

Conceptualizing infrastructure-systems as socio-technical autocatalytic processes

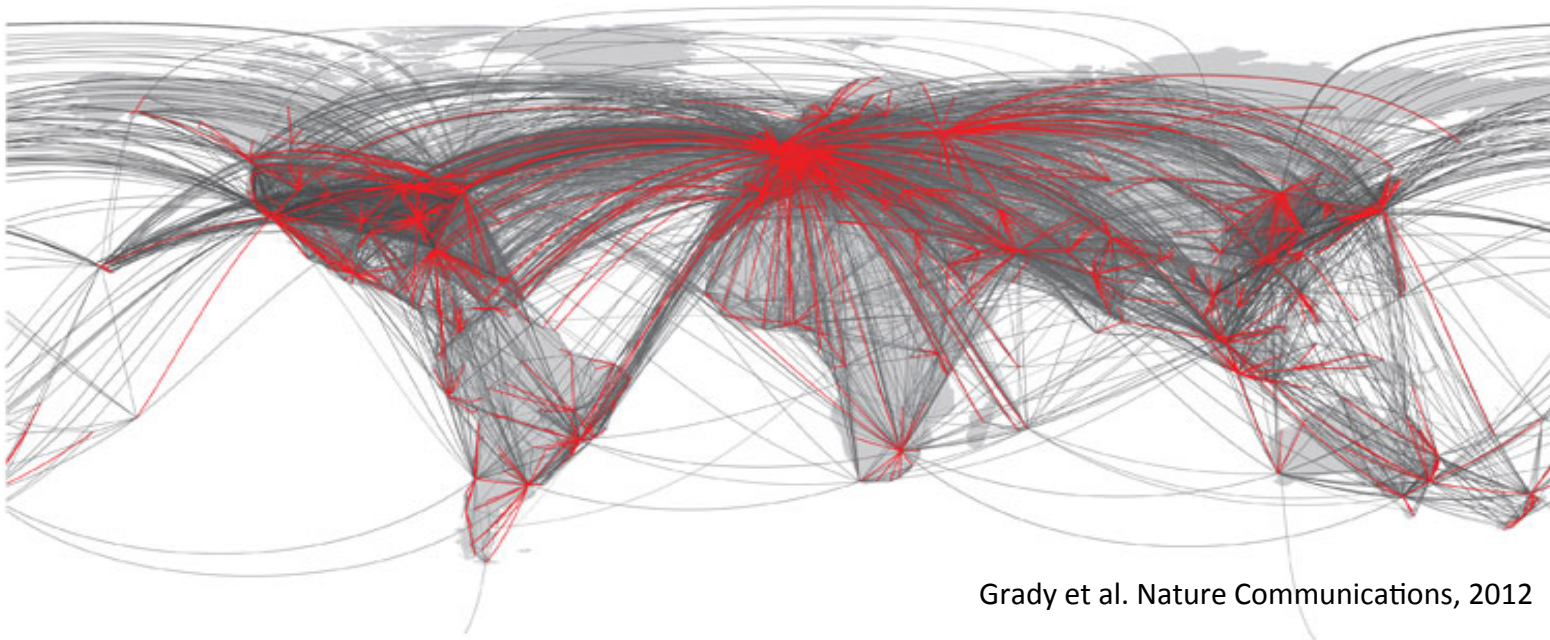
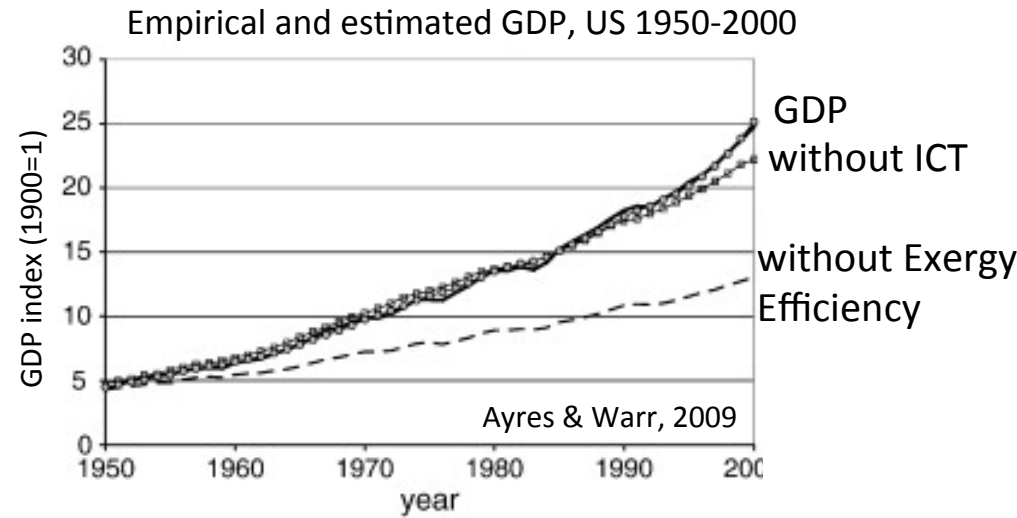
Implications for economic infrastructure performance

Alexander Otto & Igor Nikolic



Cambridge, 27 March 2014

Information Infrastructure & Long-term Infrastructure Evolution

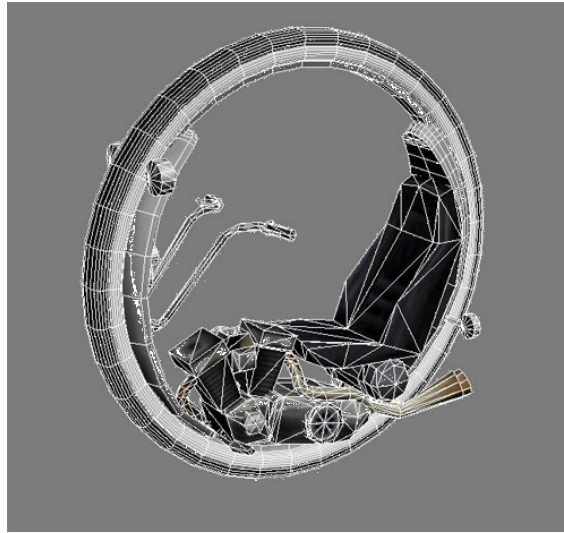


Grady et al. Nature Communications, 2012

Universal Darwinism

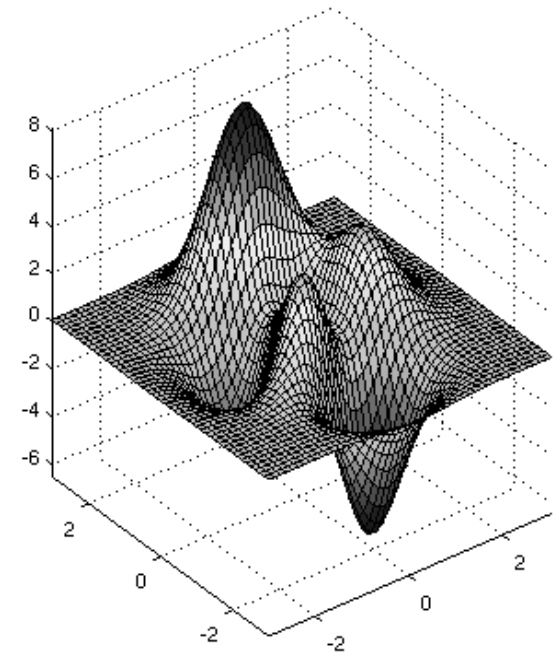
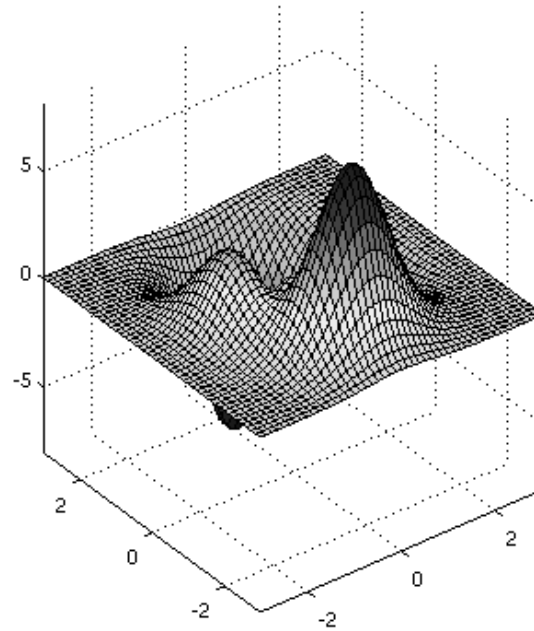
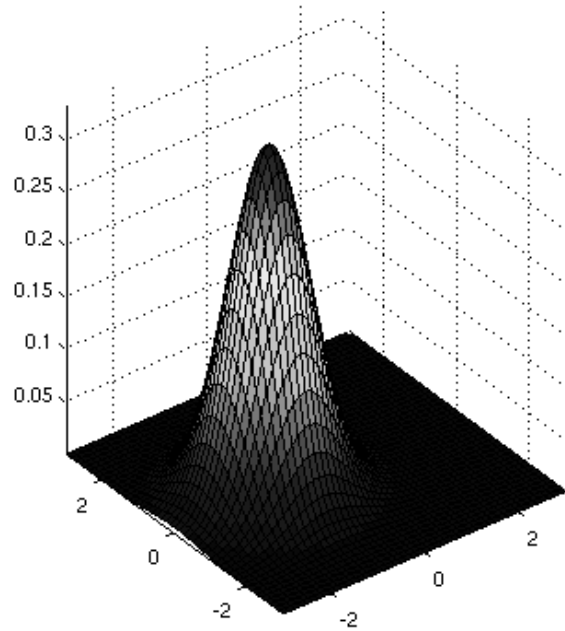
Variation, Selection, Replication of Memes

Universal Darwinism

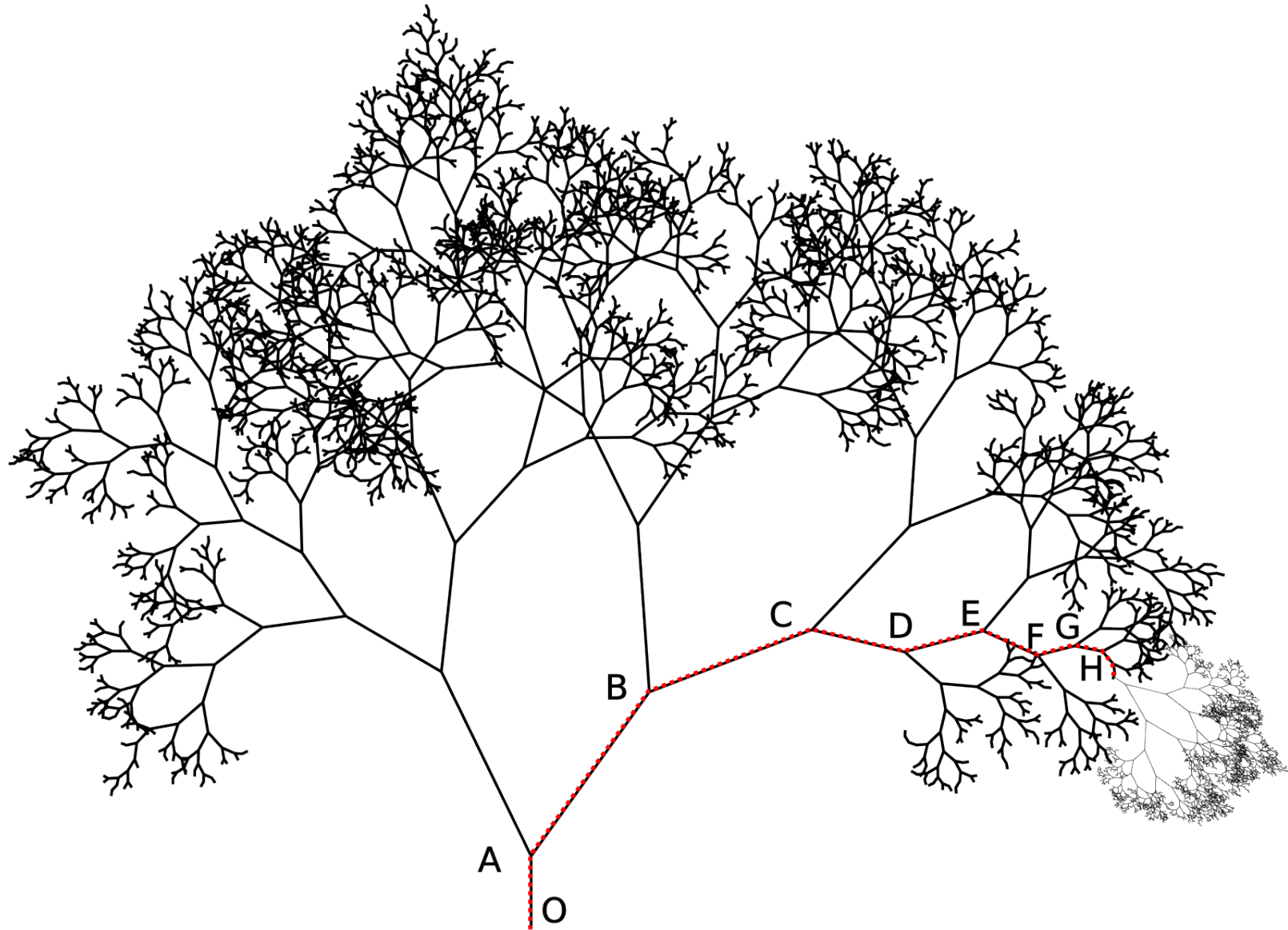


Universal Darwinism

Co-Shaping of Fitness Landscapes

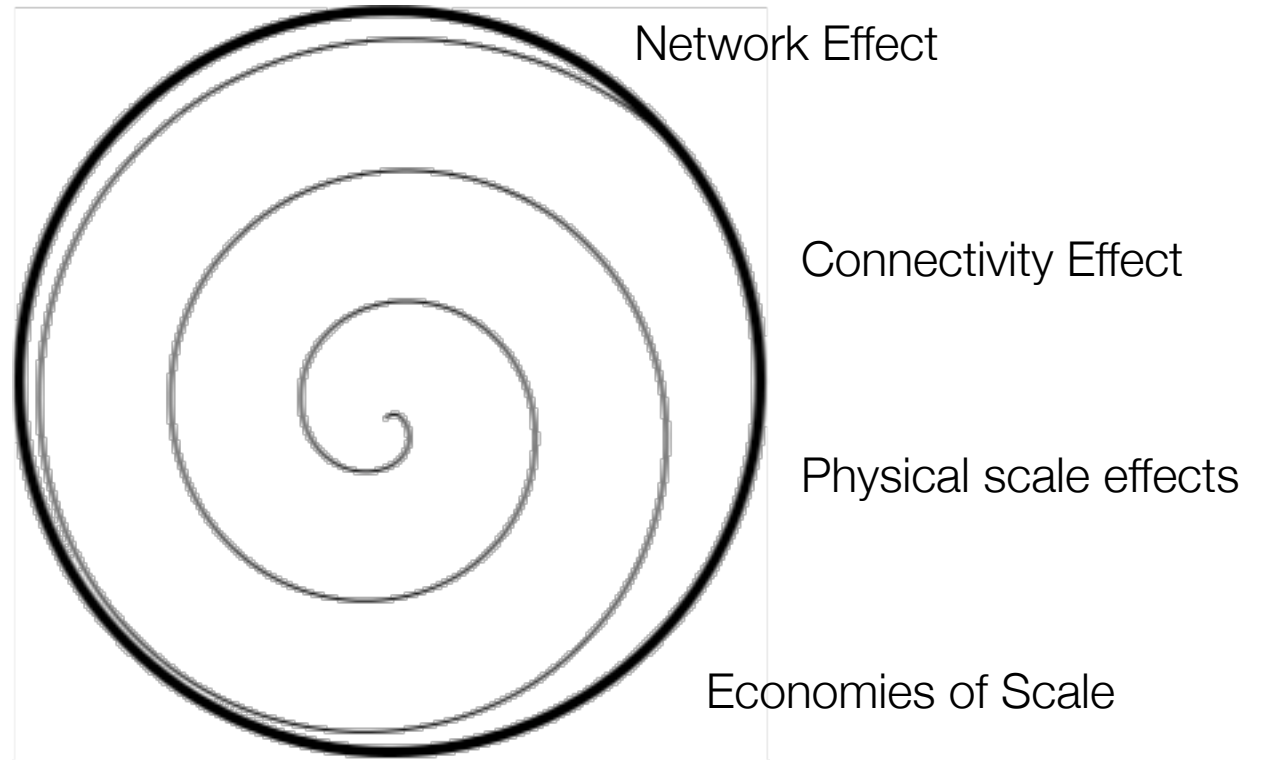


Bone and Bane of Complexity



The Power of auto-catalysis

Physical loops



The Power of auto-catalysis

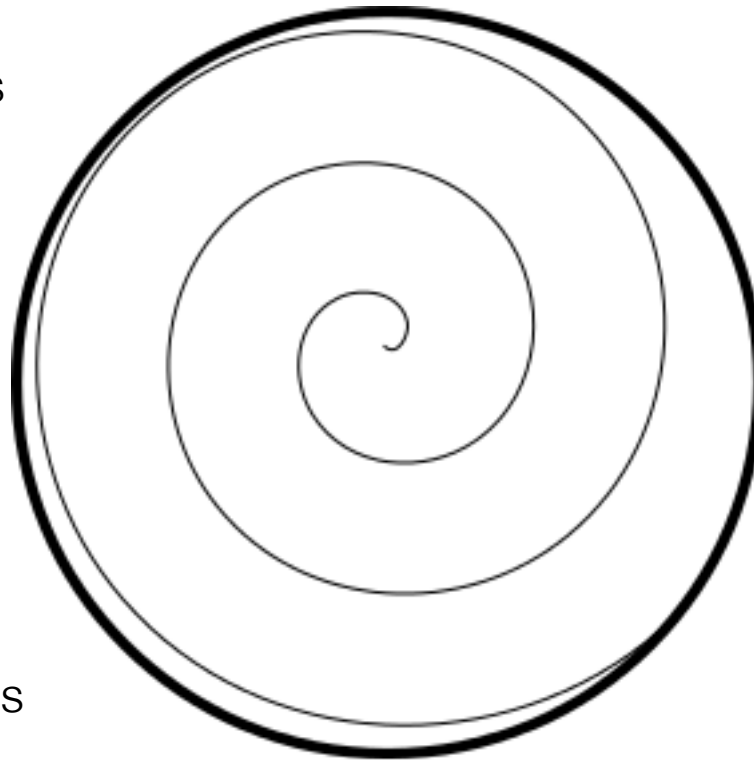
Memetic Loops

Framing Effects

Issue linking

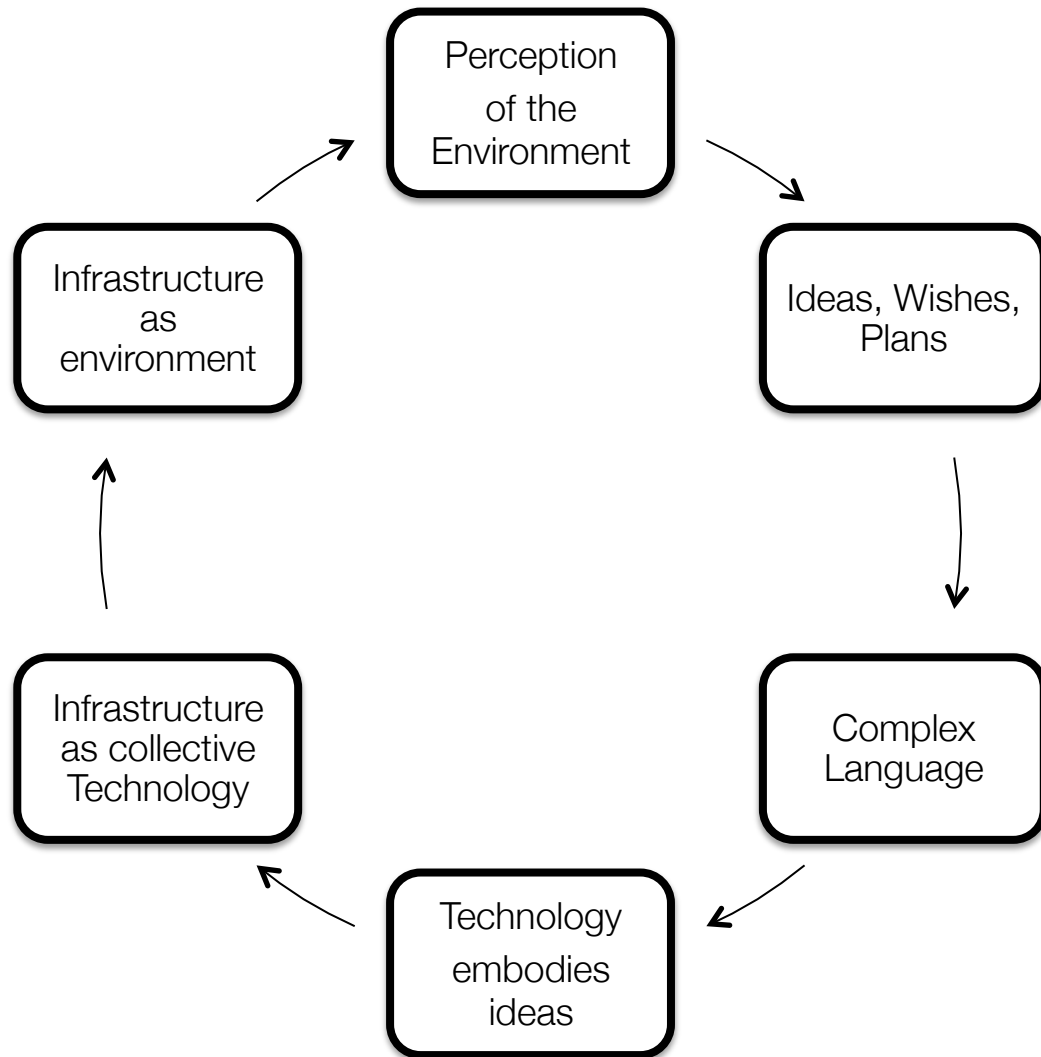
Social influence
networks

Institutions

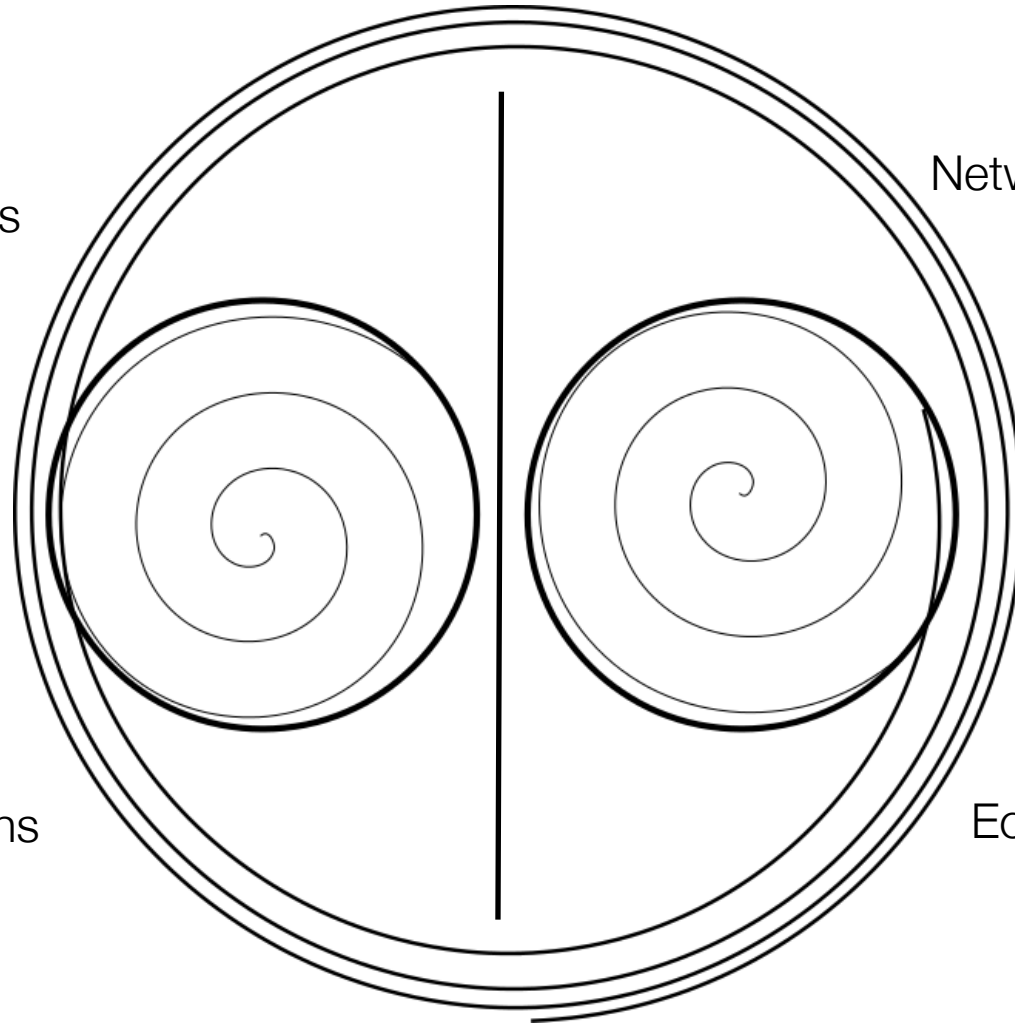


The Power of auto-catalysis

The Physical-Memetic Loop



Multiple Sectors, Actors, Influences



Network Effect

Framing Effects

Connectivity Effect

Issue linking

Physical scale effects

Social influence
networks

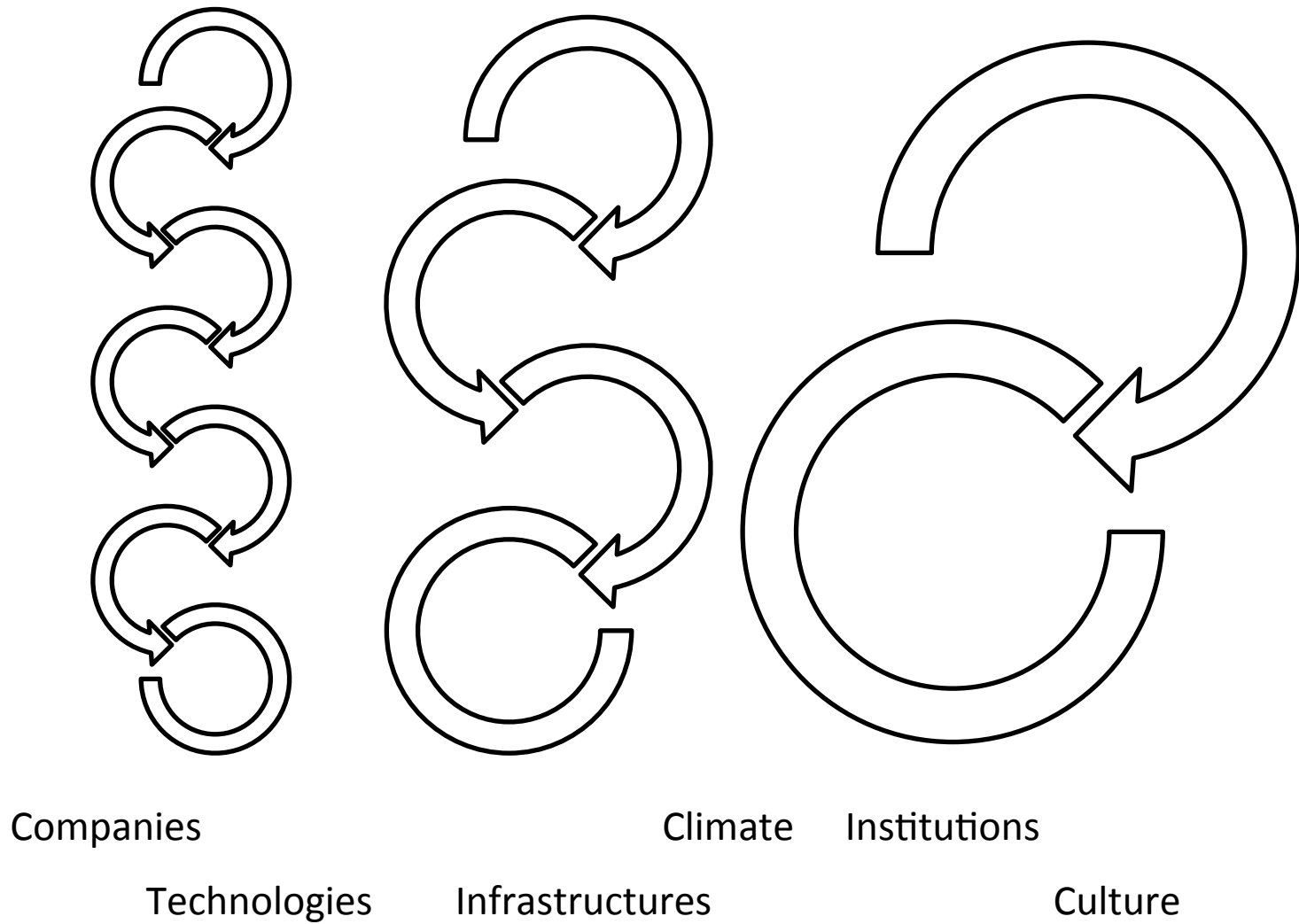
Economies of Scale

Institutions

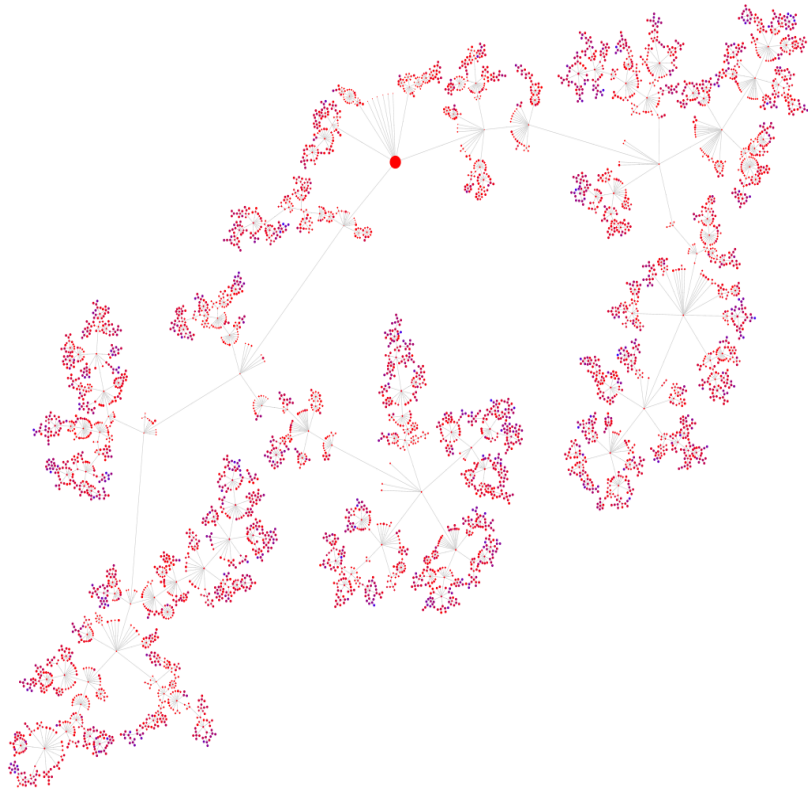
Memetic Space

Physical Space

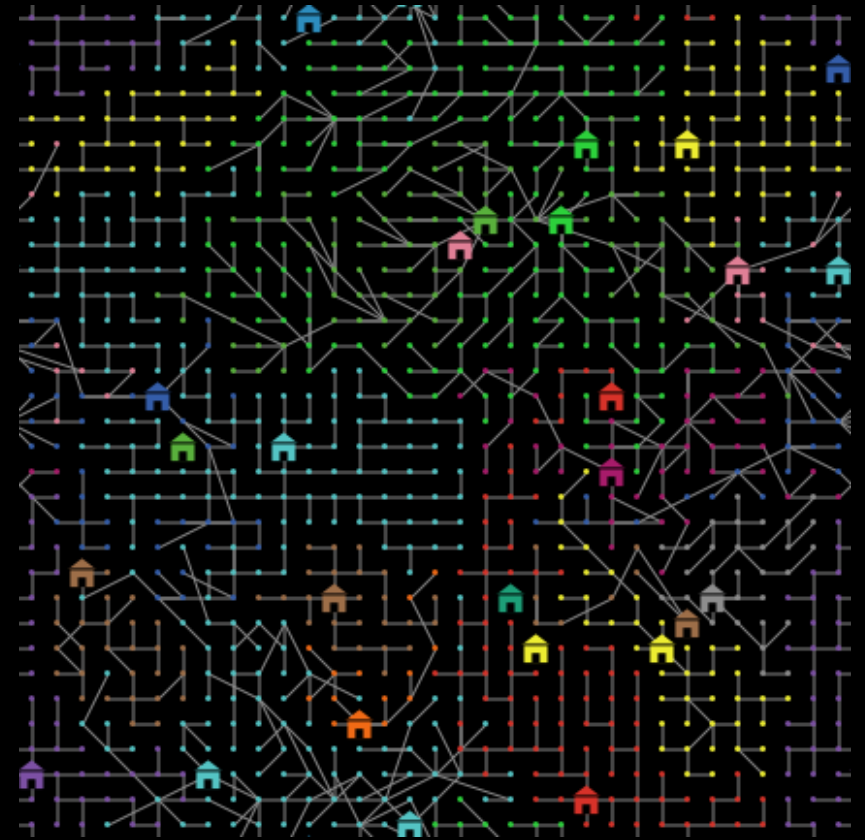
Timescales of Change



A Generic Model of Infrastructure System Evolution



Memetic space



Exergy space

A Generic Model of Infrastructure System

Next Steps

- Completing and testing the demonstrator
- Integrating with other activities in WS3 of ITRC

A new economic geography model with Infrastructure
with Robert Carlsson, Jim Hall

A generic model of integrated Infrastructure capacity and
demand allocation and planning
with Beate Dirks, Jim Hall

- Develop case studies and collaborations (e.g. TU Delft)