

Introduction

Business landscapes are changing at global, regional and sectoral levels as well as the social and ecological contexts. In order to understand what these changes are and how clusters are dealing with these, the research explores drivers of change and cluster dynamics using a Complex Adaptive Systems (CAS) approach. The research uses Energy Valley as its main case study to gain insights into these changes. The research has developed a conceptual framework for cluster development. One of the main reasons for this research is the significance of clusters in the European Union's competitiveness strategy, Innovation Union (EC, 2010).

Research objective and questions

Objective

The research sets out to investigate cluster developments both in practice and theory against the changing nature of business environments to explore the need for new frameworks.

Research questions

Main research question

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

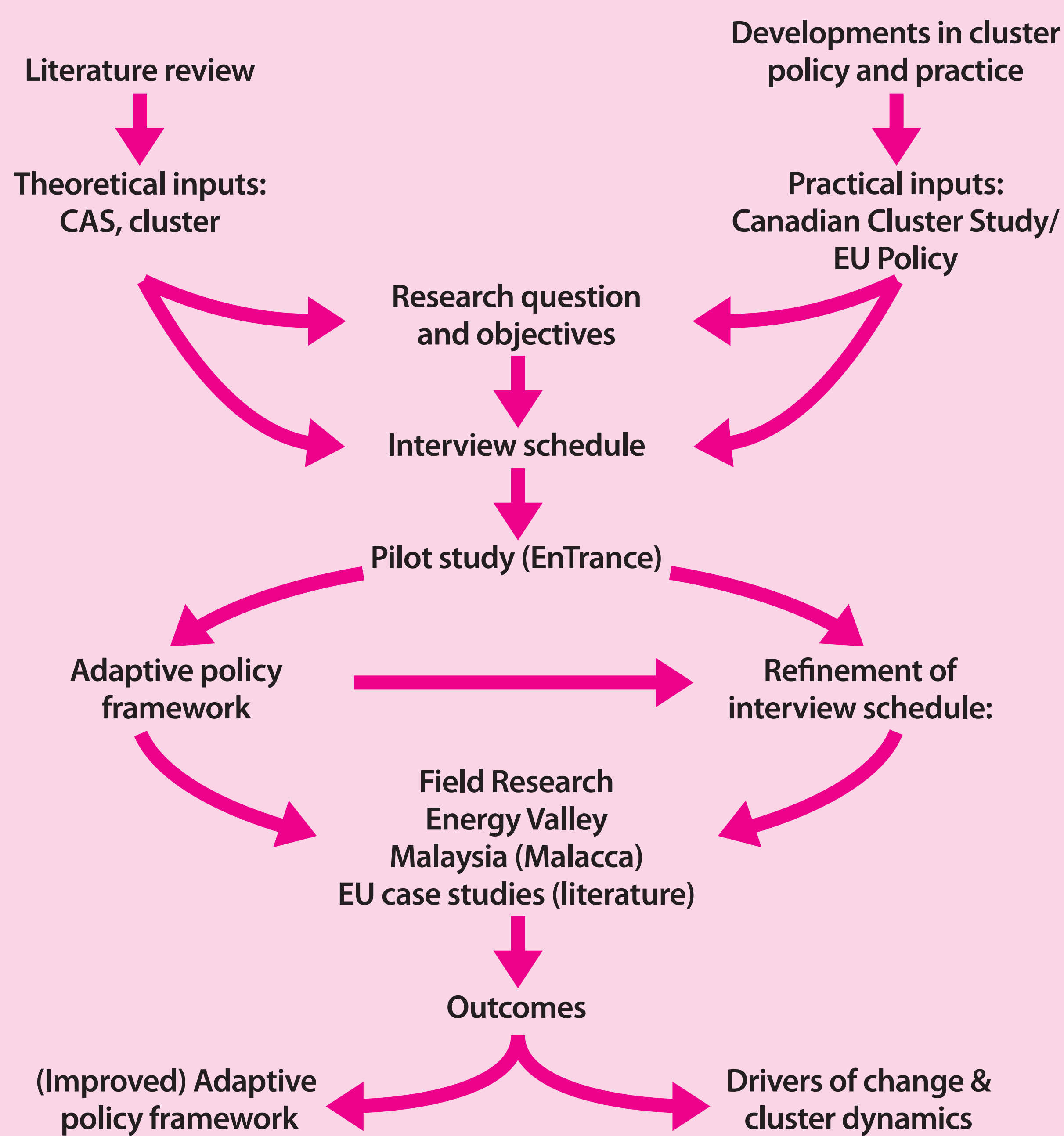
Research sub-questions

- What is changing in the context of clusters and what influences cluster development?
- How can internal cluster dynamics be captured?
- Can a Complex Adaptive Systems approach be incorporated into cluster theory to support the future of cluster development?

This research explores energy clusters based on the case study of Energy Valley of the Netherlands. The Malaysian case study serves to validate the findings of the research.

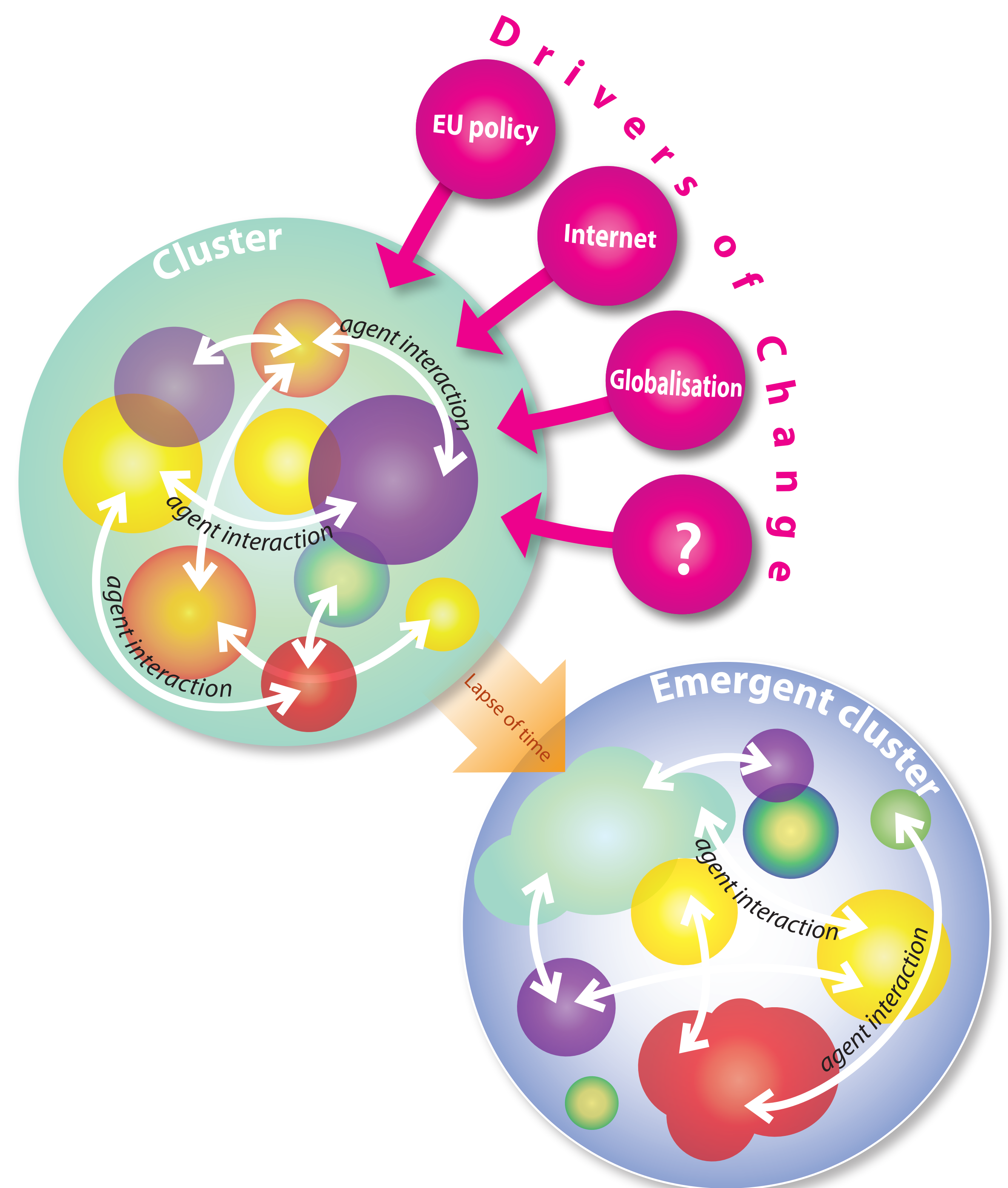
Methodology framework

The diagram below captures the methodology for the research. Exploratory case study method (Yin, 2003, Eisenhardt, 1989) has been used to develop insights into drivers of change and cluster dynamics in energy clusters. Inputs from cluster theory and practice as well as CAS have contributed to the development of the conceptual framework and the interview schedule. The pilot study on EnTrance, an emerging energy cluster in the Netherlands, has also contributed to initial results of the research including refining the framework. A second case study has been incorporated to enhance the findings of the research.



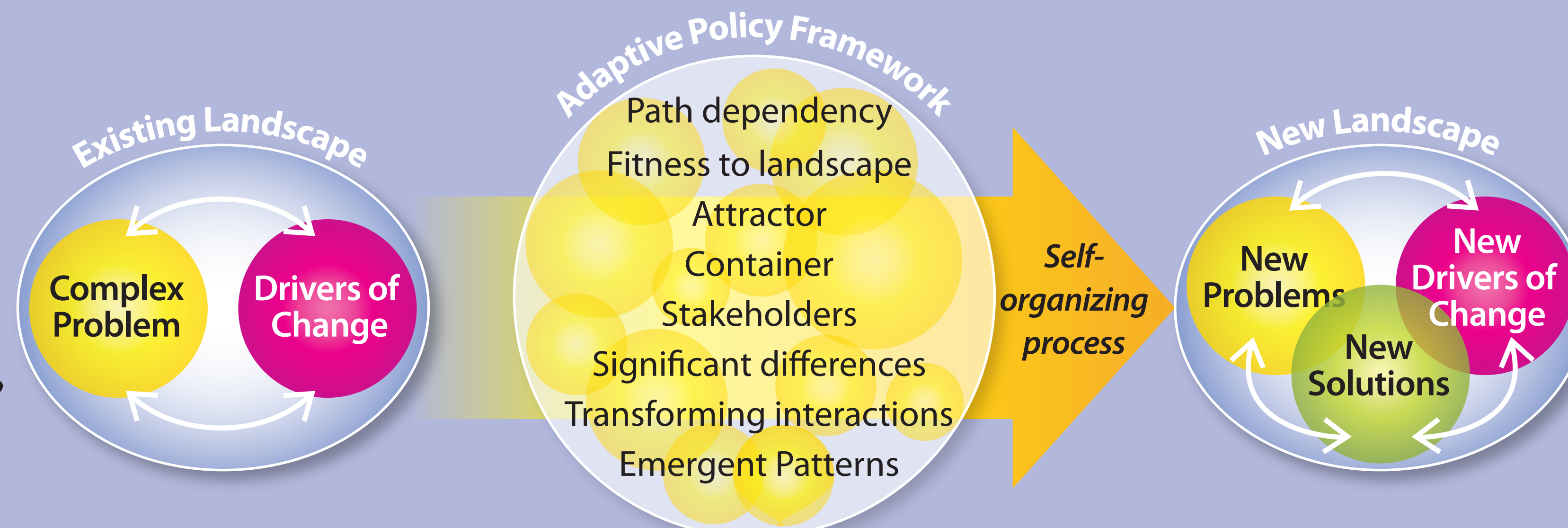
Drivers of change and cluster dynamics illustrated

The diagram below captures the interaction between drivers of change and cluster dynamics which is reflected in agent interactions with their environment (inside and outside the cluster). This, in turn, results in emergent patterns and interactions over time as cluster development.



Energy landscape is complex

- Differences in problem definition: urgency, scope of problem, relevance, who's problem it is, links to regional development...
- Differences in what and where the solutions to be found: in terms of scale, priorities, local vs. national/ EU, technology vs. political choices, who is involved in energy cluster, who is paying? industry, policy, academia or consumer-led solutions, how to manage different developments?...



Drivers of change

- Micro drivers of change seems to be just as important as external drivers of change.
- ### Cluster dynamics
- Global energy landscapes serve as back ground as agents act in local, geographic landscapes. 'Localness' is crucial but, it seems that the 'background' is driving the 'local'.
 - 'Scale' seems to be important in the development of clusters: is it a nationally driven large cluster or, a local small scale cluster initiative?
 - EU cluster policy has affected Energy Valley's strategy: from regional and national focus to lobbying in Brussels and connecting to North Sea Region clusters.
 - Individual (agent) interactions are important and lead to bigger developments – EnTrance started in the Skybox of a football club.