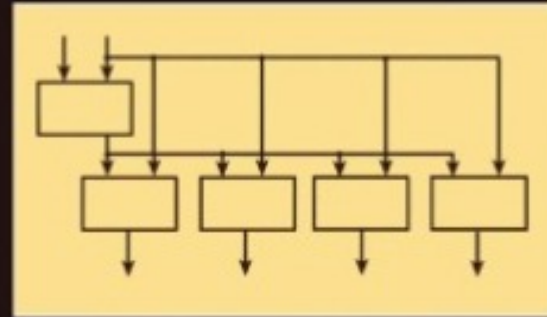


Facets of Systems Science

Second Edition

George J. Klir



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University

O V E R V I E W

- Historical background
- What is an AM-Smart method?
- Core Characteristics of AM-Smart methods
- AM-Smart methods and policy evaluation
- COMPLEX-IT – An example of an AM-Smart method

Approachable Modelling and Smart Methods:

A New Methods Field of Study

Corey Schimpf and Brian Castellani

Abstract

Advances in the integration of smart technology, computational modeling and statistical software has created a new methods genre, *approachable modelling and smart methods* – AM-Smart for short. The AM-Smart platforms are comprised of bespoke tools that facilitate user-driven learning by building expertise into the platform to create an intuitive, supportive, and open-ended environment for complex social inquiry. Unlike statistical platforms, AM-Smart platforms focus on a single technique or small network of interrelated (mostly computational) methods, which help users engage new methods. AM-Smart platforms provide method-specific operational scaffolding, rapid and formative feedback, and which requires modest technical skill while being rigorous and reliable. AM-Smart platforms are designed for applied, interdisciplinary and public sector analysis and researchers new to a method. Examples include R-shiny programmes, statistical and geospatial web apps, online computational modelling and data visualisation tools, and smart phone apps. We introduce readers to the AM-Smart platform genre, ending with a research agenda for the field.

ACKNOWLEDGEMENT

Corey Schimpf



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.

WHAT IS AN AM-SMART METHOD?

- They employ the latest advances in nonconscious machine cognition to create a methods environment in which the method acts as an expert guide for social inquiry.
- **They do this by design:** by allowing users to *cognitively offload* the challenges of running otherwise complex methods, they increase non-expert access to highly novel forms of methods-driven inquiry.
- Expertise is built into the smart technology of the platform.

CORE CHARACTERISTICS

- AM-Smart platforms are *bespoke tools* designed to focus on a single technique or small network of closely interrelated methods (mostly computational in focus)
- This approach helps users to simultaneously use and learn new methods.
- They facilitate methods learning by
 - scaffolding* both routine and difficult tasks,
 - providing *rapid and formative feedback*,
 - leveraging *visual reasoning skills*
 - requiring *modest technical skill*, while still being *rigorous, authentic, and reliable*.

CORE CHARACTERISTICS

- The AM-Smart emphasis on **methodological approachability** is key.
- It allows for a quicker, more seamless and responsive approach to information gathering, analytical execution and, in this case, social inquiry.
- They facilitate *user-driven learning of a topic*, primarily through intuitive, tailored supports within a *no-fault learning environment* designed to solve specific *user-identified tasks*.
- AM-Smart platforms are *mainly designed for applied and public sector analysis* and researchers who are not methods experts.

CORE CHARACTERISTICS

- AM-Smart methods can be stand-alone platforms, downloadable computer programmes or apps on the web.
- They can also be built from existing programming environments (e.g., R or Python) while maintaining a standalone interface.
- AM-Smart tend to embrace the open-source, open-access movement.

EXAMPLES

- *AUTHOR SOFTWARE* for computational modeling and data visualization
- *SOMbrero* for artificial intelligence
- *PRSM* for participatory systems mapping
- *SAGEMODELER* for learning systems dynamics through designing models
- *FactoShiny* for statistical analysis and visualization
- *COMPASS* for comparative methods software

EXAMPLES

- *NetLogo Web* for agent-based models
- *MAIA* for designing multiagent models for institutional analysis
- *Cytoscape* for modeling complex networks
- Several platforms that meet many of the AM-smart attributes but may be less representative on a few attributes including
- *IQAir*, the world's largest real-time, air-quality information platform, including a suite of tools – IQAir Earth, Map, App and AirVisual
- *UK CDRC Mapmaker*, including indices of multiple deprivation
- *Gapminder* for exploring global trends statistically and visually

AM - SMART POLICY EVALUATION

- Most policy makers and analysts in the public and third-sector:
- Are fully aware that the topics they are dealing with today are more and more complex. This is not new information to them.
- They do not have time to learn leading-edge methods.
- They are under pressure to demonstrate impact, cost-efficiency and scalability.
- Looking for no-fault learning environments.
- They are keen to use these new methods if made accessible.
- Somewhat!

The Centre for the
Evaluation of Complexity
Across the Nexus

The image features a vibrant, multi-colored mosaic background composed of small, irregular tiles in shades of blue, red, orange, yellow, green, and white. Overlaid on this mosaic are two large, overlapping circles: a light blue circle on the left and a dark blue circle on the right. The text 'The Complexity Evaluation Toolkit' is centered within the dark blue circle in a bold, white, sans-serif font.

**The
Complexity
Evaluation
Toolkit**

AM-SMART POLICY EVALUATION

- AM-Smart methods often require
- Training
- Follow-up
- Case studies
- Transfer to more sophisticated methods packages



Exploring complex data from a case-based perspective

Build the Model

- 1. Build Database and Import Cases
- 2. Cluster Cases

Test the Model

- 3. The Computer's turn
- 4. Compare and Visualise Results

Extend the Model

- 5. Simulate Interventions
- 6. Predict New Cases

Export Results

- 7. Generate Report

beta version
release 2019

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!



DOWNLOAD
VERSION



WEB
VERSION

USER RESOURCES

- Video Tutorials
- Step-by-step User Guide
- Additional Readings

Meet the team





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 visualize your results](#)

Run Scenario Simulations

5. [Simulate your scenarios, policies, and interventions](#)

Run Data-forecasting/classification

6. [Use AI to predict the cluster membership of new cases](#)

Export Your Results

7. [Generate your report](#)

[Help](#)

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