# The COMPLEX-IT Platform and the new field of Smart Methods (AM-Smart)


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# Gallery

Welcome to the Shiny Gallery! Below you can find a myriad of Shiny apps to be inspired by and to learn from. We have organized the apps in two main categories:

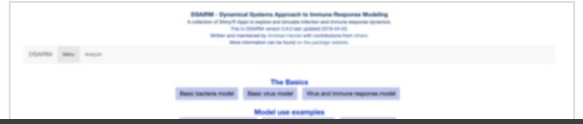
- **Shiny User Showcase** comprised of contributions from the Shiny app developer community.
- **Shiny Demos** that are designed to highlight specific features of shiny, the package.

## Shiny User Showcase

The Shiny User Showcase is comprised of contributions from the Shiny app developer community. The apps are categorized into application areas and presented with a brief description, tags, and for many, the source code. Note that many of these apps are winners and honorable mentions of our annual Shiny contest!

### Education

**Apps designed for teaching**




- Advances in the integration of smart technology with interdisciplinary methods has created a new genre, approachable modelling and smart methods – AM-Smart for short.

- AM-Smart platforms address a major challenge for applied and public sector analysts, educators and those trained in traditional methods: accessing the latest advances in interdisciplinary (particularly computational) methods.

- AM-Smart platforms do so through nine design features. They are

    - (1) bespoke tools that
    - (2) involve a single or small network of interrelated (mostly computational) methods
    - (3) they also embed distributed expertise
    - (4) scaffold methods use
    - (5) provide rapid and formative feedback
    - (6) leverage visual reasoning
    - (7) enable productive failure
    - (8) promote user-driven inquiry
    - (9) while counting as rigorous and reliable tools

- Critical reflection on AM-Smart platforms, however, reveals considerable unevenness in these design features, which hamper their effectiveness.

- A rigorous research agenda is vital.

- **PURPOSE OF SESSION**

- introduce this newly emerging field,
- provide an example by exploring the COMPLEX-IT platform
- explore with attendees how to critically engage and develop new smart methods for social science and health research.

## ACKNOWLEDGEMENT

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# Approachable modeling and smart methods: a new methods field of study

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To download paper, go to Sociology and Complexity Science Blog

https://sacswebsite.blogspot.com/

# CATALOGING AM-Smart Methods

To gain a basic impression of the field, we did the following.

First, we reviewed the gallery of apps on R Shiny.2 ‘Shiny is an R package that makes it easy to build interactive web apps straight from R. Given its open-source flexibility, a significant number of AM-Smart apps are made using R.

Second, we did a Google search, using such terms as ‘computational modelling and app’ and ‘shiny and machine learning,’ which yielded most platforms we found.

Third, we searched for AM-Smart platforms on the Apple App Store, which were primarily statistical or data management in nature.

Finally, we put out a call on Twitter asking colleagues for examples, to which we received a handful of replies.

# CATALOGING AM-Smart Methods

Two caveats are important to note from our basic review.

First, the majority of AM-Smart platforms are in the natural, engineering and computational sciences and applied mathematics.

Second, we could not find a rigorous AM-Smart platform for qualitative inquiry.

The closest we found were some of the R COMPASSS packages for running qualitative comparative analyses. But these were rather conventional.

The development of qualitative AM-Smart methods could be a major avenue for anyone here today to pursue.

# CATALOGING AM-Smart Methods

Based on our initial survey, we identified a handful of ‘best example’ platforms for social inquiry and, along with them, the nine key design features we listed earlier.

- COMPLEX-IT for computational modelling and data visualization
- Radiant for statistics and machine learning
- JASP for Bayesian statistical modelling
- PRSM for participatory systems mapping
- SAGEMODELER for learning systems dynamics through designing models
- MAIA
- NetLogo for designing and exploring agent-based models
- Cytoscape for modelling complex networks
- ExPanD for visually exploring your data.

- All these platforms are online and include tutorials, datasets, and published examples to explore

# HISTORICAL BACKGROUND

- AM-Smart methods are part of the wider shift in the *knowledge economy*, particularly in the last two decades, toward smart technology.
- Smart technology builds on, extends, and adds to advances in smart environments, ubiquitous computing, smart devices, and the internet of things.
- AM-Smart platforms draw more specifically from two interdisciplinary fields of study: the learning sciences and human-computer interaction.

# HISTORICAL BACKGROUND

- LEARNING SCIENCES
- Support the development of the complex and adaptive skills and knowledge needed for the knowledge economy and smart globalised world in which we now live.
- Extensively studies how computational technologies may be leveraged to support learning

# HISTORICAL BACKGROUND

- HUMAN-COMPUTER INTERACTION
- Interdisciplinary field focused on understanding, designing, and evaluating the interface between people and computational technologies.
- Extensively involved in the development of many types of software, including those dedicated to research methods
- Its integration with the learning sciences to support the development of methods software is less common.

# WHY AM-SMART METHODS?

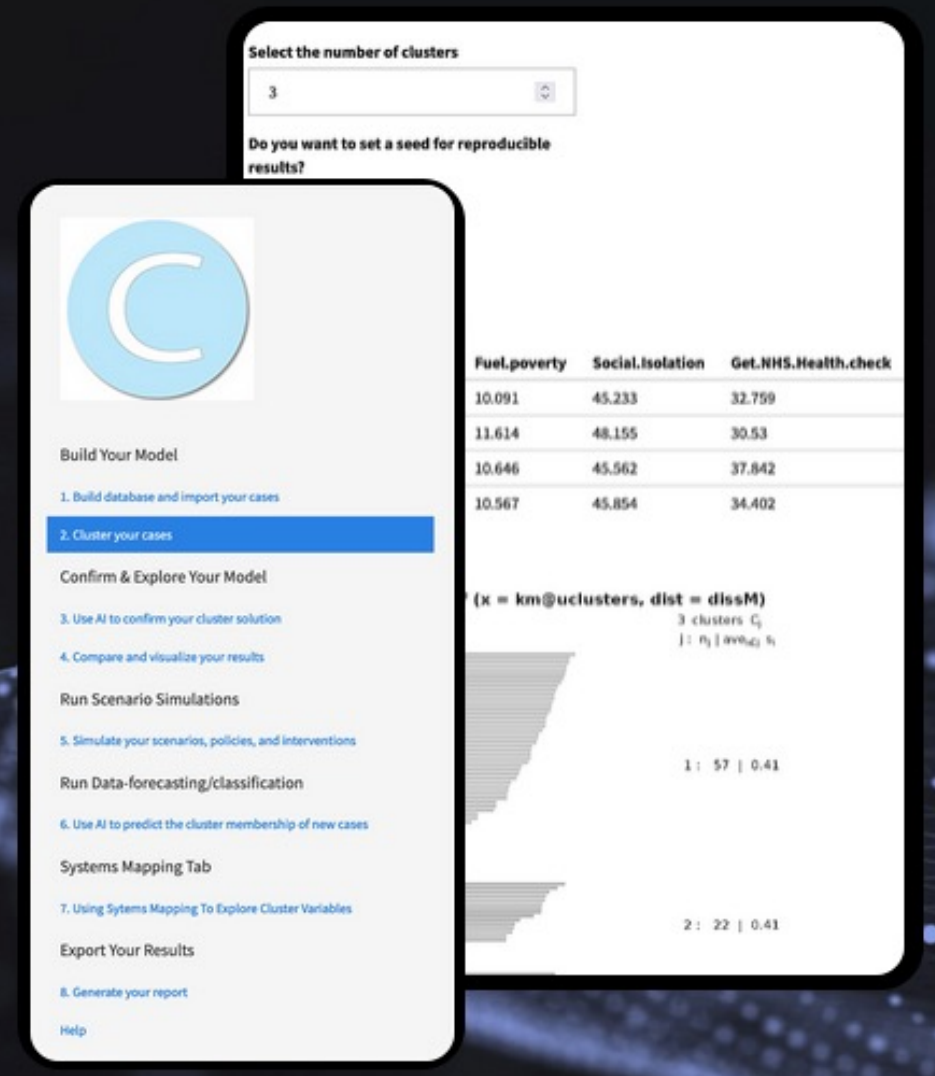
- IN THE SOCIAL SCIENCES, THREE REASONS:
- Massive growth in computational methods.
- Big data and the datafication of everything.
- Complexity and wicked problems.

# COMPLEX-IT

**Run Online or Download for R-Studio**

WEB VERSION

DOWNLOAD VERSION



# COMPLEX-IT

Exploring complex data from a case-based perspective

COMPLEX-IT is a web-based and downloadable software tool designed to increase your access to the tools of computational social science (i.e., artificial intelligence, micro-simulation, predictive analytics). It does this through a user friendly interface, with quick access to introductions on concepts and methods; and with directions to richer detail and information for those who want it.

The result is a seamless and visually intuitive learning environment for exploring your complex data -- from data classification and visualisation to exploring simulated interventions and policy changes to data forecasting.

**You don't need any technical expertise to start using COMPLEX-IT, all that is required is a data set you want to explore, and a curious mind!**

### Build Your Model

1. Build database and import your cases
2. Cluster your cases

### Confirm & Explore Your Model

3. Use AI to confirm your cluster solution
4. Compare and visualise your results

### Run Scenario Simulations

5. Simulate your scenarios, policies, and interventions

### Run Data-forcasting/classification

6. Use AI to predict cluster membership of new cases

### Systems Mapping Tab

7. Use systems mapping to explore causal links in your cluster solution

### Export Results

8. Generate Report

beta version release 2023

COMPLEX-IT **DOWNLOAD VERSION**

COMPLEX-IT **WEB VERSION**

## USER RESOURCES

Video Tutorials
Step-by-step User Guide
Additional Readings

Meet the team


University of Oxford · University at Buffalo, The State University of New York · Durham University · cecan, Centre for the Evaluation of Complexity Across the Nexus · Kent State University Ashtabula

https://www.art-sciencefactory.com/complexit.html

# Challenges

- How do AM-Smart methods impact learning due to the speed at which we they work?
- The value or ramifications of datasets that have not been understood?
- The value of pausing and slow science.
- When is it good to have slow versus fast science?
- In terms of scaffolding how do we make sure of not cutting corners.
- How do we decide what to use based on different context and users and different levels of expertise.
- The importance of co-production.
- How could AM-Smart methods
- Throwing the baby out with the bathwater by critiquing conventional methods without being as critical of AM-Smart method. Are they actually learning what we want them to learn?
- Where is the learning taking place or not taking place?
- Are we smart enough for AM-Smart methods?
- The value of gaming environments for AM-Smart environments?
- This tends to favour fast processing.