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Using ANT to understand the Web
Part II:
Open Government Data

Ramine Tinati
r.tinati@soton.ac.uk
University of Southampton

Web and Internet Science (WAIS)

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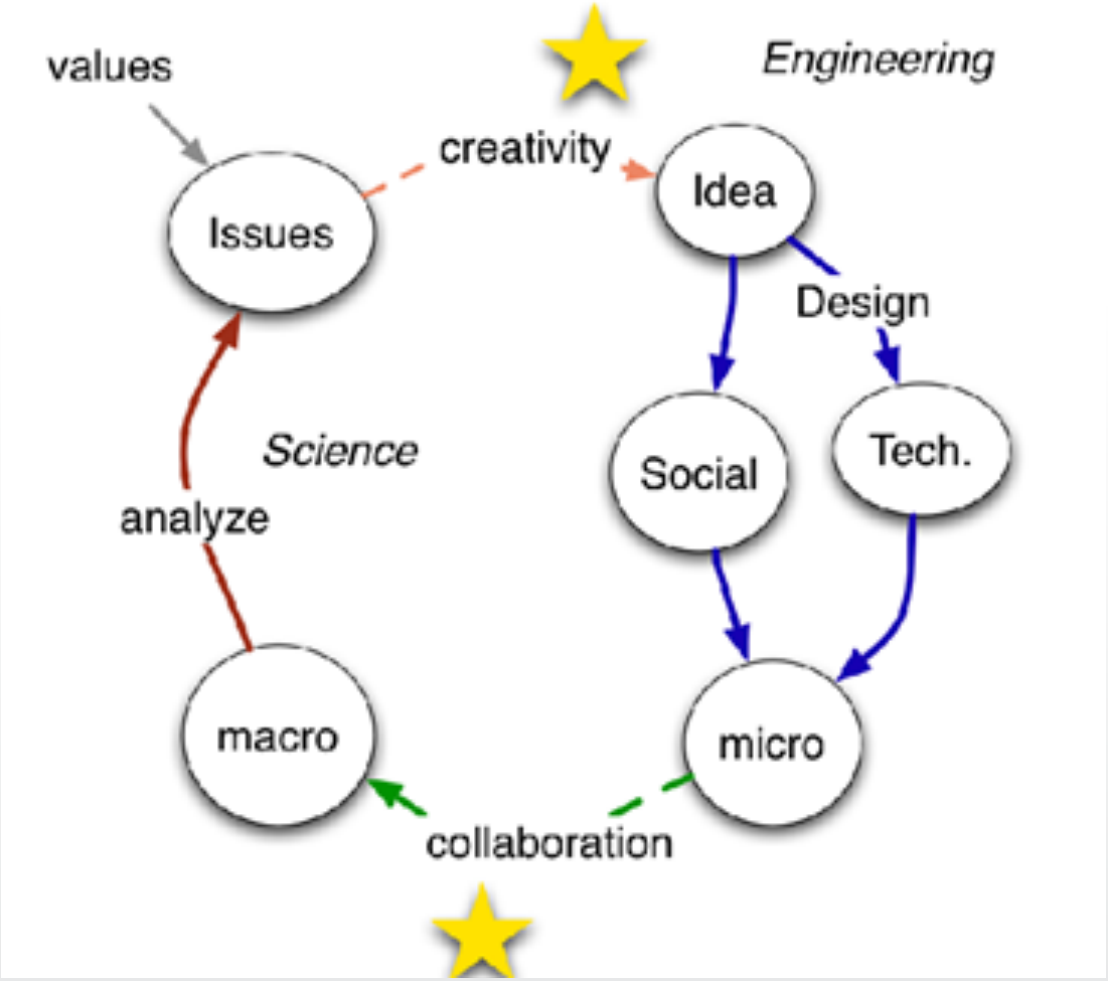
Background

- **The Web is a collection of Web Activities**
  - Online Shopping, Online Banking, E-Government, Online Networking, etc.
  - These activities reflect *human interaction* and *technological development*
- **Web Activities are not exclusive**
  - They develop together with other activities
    - As does the development of the technologies
  - Their development are *internally* and *externally* co-constructive
- **Social machines are forms of Web Activity**
  - They emerge, develop, adapt and fail


values
Engineering
creativity
Issues
Idea
Design
Science
Social
Tech.
analyze
macro
micro
collaboration

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The Problem Statement (1)

- **Why study how the Web grows?**
  - The Web is an integral part of modern society, yet methods did not describe a socio-technical understanding of how it grows through the co-construction of humans and technology
  - To be able to support or advise on the growth of the Web, first, one must be able to understand what it is, and how it operates.

- **The current understanding of the Web:**
  - Research was polarised between understanding the Web in regards to its technical structure, or understanding the Web at small scale social interaction
  - The Web was studied at either the micro or the macro
    - Small scale studies, or large Web Graph experiments
  - This does not help explain how the Web has grown. It is important to understand the Web beyond this disconnected perspective

The Problem Statement (2)

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- **We (Web Science, Researchers, Business, Society) want to understand how the Web functions**
  - Often described as socio-technical – But what does that mean?
- **Conceptualising the Web as a network of Social Machines**
  - Examine specific activities and analyse how they operate
  - Compare the functionality of Social Machines
    - Leading to a classification of machines…
- **This can be done technically! Community clustering, etc.**
  - However, it does not reflect the co-constructive process of the Web
- **We require a (*Web Science*) Theory of Web Growth**
  - How they emerge, evolve and function
-

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The Approach to the Problem

- **How to understand the growth of a socio-technical Web?**
  - Use a theory that provides an analytical window into the co-construction between humans and technologies
  - Follow human and technological actors.
  - Use quantitative and qualitative data sources, both online and offline, both individually and at scale
  - Examine the *micro* and the *macro* at the same time using a mixed methods approach
- **But, how to investigate and study the growth of the Web?**
  - The Web contains different types of Web activities (as shown in the topological Web graph analysis)
  - Take an emerging and growing area of Web activity, both active socially and technically visible
  - Examine the socio-technical processes that occur in order to enable the Web activity to grow

Introduction to the Socio-Technical Framework –
Background to Theory

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- **Drawing upon concepts from Actor-Network Theory (ANT)**
  - Actor-Networks are fundamental to understanding phenomena
  - Radical Symmetry of Human and Technological Actors
  - Structures emerge from the network, they are not assumed to exist
    - - The Web does not exist without the Web activities that occur
  - Exposes the interplay between humans and technologies
- **Application is beyond a descriptive framework**
  - ANT provides the underlying theoretical position
  - Mixed methods takes it from description to explanation

Introduction to the Socio-Technical Framework – (1) Heterogeneous networks

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- **A social machine is a heterogeneous network of associations**
  - Humans and Technologies
  - Network Artefacts
  - Agendas and Goals
- **A heterogeneous network is formed around a specific agenda, i.e.**
  - Open Data
  - Social Networking
- **A heterogeneous network contains actors which:**
  - Share a common interest or goal
  - Work towards a shared set of common outcomes

Introduction to the Socio-Technical Framework –
(1) Heterogeneous networks

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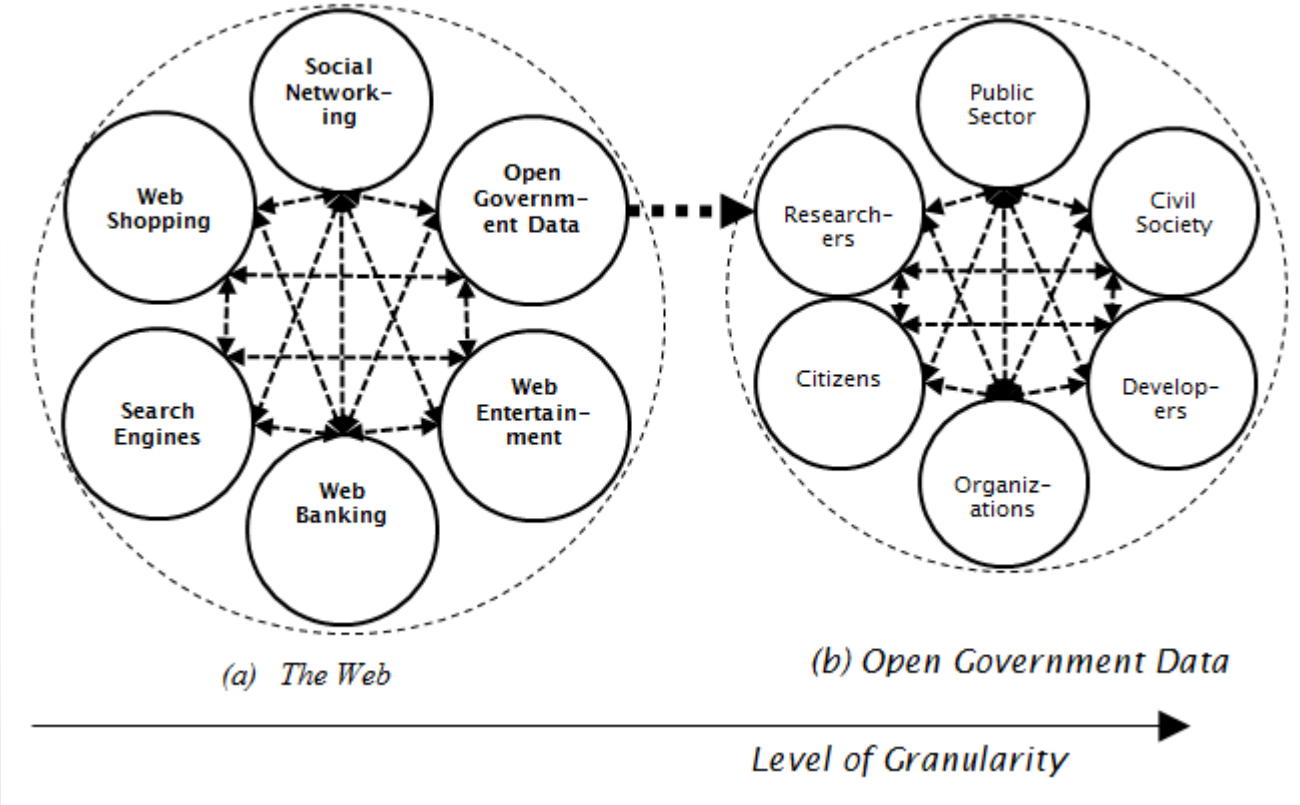

Introduction to the Socio-Technical Framework – (2) Translation

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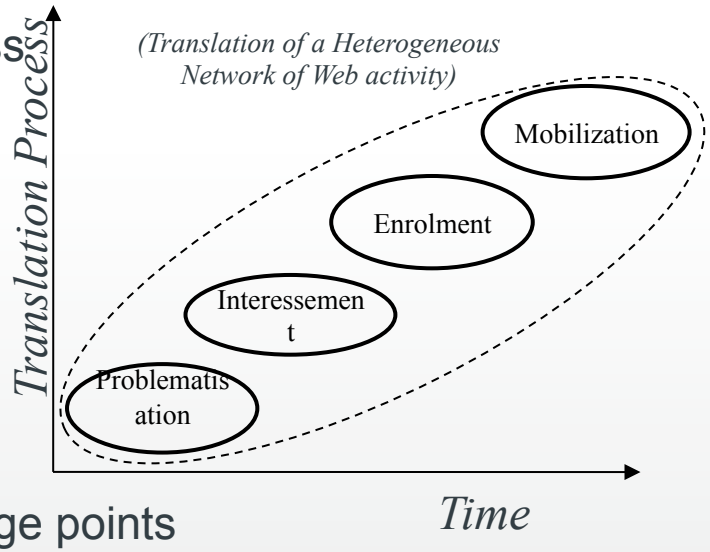
- **Translation describes the emergence and development of a Social Machine**
  - Social Machines translate towards stability
  - Translation is a multi-staged, multi-actor process
  - From a messy, unorganized set of actors to a mobilized network of activity
- **The process of translation involves**
  - Focal actors setting the agenda and goals
    - problematizing actors and activity
  - The alignment of actors passing through passage points
    - Requirements for a network to succeed, i.e.
      - develop a technology, create a policy, gain more actors.
- **Translation does not promise stability!**
  - Network stability is only ever held in a temporary state



Introduction to the Socio-Technical Framework – (3) Phases

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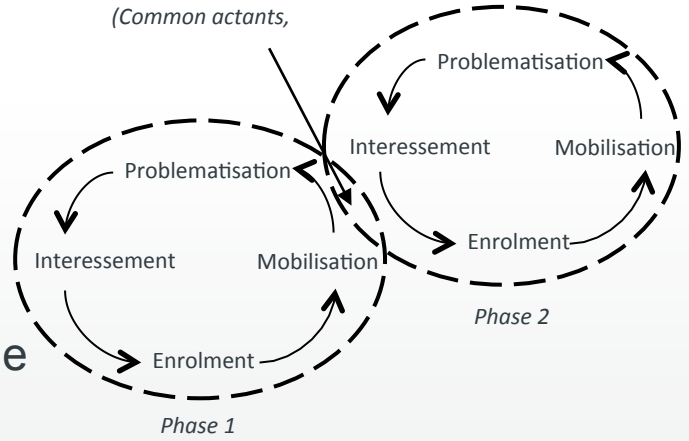
- **Phases are the result of multiple Translations**
  - The success and (temporary) stability of a network triggers changes in surrounding networks
  - Restructuring of the original agenda occurs
- **Phases can be conceptualised as layers in social machine development**
  - New phases build upon previous layers
    - However, previous layers must remain stable
- **Transition from one phase to another**
  - Contains common actants (humans or technologies)
  - Shares common goals or interests (not all)!



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An Empirical Study

- **Examined the emergence and growth of the Open Government Data Web activity**
  - How did the community emerge, both socially and technically, online and offline
    - What were the socio-technical processes that occurred
  - Used a mix of quantitative data and qualitative data sources to understand the social-technical processes at the micro and macro
    - Interviews, documents, observations, big (network) data, repository data
  - Informed by the analytical lens of Actor-Network Theory
    - At the epistemological and methodological layer
- **The emergence of the Web activity exposed a number of findings with regards to human and technological interaction, and Web growth**
  - Providing a new perspective on the growth of Web activity…

Exploring the Development of a Social Machine

Open Government Data

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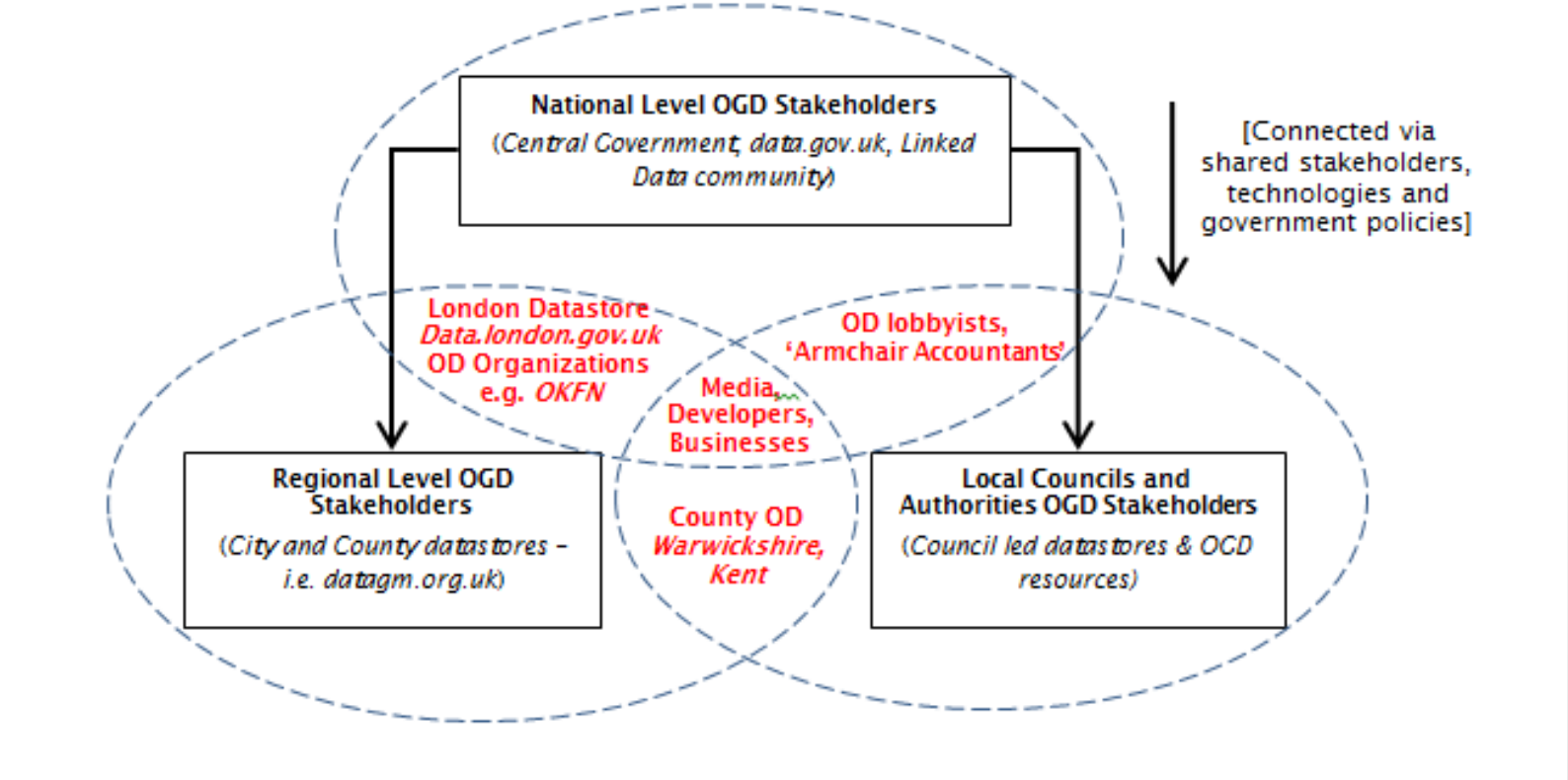

The structure of UK OGD

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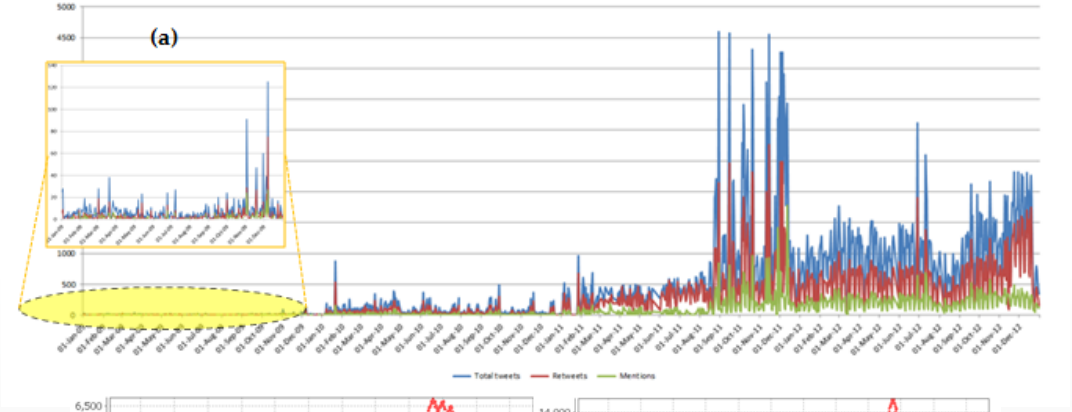

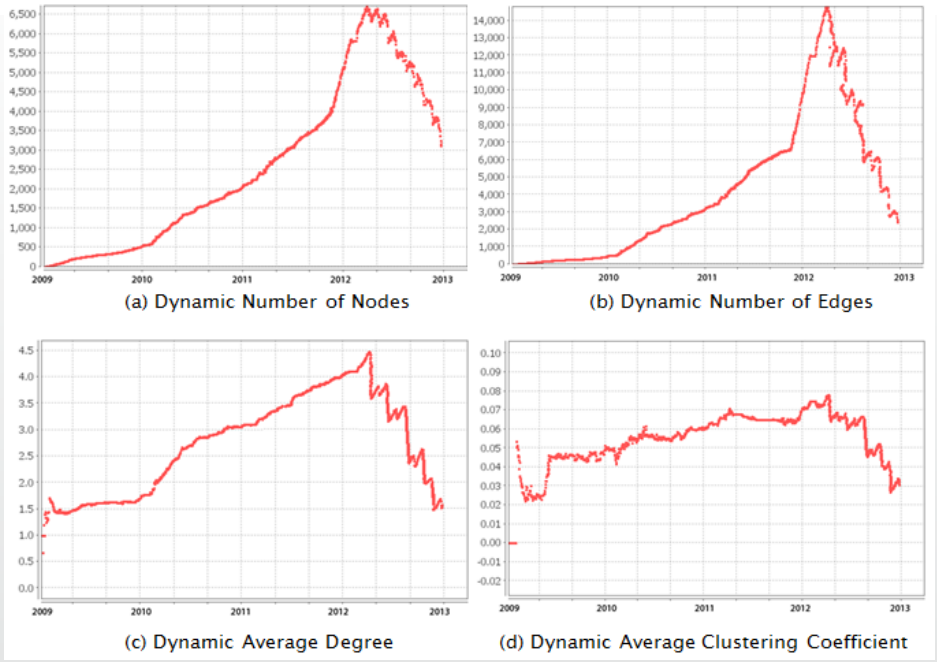

Exploring the Development of a Social Machine

Open Government Data – Phase 0

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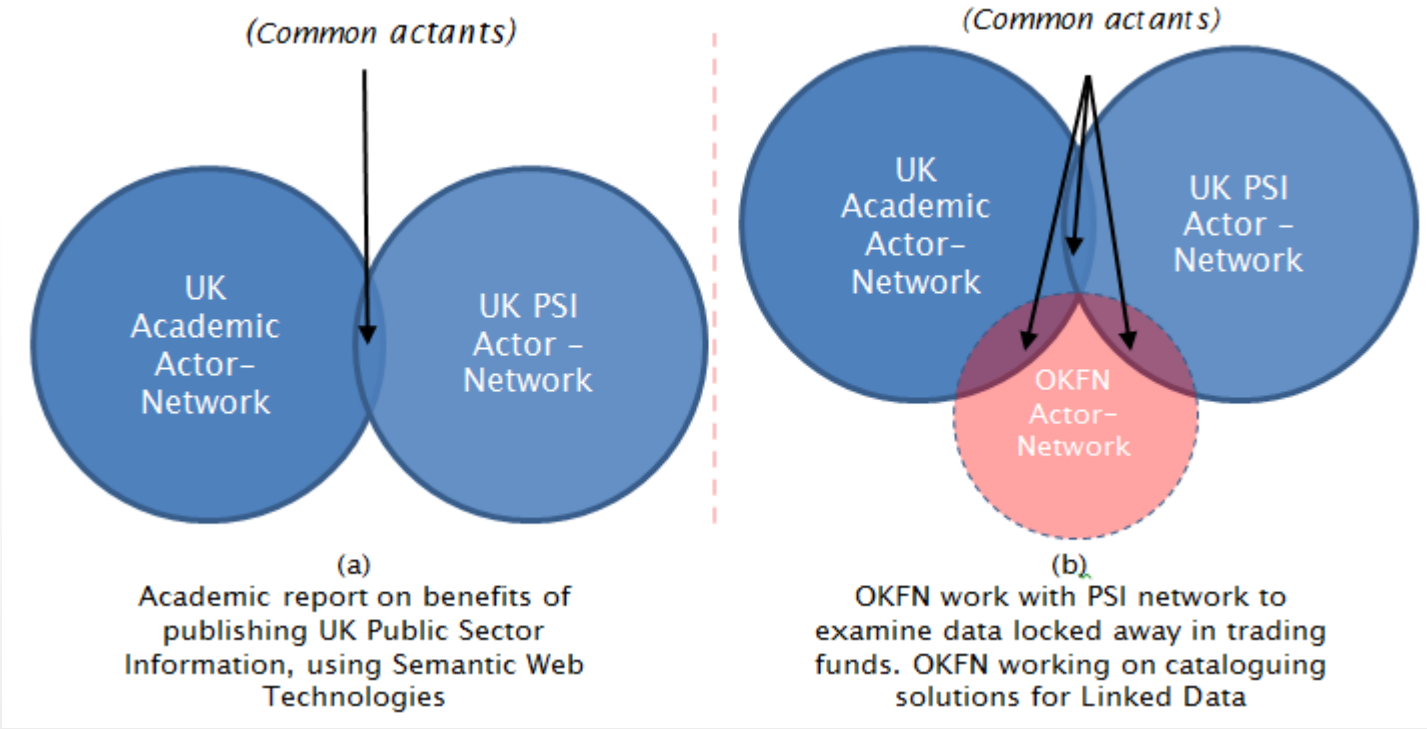

PSI and Academics – The Early Emergence of OGD

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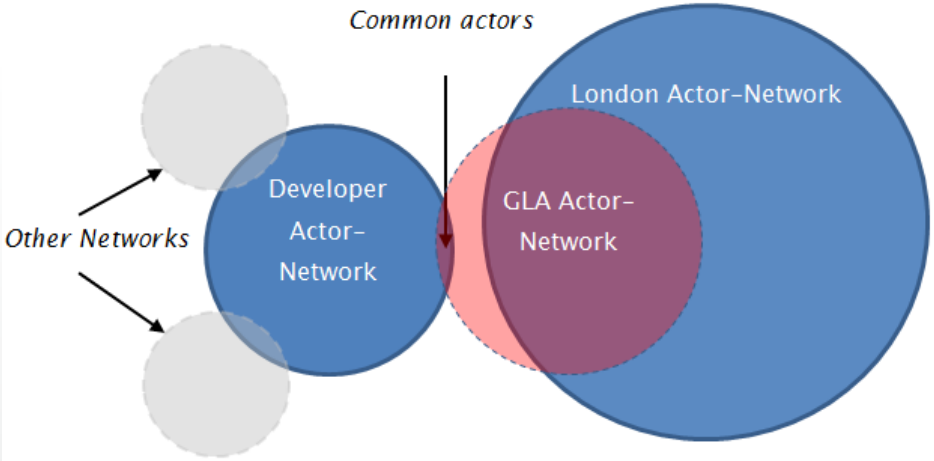

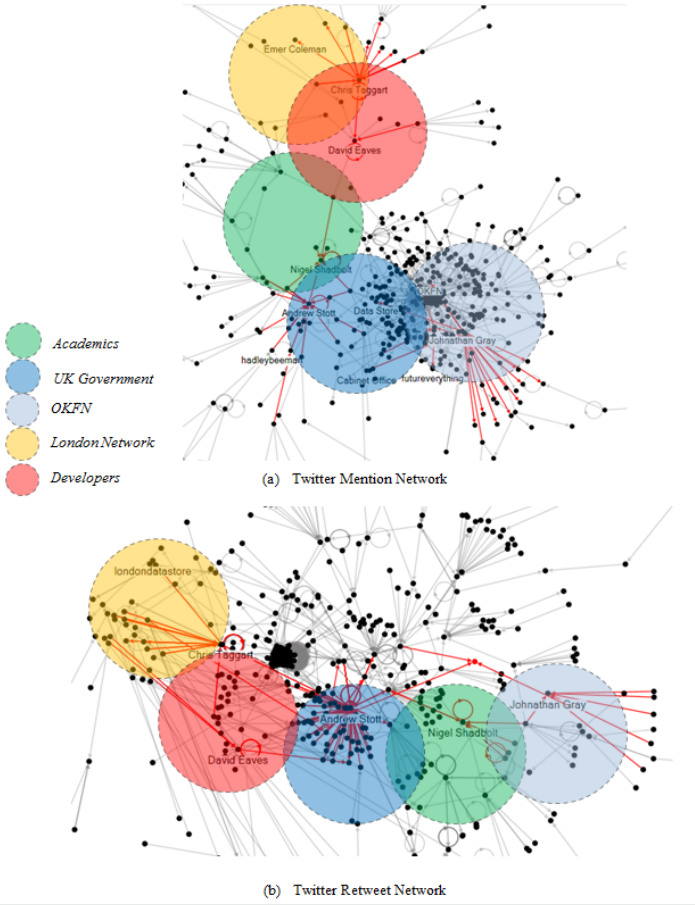

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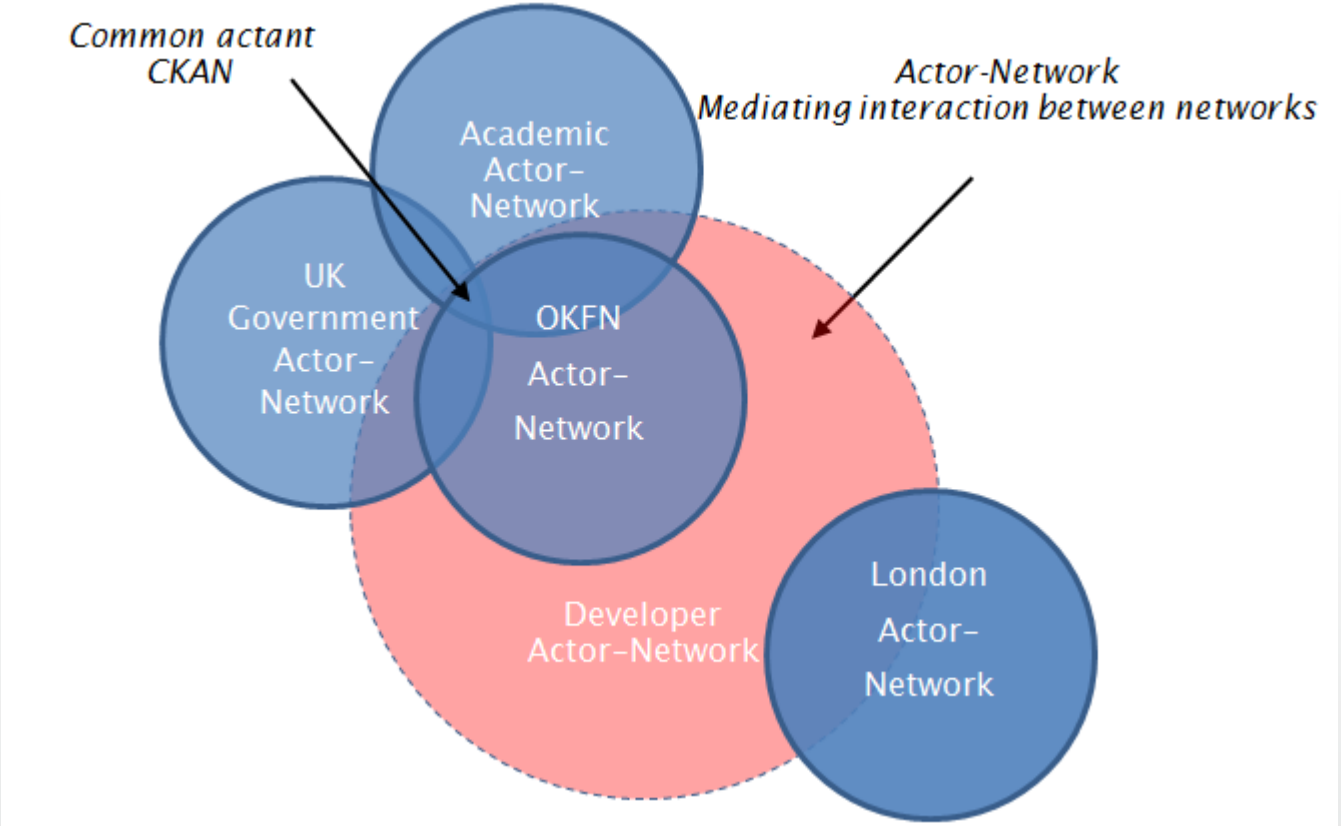

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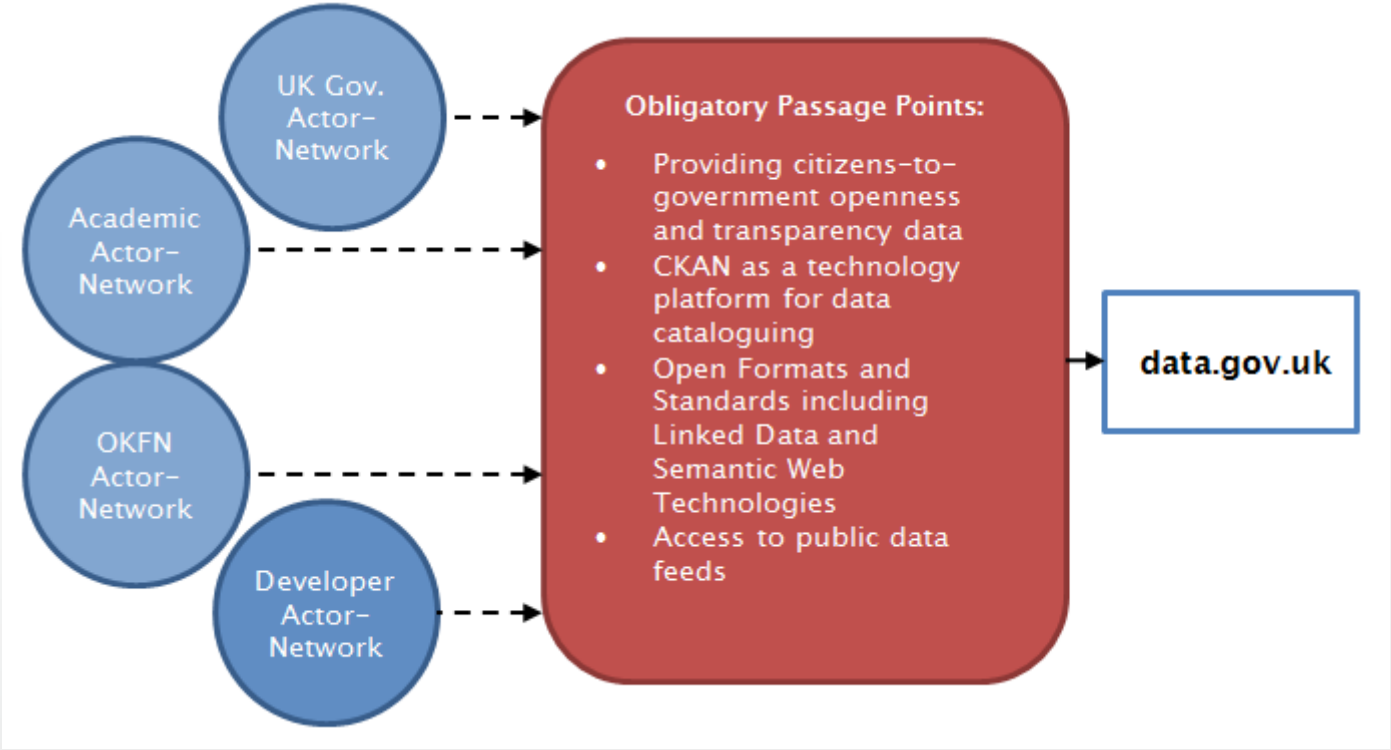

The 'Obligatory Passage Point' of data.gov.uk

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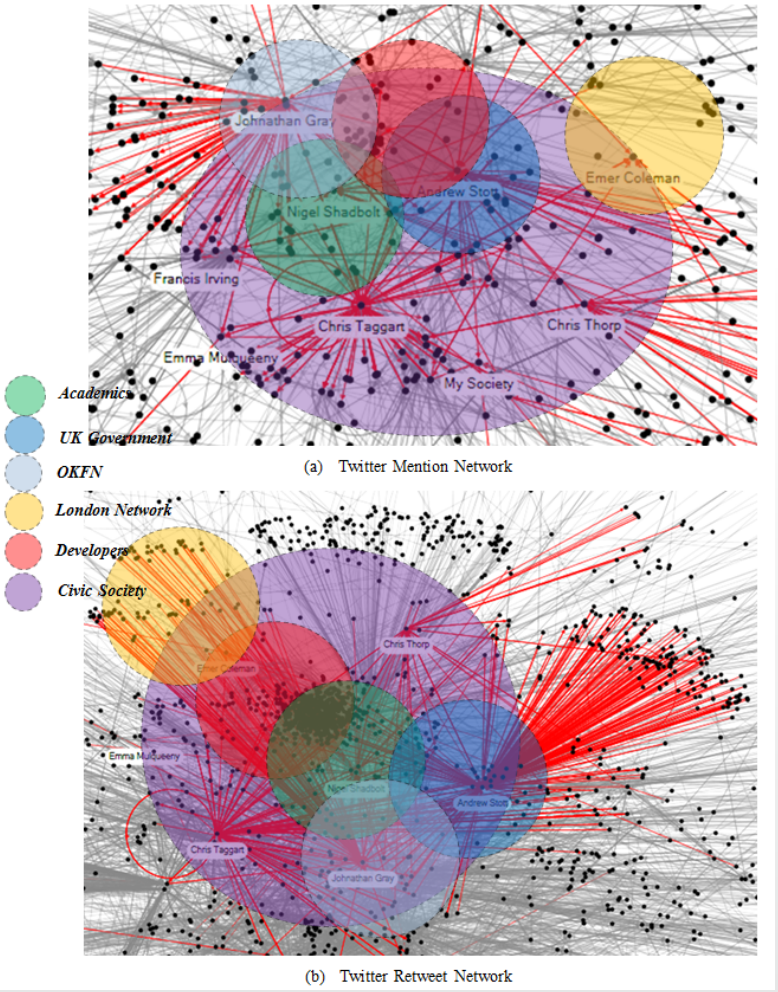

Civic Society – Connecting Together Actor-Networks

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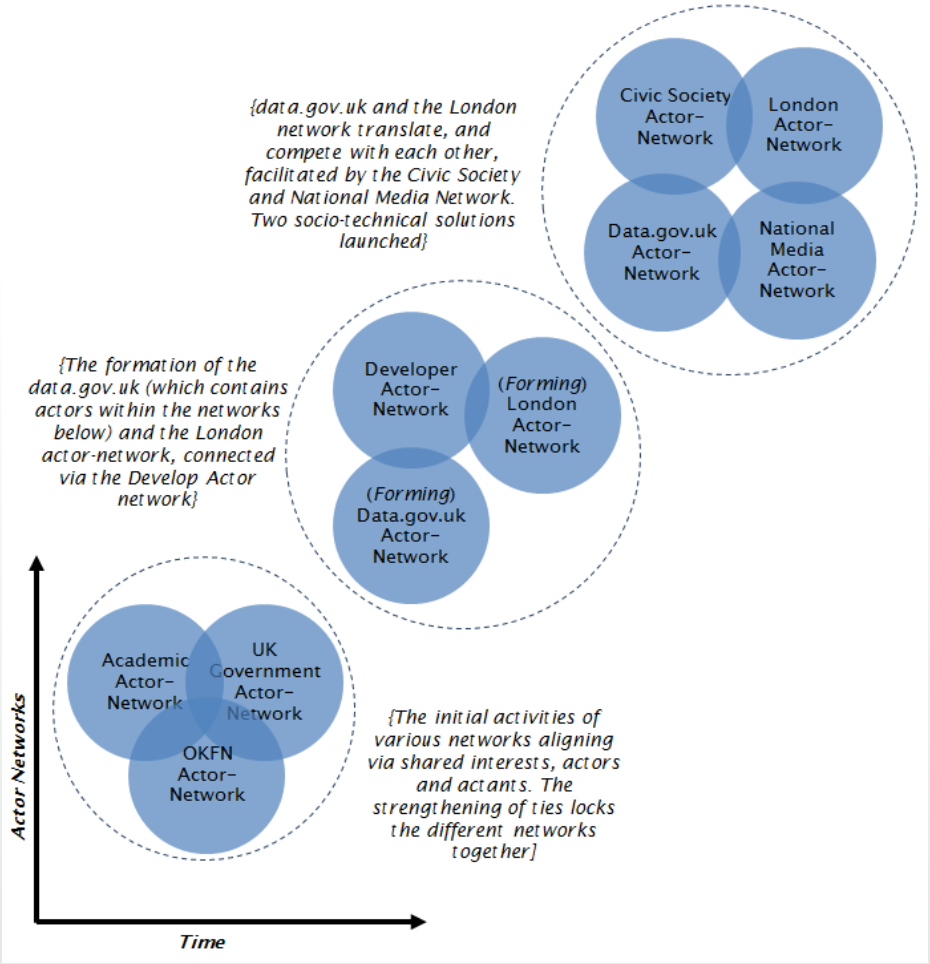

The first three Phases of UK OGD

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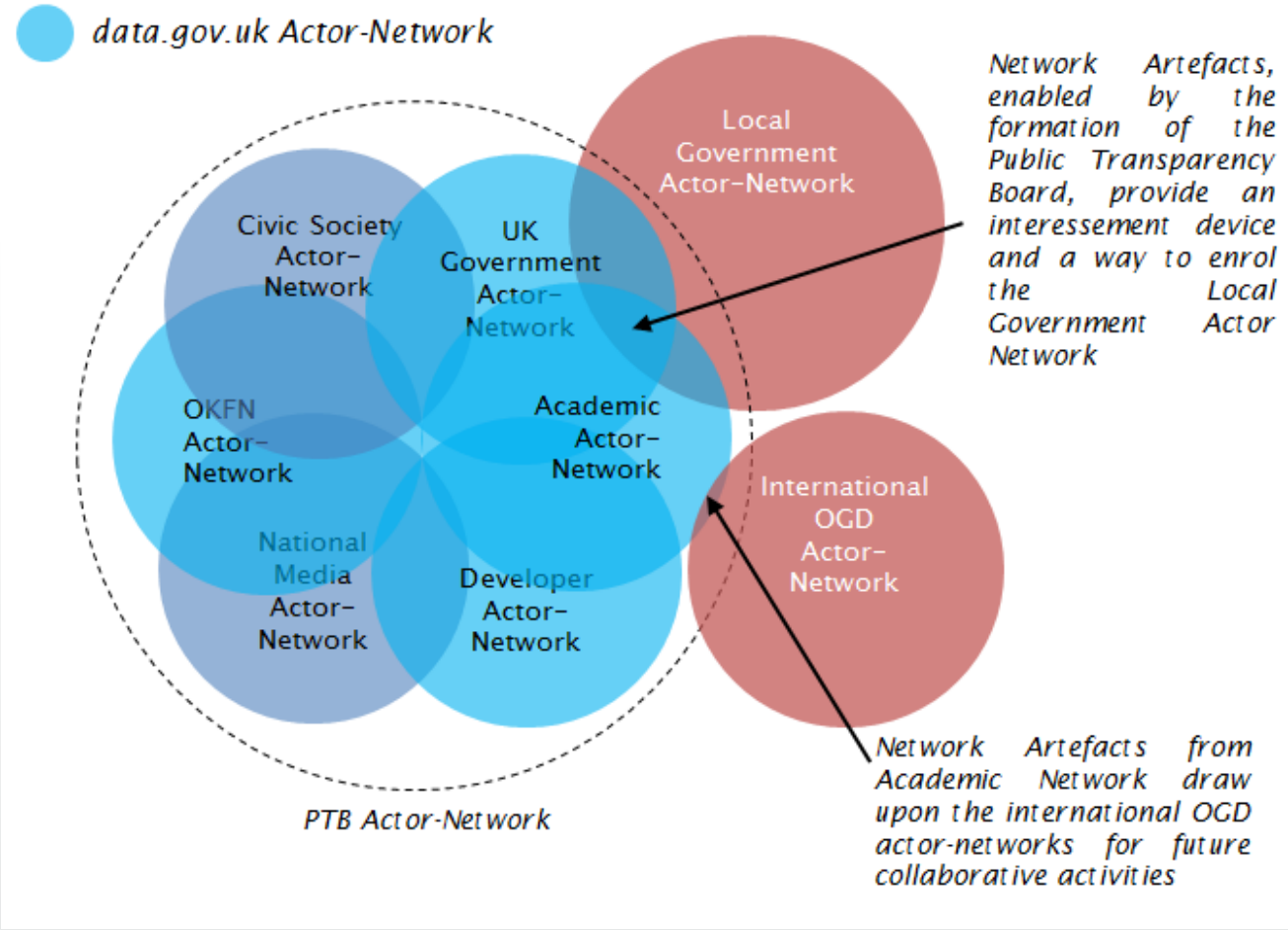

Data.gov.uk as a layer of activity

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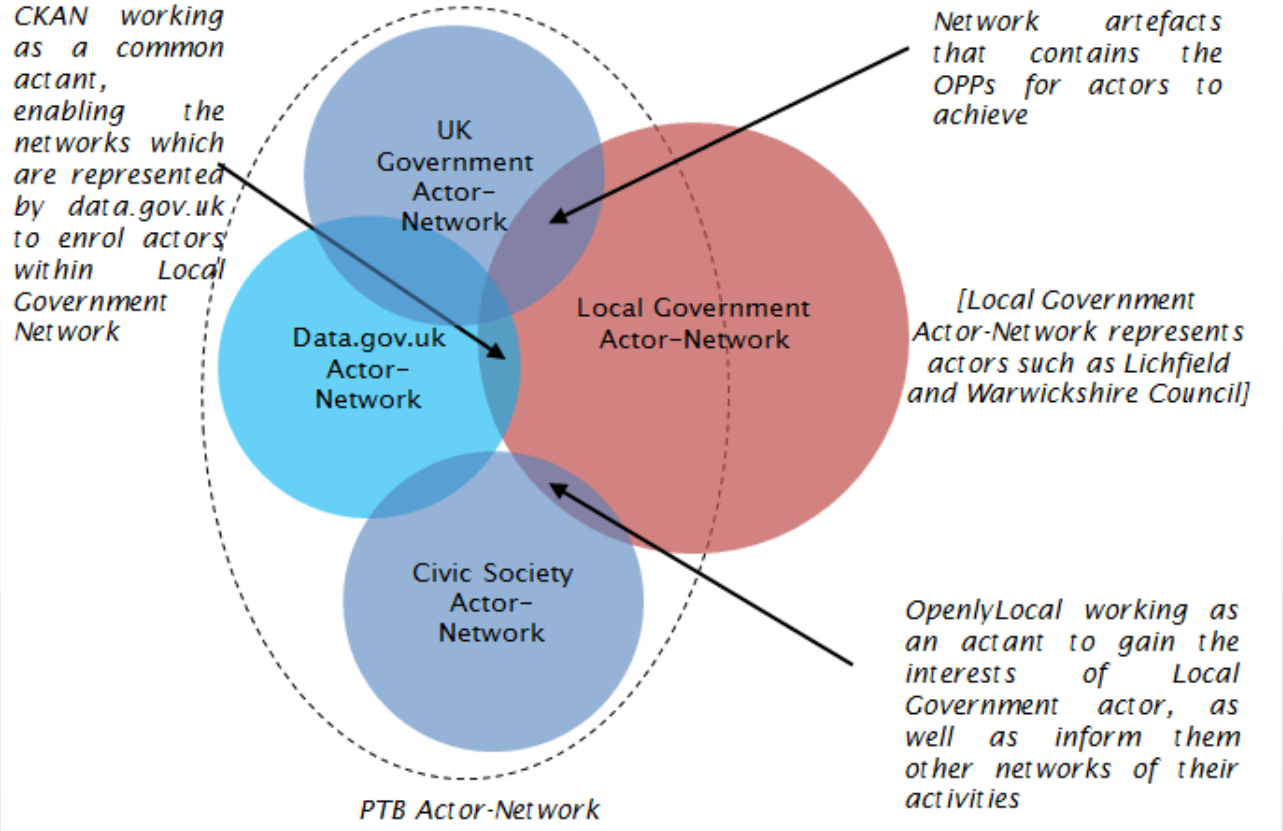

A Closer Look – Local Government

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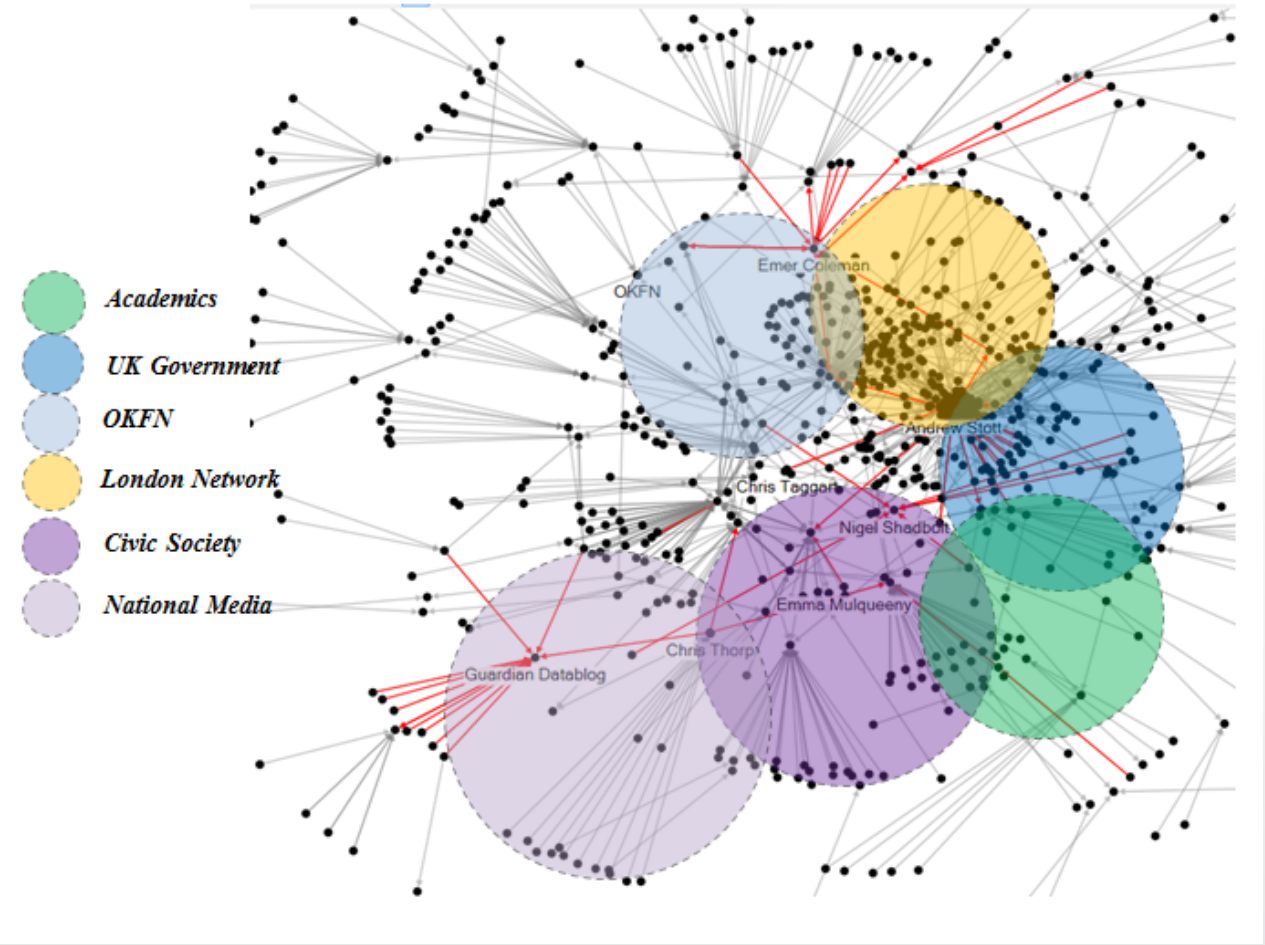

Expanding the Network - National Media

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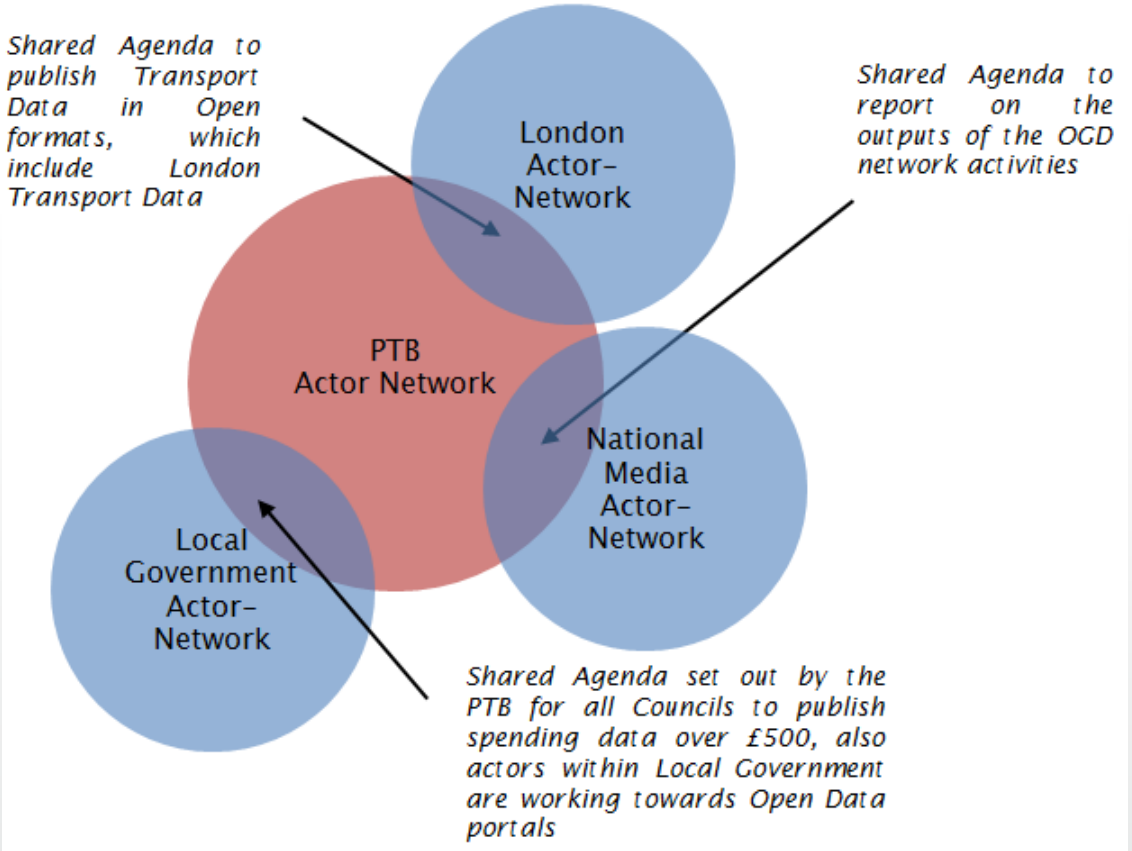

A network of shared Agendas

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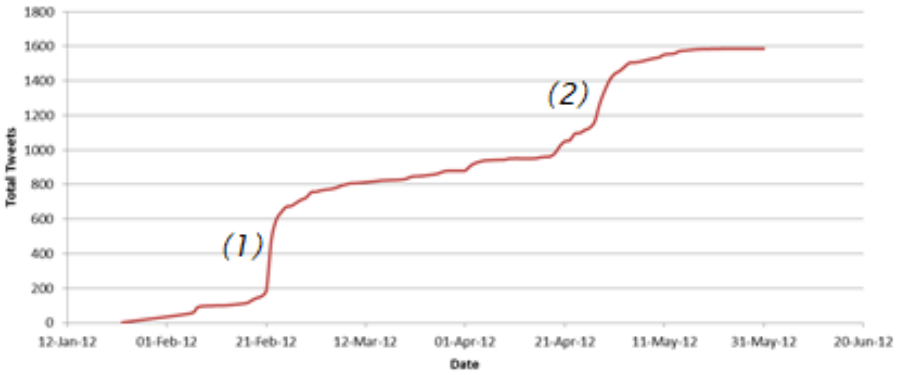
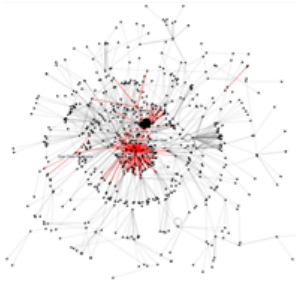
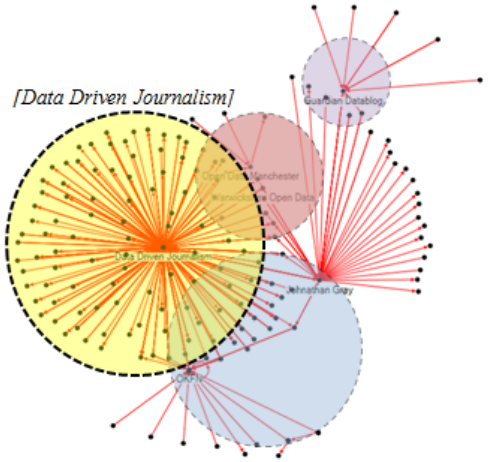


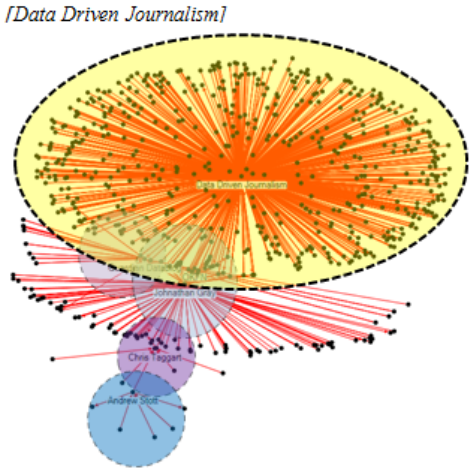
1. Announcement of the Data Journalism Handbook, Also, requests for participants for data journalism award
2. Data Journalism Handbook published



(a)

(b)





The support of 'Data Journalism'

Exploring the Development of a Social Machine

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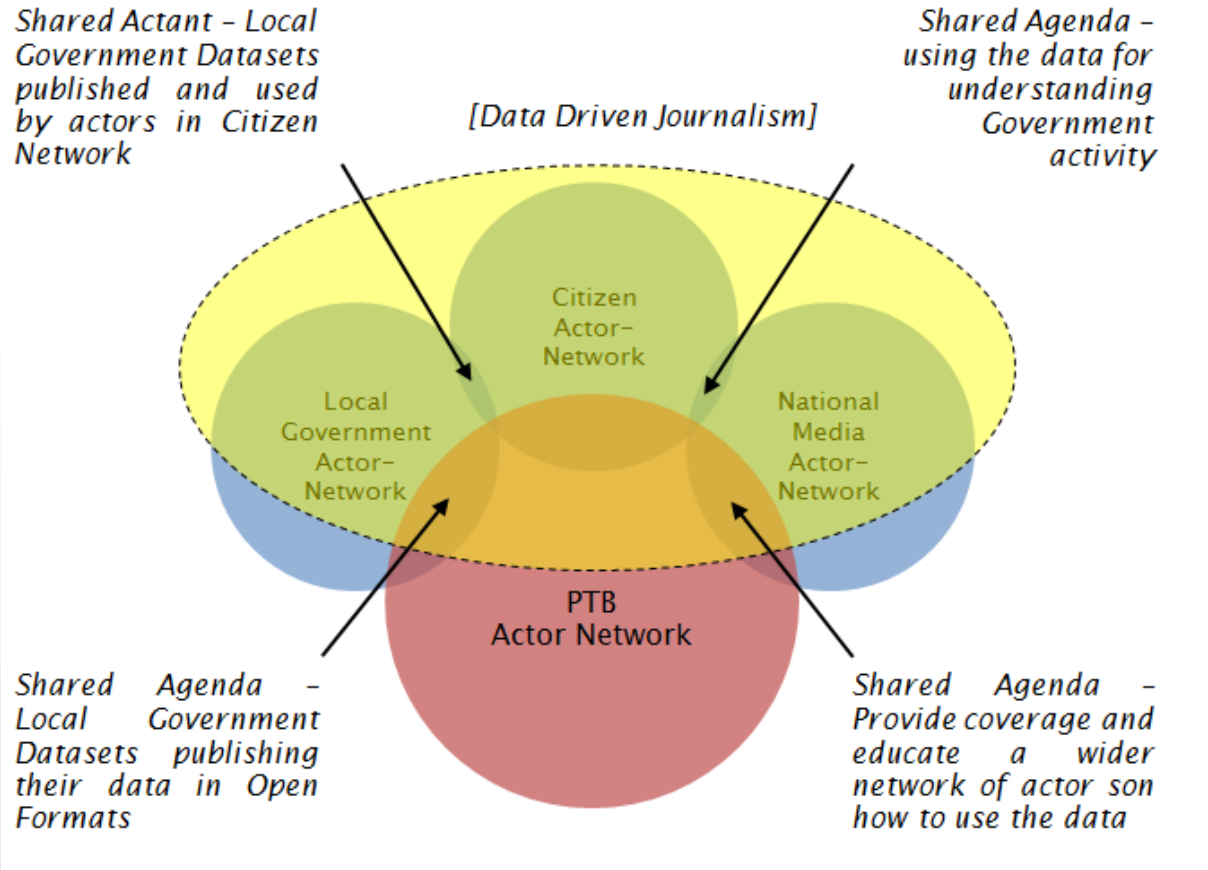

The support of 'Data Journalism'

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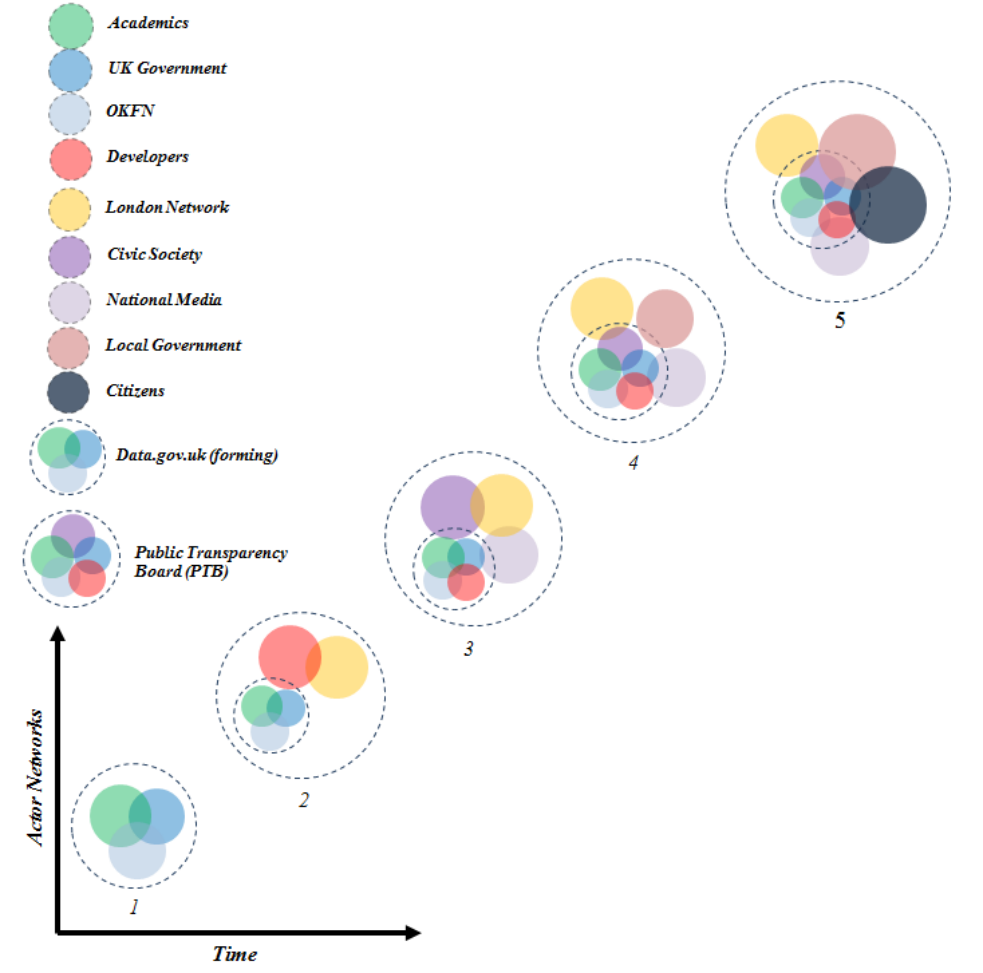

Five Phases of OGD - a stabilised network of Activity

Exploring the Development of a Social Machine

Open Government Data

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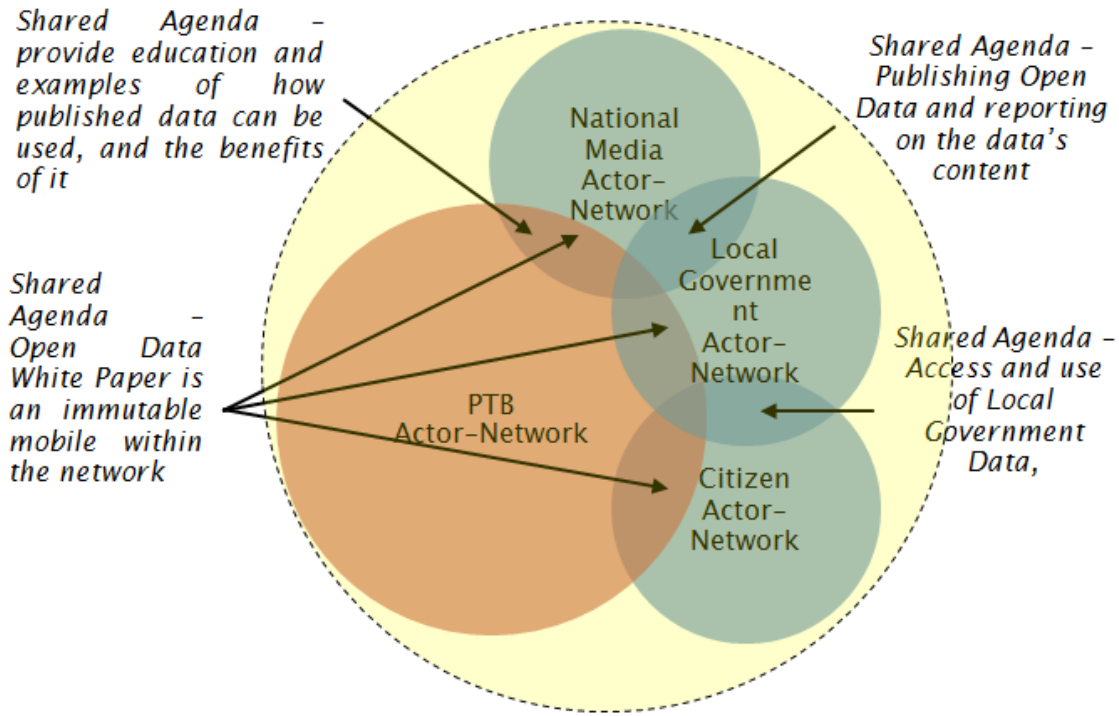

ODI – Representing the Stabilised Phases of UK OGD

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The Findings

- **The emergence and growth of the Open Government Data Web activity result of multiple networks of activity bringing:**
  - Different agendas and
  - Technological and humans actors
  - Occurring both online and offline activities
- **The stability of these networks worked as the building blocks or layer to enable actors to re-problematise agendas and form new Web activities**
  - PSI activities → Data.gov.uk → Data Journalism and 'Armchair accounting' → Open Data Institute
- **Structure, Agency, Competition, and Serendipity emerged as factors in success**
  - These were all socio-technical processes co-constructed between humans and technology

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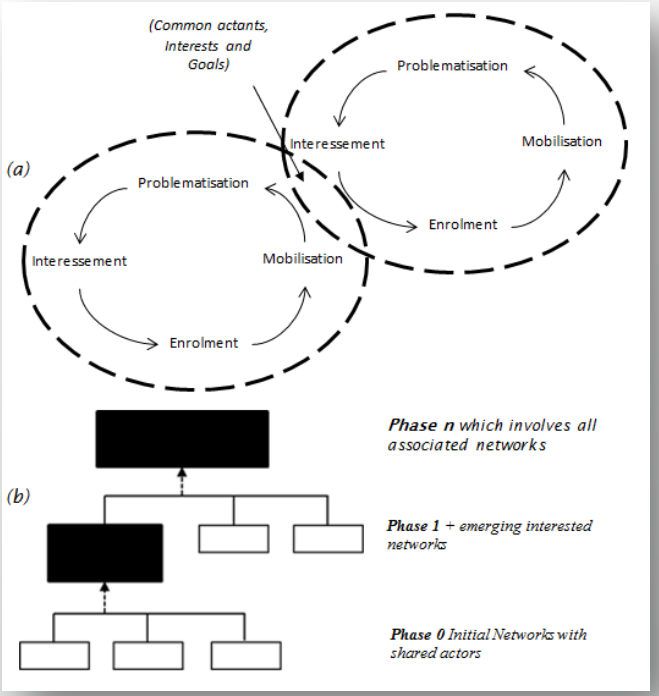
Re-conceptualising Web Growth

- **A new theoretical model to understand the development and growth of a Web activity**
  - Heterogeneous networks translate, form temporarily stabilised phases and enable new forms of Web activities to emerge
  - These new phases interact and alter the previous phases, thus re-configure the 'Web'

- **This perspective re-integrates the micro and the macro (***Berners-Lee's micro and macro***)**
  - There is no 'inside' development and 'outside' growth, these are tightly coupled processes

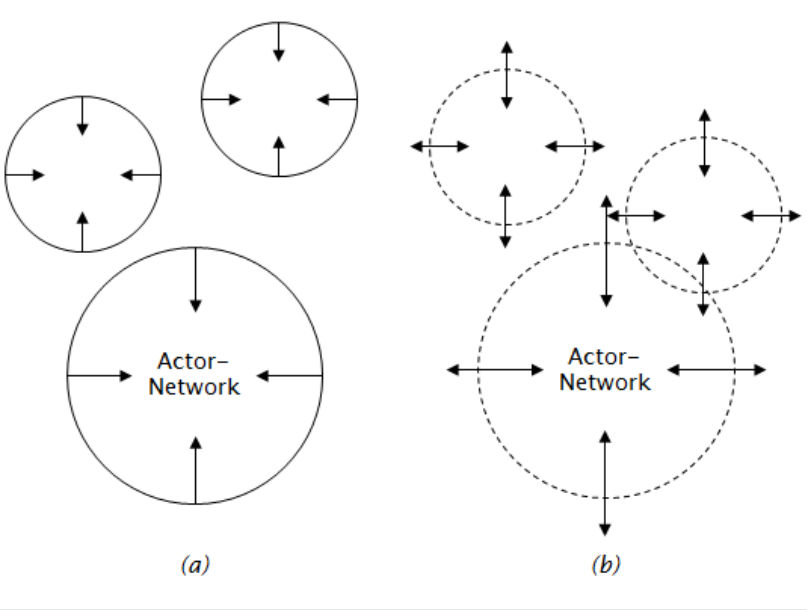


Re-conceptualising Web Growth

The "Weaving of the Web" *is* the Web

The socio-technical processes that enable the Web activity to emerge are the same processes that lead to the growth of the Web

The Web is not 'out there' – what we (humans and technologies) do *is* the Web



Implications of HTP

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- **HTP for understanding social machines**
  - Understanding a social machine is the first step to creating them
    - Their formation, development, failure?
  - Can be used to explore social machines at various scales
    - Large scale machines (Open government?)
    - Small Scale machines (reCAPTCHA?)
- **Using HTP to begin predicting the behaviour of a social machine**
  - Quantitative sources provide the data for network analysis/modelling
  - Mixed methods required
    - Human behaviour, motivations, incentives

Towards Theory of the Web

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- **Identifying and supporting the temporarily stabilised phases that are critical to the continued growth of the Web**
  - Both a social and technical challenge, not only are technologies responsible for Web stability, but also the socio, economical, political, governance, legal factors
- **Applying a methodology developed to understand how other Web activities emerged**
  - Is it possible to use this to help predict the evolution of a “social machine”, or the Web?
- **Rethinking the way that we approach design and development of technology**
  - Not only as an engineering practice, but in terms of the wider societal factors involved in setting agendas, and forming Web activities
  - Move beyond the vision of Web activity as a development process of inside-outside the lab. Question how the fundamentals of the Web development lifecycle

Future Work

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- **Applying the model to other social machines**
  - Can similarities be identified between their emergence, growth, structure, phases, etc.
- **Developing a computational approach to tracking social machines**
  - Their socio-technical development by specific metrics
    - Network structure
    - Number of users, comments, activity levels, flow of data
- **Using the Web Observatory to monitor and track the Web as a social machine**