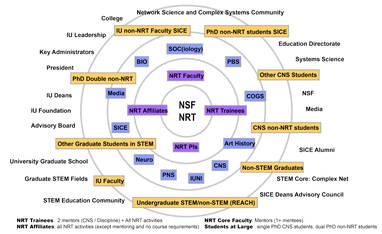
Visual Analytics of STEM Graduate Education: Combining the Systems Evaluation Protocol and Data Visualizations in Support of a NSF NRT Program Evaluation

Olga Scrivner[1], William Trochim[2], Katy Börner[1]

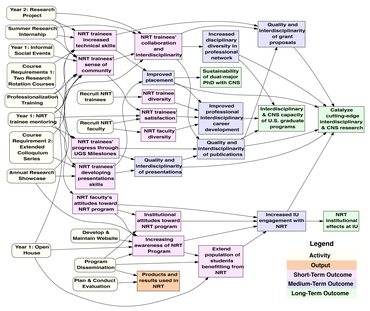
[1]School of Informatics, Computing, and Engineering, Indiana University and [2]Cornell University

Systems Evaluation Protocol - Netway

The Systems Evaluation Protocol (SEP) enables the inclusion of multiple perspectives, reflecting the complexity of program activities and outcomes [2, 5].



Stakeholder Analysis. The stakeholders perspective is essential to build the CNS NRT logic and pathway models.

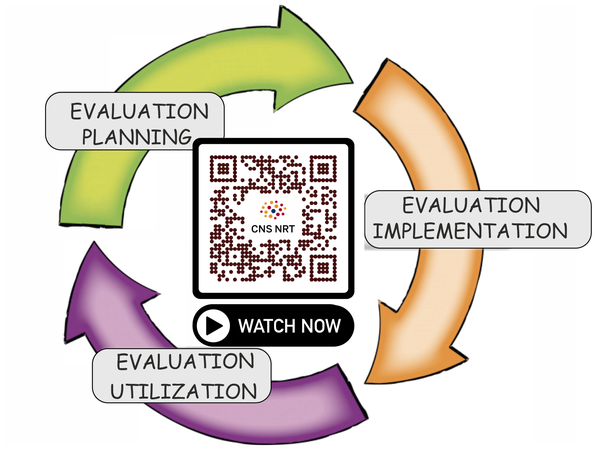


Logic Model: Understanding the relationships between actions and expected results for a program [4].

Desired Outcome	Concepts to Measure	Source of Data
NRT institutional effects at IU	- Program dissemination - Evaluation results - Attitude, awareness - Extending population	- Annual surveys - CNS NRT data - Interviews - Applications/Website
Catalyze interdisciplinary & CNS research	- Quality presentation - Quality grants - Quality publications - Professional network	- SIS, GED - Annual surveys - CNS NRT data - MSS
Interdisciplinary & CNS capacity of U.S. graduate programs	- Faculty/trainees diversity - Improved career development - Nature of publications	- Institutional data - CNS NRT data - MSS - Interviews
Sustainability of dual-major PhD with CNS improved placement	- Time/length - Extension to other programs	- PI interview/surveys - Annual surveys - MSS
Institutional innovations	- Evaluations	- National data

SIS, GED - Institutional data; MSS - Most significant stories

A unique interdisciplinary STEM training for 34 PhD students, 40 summer affiliates and more than 300 participants across the participating PhD programs.



Program Goals

Goal 1: Dual Research Proficiency

Goal 2: Collaborative Skill Development

Goal 3: Workforce Development

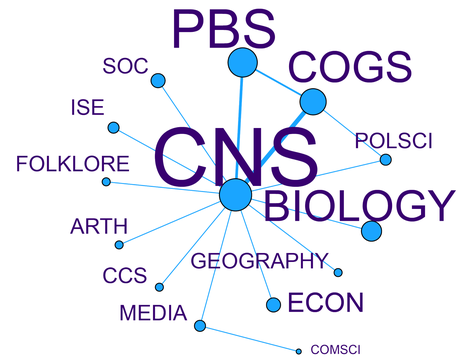
Goal 4: Interdisciplinary Training Model

CNS NRT

Data Management and Analysis

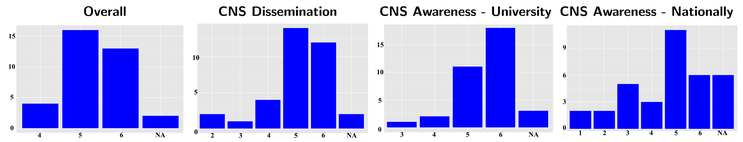
Unstructured Data: Annual student progress report (GED), Most significant stories, Annual survey open-ended questions, Interviews

Structured Data: Student information system (SIS), Annual survey rating questions, Mentor-mentee linkage table



CNS NRT Program - Year 2 Survey

Is NRT program on track to achieve its goals?



Interdisciplinary Scale. TDO measures values, attitudes, behaviors, and conceptual skills in team-base and individual cross-disciplinary orientation.

My research reflects - my openness to diverse disciplinary perspectives.

Mentorship Scale. 23-items scale measures the effectiveness of mentorship from mentors and mentees perspectives [1].

My mentor - was supportive and encouraging.

Most Significant Change Technique. MSC enables broad participation (trainees, affiliates, faculty, staff, advisory board) places events in context and monitors program impact [3].

References

[1] Ronald A Berk et al. "Measuring the Effectiveness of Faculty Mentoring Relationships". In: *Academic Medicine* 80.1 (2005), pp. 66–71.

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[4] Lisa Wyatt Knowlton and Cynthia C. Phillips. *The logic model guidebook : better strategies for great results*. SAGE Publications Inc., 2012. ISBN: 9781483307237.

[5] J. B. Urban, M. Hargraves, and W. Trochim. "Evolutionary Evaluation: Implications for evaluators, researchers, practitioners, funders and the evidence-based program mandate". In: *Evaluation and Program Planning* 45 (2014), pp. 127–139. DOI: 10.1016/j.evalprogplan.2014.03.011.

obscrivn@indiana.edu