INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

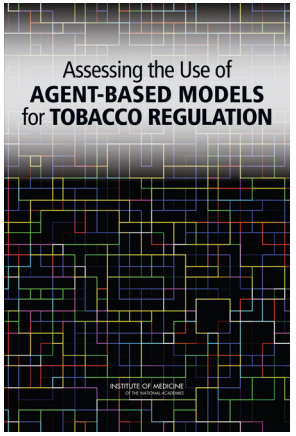
Assessing the Use of Agent-Based Models for Tobacco Regulation

An Evaluation Framework for Policy-Relevant Agent-Based Models

Agent-based computational models (ABMs) examine how individual elements, or agents, of a system behave as a function of individual characteristics, the environment, and interactions with each other. Each agent interacts with other agents based on a set of rules and within an environment specified by the modeler, which leads to a set of specific aggregate outcomes, some of which may be unexpected. With these capabilities, ABMs have the potential to provide a deeper understanding of complex behaviors and interactions of diverse individuals and their environment, and to inform policy making.

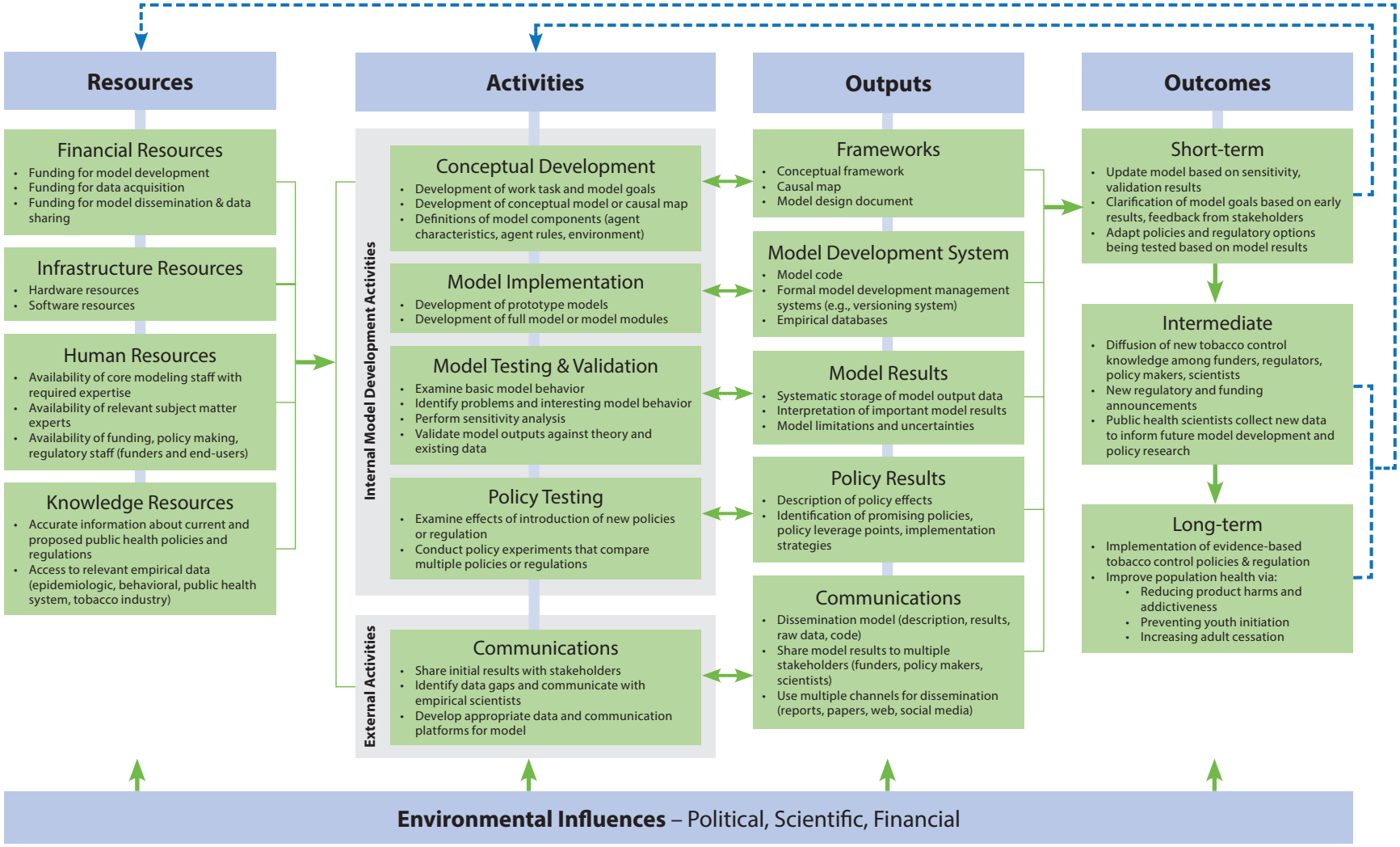
Since 2009, the U.S. Food and Drug Administration (FDA) has had broad regulatory authority over tobacco products and has used models as one tool to guide policy. FDA asked the Institute of Medicine (IOM) to convene a committee of experts to provide guidance on using ABMs to inform decision making for tobacco control policy. The resulting report, *Assessing the Use of Agent-Based Models for Tobacco Regulation*, describes the complex tobacco environment and provides key recommendations for policy makers and modelers to consider when developing ABMs. The committee also recommends a formal process to guide rigorous model development and evaluation.

This document highlights the five major categories of the evaluation framework, which were developed by the committee based on best practices identified in a number of modeling fields across disciplines. A figure showing the framework is on the reverse side of this document.



RESOURCES	ACTIVITIES	OUTPUTS	OUTCOMES	ENVIRONMENT
Policy-relevant ABMs are resource-intensive, requiring both financial and human resources. These resources include access to the relevant subject matter experts, data, and other infrastructure to inform the model. Appropriate resources are also needed to disseminate model findings.	The relevant social and behavioral processes need to be captured meaningfully. Relevant data should inform policy-relevant ABMs throughout the modeling process. For those data that are not available, regulatory agencies like FDA should help identify and collect these data. Subject matter experts are needed throughout the model development process, from deciding which modeling approaches are appropriate for the question at hand to interpreting and communicating model results.	The outputs from the conceptual development stage may include causal maps, conceptual frameworks, and the general model design document. The model results include agent- and aggregate-level data as well as the statistical analyses of these data. To ensure that decision makers understand the scope of the model and properly apply the modeling results, the documentation of this model's limitations and uncertainties is an important output.	Comparing the results of a policy-relevant ABM with other types of ABMs or other types of models that approach the same question would increase the policy makers' confidence in the model results. Policy makers need to work with model developers and subject matter experts to make changes to the model based on newly available data, and to decide how to apply the model for short- and long-term use. The ultimate utility of the model rests on the extent to which model results have influenced policy and led to improved population health.	Changes in the environment, such as policy priorities, may influence model development. These external factors are typically not the focus of an evaluation, but the evaluator needs to be aware of these influences so that the evaluation results and conclusions can be put into the appropriate context.

Figure 1: An Evaluation Framework for Policy-Relevant Agent-Based Models



NOTE: Chapter 4 of the report provides additional detail about each category as well as sample evaluation questions for these categories.

For more information, visit **www.iom.edu/TobaccoModeling**

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