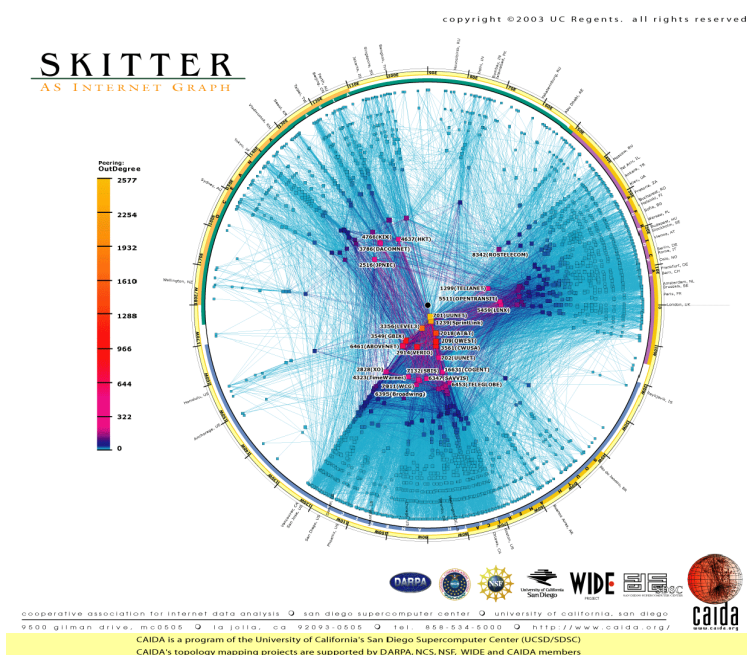


# Abstract/Research Summary Presentation

Environments informed/created by sustainable information exchanges?  
New possibilities and takes on things we might take for granted?  
Revealing things that exist in clear view but are unseen?  
Searching for new ideas in design using Network Theory?

## Network Theory

**Network theory** is an area of [computer science](#) and [network science](#) and part of [graph theory](#). It has application in many disciplines including [particle physics](#), [computer science](#), [biology](#), [economics](#), [operations research](#), and [sociology](#). Network theory concerns itself with the study of [graphs](#) as a representation of either [symmetric relations](#) or, more generally, of [asymmetric relations](#) between discrete objects. Applications of network theory include logistical networks, the [World Wide Web](#), [gene regulatory networks](#), metabolic networks, [social networks](#), [epistemological](#) networks, etc.



## Examples

### Blackshoals

#### Abstract

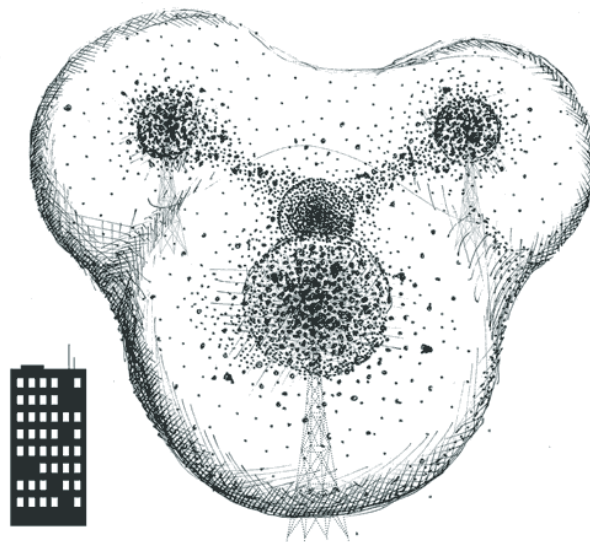
In the Black Shoals project, artificial evolution was employed to design articulated creatures which interact with a world of real time financial data. Their phenotypes are composed of multiple interacting elements in a discrete time simulation of Newtonian physics. The couplings formed between evolved, recurrent neural nets and bodily components generate co-ordinated, efficient strategies for the exploitation of their environment. The ecosystem in which they are embedded implements a

decentralised evolutionary algorithm, applying competitive selective pressure to the population through conservation of energy. It also couples them to a larger complex system. The opportunities in their world derive from real time stock market information fed from a live Reuters data-feed. The genotype to phenotype mapping employed offers the features of redundancy, neutrality and epistasis. Support is also provided for the ad hoc inclusion of new creature components without modifying the evolutionary algorithm. The focus of this paper is the design and implementation of the ecosystem-based population management, the genetic encoding and developmental process of the creatures.

## [Fictional Radio-Spaces](#)

In this project called "the bubbles of radio" [Ingeborg Marie Dehs Thomas](#) used critical, visual design as a way of exploring the perception of many kinds of electromagnetic fields. The project answered the brief [Fields and Seams](#) that asks "How can we use the increasingly radio-saturated landscape for creative or functional purposes?"

Using inspiration from richly illustrated books on botany, zoology and natural history, Ingeborg arrived at the concept of an *encyclopeadia of radio waves* that contains a selection of fictional radio 'species'. Armed with a well researched and advanced knowledge of the use, application and technicalities of each radio technology she created fictional visualisations of the ways in which radio waves inhabit space. These are creative expressions based as much on personal creativity as on technical or scientific data like range and signal strength. Six contemporary radio technologies were visualised: [Bluetooth](#), [DMB](#), [GSM](#), [RFID](#), [Wifi](#) and [Zigbee](#).



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## Abstract

In the vast sea of networked information a new landscape has been born, its pillars of strength are not made of stone but instead digitised nodes of data. These nodes are as varied as they are numbered; from the linear to hyper-dynamic-always changing hubs of information that influence one another's shape, volume and social meaning. In particular I am interested in exploring the concept of a self sustained flow of information and to further see how this can be articulated in a dynamic and complex way capable of reflecting its inherent properties.

This research begins with a look into how to consolidate and define a measuring of a network's activity and size and to explore potential ideas of how to articulate this environment in a visual manner. These findings will then contribute to a time based motion graphic, whether pre-rendered or dynamically generated on the spot with changing information is unknown at this stage. This research and deliverable will offer a new framework for interpreting data landscapes.

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## Introduction

### Possible research proposal:

- Environments informed/created by sustainable information exchanges? Revealing structures that exist in clear view but are unseen?
- How might a sustained flow of information exchange be re-interpreted in a new context? what new social meanings are created?
- How can a physics philosophy used to explain our perceived reality be applied to sustainable information systems and what new results are created?
- Can the theory of everything (M-Theory) be applied to a sustainable information platform and what new views can be expressed?
- Can the laws of physics be applied to information flow? What links are there and what new possibilities does this open up for designers?

### Consistent themes I have seen emerging:

- convergence
- M-Theory
- new cultural meanings
- new creative applications for concepts/theories to IT practices

### Reason for engaging in this research?

- To discover new interpretations of data flow and the effect it has on an environment.
- To re-apply existing theories to new emergent technologies and methods of communication/information exchange.
- To draw parallels between the naturally occurring and the synthetically created.
- To offer new takes on existing content.
- Convergence between digital mediums and un-explored concepts (hopefully).

### Methods Used and Proposed

- Creation of an artificially-sustained-information system and the measured effect on the environments surrounding them; e.g. magnetic fields example, corn starch example.

## What do I know so far about the topic?

Means of potentially mapping an 'information environment.'

### Network Theory

#### Network Analysis

- Network analysis, and its close cousin [traffic analysis](#), has significant use in intelligence. By monitoring the communication patterns between the network nodes, its structure can be established.

## Link Analysis

- Link analysis is a subset of network analysis, exploring associations between objects.
- Link analysis here provides the crucial relationships and associations between very many objects of different types that are not apparent from isolated pieces of information.
- Computer-assisted or fully automatic computer-based link analysis is increasingly employed by [banks](#) and [insurance](#) agencies in [fraud](#) detection, by telecommunication operators in telecommunication network analysis, by medical sector in [epidemiology](#) and [pharmacology](#), in law enforcement [investigations](#), by [search engines](#) for [relevance](#) rating (and conversely by the [spammers](#) for [spamdexing](#) and by business owners for [search engine optimization](#)), and everywhere else where relationships between many objects have to be analyzed.

## Spread of content in networks [link](#)

Content in a [complex network](#) can spread via two major methods: *conserved spread* and *non-conserved spread*.

In **conserved spread**, the total amount of content that enters a [complex network](#) remains constant as it passes through. The model of conserved spread can best be represented by a jug containing a fixed amount of water being poured into a series of funnels connected by tubes. Here, the jug represents the original source and the water is the content being spread. The funnels and connecting tubing represent the nodes and the connections between nodes, respectively. As the water passes from one funnel into another, the water disappears instantly from the funnel that was previously exposed to the water. In non-conserved spread, the amount of content changes as it enters and passes through a [complex network](#).

The model of **non-conserved spread** can best be represented by a continuously running faucet running through a series of funnels connected by tubes. Here, the amount of water from the original source is infinite. Also, any funnels that have been exposed to the water continue to experience the water even as it passes into successive funnels. The non-conserved model is the most suitable for explaining the transmission of most [infectious diseases](#).

## Resources

Network Theory: Analysis And Synthesis [link](#)  
Network Theory: An introduction [link](#)  
Fictional Radio-Spaces (project) [link](#)  
Blackshoals (project) [link](#)  
Network Theory [link](#)

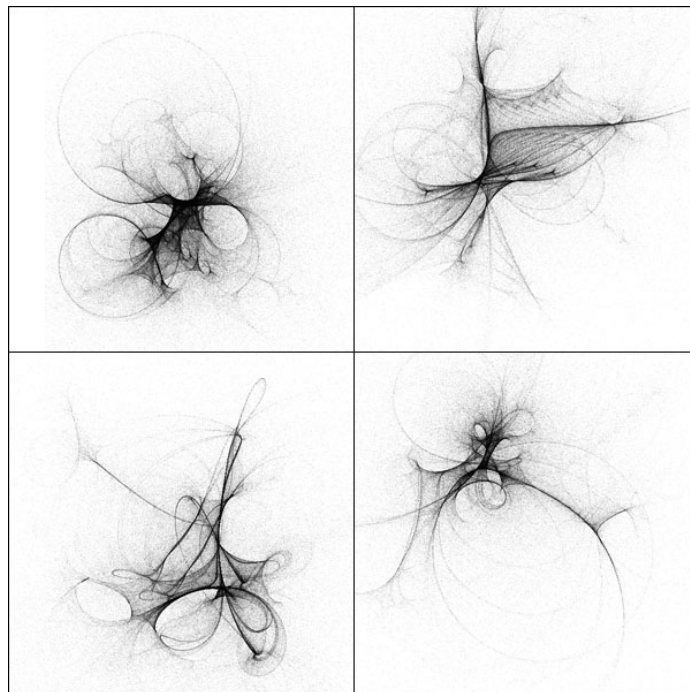
## What reason is there to continue with the research?

- Potential for new creative links to be drawn between previously unconsidered information sets.

- I'd like to offer a new perspective on the information landscape visual aspect, as well as research further into a potential self-sustained information subset.
- I feel the information architecture can offer new, original, and visually stimulating design across a range of mediums, including self-generative, time based, static and interactive.
- I think also there is potential to better communicate complex ideas to an audience in a way they can understand by using relevant information that they engage with.

### **Intended Methods**

- I'd like to start looking at how other people have articulated complex and dynamic information in a visual manner.
- Survey
- Reading
- Join a community forum that asks such questions
- I'd like to perform simple experiments with applications such as processing [link](#)



## **Summary**

### **Significance for this research/activity**

- I intended to find potentially interesting visual links that are created via applying a new perspective to information systems, and in particular self-sustained systems. I believe this has the potential to offer new questions and views to be considered by a number of communities concerned or governed by information flow.

### **Reflection on actions so far**

- So far I have looked into a range of theories concerned with explaining the world around us, such as quantum physics, M-theory etc, and this has led me to a place where I'd like to examine the environments not immediately seen. I believe that the study of Network theory can offer me a sufficient entry point into the chosen topic area and provide me with a good base of research to come back to.

### **Future Work**

- I'd like to simplify down some of my ideas and research tangents, and in particular find an example of a sustainable information system (perhaps a forum (information is consumed and put back into the forum)). I'd also like to learn how other people have dealt with similar ideas and see where I might improve or deviate away from their research.