.

2 Setting up **common factors**. What is common between the 4 classes we have observed?:

- Human resources gap
- Oppenness and learning gap
- Technological gap
- Financial gap

- Class 1 (KIBS)
- Class 2 (KIBS)
- Class 3 (T.T. offices...)
- Class 4 (BAs...)

3 **Global comparison** of **commonalities** and **discrepancies** among the groups of variables. Do all the classes feed back a similar typology of regions?

4 **Comparison of typologies** of regions provided by each group of variables. If two regions are similar from one point of view (e.g. Class 1), are they similar from the other points of view ? (e.g. Class 3).

Escofier and Pagès, 1990, 1998 & 2008

Abdi et al., 2007



# Database

2

We compose a [database](#):

...by the [adaption](#) of several variables into [sets](#) that would correspond to each [class](#). These variables (proxies) are sourced on various studies carried out by the [Spanish Official Statistical Institute](#) and the [Spanish Venture Capital Association](#).

INE 2007-2012

ASCRI 2005-2011



So, we gathered the data in a [matrix](#) that groups "[classes](#)" and "[regions](#)" (Autonomous Communities -NUTS-2-) together:

	1	Class1	Class2	Class3	Class4	1	1
Spanish regions	17	<b>Class 1 (overcoming Human Resources Gap)</b> We employ variables regarding the improvements in managerial and organizational betterments as a proxy to understand the services provided by class 1 organizations (e.g. Private companies that have implemented marketing innovation).	<b>Class 2 (overcoming Oppoteness and learning Gap)</b> We employ variables that permit us to proxy the density of interactions of class 2 organizations (e.g. private organizations that have cooperated with other companies in order of their international networks).	<b>Class 3 (overcoming Technological Gap)</b> We employ variables that permit us to proxy the density of interactions of class 3 organizations between the "exploration" and the "exploitation" subsectors (e.g. private companies that contracted R&D services to organizations and institutions belonging to "exploitation subsector").	<b>Class 4 (overcoming Financial Gap)</b> We employ variables that permit us to proxy the density of interactions of class 4 organizations (e.g. private companies that have cooperated with other public firms addressing private companies' innovative activity).		



# Spanish regions

17

1

Class1 Class2 Class3 Class4

11

## Class 1 (overcoming Human Resources Gap)

We employ variables regarding the improvements in managerial and organizational betterments as a proxy to understand the services provided by class 1 organizations (e.g. Private companies that have implemented marketing innovations ).

## Class 2 (overcoming Oppenness and learning Gap)

We employ variables that permit us proxy the density of interactions of class 2 organizations (e.g. private organizations that have cooperated with other companies in some of their innovating activities).

## Class 3 (overcoming Technological Gap)

We employ variables that permit us proxy the density of interactions of class 3 organizations between the "exploitation" and the "exploration" subsystems (e.g. private companies that contracted R&D services to organizations and institutions belonging to "exploration subsystems").

## Class 4 (overcoming Financial Gap)

We employ variables that permit us proxy the density of interactions of class 4 organizations between the regional policy and the exploitation subsystems (e.g. public loans addressing private companies innovative activity).

Communities -19-15-27) together.

# Spanish regions

---



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Class 1 Class

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# Methodology

3

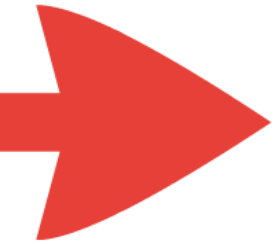
...and we conduct a [Multiple Factor Analysis](#), which creates a product space integrating different groups of variables (each gap) describing the same observations (Spanish regions).

Escofier and Pagès, 1990, 1998 & 2008

...we chose a beautifully simple tool which is the [FactoMineR](#) package using [R](#)...

Lê et al., 2008

...we simultaneously perform a [cluster analysis](#) on the standardized database to [classify regions](#) in [homogeneous groups](#), which will help us present the outputs of the study...



## Multiple Factor Analysis

- 11 variables describing 4 Gaps are reduced to two factors (unobservable variables) we named: "ASs specialized in management" and "ASs specialized in networking, technological & financial" that gather 75% of the variance (meaning we lose 25% of information).



## Dendrogram

- 1 We find a strong north (center and east)-south pattern that resembles the one obtained by other authors when evaluating more general aspects of RISs.

This finding might correlate the effectiveness of "ASs" with other aspects measured by a literature strand that specializes in typologies, such as "technological development" or "innovative capabilities".

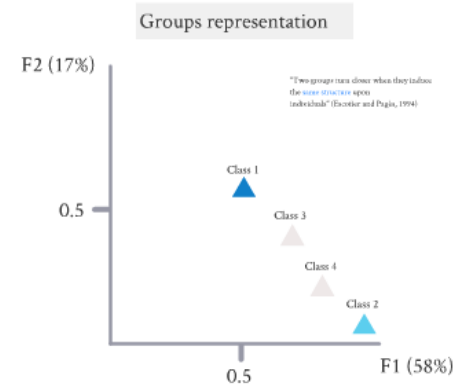
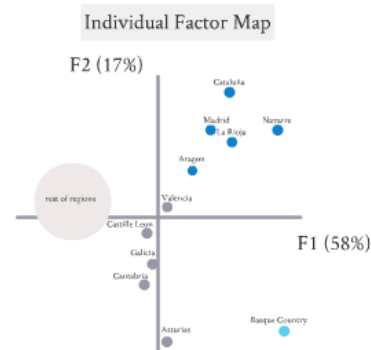
Geroski and Soete, 1999; Bressa et al., 2002; Martinez-Politeiro, 2002; Navarro and Gilabue, 2009 & 2012

- 2 The cluster analysis feeds us back with four meaningful groups of regions:
  - > G1: Effective industrial-oriented "ASs" (Basque Country)
  - > G2: Effective service-oriented "ASs" (Aragon, Madrid, La Rioja, Catalunya, Navarre)
  - > G3: Potentially effective ASs (Cantabria, Galicia, Castilla-La Mancha, Valencia and Asturias)
  - > G4: Ineffective or missing ASs (rest of the regions)

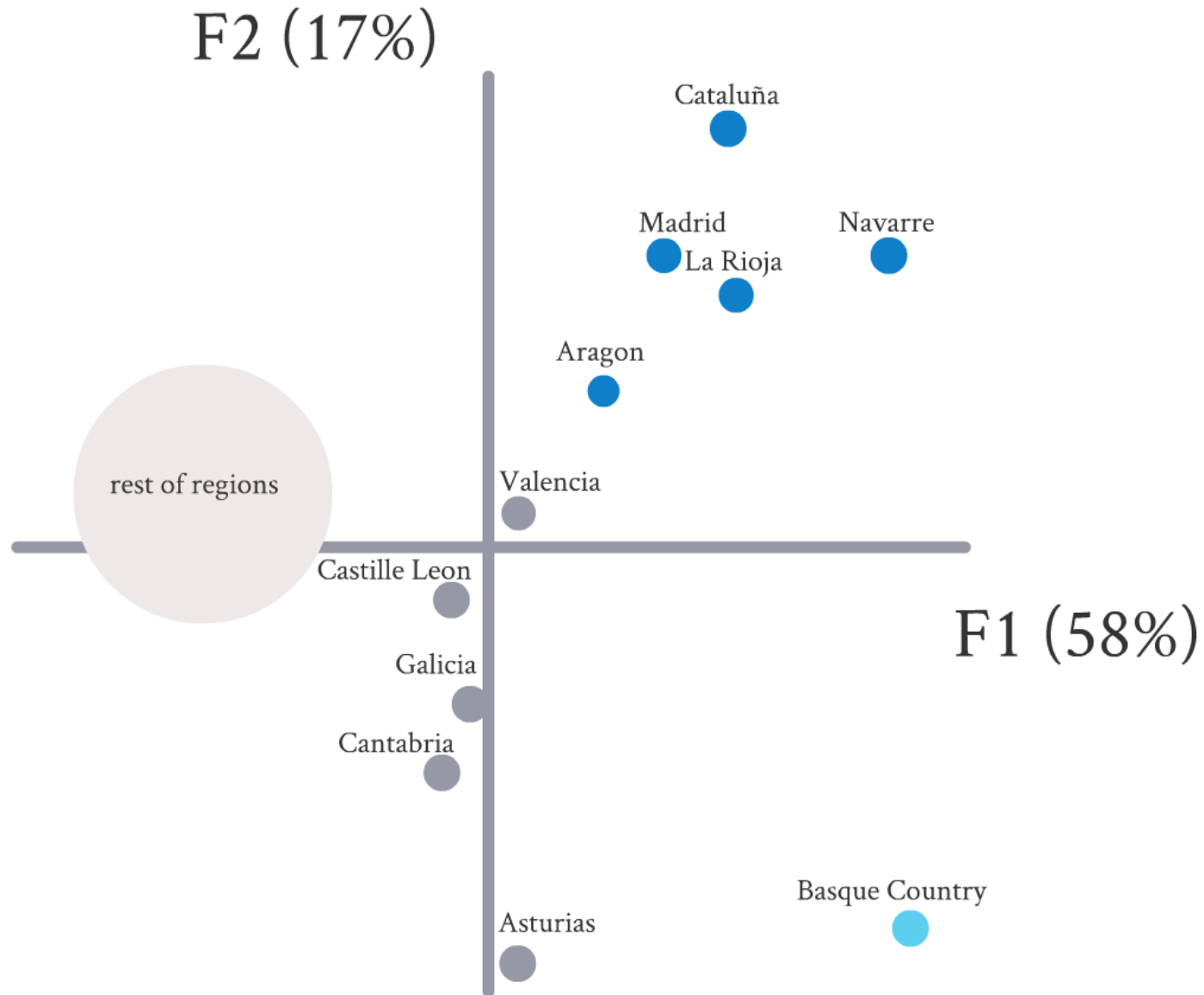
# Outputs

# Multiple Factor Analysis

- 1 11 variables describing 4 Gaps are reduced to **two factors (unobservable variables)** we named: "**ASs specialized in management**" and "**ASs specialized in networking (technological & financial)**" that gather 75% of the variance (meaning we lose 25% of information).



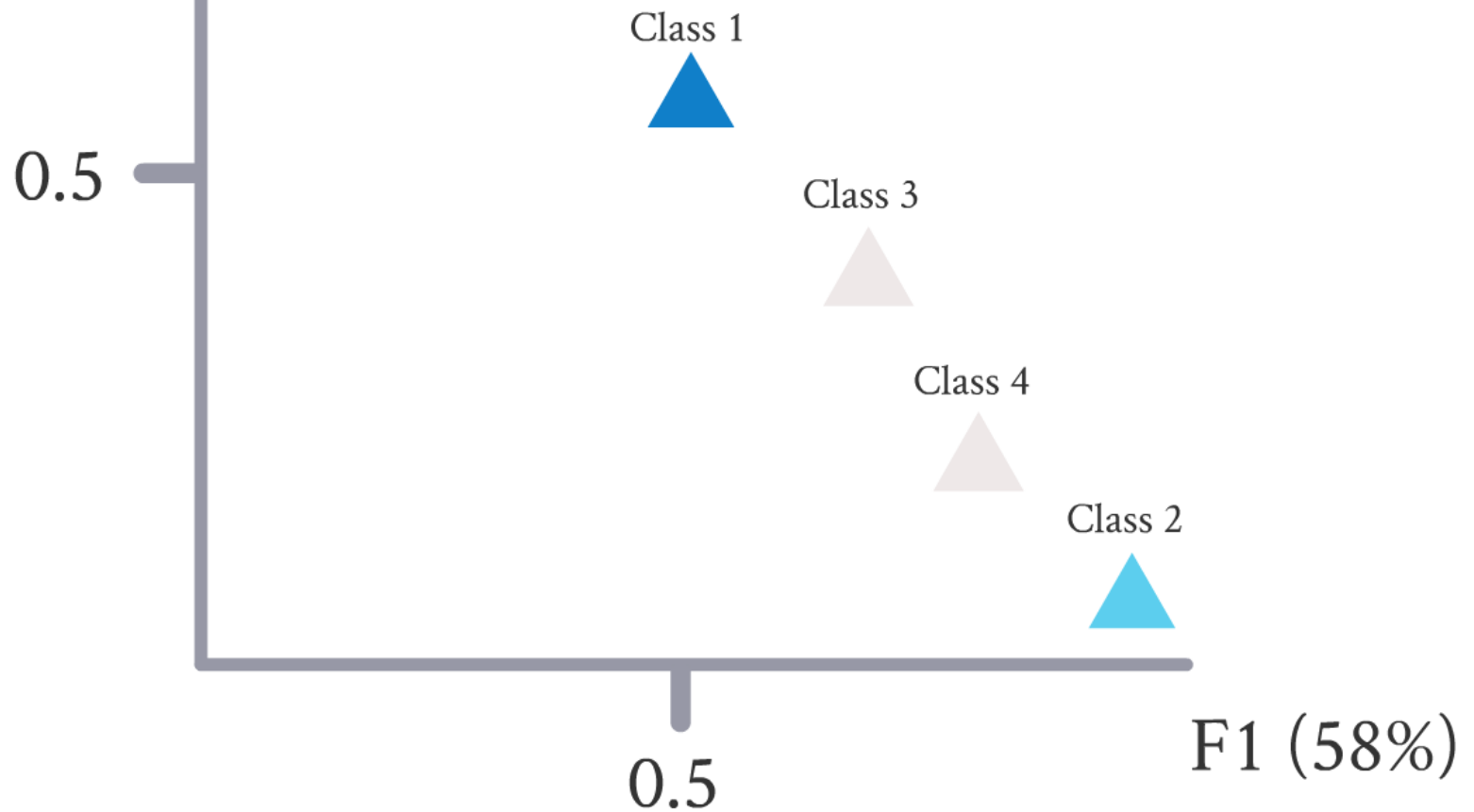
# Individual Factor Map



# Groups representation

F2 (17%)

"Two groups turn closer when they induce the same structure upon individuals" (Escofier and Pagès, 1994)



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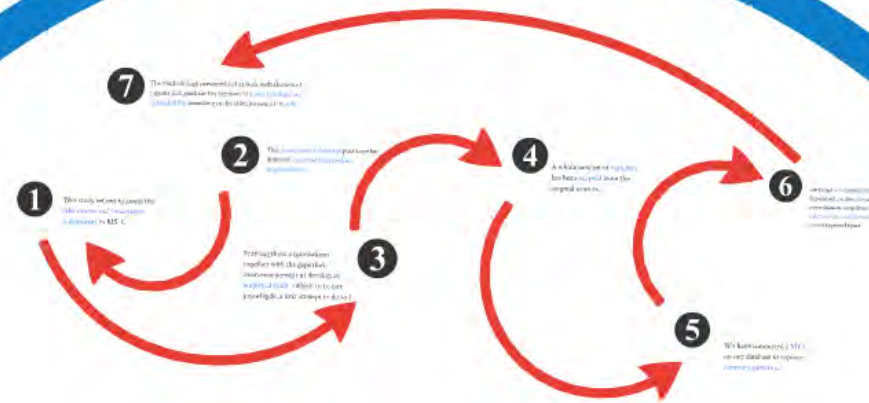
Coronado and Acosta, 1999; Buesa et al., 2002; Martinez-Pellitero 2002; Navarro and Gibaja, 2009 & 2012

- 2 The cluster analysis feeds us back with four meaningful groups of regions:

- G1. Effective industry-oriented "AS". (Basque Country)
- G2. Effective service-oriented "ASs". (Aragon, Madrid, La Rioja, Cataluña, Navarre)
- G3. Partially effective ASs. (Cantabria, Galicia, Castille Leon, Valencia and Asturias)
- G4. Ineffective or inexistent ASs. (rest of the regions).



# Contributions and limitations



region that push for the creation of a new type of [Spanish RISs](#), according to the effectiveness of its [ASs](#).

1

This study set out to assess the [effectiveness](#) of [Associative Subsystems](#) in RIS s.

2

This [Associative subsystem](#) puts together different [classes](#) of [intermediary organizations](#).

3

Framing these organizations together with the gaps they overcome permits us develop an [empirical study](#). (which is, to our knowlegde, a first attempt to do so )



4

A whole new set of [variables](#) has been [adapted](#) from the original sources.

6

we found [ASs](#) patterns vary depending on the [class](#) of organization considered ([pictures are not homothetic](#)) across regional space.

5

We have conducted a [MFA](#) on our database to explore [common patterns](#).



7

The methodology presented fed us back with clusters of regions that push for the creation of a [new typology for Spanish RISs](#), according to the effectiveness of its [ASs](#).

2

This [Associative subsystem](#) puts together different [classes](#) of [intermediary organizations](#).



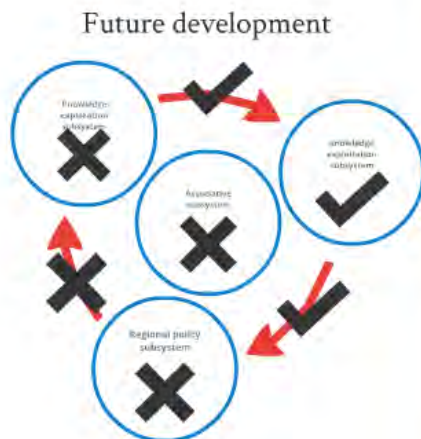
1

We confirm the **data** available to evaluate RISs is very limited and, consequently, the results are only as good as the data is!!

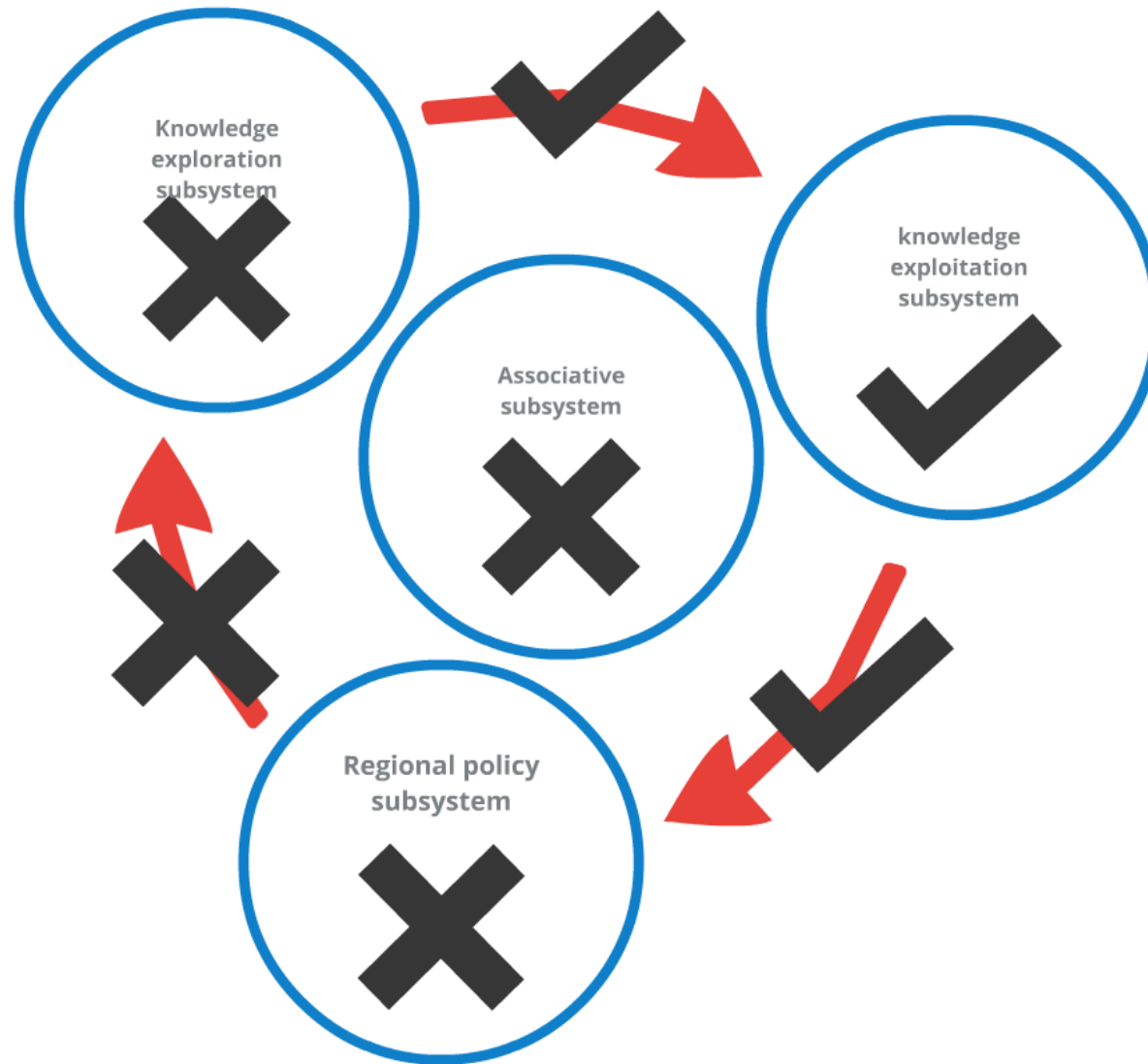
**Zabala-Iturriagagoitia et al., 2007; Chaminade et al., 2012; Asheim and Parrilli, 2012.**

## 2

The literature is **blind** when it comes to describing the work of **associative organizations** among several subsystems considered only partially in this study, and also among themselves.



# Future development







3

The visual output we get is just a snapshot of RIS's behavior.

Longitudinal analyses could shed some light on the long run.

Edquist, 2011



# 4

Since it is "interactions that matter" what we want to assess, Social Network Analysis (SNA) could help at the comprehension of several hidden interdependencies that could enrich the “black box” of regions’ connectivity.

# Thanks very much for your attention!!



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