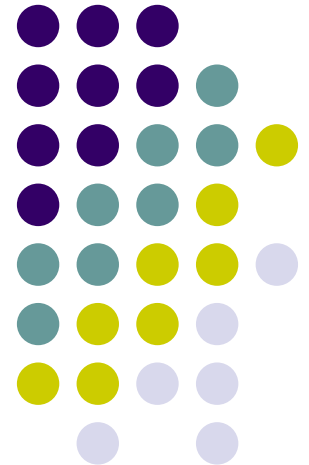


Content and Values in the Management of R&D Portfolios

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Presentation Outline

- Project on Content-Value Dimensions for Portfolio Management
- Literature perspectives on R&D portfolios
- Content and Values in R&D portfolios
 - Strategic dimensions of R&D portfolios
 - Implementation and impact assessment
- Case application: NIDRR portfolio
- Lessons and next steps

Project on NIDRR Portfolio



- Categorical demand for performance:
 - Make a difference in the life of people with disabilities
 - Mission seems clear conceptually but hard to demonstrate how research makes a difference
- Very complex agency portfolio
 - Based on themes that articulate priorities improving life of people with disabilities
 - Thoroughly inter- and multi-disciplinary
 - Institutional convergence for the field of rehabilitation
 - Underlying epistemic fragmentation
 - Composed by many fields with strong epistemic traditions of their own

NIDRR Portfolio



- Disability and Rehabilitation Research Agency (US Dept. of Education)
 - 8 project areas (defined by targeted needs: employment, health and function, technology for H&F, participation and community living, KT, disability demographics, ADA assistance, capacity building)
 - Approx. \$105M research budget
 - About 30 Rehab. Research and Training Centers
 - \$600K-800K a year in 5 year periods.
 - About 30 Rehab. Engineering Res. Centers
 - \$800K – 1M per year in 5 year periods.
 - Utilization and Field Initiated Projects

Project on NIDRR Portfolio



- Management challenge
 - Internally: Determine the optimal composition of the portfolio
 - Regular dimensions of risk, resources, payoff, etc.
 - Maintain coherence of the portfolio as a whole
 - Externally: Facilitate the knowledge flow from the portfolio for maximal impact
 - Diverse constituencies that include people with disabilities, their activist organizations, care givers, etc.
 - Dual translation:
 - meaning of impact into research priorities
 - Available results into applications, uses and practices that have an impact

Perspectives on R&D portfolios



- Literature on portfolio management doesn't address this situation
- Analogy from financial investments
 - Partition of investment assets into a set of diverse financial instruments with relatively uncoupled risk factors
- Two main types of R&D portfolio
 - A set of projects pursuing different technical approaches to solve the same overall problem
 - A set of projects focused on the same technical problem executed in competition with each other

Perspectives on R&D portfolios



- Analysis of R&D portfolios:
 - Economic approaches
 - Cost-benefit analysis
 - Internal Rate of Return; Net present Value; ROI
 - Option pricing
 - Management approaches
 - Project selection techniques
 - Operations research
 - Scoring schemes
 - In general, ways to translate priorities held by groups into a single algorithmic framework

Perspectives on R&D portfolios



- Broader value context of these approaches
 - Organizational goals for R&D activity are very clear
 - Market competition or strategic technical goal (defense)
 - Winner take all game
 - Public good is realized independently of who wins (challenged by globalized markets)
 - Allows optimality calculation for aligning project set with organizational objectives
 - The knowledge field of projects is essentially uniform
 - Infrastructural concerns are not a priority
 - Process and criteria for knowledge validation are clear
 - Basic or exploratory research is treated as borderline (research is demand driven, it varies according to who is doing the demanding)

Perspectives on R&D portfolios



- Applicability of financial investment analogy
 - Doesn't work well for looking at R&D portfolios
 - Different configuration of principal-agent problem
 - Finance: individual investments selected to have different levels of risk (eggs in several baskets)
 - Research: not oriented to risk of individual projects so that some failures are compensated by the successes
 - Complementarity and coherence of the research front
 - Incentives for scientists are affected by the criteria for selecting projects (i.e. individual components of the portfolio)

Content and Values in R&D portfolios



- Portfolios in the public sector
 - Constitution of relevant knowledge fields (capacity)
 - Epistemic values (rigor, validity) and the research infrastructure (ability to address certain problems)
 - Performance measured outside of jurisdiction
 - Content-value in patterns of use
- Definition of balance or optimality
 - Degree to which validation criteria of contributing fields are met in interdisciplinary portfolios
 - Degree to which values favor knowledge flow along path to desired outcome
- Similar problems also perceived in corporate environments with multiple businesses and markets (Herfert and Arbige 2008)

Content and Values in R&D portfolios



- Content-Value issues internal to portfolio:
 - Exemplars of “good science” in the “evidence-based” movement (foundation of knowledge translation)
 - Highly significant statistical results
 - Sampling: size, representativeness,
 - Controlled experiments: measured effects of causal factors
 - Skepticism of qualitative methodology
 - Diversity of validation “cultures” in interdisciplinary portfolios
 - Epistemic values are content dependent
 - “How a demographer sees a cultural anthropologist”
 - Makes collaboration very difficult
- Boundaries that must be managed by “science management”

Content and Values in R&D portfolios



- Content-Value issues in the use-impact field
 - Heterogeneity of “clients”, stakeholders, users
 - Each has a local view of the application
 - Each will engage in appropriation of the knowledge and change it (more or less)
 - Each responds to different forms of presentation of the knowledge and what it is about (different attribution of meaning)
 - They are in a variety of relations to each other as well as the knowledge production system (systemic interactions in the application field)
 - Content-value interaction at the impact point (e.g. mental health theories and measures of impact)
 - Lack of uniformity of knowledge flows is analogous to trading without a currency
 - We cannot have a single currency for knowledge trading because the exchange value is irrelevant
 - The linear model and diffusion of innovations are attempts to simplify these problems of “knowledge markets”
- Managers are responsible for proving the value of what they do for their customers

NIDRR Portfolio



- Empirical determination of phenomena
 - Internal to portfolio
 - External to portfolio
- Internal:
 - Determine what managers know about the portfolio
 - Determine what researchers know about the portfolio
 - Analyze portfolio from perspective of organizational learning
 - Formal and enacted theory of the portfolio
 - Feedback loops in managerial frame

NIDRR Portfolio



- Empirical approach,
 - External
 - Determine the user field
 - Variety of uses and roles
 - Attributions of meaning to knowledge at each point (e.g. evidence-based practices that have barriers to adoption due to redefinition of roles and shifting of burdens of implementation)
 - Determine links and types of interactions
 - Determine articulations of value
 - Documentation
 - Evidence of past action
 - Compare description of user field with mission and strategic goals for portfolio

NIDRR Portfolio



- Components of information gathering tool:
 - Knowledge production (fields, types of output, organization, professional roles)
 - Links and knowledge flows (types of uses, expected and unexpected, types of users, intermediaries, networks)
 - Values (own values, researchers, users, audiences, articulation)
 - Content dependence and other patterns



NIDRR Portfolio

- The portfolio as investment in a field
 - Disciplines of project participants
 - Medical specialties:
 - Engineering specialties:
 - Architecture and Industrial Design:
 - Social Sciences:
 - Psychology:
 - Value: Coherence of epistemic practices
 - Integration of theoretical discourse
 - Integration of data and methods
 - Management role: epistemic mediation
 - Optimality criterion: minimum fragmentation



NIDRR portfolio

- Portfolio as tool for knowledge “market”
 - Markets of the NIDRR portfolio
 - Populations by disability
 - People with disabilities
 - Families and close circles
 - Practitioners and deliverers of care
 - Government bodies in the accountability chain
- Value: Rapid adaptation of knowledge in locale
 - Attributions of meaning
 - Optimality criterion: minimum translation distance



Lessons and Next Steps

- Managers are hard pressed to respond to demands of complex portfolios
 - Competing epistemic values of interdisciplinary portfolios
- Managers and researchers often have misperceptions of each other
- The field of use seems like “outer space with a sprinkle of stars” where known spots are
 - No systematic understanding of knowledge flows
 - End points are defined abstractly
 - No unified categorization of the targets as results of known phenomenological mechanisms
- Determine patterns of content-value on both sides of the portfolio