Evaluation of the Collaborative Research and Development (CRD) Program

A discussion of the challenges and lesson learned associated with online surveying companies and university students

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Outline

- Overview of the CRD Program
- Summative evaluation of the CRD Program
  - Scope, Objectives, Issues
  - Methods
- Web survey of highly qualified personnel (HQP)
  - Challenges, Approach & Limitations
  - Results and Lessons Learned
- Web survey of industrial partners
  - Challenges, Approach & Limitations
  - Results and Lessons Learned
- Discussion

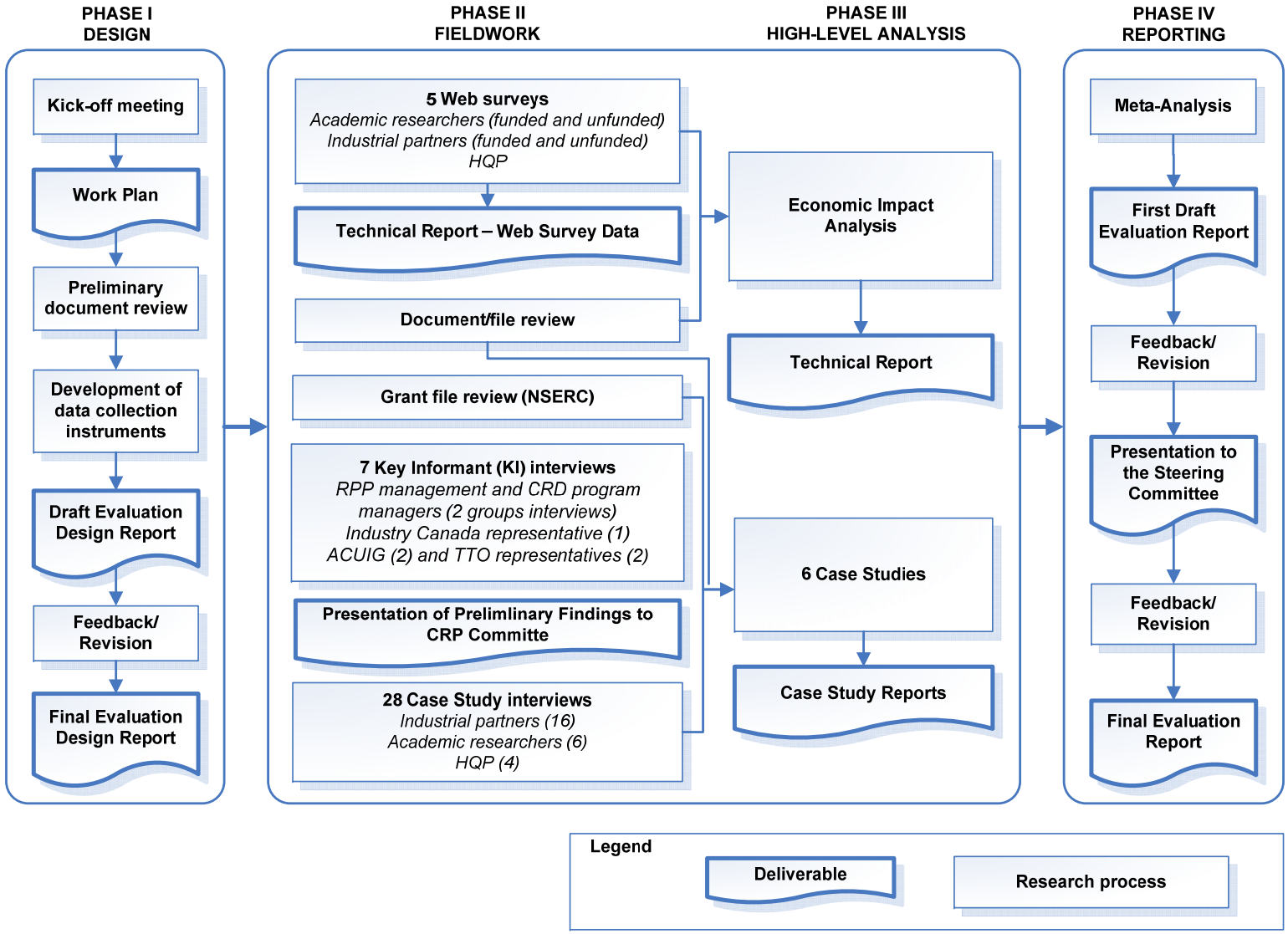
Overview of the CRD Program

- Longstanding program within NSERC's suite of Research Partnership programs, CRD grants aim to:
  - Give companies access to the knowledge, expertise and educational resources available at Canadian postsecondary institutions
  - Train students in technical skills required by industry
- Industry driven: cost-shared support of industry-academic collaborative R&D projects with economic benefits
- Proposals can be submitted at any time and all proposals undergo peer review
- Key beneficiaries are industrial partners, highly qualified personnel (HQP) and academic researchers

Summative evaluation of the CRD Program

- Science-Metrix mandated by NSERC, summative evaluation conducted in 2009–2010
- Scope, Objectives and Issues
  - 10 years: FY 1997–1998 to FY 2007–2008
  - Designed to evaluate intermediate outcomes and longer-term impact of the program on industrial partners, academic researchers and highly qualified personnel (HQP)
  - Four evaluation issues (relevance, design & delivery, success/impact and cost-effectiveness), specific sub-questions refined through internal consultation process
  - Included an assessment of the program's socio-economic impact

Evaluation methods overview



Evaluation methods – Fieldwork

- Document and file review (including grant file review)
- Key informant interviews
- 5 web surveys:
  - Academic researchers (2 surveys)
    - Both funded and unfunded applicants were surveyed
  - Highly qualified personnel (HQP)
    - Collection of data on participation and impact of CRD projects
    - First consultation of HQP involved in the CRD program
  - Industrial partners (2 surveys)
    - Industrial partners from both funded and unfunded projects
    - Included collection of data to support economic impact analysis
  - All administered using SNAP Online software
    - Fully customizable, many advanced functionalities

Evaluation methods – High-level analyses

- Economic impact analysis:
  - Several types of analysis: static and dynamic (top-down and bottom-up)
  - Results expressed as impact on Canadian GDP (2006$, return on investment)
  - Static and top-down approaches mainly used data from program files (e.g., budget/expenses) and StatCan, plus some survey data
  - Bottom-up approach sought to estimate the effect of the program based on an econometric analysis of **micro-data observations** of firms and researchers involved in the program
    - **Highly dependent on survey data**, especially from industrial partners, both funded and unfunded
- 6 case studies

Challenges – HQP web survey

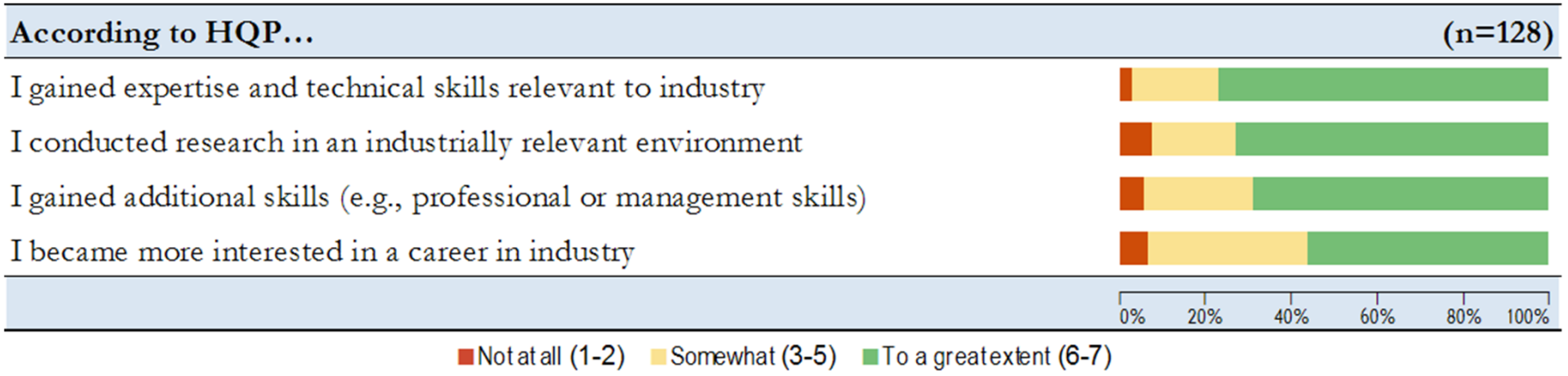
- Population of HQP
  - The population of HQP participating in CRD projects is not known (i.e., no central list/database of HQP)
    - Information on number and type of HQP is available on from the Final Reports (completed by researchers) for each CRD grant and some data was collected via the researcher and industrial partner web surveys
- Availability of contact information
  - Ongoing collection of HQP contact information is not feasible given nature of program delivery and HQP involvement
    - HQP contact information is not collected in a systematic manner in Final Reports for CRD grants
  - Privacy laws pertaining to use of personal information prevented use of available contact information

Approach & Limitations – HQP web survey

- Survey approach
  - "Respondent-driven" non-probability sampling approach: HQP were invited by academic researchers, then volunteered to participate
  - At the end of their own survey, academic researchers were asked to forward a survey invitation to HQP who had participated in their CRD grant(s) within period under evaluation
- Limitations
  - **Selection bias**: Likely biased toward HQP who maintained contact with researchers; could not assess representativeness of the sample due to sampling approach
  - **Self-selection bias**: HQP volunteered to participate in the survey, likely resulting in an over-representation of characteristics correlated with willingness to participate
  - **Evidence of biases**: A higher percentage of HQP survey respondents were employed in academia (46%) than the proportion of HQP employed in this sector as indicated by academic researchers in the surveys and grant files (approximately 24%)

Results – HQP web survey

- An estimated response rate of 39% and margin of error of ±6.53%
  - A total of 164 HQP volunteered to participate (of which 144 responded to the survey). A conservative estimate suggests that at least 355 HQP were sent an invitation. The response rate and margin of error are thus based on a sample population of 355.
- Provided important insight into the skills, experience and expertise acquired by HQP as a result of participating in CRD grants
- Survey findings provided a better understanding of the impact of the program on HQP; complimented and confirmed findings from other lines of evidence (e.g., file review, other surveys, and case studies)



Lessons learned – HQP web survey

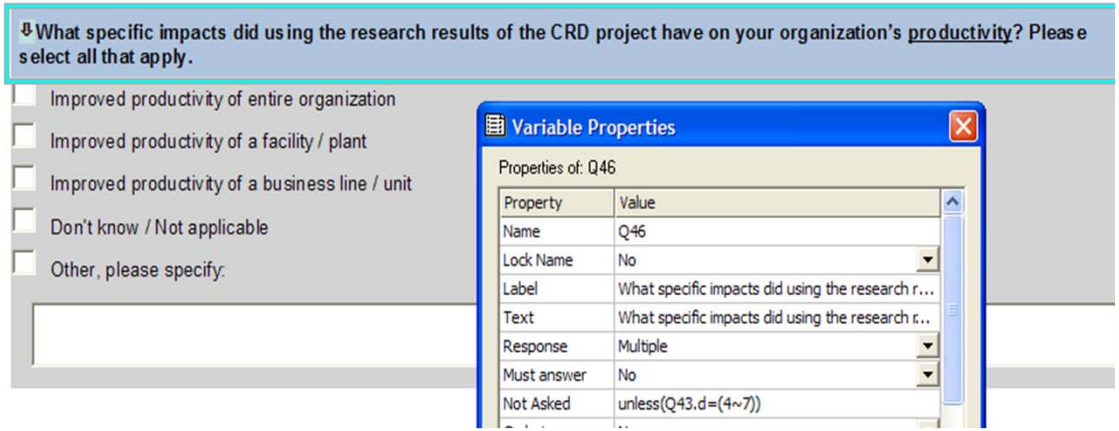
- Successful first attempt to collect primary quantitative data from HQP on the impact of CRD program
- Approach allowed for estimate of invited sample, and comparison with other data sources provided evidence of bias
- Given limitations, data was handled in a more qualitative than quantitative manner (e.g., use of quotes)
- Used to complement/corroborate data from other lines of evidence in the evaluation
  - Economic impact of CRD program via capacity building confirmed by economic impact analysis
  - Benefits for HQP highlighted in evaluation findings, which directly supported one of four recommendations

Challenges – Industrial partner web surveys

- Population of industrial partners
  - Data on total population of industrial partners (n ≈ 1,500) but current email addresses for only 65%
  - Small initial population of unfunded partners (n ≈ 220) and current email addresses for only 47%
  - Variation in company size and structure, gatekeepers, finding the “right” person(s) to provide information
- Data needs for economic impact analysis
  - Timescale for impacts: projects with end date from 1998 to 2007
  - Availability/quality of data vs. level of detail required
  - Confidentiality concerns

Approach – Industrial partner web surveys

- Follow-up by NSERC and online searches to obtain current email addresses
- Long survey timeframe (9-10 weeks), up to 3 reminders, and surveys could be completed in multiple sessions
- Clear messaging: Invitation signed by NSERC, privacy and data use statements
- Use of advanced web survey functionalities to improve data quality, data validation and completion rate
  - Project “seeding”
  - Question routing (skip logic)
  - Error messages
  - Database link via unique ID



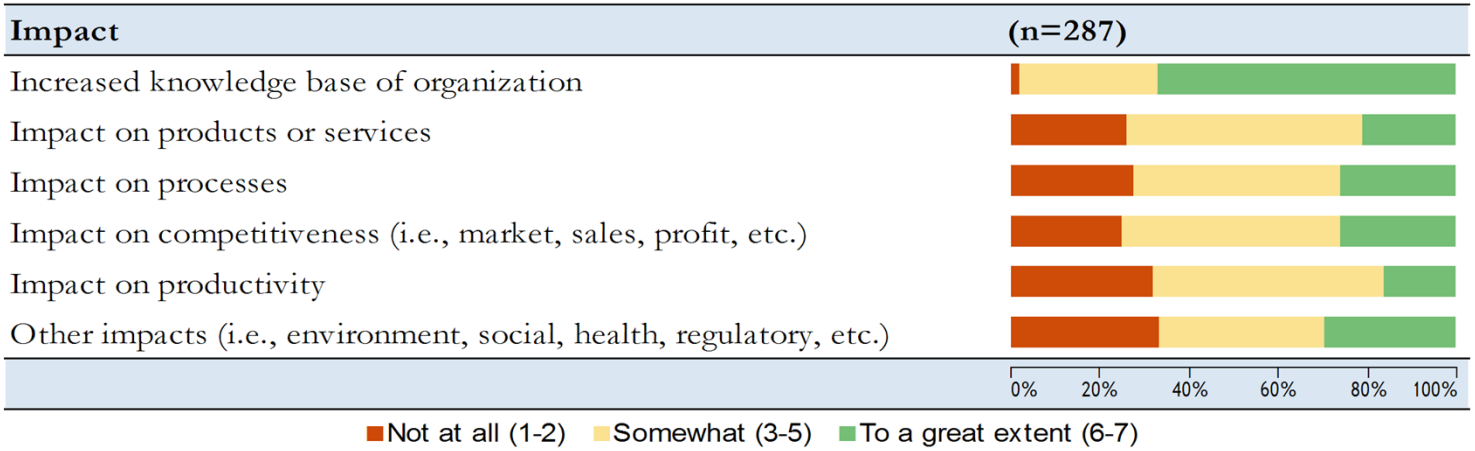
- Back-up for the economic impact analysis: case studies
  - Case study sample too small (6) and limited data on financial impacts was obtained

Limitations – Industrial partner web surveys

- Limitations
  - Self-selection bias
    - Likely over-representation of characteristics correlated with the willingness to participate (e.g., grant amount)
  - Self-reported data/information
    - May rely on memory of projects completed > 10 years ago
  - Could not force responses without reducing completion rate
    - Fewer responses for questions asking detailed/confidential data for the economic impact analysis
    - About 45% did not respond to the question on annual sales figures

Results – Industrial partner web surveys

- Funded industrial partners: 288 completed surveys
  - Response rate of 30% and margin of error of ±4.84%
  - Sample was generally representative of total population (industry, region)
- Unfunded industrial partners: 29 completed surveys
- Provided valuable insight on impact of CRD grants:
  - Use/impact of research results, hiring of HQP, effect on internal R&D, collaboration with academia and relevance of program



Lessons learned – Industrial partner surveys

- (Mostly) successful first web-based approach to collect quantitative and qualitative data from industrial partners on CRD grant participation and impacts to support program evaluation
  - Lower response rate than telephone surveys (30% vs. 57-69%) but efficiently reached more respondents (288 vs. 65-88 completed)
  - Population characteristics of unfunded industrial partners (small population, lack of "true unfunded") limited the use of data collected
- Multiple lines of evidence: Don't put all your eggs in one basket!
  - Data limitations circumvented the bottom-up economic impact analysis
  - Elements of economic impact analysis based on other sources of data (i.e., project files, StatCan tables) were successfully completed
- Constant challenge to obtain economic/financial data from private sector
  - Assess potential to use data from StatCan surveys or other sources

Discussion

- Implications for other evaluation projects (HQP)
  - Similarities with other populations
    - Challenges faced with CRD HQP are common to HQP in other NSERC partnership programs, but not scholarship programs
  - Lessons learned apply to evaluations of other types programs with “second-level” beneficiaries
    - Value in collecting information from such populations
  - Consider web-based approach to collect HQP contact information (with consent) during grant
  - Test snowball sampling

Discussion (cont'd)

- Implications for other evaluation projects (industrial partners)
  - Frequent non-response for economic/financial questions
  - Improve/enhance performance data collected (e.g., web-based forms) from industrial partners during grant
  - Test mixed-mode survey administration (mail, telephone, web) to reduce non-response
  - Consider follow-on data collection (interviews, case studies) with representatives from partner organization
    - Identify appropriate contact person(s) for questions relating to economic impact

Feedback, Questions and Contact Information

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