

# Bio-inspired Auckland Transport Network

JERRY KHOO, BECA



**The Changing  
Face of Transport  
in New Zealand**

3-6 March . Wellington . Te Papa

# What is Slime Mould?

*Physarum polycephalum*

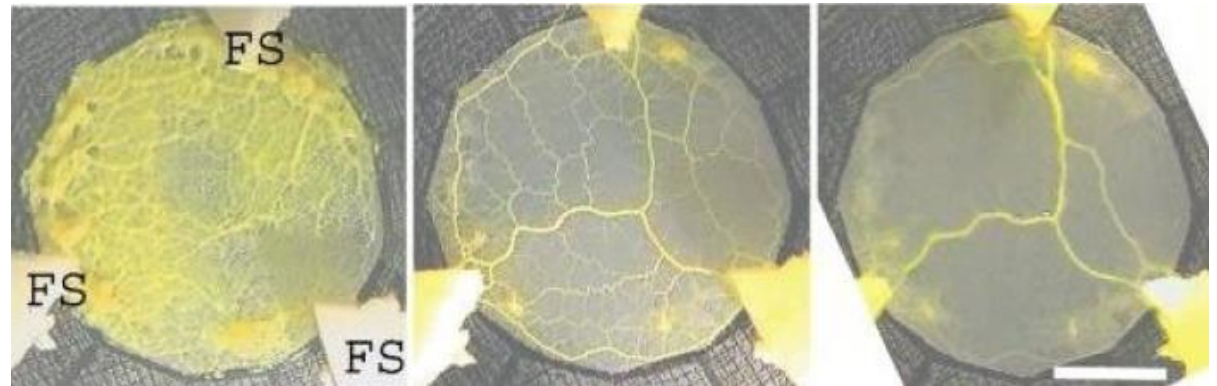
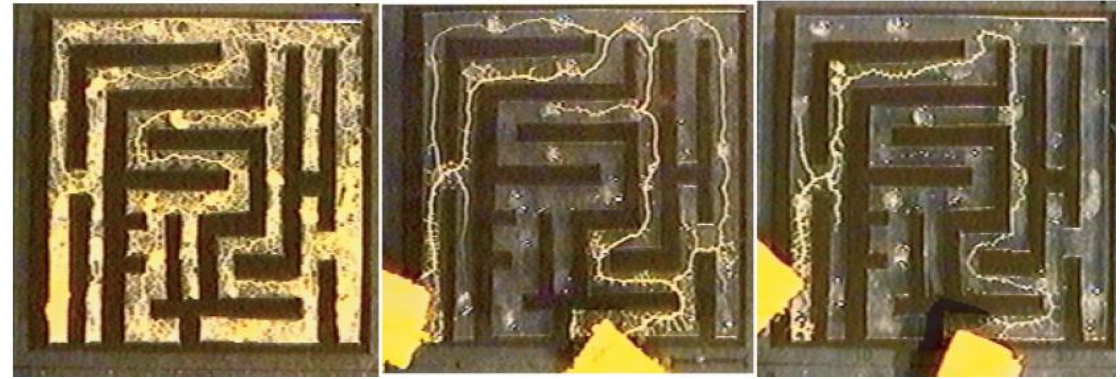
- Neither plant, nor animal nor fungi
- Ignored by botanists, passed over by zoologists and largely shunned by mycologists
- Single cell with many nuclei
- Forms protoplasmic tubes and network during foraging behaviour
- Network optimised to transport food in the plasmodium body



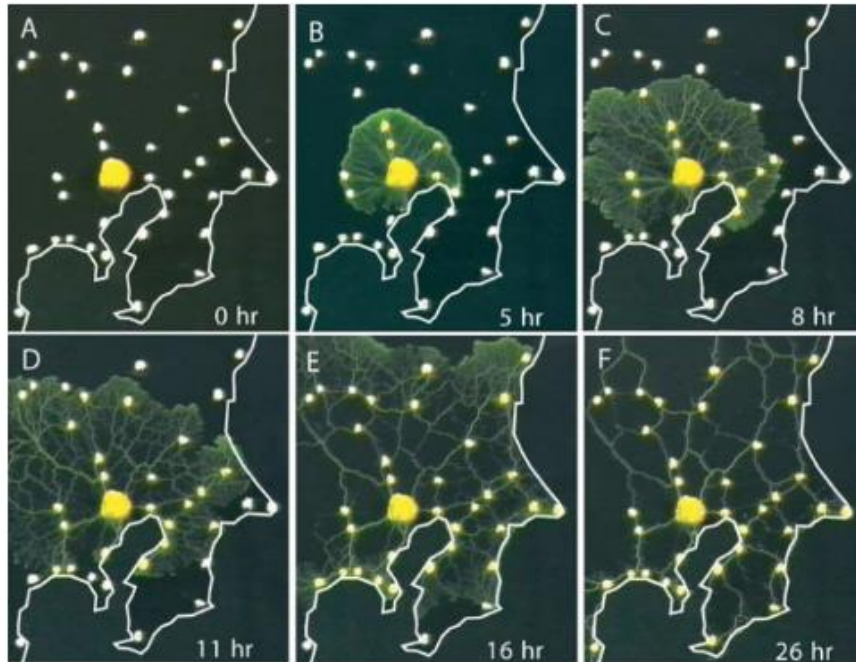


# Why Slime Mould?

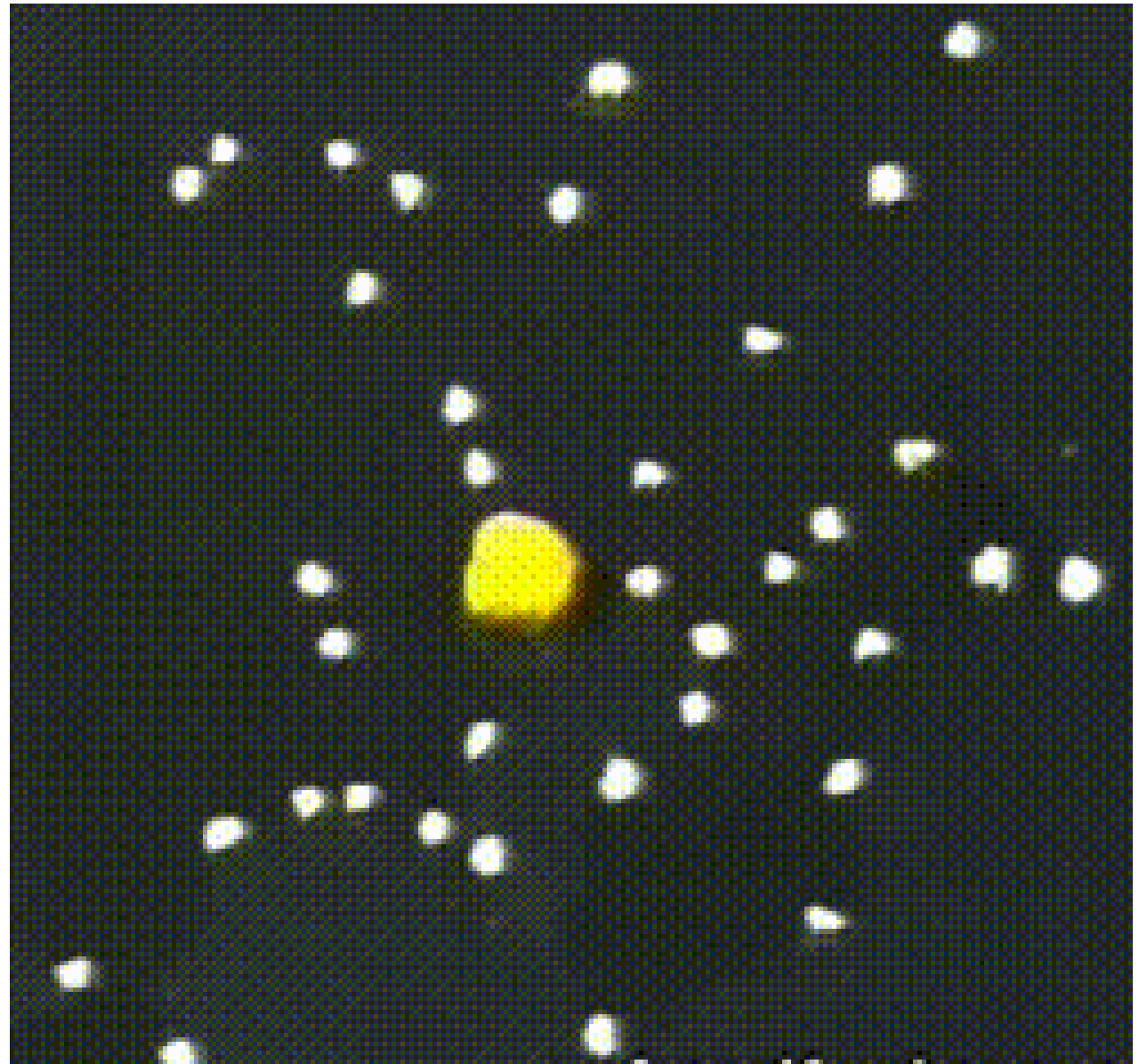
- Finding Shortest Path
- Building High Quality Networks
- Adapting to Changing Environments
- Memorising and Learning
- Biological Computing
- Distributed Intelligence



# SLIME MOLD GROWS NETWORK JUST LIKE TOKYO RAIL SYSTEM



Talented and dedicated engineers spent countless hours designing Japan's rail system to be one of the world's most efficient. Could have just asked a slime mold.



# The Journey

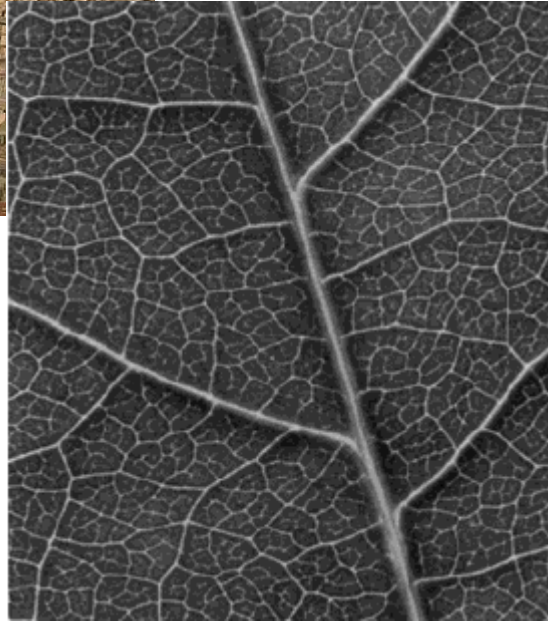
- International network (Slime Mould Collective)
- Network of enthusiasts around the world, with background ranging from biologists, natural mathematical sciences, artists etc

**Challenge: How to import this substance into NZ???**

- Dr Elizabeth Ostrowski, Senior Lecturer Massey University – School of Natural and Computational Sciences
- Set up lab at Massey University to test NZ transport networks



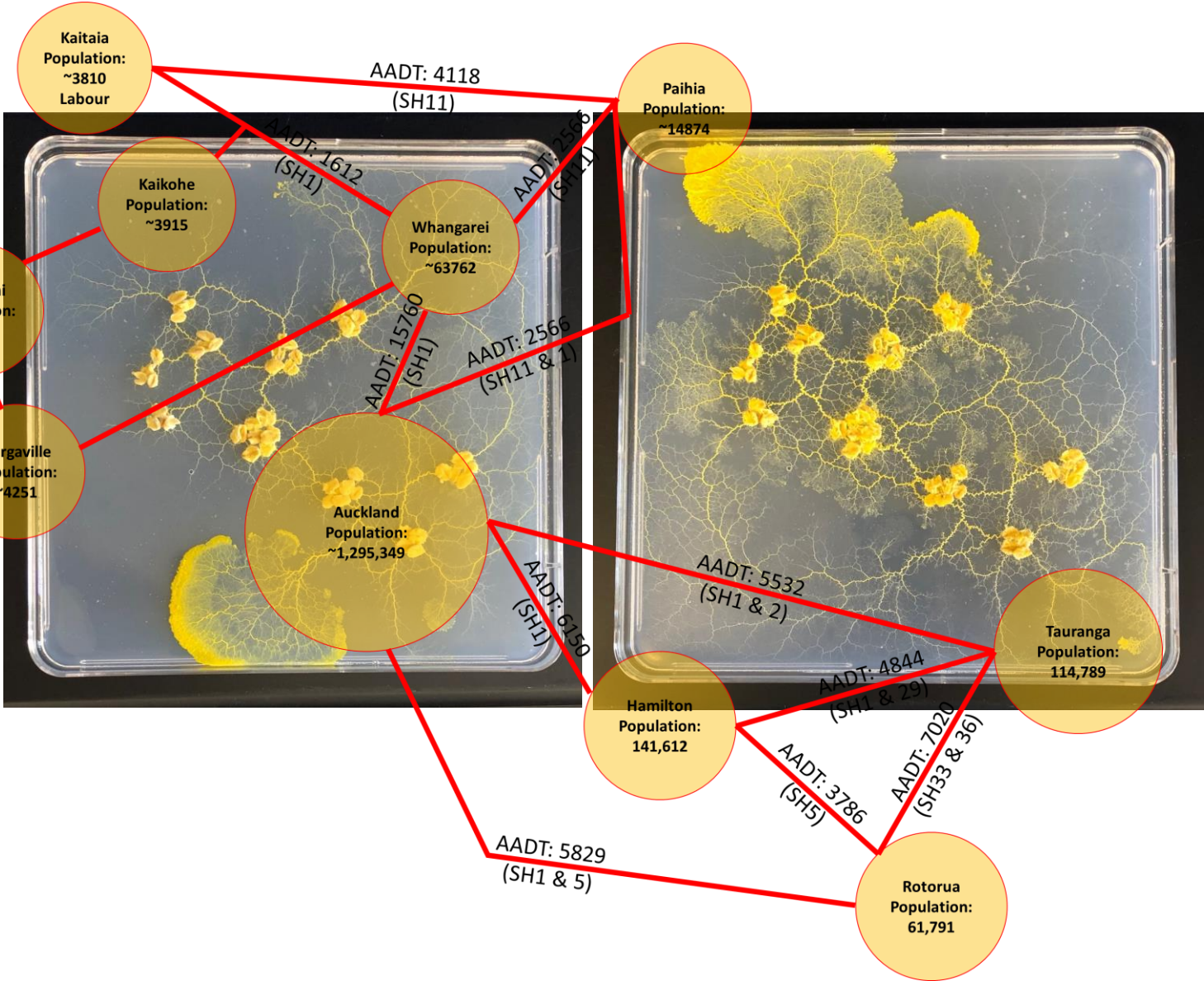




## Pilot Study

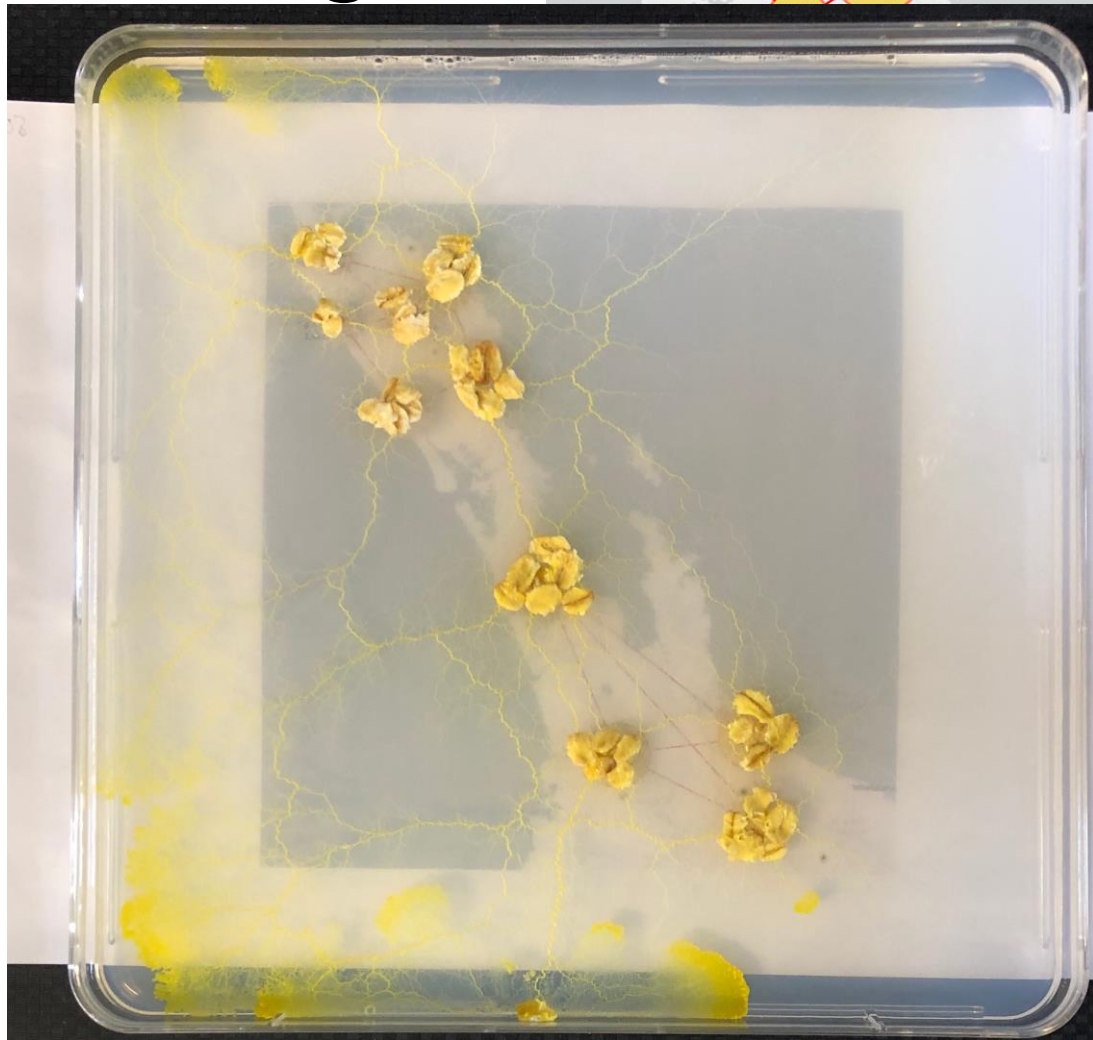
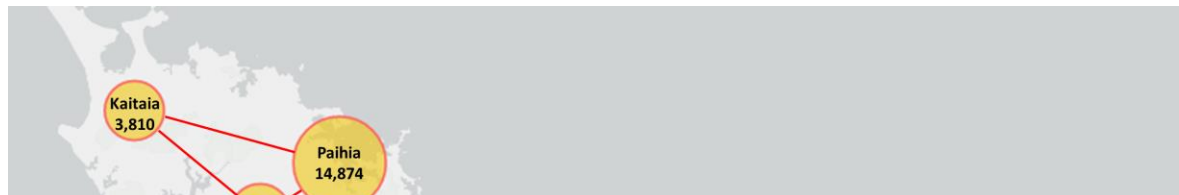
- To compare the transport network links developed by the plasmodium for the Upper North Island against the existing network based on existing population data
- Repeated for Auckland region, based on combined existing population and employment numbers.

# Findings

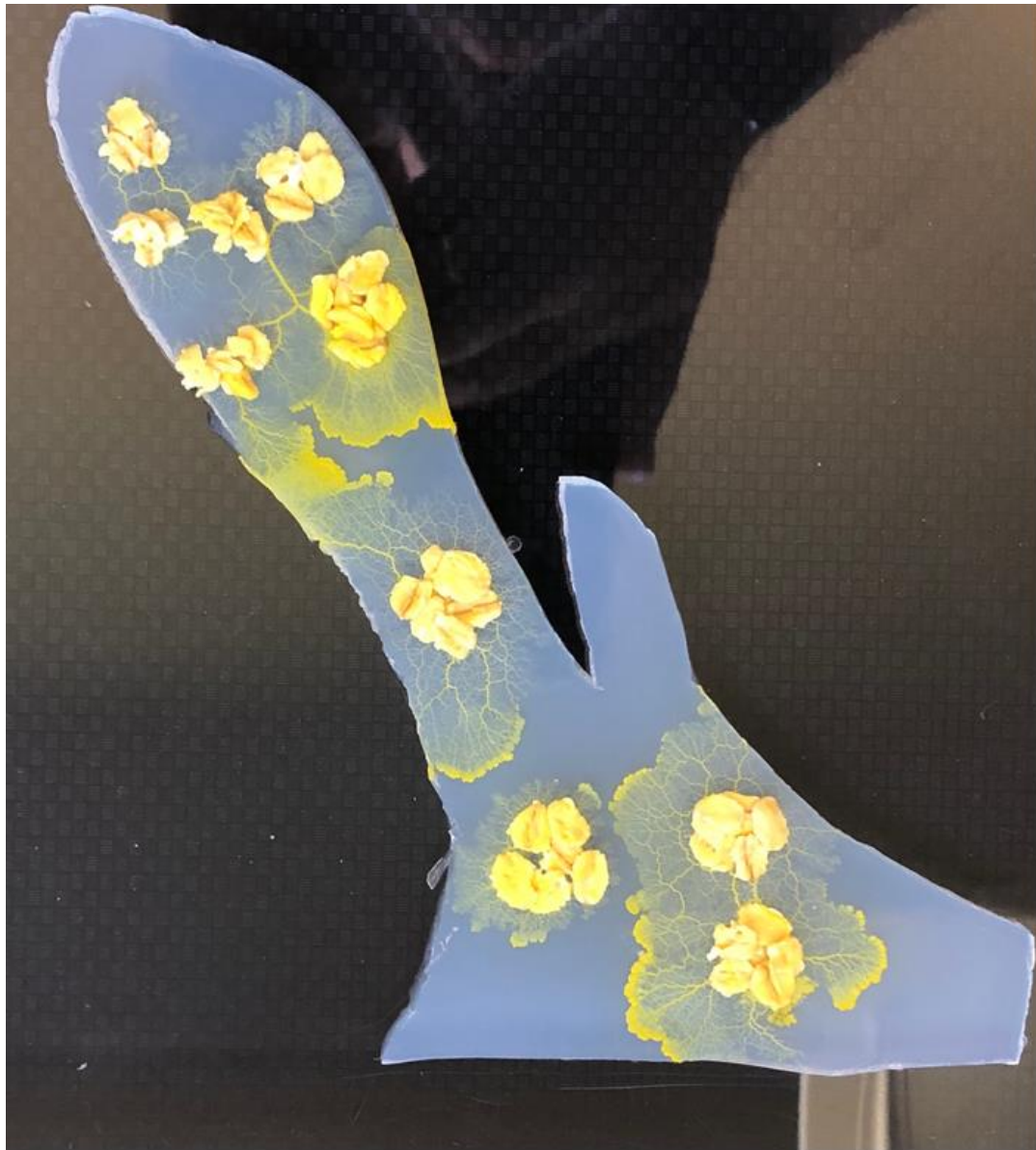




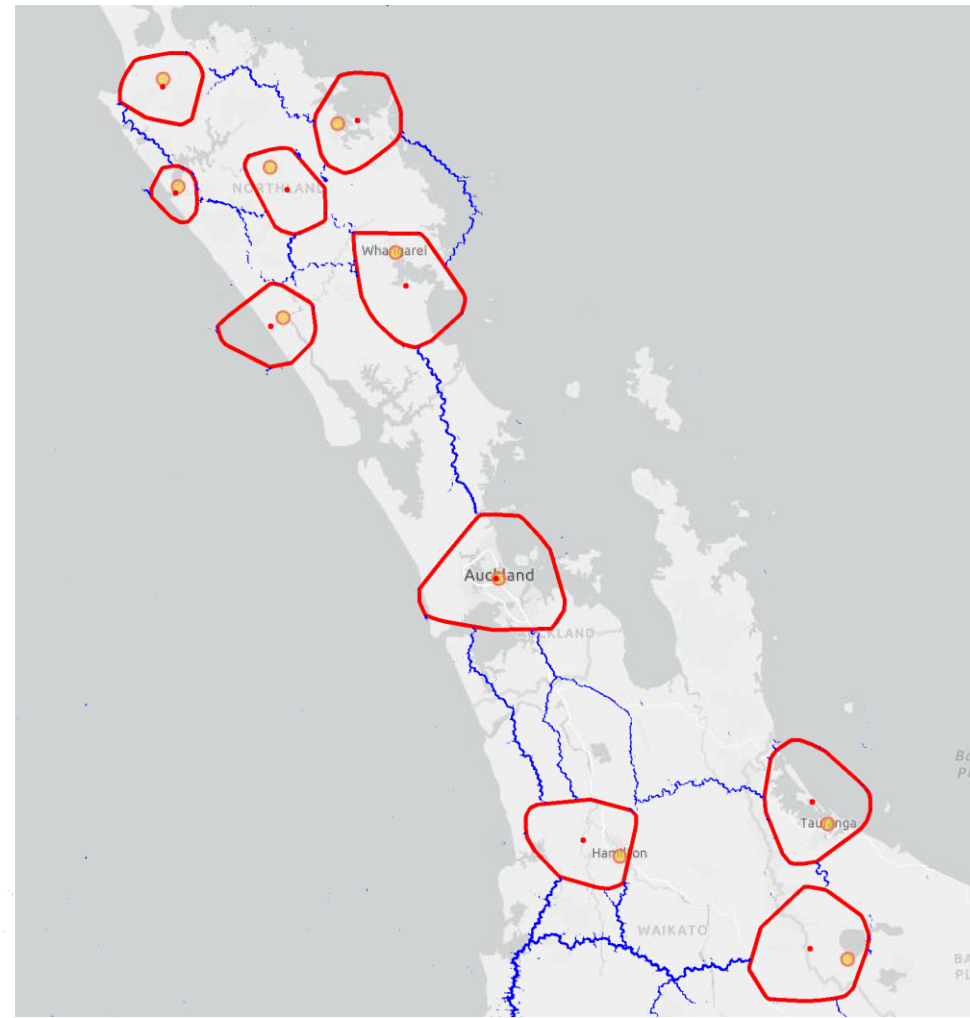
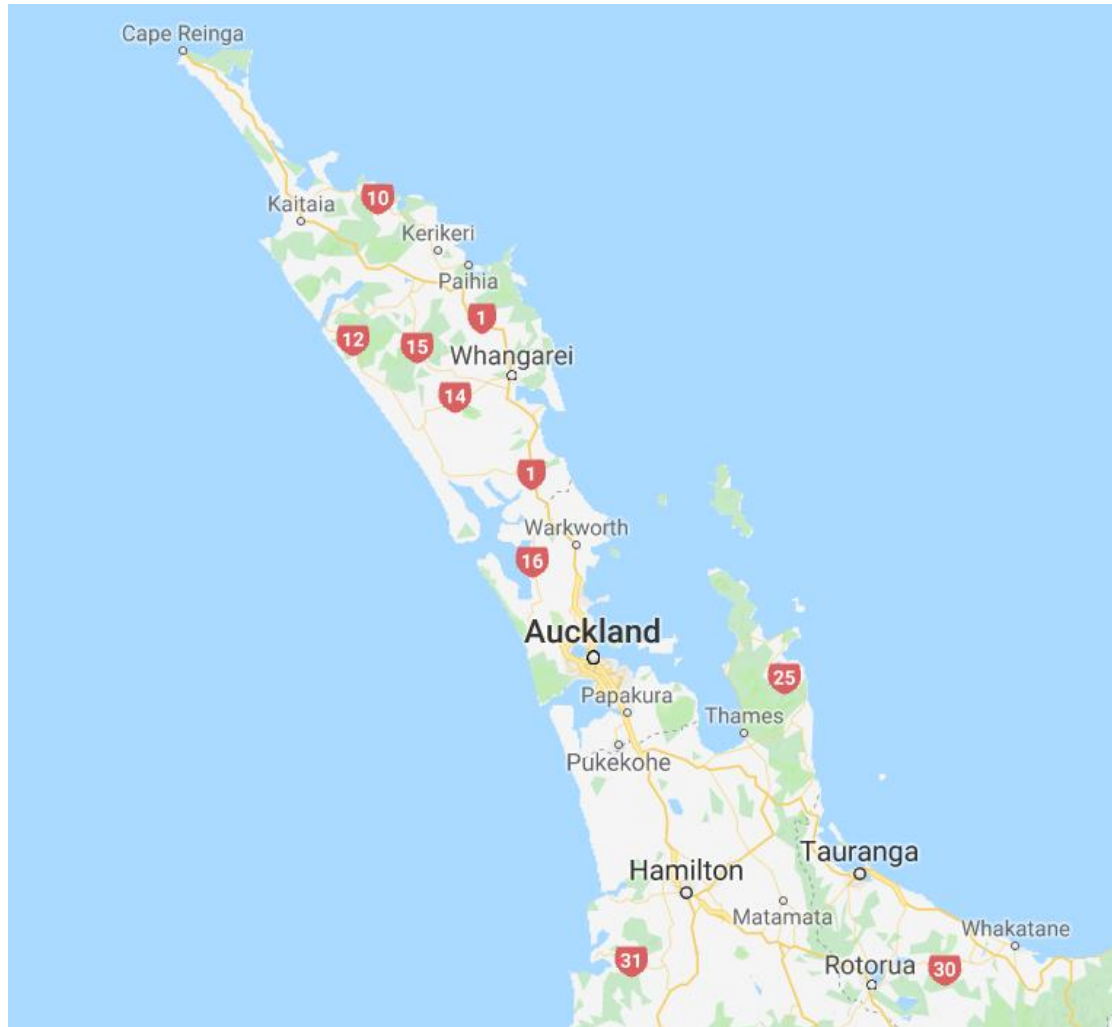
# Findings





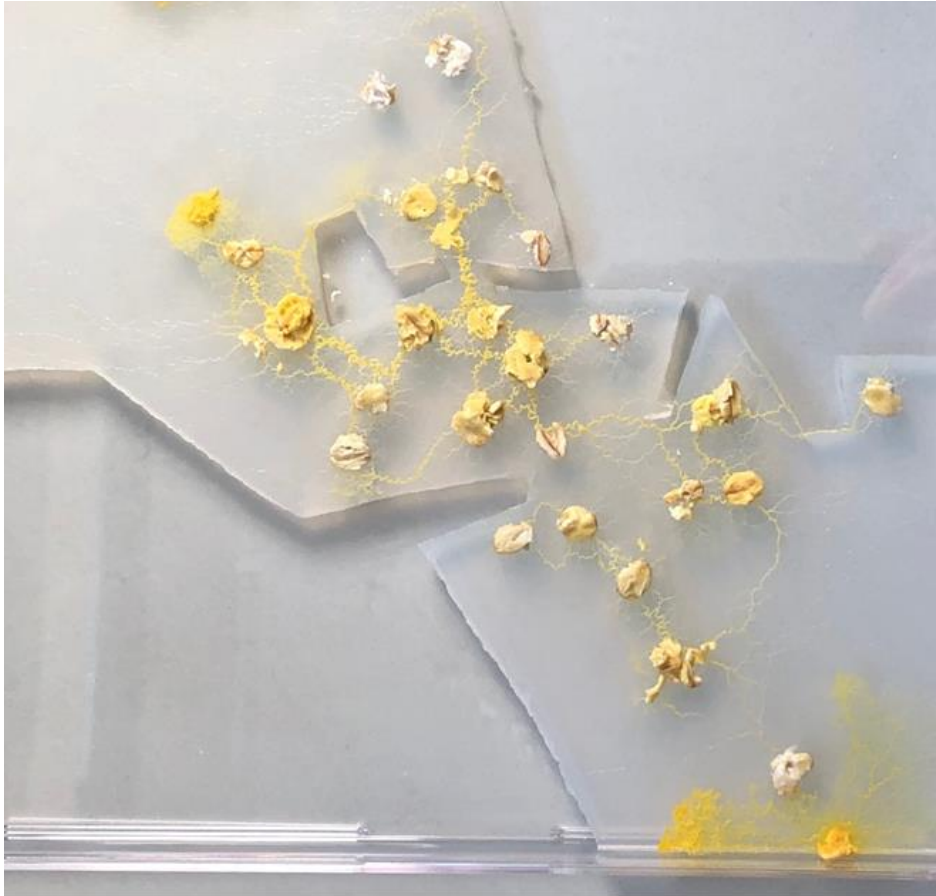


# How does it compare to our network?





# Bio-inspired Auckland network



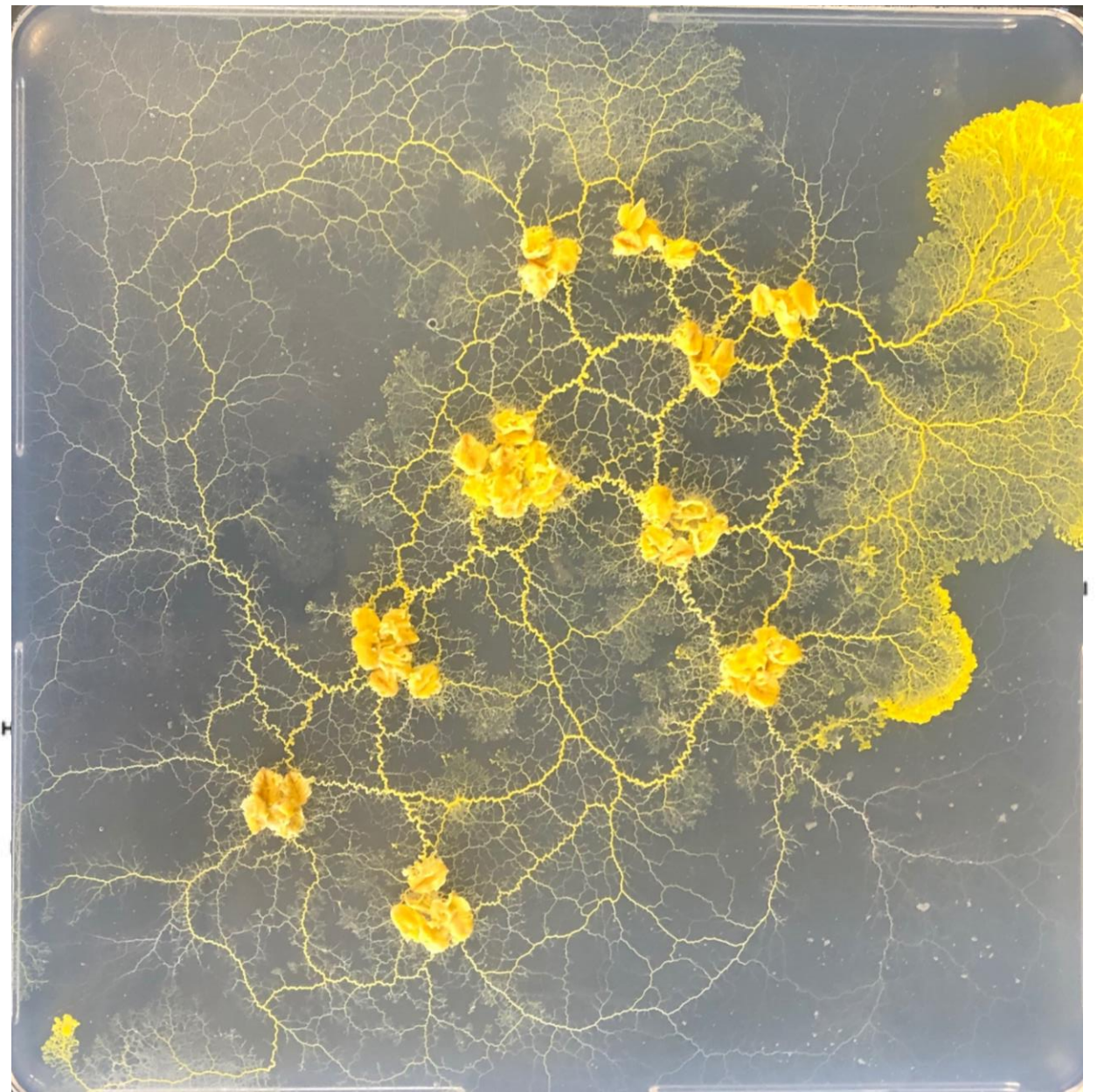
- Setting up a based on **existing** and **future** (Scenario I11 2046+) population and employment data
- Compare against the public transport network, including:
  - Radial routes
  - Non-radial, intertown routes

## Future Add-Ons

- Terrain model from 3D printing
- Resistance modelling
- Scenario based planning

# Key Learnings

- Cross-disciplinary fertilisation
- New perspective of natural world network models







**make  
everyday  
better.**