Institutionalizing Innovation Management: A Case Study from the Utility Industry

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Introduction

- Technology Management Process in Literature
- Overview of the Bonneville Power Administration (BPA) transmission system
- Managing Research and Development at BPA
  - Roadmapping
  - Portfolio management
  - Project management
  - Technology transfer
- Application to others industries
- Lessons learned
- Conclusions
Technology Management Process in Literature

- Technology Strategy Development
- Technology Needs Assessment
- Technology Gap Analysis
- Technology Availability Assessment
- Technology Evaluation
- Technology Selection
- Technology Acquisition
- Technology Adaptation
- Technology Implementation
- Technology Improvement
- Technology Imitation
- Technology Innovation
One of four regional Federal power marketing agencies within the U.S. Department of Energy (DOE).


BPA markets wholesale electrical power from 31 federal hydro projects in the Columbia River Basin, one nonfederal nuclear plant and several other small nonfederal power plants.

The BPA has more than 15,000 miles (24,000 km) of electrical lines and 300 substations in the Pacific Northwest and controls approximately 75 percent of the high-voltage (230 kV and higher) transmission capacity in the region.
Technology Innovation: Cyclical Process
Technology Innovation Structure

Technology Confirmation/Innovation Council
Chaired by Sr. VP Corporate Strategy: Executives and Technologists

Technology Innovation Office
Chief Technology Innovation Officer: Terry Oliver

Technology Roadmaps
- Energy Efficiency
- Transmission

Next Roadmap
- Define which technologies are important to BPA
- ID gaps between the current & future technologies
- Help prioritize research choices

Technology Targets

Technologies Identified in Roadmaps

Function
- Provide direction & principles
- Portfolio selection
- Ensure decisions are applied
- Manage Portfolio
- Develop Project Mgt tools
- Manage Projects
- Roadmaps identify R&D targets
Technology Innovation Operations: Integrated Process

**Portfolio Management**
- Definition of focus areas
- Balanced portfolio

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

**Roadmapping**
- Identifies technologies matched to business challenges
- Integration of key agency targets
- Serves as the basis for the research portfolio

**Technology Transfer**
- Application of technology to meet business challenge
- Technology commercialization
- Intellectual property considerations

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Technology Innovation Operations: Integrated Process

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Roadmapping

- Synthesis of internal and external expert opinions
- Links business, operational and technical challenges
- Guides R&D efforts
- The roadmapping process:
  - Workshops to identify BPA challenges and drivers
  - Identify technologies that address the challenges
  - Identify technology gaps
  - Determine how technologies will be acquired or developed
  - Consider alternative solutions
Roadmapping

- Current technology roadmaps
  - Transmission Operations and Planning
  - National Energy Efficiency
- Roadmap framework
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
Portfolio Management: Balanced Portfolio

Value

Low

High

Feasibility
(Probability of Project Success)

High

Easy gain but little benefit

Target project

Low

Poor investment

Good but needs attention
Portfolio Management: Balanced Portfolio

Assessing BPA Role in Technology Development
- Centralized Agency R&D
- Collaboration
- Actively Assess
- Watch
- No Interest Pass

Balancing of Portfolio Issues
- Breakthrough
- Incremental
- Internal
- Subject Matter Themes

Improving Effectiveness of R&D Investment
- $ → $$ → $$$

Size of Project Investment
Portfolio Management: Portfolio Selection

BPA Value and Feasibility

Chart 8 Tier 1 Portfolio (Reapplied and New Projects: B+C) in FY13

Feasibility (Weighted Average of C2, C3, C6)

Size by Cost of the Area in FY13

FY11-13 R&D Portfolio
Project Management

- Provide oversight and guidance

- Implement the Project Management Maturity Model (PM3) 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 gate
  - Informal monthly meetings
  - Formal quarterly reports
  - Provide PM training and development opportunities
  - Implement financial reporting tools

- Facilitate collaborative engagement
Project Management: Stage Gate Reporting

Analysis of Project Value Includes:

- Risk
- BPA business challenges
- Cost
- Relation to objectives
- Achievement of deliverables

Option = quit, continue, expand, change

Stage 1  Stage 2  Stage 3  Stage 4

Project X Restructured as a Series of Stage Gates

Decision 1  Decision 2  Decision 3  Decision 4
**Technology Transfer: Intellectual Property**

- Dissemination of knowledge and research results to maximize value of R&D investments
- Intellectual Property incentivizes technology development
- Externally - Research partners have elective rights. BPA receives licenses
- Internally - BPA can develop IP and utilize for a variety of purposes consistent with our mission
  - Defensive use
  - Leadership in sector
  - Reasonable returns on investment
Technology Transfer: Application

- 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!

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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 Application to Industry

- 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 stage gates
  - Integrated to support business objectives and corporate strategy
- 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!
Lessons Learned

- Council of Peers
  - The Technology Council provides a forum for executives and subject matter experts to exchange ideas
  - Ensures diverse opinions are considered.

- Pruning is a necessity
  - Otherwise, complacency is a risk
  - Makes funding available for more relevant projects

- Summit review requires objective data
  - Implement rigorous review process
  - Use quantified criteria
  - Improves the clarity of project’s value
Conclusions

- Demonstrated success with R&D
  - Provides a framework for selecting and managing a portfolio
    > $12M and 50 projects annually

- Framework serves as a model for other utilities
  - There are some common themes that can be applied to all industries

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

**Disciplined R&D = $000 Millions in Value**
References


