"Making Sense of Technological Complexity"
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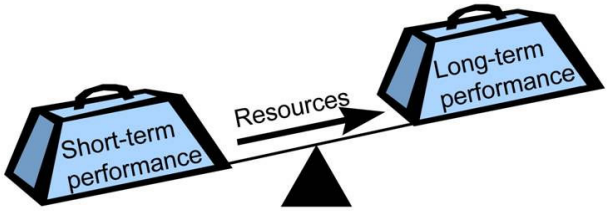
Sustainable Innovation: Key Concepts

What is Sustainable Innovation?

Sustainable innovation is a framework for educational technology policy and planning. The "roof" of the framework is a philosophy of sustainable development that guides all aspects of decision-making. The analytical "pillars" of the framework are different fields of research that provide specific strategies to cope with technological change, integrate technology into classroom practice, design reliable systems, and manage limited resources.

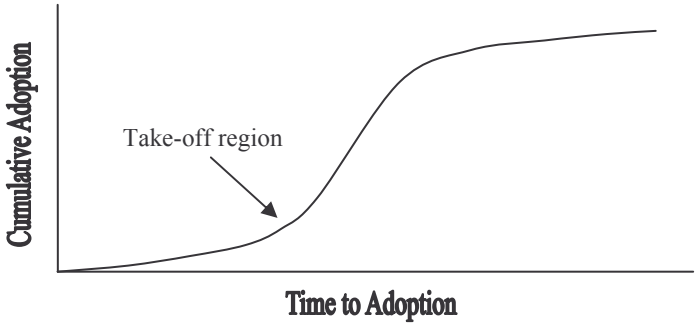
Sustainable Development

Sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[1] It argues for re-balancing resources towards *long-term performance*, and emphasizes equity, diversity, grass-roots participation, cooperation, and rigorous science. As the overarching philosophy for sustainable innovation, sustainable development guides all aspects of decision-making.



Diffusion of Innovations

Diffusion of innovations research provides powerful tools for accurately predicting technological growth,[2] and argues for selecting technologies only after they *take-off* in the marketplace. As an analytical pillar of sustainable innovation, diffusion of innovations provides strategies for coping with the fast pace and inherent uncertainty of technological change.

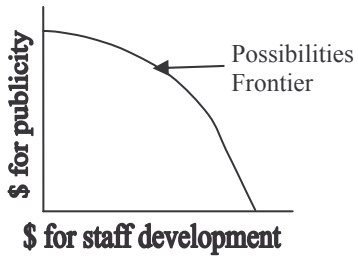


[1] Brundtland, G. Our Common Future: The World Commission on Environment and Development, Oxford University Press, 1987.

[2] University of Georgia, "Everett Rogers' Diffusion of Innovations Theory" web-based learning module available from http://www.arches.uga.edu/~bhummel/6200Project/Diffusion_of_Innovations.html. No specific author or date.

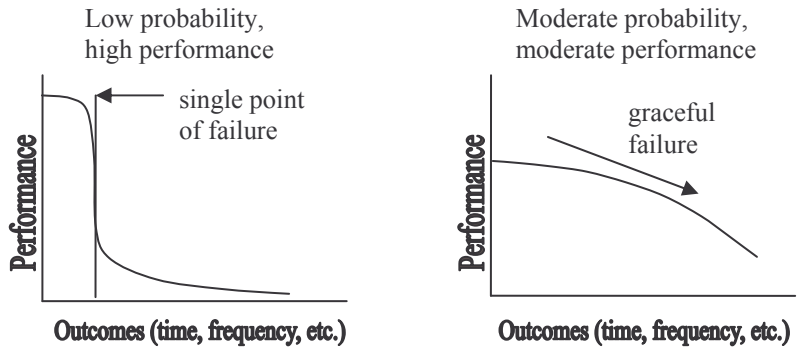
Operations Research

Also called management science, this field of research explains and predicts how an innovation is spread throughout an organization. It models both the processes and the significant factors, and argues for spreading resources among several different implementation strategies along a *possibilities frontier*. As an analytical pillar of sustainable innovation, operations research provides strategies for successfully integrating new technologies into classroom practice.



Risk Assessment / Failure Analysis

Risk assessment describes performance in terms of a range of probabilities, while failure analysis seeks out the root causes of failure so that the entire system can be improved. Together, they advocate for systems that function adequately most of the time, rather than those that function at a high level but only on rare occasions. Such a system avoids *single points of failure*, and demonstrates *graceful failure*.[3] As an analytical pillar of sustainable innovation, risk assessment provides strategies for designing reliable systems.



Economics of Public Goods

In economics, public goods are often characterized by *free-riders*, *market externalities*, and the *tragedy of the commons*. Free-riders are those who take advantage of a resource without having to pay for it. A market externality occurs when there is no direct relationship between supply and demand, causing the price (cost) of a resource to become skewed. The tragedy of the commons explains how a resource is always seems to run out when everyone can use it but no one really owns it. As an analytical pillar of sustainable innovation, public good economics provides strategies for regulation and marketization[4] that can help manage limited resources.

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[3] Kalinsky, D. "Design Patterns for High Availability," Embedded.com. http://www.embedded.com/story/OEG20020729S0030. July 2002.

[4] Andrisani, P. & Hakim, S. Introduction. Privatization Research Center, Richard J. Fox School of Business & Management, Temple University. http://www.sbm.temple.edu/ccg/introprivatization.doc. No date.