

# Generic logic models for research, technology development, deployment, and innovation

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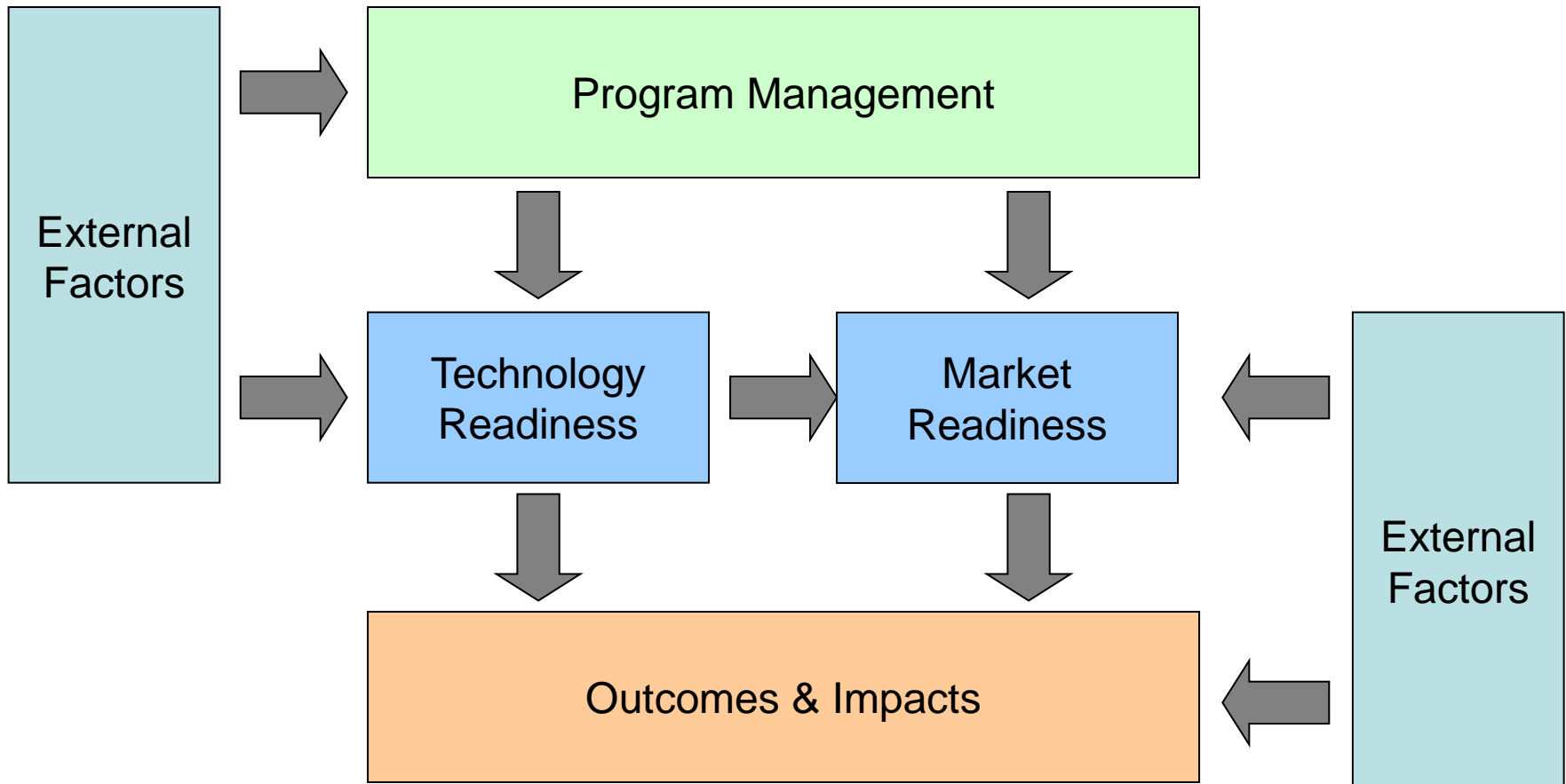
# **Example 1. Research, Technology/ Development and Deployment Programs**

## **U.S. DOE Energy Efficiency and Renewable Energy (EERE) 2007**

Jordan, G. and J. Mortensen. Logic Models for a Diverse Portfolio of Research, Technology, and Deployment Programs, Presentation at American Evaluation Association Annual Conference, November 8, 2007  
<http://comm.eval.org/researchtechnologyanddevelopmenteval/tigresources/new-item/new-item2#AEARTD2007>

# Example 1. U.S. DOE EERE Proposed measurement framework includes 5 inter-related areas that will provide useful data

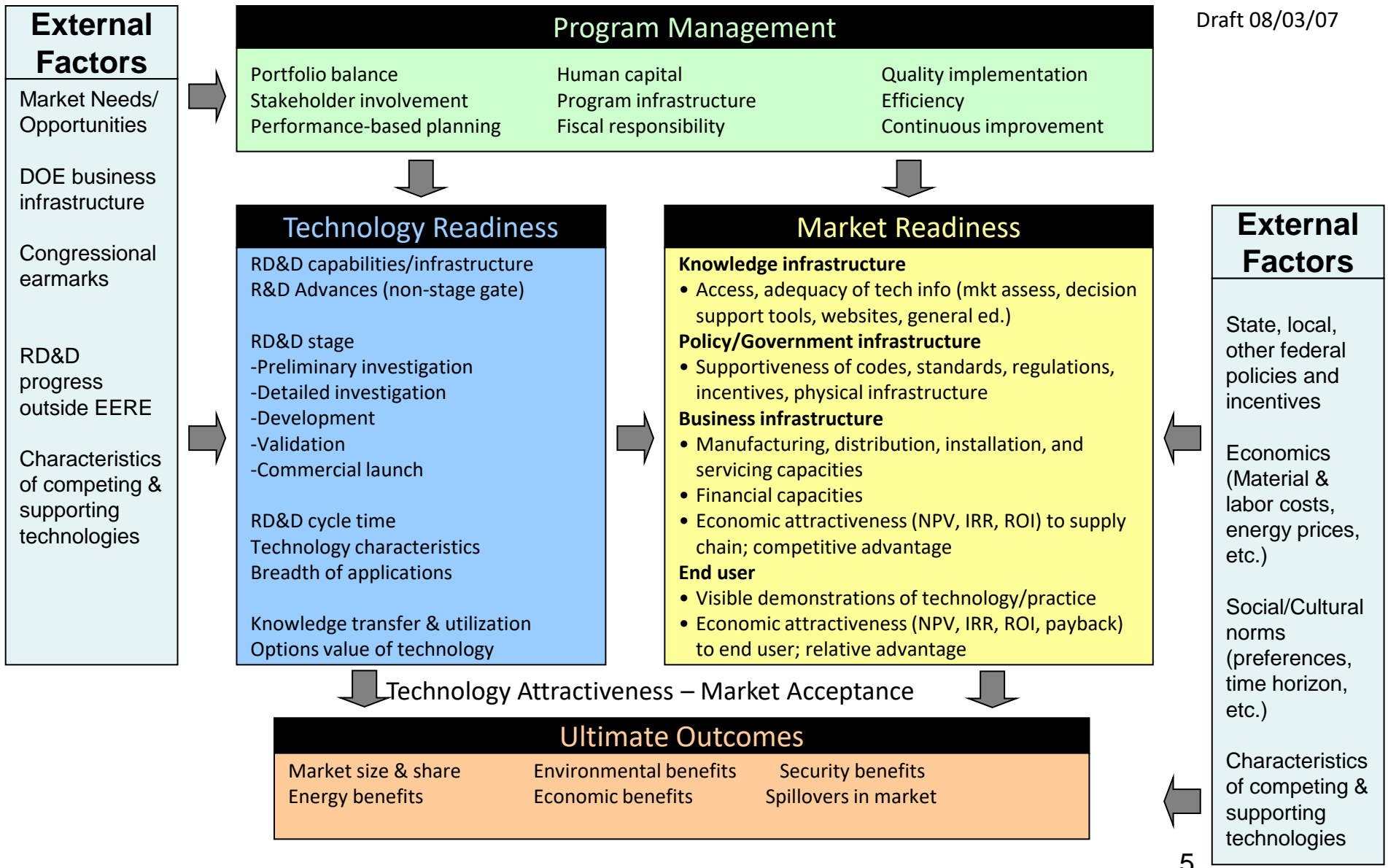
Draft 08/03/07



(Feedback loops not shown)

# Example 1. Proposed Generic Measures for U.S. DOE/EERE categorize R&D and market readiness

Draft 08/03/07



## **Example 2.**

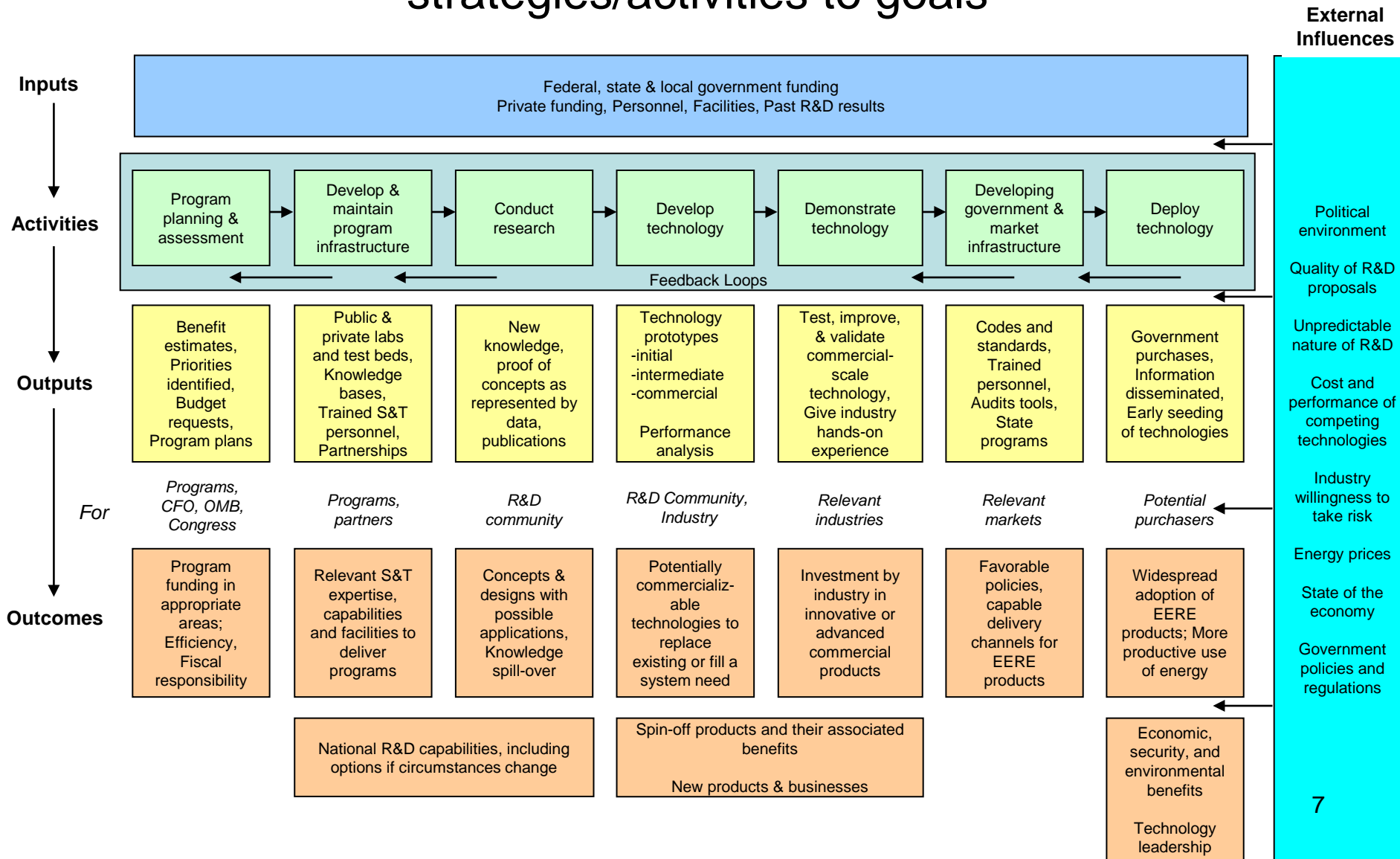
# **Research, Technology/ Development and Deployment Programs**

## **U.S. DOE Energy Efficiency and Renewable Energy (EERE) 2004**

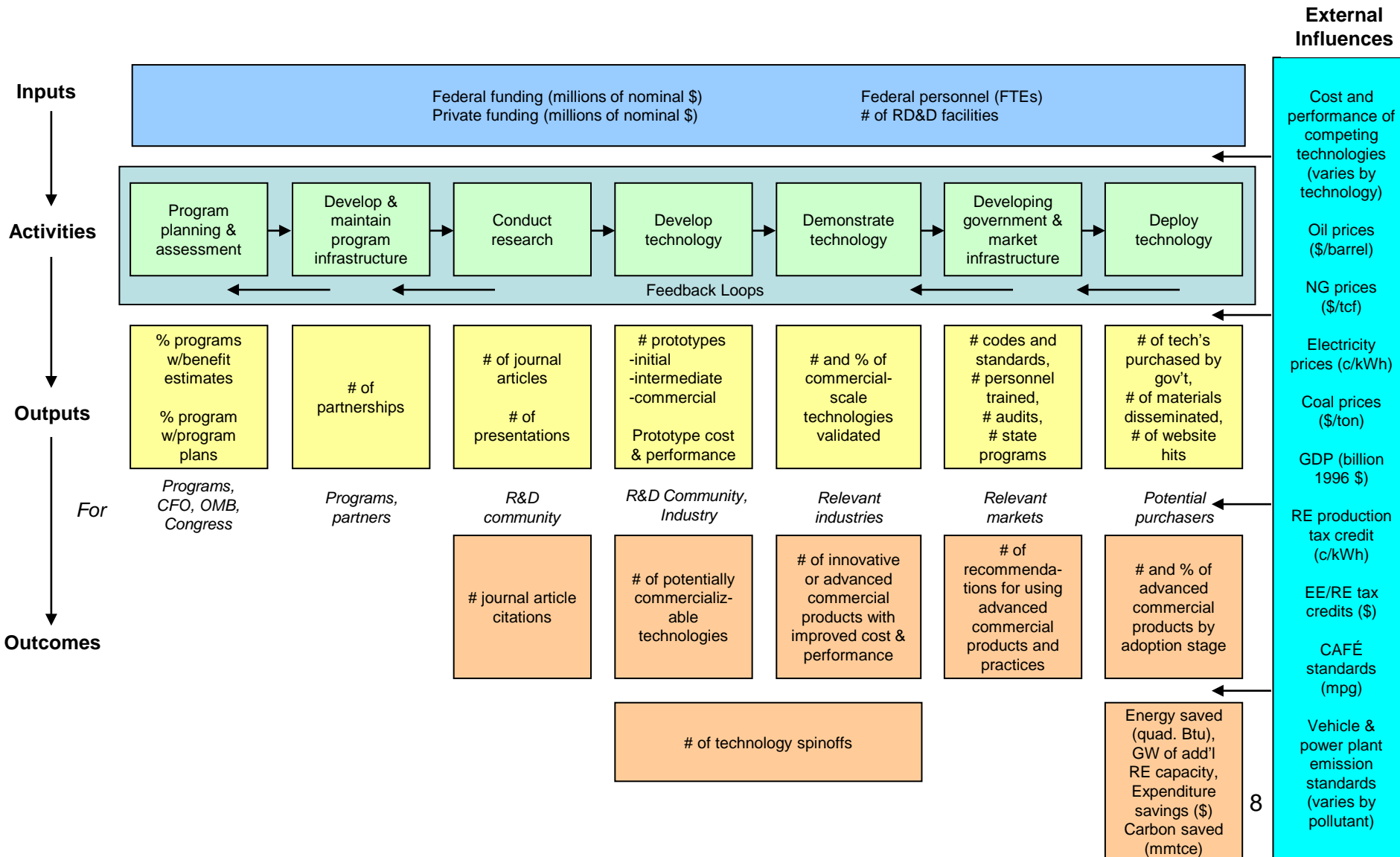
Jordan, G., John Mortensen, John Reed, George Teather. Using Logic Models in Managing Performance of Research and Technology Programs, IAMOT 13<sup>th</sup> International Conference on Management of Technology, April 4, 2004

(2004)

# Example 2: EERE's draft logic model links strategies/activities to goals



(2004) Example 2: Each box in the logic model is a potential measurement area





# **Example 3. Research, Technology/ Development and Deployment Programs**

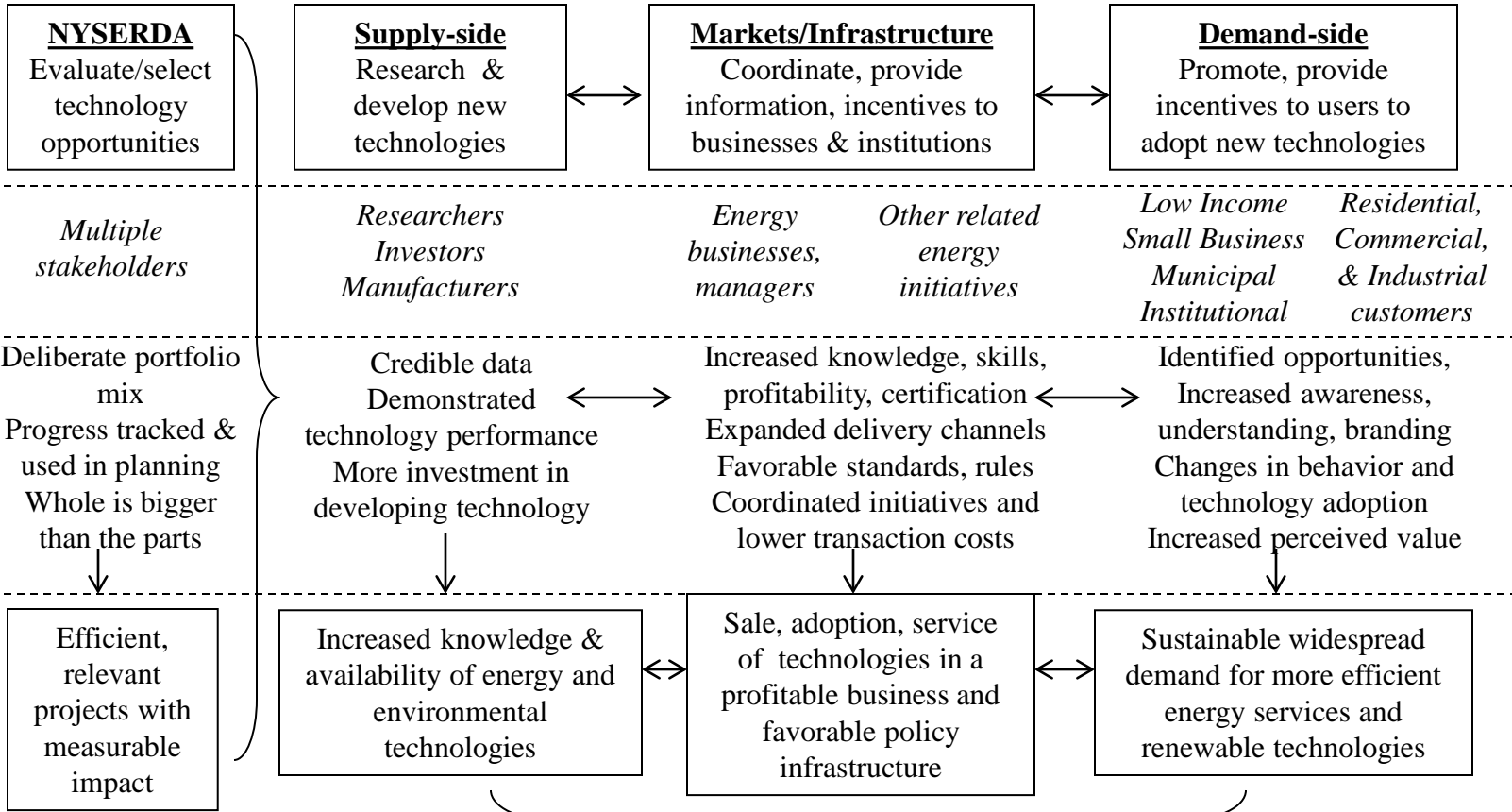
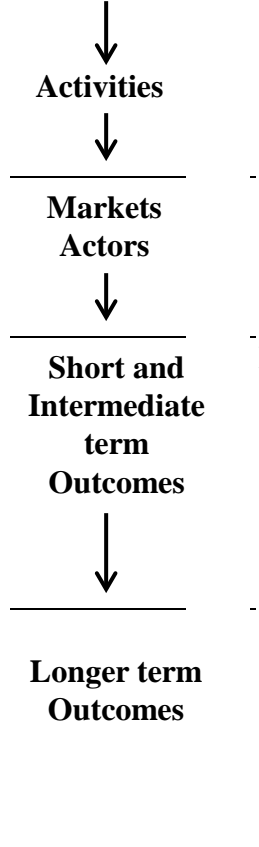
## **New York Energy R&D Authority**

Albert, Scott, Victoria S. Engel, Gretchen Jordan, Lori Megdal, Jane Peters, 2004. Using Program Theory And Logic To Improve Design and Likelihood of Real Market Change - Experience With A State Public Benefits Program,” accepted for presentation and publication at the ACEEE Annual Summer Buildings Study. [http://aceee.org/files/proceedings/2004/data/papers/SS04\\_Panel6\\_Paper01.pdf](http://aceee.org/files/proceedings/2004/data/papers/SS04_Panel6_Paper01.pdf)

# New York Energy \$mart<sup>SM</sup> Portfolio Basic Logic

DRAFT  
3/25/2004

**Inputs:**  
Funds, staff, allies,  
market knowledge



**Public Benefits**

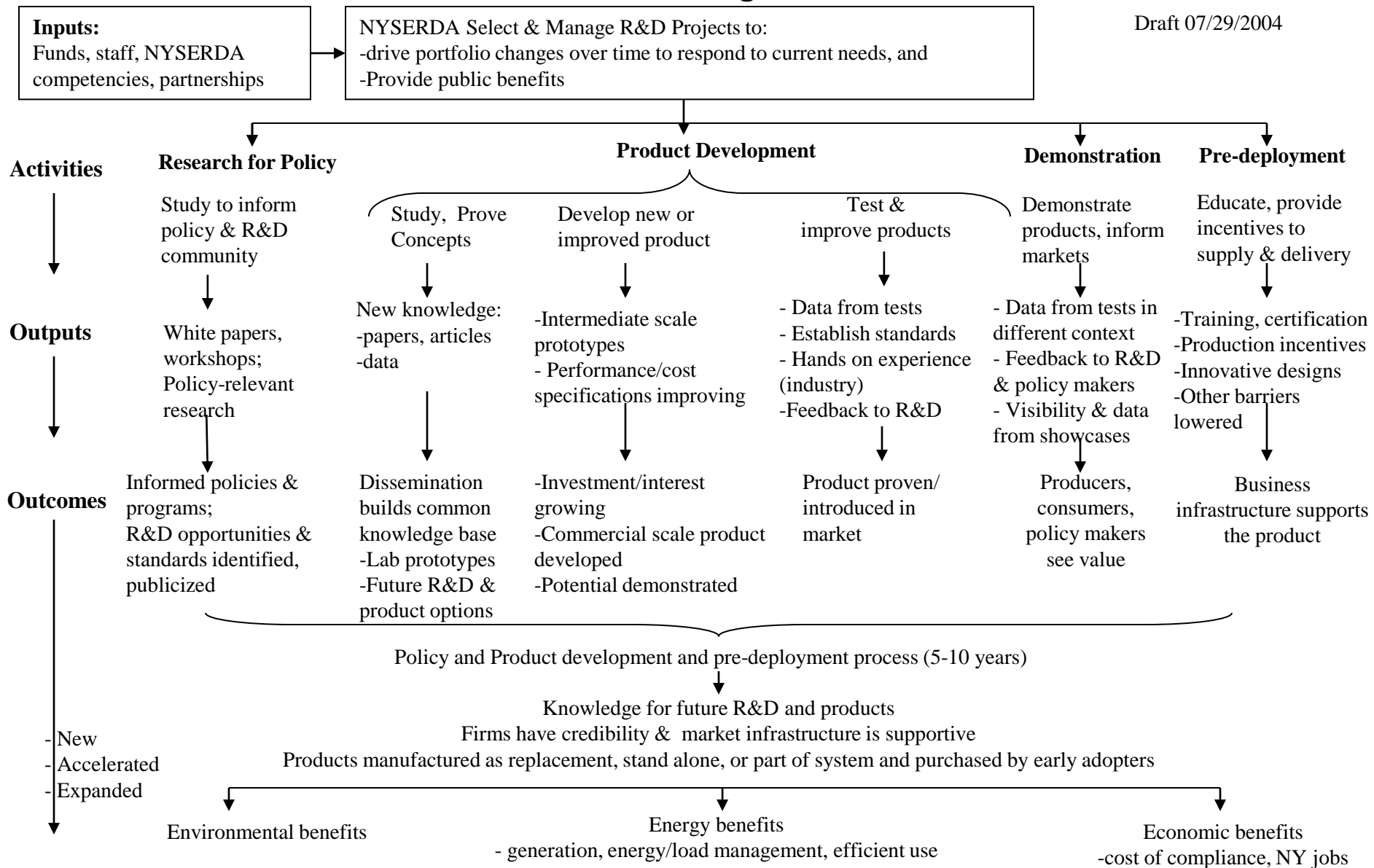
Reduced energy use for all customer sectors	Increased system reliability and reduced peak load
Reduced environmental impact of energy production and use	Increased competition and consumers and businesses saved money

**External Influences:**

Economic realities impacting new investment in technologies & energy improvements in some sectors, energy prices, effect of changing political climates, legislation & regulation, cost & performance changes in technologies that support or compete with those targeted by NYSERDA, existence and activities of numerous other public & non-profit organizations promoting similar objectives

# NYSERDA R&D Logic - DRAFT

Draft 07/29/2004



**External Influences:**

Cost, Performance of existing technologies; Industry willingness to take risks; Uncertainty of R&D; Energy prices; Government policies

# Example 4.

## Logic of Technology (or Practice) Deployment (Diffusion in Market)

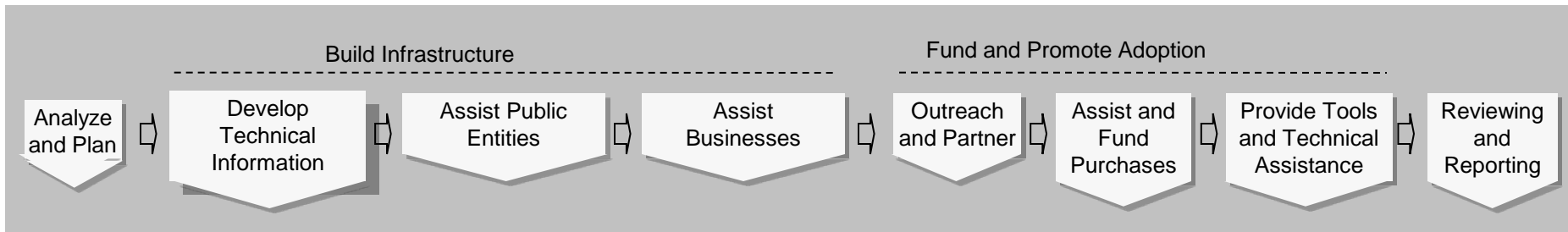
Reed, John H., and Gretchen Jordan. 2007. Impact Evaluation Framework for Technology Deployment Programs, U.S. DOE, July.

[http://www1.eere.energy.gov/analysis/pdfs/impact\\_framework\\_tech\\_deploy\\_2007\\_main.pdf](http://www1.eere.energy.gov/analysis/pdfs/impact_framework_tech_deploy_2007_main.pdf)

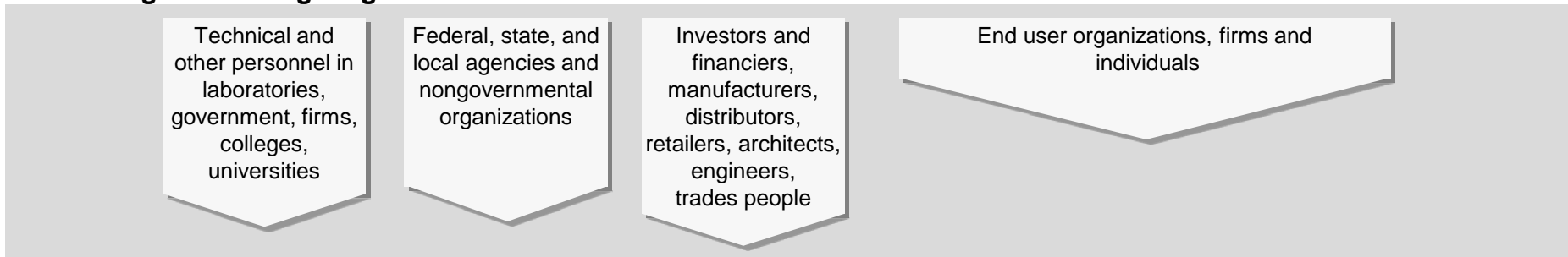
See also

Reed, John H, G. Jordan. 2007. Using Systems Theory and Logic Models to Define Integrated Outcomes and Performance Measures in Multi-program Settings, in *Research Evaluation*, Volume 16 Number 3 September.

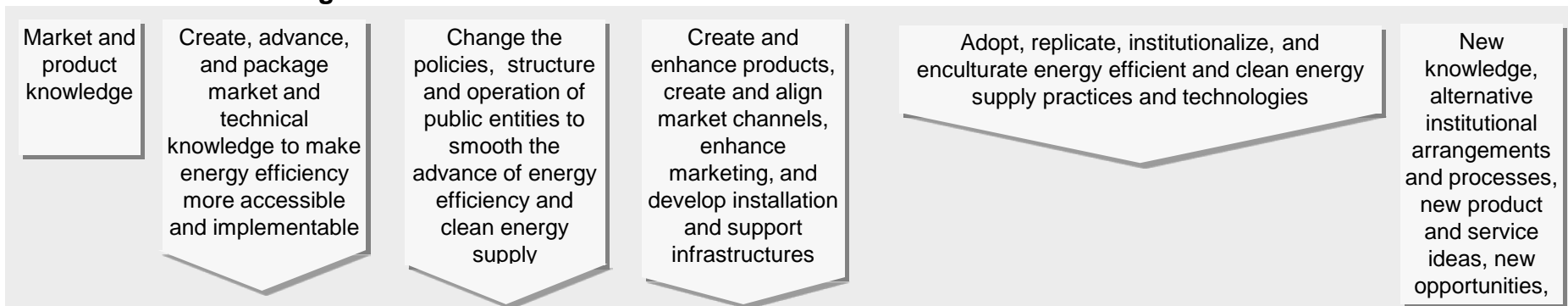
## EERE deployment programs typically undertake these activities



## Partnering with or targeting these audiences



## To achieve the following intermediate outcomes

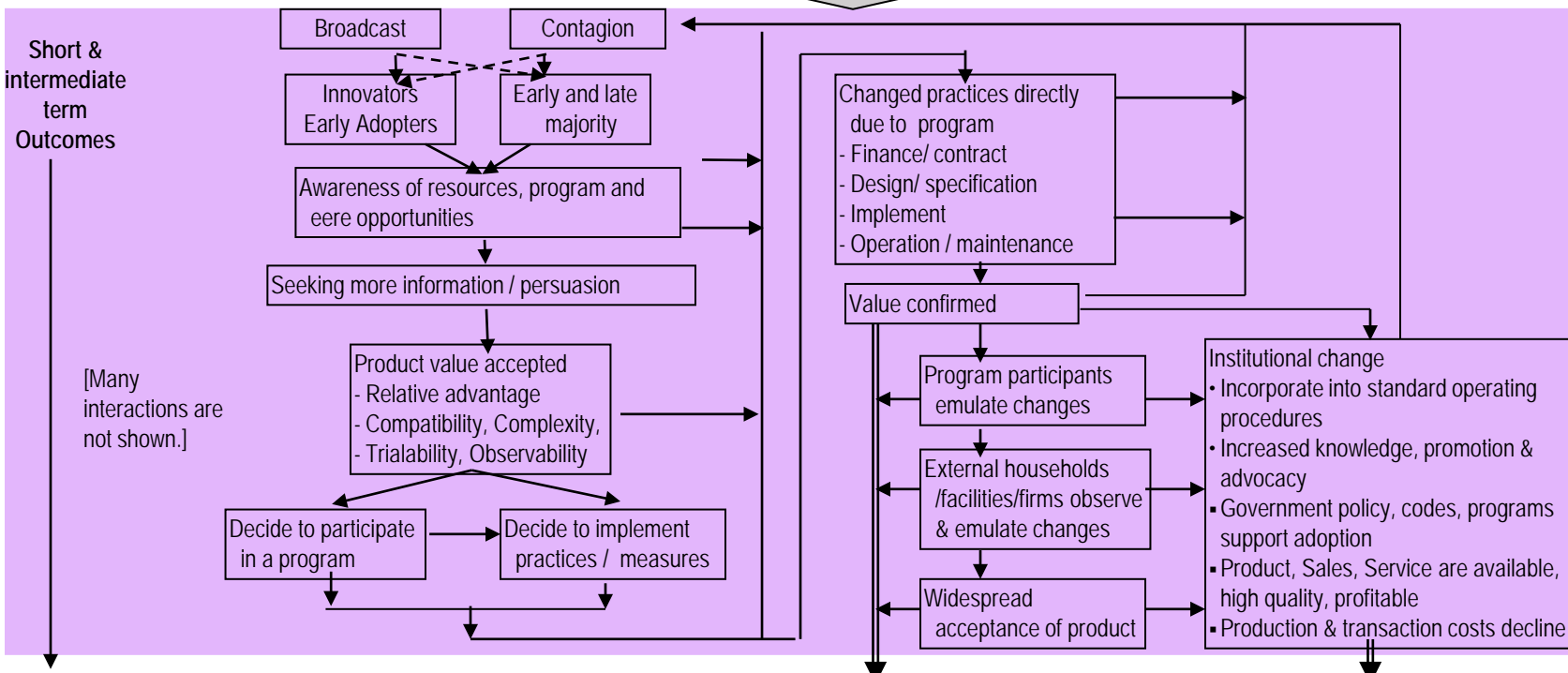
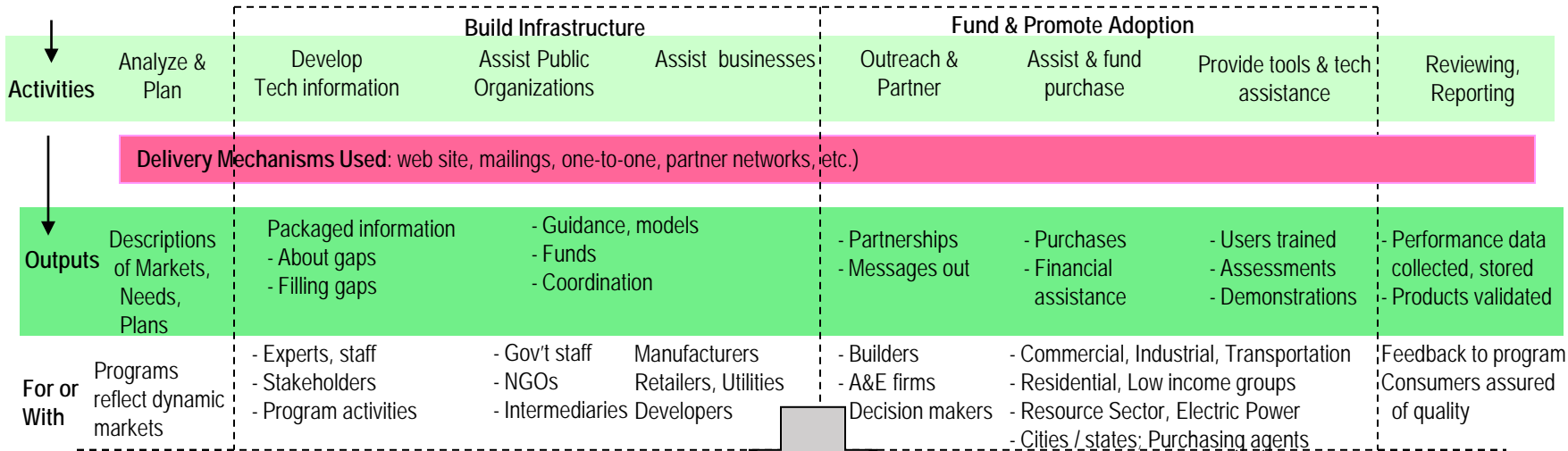


## That produce the following long-term outcomes or impacts

Reduced energy use and emissions, increased clean energy supply, and enhanced productivity and global security

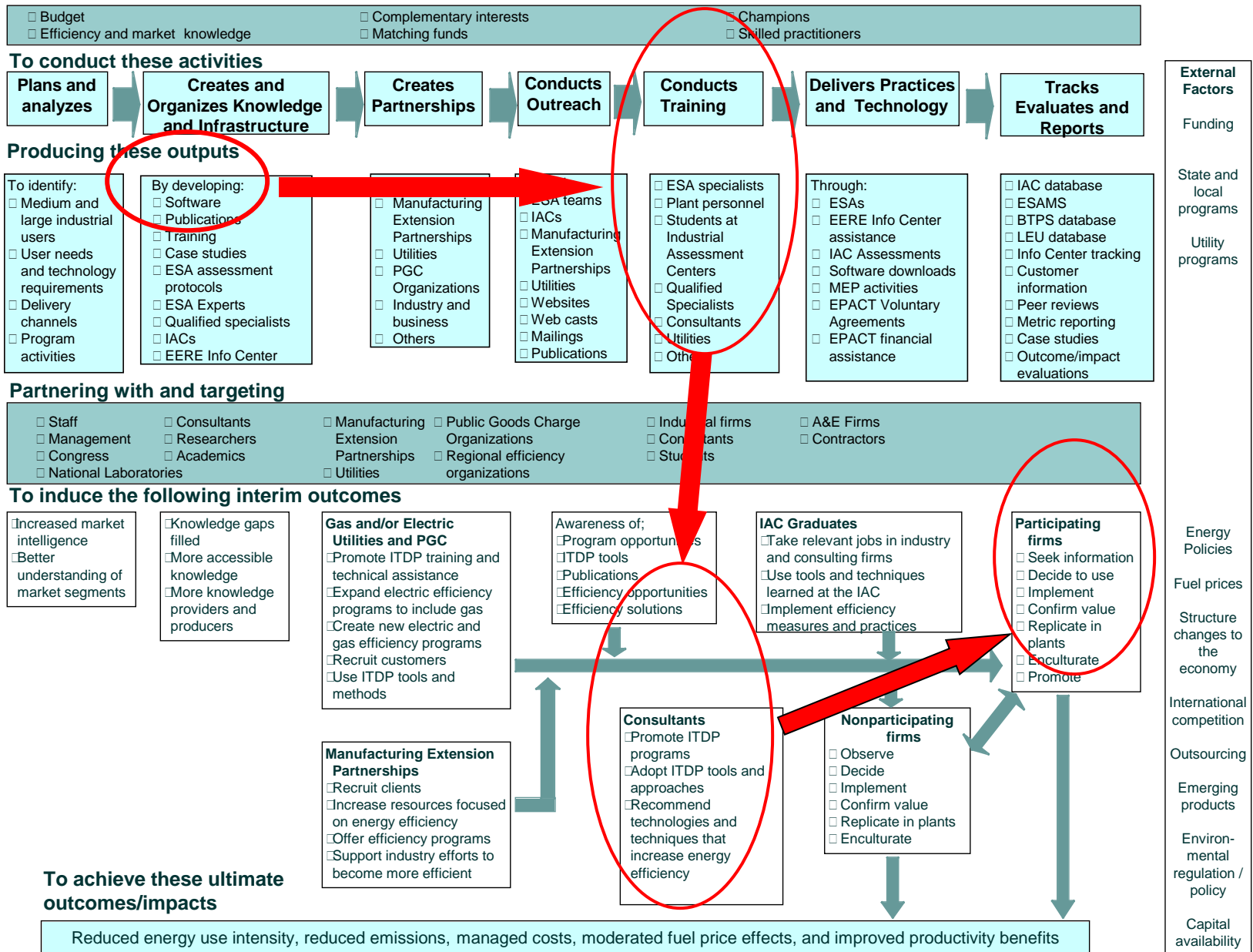
# Generic Logic of Federal Technology Demonstration and Deployment Programs

**Inputs:** Federal funds, staff, state & local funds & staff, existing technologies, partnerships



**Ultimate Outcomes** Energy Saved; Clean Energy Used Sustained Changes in Markets Serving underserved, energy security, other non-economic benefits

# A detailed deployment logic model



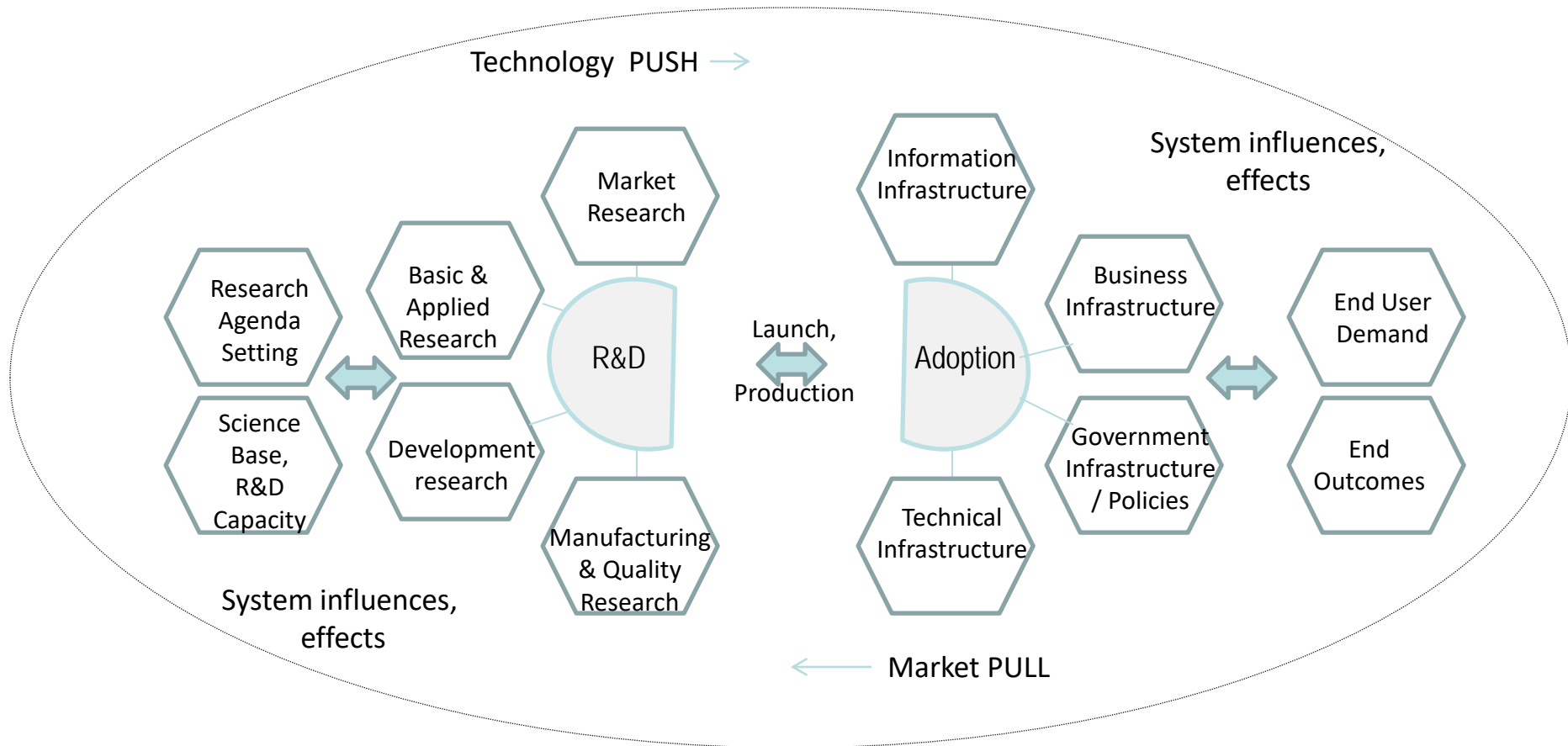
# **Example 5.**

## **Logic of Innovation (R&D, Launch and Market Uptake)**

Jordan, G. 2010. A Theory-Based Logic Model for Innovation Policy and Evaluation, *Research Evaluation*, 19(4), October 2010, 263-274.

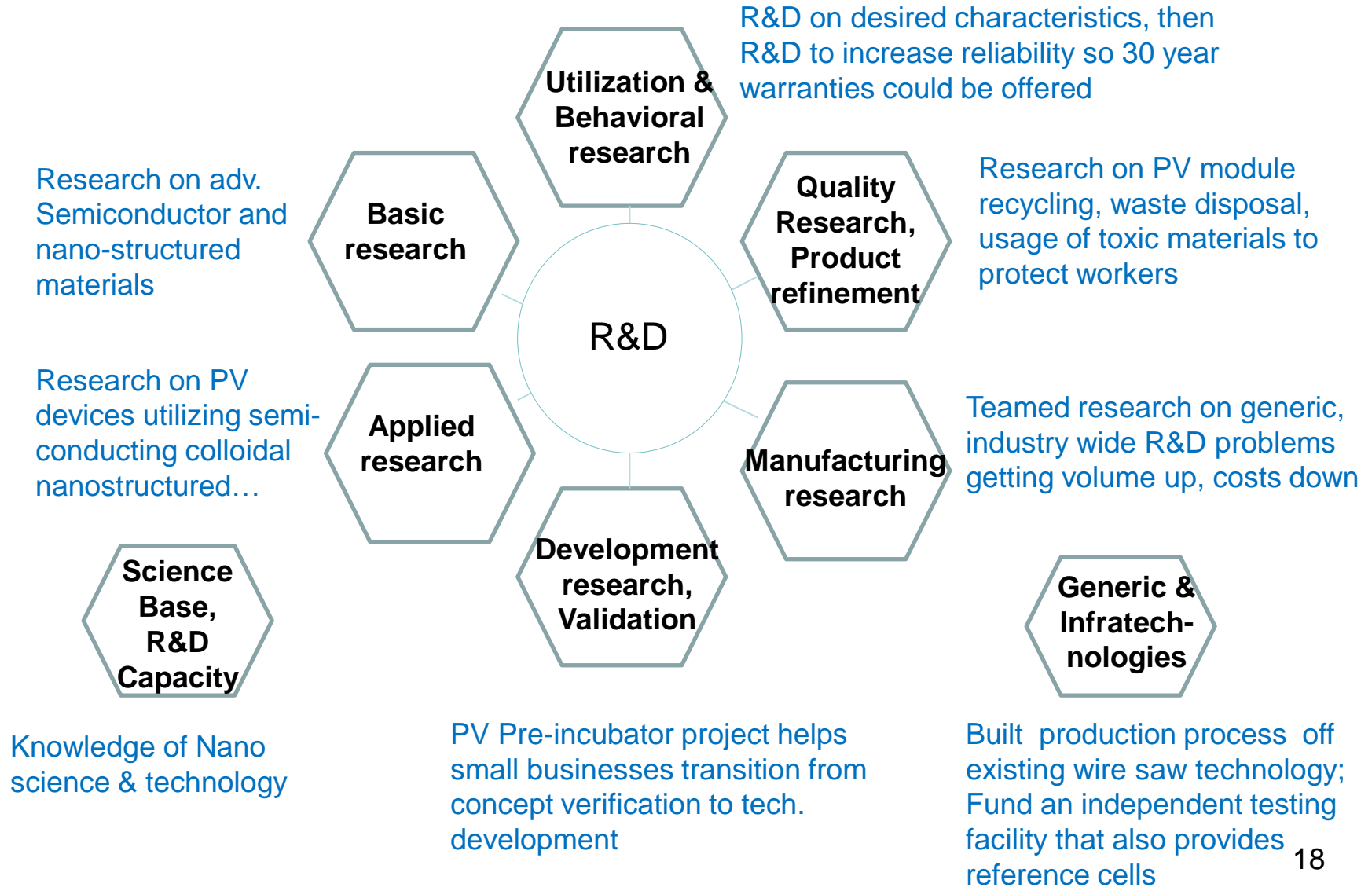


# Example 5. A Systems Logic Model of the R&D to Adoption Life Cycle



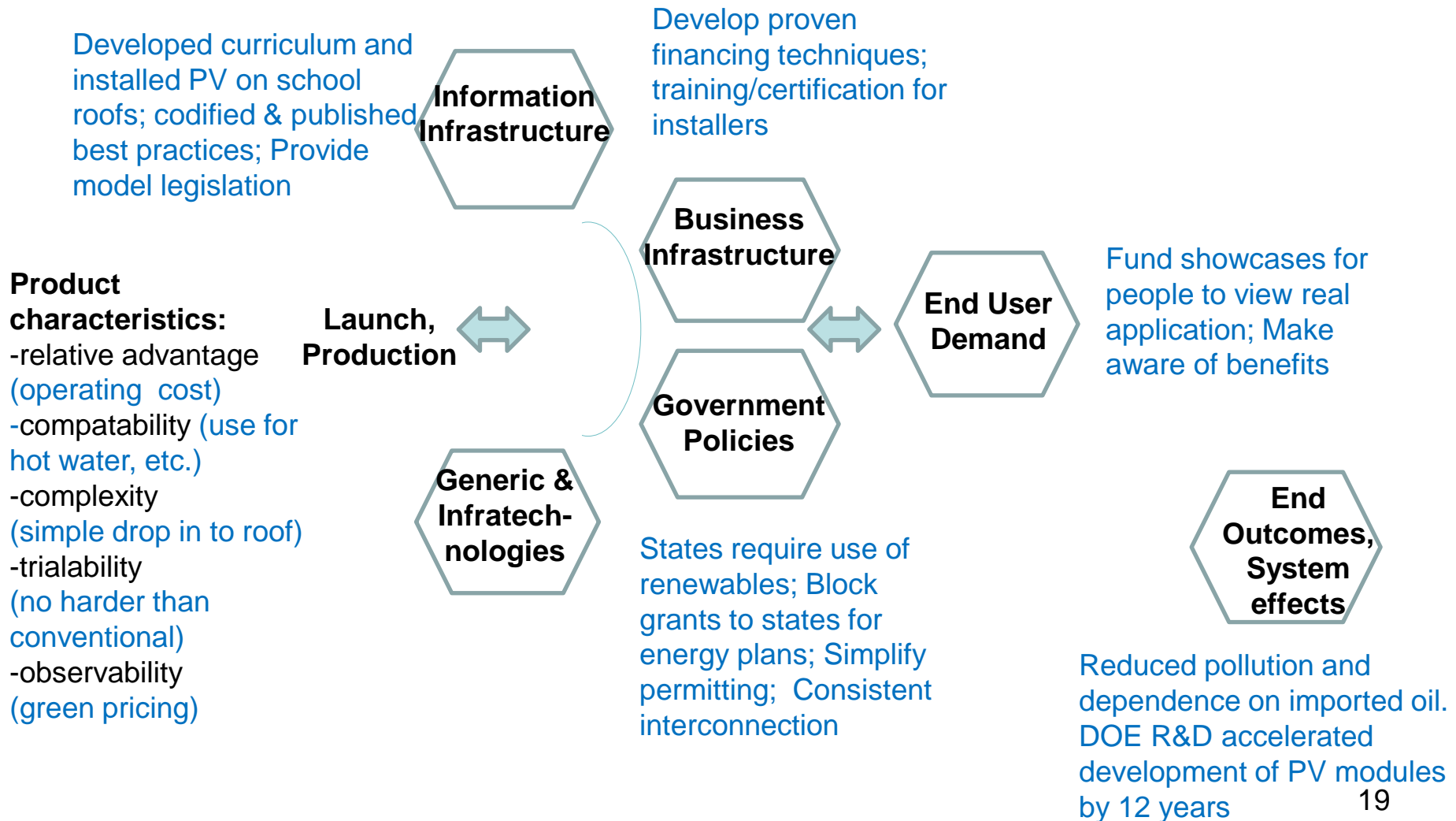
# Example 5: DOE Renewable Energy

## Do these groups transfer knowledge?



# Example 5: DOE Renewable Energy

## Do these groups transfer knowledge?



# Example 6.

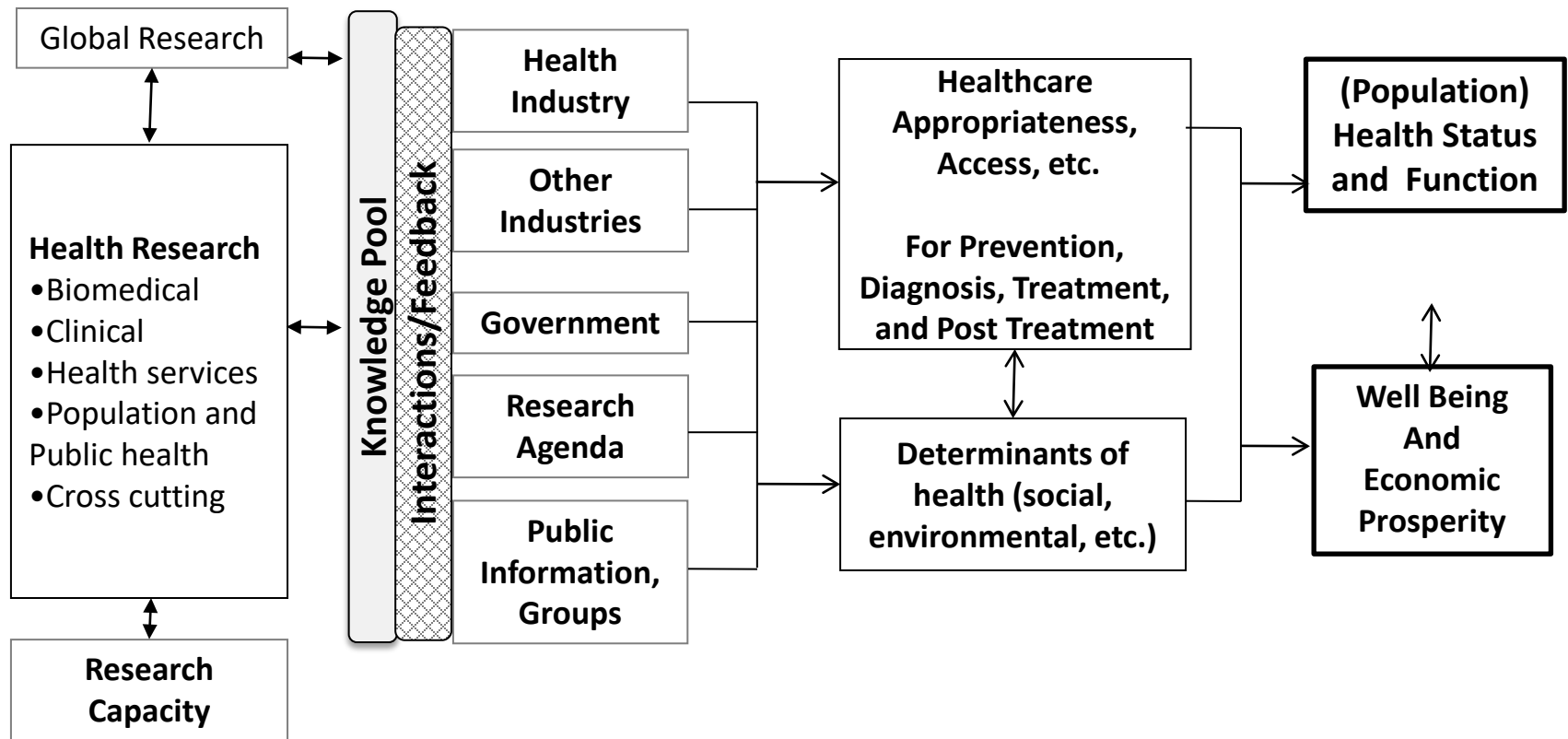
## Impacts of Health Research – Canadian Academy of Health Sciences Framework

Canadian Academy of Health Sciences, Panel on Return on Investment in Health Research. (2009). *Making an impact: A preferred framework and indicators to measure returns on investment in health research*. Ottawa (ON), Canada: Canadian Academy of Health Sciences (CAHS). Retrieved from: [http://www.cahs-acss.ca/wp-content/uploads/2011/09/ROI\\_FullReport.pdf](http://www.cahs-acss.ca/wp-content/uploads/2011/09/ROI_FullReport.pdf)

See also

Graham KER, Chorzempa HL, Valentine PA, Magnan J. . (2012).Evaluating health research impact: Development and implementation of the Alberta Innovates – Health Solutions impact framework. *Research Evaluation*,21(5):354-367.

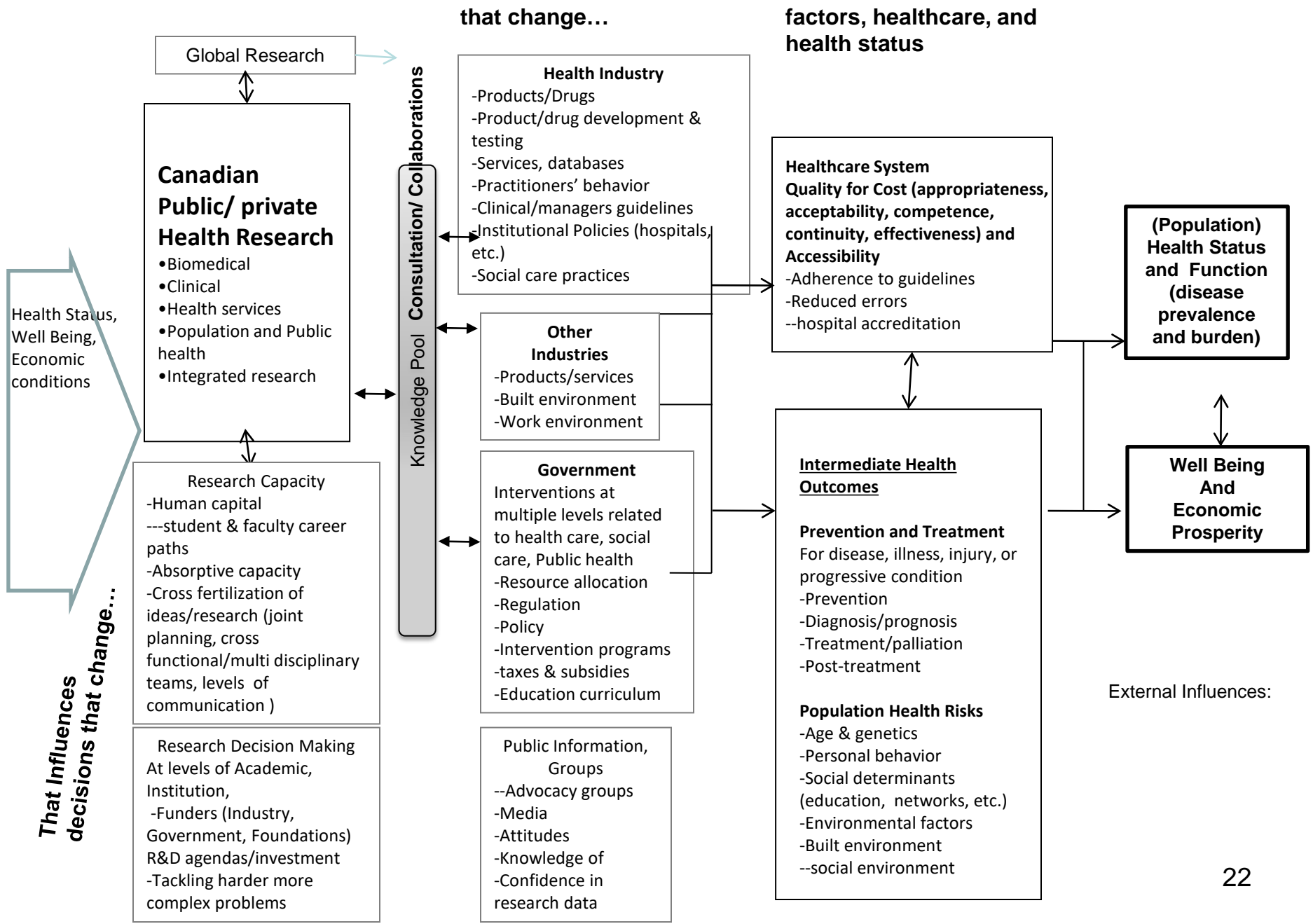
# Example 6: The Canadian Academy of Health Sciences Logical Framework for Understanding the Impacts of Health Research



Modified from CAHS Report on ROI for Health research available at [www.cahs-acss.ca/making-an-impact-a-preferred-framework-and-ind...](http://www.cahs-acss.ca/making-an-impact-a-preferred-framework-and-ind...)

# Example 6: Detail

Research results...

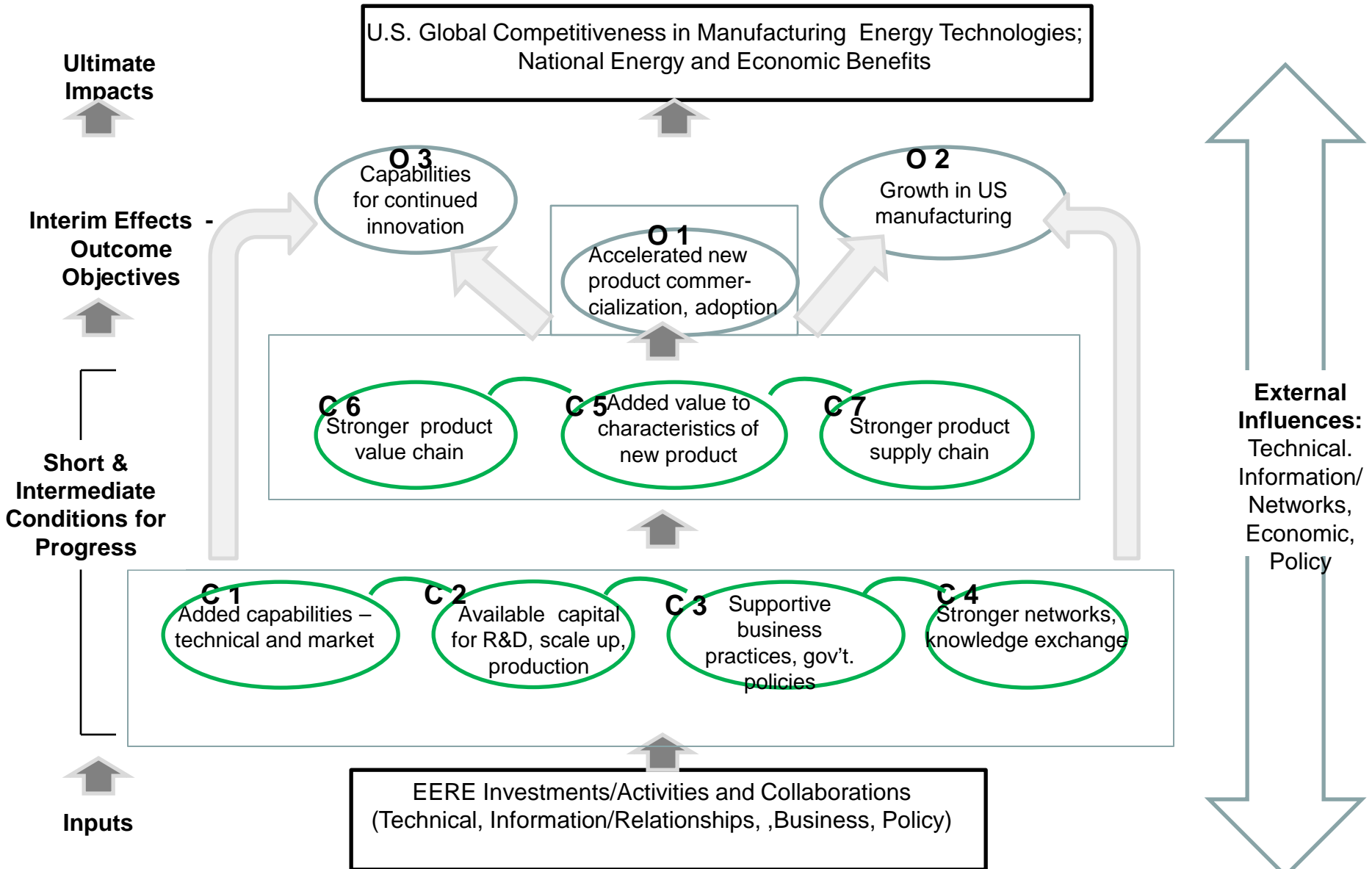


# **Example 7.**

## **Logic of Accelerating Technology Introduction in U.S. Supply Chains**

Jordan, Gretchen, Jonathan Mote, Rosalie Ruegg, Thomas Choi, and Angela Becker-Dippmann. 2014. A Framework for Evaluating R&D Impacts and Supply Chain Dynamics Early in a Product Life Cycle: Looking inside the black box of innovation, prepared for the U.S. Department of Energy. [http://www1.eere.energy.gov/analysis/pdfs/evaluating\\_rd\\_impacts\\_supply\\_chain\\_dynamics.pdf](http://www1.eere.energy.gov/analysis/pdfs/evaluating_rd_impacts_supply_chain_dynamics.pdf)

# A Framework for Assessing Accelerated Product Innovation, Manufacturing, Early Market Growth





# Detailed Logic of Accelerating Technology Introduction in U.S. Supply Chains

**U.S. Global Competitiveness in Manufacturing Energy Technologies;  
National Energy and Economic Benefits**

**Capabilities for Continuing Innovation**  
Intellectual property captured in an area.  
Technical leadership in the area.  
Companies and universities strong in R&D.  
R&D infrastructure, knowledge diffusion.  
Favorable standards, regulations.  
Leverage capital available at multiple points.  
Proximity of R&D, firms, collective action.

**Accelerated Commercialization, Adoption**  
New products, features available, including energy efficient, environment friendly; measure of their value added.  
New production features available (e.g., mobile, flexible, lower costs of transport).  
Faster time to development, market.

**Growth in U.S. Manufacturing**  
Domestic production of components, end products in a supply chain.  
Increased production due to advantages of using a new process.  
Emergence of new markets where U.S. firms are competitive.  
Sales, employment, market share.

**Stronger Product Value Chain**  
-small businesses are involved  
-challenges such as retooling met  
-new business models adopted  
-firms add to/modify product line

**Added Value to a New Product or Process**  
-adaptation of existing, scale up, volume  
-new, improved performance, -cost, compatibility

**Stronger Supply Chain**  
-incentives to enter, to stay  
-market, customer orientation  
-maturity, ability to deliver, on time  
-flexibility, adaptability, robustness

**Added Technical & Market Capabilities**  
-existing research, tools, techniques  
-technical challenges solved  
-standards, test facilities,  
-market knowledge, strategies.

**Availability of Capital at Multiple Stages**  
-able to raise private capital; use user facilities  
-early adoption by government

**Supportive Business Practices, Policies**  
-appropriate focus, network connections  
-remaining flexible  
-checking potential market regularly  
-favorable policies (tax, regulation)

**Stronger Networks, Knowledge Exchange**  
-connectedness within value chain (e.g., with sources of capabilities), in Supply Chains  
-network characteristics (strategic partnerships, structure, ties, roles)

**Technical**  
Fund R&D & test facilities.  
Develop & provide measurement tools.

**Business**  
Support validation, demonstration.  
Co fund start up firms, production facilities.

**Government**  
Supportive standards, government policy.  
Government procurement (early adopter).

**Information/Relationships**  
Provide technical/ market analysis, databases.  
Facilitate networking, public-private partnership.

Ultimate Impacts

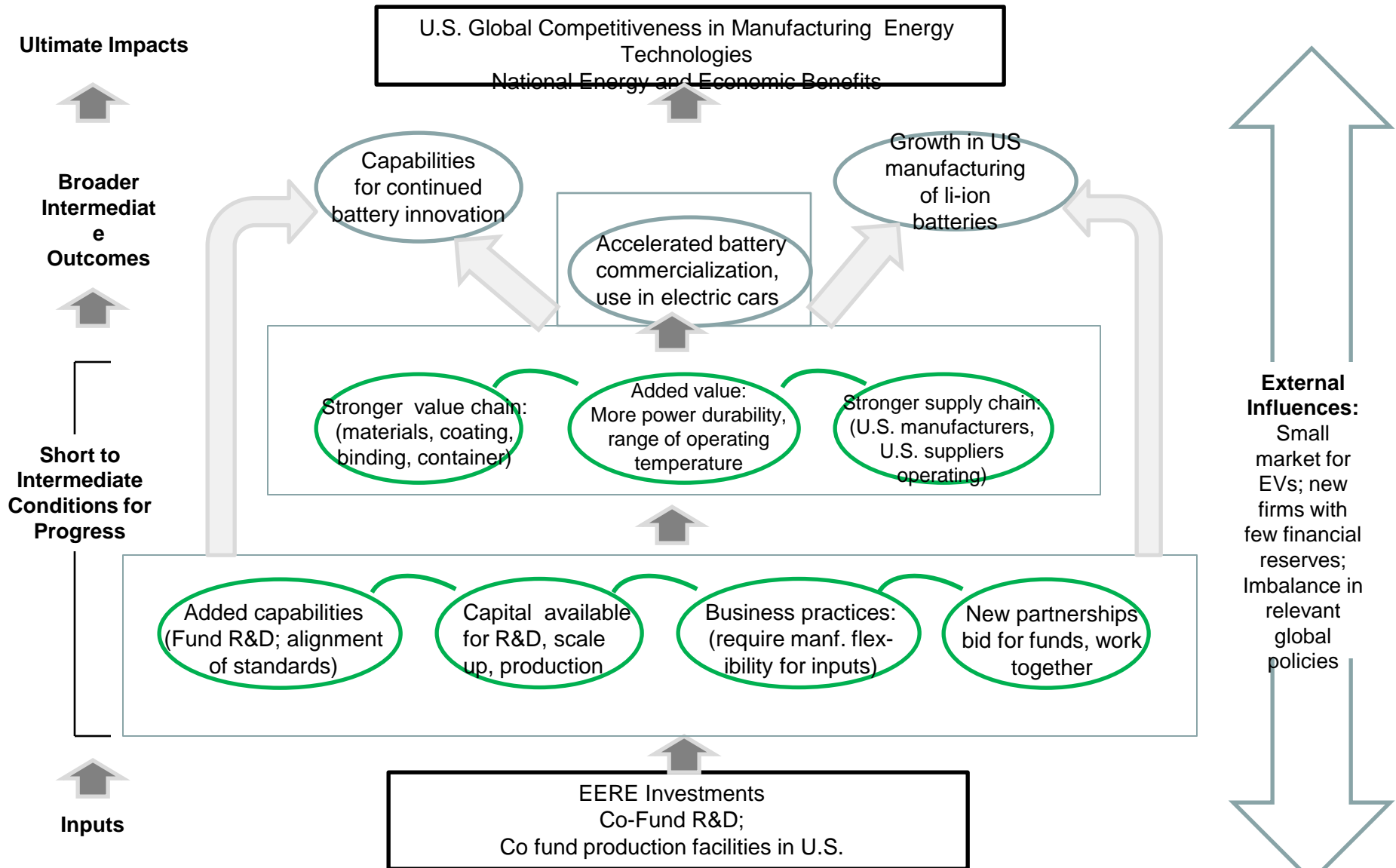
Broader Intermediate Outcomes

Short & Intermediate Conditions for Progress

EERE Investments, Inputs

External Influences

# EERE Investment in Lithium-ion Battery Plants in the U.S.



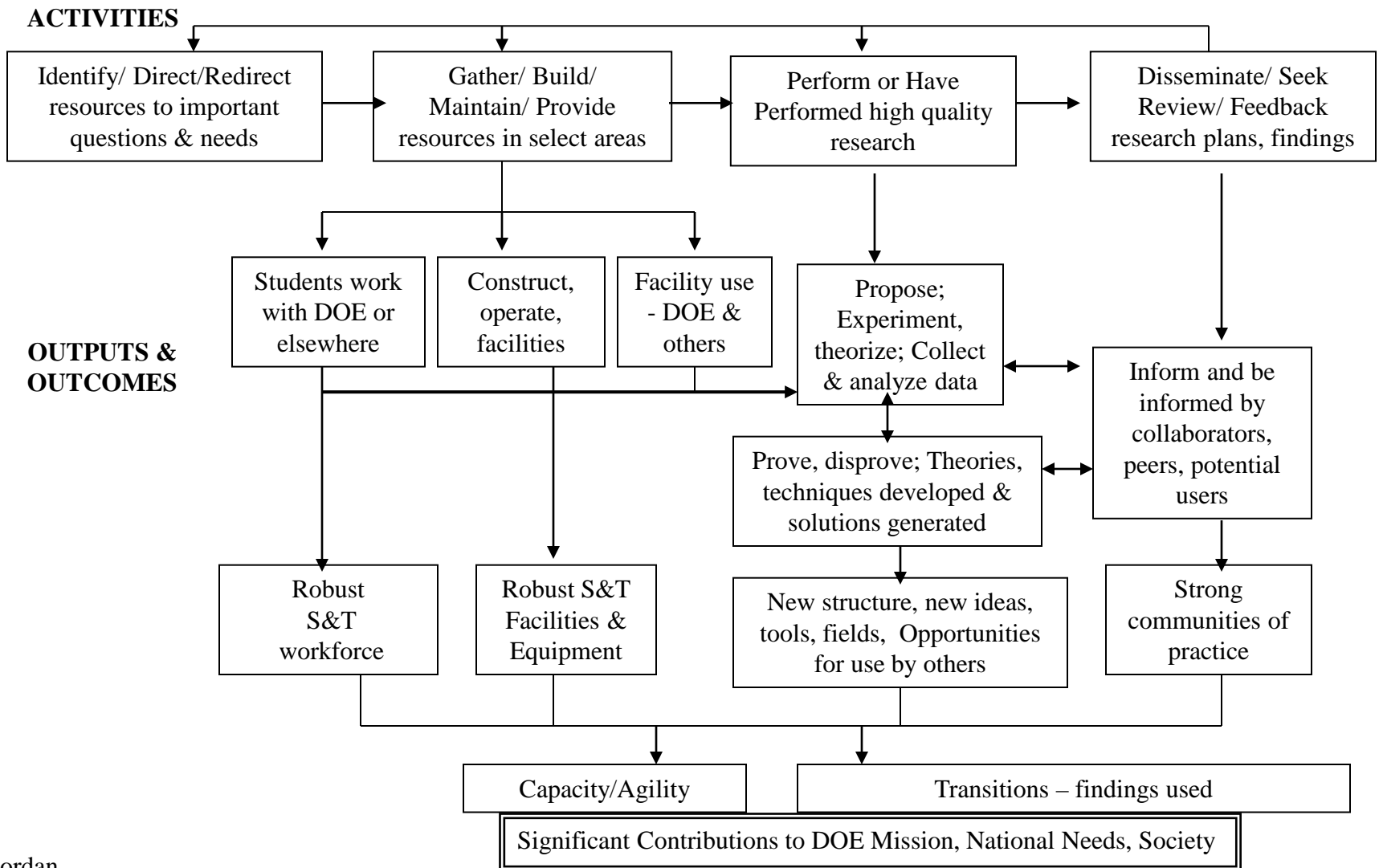
# **Example 8.**

## **Logic of Basic Science Program and Projects**

Related discussion:

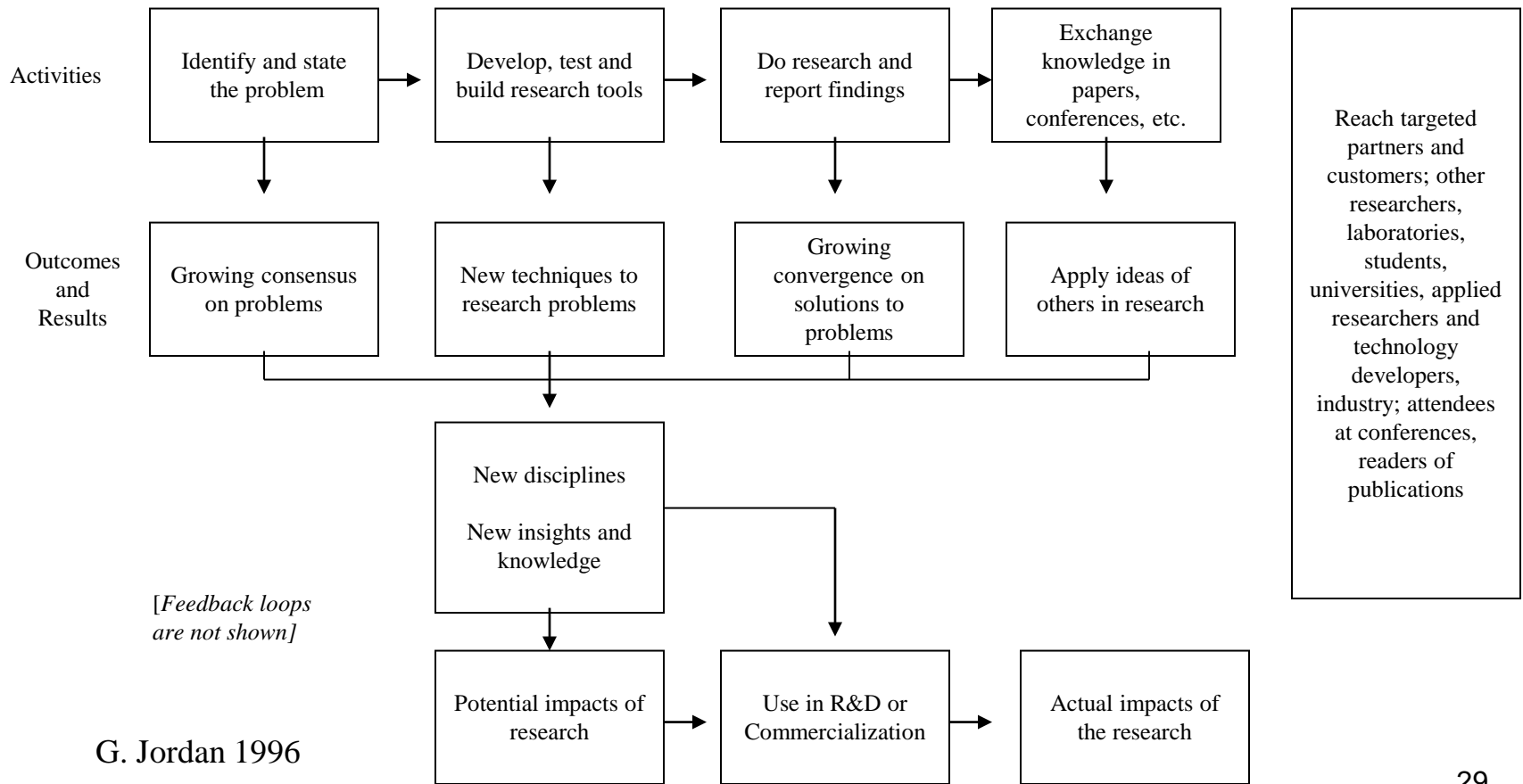
Lee, Russell, Jordan, Gretchen, Leiby, Paul N., Owens, Brandon, Wolf, James L. 2003.  
“Estimating the Benefits of Government-Sponsored Energy R&D,” *Research Evaluation*, Vol.  
12 No. 3 (Dec.): 189-195.

# Logic Model of a Program of Basic Research (U.S. DOE DRAFT -Unofficial)



# The Logic of a Basic Research Project

Manage Resources: expenditures by types of activities, skilled staff, core competencies; environment for quality research, soundness of research planning and evaluation, use scientific method



# **Example 9.**

## **National Science Foundation's Experimental Program to Stimulate Competitive Research (EPSCoR)**

[Evaluation of the National Science Foundation's Experimental Program to Stimulate Competitive Research \(EPSCoR\): Final Report](#)

Brian L. Zuckerman, Rachel A. Parker, Thomas W. Jones, Brian Q. Rieksts, Ian D. Simon, Gilbert J. Watson III, Elaine A. Sedenberg, Sherrica S. Holloman, Ryan M. Whelan, Lucas M. Pratt, Christopher T. Clavin, Abigail R. Azari, Mitchell J. Ambrose, Jessica N. Brooks, and Pamela B. Rambow. IDA Paper P-5221, December 2014



# EPSCoR FINAL Logic Model and Theories of Action

