Use-Inspired CDR Science and Applications: Pasteur in the 21st Century

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Outline

- Science the Endless Frontier – Review of the Research to Operations Paradigm
- Beyond Research to Operations – Pasteur's Quadrant
- CDR Maturity Matrix as a Pasteur's Matrix?
- Questions on Use-Inspired CDR Applications

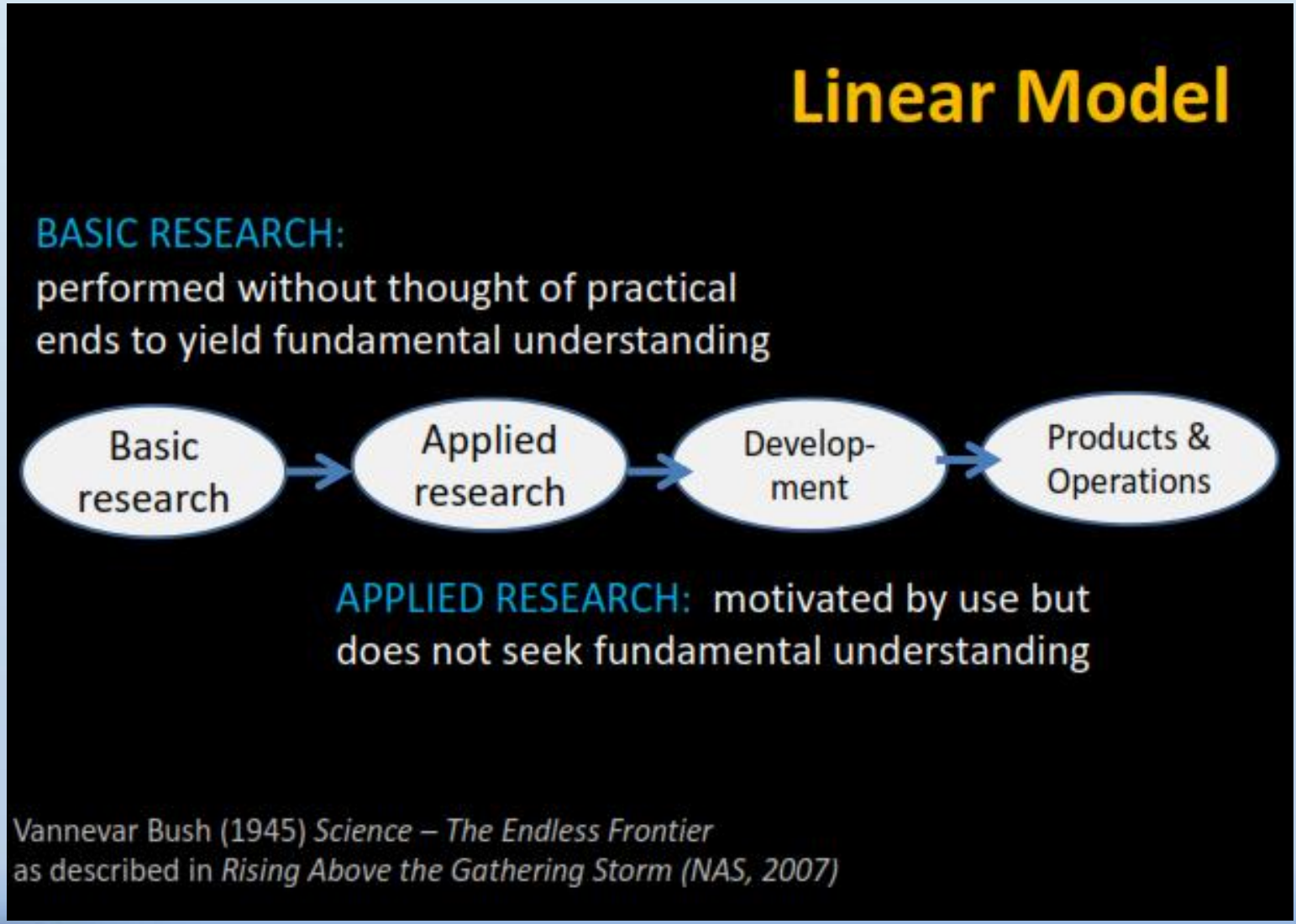
* Excerpts from Dr. Lubchenco's NOAA Brown Bag Lunch 27 January 2012

Science – The Endless Frontier

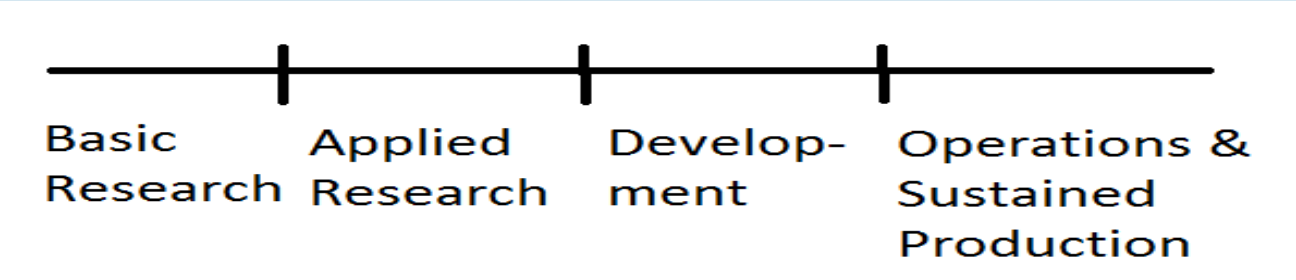
Vannevar Bush

"Basic research is performed without thought of practical ends. It results in general knowledge and an understanding of nature and its laws. This general knowledge provides the means of answering a large number of important practical problems, though it may not give a complete specific answer to any one of them. The function of applied research is to provide such complete answers. "

Linear Model of Research to Operations

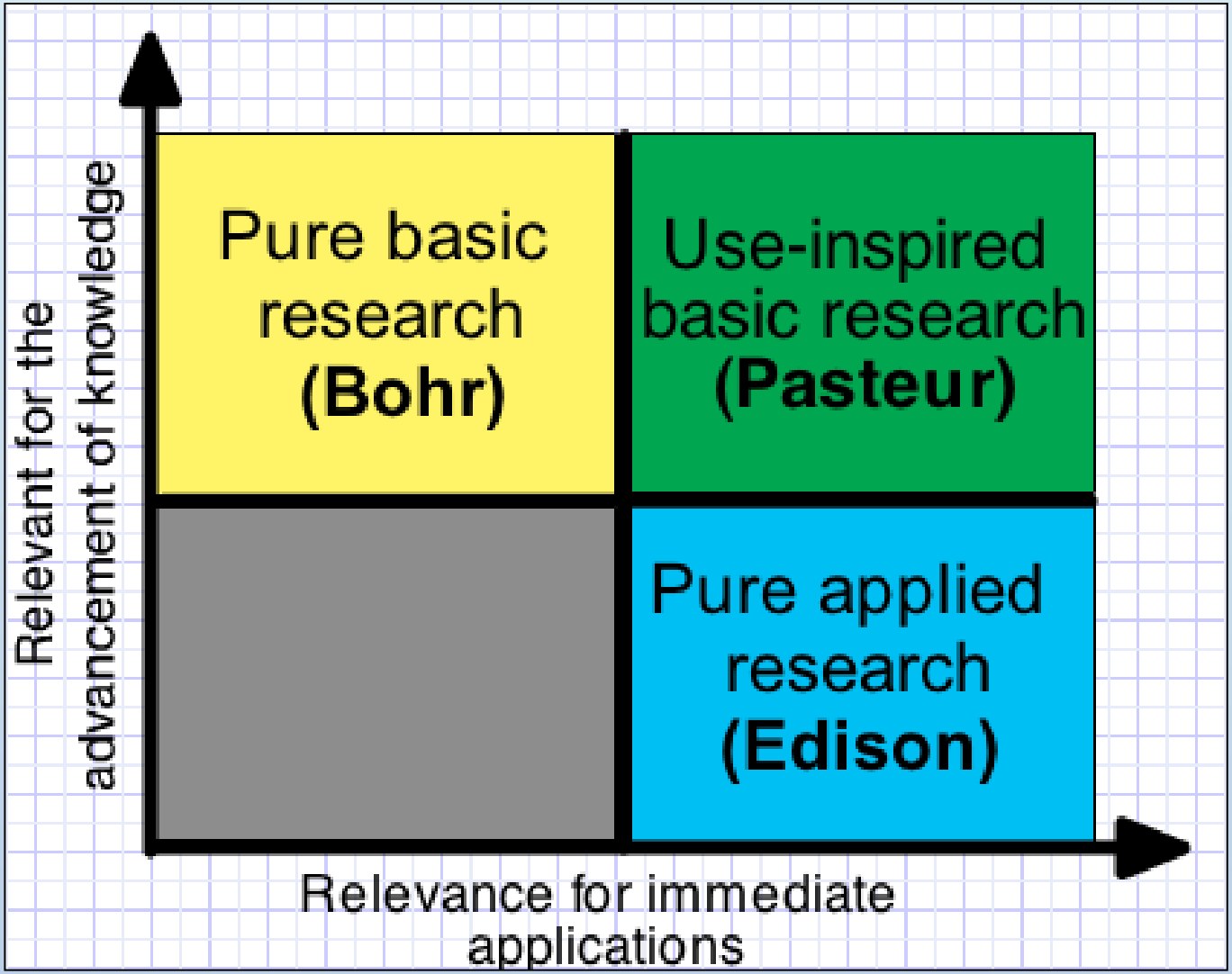


Myths of the Linear R2O Model



- The differing goals of basic and applied research make these types of research conceptually different
- The inherent tension between the goals of general understanding and applied use is thought to keep the categories of basic and applied research empirically separate
- The belief that the goals of understanding and use are inherently in conflict, and that the categories of basic and applied research are necessarily separate, is itself in tension with the actual experience of science

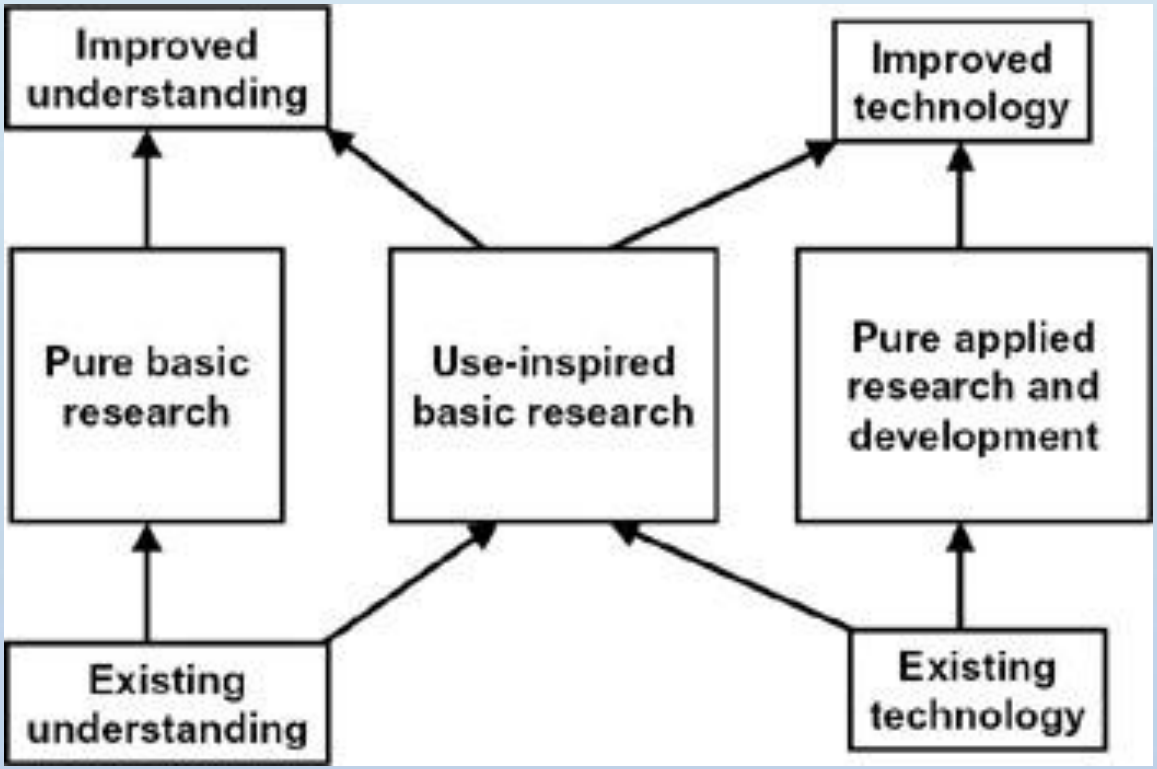
Pasteur's Quadrant



There is not **pure science** and **applied science**,
but only **science** and the **applications of science**.

Louis Pasteur, 1863

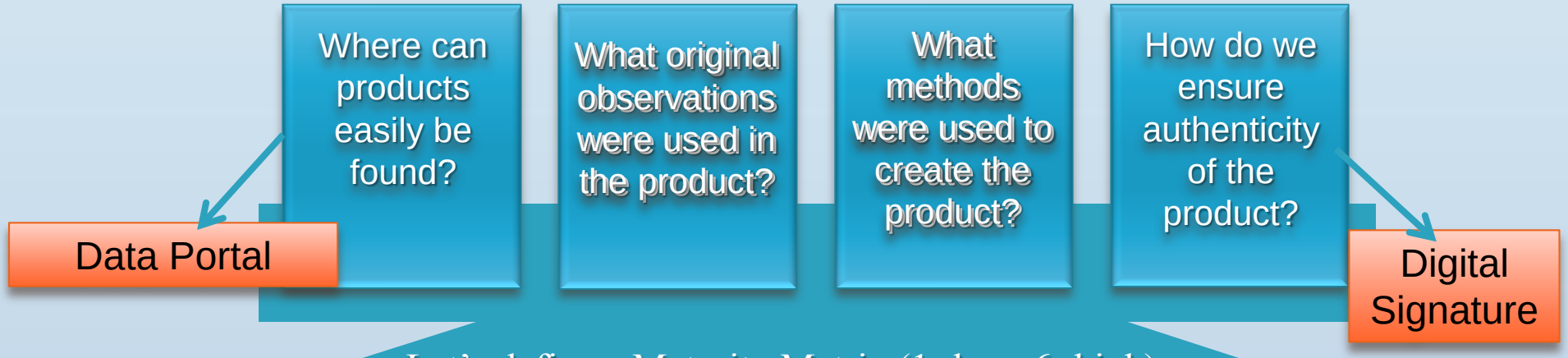
Revised Dynamic Model for Science and Technology Innovation



Science Maturity Model Level

Technology Readiness Level

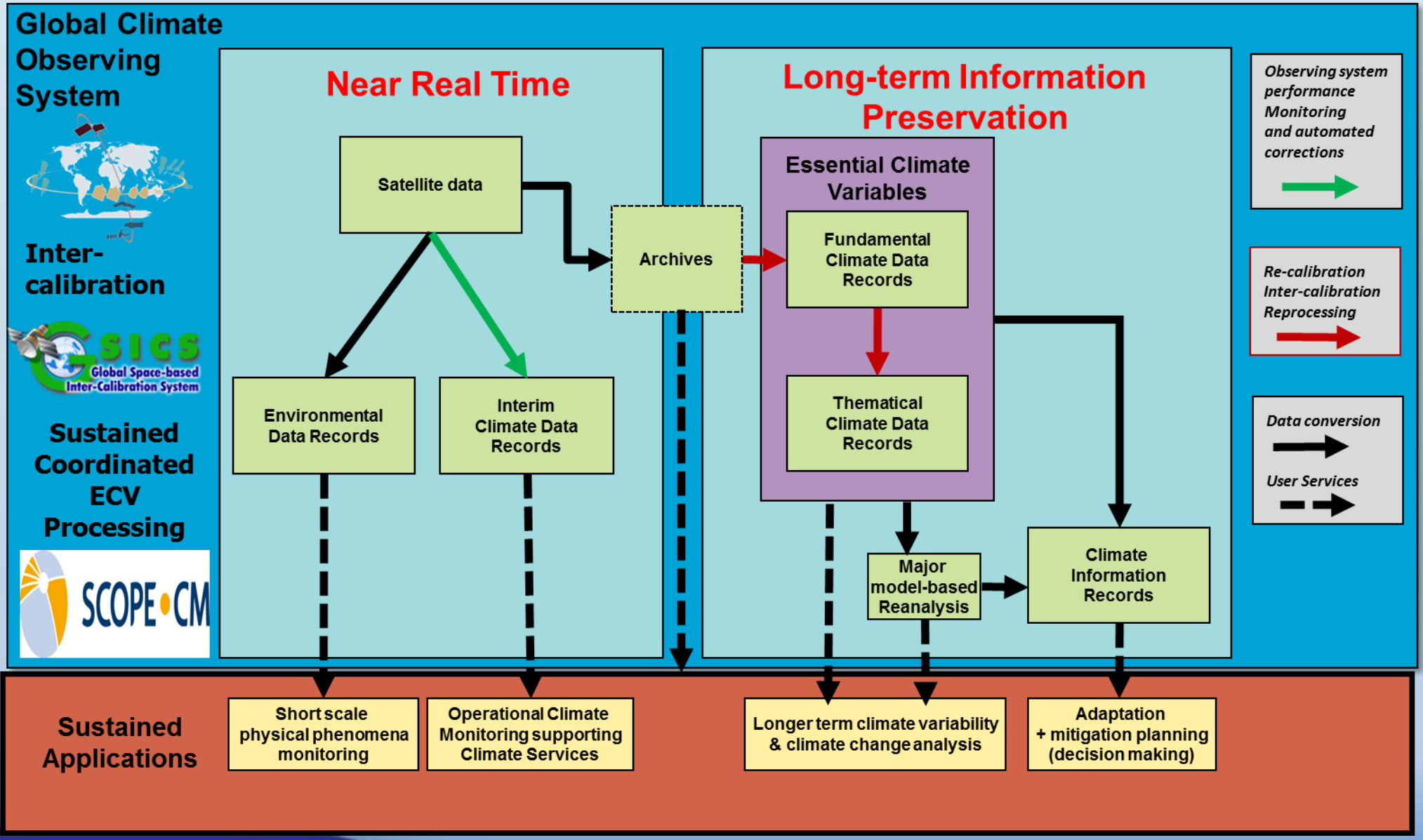
A Maturity Matrix for Assessing the Completeness of Climate Data Records



Let's define a Maturity Matrix (1=low; 6=high) that sets expectations and assesses progress

Software Readiness	Metadata	Documentation	Product Validation	Public Access	Utility
Are algorithms under configuration management and how mature?	How full and complete are the metadata and quality assessment?	Is the Operational Algorithm Description full, complete, and peer reviewed?	How complete is the validation?	Are the data, algorithms and software open and available to the Public?	How extensive is the peer reviewed literature and how varied are the applications?

Sustained Climate Information Flow



QUESTIONS

- What are our best stories of user-inspired science that has benefited society?
- What should we call “user-inspired science”?
- What new discoveries would most improve our management and policy missions?
- Where are our good opportunities to make a case for use-inspired science?

Jeffersonian science

"The specific research project is motivated by placing it in an area of basic scientific ignorance that seems to lie at the heart of a social problem. Its main goal is to remove basic ignorance in an uncharted area of science and thereby to attain knowledge that will have a fair probability – even if it is years distant – of being brought to bear on a persistent debilitating national (or international) problem."

Sonnert & Holton, 2002