

Modeling, Simulation, and Analysis: COMPARE

Challenge

Healthcare and possible healthcare reform are important issues for the American public, the healthcare industry, policy analysts, and politicians. However, it is difficult for policymakers in either the public or private sector to *reliably* assess the intended and unintended consequences of such reforms. Until now, it has been practically impossible to have a constructive, objective dialogue about the relative merits of different potential solutions.

Comprehensive Assessment of Reform Efforts (COMPARE)

What is COMPARE?

The RAND Corporation's COMPARE Initiative is a *nonpartisan* attempt to develop and promote the use of analytical tools and methodologies that will help inform the debate on national healthcare policy reform. The ultimate goal of the initiative is to allow decision makers to test whether their plans will meet their stated objectives. Any individual or group that is seriously interested in improving the health care system — including policymakers, political leaders, candidates for Federal and State offices, business leaders, and the American public — should find the results from COMPARE relevant and encouraging.

Argonne's Responsibility

Argonne National Laboratory is assisting RAND by developing the core computer simulation system upon which all COMPARE assessments will be based. We will complete the project by using advanced, Argonne-developed modeling and simulation technologies and by leveraging extensive prior experience in large-scale, multidisciplinary simulation of highly complex dynamic systems — including the diverse, coupled dynamic processes (e.g., clinical, physiological, logistical, fiscal) associated with healthcare.

Approach

By using COMPARE, Argonne will attempt to explicitly represent the entire U.S. healthcare picture, including the characteristics and relevant dynamic behaviors of:

- Federal and state governments and government regulatory agencies;
- Health insurance providers;
- Healthcare providers;
- Employers, with their various benefit packages;
- Individual persons and households, embedded in social networks relating to family, employment, finance, insurance, etc.



Complex dynamics represented in COMPARE

Agent-based Approach

Argonne has extensive, varied experience in employing agent-based modeling and simulation (ABMS), a new approach to support decision makers in private business and government environments. ABMS is used to determine the *system-level* results of complex, interacting, and often conflicting *individual-level* decisions. ABMS of healthcare delivery can provide actionable guidance for decision makers by:

- Enabling healthcare experts to define the individual, agent-level rules of operation;
- Allowing them to see how the agent rules play out over time in a detailed, real-world context;
- Providing them with the tools to assess the consequences of alternative plans; and
- Giving them a clear method for communicating results to the broader stakeholder community.

ABMS helps decision makers understand *macro-level* effects generated by *micro-level* behavior over time.



The diverse stakeholders in the **healthcare system** are represented as “**agents**.” All agents can have their own set of objectives, decision-making rules, and behavioral patterns. An **agent** can learn with time and change its character attributes or follow the group behavior of its kind.

Why Argonne?

Argonne National Laboratory is one of the U.S. Department of Energy’s largest research and development centers. As the nation’s first national laboratory, Argonne combines scientific research and applied engineering techniques across a wide spectrum of disciplines, such as high-energy physics, climatology, biotechnology, modeling and simulation, and visualization. Argonne leverages its science and engineering leadership to support the needs of private industry and public organizations. Today, the laboratory has 21 research divisions, including the Decision and Information Sciences Division.

The Decision and Information Sciences (DIS) Division is focused on providing tools to assist decision makers in making informed choices that consider evolving information, increasing complexity, and continuing uncertainty. DIS employs 330 professionals, including 242 scientists and engineers, holding more than 160 doctorate or other advanced degrees. With an annual budget of more than \$55 million, DIS supports more than 200 research programs for governmental and non-governmental organizations. DIS’ staff of engineers, scientists, software developers, operations researchers, economists, sociologists, political scientists, and lawyers work together to develop tools designed to be useful, usable, and used.

Learn more about COMPARE and other Argonne-developed models at:

<http://www.dis.anl.gov/>

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