

# CLUSTERS AS COMPLEX ADAPTIVE SYSTEMS: CASE STUDY OF ENERGY VALLEY

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## BACKGROUND: CHANGING PRACTICE OF CLUSTERS

Scholars in cluster theory have acknowledged the need for more integrated approaches (Martin and Sunley, 2007). This need is also echoed by policy studies and other scholars (OECD, 2010, Battie, 2008). Also, an recognition of the changing context in which clusters operate includes an interconnected globalized world.

(Karlsson, 2008, Langedijk and Boekema, 2008, Lorenzten, 2008, Gertler and Levitte, 2005, Pacquer, 2008).

## RESEARCH QUESTION

What drivers of change and cluster dynamics, in particular for energy clusters, are significant to cluster development and what revision might be needed for cluster theory?

## SUB-QUESTIONS

- What is changing in the context of clusters and influencing cluster development?
- How are stakeholders and other factors at the micro-level influencing cluster development?
- Can Complex Adaptive Systems approach be incorporated into cluster theory to support the future of cluster development?

## CONCEPTUAL FRAMEWORK AND RESEARCH METHOD

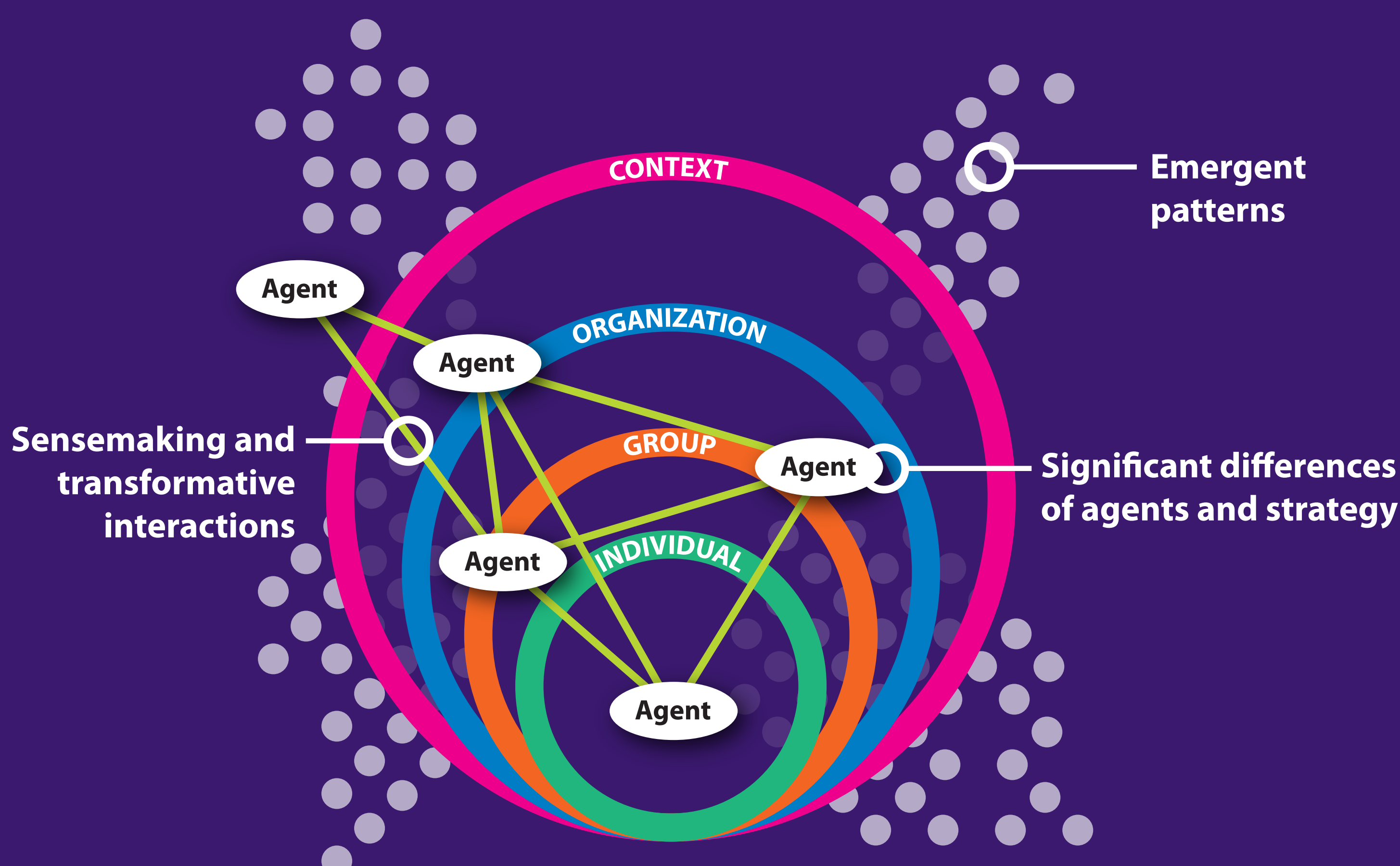
The cluster framework was developed based on current cluster theory (evolutionary economics, regional innovation systems and innovation policy studies), inputs from the Canadian cluster study (Wolfe, 2009) and, from complex adaptive systems literature. The research engaged an exploratory case study method (Yin, 2003) to understand cluster dynamics and drivers of change in the Dutch energy cluster, Energy Valley. In-depth interviews of stakeholders and experts, data from documents, literature, media were inputs for the research.

## NEW APPROACH TO CLUSTERS

Clusters as people-based interactions creating innovative, adaptive cluster developments responding to changes in context:

- individuals respond to (local) drivers of change
- history, geography and cultural factors influence interactions
- connections and interactions between people, organizations, knowledge, facilities, visions, resources, etc. contribute to new patterns of collaborations
- degree of autonomy and policy planning influence development

## WHOLE SYSTEMS APPROACH



Dynamics of complex adaptive systems  
(unpublished, van Berkel and Manickam, 2012)

## CLUSTER DEFINITION

'Clusters are geographical concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, associated institutions in particular fields that compete but also co-operate'

(Porter, 1998)

## CONCEPTUAL FRAMEWORK FOR CLUSTER ANALYSIS



## RESULTS

Insights into cluster developments are gained through stakeholder and expert inputs guided by the framework. Case study description of Energy Valley will provide insights into cluster dynamics and drivers of change for further investigation and implications for cluster theory will be discussed.