CLUSTER GAMES
Is There An Iceberg Under The Water?

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innopartners and FRIENDS

Where we are today in cluster development?

Today's challenges: Fourth Industrial Revolution & The VUCA World

The fourth industrial revolution

There are at least **three differences** between this revolution and the previous ones:

- **Speed** - like a **tsunami**.
- **It is** not **related to** one area - the accessibility and affordability of **complex technologies** will spread them farther and faster.
- This revolution is not about a single product or service innovation – **it is about innovation of entire systems**.

Source: https://www.weforum.org/agenda/2015/10/will-the-fourth-industrial-revolution-have-a-human-heart-and-soul/ (Klaus Schwab)

COMMITTED TO IMPROVING THE STATE OF THE WORLD

Global Challenge Insight Report

The Future of Jobs

Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution

January 2016

I. Immediate focus

- Reinventing the HR Function
- Making Use of Data Analytics
- Talent diversity – no more excuses
- Leveraging flexible working arrangements and online talent platforms

Source: Future of the Jobs / World Economic Forum January 2016

Talent diversity - no more excuses

Top 10 skills

in 2020	in 2015
1. Complex Problem Solving	1. Complex Problem Solving
2. Critical Thinking	2. Coordinating with Others
3. Creativity	3. People Management
4. People Management	4. Critical Thinking
5. Coordinating with Others	5. Negotiation
6. Emotional Intelligence	6. Quality Control
7. Judgment and Decision Making	7. Service Orientation
8. Service Orientation	8. Judgment and Decision Making
9. Negotiation	9. Active Listening
10. Cognitive Flexibility	10. Creativity

Source: Future of Jobs Report, World Economic Forum

II. Longer term focus

- Rethinking education systems
- Incentivizing lifelong learning
- **Cross-industry and public-private collaboration**

Source: Future of the Jobs / World Economic Forum January 2016

Today's challenges
Fourth Industrial Revolution
&
The VUCA World

The VUCA World

What does it mean?

- **V**olatility → Vision
- **U**ncertainty → Flexibility and speed
- **C**omplexity → Impact and effect
- **A**mbiguity → Personal Individual Perspective

How we can manage it in an organisation?

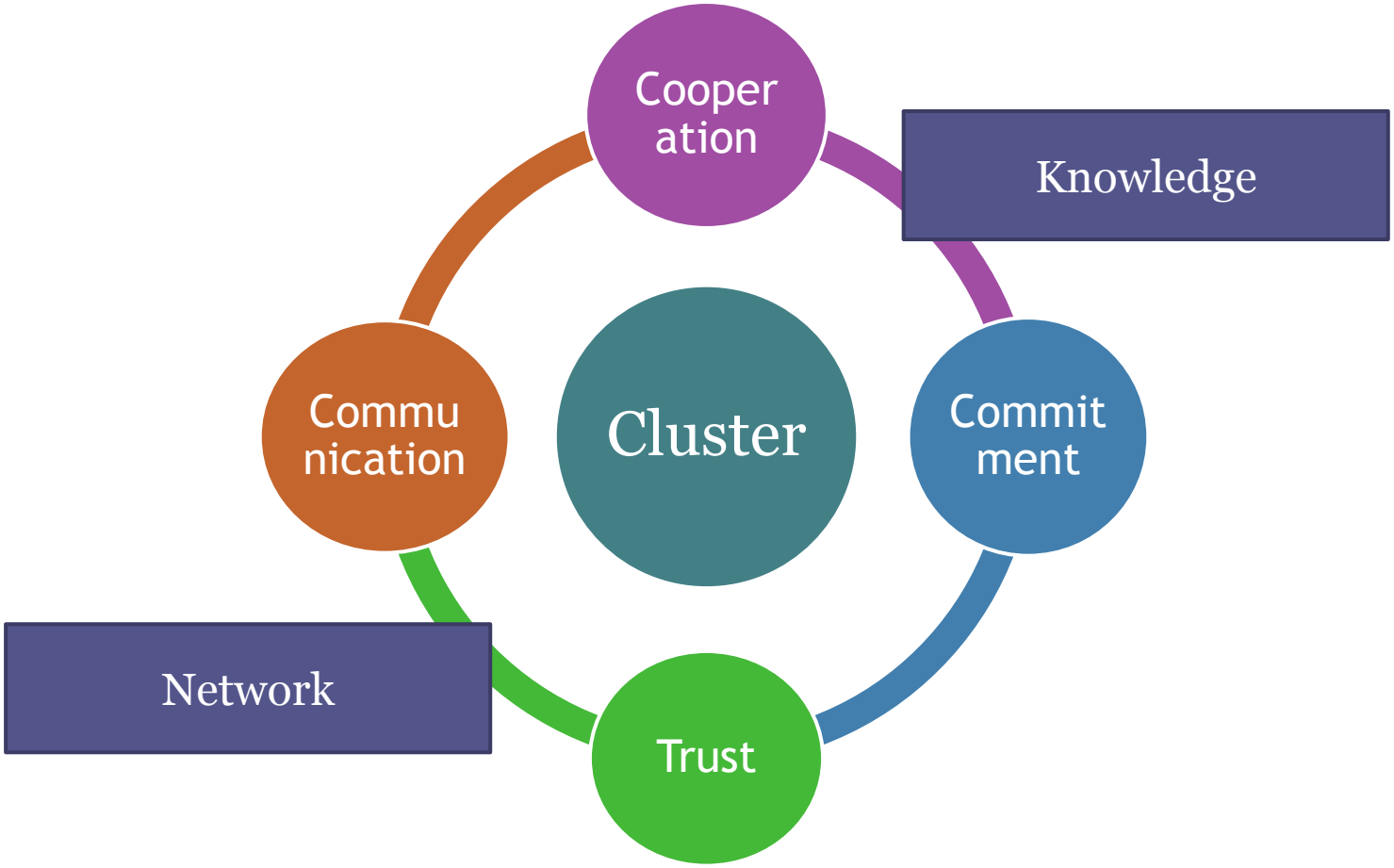
We need

- Common understanding
- Aware of the organizational view
- New information built in immediately

via

COMMUNICATION!

The basic elements of a cluster

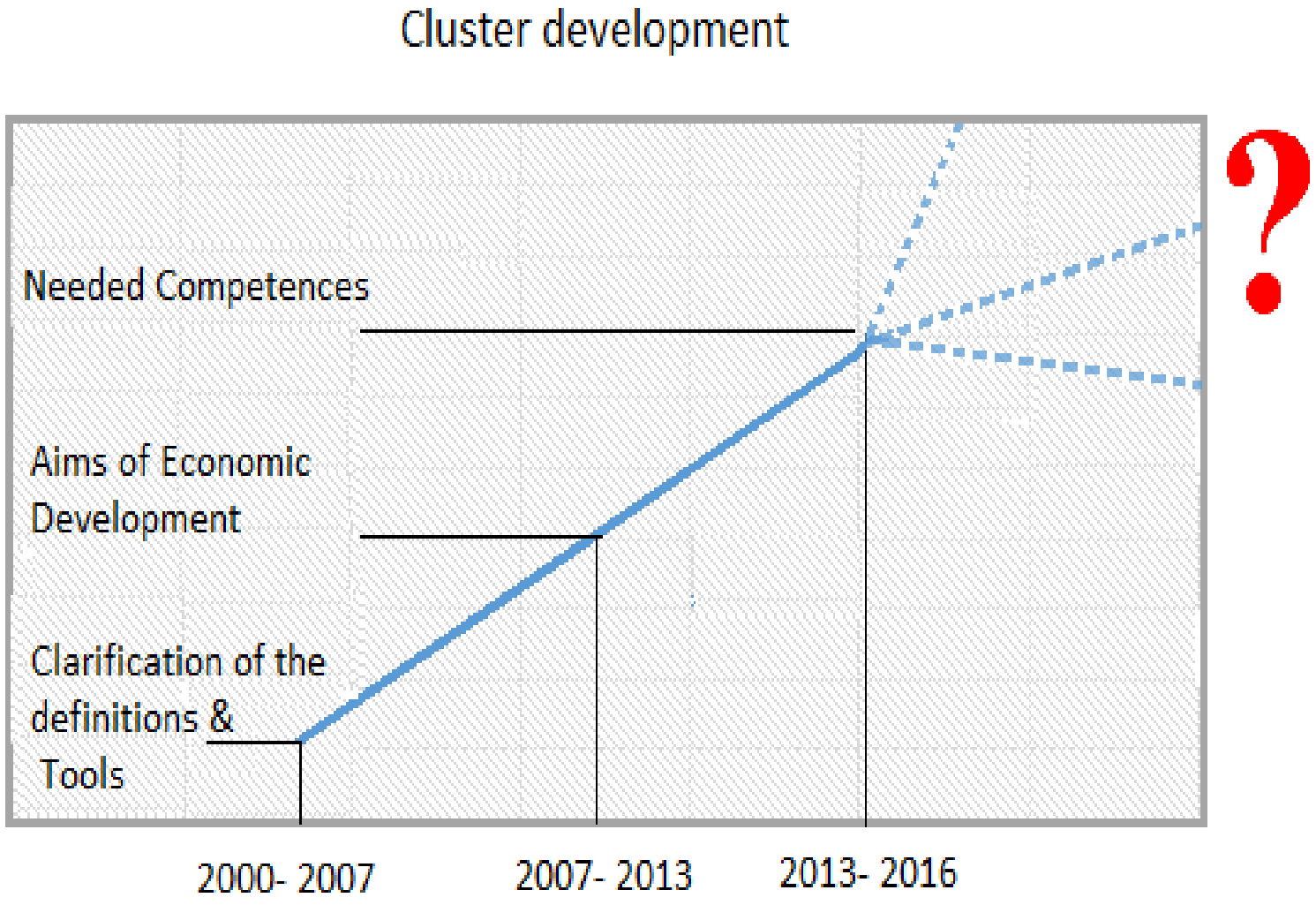


A (Cluster) Organisation

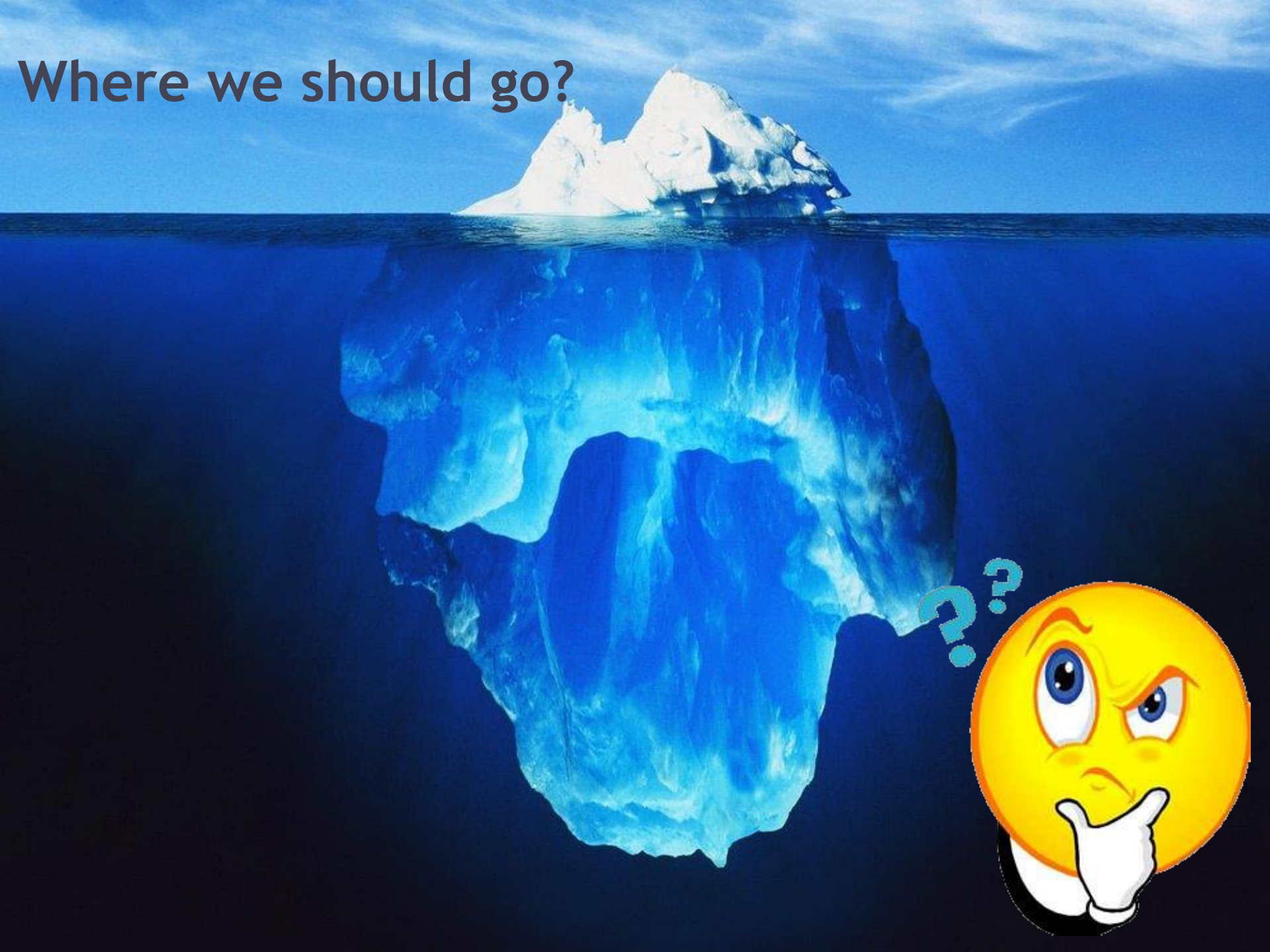
Why should any SME network with others? What are the main motivation factors?

The knowledge accumulated by the network and **the profit** achieved by this knowledge are among the most important **motivation factor**s for cluster actors.

Then where we are today in cluster?



Where we should go?



We have to dive under the water!

The aim of the Game Theoretic Model

is
to help the work of the cluster management organisation
to build up
a better, stronger, more efficient and preferable network
among the cluster actors
in which the main point is:

the more you invest
the better you will get!

How clusters can support SME's?
What the hell is the Game Theory?

Game Theory

- Game theory studies **strategic conflict situations.**
  - Strategic: Selfish actors make *decisions*, payoff depends on the decisions
  - Conflict: Interests not *completely* aligned. (Win-win conflicts included)

- Conflict situation or **game** consists of
  - Players: the actors
  - Rules of the game: Possible actions and strategies; Payoffs

- Network games: we study the **structure of interaction**
  - **Optimal and stable structures**
  - Network dynamics
  - Vulnerability
    - External attacks
    - Redundancies
  - Position of players, especially **key players**

Theory in practice: problems

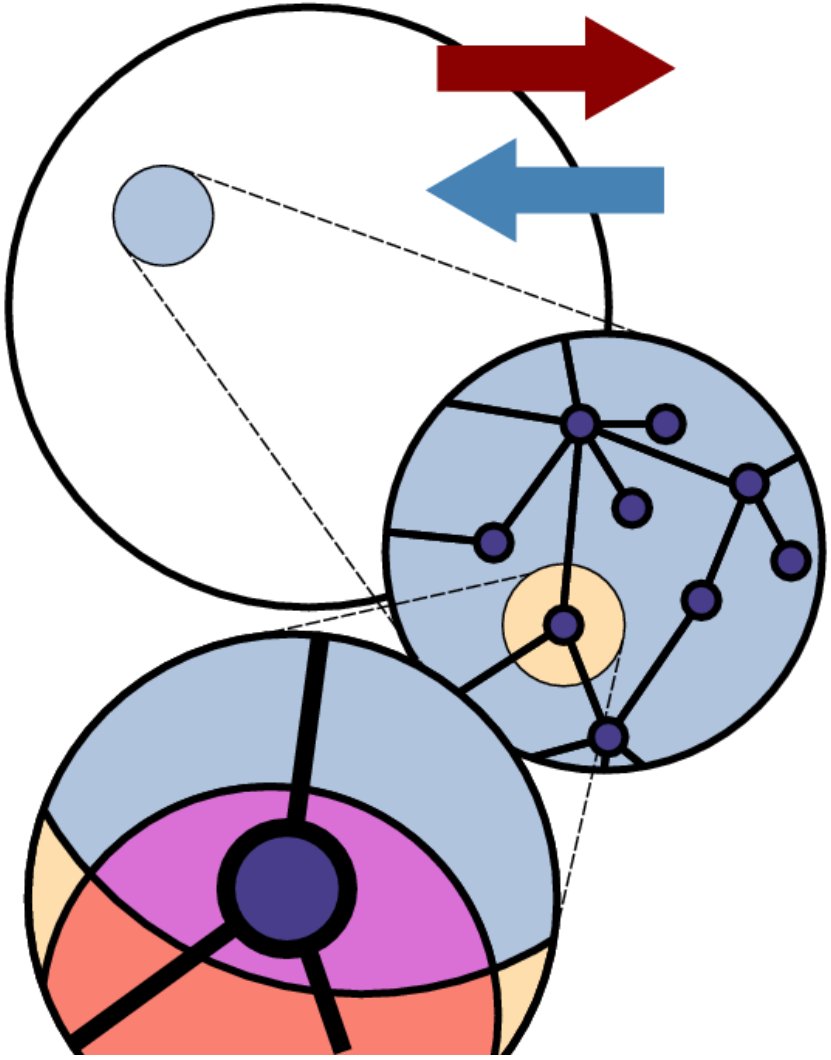
- Are actors **rational**?
  - Theory assumes: yes
  - Real life is more complicated
    - Incomplete and imperfect models
    - Rationality is too costly: Rule-of-thumb decisions in simple problems

- Games are **too complex**
  - For 40 cluster members the game has 10^12 to 8x10^47 elements.
  - Calculations may take a lifetime (of a planet) on a supercomputer

- Simplifications

Game theoretic models of cluster cooperation

Key factors of cluster cooperation



Intensity

- Input and output
- Total value of cooperation
- Overall cooperation effort

Structure

- Network (cooperation) structure within a cluster
- Central (key) and peripheral members

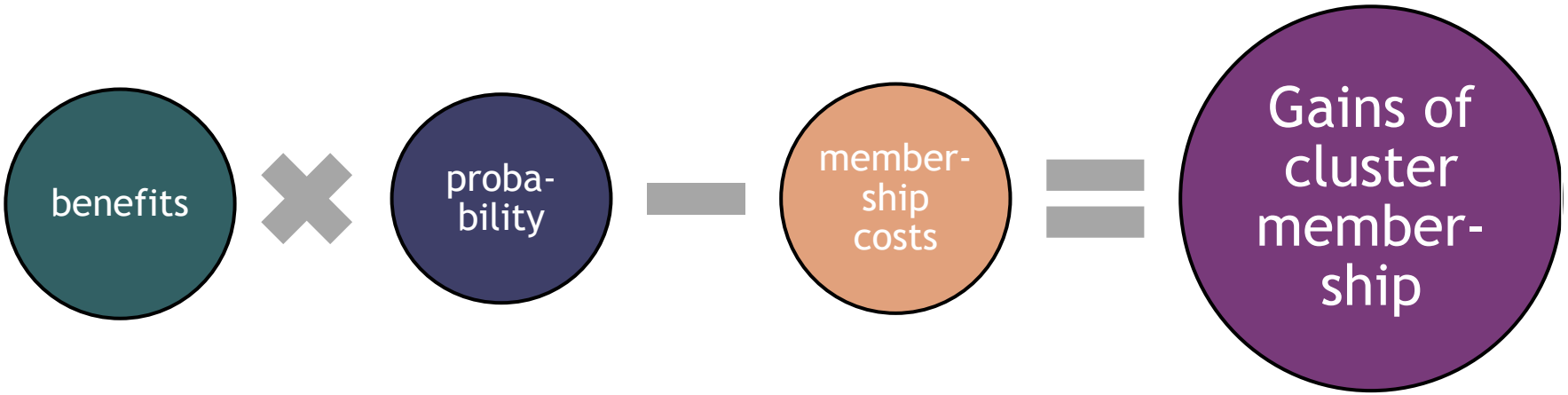
Balance

- Main beneficiaries
- Cooperation in- vs outside of cluster

Game theoretic models

Intensity of cooperation

Intensity:
The gains of cluster membership



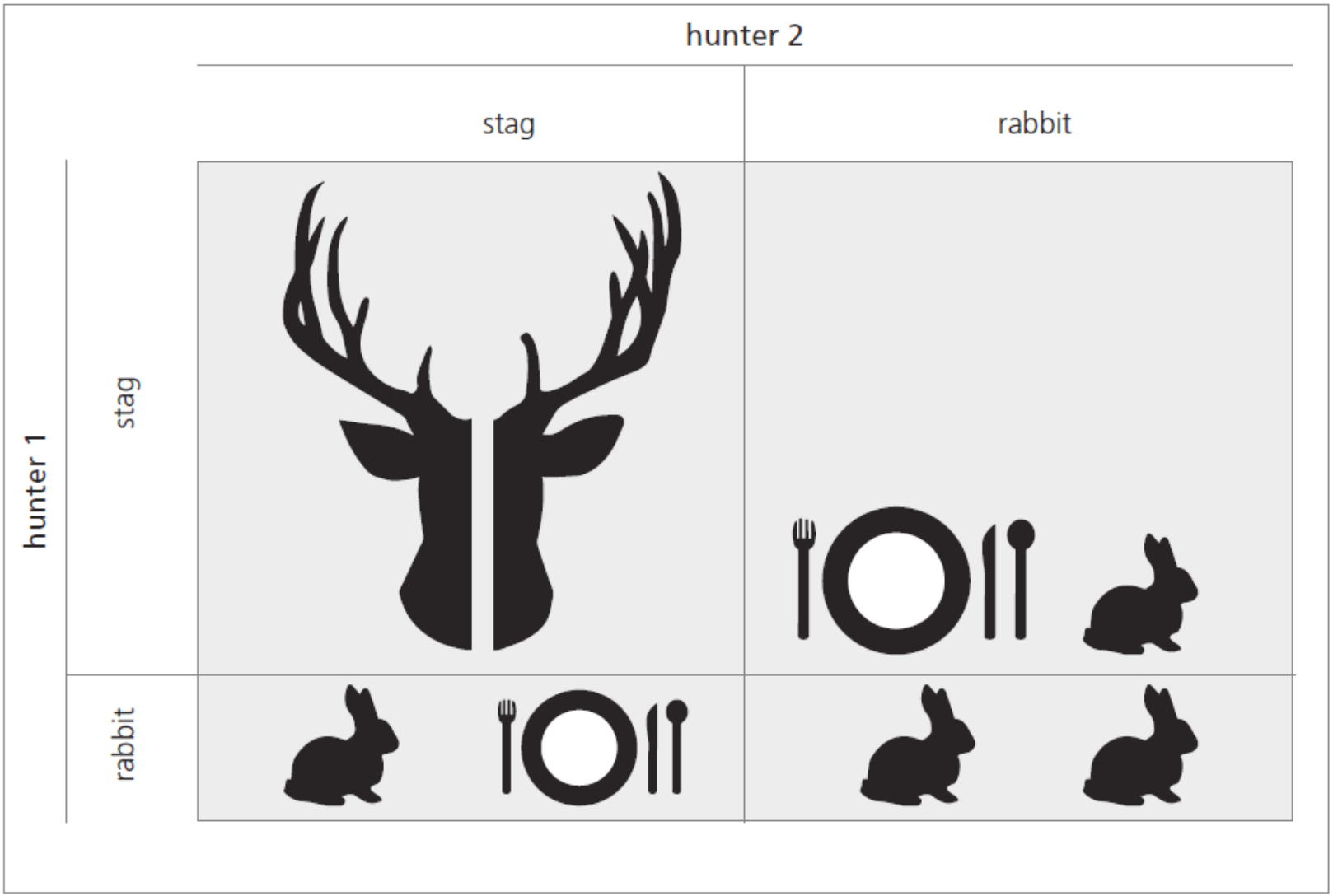
Intensity: benefits

- Size and concentration: economies of scale
  - The bigger, the better
- Common interests and threats: joint action
  - The more specialised, the better
  - More specialised = less members?
- Cluster services (by the management)
  - The more services, the better
  - *Costs*!
- External resources/funding
- Overall intensity of cooperation:
  - Cooperation effort

Intensity: probabilities

- Access to common resources
  - Are common resources uncontested?
- Cooperation culture
  - Is cooperation a membership objective?
- Cooperation density
  - What is the average number of partnerships per firm?
- Commitment
  - „Put your money where your mouth is."
  - Do members invest into cooperation? Membership fees, time,…?
- Long term commitment
  - Time dimension of cluster strategies
  - Administrative aspects of membership?

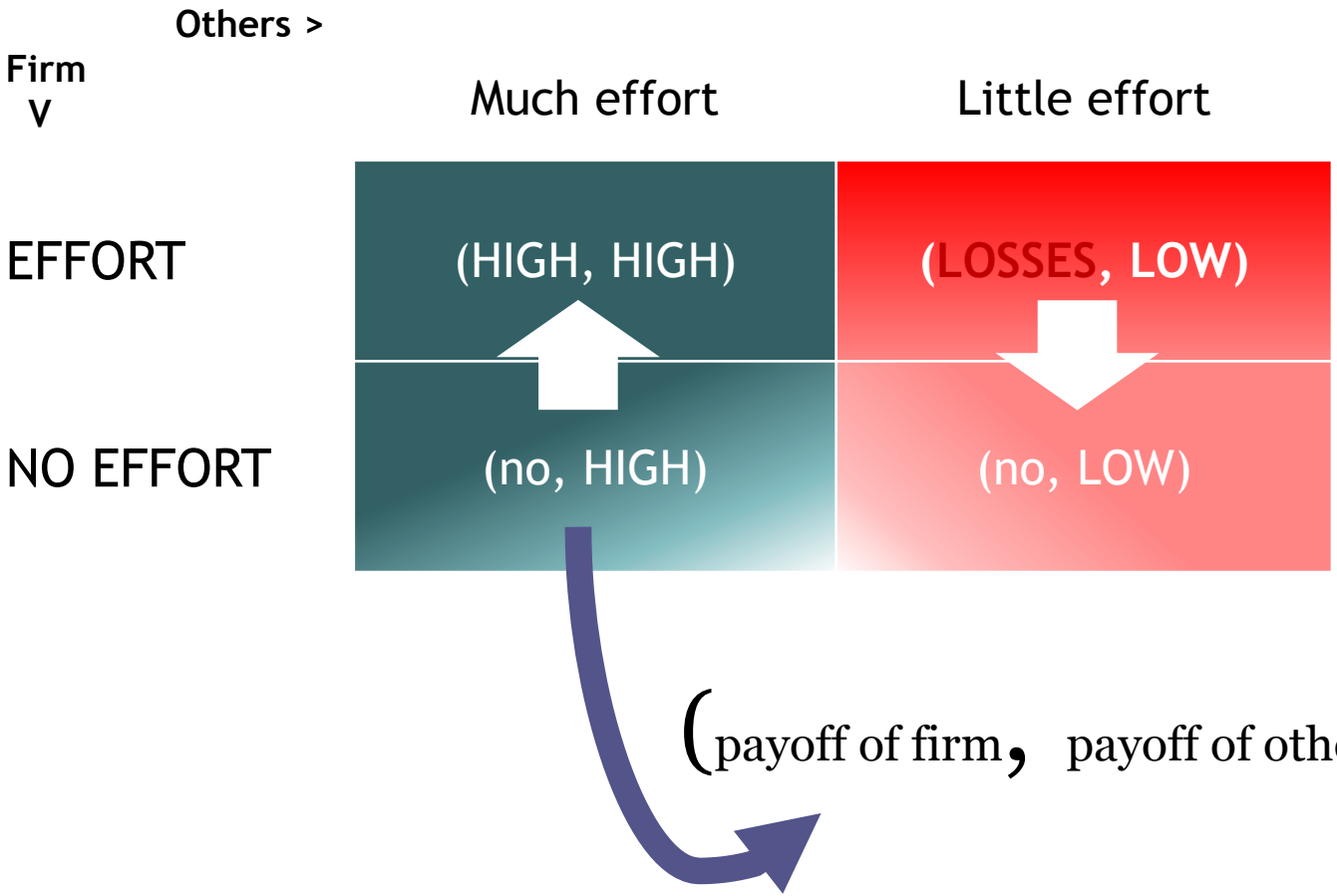
The stag hunt game



The Cluster Game
- Adopting Game Theory to Clusters -

- Framework conditions (adopted stag hunt game)
- Cluster actors are selfish and interested in profits
- Cluster actors are serving same market
- Profits can be gained through
  - Networking and information exchange
  - Trustful cooperation and knowledge sharing

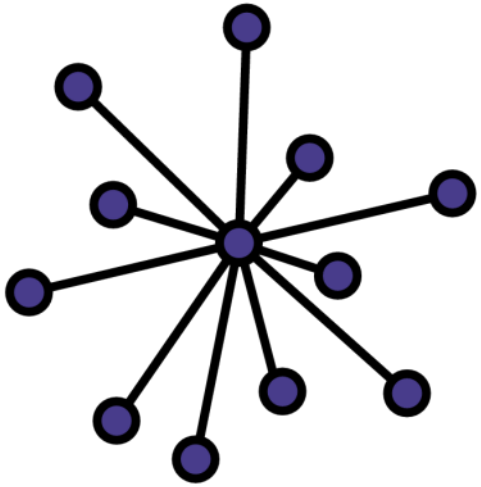
The „Profits from Cooperation” game



Game theoretic models

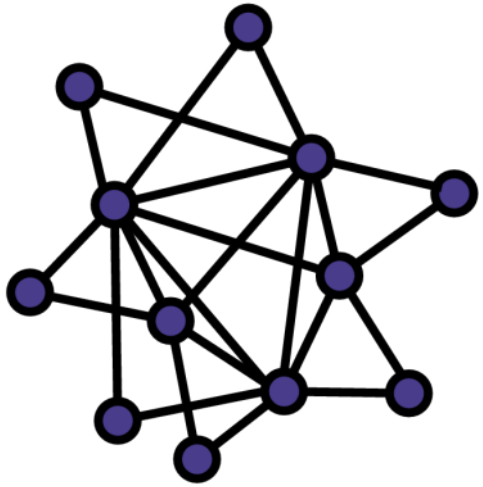
Structure of cooperation

Characteristic network structures within clusters



Star

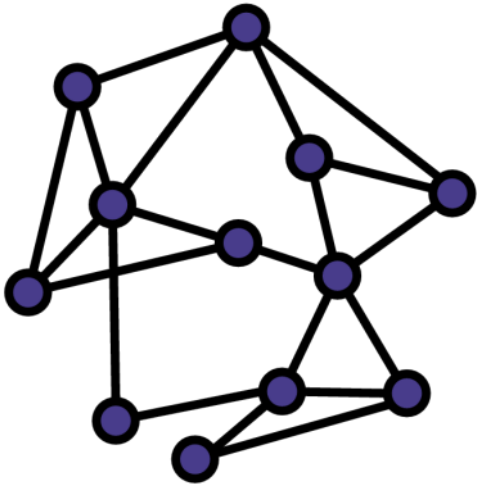
- Quick growth; Small diameter
- No cooperation; management-dependance
- Potential for decentralised cooperation
- Sustainability; Little or no cooperation



Snowflake

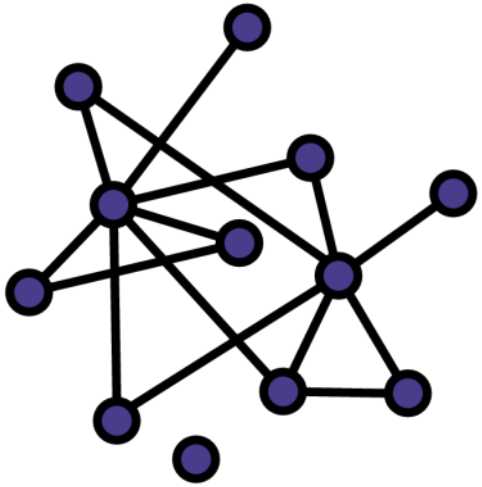
- Densly connected core; agenda
- Periphery has limited acces
- Entry-exit dynamics
- Imbalanced benefits and profits

Characteristic network structures within clusters



Circle

- Established cooperation; actors as peers independent of facilitator
- No agenda or leadership
- Lack of openness for new actors



Haystack (benchmark random network)

- Some actors well-connected
- No leadership; some actors badly connected
- Easy entry or exit
- Disintegration

Pilot study of clusters of excellence

Different competences demanded by cluster actors

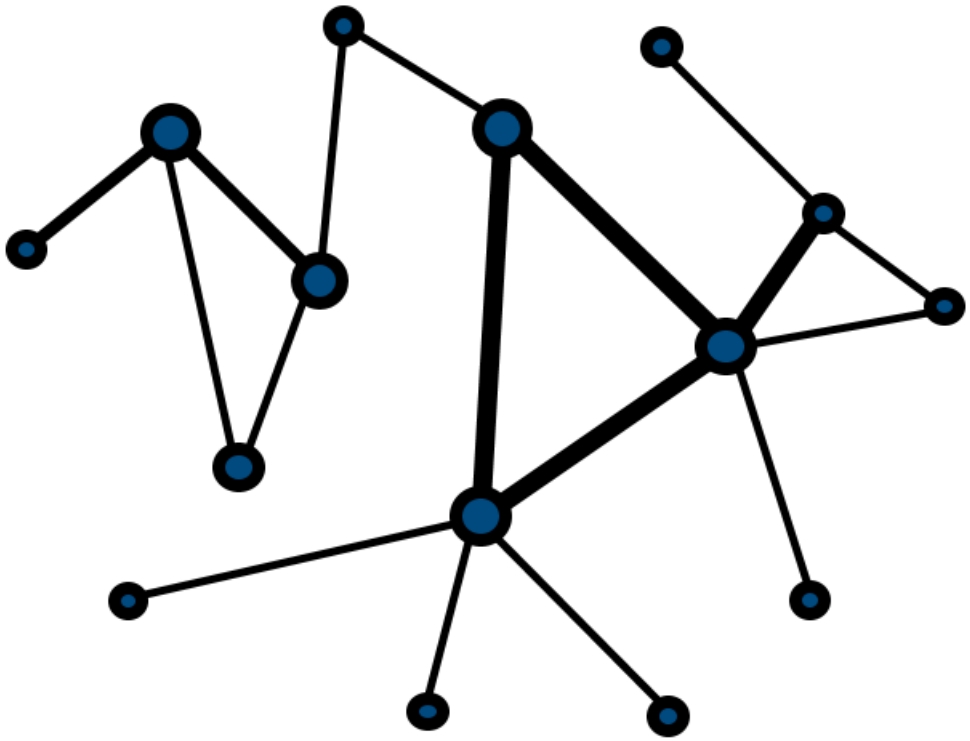
New markets	Cooperation	Qualified personnel	Networking	Access to capital or public funding
Information exchange	Cooperative development	Industry/sector reputation	Politics & associations contacts	Services by the cluster management
Market/sector trend info	Initiate R&D projects	Company reputation	Influence on standardization process	Other
Business/tech consultants	Technological know-how & infrastructure	Location's reputation	R&D and business contacts	Do not know

High risk actions, requiring intensive cooperation

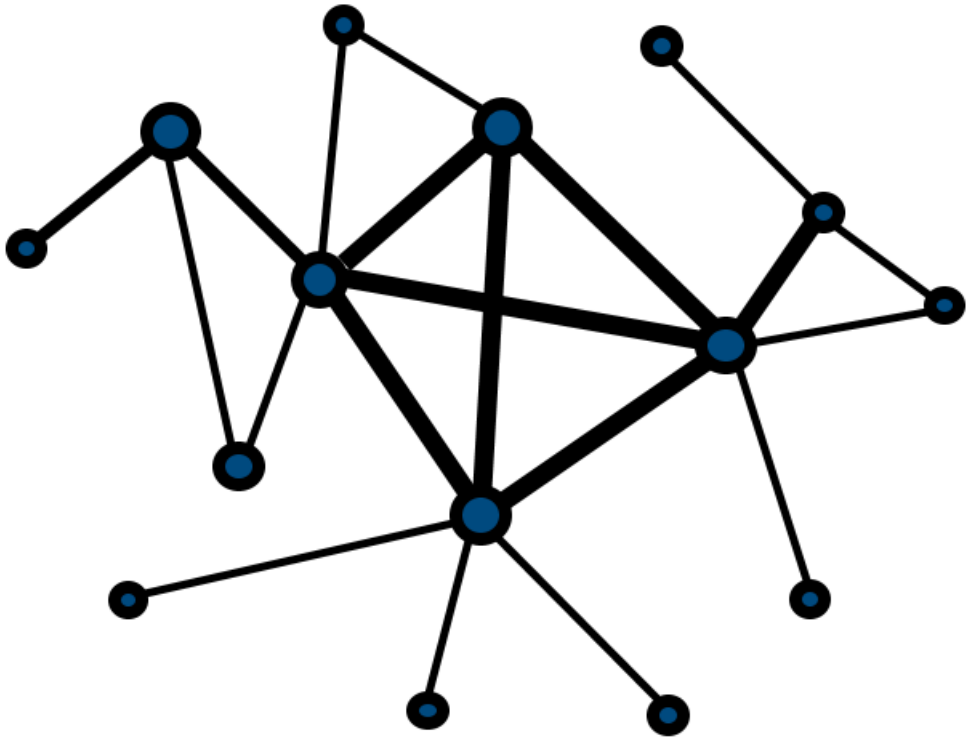
Low risk actions, requiring cooperation

Task, services requiring minimal effort

Cluster ‚A’



Cluster ‚B’



Special thanks to

- Gerd Meier zu Köcker
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and

- Thomas Alslev Christensen
  DASTI

A study of two clusters

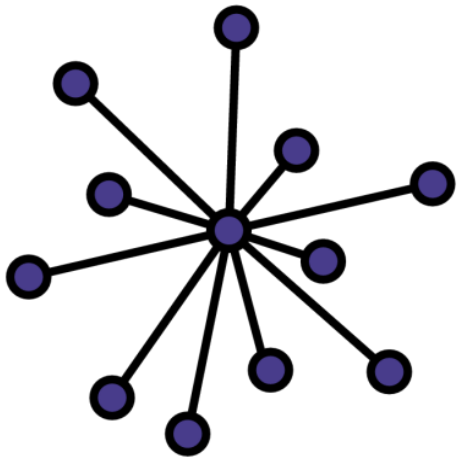
	Scandinavian CI	Central European CI
Sector	Lifestyle	IT
Age	12 years	8 years
Participation type	Letter of intent	Membership
Number of actors	389	45
SMEs	89%	96%
Actors w/ 50- employees	76%	95%
Origins	Professional recruitment	Past relations
Growth	Calls for participation at workshops and trainings	Via business and personal relations
Cooperation focus	Breadth	Depth

Data collection:

- Facts from cluster manager
- Interviews and questionnaires with members

Non-cooperative culture within a cluster

Non-cooperative Cluster Game
Simple cooperation structure (star)
CM key driver
Cluster actors only benefit from other‘s competences in dedicated projects

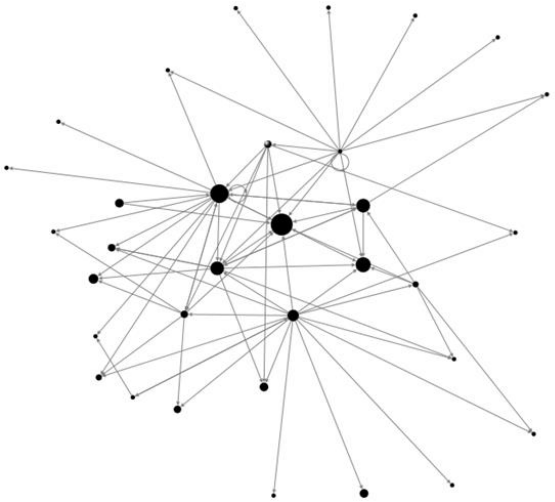


Cooperation structure similar to star structure

- Most activities are initiated by CM, cluster actors are ready to follow
- CM is the key, many cluster actors jointed because of CM
- Cluster actors often were not able to name key actors

Cooperative culture within an excellent cluster

Cooperative Cluster Game
Complex cooperation structure (snowflake)
Actors key drivers for actions, CM coordinates
Individual competences of actors become of mutual benefit for many actors



Actual cooperation structure according to cluster actors information - Snowflake

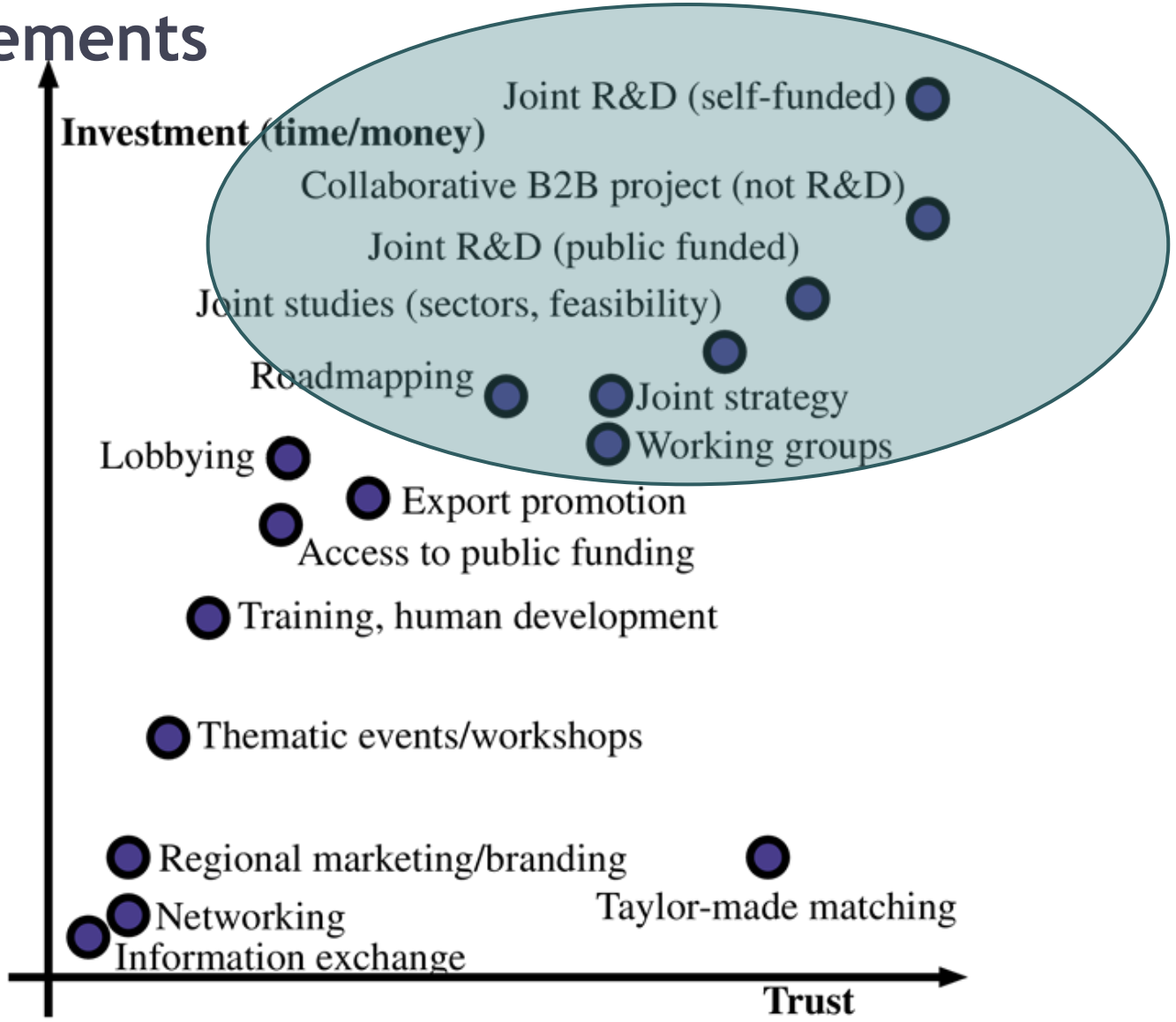
- Most activities are initiated by cluster actors, coordinated by CM
- CM is considered to be important, but not main reason to join
- Cluster actors well aware of key drivers

Lessons from the pilot study

Composition of cluster actors

Free Riders	• Selfish • Non-cooperative
Reactive Actors	• Sleeping giants • Can be transform from non-cooperative to cooperative actors
Active Actors	• Hidden Champions • Cooperative actors
Key Drivers	• Pearls within cluster • Self-motivated

Services provided by excellent cluster managements

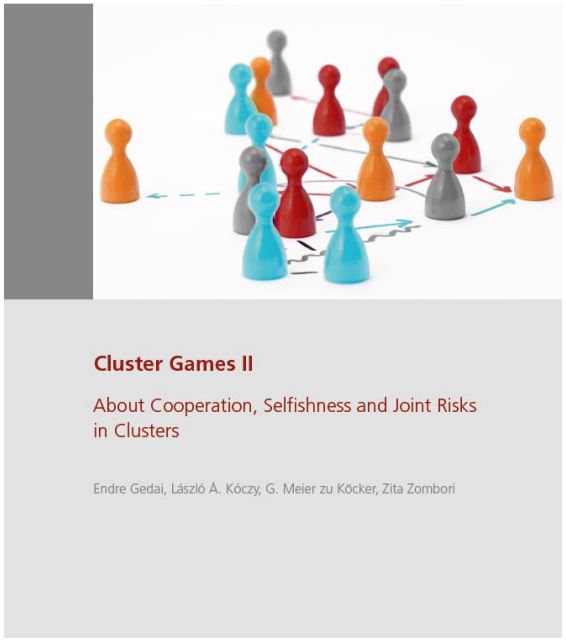


The act of a cluster manager (organisation) is crucial!

Our projects

- Economic development as public policy and its territorial aspects
- TRACE Kei

Enjoy reading about selfishness in clusters!



bit.ly/clustergames02

Thank you for your attention!

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