Applying Simulation & Computation to Innovation Research

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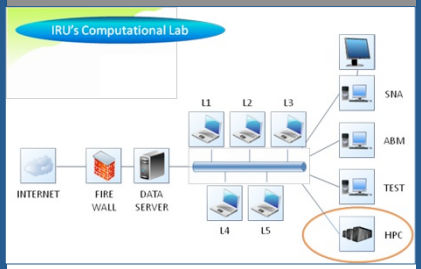
UCD INNOVATION RESEARCH UNIT (IRU)

Worldwide, every year, governments spend billions on promoting innovation. How to inform and evaluate this investment? To generate and optimise innovation performance on the international, European, national and regional level, it is necessary to analyse the underlying innovation structures and processes, designs, and policies, and to anticipate new developments using computation and simulation.

INTRODUCTION

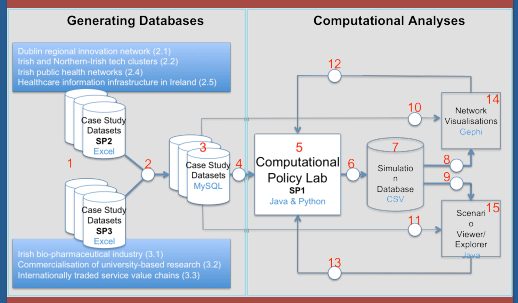
At the **Innovation Research Unit (IRU)** we combine interdisciplinary empirical research on issues identified as important for innovation performance with computational methods such as network analysis, agent-based modelling and social simulation, to implement and test innovation policy scenarios.

IRU Computational Laboratory



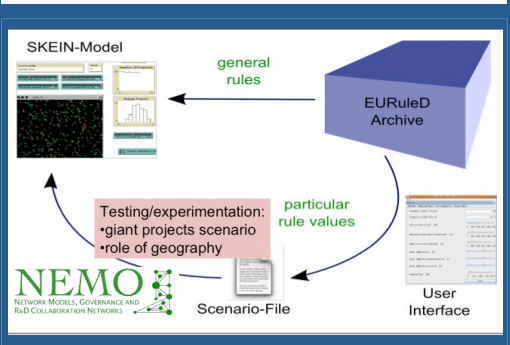
At IRU, agent-based modelling (ABM) is used – a powerful and innovative methodology for policy modelling, which gains more and more prominence in the scientific community – to identify and understand the effects of certain innovation policy strategies and their associated knowledge dynamics.
We can build on a highly-validated and widely-used simulation model, which has been used to model e.g. organisational learning in and between firms to explore spillover effects (Gilbert, Ahrweiler and Pyka, 2007; Pyka, Ahrweiler and Gilbert, 2009), the effects of partner choice and capital distribution on industry size and performance (Ahrweiler, et al., 2010), and the structural characteristics of innovation networks (Pyka, Ahrweiler and Gilbert, 2007). This model is constantly improved for different applications relying on a development history, which started in 1998 with the EU project "Simulating self-organising Innovation Networks") (SEIN).

Examples of IRU research projects

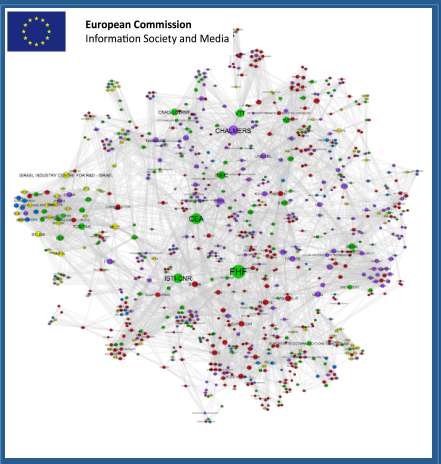


1 *Innovation Policy Simulation for the Smart Economy (IPSE)*
PRTLI, Irish Higher Education Authority
Workflow: Databases, Applications and Middleware

The IPSE project (funded by Irish Government) investigates different aspects of Irish innovation networks. In our Computational Policy Lab, we will develop and test optimising strategies for Irish innovation policy, and work on options for anticipating and analysing new developments to help the recovery of the economy.



2 *EU project "Networks Models, Governance and R&D Collaboration Networks" (NEMO, FP6).*
Agent-based modelling of policy changes between Framework Programmes 1-7 investigating the relations between FP network structures and performance.



3 *FP7 CSA-network in ICT*
Work for DG INFSO (tender project) "Using Network Analysis to Monitor and Track Effects Resulting from Changes in Policy Intervention and Instruments"

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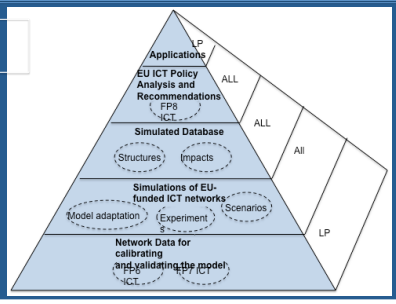

Informed by FP6 and FP7 datasets on EU-funded ICT R&D networks, IRU applies and further develops methods from network analysis and agent-based simulation to understand and manage the relation between research funding and realising the different goals of EU policy programmes. IRU's innovative contribution will be to develop computational designs for a DG INFSO´ R&D policy laboratory in silico in order to inform policymakers about optimal network structures for ICT research and innovation. Our study will provide insights for the ex-post evaluation of FP7 and for the impact assessment / ex-ante evaluation of FP8.