

The Diverse Variables To Consider When Planning and Assessing Public Research Portfolios

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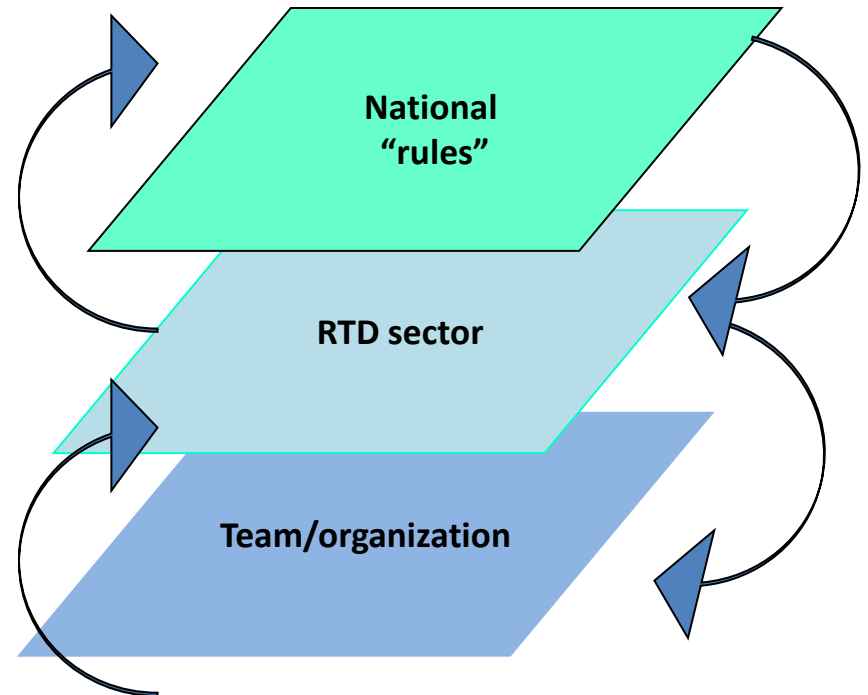


Motivation for describing considerations of RTD portfolio assessment more broadly

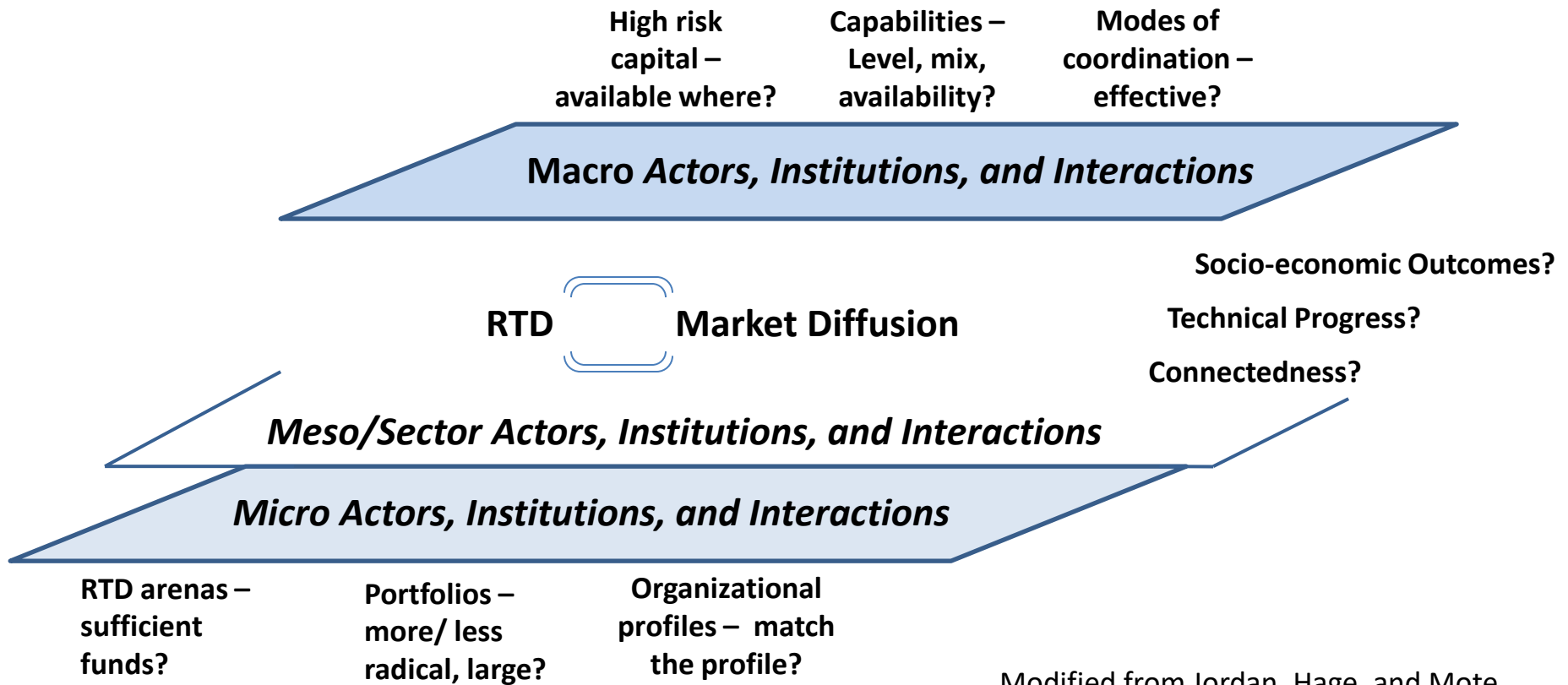
- Current policy and program rationale and assessment for research, technology development and deployment (RTD) programs and portfolios
 - use a limited and fragmented picture of the innovation process
 - which provides incomplete or inaccurate answers to questions.
- To improve design, management, and assessment of these
 - Use systems view with focus on technology sector
 - Take broad view of arenas of RTD and their connections
 - Integrate views of RTD and market diffusion
 - Organize thinking about differences in RTD portfolios, organizations, and circumstances

Take a systems view, with focus on the Meso level (RTD sector)

- Meso level connects macro with micro
- Bottlenecks to innovation can be spotted more easily here
- Mission and policy decisions are often sector specific
- Policy impacts differ by sectors because sectors differ in
 - Amount of investment by RTD arena
 - Rates of technical change



For example, one framework for assessing an innovation system, with 9 sets of indicators



Modified from Jordan, Hage, and Mote, January 2008.

Meso Level: Considerations of RTD arenas and their connectedness

There is increasing differentiation of arenas in the innovation process.

For successful introduction of new product/ mission solution

- Manufacturing, quality research can't be ignored
- RTD advance can occur in one or more arenas
- Ideas move between arenas
- Inter-organizational networks transfer tacit knowledge



The idea innovation network: Hage and Hollingsworth (2000), modifying Kline and Rosenberg (1986)

Meso Level:

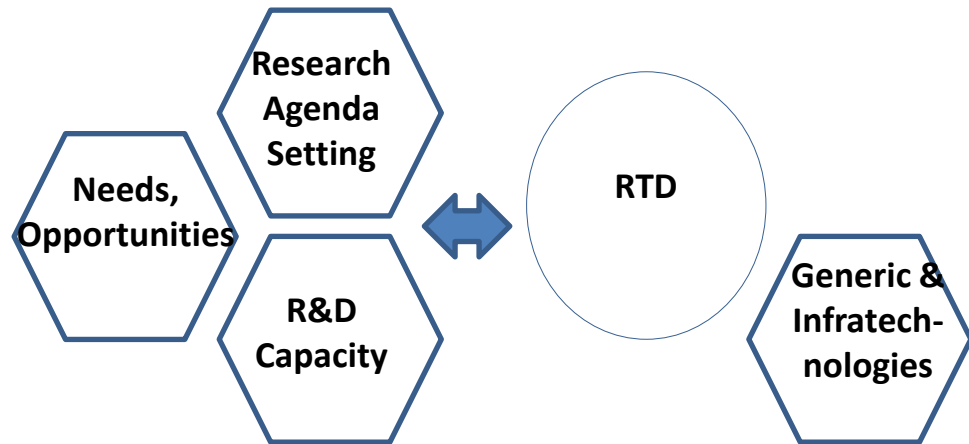
Other considerations related to RTD

Needs and Opportunities: in business models, policy incentives, paradigm shifting research advance.

Research Agenda Setting: Influences RTD by defining problems, adding understanding, or calls for joint planning.

Research Capacity: science base or knowledge pool, R&D facilities, tools, educated R&D workforce, networks of researchers.

Generic and Infratechnologies: such as new materials or standardized measurement that reduce risk or provide complementary components.



Sources: Jordan 2010, Tassej 2007, Canadian Academy of Health Sciences return on investment framework 2009.

For example, questions to ask about an RTD portfolio at Sector level

- What is overall sector socio-economic performance (new sales in product mix, speed to develop, how radical/broad)?
- What are the expected outcomes of this portfolio, and in what time frames?
- Has past work had an impact, and is current work targeted to these outcomes and making progress? What are current priority needs?
- What is the role of various parts of this portfolio in relation to others funding related or similar initiatives?
- Are the interfaces among researchers and between research and the private sector who must pick it up effective?

Meso Level: Considerations for assessing the likelihood of market diffusion

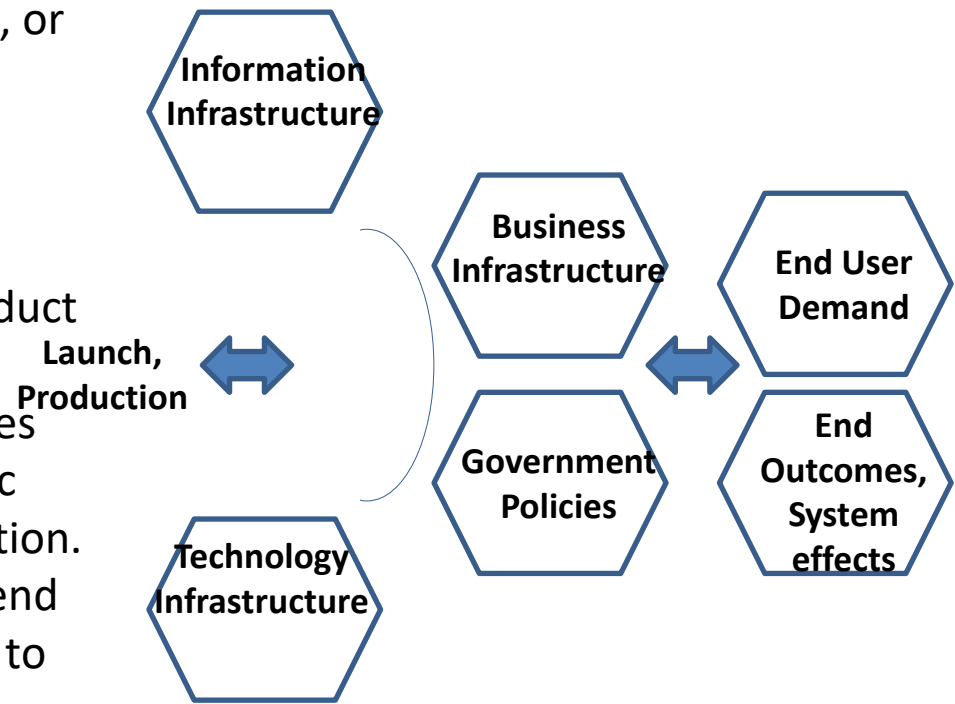
Information Infrastructure: Create, advance, or package knowledge about a technology or market; Delivery channels.

Business Infrastructure and Risk Reduction: Individuals/firms who finance, produce, distribute, sell, maintain the technology, product or process.

Government Infrastructure: Agencies/entities that change structure and operation of public policies/programs to help/hinder tech. adoption.

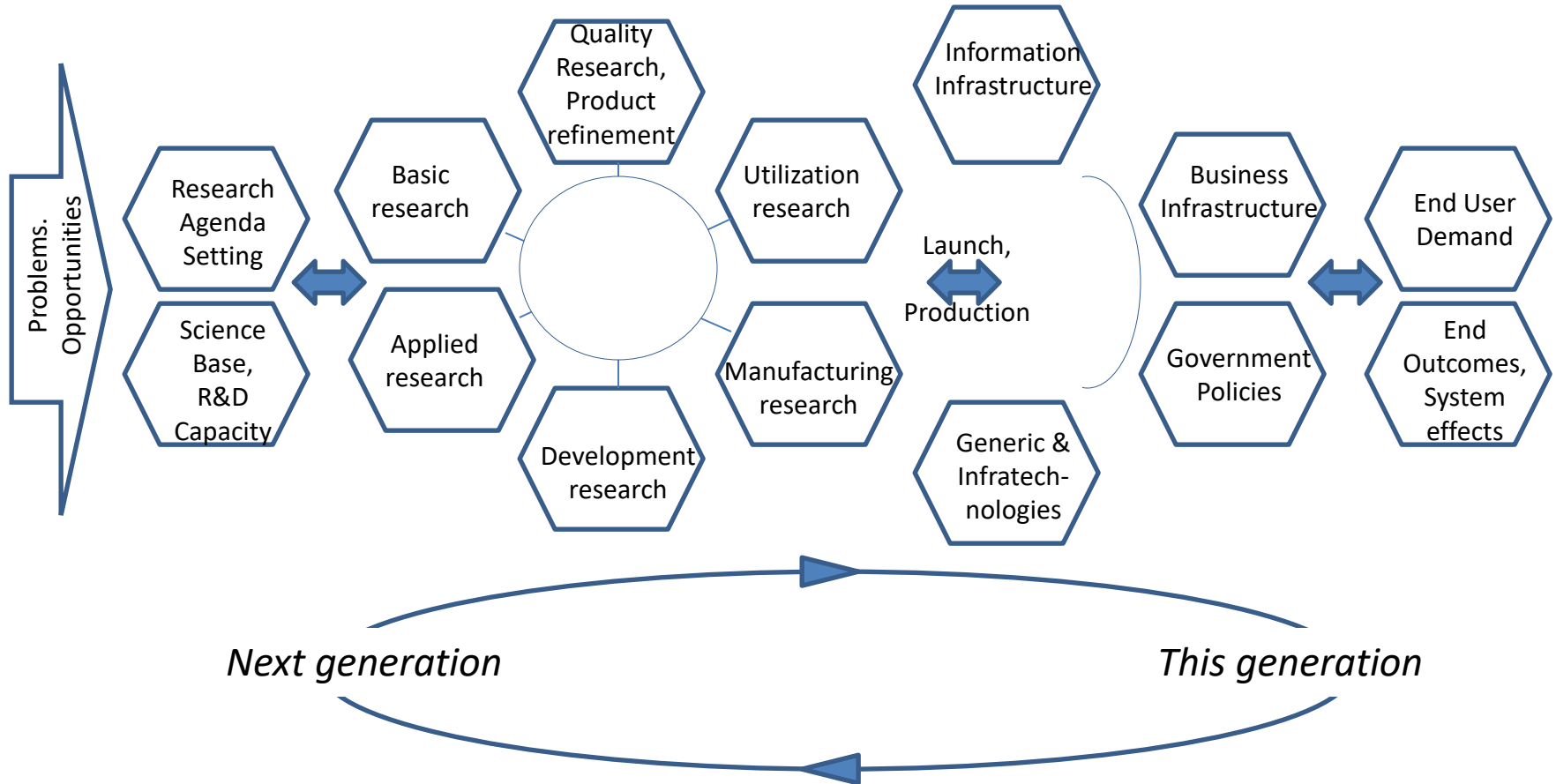
End User Demand. Process through which end user individuals/organizations are convinced to try, and then continue to use, a technology.

End Outcomes and Systems Effects. Adoption leads to ultimate desired outcomes. Along the way there are multiple planned and unintended effects and spillovers.



Source: G Jordan, 2010

Putting RTD and Diffusion together in one diagram

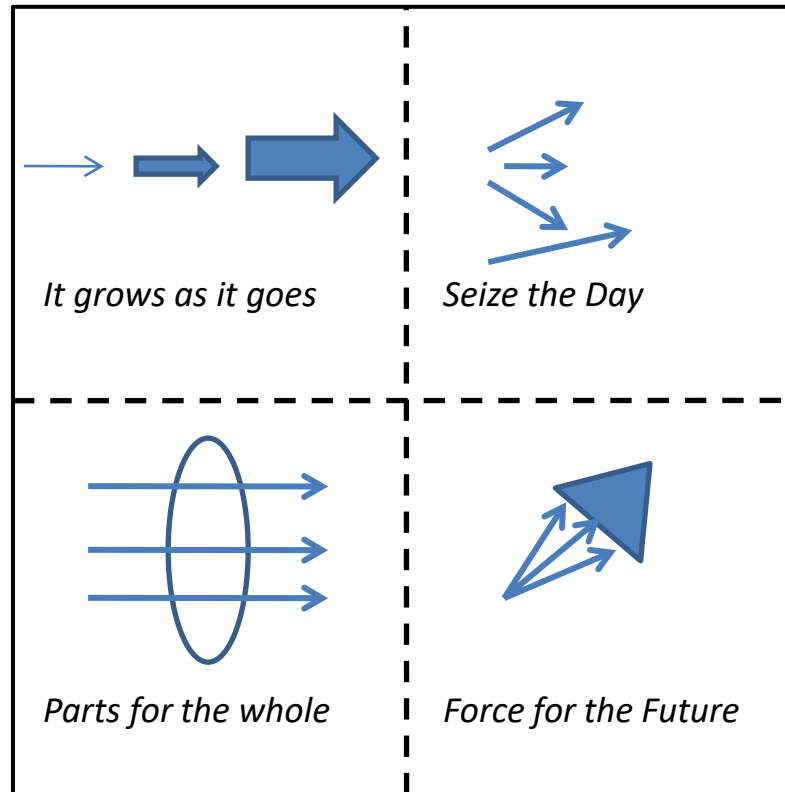


Turning to the Micro level, questions to ask about an RTD portfolio

- What is overall organizational business strategy and performance against that strategy?
- What are RTD objectives?
- What is the role of various parts of this portfolio in relation to other parts funding related or similar initiatives?
- What are characteristics of the RTD undertaken (size, how radical/broad)?
- Should the portfolio shift because of changes in the technology (barriers or opportunities) or in the business or external context?
- Do the organizational characteristics (strategy and structure) of the organization match the type of RTD work they have chosen to do?

Example of Micro level considerations, a framework for organizational portfolio strategies

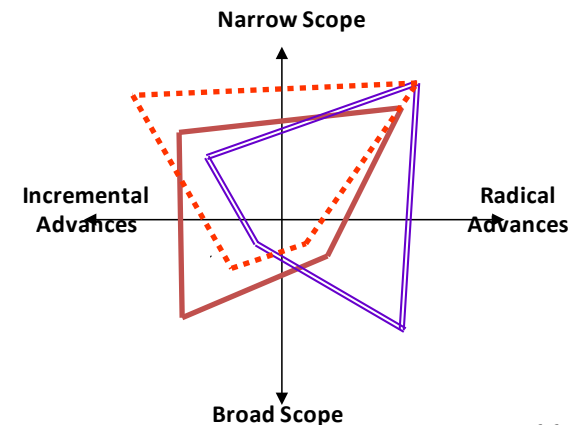
Narrow focus
Small size



Consolidation focus
Lower risk
Specialized teams
Intra organizational

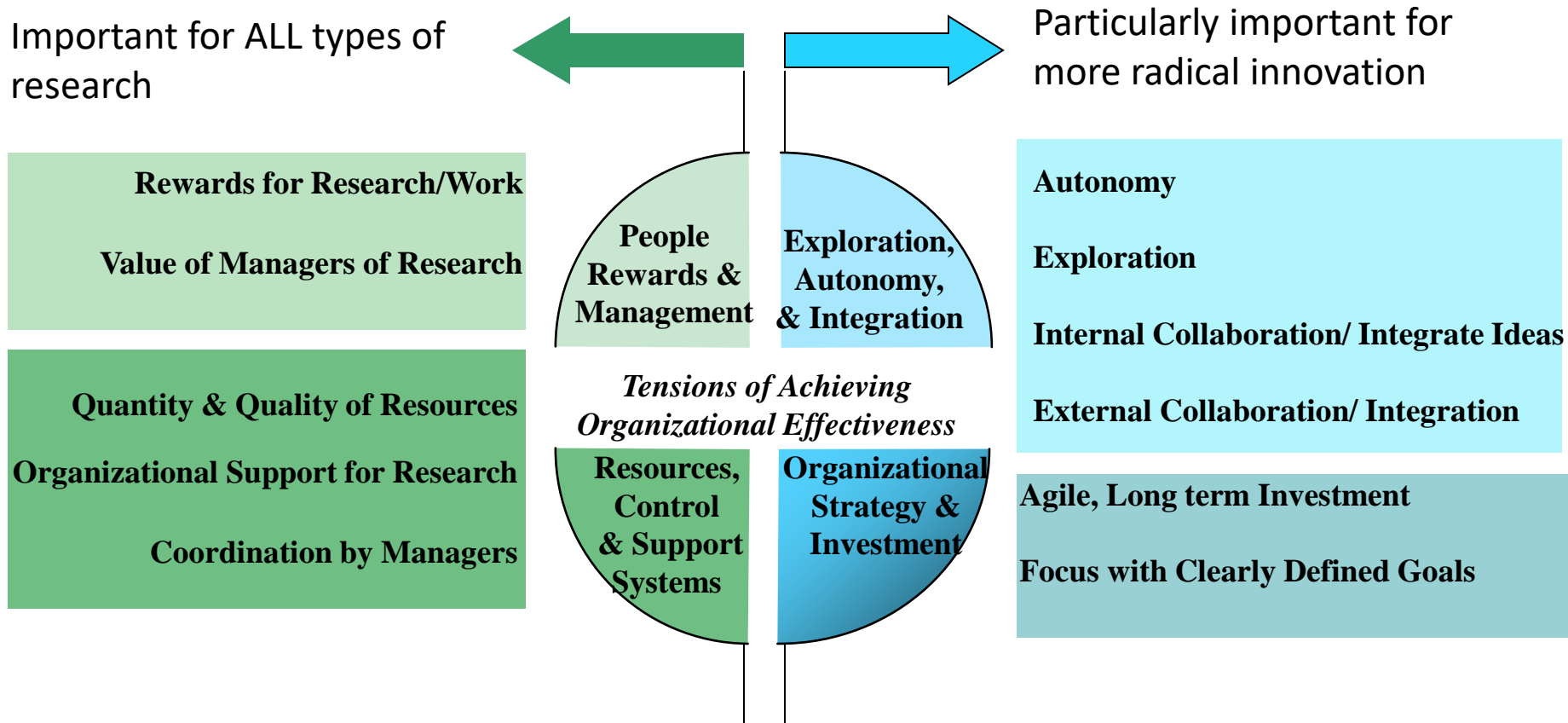
Growth focus
Higher risk
Diverse teams
Inter organizational

Broad focus
Larger size



Sources:
G Jordan, Research Profiles 2006, 2011;
VanDevender 2003

Micro level considerations include RTD organizational effectiveness. Balance of tensions among attributes depends on context.



Sources: G Jordan, Research Environment study, 2003, 2006
Cameron and Quinn 1999

Contextual Considerations include four aspects of the external environment

- **Technical** (presence or absence of necessary research tools or technologies, the stage or maturity of the R&D, and the degree/speed of widespread technical change)
- **Social/demographic** (the culture, such as society's values and preferences, and the structure, such as shifts in age distribution, future availability of trained scientists)
- **Legal, Regulatory, and Political Environment** (State and Federal government laws, regulations, or policies and political pressures; can be simple or complex, strict or flexible)
- **Economic Environment** (trends, including national prosperity, levels of Federal funding for R&D, and availability of funding; level of competition for funds; cost of the research infrastructure)

Is the state of the environment for Labs/a field of research ...

- Very stable or very dynamic?
- Very predictable or very unpredictable?
- Generally favorable or unfavorable?

Source: G Jordan, Research Environment study, 2003, 2006

Summary and conclusions

For portfolio assessment and planning we have

- examined both RTD arenas and market diffusion
- organized and characterized variables at the meso and micro levels that could be considered
- suggested that considering combinations of variables could improve both assessment and planning

Building on

- a systems view of research assessment
- a theory-based framework that emphasizes blockages to innovation
- generic logic models of the RTD and diffusion processes

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