Delivering the "D" in Research & Development: Establishing Parity in Rigor and Relevance

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RERC on Technology Transfer

Retrospective Case Analyses

- Grounded a study of RERC innovations in actual events.
- Timeframe of recent but completed cycles (1998-2005) – 14 RERC funded but 11 qualified for study.
- Select for study only those RERC projects “with expressed intent” to achieve transfer outcomes.
- Apply “Success Case Method” – identify evidence that stands up in court (Brinkerhoff, 2003).
- Create “business model” framework and overlay RYD plans described in proposals.
- Track evidence of progress via Outputs and Outcomes.

Justification for Study

- NIDRR 2003 Priority: *"Identify innovative practices in technology transfer."*
- NIDRR struggled with development metrics in logic models and in evaluation metrics (APAER).
- Advisory Boards and T/A - RERC's applying academic rather than industry standard R&D methods.
- RERC Development Projects routinely dwell "in the pipeline" then gradually fade away – low apparent yield.
- Evidence of some successes including "home runs."

Case Analysis Method

- Review original RERC grant narratives to identify all development projects.
- Overlay plans and evidence of progress on development model template.
- Interview PI's to fill in gaps in evidence, collect project data and explore why's.
- Identify innovations in processes as variance from industry template.

4 Product Categories

1. ***Industry Standard / Clinical Protocol***

   Guidelines generated and validated internally then adopted and implemented externally.

2. ***Freeware***

   Operational hardware or software acquired at no cost by external users via order or download.

3. ***Instrument/Tool***

   Instructions, component kit, or built to order at cost recovery, for laboratory or clinic use.

4. ***Commercial Product***

   Prototype or design acquired as basis for new or improved product manufactured and sold in market.

Development Projects Proposed

	CAT 1	CAT 2	CAT 3	CAT 4	Total
Total projects proposed by 11 RERC's	11	8	15	44	78

Case Results – Progress to Output or Outcome

Evidence of Internal Draft/Prototype (Output):

	CAT 1	CAT 2	CAT 3	CAT 4
Proposed Output:	*11*	*8*	*15*	*44*
Achieved Output:	12	2	7	19
	100%+	33%	44%	43%

Evidence of External Transfer and Use (Outcome):

Achieved Outcome	11	2	2	6
	100%	29%	13%	14%

What did work?

- Twenty-five percent of all proposed projects yielded transfers of some type.
- 90% of Category 1 transfers came from one RERC.
- 16% of Category 4 projects yielded transfers – all from 3 RERC's.

Why They Worked?

- Tracked target industry and knew decision-makers – knew customer and values.
- Maintained close and frequent contact with inside corporate contacts – high turnover.
- All based on prototypes initiated in prior funding cycles -- long time frames.
- Addressed broad access issues – high market relevance.
- Applied standard practices independently or through broker (T2RERC).

What didn't work and why not?

Seventy-five percent of proposed projects – sixty in all -- did not achieve transfer:

- Project Management/Staff Loading (43%).
- Inability to recruit transfer partner (37%).
- Loss of Original External Partner (14%).
- Technical Issues (6%).

Operational Issues account for full 80%!!

Project Management/Staff Loading (43%)

- Twelve projects failed to launch at all.
  - *Limited commitment to implementation?*
  - *Insufficient FTE allocations - 5% to 20% of PI and partial allocation of GRA's?*
  - *Focus on research deliverables or other duties assigned in department/school?*

Project Management/Staff Loading

- Eight projects lost their “Internal RERC Champion.”
  - *Projects based on PI interests, not on need of field, industry or user group?*
  - *No succession plan evident in event PI or key staff depart – Industry replaces managers?*
  - *No clear inter-dependence of projects, to ensure coherence during periods of staff disruption?*

Project Management/Staff Loading

- Five projects had testing/trial periods that exceeded funding cycle.
  - *Projects progressed slowly, initiation postponed, or work pace cycled?*
  - *Projects did not program in slack time for unscheduled or routine logistical delays?*
  - *No evidence that management/project tracking tools were routinely used?*

Inability to Identify Partner (37%)

- Twenty-two prototypes did not attract external partners willing to transfer.
  - *Some development projects justifiable on internal needs basis, expressed an intent to transfer externally – a necessary response to proposal criteria?*
  - *Little evidence of effort to offer externally?*
  - *“Supply push” type projects initiated by internal champion without external validation?*

Observations on Operational Issues

- RERC priority/review criteria do not fully reflect standard practices for development activity (RERC vs. SBIR; FIR vs. FID).
- Grantees focus attention and resources on research agenda where incentives await.
- RERC requirement for transfer plan in Year One is too late yet still not done.

Secondary Analysis of Narrative

- Compare R&D “Rigor” described by Grantees to Industry standard practices.
- Reference Manual - Product Development Manager’s Association (PDMA) Handbook –
  - *“Campbell & Stanley” for industry.*
  - *PDMA: Seven Forms of Essential Preliminary Analysis for New “Product” Development.*

PDMA's Seven Forms of *Essential Preliminary* Analysis

1. Initial Screening for need.
2. Technical Assessment.
3. Customer Interest Build/Buy.
4. Collaborations.
5. Assessment of Uniqueness.
6. Implementation Plan.
7. Allocation of Resources.

Scoring System for Narrative Review

0 = No mention of activity/factor.

1 = Declarative statement without further substantiation – “trust me.”

2 = Explained with partial justification or analysis – some pieces of the puzzle.

3 = Addressed in comprehensive manner – worthy of investment with confidence.

Evidence of Seven Essential Preliminary Analysis Factors in Proposal Narrative

1. Initial Screening for need and demand - .75*
2. Technical Assessment - 1.60**
3. Customer Interest Build/Buy - 1.00
4. Collaborations - 1.43
5. Assessment of Uniqueness - 1.06
6. Implementation Plan - 1.53**
7. Allocation of Resources - .24*

Average for all 78 projects: 1.09 out of 3.00

Evidence Highs and Lows

- Allocation of Resources (.24) & Initial Screening of Need (.75).
  - *Between "no mention" and "trust me."*
  - *Budget elsewhere but no work plan here.*
- Implementation Plan (1.53) & Technical Assessment (1.60).
  - *Focused on implementation of technical assessment to exclusion of market and use.*

Ten Lessons to Improve Outcomes

- ✓ *Conduct thorough preliminary technical, market and customer analyses, to validate need objectively.*
- ✓ *Require specifics in the project planning stage to limit impact of unanticipated barriers during implementation.*
- ✓ *Focus on overcoming operational barriers by applying standard methods and metrics such as those offered by PDMA.*
- ✓ *Identify, track and protect all intellectual property.*
- ✓ *Ensure that the internal team resources and commitment are comparable to that expected from the external transfer partner.*

Ten Lessons cont'd

- ✓ *Create contingency plans as corporate transfer partners are subject to substantial changes over project cycle.*
- ✓ *Integrate project management tools to track resource allocation, tasks completion and benchmarking effort.*
- ✓ *Identify incentives for development and transfer achievements, comparable to career incentives for research publications.*
- ✓ *Consider how to maintain project commitment beyond specific investigators or established budget cycles.*
- ✓ *Focus on the outcome to maintain a stable path of progress in a dynamic context with extended timeframes.*

Expected Benefits

- To NIDRR – adopt a method to identify and track evidence of development outputs & outcomes.
- To RERC's – apply technology transfer innovations from other RERC's, to improve practice and increase project yield.
- To T²RERC – offer case-based Technical Assistance to all stakeholders.
- To A/T Field – provide metrics on inputs, process, outputs, outcomes and impacts.

T2RERC → KT4TT

- ***Effort underway to create a model that integrates Technology Transfer and Knowledge Translation processes.***
- ***A Stage/Gate model useful for planning, implementation and tracking purposes.***
- ***www.kt4tt.buffalo.edu***

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