Prioritizing and Managing a Research Portfolio in a Risk Averse Culture

A Case Study of the Bonneville Power Administration

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OUTLINE

I. Bonneville Power Administration (BPA) Background

II. Prioritization Process

III. Creating a Research Portfolio

IV. Striking a Balance

V. Takeaways for General Industry Application

Learning Objectives

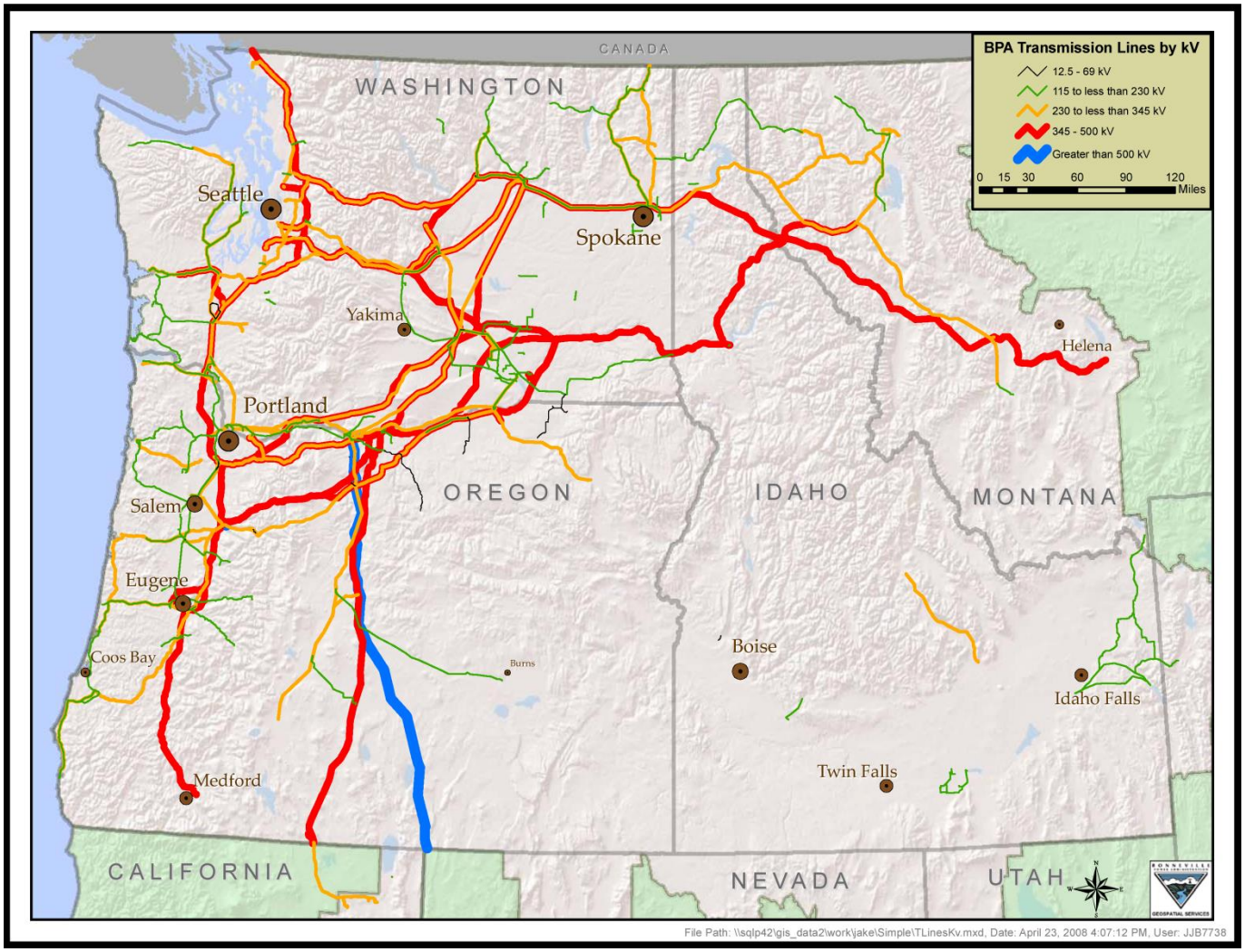
- How research is managed in a utility environment
- Prioritization process for managing an R&D budget
- How to apply these practices to other organizations

Pacific Northwest Service Region

- BPA markets power from 31 Federal dams, the Columbia Generating Station Nuclear Plant, and several small non-Federal power plants.
- About 80% of the power BPA sells is hydroelectric.
- BPA accounts for about 30% of the electric power consumed within the region.
- BPA is statutorily prohibited from owning power generating assets.
- 3,100 Federal employees.

Pacific Northwest Service Region

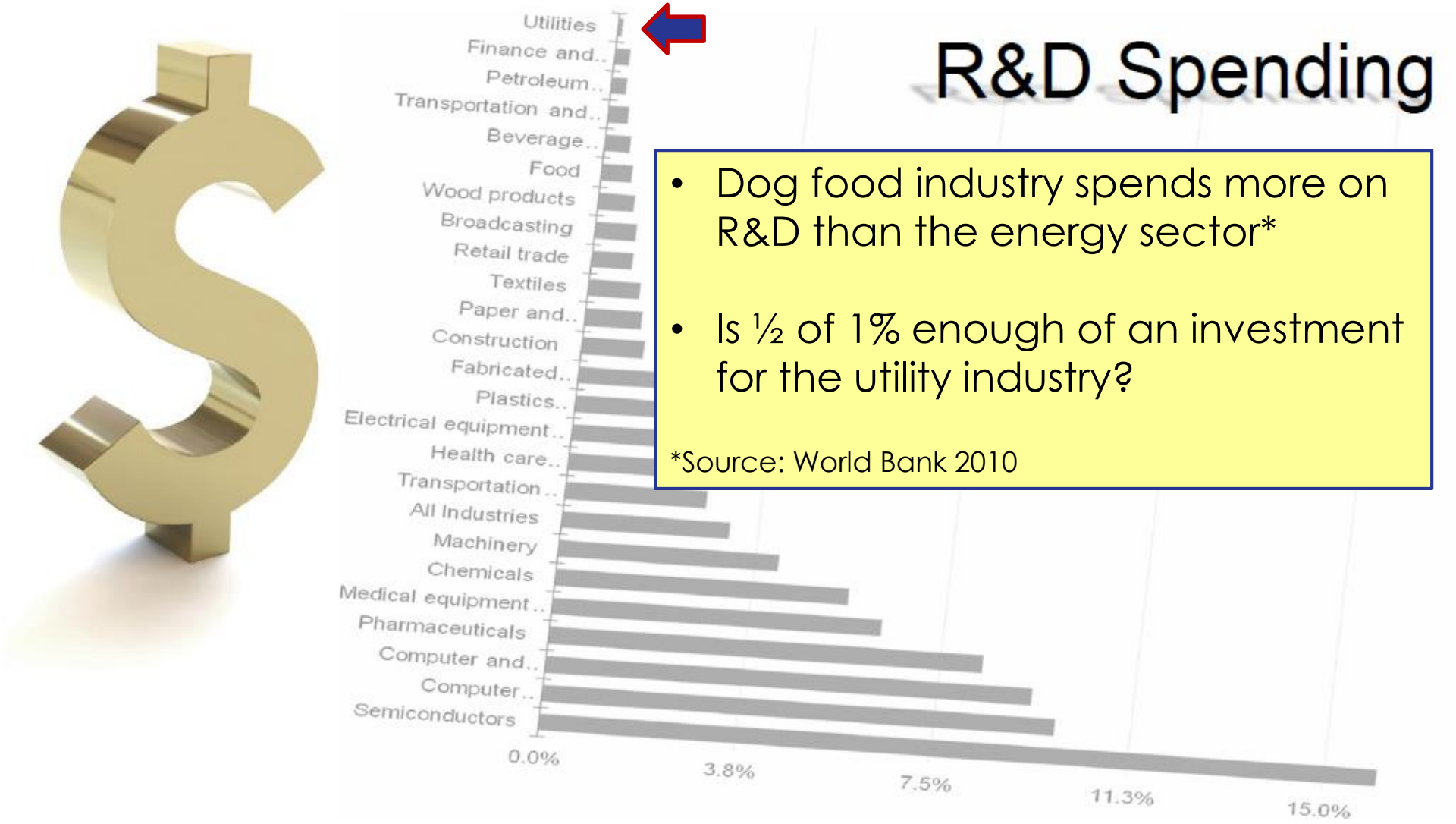
BPA's Transmission System



Operating voltage (kV)	Circuit miles
1,000	264*
500	4,735
345	570
287	229
230	5,324
161	119
138	50
115	3,556
< 115	368
Total	15,215

* BPA's portion of the Pac NW / Pac SW direct current intertie. Total length from The Dalles, OR to Los Angeles, CA = 846 miles.

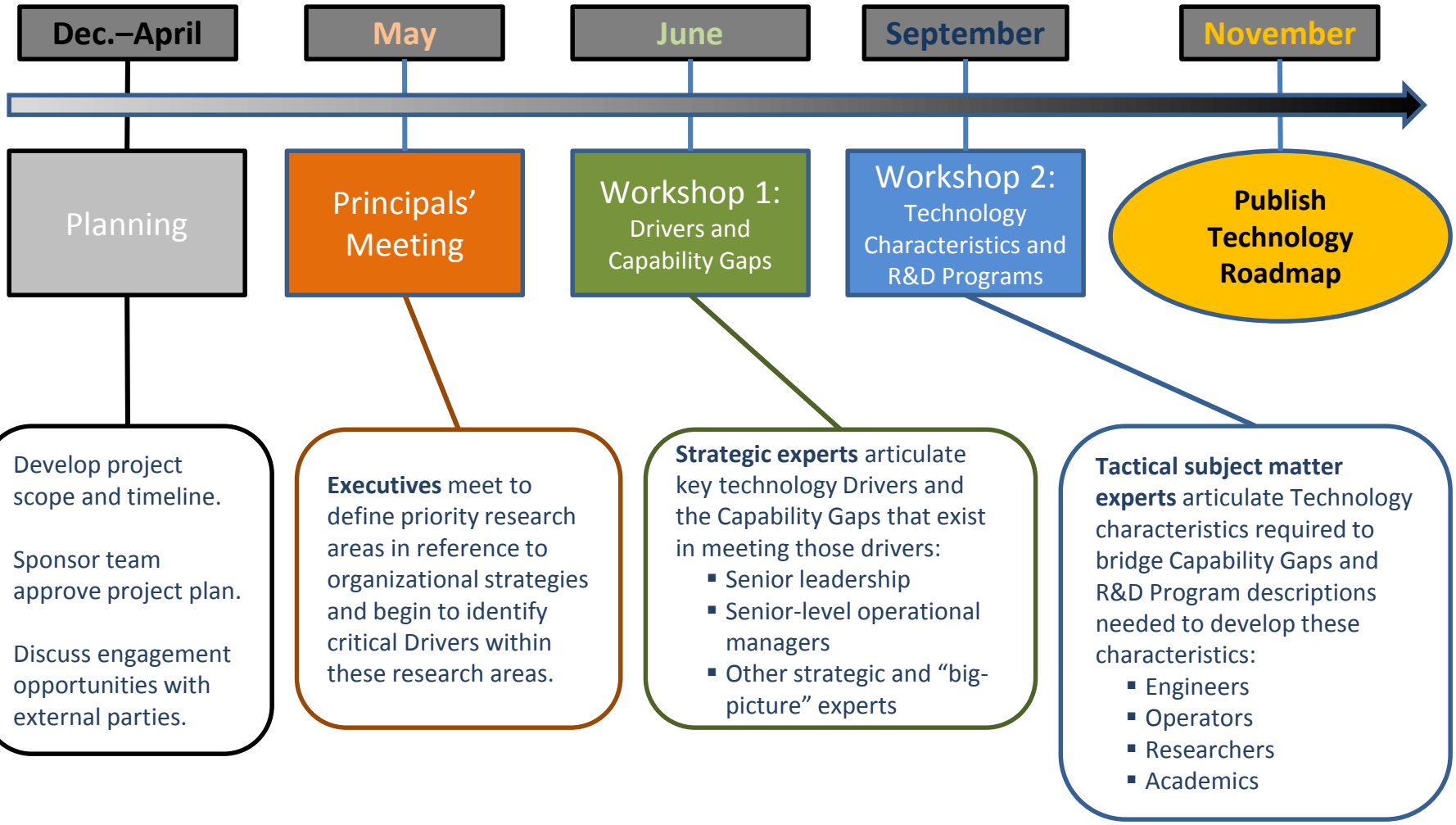
Utility R&D Spending



- Dog food industry spends more on R&D than the energy sector*
- Is ½ of 1% enough of an investment for the utility industry?

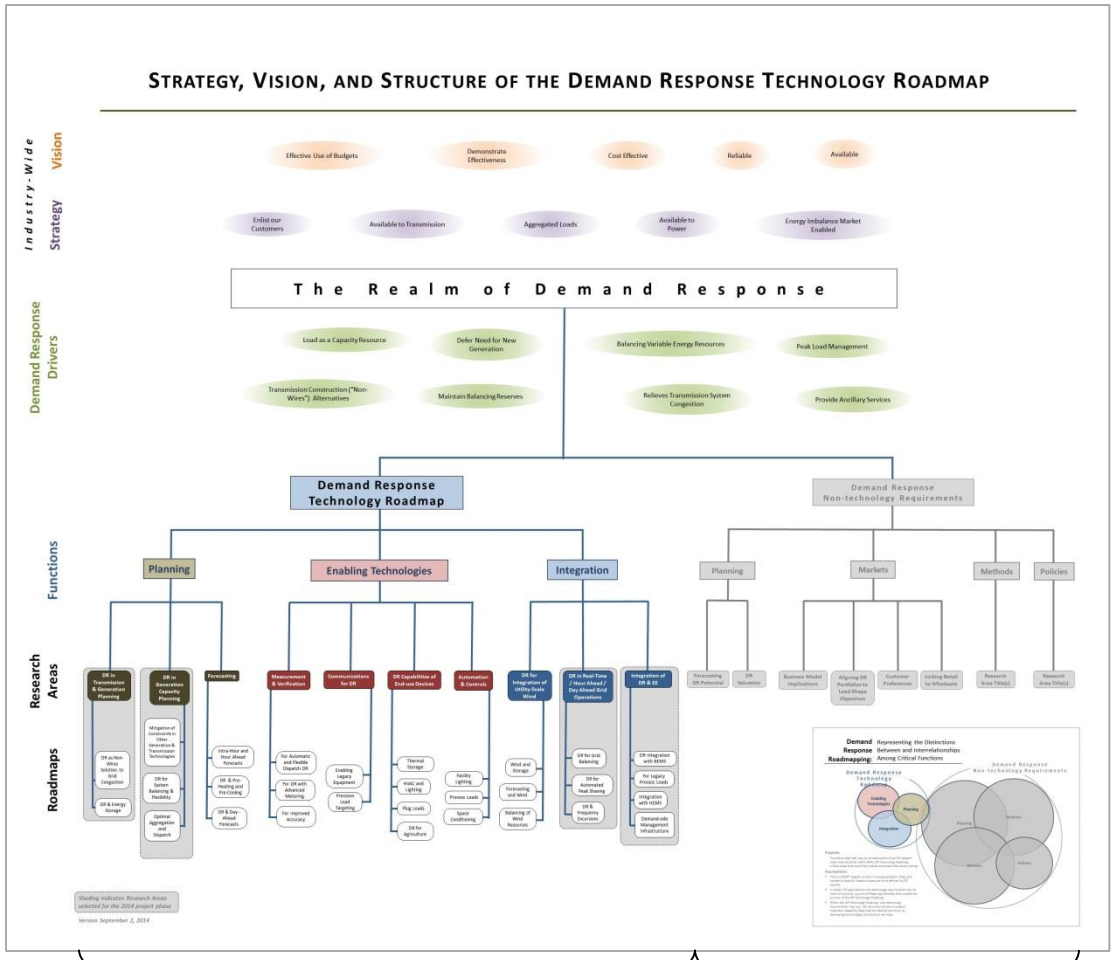
*Source: World Bank 2010

General Roadmap Project Timeline



"Organizational Chart" Example

nested set of functions, research areas, and individual roadmap topics



Increase in specificity

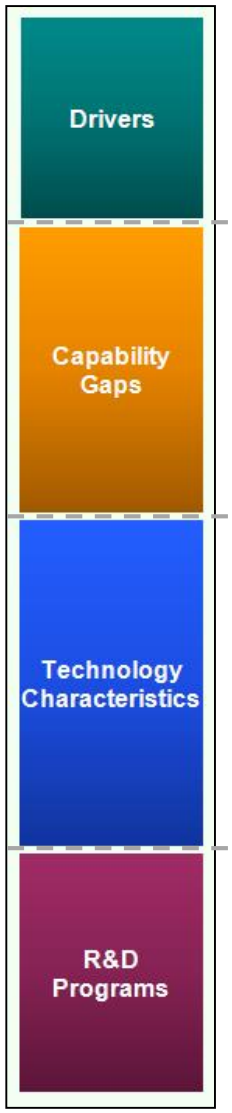
Increase in abstraction

Technology needs

Non-technology needs

Roadmap Diagram

"Swim Lanes"



Drivers: Critical factors that influence organizational decisions, operations, and strategic plans, i.e., existing or pending regulations and standards, market conditions, consumer behavior, organizational goals and culture, etc.

What are the reasons to change?

Capability Gaps: Barriers or shortcomings that stand in the way of meeting Drivers.

What are the barriers to change?

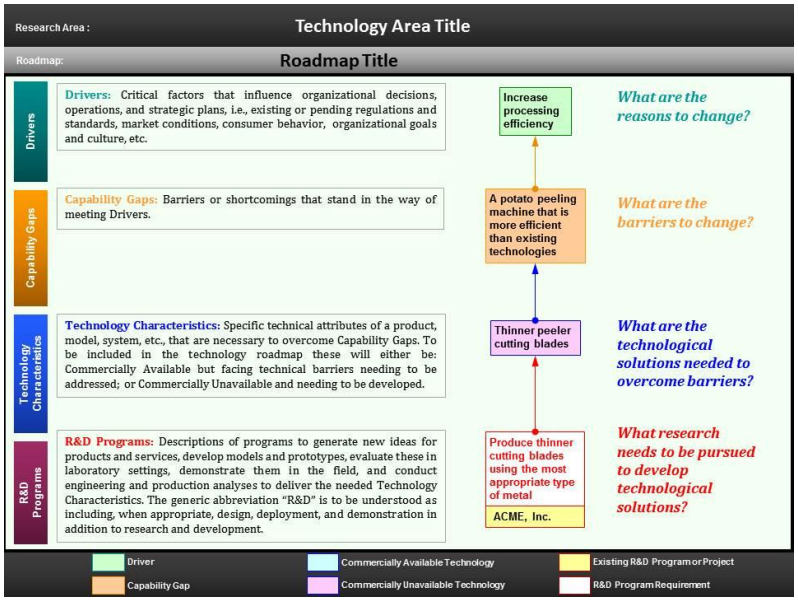
Technology Characteristics: Specific technical attributes of a product, model, system, service, etc., that are necessary to overcome Capability Gaps.

What are the technological solutions needed to overcome barriers?

R&D Programs: Current and planned research, development, and demonstration programs to deliver the needed Technology Characteristics, undertaken at utilities, universities, national laboratories, and vendors.

What research needs to be pursued to develop technological solutions?

Communicating R&D Needs



Top-down

Bottom-up

Executives and senior managers can read down the diagram to learn about business opportunities and challenges and barriers that stand in the way of meeting these.

Researchers and technical subject matter experts learn about specific research questions and technology characteristics that might help deliver solutions to pressing needs.

External

Research community learns utility industry needs, increasing the likelihood of receiving higher-quality proposals expanding partnerships based on topics of mutual interest.

Internal

Executives, managers, and staff ensure that needs are aligned and documented prior to the TI Office's annual solicitation.

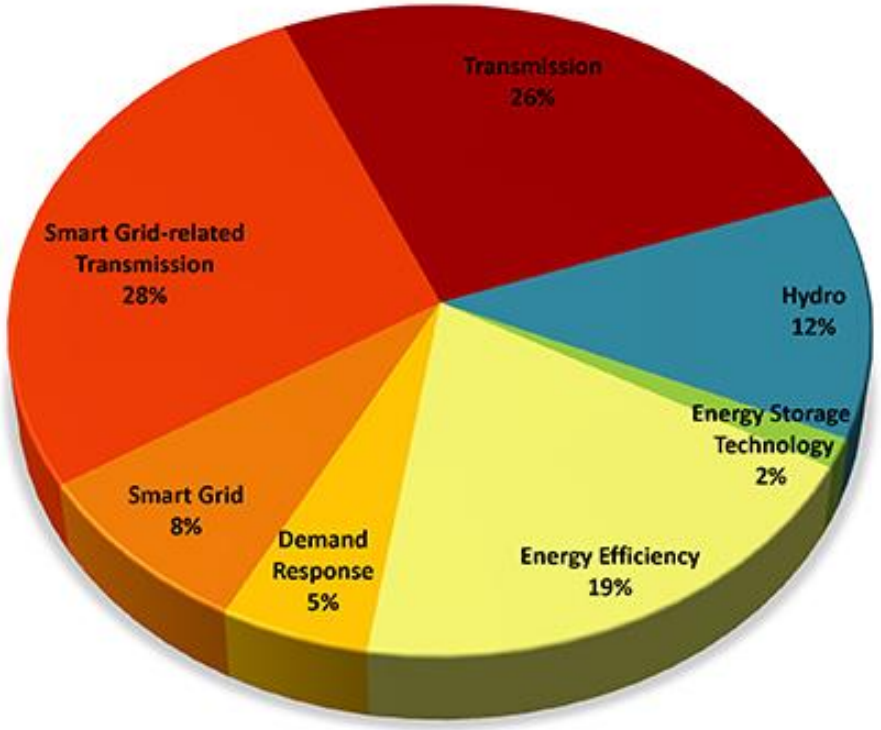
BPA TI Background

BPA's technology innovation agenda is guided by a strict logic and framework that links the agency's research goals to current business challenges and technology gaps facing the agency.

This agenda supports three of the agency's strategic priorities:

- Preserve and enhance generation and transmission system assets and value;
- Advance energy efficiency; and
- Expand balancing capabilities and resources.

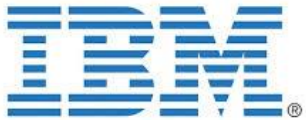
Since 2005, BPA's Technology Innovation Office has pioneered an approach that ensures the agency is making shrewd investments in technology research.

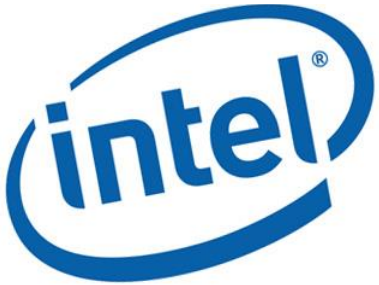


2015 Technology Innovation Portfolio by Investment Category and Percent of Total Budget

Best-Practice Based Research

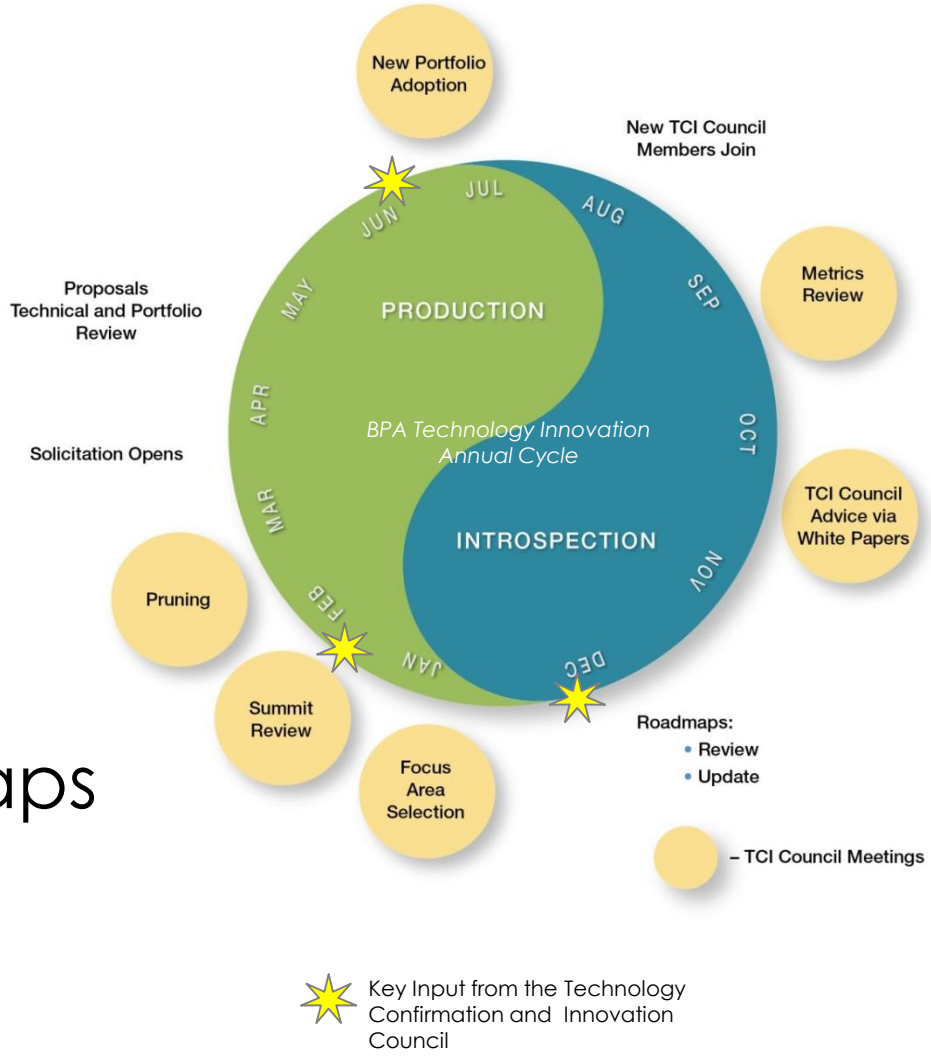
- Benchmarking forum with utility participants
- Independent audit of portfolio and project management practices





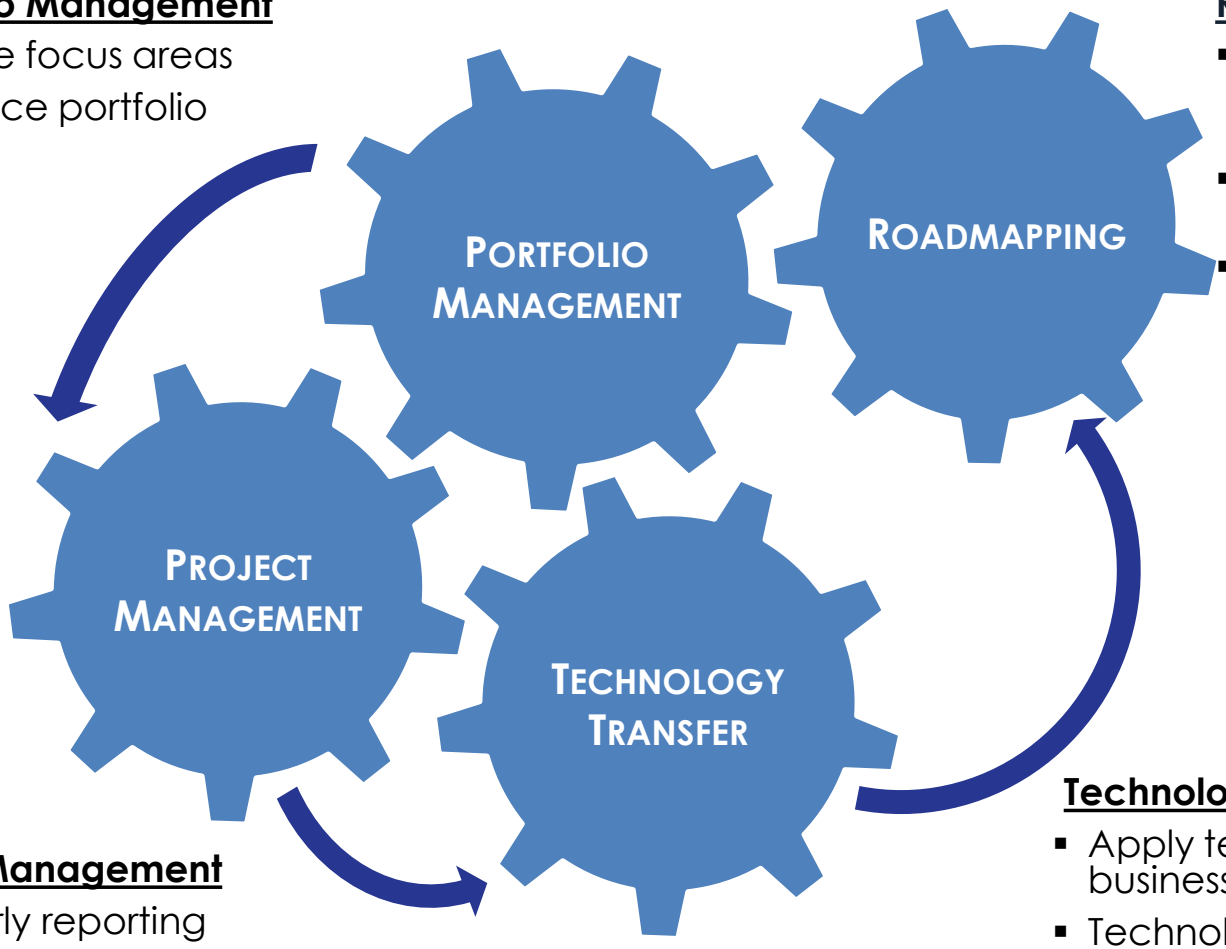
BPA TI "System of Systems"

- 2015 Budget: >$18M
- Projects: >50
  - Energy Efficiency
  - Transmission
  - Demand Response
  - Smart Grid
  - Hydro Optimization
- Well articulated Technology Roadmaps serve as the basis for R&D portfolio



BPA TI "System of Systems"

Portfolio Management
- Define focus areas
- Balance portfolio



Roadmapping
- Identify technologies matched to business challenges
- Integrate key agency targets
- Serve as basis of research portfolio

Project Management
- Quarterly reporting
- Stage gate management
- Triple constraint management

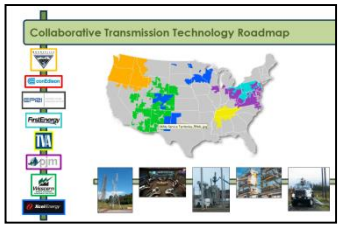
Technology Transfer
- Apply technologies to meet business challenges
- Technology commercialization
- Intellectual property considerations

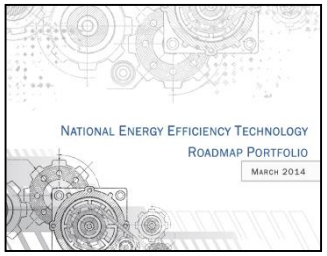
Portfolio Management

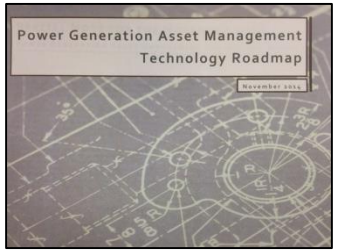
- Define focus areas
  - Alignment with key agency targets
- Balance portfolio
- Manages annual portfolio solicitation
- TI publishes annual reports on the performance of the portfolio
- Cyclical process
  - Solicitation
  - Portfolio selection
  - Summit review/prune

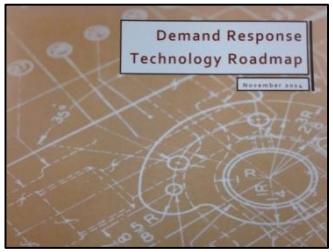
Proposal Solicitation

Technology Roadmaps









Proposals Received Based on Technology Roadmaps

- Solicitation opens
- Proposals are submitted via web portal

MARCH

Phase1 Review: Concept Paper

- Is the proposal feasible?
- Does it address a technology roadmap?

APRIL

Phase 2 Review: Full Proposal

- Selected concept papers are invited to submit a full proposal
- Proposals reviewed by external and internal SMEs
- Scored based on established criteria

MAY

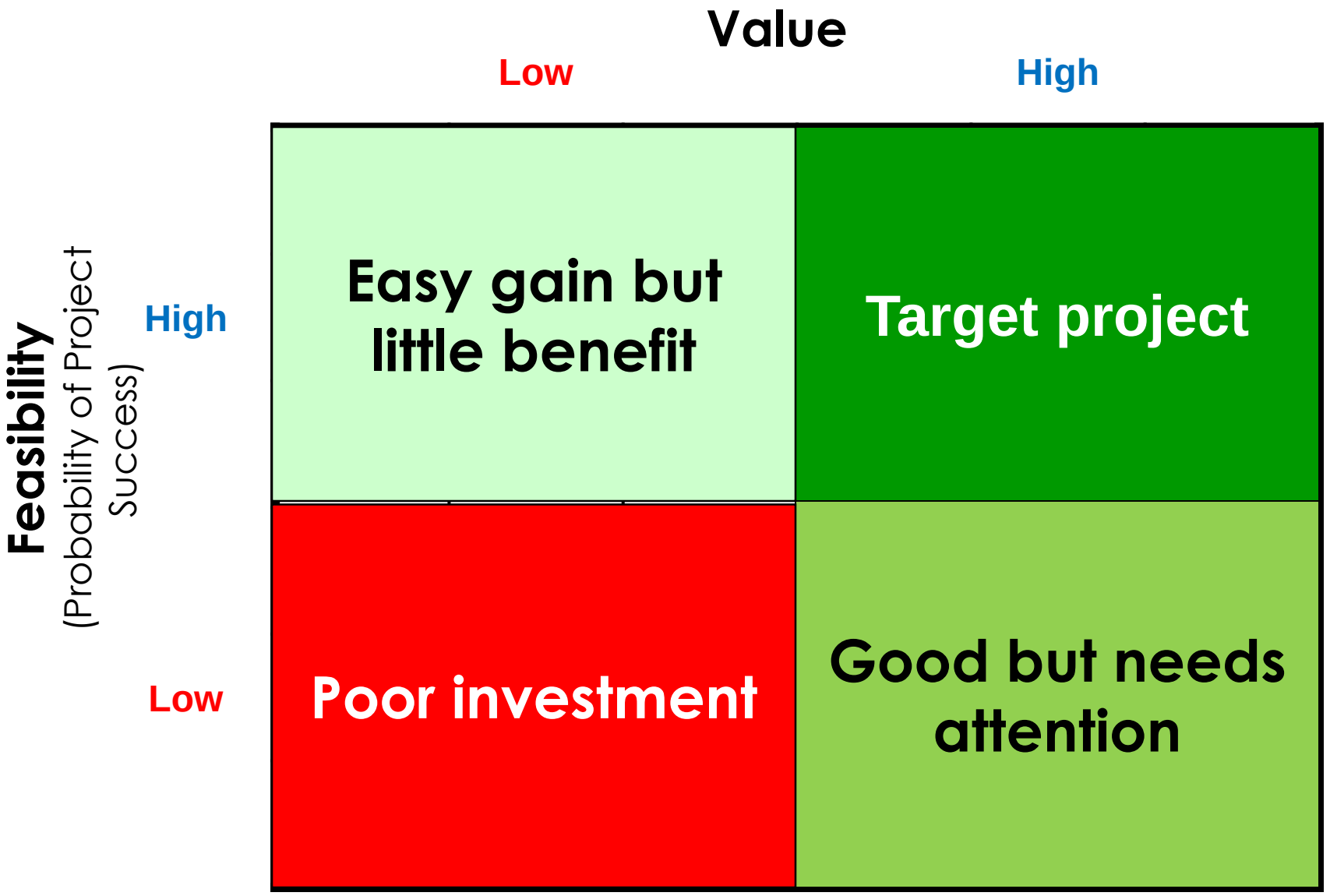
Council review and approval

JUNE

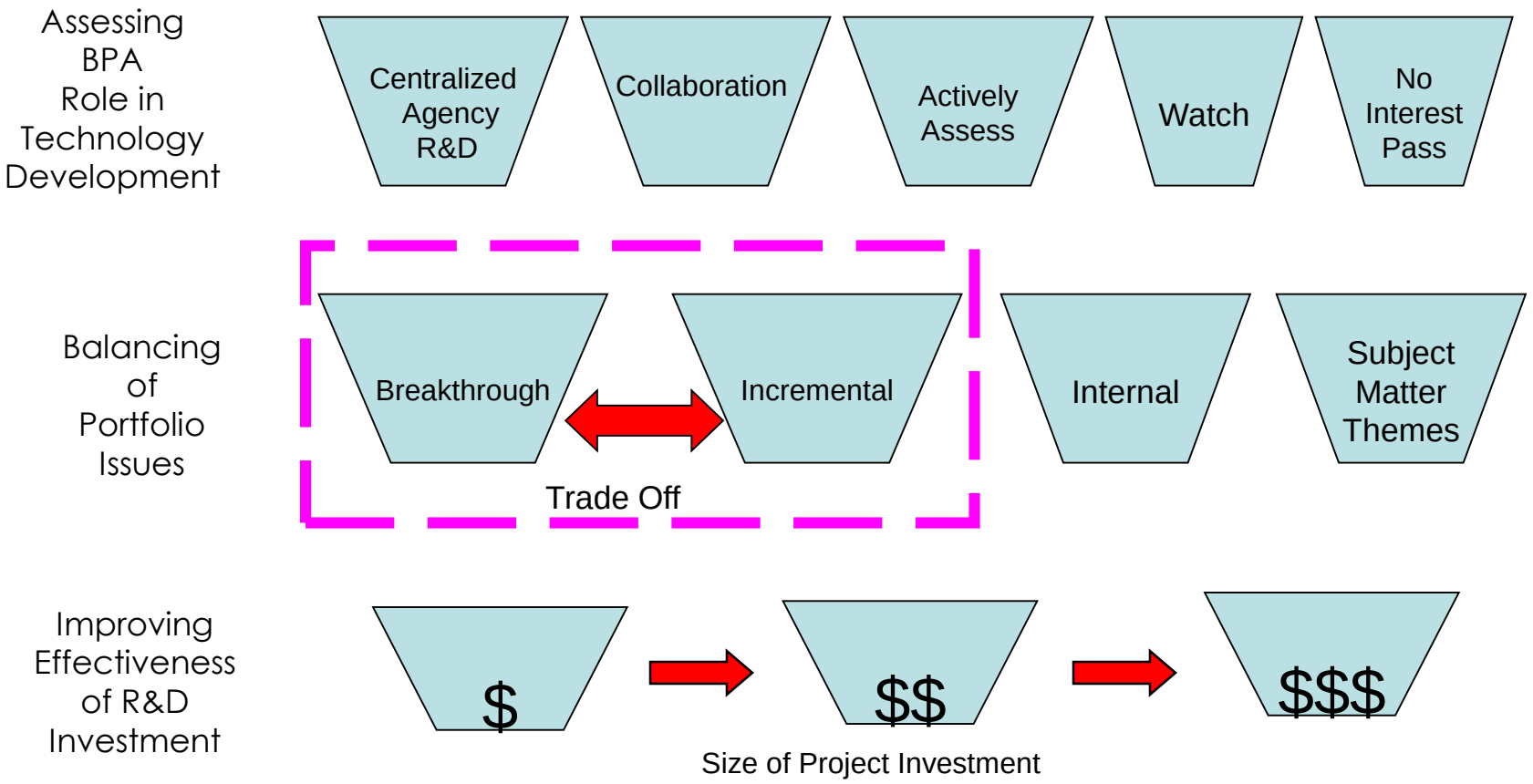
Portfolio Selected

JULY

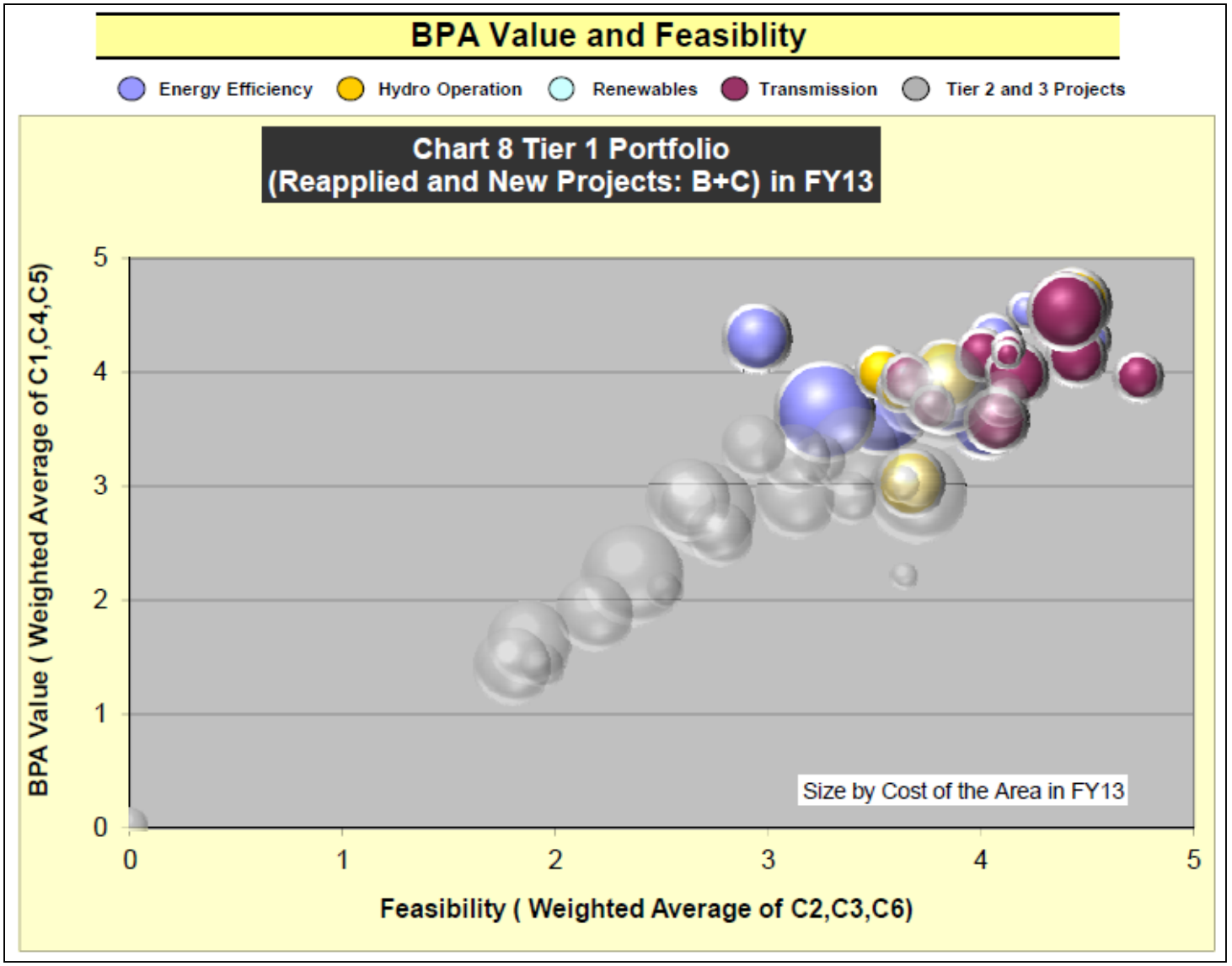
Portfolio Management: Balance



Portfolio Management: Balance



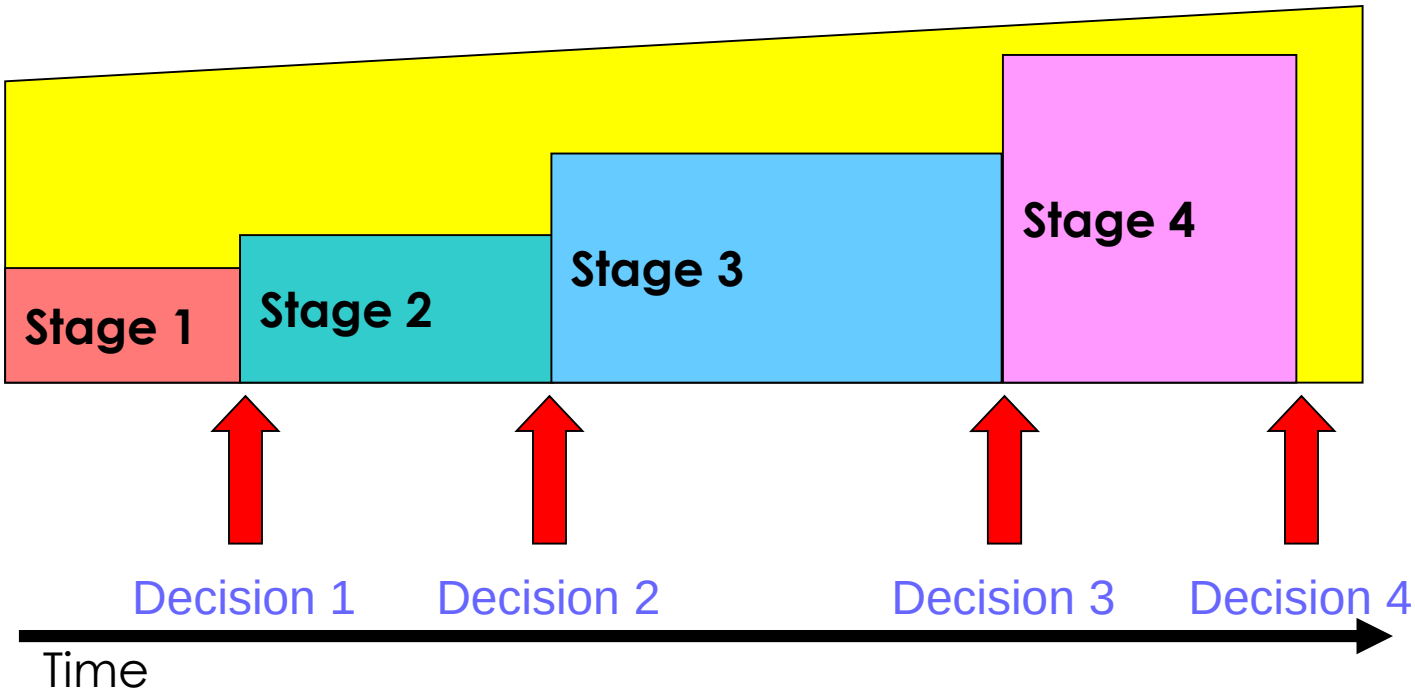
Portfolio Selection



Project Management

- Provide oversight and guidance
- Implement the Project Management Maturity Model to advance R&D project management skills and practices
  - Develop and maintain comprehensive tools, templates and documentation for the TI PMs
- Establish methods to monitor, influence, and appropriately control project performance
  - Require stage gates
  - Informal monthly meetings
  - Formal quarterly reports
  - Provide PM training and development opportunities
  - Implement financial reporting tools
- Facilitate collaborative engagement

Project Management: Stage Gates

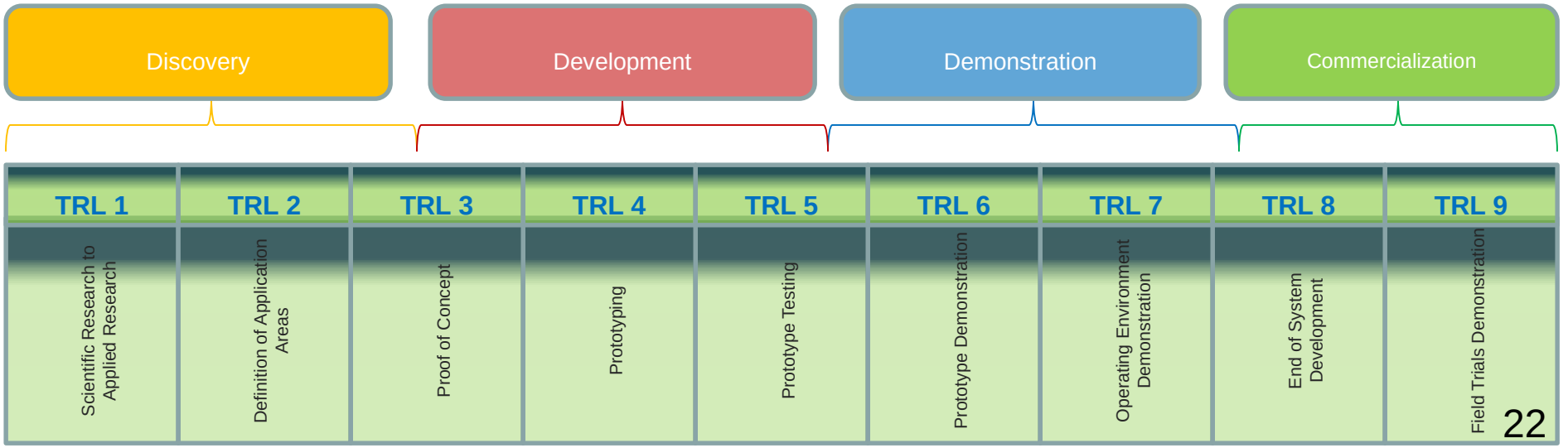


- Project "X " represented as a series of Stage Gates
- Options at each SG: Quit, Continue, Expand

Mantra: "Fail Early, Fail Cheap"

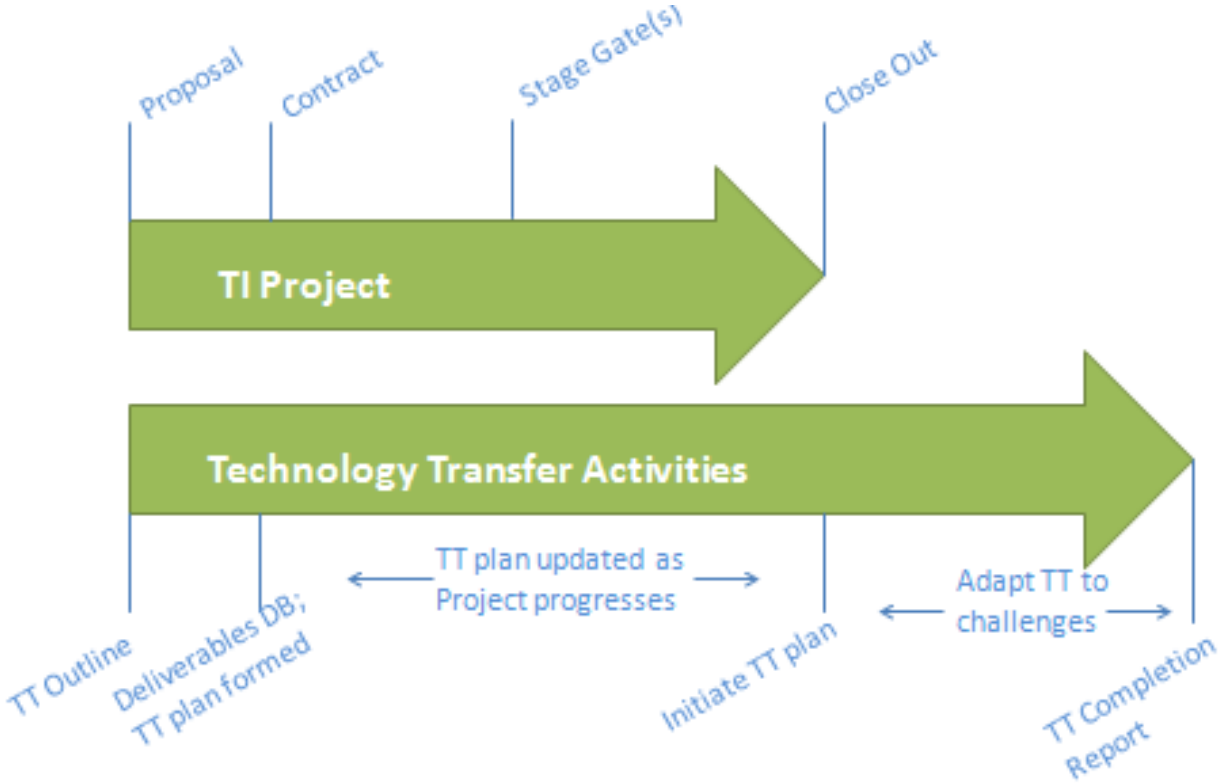
Technology Transfer: Application Planning

- Structured approach
- Consider implementation strategy at project *inception*
- Next steps based on Technology Readiness Level (TRL)
  - TRL<7
    - Development continues through
      - Direct BPA investment or
      - Reference to outside institutions (National Labs or Academia)
  - TRL≥7
    - Ready for implementation in real-world application!



Technology Transfer: Application Planning

- Application planning begins at project inception, and continues past project completion.
- A Technology Transfer plan matures throughout the course of project and is to be used to pro-actively addresses challenges to eventual technology application.



General Industry Application

- Innovation investment is a *requirement* for success and relevancy
  - Choice: **Managed** process or 'chaotic' funding and missteps
- Innovation is messy – most R&D fails
  - Embrace a **balance**
  - Fail **early** = fail **cheap**
- Structured R&D program
  - Manage the investments
  - Appropriately **timed** and well **articulated** stage gates (measureable outcomes)
  - Integrated to **support** business objectives and corporate strategy

General Industry Application

- Road maps and technology transfer are the bookends of innovation
  - Road Maps show *innovation* can achieve the vision and mission of your business.
  - Technology transfer *starts* when the project is awarded
    - Know who will 'own' the innovation (and when they need to prepare)
    - Plan for the implementation strategy and funding

Change is the constant: Innovation is Essential!

Conclusions

- BPA demonstrated success with R&D
  - Provides a framework for selecting and managing a portfolio >$17M and 50 projects annually

- Money is not enough! The process requires:
  - Clarity of purpose
  - Clarity of choice
  - Clarity of the system

Disciplined R&D = $100 Millions in Value

RESOURCES & CONTACTS

To Learn More:

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