

THE IMPACT (INFLUENCE) OF STAKEHOLDER PARTICIPATION IN THE LOGIC
MODELING PROCESS:
A CASE STUDY FROM NASA GODDARD SPACE FLIGHT CENTER

By

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Dedication

To:

My beloved husband Dan, whose steadfast and unwavering love and support made this happen; he has the patience of Job.

My editors and dear friends Lori and Margie, for their commitment and their loving guidance.

My brother Tom, who understood the urgency of this endeavor.

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Paper One: The Impact (Influence) of Stakeholder Participation in the Logic Modeling Process: A Case Study from NASA Goddard Space Flight Center

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Abstract

This paper responds to a gap in the empirical research on stakeholder influence in evaluation recommendations in public organizations. It presents a richly descriptive case study showcasing the expected relationship (Weller & Barnes, 2014) of the logic modeling process in designing two technical training and development programs in the NASA Goddard Space Flight Center Engineering and Technology Directorate. The proposition is: Stakeholder influence in the logic modeling process has an impact on organizational decision-making and change. Driving this proposition is the question: How (and in what direction) might stakeholder participation in the logic modeling process influence its acceptance as the framework for program design and evaluation? The key decision point (KDP) is stakeholder acceptance of the logic model. In this case, the KDP was *accepted*, the outcome was *met*, the proposition was *supported*. Intentionally hiring an evaluator into a data-driven organization created best case for influencing organizational decision-making and change.

Keywords: organizational decision-making, logic model, participatory evaluation, case study, causal pathway analysis

**The Impact (Influence) of Stakeholder Participation in the Logic Modeling Process:
A Case Study from NASA Goddard Space Flight Center**

NASA established Goddard Space Flight Center (Goddard, the Center) in 1959 as its first space complex. In the years since, Goddard has grown to become a “major laboratory for developing and operating unmanned scientific spacecraft” (NASA, n.d.a). Of the directorates within Goddard, the Engineering and Technology Directorate (ETD, the Directorate) is the largest. ETD is a data-driven organization that “provides multidisciplinary end-to-end engineering expertise for the development of cutting-edge Science and Exploration Systems and technologies...” (NASA, n.d.b). For the purpose of this study, a data-driven organization is one that uses data to make decisions and build strategy (Van Ooijen, et al., 2019).

Responding to needs within the Directorate, ETD established several in-house engineering technical training and development programs. Of these programs, I selected two as typical (Yin, 2013) for this study: the Technical Management Training (TMT) and Product Development Lead (PDL) Training programs. I purposefully chose these programs for the expected relationship and variation in case characteristics (Weller & Barnes, 2014), for the role of stakeholders and evaluation in the design (logic model-driven), and for the availability of data. In this context stakeholders are “people who have a stake or vested interest in the program, policy, or product being evaluated ... and ... also have a stake in the evaluation” (Greene, 2005, as cited in Daigneault & Jacob, 2009, p. 335). In this case, they range from evaluator researchers to non-evaluator decision-makers, program managers, instructors, presenters, panelists, and trainees.

Although “typical” in the NASA Goddard ETD technical training and development context, some may consider the case “extreme” due to the organization, the

insider role of the researcher/evaluator, the stakeholders involved, and the organizational investment of time and money. For these reasons, in addition to being “typical,” this case study is also presented as “exemplary” (Yin, 2018). For context, I will briefly introduce the TMT and PDL Training programs and the evaluation process.

The TMT and PDL Training programs are offered twice yearly. Both include lecture, lessons learned, and activities to support practice and learning. Designed as an introduction and orientation to Goddard, TMT is considered early career training and targets civil servants with an estimated five years of experience and/or contractors recently converted to civil service. PDL Training, on the other hand, is mid-career training. It is designed to provide the knowledge and skills necessary to manage subsystems on larger projects. It targets engineers typically between five and ten years of their tenure at Goddard. For both, invitation is by supervisor nomination and Division concurrence.

Each uses a participatory stakeholder-based approach to program design. This includes a logic modeling process that defines problem, program objectives, inputs, activities, outputs, and outcomes. As described by Kellogg (2004), Weiss (1998), and Wholey et al. (2004), logic modeling has long been used in program evaluation. Fed by the theory of change and intended to focus assumptions and expectations, stakeholders “profit from the disciplined thinking [that] this approach stimulates” (Weiss, 1998, p. 67). In TMT and PDL Training, once stakeholders accept the logic model, its contents drive program and evaluation design.

The remainder of this paper is organized as follows. First, I position myself in the study, then present the problem, key decision point (KDP), and expected outcomes. I

review current and historical literature that inform the theory and framework upon which my argument is built. I propose a concept map and involvement (influence) diagram. I describe the logic modeling processes and stakeholder meetings, include anecdotes, and complete the analysis using the interest/power work of Bryson et al. (2011) as adapted by Hamilton Edwards and Williamson (2019). I finish with a discussion of findings, a counterfactual to using the logic model relative to not using the logic model, and outline the strengths, limitations, and next steps.

Positionality Statement

I am an evaluator embedded in the technical training and development group in the Instrument and Payload Systems Engineering Branch of ETD. I was hired specifically to evaluate the technical training and development programs and to provide research-based data-driven recommendations for program improvement and change. I believe this investment of a full-time evaluator reflects the high level of importance placed on data to drive decisions, and it signals an openness to implement the resulting evaluation recommendations. To remain as objective as possible, I adhere carefully to the protocols in place. These include collecting anonymous data, analyzing all collected data, and reviewing findings as they relate to the problem statement and logic model. For this paper, I write from a normative, deontological perspective and focus on the influence of evaluation in making policy through the implementation of data-driven evaluation recommendations and through stakeholder participation in organizational decision-making, learning, and change (see e.g., Alkin & Christie, 2004; Henry & Mark, 2003; Weiss, 1983, 1998; Wholey et al., 2004).

Motivation

The literature is consistent in that stakeholder participation (involvement, influence) increases implementation for many reasons. These include engagement, voice, and culture (Christie, 2011; Cousins & Earl, 1992; Fetterman, 2004). Although the literature is consistent in stating that stakeholder involvement should influence and increase the probability of implementation, it is largely theoretical. A gap in the empirical research remains (Christie, 2007; Coryn et al., 2011; Cousins & Leithwood, 1986; Johnson et al., 2009).

Partially motivated by Cousins and Earl (1992), Lindblom (1959), and the Fleischer and Christie (2009) observation of a “relative dearth of empirical data on this topic” (p. 161), this study supplements current research on organizational decision-making and change as influenced by stakeholder involvement. It showcases the expected relationship of the logic model as a tool for stakeholders to influence the implementation of evaluation recommendations and the logic modeling process as a mechanism for stakeholder involvement (influence), control, and diversity (Daigneault & Jacob, 2009). This study also highlights conditions that enable the outcome (Weller & Barnes, 2014).

The driving question is: How (and in what direction) might stakeholder participation in the logic modeling process influence its acceptance as the framework for program design and evaluation? The proposition is: Stakeholder influence in the logic modeling process has an impact on organizational decision-making and change. The outcome of interest is use of the logic model to frame evaluation and program design.

To use the logic model, however, stakeholders must first accept its contents. More broadly, to implement/influence an evaluation recommendation, a stakeholder must first

accept the recommendation. Thus, accepting the logic model to frame program and evaluation design is the KDP.

Decision-Making in the Public Sector

Decision-making in the public sector is complicated (see as e.g., Lindblom, 1959; Stone, 2012; Vaughan, 1990, 2004). In one theory, rational decision-making, all options are considered and “the best alternatives based on careful analysis [are chosen]” (University of Texas, n.d.). However, this is absolutely not how bureaucracies make decisions (Lindblom, 1959). Instead, Lindblom theorizes, bureaucracies “muddle through” using limited information, focusing on desired outcomes, and making “adjustments at a margin” (p. 82).

This is not to say that NASA engineers are irrational or that they intentionally make the same mistakes over and over. I argue that NASA engineers are boundedly rational (Gigerenzer, 2001; Office of Naval Research, 1989) and maximize by “satisficing” (Gigerenzer, 2001, p. 2). In this context, NASA engineers strive for the perfection of rational decision-making and accept “good enough” (Gigerenzer, 2001, p. 2).

In addition to how an organization makes decisions, a critical assumption is the mechanism by which the organization builds knowledge. Here, I look to the constructivist theories of Dewey (1896), Piaget (as cited in Rogoff, 2003), and Vygotsky (1978) and consider them normative to organizational learning and memory. If organizational decisions are made by people within a social construct, then the constructivist framework of organizational learning is the underlying assumption and theory for this case.

For an organization to make a decision and change, “a necessary precursor to individual and group learning is [first to make] explicit the underlying assumptions” (Senge, as cited in Cousins and Earl, 1992, p. 401). This requirement implicitly leads to

stakeholder involvement and to the logic model as a tool to more rationally guide thinking and decision-making, to develop program theory, and to define “the set of assumptions about the relationships between the strategy and tactics the program has adopted and the social benefits it is expected to produce” (Rossi, et al., 2004, p. 93). My question then is, if we bring stakeholders into the logic modeling process, will their involvement influence its use and ultimately the implementation of evaluation recommendations? The literature says yes. So then, how do we decide whom to include?

Rossi et al. (2004) identify the sponsor as a key stakeholder. Weiss (1998) adds that the level of involvement is driven by the stakeholder. I would argue that Rossi et al. (2004) and Weiss (1998) are describing the power and interest work of Bryson et al. (2011) as adapted by Hamilton Edwards and Williamson (2019).

Bryson et al. (2011) introduce stakeholder analysis with a compelling argument about ethics. They suggest it “would be hard to follow the [American Evaluation Association (AEA)] guiding principles for evaluators without attending to the stakeholders” (p. 1). They use the Ackermann and Eden (1998) power vs. interest matrix as a tool to identify key stakeholders. Building on the Bryson et al. (2011) power vs. interest matrix, Hamilton Edwards and Williamson (2019) place stakeholders into four quadrants (high interest/high power, high interest/little power, slight interest/high power, and slight interest/little power) and identify each quadrant through needs and potential involvement. This way, the Hamilton Edwards and Williamson (2019) matrix becomes a tool for making “informed decisions” on who is and who should be involved (p. 249).

Previous Studies and Methods

Historically, stakeholder involvement and evaluation use were measured by evaluator observation. In 1997, Preskill and Caracelli surveyed an AEA Topical Interest

Group (TIG) and found the major purposes of evaluation [were] to “facilitate organizational learning, provide information on decision making, improve programs, and determine the merit or worth of the evaluand” (p. 209). Later, Fleischer and Christie (2009) surveyed the same AEA TIG using an adaptation of the Preskill and Caracelli (1997) instrument. Their results were similar to those reported by Preskill and Caracelli.

Where Preskill and Caracelli (1997) and Fleischer and Christie (2009) measured evaluators’ perceptions of stakeholder participation, the Daigneault and Jacob (2009) Participatory Evaluation Measurement Instrument (PEMI) framework provides for primary data collection. The PEMI defines stakeholder participation using three dimensions: extent of involvement, diversity of participants, and control of the evaluation process. It limits non-evaluator stakeholder involvement to the “technical tasks of the evaluation process” (p. 338), defines stakeholder diversity as the presence of both evaluator and non-evaluator stakeholders, and argues that for an evaluation “to be considered participatory, [it] must involve at least one type of non-evaluative stakeholder” (p. 341). In this study, I too limit diversity to evaluator and non-evaluator stakeholders. As such, the diversity dimension may not be as the reader expects.

The final dimension, control of the evaluation process, is also necessary to “classify an evaluation as participatory” (Daigneault & Jacob, 2009, p. 336). Although the control dimension is less clearly defined than the others, it may well be the most important because participatory evaluation “is characterized by the fact that stakeholders’ partially or totally control the evaluation process...” (Daigneault & Jacob, 2009, p. 342).

To measure these dimensions, Daigneault and Jacob (2009, 2014) proposed the Goertz (2006) *m* of *n* rule, meaning *m* dimensions out of *n* are needed to assume presence of a concept. In this case, I use *m*=1 proposed by Daigneault and Jacob (2009, 2014).

Method (Procedure)

From these previous studies, I chose the Daigneault and Jacob (2009, 2014) dimensions to define stakeholder involvement and the *m* of *n* rule where *m*=1 to measure. In this section I explain how I used them to establish plausibility of causality.

I begin the stakeholder involvement (influence) and implementation causal pathway argument in Table 1 by mapping TMT and PDL Training data to the Weller and Barnes (2014) causal pathway criteria. I list the variations between the TMT and PDL Training programs, the expected relationships, and the theoretical foundation upon which the argument is built. I note that empirical data exist but are limited.

Paper 1 Table 1

Weller and Barnes (2014) Causal Pathway Analysis Criteria Mapped to TMT and PDL Training Programs

	Variation in cases	Expected relationship	Theoretical foundation	Existing data
TMT	Purpose as indicated			
	Learning evidenced by case study presentation		Organizational decision making and change	
	No pre- and post-testing		Stakeholder involvement increases implementation	
	No presentation-level logic models	Stakeholders accept logic model	Program theory: Logic model is tool	Mostly theoretical
PDL Training	Traditional format			Limited empirical data
	Purpose as indicated	Logic model drives program and evaluation design	KDP is relationship between evaluation use and planning	Gap identified
	Learning evidenced by e-learning, pre- and post-testing, and case study presentation			
	Workshop-level logic models		Organization makes decisions using knowledge constructed in social setting	
	Non-traditional format			

Note. Adapted from Weller and Barnes (2014).

In Tables 2 and 3, I continue to build the causal pathway by expanding on the information in Table 1. In Table 2, I list constructs (Daigneault and Jacob dimensions) and measures. Measures include the Goertz (2006) necessary and sufficient condition that

uses the m of n rule where $m=1$ and a requirement that the data inform recommendations, and/or that the recommendations are implemented.

Paper 1 Table 2

Constructs (Dimensions) and Measures

Construct (dimension)	Measure
Stakeholder involvement	Daigneault & Jacob using Goertz (2006) necessary and sufficient, m of n rule where $m=1$
Stakeholder diversity (evaluator/non-evaluator)	
Stakeholder control	
Implementation	Data are used to inform recommendations for change and/or recommendations are implemented

Note. Influenced by Daigneault and Jacob (2009, 2014).

In Table 3, I identify stakeholders by role and detail the necessary and sufficient conditions for each construct (dimension) to support the causal pathway. If, in the TMT and/or PDL Training programs, I observe the evidence described in this table minimally once, then the condition m of n where $m=1$ is met.

Paper 1 Table 3*Stakeholders, Evidence*

Stakeholders	Construct (dimension) and evidence
Program champions at Directorate/Division	Stakeholder involvement There will be stakeholder changes to logic model content.
Program team: Program manager Workshop instructors Presenters Subject matter experts Evaluator Curriculum designer Program coordinator	Stakeholder diversity There will be evaluator and non-evaluator stakeholders in meetings. Stakeholder control There will be public-facing logic models. KDP (key decision point) There will be stakeholder acceptance of logic models to frame program and evaluation design.

Note. Influenced by Daigneault and Jacob (2009, 2014).

The case description follows.

TMT and PDL Training Program Case Description

I selected TMT and PDL Training, as “typical” cases for this study. No control training program is included. Case selection was purposeful and based on the availability of data (Yin 2013, 2018), on the expected relationships and variability of characteristics (Weller & Barnes, 2014), and on the role of evaluation in the design of each program (logic model-driven).

As one stakeholder observed, “The logic model is a living document.” The TMT and PDL Training logic models are living in that each draft is built and updated collaboratively by evaluator and non-evaluator stakeholders. Once stakeholders accept a logic model as the framework, the KDP is met and the logic model frames program and

evaluation design. Data are collected and analyzed. Findings are presented to stakeholders. Data-driven evaluation recommendations are negotiated and recommendations are implemented as agreed.

Accepted logic models are also used in training orientations and in presentations to others. An example can be found in the NASA (2018) Cost and Schedule Symposium presentation (Derro et al., 2018). It is this use of the logic model that I argue is evidence of stakeholder control and the KDP. Simply put, if stakeholders do not agree with the content, a logic model will not be presented publicly.

There are similarities in the TMT and PDL program logic models. First and foremost, the TMT and PDL logic modeling process began around the same time chronologically (2015) and, apart from program managers and invited presenters/instructors, involved the same core team. The team was diverse from a Daigneault and Jacob (2009, 2014) perspective and included evaluator and non-evaluator stakeholders. Both TMT and PDL Training logic models were framed from the USDA National Institute of Food and Agriculture (NIFA) logic model and influenced by the Kirkpatrick model of program evaluation (Bell, 2012).

The same assumptions and theoretical foundation inform both programs and are shown in Table 1. Assumptions include: 1) the organization makes decisions using knowledge constructed in a social setting (Vygotsky, 1978), 2) stakeholder involvement increases influence and implementation (see as e.g., Christie, 2011; Cousins & Earl, 1992; Preskill & Caracelli, 1997), 3) the logic model is the tool that involves stakeholders, and 4) the KDP defines the relationship between evaluation use and planning (Toal, 2009).

There are also program differences. One example can be seen in the measures of learning. In both TMT and PDL Training, program deliverables are held as evidence of learning; and although no other assessment of learning is included in TMT, there are also pre- and post-tests that provide on-going evidence of learning in PDL Training.

Stakeholder involvement is evidenced by an early draft logic model. In it, I note participating stakeholders and dates of interaction and I code content. Red font represents stakeholder input, new ideas, or drafty wording. Red font also denotes change, i.e., wording that might change, an idea that might not be included, or an outcome that might not be measurable. Black font represents mature wording.

Although I used the logic model process to involve stakeholders, I was not hired explicitly to create the logic model framework described here. I was hired to facilitate a process that engaged stakeholders to build a framework that represented their collective vision of the problem, program inputs, outputs, and outcomes – a framework that was accepted. This occurred in the collaborative logic modeling meetings that resulted from the NASA culture of teamwork and the need for stakeholder support.

When the logic model was first introduced, there was a time of stakeholder learning. I remember one brilliant engineer expressing frustration at not immediately understanding the document as presented. About that same time, one of the other stakeholders took the one-page logic model and, holding it in both hands, turned it from landscape to portrait orientation. In portrait view, it became familiar to him. He called it a “requirements flow down.”

For both of us, and for the other stakeholders, this was an important moment of understanding. It was at this moment that I (the evaluator) realized, although we were

working from the same document, it had a very different meaning (and importance) to each of us. In trying to understand the logic model document, this interested stakeholder found a way to make it familiar and – as a requirements document – hierarchically important to the design of the program. Further, once the logic model was understood in those terms, it became something that he and others could accept as the framework for program and evaluation design (thus meeting the KDP).

Once the importance of the logic model (and consequently the process itself) was recognized, a key concern of non-evaluator stakeholders became the focus of the evaluation. On multiple occasions, they stressed to me that it was important to maintain the focus solely on the program so that the measure of program success would not be expanded to measure personnel performance. An extension of this stakeholder concern was that, to the extent possible, outcomes should be measurable and limited to that which could be controlled by the program.

These vignettes illustrate the significant time and energy stakeholders allocated to working various aspects of the evaluation. This willingness to invest time and money enabled the outcomes and is further evidence that this case is an exemplar (Yin, 2018).

Were there types of stakeholders who voluntarily involved themselves in the process? In short, the answer is yes. I was the only evaluator stakeholder on the team.¹ The curriculum designer and program coordinator were non-evaluator stakeholders, as were the systems engineers and subject matter expert (SME) stakeholders. Although the

¹ I identified meeting participants by searching keywords *logic model* and *logic models* in my Outlook calendar and added participants as indicated on the logic models themselves. Although stakeholder involvement could not be inferred from meetings, the accepted and early program logic models provide evidence of stakeholder involvement and control.

systems engineers and SMEs were not trained in program evaluation, they were expert at crafting requirements documents and, once they understood the logic model as such, commented that the processes were similar. This mix of non-evaluator and evaluator stakeholders meant the Daigneault and Jacob (2009, 2014) diversity dimension was met.

Who were these non-evaluator stakeholders? In 2008, Casey et al. published a systems engineering behavior study. In it, Myers-Briggs data from a small sample ($n=6$) of Goddard systems engineers were reported (Myers & Myers, 1990, as cited in Williams & Derro, 2008). Noting the small n and the lack of statistical power for the population, Casey et al. (2008) found within the Goddard sample a “balanced distribution” of introvert/extrovert and judging/perceiving dimensions with preference of intuition (I) over sensing (S) and thinking (T) over feeling (F).

The Casey et al. (2008) work is important in that the Goddard ETD technical training and development programs are housed in the Instrument and Payload Systems Engineering branch. Though certainly not generalizable to all, this small sample provides insight into some of the stakeholders with whom I worked. Beyond Myers-Briggs I present stakeholder roles in Figure 1, using the Hamilton Edwards and Williamson (2019) adaptation of the Bryson et al. (2011) power and interest matrix.

Paper 1 Figure 1*Power vs. Interest Analysis Matrix–TMT, PDL Training Program Stakeholders*

	Power	
	Less power/high interest (~,+)	High power/high interest (+,+)
Interest	Needs: Information, training on content and practicing newly learned knowledge and skills Involvement: Logic modeling process/outcomes when implementing plan Examples: Training participants, engineer trainees	Needs: Participates in, supports logic modeling process as framework for program design and evaluation. Understands research-based, data-driven approach Involvement: Partners during logic modeling process, planning, building, and implementing Examples: Program team, program managers, subject matter experts, instructors, evaluator
	Less power/less interest (~,~)	High power/less interest (+,~)
	Needs: Information sharing Involvement: Information sharing in planning, and implementing plan Example: Uninvolved Goddard engineers, scientists, and other non-trainees	Needs: Process support Involvement: Share process (monthly updates?) during logic modeling process, program design and evaluation recommendations, share information Example: Champions at Division, Directorate and Center levels

Note. Adapted from Hamilton Edwards and Williamson (2019, p. 250).

In Figure 1, I identify the program team, program manager, instructors, subject matter experts as high power/high interest non-evaluator stakeholders. Others at the Center, Directorate and Division levels are high power/less interest non-evaluator stakeholders. Though not directly involved in the logic modeling process, the support of these high power/less interest champions was important to the success of the programs and the implementation of recommendations. With the logic modeling process described

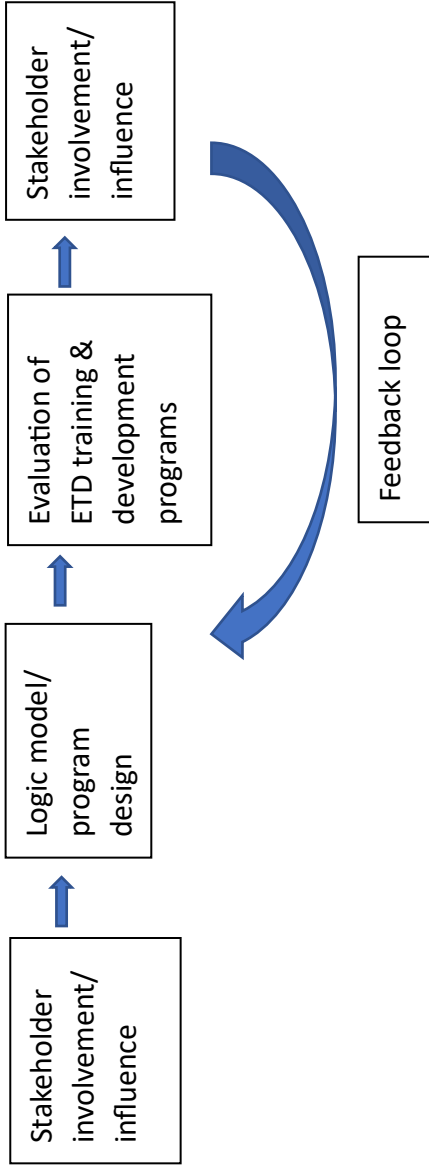
and stakeholders identified, what follows are the stakeholder influence models that support the proposition.

Proposed Stakeholder Influence Models and Constructs

A model evolved from this research. It began as a concept map of stakeholder involvement/influence (Figure 2) and grew into a stakeholder involvement (influence) diagram (Figure 3).

Paper 1 Figure 2

Concept Map of Stakeholder Influence on Logic Model and Program Design



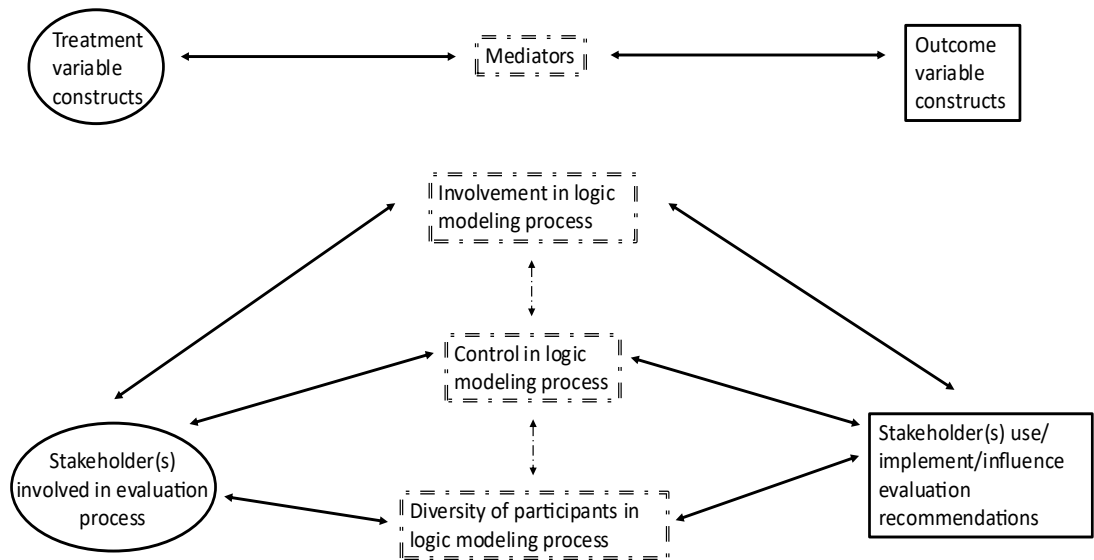
Note: Influenced by Daigneault and Jacob (2009, 2014) and Kirkhart (2000).

Figure 2 depicts stakeholder influence and involvement in constructing and implementing logic model outcomes. Note the role of evaluation of the program and the loop feeding back from stakeholder involvement/influence on the logic model and program design. The concept map is influenced by Kirkhart (2000) and Toal (2009). Where Kirkhart (2000) expanded evaluation implementation and use to include influence and process, Toal (2009) identified a “significant positive relationship” between evaluation planning and use and between evaluation implementation and use (p. 359).

Planning, implementation, influence, and use are reflected by the placement of stakeholder involvement/influence at the beginning and end, by the inclusion of evaluation, and by the feedback loop from stakeholder involvement/influence on the logic model/program design. Additionally, by influencing the logic model and program design, this concept map implicitly reflects the dimensions – stakeholder involvement, diversity, and control (Daigneault & Jacob, 2009, 2014) – as detailed throughout this paper and expanded here in Figure 3.

Paper 1 Figure 3

Stakeholder Involvement (Influence) Diagram



Note. Influenced by Daigneault and Jacob (2009, 2014). Vertical arrows between mediators are unsupported.

In Figure 3, I incorporate and expand the Daigneault and Jacob (2009, 2014) dimensions – stakeholder involvement, control, and diversity – as mediators to stakeholder involvement (influence). Although I propose these dimensions as mediating

constructs, they may also have moderating properties; I note these moderating properties as the feedback loop in the concept map and as multi-directional arrows in the diagram. Planning (Toal, 2009) is operationalized by the logic modeling process. The outcome of interest represents implementation, use, and influence of stakeholders on evaluation recommendations (Kirkhart, 2000; Toal, 2009).

Treatment is in a solid oval, mediators are in dashed rectangles, and outcome is in a solid rectangle. Each arrow is a proposition. Double sided arrows represent feedback. Note all arrows are double sided. Thicker arrows are supported by the case description. Thinner dashed vertical arrows represent unsupported interactions and suggest next steps or additional work.

Findings and Discussion

In this study I first identified, then confirmed, expected relationships in an exemplary case study (Yin, 2018). By “examining the phenomenon in a real-life context” (Yin, 1997, p 70), I explored in rich detail the use of the logic model as a tool for stakeholder involvement and influence. I proposed that stakeholder influence in the logic modeling process had an impact on organizational decision-making and change. I used purposeful sampling to identify the case described. Starting with the Daigneault and Jacob (2009, 2014) framework, I added the Weller and Barnes (2014) causal pathway analysis and used the logic modeling process as the vehicle for influence. By identifying acceptance of the logic model as a framework for program design and evaluation as the KDP (Toal, 2009), I linked the logic model to the outcome of interest which was stakeholder influence in evaluation recommendations.

In Table 4 below, I present the Daigneault and Jacob (2009, 2014) dimensions (constructs) and measures as defined in Tables 1 and 2. I include observables and

evidence. I note that for each construct, the evidence was observed. What this means is that the necessary and sufficient condition m of n where $m=1$ was met.

Paper 1 Table 4*Data Sources, Observables and Evidence*

Construct	Source(s)	Observable(s)	Evidence	Observed?
Stakeholder influence	Meeting outputs	Coded output of meetings	There will be similarities between meeting output and logic model wording, content, ideas.	Yes
	Accepted logic model	Evaluator observations	There will be common ideas and vocabulary between logic models and program and evaluation design.	Yes
	Program & evaluation design	Comparison of meeting output to accepted logic model	There will be stakeholders in process.	Yes
Stakeholder involvement	Coded logic model output of meetings	Coded output of meetings	There will be iterations of the logic model culminating in the current logic model.	Yes
	Current logic model	Evaluator observations	There will be use of the logic model to design the program and evaluation.	Yes
Stakeholder diversity	Coded logic model output of meetings Meeting notes Meeting invitations	Coded output of meetings Evaluator observations	There will be evaluator and non-evaluator stakeholder(s) in meetings.	Yes
Stakeholder control	Meeting outputs	Coded output of meetings, evaluator observations, accepted logic model	There will be accepted logic models used to frame program and evaluation design.	Yes
	Logic model content Accepted logic model		There will be accepted logic models for public use.	Yes
Influence arrow from constructs to outcome (KDP, proposition)	Meeting outputs	Presentations	There will be stakeholder acceptance of logic model content.	Yes
	Logic model content	Coded output of meetings	There will be presentations that include logic model.	Yes
	Logic models for presentations	Evaluator observations	There will be stakeholder reference to logic model and content.	Yes
Outcome	Accepted logic model frames evaluation and program design	Use/implementation of logic model content	Stakeholders will implement/influence logic model to frame program and evaluation design.	Yes
			Stakeholders will approve logic model for public use.	Yes

Note. Adapted from *IQMR 2020 Alt Acts Data Collection Plan template*.

In Tables 1 and 2, I outlined the constructs and measures that supported the Weller and Barnes (2014) causal pathway analysis. In Tables 3 and 4, I built the argument for stakeholder involvement (influence) in the implementation of evaluation recommendations using the Weller and Barnes (2014) causal pathway criteria. I directly mapped programmatic evidence to the necessary and sufficient conditions and noted that this evidence was observed and conditions were met. What this means then is in this case the KDP was *accepted*, the outcomes were *met*, and the proposal was *supported*.

I found that stakeholder involvement impacted organizational decision-making and change through the use of the logic model to frame program and evaluation design. These findings are consistent with and fully supported by the theories of Lindblom (1959), Cousins and Earl (1992), and Weiss (1983, 1998) the observations of Rossi et al. (2004), and Stone (2012), and the causal pathway work of Weller and Barnes (2014). Strong evidence of this is found in the case study descriptions. Included are similarities in the meeting outputs and logic model content and in the logic model iterations that culminated in the current logic model.

I showed that stakeholder involvement positively influences implementation. Although the case is an exemplar and not all organizations will have the time, money, or commitment to spend on their efforts, there are things that can be done to meaningfully include stakeholders. As possible, evaluators and organizations can: 1) initially include high power/high interest stakeholders, 2) devote resources (time, money, stakeholders) to the process, 3) use organizational culture and vocabulary, 4) understand that logic models are living documents, and 5) get to work.

Stakeholder participation matters. We know this from theory and from the data presented in this case. Additionally, in this case, the organizational investment in evaluation cannot be underestimated and thus becomes an important unobserved construct. The investment, of course, is not enough; but it is important to acknowledge that the conditions for success were there. Hiring and embedding an evaluator is significant and should be considered in terms of impact on the outcome, as should positioning the work in a data-driven organization with numerically literate stakeholders (Peters et al., 2006). Finally, being supported by participating high power/high interest stakeholders likely facilitated the acceptance and illustrated stakeholder influence on organizational decision-making and change.

The counterfactual to this may be to ignore theory, not use an evaluator, not use a logic model, not include stakeholders, not have a plan or a strategy. An alternate might be to begin the process with a boundedly rational approach where sufficing is used to define problems and to craft outcomes that are good enough. By normalizing a boundedly rational approach, Lindblom's muddling could potentially be avoided or minimized. This then would provide opportunities for stakeholder influence beyond the exemplar presented in this case.

Additionally, and as indicated in the discussion on limitations below, if the process were to include less powerful stakeholders, outcomes originally thought to be important might become less important and the process more accessible and more implementable. Once a working logic model was constructed, it could then be iterated with high power/high interest stakeholders and the program propelled forward.

In both TMT and PDL Training, stakeholder participation in the logic modeling process positively influenced its acceptance as the framework for program design and evaluation. As indicated in Table 4, I observed each listed point of evidence minimally once (thus the m of n condition where $m=1$ was met).

Limitations

This descriptive case study is an “ n of one,” meaning this is an example of only one model, the NASA Goddard ETD technical training and development program model. As such, this may suggest a lack of generalizability; and, although noted by Wu et al. (2016), “a lack of generalizability is not a limitation in qualitative research” (p. 418), the unique siting of this work in the Engineering and Technology Directorate of NASA Goddard Space Flight Center must be considered when thinking about its generalizability to other organizations. The ETD is a data-driven public organization and participating stakeholders were generally engineers, people who work in a data-driven world for whom iteration is second nature.

The process was structured toward measurable data. Outcomes that were not considered measurable were not included in the logic models.

I was hired explicitly to create the outcome of interest, to evaluate existing ETD engineering technical training and development programs, and to provide data-driven recommendations for program improvement – recommendations that would be implemented. Thus, the system/culture in which I worked was set up to implement the evaluation recommendations.

Involved stakeholders, although diverse from the Daigneault and Jacob (2009, 2014) evaluator vs. non-evaluator perspective, were all high power/high interest (Hamilton Edwards & Williamson, 2019). This limited population of stakeholders

arguably steered the logic models and resulting programmatic changes in a specific direction. Who the stakeholders were on the power vs. interest matrix and their education as engineers and scientists, fed directly into Lindblom's (1959) incremental theory of organizational decision making and set the stage for an iterative approach.

It was the high power/high interest people who needed this work done and who hired me to do it. I (the evaluator) needed the high power/high interest stakeholders to involve themselves in the early stages of evaluation planning so that evaluation recommendations (in this case using the logic model as the frame for program evaluation and design) would be implemented.

Pateman (1970) tells us that stakeholder involvement is a normative value. Those who are not normally involved in decision-making, who are not asked to produce or provide data that informs decision-making, yet who are asked to implement the decision(s), must also be included as stakeholders because they have the right to participate. In this case, those with less power were not included. This is a significant limitation to this work that requires attention.

Strengths

The case study approach and its detailed description of the process as sited in the NASA Goddard ETD provides a best-case context for organizations to consider in designing and evaluating their programs. With the understanding that this work literally occurs where the "stars align," I recognize the uniqueness of my position as embedded evaluator and the culture of collaboration and interaction in the NASA context. It follows that if implementation of evaluator recommendations is going to work anywhere, it would (likely) work in the NASA Goddard Engineering and Technology Directorate – a

data-driven organization with established intellectual resources, culture, and infrastructure of collaborative iteration.

By hiring and embedding an evaluator for the purpose of refining program outcomes, collecting data, identifying trends, making recommendations for program improvement and change, and by siting this work in a highly intelligent, data-driven organization, the stage for stakeholder influence on organizational decision-making and change through the implementation of evaluation recommendations was set.

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**Paper Two: How Stakeholder Participation in the Logic Modeling Process Frames
Data Collection: A Case Study from NASA Goddard Space Flight Center**

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Abstract

This is the second in a three-paper dissertation that responds to a gap in the research on stakeholder participation and influence in the implementation of evaluation recommendations. In the first paper, I presented a case study of two Goddard Space Flight Center engineering technical training and development programs. I introduced the logic modeling process as a tool to involve stakeholders in program and evaluation design. I began a pathway of causality argument using the Weller and Barnes (2014) criteria and found that stakeholder participation in the logic modeling process impacted (influenced) organizational decision-making and change. In this, the second paper, I use the same two programs and expand the case to include implementation of logic model outcomes through the data collection process. The proposition is as in my first paper: Stakeholder influence in the logic modeling process has an impact on organizational decision-making and change. The driving question is: How and in what direction might stakeholder participation in the beginning phase of the data collection process influence implementation of recommended actions? The outcome of interest is implementation of recommendations, which in this case is using logic model outcomes to inform programmatic data collection and findings. As in my first paper, the outcome was *met* and the proposition was *supported*.

Keywords: organizational decision-making, stakeholder participation, logic model, data collection, DCI, evaluation use, implementation, case study, causal pathway analysis

How Stakeholder Participation in the Logic Modeling Process Frames Data Collection: A Case Study from NASA Goddard Space Flight Center

Detailed descriptions of NASA Goddard Space Flight Center (Goddard), the Goddard Engineering and Technology Directorate (ETD), and case selection criteria are in my first paper. A short summary is here.

Located in Greenbelt, Maryland on about 1300 acres, Goddard is a “major laboratory for developing and operating unmanned scientific spacecraft” (NASA, n.d.a). Within Goddard, ETD “provides multidisciplinary end-to-end engineering expertise for the development of cutting-edge Science and Exploration Systems and technologies...” (NASA, n.d.b). In recent years, ETD has developed a number of engineering technical training and development programs to provide the necessary skills and knowledge to work or lead aspects of these cutting-edge technologies. Of these programs, I purposefully chose Technical Managers Training (TMT) and Product Development Lead (PDL) Training to comprise the case study. I chose them for the expected relationships and case variations (Weller & Barnes, 2014), for the roles of non-evaluator stakeholders and evaluation in program design, and for the wealth of programmatic data (see paper 1). I also chose these two programs because I consider TMT and PDL both “typical” and “exemplary” (Yin, 1997, 2013, 2018). This is partially due to the on-going participation of non-evaluator stakeholders; to the positioning of the case in ETD, a data-driven engineering organization; and to the deliberate hiring of an evaluator to collect programmatic data and to make recommendations for program improvement. For the purpose of this study, a data-driven organization “uses data to make decisions and build strategy” (Van Ooijen, et al., 2019).

A richly detailed description including a stakeholder analysis adapted from the Bryson et al. (2011) power/interest matrix is in my first paper. In it, I describe the stakeholders who voluntarily participated in the logic modeling process as high power/high interest and experts at crafting requirements documents. Expanding on my first paper, in this one I look to implementation. I describe stakeholder influence on the beginning phases of data collection, including the participatory construction of programmatic data collection instruments (DCIs). I include vignettes of data collection meetings and interactions with stakeholders. I detail data-driven recommendations that were implemented. I include heatmaps as vivid illustrations of pre- and post-training data and as evidence of key decision points (KDPs) necessary to implement recommendations.

I organize the paper as follows. I position myself in the study. I present the problem, KDPs, and expected outcomes. I review current and historical literature that inform the theory and framework upon which the expanded argument is built. I propose a concept map and involvement (influence) diagram. I describe the data collection process and present findings, limitations, and a counterfactual.

Positionality Statement

I am an evaluator embedded in the technical training and development group in the ETD Instrument and Payload Systems Engineering Branch. I was hired specifically to evaluate the ETD training and development programs and to provide data-driven recommendations for program improvement and change. It is my opinion that by hiring a full-time evaluator, a high level of importance was placed on data in the decision-making processes which in turn suggests an openness to implement evaluation recommendations. To minimize bias, I adhere carefully to the American Evaluation Association [AEA] guiding principles for evaluators, and to the data collection and analysis protocols for this

work. I collect anonymous, census data and analyze following the limits of Stevens (1946) theory of measurement. As with paper 1, I write from a normative, deontological perspective.

Motivation

The motivation for all three papers is a gap in the empirical research on stakeholder influence in implementing evaluation recommendations (Christie, 2011; Cousins & Earl, 1992; Fetterman, 2004). My response is a pathway of causality argument based on the Weller and Barnes (2014) pathway analysis. My argument begins with stakeholders participating in the logic modeling process (paper 1). It continues with stakeholders implementing logic model outcomes through a collaborative data collection process that includes constructing and accepting DCIs (paper 2). Finally, it culminates in a third paper that looks at primary stakeholder data to validate findings.

One question drives the proposition for this paper: How and in what direction might stakeholder participation in the beginning phase of the data collection process influence implementation of recommended actions? The sub-question is: How might stakeholder participation in constructing DCIs influence acceptance of the resulting programmatic data? As in my first paper, the proposition is: Stakeholder influence in the logic modeling process has an impact on organizational decision-making and change. The outcome of interest is implementation of recommendations, which in this case is using logic model outcomes to inform programmatic data collection and findings.

The argument builds from my first paper; for stakeholders to accept programmatic findings, they must first accept programmatic data. In other words, to implement (influence) evaluation recommendation(s), a stakeholder must first accept the data

(outcomes) that inform the recommendations. From this, two KDPs emerge: KDP(1) Stakeholders accept DCI content, and KDP(2) Stakeholders accept findings.

Just as the driving question and pathway of causality in this paper build from my first paper, so does the program theory. The first paper included theories of incrementalism, rational and non-rational decision-making, constructivism, stakeholder participation in evaluation, and logic modeling. In it we learned that decision-making is complicated and bureaucracies do not generally make decisions quickly or rationally. Instead, they “muddle through, [making] adjustments at the margin” (Lindblom, 1959, p. 82) and making organizational decisions in a social context (Dewey, 1896; Rogoff, 2003; Vygotsky, 1978). We learned that stakeholder participation in evaluation should increase implementation (Christie, 2011; Cousins & Earl, 1992; Fetterman, 2004; Weiss, 1998); we learned that stakeholders influence implementation (Kirkhart, 2000); and we learned that there is a relationship between planning and use, and implementation and use (Toal, 2009; Weiss, 1998).

In this paper, I add theories of implementation and implementation evaluation (Alkin & Christie, 2004; Cousins, 2004; Patton, 2004; Wholey, 2004), of goal setting (Latham, 2016; Locke & Latham, 2002, 2019), and of performance monitoring (Alkin & Christie, 2004; Wholey, 2004; Wholey et al., 2004).

Implementation and Goal Setting Theories

Developmental evaluation is a subset of implementation theory. Patton (2004) argues that in developmental evaluation, the evaluator is, or should be, a full participant in decision-making. In this case study, full participation might include collaborating with and guiding stakeholders through the data collection process, collaboratively constructing DCIs, collecting programmatic data, determining findings, and negotiating

recommendations. It might also mean designing the evaluation for continued stakeholder participation, which Cousins argues is an important aspect of participatory evaluation that contributes to implementation (Alkin & Christie, 2004).

In their work in implementation evaluation, Wholey et al. (2004) consider unrealistic goals to be barriers to implementation and argue that by including stakeholders in setting goals, performance in public organizations will likely improve. Wholey considers performance-based monitoring to be a form of implementation evaluation that is critical to program accountability (Alkin & Christie, 2004).

Latham (2016) and Locke and Latham (2019) add to Wholey's argument by suggesting that goals are more likely to be met if they are challenging and if stakeholders are involved in their construction. Importantly, Latham and Locke (2006) and Locke and Latham (2006, 2019) identified feedback as a key moderator to meeting goals. This supports the stakeholder involvement (influence) model that I proposed in my first paper and expand in this one.

Previous Studies and Methods

Previous studies that inform this case study include Preskill and Caracelli (1997), Fleischer and Christie (2009), Daigneault and Jacob (2009, 2014). Stevens (1946) informs the analysis.

In two separate studies, Preskill and Caracelli (1997) and Fleischer and Christie (2009) queried an AEA Topical Interest Group (TIG) for evaluator perception data on stakeholder involvement. Preskill and Caracelli (1997) developed the original DCI that Fleischer and Christie (2009) later modified for their work. Both studies had similar findings – the purpose of evaluation [is] to “facilitate organizational learning, provide

information on decision making [and] improve programs...” (Preskill & Caracelli, 1997, p. 209).

In their Participatory Evaluation Measurement Instrument (PEMI), Daigneault and Jacob (2009, 2014) defined three dimensions of stakeholder participation: extent of involvement, diversity, and control of the evaluation process. They limited non-evaluator stakeholder involvement to the technical portion of the evaluation, argued that minimally one non-evaluator stakeholder must be involved for the process to be considered diverse, and proposed that non-evaluator stakeholders must maintain some level of control throughout the evaluation. To measure these dimensions, Daigneault and Jacob (2009, 2014) proposed the Goertz (2006) *m* of *n* condition with $m=1$ as the minimum number of times the evidence was observed and *n* as the number of observations. Once the minimum condition $m=1$ was met, the evidence was considered to have been observed. No matter the number of observations.

Stevens (1946) provided a compelling argument against the use of mean and standard deviation when analyzing ordinal data. He argued that “rigor is compromised” and the “linearity of an ordinal scale is precisely the property open to questions” (p. 679).

Method (Procedure)

For this paper, I use the same approach as the first. I do so to maintain consistent constructs which in turn allows me to expand on the argument. I begin with the Daigneault and Jacob (2009) PEMI to frame the method. I incorporate their dimensions of stakeholder participation and measure each using the *m* of *n* condition where $m=1$. I follow the Stevens (1946) argument in the analysis of ordinal data.

In Table 1, I expand this argument by mapping the data collection process to the Weller and Barnes (2014) pathway analysis criteria. I use the Weller and Barnes (2014)

criteria with the intent of building a causal pathway. Pathway analysis is an “imperfectly understood tool in the search for causal mechanisms” (Weller and Barnes, 2014, p. 7). It is designed to explore “unobserved links in specific case [studies]” so that mechanisms between variables might be revealed and “mechanism-centered quantitative work” might be informed (Weller and Barnes, 2014, p. 7). The criteria include “variation in case characteristics” and “expected relationships.” In this study, variation in characteristics is specific to the TMT and PDL Training programs and does not change from paper to paper. Expected relationships do change. Where in paper 1, the expected relationships were between the logic model outcomes and the program and evaluation design, in this paper, expected relationships are between the logic model outcomes and the DCI content.

Paper 2 Table 1*Weller and Barnes (2014) Causal Pathway Analysis Criteria Mapped to TMT and PDL**Training Programs*

	Variation in cases	Expected relationship	Theoretical foundation	Existing data
TMT	Level and type of stakeholder participation	Accepted logic model informs program and evaluation design, including DCIs and recs	Paper 1 theory + evaluation use and implementation, goal setting, and performance monitoring Cousins: the evaluation should be designed for on-going, continued participation	Mostly theoretical
	Purpose as indicated			
	Learning evidenced by case study presentation			
	No pre- and post-testing			
	No presentation-level logic models			
	Traditional format	Stakeholders use logic model outcomes to inform DCI content	Patton: the evaluator should be a member of team, fully participates and facilitates decisions	Limited empirical
PDL Training	Level and type of stakeholder participation	Stakeholders implement evaluation recommended actions informed by programmatic data collected	Wholely: performance improvement is a measure of accountability, is the program doing what it was designed to do?	Gap identified
	Purpose as indicated			
	Learning evidenced by e-learning, pre- and post-testing, and case study presentation			
	Workshop-level logic models			
	Non-traditional format			

Note. Adapted from Weller and Barnes (2014).

For this paper, the variables of interest are level and type of participating stakeholders. Expected relationships include stakeholders' using logic model outcomes to drive the data collection process and to implement (influence) recommended actions. The

underlying assumptions that inform this work include: 1) Organizational knowledge is constructed by people in the organization (Vygotsky, 1978); 2) Stakeholder participation increases influence and implementation; 3) Logic modeling and data collection processes are tools to involve non-evaluator stakeholders; and 4) KDPs define the relationship between planning and use, and between use and implementation (Toal, 2009).

I use Table 2 to remind the reader of the constructs and measures in the study. Both are based on the Daigneault and Jacob (2009) PEMI framework and dimensions.

Paper 2 Table 2

Constructs (Dimensions) and Measures

Construct (dimension)	Measure
Stakeholder involvement	Daigneault & Jacob (2009) using Goertz (2006) necessary and sufficient m of n condition where $m=1$
Stakeholder diversity (evaluator and non-evaluator)	
Stakeholder control	
	Programmatic data are used to inform recommendations for change and/or recommendations are implemented
Implementation	Programmatic data are used to inform recommendations for change and/or recommendations are implemented

Note. Adapted from Robbins paper 1. Influenced by Daigneault and Jacob (2009).

The dimensions in Table 2 are from Daigneault and Jacob (2009). The outcome of interest is implementation. Programmatic data inform the measures which include the Daigneault and Jacob (2009, 2014) coding schema and the Goertz (2006) necessary and sufficient condition m of n where $m = 1$.

In Table 3, I list stakeholders, constructs (dimensions), mechanisms, and evidence specific to the data collection process. Here, I include KDPs as potential mechanisms.

Paper 2 Table 3*Stakeholders, Evidence*

Stakeholders	Construct (dimension), evidence
Program champions at Directorate/Division	Stakeholder involvement There will be stakeholder changes to DCI
Program team: Program manager Workshop instructors Presenters	Stakeholder diversity There will be evaluator and non-evaluator stakeholders in meetings
Subject matter experts Evaluator Curriculum designer Program coordinator	Stakeholder control There will be collaboratively constructed DCIs that are accepted and used to collect programmatic data There will be data-driven recommendations implemented
	KDPs (key decision points) (1) There will be stakeholder acceptance of DCI content, and (2) There will be stakeholder acceptance of findings

In Table 3, I include the necessary and sufficient conditions to grow the argument.

As in my first paper, if I observe the evidence outlined in Table 3 minimally once, the condition is met.

TMT and PDL Training Program Case Description

What follows is a rich description of the beginning phase of the data collection process, including snippets of collaborative data collection meetings and examples of recommended actions that were implemented. In this study, I use implementation as evidence of stakeholder control and as evidence of organizational decision-making.

The data collection meetings were similar to the logic modeling meetings described in my first paper and generally included the same participating stakeholders. I was the only evaluator. Non-evaluator stakeholders included the curriculum designer,

program manager, program coordinator, and systems engineers. Occasionally, an instructor or subject matter expert (SME) would be involved. As with the logic modeling meetings, a mix of evaluator and non-evaluator stakeholders in the data collection meetings meant that the Daigneault and Jacob (2009) diversity construct was met.

The coding schema for the collaborative logic modeling and data collection meetings was also similar. In both, black font indicated most recent wording (usually latest draft), and red or purple font indicated wording that was under construction. Meeting outputs reflected work in progress and evidence of stakeholder involvement.

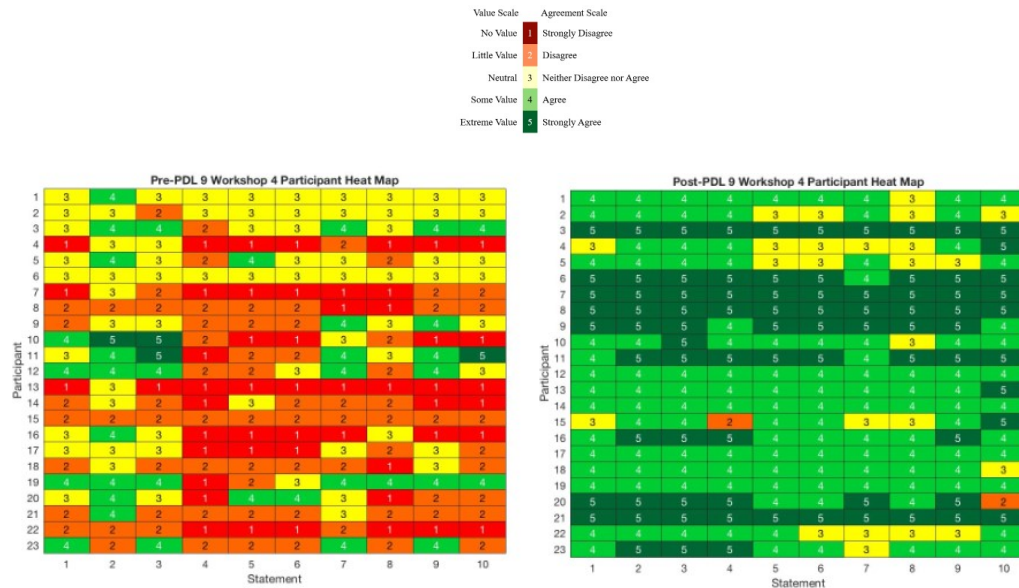
An example of a data collection meeting took place early in the PDL process (around 2016). I was with a high power/high interest non-evaluator stakeholder engineer who had also been involved in the logic modeling process. We were discussing the wording of one DCI prompt. I proposed a statement that included the word “feel” (as in “I feel the presenter was prepared”). The engineer stakeholder laughed and suggested that [some] engineers don’t have feelings. This began a discussion about the importance of using words that were explicit and would be understood by all. In the end, we decided not to use the word “feel” because it might mean different things to different respondents. We settled on “The presenter was prepared.” This was the exact wording for one of the logic model outcomes.

An example of implementation is from the TMT (2018) evaluation summary. In it, I recommended an increase in collaborative team building and networking activities. As supporting evidence for this recommendation, I cited one of the five logic model-defined program objectives (to increase effectiveness in work teams through

collaborative activities) and included participant comments. Program management accepted and subsequently implemented this recommendation.

In a more recent (2022-2023) example of implementation, I facilitated an update of the PDL Training logic model. Wording for the revised outcomes was based on previously used language with the expectation (by the group) that the updated outcomes and wording would be used in the updated DCIs. I mention this not only to illustrate how the logic model informed the data collection process but to provide evidence of feedback from planning (logic model) to data collection (implementation) and back to planning, as well as evidence of stakeholder control and influence.

In Figure 1, I use pre- and post-training heatmaps from the NASA (2018) Cost and Schedule Symposium (Derro et al., 2018) to illustrate data that were accepted by stakeholders and informed findings and recommendations.

Paper 2 Figure 1*Pre- and Post-learning Data Depicted as Heat Maps*

Note. Excerpted from 2018 NASA Cost and Schedule Symposium (Derro et al., 2018).

I use these heatmaps to vividly illustrate the learning that occurred in this workshop. Pre-training data are on the left. Post-training data are on the right. Note the agreement scale at the top of the figure. Rows represent one participant's responses to all prompts. Columns represent all participants' responses to one prompt. Responses are anonymous and cannot be read pre- to post-training. However, one respondent's data can be read within a heatmap horizontally across a row. For example in the pre-training heatmap on the left, respondent number 15 marked 2 (disagree) to each prompt.

The data were collected using a collaboratively constructed DCI with content informed by logic model outcomes. As an example in Figure 1, prompt #7 read, "I can describe the steps to develop a credible spending plan." This is similar to the wording in the associated logic model, "Participants shall be able to develop a spending plan." Data

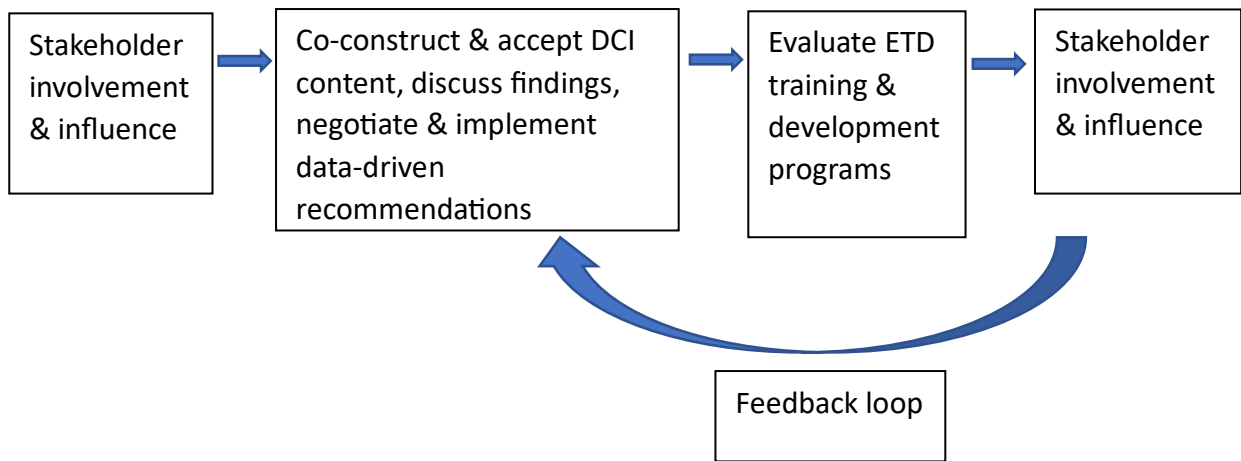
like these, informed findings which in turn informed recommended actions. In this example, learning was evidenced and there was no recommendation for change.

I would typically present ordinal data as heatmaps. I would note modes and ranges (Stevens 1946) and would discuss findings and propose recommendations.

Participating stakeholders would generally accept the data within the bounds of identified biases. I attribute this to the data-driven nature of the organization, to the level of non-evaluator stakeholder involvement in the logic modeling and data collection processes, and to the care with which the DCIs were collaboratively constructed. In fact, in late 2022, one Directorate-level stakeholder thanked the team for the high level of rigor in the data collection and analysis processes.

Proposed Stakeholder Influence Models and Constructs

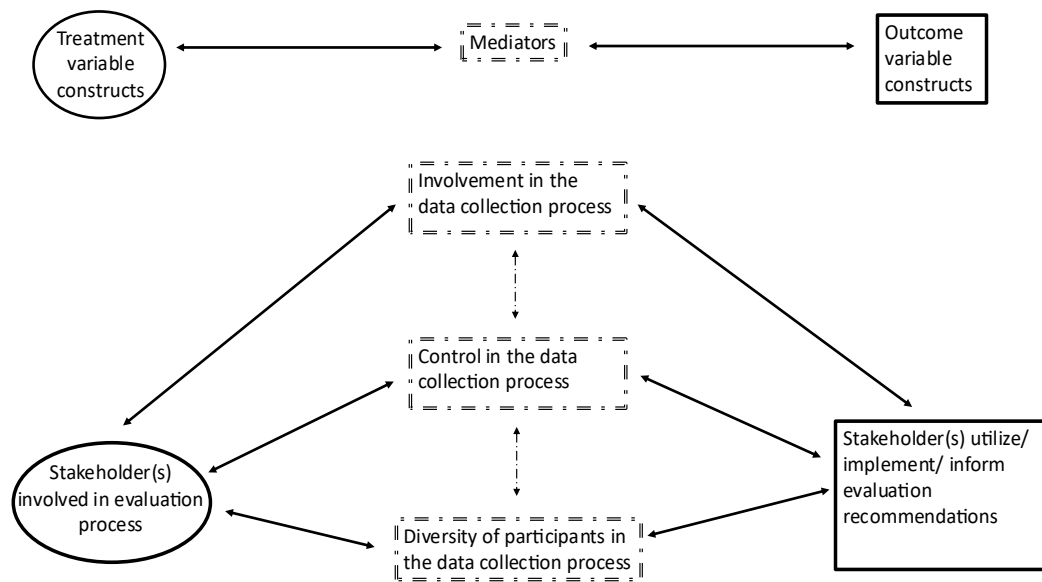
In Figure 2, I present a concept map of stakeholder involvement and influence in the data collection process. This is based on the Kirkhart (2000) framework that I used in my first paper to introduce stakeholder influence. It is also based on the relationships between planning and use, and use and implementation (Toal, 2009).

Paper 2 Figure 2*Concept Map of Stakeholder Influence on Logic Model and Program Design*

Note: Influenced by Daigneault & Jacob (2009, 2014) and Locke & Latham (2006).

In Figure 2, I include feedback as a moderator from stakeholder involvement (influence) to DCI construction and implementation.

In Figure 3, I expand the concept map by adding the Daigneault and Jacob (2009, 2014) dimensions: stakeholder involvement, diversity, and control. In this figure, I consider the dimensions to be mediators and feedback to be a moderator. Feedback as a key moderator in meeting goals was identified by Locke and Latham (2006).

Paper 2 Figure 3*Stakeholder Involvement (Influence) Diagram*

Note. Influenced by Daigneault and Jacob (2009, 2014). Vertical arrows between mediators are unsupported.

I place treatment in the oval, mediators in the dashed rectangles in the center, and outcome in the solid rectangle on the right. I use thick arrows to represent case-supported propositions and dashed vertical arrows to represent interactions unsupported by the case. Double-sided arrows represent feedback. Note each arrow in the diagram is double-sided.

Findings and Discussion

In this paper, I explored stakeholder participation in the data collection process. I found that stakeholders participating in the beginning phases of the data collection process positively impacted organizational decision-making and change by first accepting programmatic data and findings (the KDPs) and then by implementing the data-driven recommendations. This is consistent with the findings in my first paper and fully supported by the theories of implementation and implementation evaluation (Alkin &

Christie, 2004; Cousins, 2004; Patton, 2004, Wholey, 2004), of goal setting (Latham, 2016; Locke & Latham, 2002, 2019), and of performance monitoring (Alkin & Christie, 2004; Wholey, 2004; Wholey et al., 2004). Strong evidence can be found in the case study descriptions. Examples include discussions of similarities in meeting outputs and DCI content and similarities in vocabulary between logic model outcomes and DCIs.

The proposition was: Stakeholder influence in the logic modeling process has an impact on organizational decision-making and change. The outcome of interest was implementation of recommendations. In this case, implementation meant using logic model outcomes to inform programmatic data collection and findings, then accepting the data and findings and making changes as recommended.

Where in my first paper I used the logic model process to involve stakeholders and to frame program and evaluation design (to plan), in this paper I used stakeholder participation in the data collection process to implement logic model outcomes. As evidence, I included rich descriptions of two different PDL Training data collection efforts, I presented an example of a TMT recommendation that was tied to a logic model outcome, and I shared heatmaps of PDL pre- and post-training learning data.

I used the Daigneault and Jacob (2009, 2014) PEMI framework to maintain consistency in the constructs in both papers. From the stakeholder analysis in my first paper, I added level and type of stakeholder participation as case variations in the Weller and Barnes (2014) causal pathway criteria (Table 1). In Table 2, I reminded the reader of the constructs (dimensions) and measures. In Table 3, I expanded the causal pathway argument by directly mapping evidence from the data collection process to the Goertz

(2006) necessary and sufficient condition m of n where $m=1$ as proposed by Daigneault and Jacob (2009, 2014).

As with Table 3, I expanded Table 4 from paper 1. I defined observables and evidence specific to the data collection process. In both, I noted that the evidence was observed and established plausibility of causality for future analyses and research. What this means is: The KDPs were *accepted*, the outcomes *met*, and the proposal *supported*.

Paper 2 Table 4*Data Sources, Observables and Evidence*

Construct	Source(s)	Observable(s)	Evidence	Observed?
Stakeholder influence	Meeting outputs	Coded meeting outputs	There will be similarities between meeting output and DCI wording, content, ideas.	Yes
	Accepted DCI	Evaluator observations		
	Program & evaluation design	Comparison of meeting output to accepted DCI and recommendations	There will be common ideas and vocabulary between logic model outcomes and DCIs and recommendations. There will be stakeholders in process.	Yes Yes
Stakeholder involvement	Coded DCI meeting outputs	Coded meeting outputs	There will be iterations of the DCI culminating in the current DCI.	Yes
	Current DCI	Evaluator observations	There will be use of the logic model to design DCIs.	Yes
Stakeholder diversity	Coded DCI meeting outputs Meeting notes Meeting invitations	Coded meeting outputs Evaluator observations	There will be evaluator and non-evaluator stakeholder(s) in meetings.	Yes
Stakeholder control	Meeting outputs	Coded meeting outputs	There will be accepted DCIs as informed by logic model(s) outcomes.	Yes
	DCI content	Evaluator observations		
	Accepted DCIs, Findings, recs	Accepted DCI Deployed DCI	There will be recommendations informed by data. There will be implemented recommendations.	Yes Yes
Outcome	Current logic model frames data collection and recommendations	Use, implementation of logic model content in DCI content and recommendations	Stakeholder(s) will implement, influence logic model outcomes to frame DCI design.	Yes
			Stakeholders will accept collected data, and use (implement) data-driven recommendations.	Yes
Influence arrow From constructs to outcome (KDP, proposition)	Meeting outputs	Presentations	There will be stakeholder acceptance of DCI content.	
	DCI content	Coded meeting outputs		
	Presented data	Evaluator observations	There will be presentations with collected data and implemented recommendations.	Yes Yes
	Implemented recommendations	Program changes based on recommendations	There will be stakeholder reference to data and recommended actions.	Yes

Notes. Adapted from *IQMR 2020 Alt Acts Data Collection Plan template*.

I found that stakeholders who collaboratively created and then accepted the data collection instrument (KDP1) tended to accept the evaluation findings (KDP2). As an example, I included a recent PDL logic model update. This example illustrated stakeholders involving themselves in the process, accepting the data and evaluation findings, then using the data to inform changes to existing DCIs and the program, thus implementing recommended actions.

Limitations and Strengths

That this study reflects only one model – one that is positioned to implement – is an important note that may suggest a lack of generalizability. I, however, do not consider this problematic (Wu et al., 2016). This model is typical to the NASA Goddard ETD training and development programs and is likely an exemplar beyond (Yin, 1997). Few organizations have the intuitively iterative engineer stakeholders that participated in this case. For those organizations, I propose an alternative that limits stakeholder involvement to planning (logic modeling) only. From the logic model, the course would then be charted and the outcomes used to inform data collection, DCI content, and wording. In this scenario data collection would occur without the benefit of stakeholder involvement and the organizational vocabulary and culture they would bring. However, I believe this alternative would be better than not involving stakeholders at all.

Finally, I note that some of the participating stakeholders were key stakeholders. These key stakeholders had more time to devote to the logic modeling and data collection processes than others. I also note that some participated in both. These “serial participators” were highly involved in negotiating and then implementing the agreed-upon recommendations. Alkin and Christie (2004) tell us that stakeholder commitment

and continued stakeholder participation positively influence implementation. I consider this an important unobserved construct that warrants further investigation.

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**Paper Three: How Stakeholder Participation in the Logic Modeling Process
Influences Implementation of Evaluation Recommendations: Primary Data from
NASA Goddard Space Flight Center**

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Abstract

This is the third in a three-paper dissertation that responds to a call for empirical research on stakeholder influence in the implementation of evaluation recommendations (see e.g., Christie, 2011; Cousins & Earl, 1992; Fetterman, 2004). In my response, I used two Goddard Space Flight Center engineering technical training and development programs to build a Weller and Barnes (2014) pathway of causality argument supporting my proposal that stakeholder influence in the logic modeling process impacts organizational decision-making and change. I first introduced the logic modeling process as a tool to involve stakeholders in program and evaluation design (paper 1) and then used the data collection process to implement the collaboratively constructed logic model outcomes (paper 2). In each paper, I defined constructs and measures and mapped evidence to the argument. In this paper I triangulate using the Toal (2009) stakeholder evaluation involvement scale to “increase the credibility and validity of research findings” (Noble & Heale, 2019, p. 67) and to garner potential mechanisms. The specific questions are: 1) What level of involvement do stakeholders report in logic modeling, in collecting data, and in presenting and using evaluation findings, and 2) What mechanisms are revealed in the data? Stakeholder data indicated varying levels of involvement in the listed constructs and the process was identified as the mechanism. Potential factors included power and interest (bluntly measured by role) and time-on-job.

Keywords: organizational decision-making, logic model, data collection, evaluation use, implementation, case study, pathway of causality analysis, triangulation, Evaluation Involvement Scale

Stakeholder Involvement in Implementing Evaluation Recommendations: Primary data from NASA Goddard Space Flight Center

Rich descriptions of NASA Goddard Space Flight Center (Goddard), case selection criteria, and stakeholder involvement in the logic modeling and data collection processes are in my first two papers. A summary follows.

NASA Goddard is located in Greenbelt, MD, about 10 miles northeast of Washington DC. It was one of the first NASA centers and is a “major laboratory for developing and operating unmanned scientific spacecraft” (NASA, n.d.a). Within Goddard, the Engineering and Technology Directorate (ETD) delivers engineering expertise to support the Goddard mission. For this case study, I purposefully chose two ETD technical training and development programs – Technical Managers Training (TMT) and Product Development Lead (PDL) Training. I consider these programs both “typical” and “exemplary” per Yin (1997, 2013, 2018). They are typical from the perspective of NASA Goddard ETD technical training and development and exemplary from the perspective of situating the programs in a data-driven organization with an evaluator hired to collect data and make recommendations for improvement.

Evidence from the first two papers suggests that stakeholder participation – measured as stakeholder involvement, diversity, and control – positively influences implementation which, I argue, reflects organizational decision-making and change. For this paper, I collect primary data on stakeholder involvement from a purposeful sample of 20 stakeholders. My goal is to use triangulation (Noble & Heale, 2019) to validate the data and strengthen the argument. I introduce one new theoretical concept – single source bias – that this triangulation addresses.

The driving questions for this paper are: 1) What level of involvement do stakeholders report in logic modeling, in collecting data, and in presenting and using evaluation findings, and 2) What mechanisms are revealed in the data? As in the first two papers, the proposition is: Stakeholder influence in the logic modeling process has an impact on organizational decision-making and change, operationalized by stakeholders accepting and using (implementing) evaluation findings to plan future work.

The rest of the paper is as follows. I position myself in the study. I present the problem and summarize the literature from my first two papers. I present a concept map and involvement (influence) diagram. I describe the data collection process, summarize primary stakeholder involvement data, and present findings, limitations, and the counterfactual.

Positionality Statement

I am an evaluator in the ETD Instrument and Payload Systems Engineering Branch technical training and development group. I was hired to evaluate the programs and to provide recommendations for improvement. This, from my perspective, suggests an organization that considers data important in decision-making. I collect anonymous, census, ordinal data. I adhere to the American Evaluation Association (AEA) guiding principles and to the data collection and analysis processes chosen for this work (Stevens 1946). I write from a normative, deontological perspective.

Motivation

Just as the pathway for causality argument in this paper builds from the previous two, so does the program theory. The theoretical foundation of my first paper included rational, non-rational, and incremental decision-making (see as e.g., Gigerenzer, 2001; Lindblom, 1959; Stone, 2012; Vaughan, 1990, 2004); stakeholder participation and

influence (see e.g., Christie, 2007, 2011; Cousins & Earl, 1992; Fetterman, 2004; Kirkhart, 2000, Weiss, 1983), program and logic model theories (Kellogg, 2004; Weiss, 1998; Wholey et al., 2004), and constructivism (Dewey, 1896; Rogoff, 2003; Vygotsky, 1978). In the second paper I added theories of implementation and implementation evaluation (Cousins, 2004; Cousins & Leithwood, 1986; Patton, 2004; Wholey, 2004), organizational performance monitoring (Alkin & Christie, 2004; Wholey et al., 2004), and goal setting (Latham, 2016; Locke & Latham, 2002, 2006, 2019).

I argued in the first two papers that if stakeholders are involved in program planning and data collection, they are more likely to accept and implement evaluation findings and recommendations. I used the Daigneault and Jacob (2009, 2014) dimensions – stakeholder involvement, diversity, and control – to map programmatic evidence to the Weller and Barnes (2014) causal pathway analysis criteria. I noted that if I observed the listed evidence minimally once, then the m of n condition $m=1$ was met. I observed the evidence. The condition was met.

For both papers, I used coded meeting outputs as evidence of stakeholder involvement. In paper 1, this was in the form of the coded logic model. In paper 2, this was in the form of the coded data collection instrument (DCI). I considered public use of the logic model and deployment of the collaboratively constructed DCI to be evidence of stakeholder control, and this reflected organizational decision-making and change. I argued, as did Daigneault and Jacob (2009), that the diversity dimension was met through the involvement of minimally one non-evaluator stakeholder in a given process.

In both, I found that stakeholder participation in the evaluation process positively influenced implementation of evaluation recommendations. This was supported, as

example, by the theories and work of Christie (2011), Cousins & Earl (1992), and Fetterman (2004). Also, as did Toal (2009), I found a relationship between evaluation planning and use (the logic model) and between implementation and use (the data collection process). In addition to Toal (2009), this was supported, as example, by the theories and work of Kirkhart (2000) and Weiss (1998). I proposed feedback as a moderator in the stakeholder involvement (influence) concept map. Use of feedback, as a moderator in meeting set goals, is supported by the research of Locke and Latham (2006).

To maintain consistent measures, in each of the three papers I use stakeholder involvement, control, and diversity as constructs that I map to Weller and Barnes (2014) pathway analysis criteria. In this paper, I triangulate the methods using stakeholder data. I do this to validate the evidence from my first two papers, to further support the causal pathway argument, and to identify factors and mechanisms.

Previous Studies and Methods

The work of Preskill and Caracelli (1997), Fleischer and Christie (2009), Daigneault and Jacob (2009, 2014), Toal (2009), and my first two papers inform the final portion of the study. Perception data from Preskill and Caracelli (1997) and Fleischer and Christie (2009) found that members of an AEA topical interest group believed that by involving stakeholders, use of evaluation recommendations would increase. Daigneault and Jacob (2009, 2014) identified three dimensions of stakeholder participation and argued that all three were necessary for an evaluation to be considered participatory. To measure these dimensions, Daigneault and Jacob (2009, 2014) proposed using the Goertz (2006) necessary and sufficient condition m of n where $m = 1$. What this meant was, if something was observed once, the necessary and sufficient condition was met. Toal (2009) developed the Evaluation Involvement Scale (EIS) to collect primary stakeholder

data on STEM (Science, Technology, Engineering, and Mathematics) education program evaluations in the federal government. The Toal (2009) EIS originally contained 13 items (prompts) and included the following response options: 1=no involvement, 2=a little involvement, 3=some involvement, 4=extensive involvement.

Toal (2009) validated 11 of the 13 items using exploratory and confirmatory factor analysis (EFA, CFA) and Messick's (1989, 1995) validation framework. The items she removed were EIS#11, which queried reviewing reports for accuracy, and EIS#13, which queried use of evaluation findings to plan. In her discussion, Toal (2009) noted as a limitation generalizability beyond multisite federal STEM education evaluations. She argued, however, that this issue was not "fatal" and was likely due to the research, not the EIS (p. 361). Toal (2009) offered the potential for generalizing beyond her research into all education. In the methods below, I explain how I used the EIS.

Method (Procedure)

In the first two papers I found that stakeholder involvement positively impacted organizational decision-making and change. As evidence, I presented rich descriptions of the logic modeling and data collection processes as tools to involve stakeholders and to implement evaluation recommendations. In this paper, I triangulate the evidence from my first two papers with primary data collected using the Toal (2009) EIS. I chose the Toal (2009) EIS as the data collection instrument because it directly mapped to the key decision points (KDPs) and outcomes in the first two papers. As well, I do this to measure "actual involvement" (Toal, 2009, p. 351), to increase validity by responding to the likelihood of single-source bias, and to identify potential causal mechanisms.

I found the 13 item EIS in my initial literature review for this study and was intrigued by the similarities between Toal's (2009) theoretical framework and mine. Both were based on Cousins and Whitmore (1998). Both used KDPs.

Differences were also evident in the two frameworks. Toal (2009) considered each EIS item to be a KDP (Burke, 1998). In my model, I consider the KDPs more as influencers than steps.

Another important difference was access. Toal (2009) was external to the programs that she was evaluating, I was internal. Toal's (2009) research was on large multi-site National Science Foundation (NSF) STEM program evaluations. This case study is on two NASA Goddard ETD engineering training and development programs. Compared to the large NSF program evaluations, it is much smaller.

Toal's (2009) stakeholders included evaluators, principal, and co-principal investigators. Stakeholders in this case were engineers, program managers, instructors, subject matter experts (SMEs), and non-engineer data analysts. Some were the people who hired me. With some, I shared office space. With others, I met weekly or bi-weekly. This group comprised the purposeful sample that I used for data collection.

I purposefully chose 20 stakeholders to receive the instrument. I chose them for their participation in the TMT or PDL Training programs and for their availability to respond to my request. In the sample, I included TMT and PDL Training program managers, data analysts, SMEs, and PDL Training instructors. I omitted the curriculum designers because they were no longer at NASA. I also omitted the TMT presenters. This was largely due to the TMT program design and the presenter schedules.

By using stakeholder participation and availability as criteria for the sample, I limited this data collection to those who were most active in the processes and most reasonably expected to respond. Arguably, this introduced a response bias which I discuss in depth in findings. With that in mind, I consider these data to be a starting point that depict stakeholder involvement in a case presented as an exemplar.

Once I understood the similarities and differences between Toal's (2009) research and mine, I realized that I could leverage Toal's (2009) work and use the EIS to operationalize the Daigneault and Jacob (2009) dimensions. To that end, I begin in Table 1 by mapping the Daigneault and Jacob (2009) dimensions to Toal's 13 EIS items. I included all 13 because the design of this study warranted it. Item EIS#13 was especially important to retain because it queries an area of interest (developing future project plans based on evaluation results) and operationalizes implementation and stakeholder control, which in turn reflect organizational decision-making and change.

The remainder of the paper is limited to the five items I consider most relevant to the constructs in the first two papers. These are italicized in Table 1 and include EIS#3 (developing the logic model), EIS#4 (developing data collection instruments), EIS#5 (developing data collection processes), EIS#12 (presenting findings), and EIS#13 (using findings to plan).

Paper 3 Table 1

Daigneault and Jacob dimensions (2009, 2014) mapped to Toal (2009) EIS items

Dimensions (constructs)	I was involved in...
Stakeholder involvement	#1 discussions that focused the evaluation #4 <i>developing data collection instruments</i> #6 collecting data #7 reviewing collected data for accuracy and/or completeness #8 analyzing data #9 interpreting collected data #10 writing evaluation reports #11 reviewing evaluation reports for accuracy
Stakeholder control	#2 identifying evaluation planning team members #3 <i>developing the evaluation plan (logic model)</i> #5 <i>developing data collection processes</i> #12 <i>presenting evaluation findings (e.g., to staff, stakeholders, external audience(s))</i> #13 <i>developing future project plans based on evaluation results</i>
Stakeholder diversity	Not measured in the EIS Measured using added prompt

Note. From Daigneault and Jacob (2009, 2014) and Table 3 (Toal, 2009, p 356).

The EIS does not measure diversity. To address this, I added a prompt asking stakeholders to mark their roles. In this way, I was able to use their roles to identify non-evaluator stakeholders and to bluntly operationalize power and interest. Although not ideal, it is a starting point. Importantly, it did not substantially change the EIS and thus preserved the validation work of Toal (2009).

I measured stakeholder participation using the Daigneault and Jacob (2009, 2014) dimensions as constructs. I framed the analysis using the Gertz (2006) necessary and sufficient argument and the *m* of *n* rule where *m* = 1 (Daigneault & Jacob, 2009). I

did so to maintain a consistent measure and to provide for direct comparison between the primary stakeholder data in this paper and the programmatic data in my first two papers. As with Stevens (1946), I did not consider the data linear and thus limited the analysis to mode, range, and frequency.

Toal (2009) used EFA and CFA to validate the EIS. She framed the validation using the Messick criteria (for a full discussion of Messick's criteria see his work 1989, 1995). Although the purpose of this paper is not to validate the EIS, in Table 2, I map three of Messick's six validation criteria (content, substantive, structural, generalizability, external, and consequential) to the five EIS items selected for discussion. I do this as a preliminary validation of the observations and data from the first two papers.

Paper 3 Table 2

Messick's Criteria Mapped to Case Study Evidence

Messick's criteria	Construct	Evidence
Content-related evidence	Evidence reflects involvement, diversity, and control	Papers 1 & 2: meeting outputs, coded logic models, coded DCIs, public use of logic models, deployment of DCIs Paper 3: EIS#3, #4, #5, #12, #13
Substantive-related evidence	Programmatic evidence supports actual data measured using EIS & m of n where $m=1$, or m of n where $m=$ mode 3 and/or 4	Papers 1 & 2: meeting outputs, coded logic models, coded DCIs, public use of logic models, deployment of DCIs Paper 3: EIS#3, #4, #5, #12, #13
External evidence	Evidence supports differentiation between stakeholder roles	Papers 1 & 2: power/interest Added item querying role Paper 3: EIS#3, #4, #5, #12, #13

Note: Adapted from Toal (2009), p. 351.

In Table 2, three of Messick's validation criteria (content-related evidence, substantive-related evidence, and external evidence) are mapped to the constructs and

evidence from each of the three papers. This increases the validity of the data across the papers and strengthens the causal pathway argument that stakeholder involvement influences (impacts) organizational decision-making and change as operationalized by implementation of evaluation recommendations.

In Table 3, I continue to develop the causal pathway argument by mapping the five selected EIS items to the Weller and Barnes (2014) criteria. As with the Daigneault and Jacob (2009, 2014) dimensions, I do this to maintain consistent constructs and measures across the papers.

Paper 3 Table 3

Weller and Barnes (2014) Causal Pathway Analysis Criteria Mapped to the TMT and PDL Programs

	Variation in cases	Expected relationship	Theory = papers 1+ 2 +	Existing data
TMT	Level, type of stakeholder participation Purpose as indicated Learning evidenced by case study No pre- and post-testing No presentation-level logic models Traditional format	Stakeholders report varying levels of involvement EIS#1-EIS#13 Stakeholders report being involved in the logic modeling and/or data collection process EIS#3-EIS#5	Noble and Heale: Triangulation is used to validate data and identify mechanisms. Fleischer and Christie: Stakeholder roles reported by evaluators may not be accurate.	Mostly theoretical Limited empirical Gap identified
PDL Training	Level, type of stakeholder participation Purpose as indicated Learning evidenced by pre- and post-testing and case study Workshop-level logic models Non-traditional format	Stakeholders report presenting and/or using evaluation findings EIS#12 & #13		

Note. Adapted from Weller and Barnes (2014).

Case variation in Table 3 includes level and type of stakeholder participation, evidence of learning, workshop-level logic models, and format. In this paper, level and type of stakeholder involvement, the three Daigneault and Jacob (2009, 2014) dimensions of participation, are measured using the EIS. Expected relationships are specific to the collected data. They include stakeholders reporting involvement in the logic modeling and data collection processes and presenting and using evaluation findings to plan.

Assumptions build from theories in the first two papers. They are: 1) Organizational knowledge is constructed by people within the organization, 2) Stakeholder participation increases influence and implementation, 3) Logic modeling and data collection processes are tools to involve non-evaluator stakeholders, and 4) KDPs define the relationship between evaluation use and implementation. The theoretical foundation also builds on the first two papers. Alone, the method would suffer from single-source bias as noted by Fleischer and Christie (2009) and others. In this study, it is managed by triangulating data and methods with primary stakeholder data.

I use Table 4 as in my first two papers to link constructs (dimensions) with measures. As well, I use the Goertz (2006) necessary and sufficient m of n condition where $m=1$. Here, the condition $m=1$ means that minimally one stakeholder marks either some involvement (3) or extensive involvement (4) for each of the five EIS prompts that I use to reflect the programmatic data described in the first two papers.

Paper 3 Table 4*Constructs (Dimensions) and Measures*

Construct (dimension)	Measure
Stakeholder involvement	Daigneault & Jacob using Goertz (2006)
Stakeholder control	necessary and sufficient m of n rule where $m=1$
Stakeholder diversity (evaluator/non-evaluator)	EIS#3, EIS#4, EIS#5, EIS#12, EIS#13 Added prompt querying stakeholder role
Implementation of evaluation Recommendations	EIS#13

In Table 5, I list constructs (dimensions) and the evidence required to meet the Goertz (2006) necessary and sufficient condition. Where in the first two papers, the evidence was artifactual, here the evidence is primary. As in the first two papers, “If I see the evidence outlined in Table 5, then the condition m of n where $m=1$ is met.”

Paper 3 Table 5*Stakeholders, Evidence*

Stakeholders	Construct (dimension) and evidence
Program champions at Directorate/Division	Stakeholder involvement There will be stakeholders reporting their involvement in the logic modeling and/or data collection processes.
Program team: Program manager Workshop instructors Presenters Subject matter experts Evaluator	Stakeholder diversity There will stakeholders reporting non-evaluator roles.
Analysts Curriculum designer Program coordinator	Stakeholder control There will be stakeholders reporting their involvement in presenting evaluation findings and/or in developing future plans based on evaluation results.

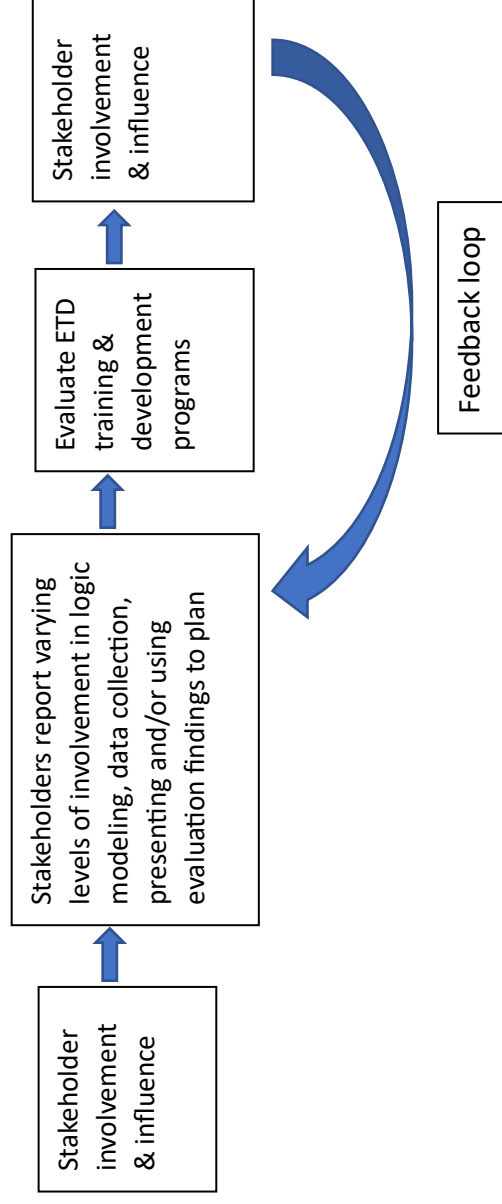
I use a table like this one in all three papers to link the data and to validate the observations. In this paper, evidence for each construct is provided by the stakeholders.

Proposed Stakeholder Influence Models and Constructs

In Figure 1, I present the concept map. In Figure 2, I present the stakeholder implementation and influence diagram. Both build on corresponding figures from my first two papers.

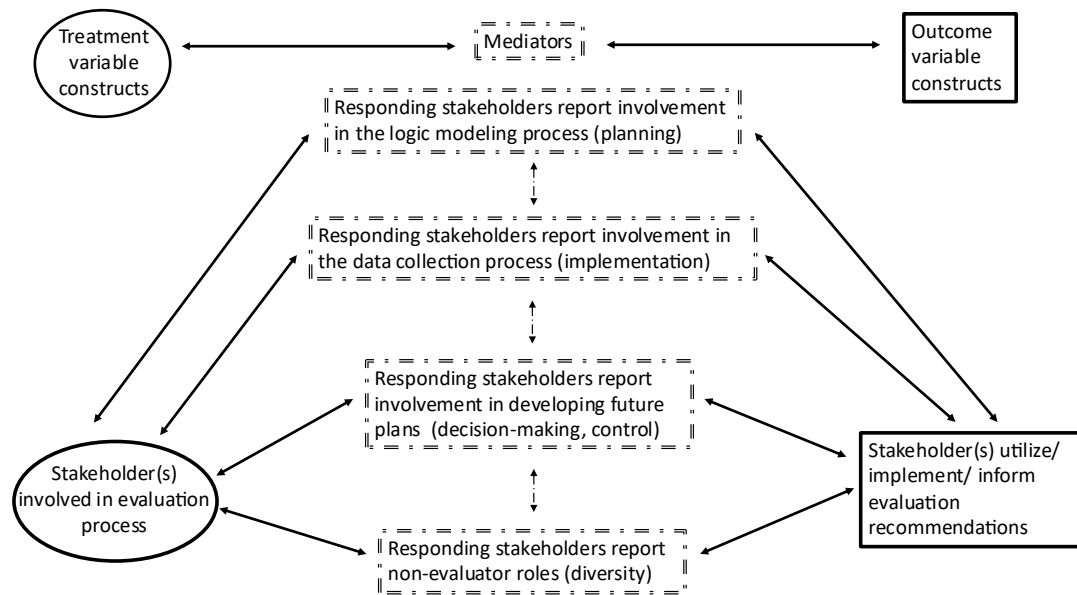
Paper 3 Figure 1

Concept Map of Stakeholder Influence on Logic Model and Program Design



Note. Influenced by Daigneault & Jacob (2009, 2014) and Locke & Latham (2019).

Here, stakeholder participation (influence) is operationalized by logic modeling, data collection, and presenting and using evaluation findings to plan. Consistent with the previous concept maps, I propose feedback as a moderator. In their work in goal setting, Locke and Latham (2006, 2016) identified feedback as a key moderator in reaching set goals. In Figure 2, I expand on the concept map using the Daigneault and Jacob (2009, 2014) dimensions.

Paper 3 Figure 2*Stakeholder Involvement (Influence) Diagram*

Note. Influenced by Daigneault and Jacob (2009, 2014). Vertical dashed arrows between mediators are unsupported.

Here, ovals represent treatment, dashed rectangles represent mediators, and solid rectangles represent outcome. Arrows represent propositions. Thick arrows are supported by the case. Thin dashed vertical arrows flow between mediators and are unsupported. I consider this a closed system with feedback between treatment and mediator(s), between mediator and mediator, and between mediator(s) and outcome. Feedback is illustrated by double sided arrows. Note all arrows are shown as double sided.

TMT and PDL Training Program Stakeholder Involvement Data

To the Toal (2009) EIS, I added space for comments and a prompt that queried respondents' roles. On 14 December 2022, I emailed a survey link to each of the 20 stakeholders. In the following weeks, I emailed four reminders. I extended the closing through 26 January 2023. Eighteen of the 20 (90%) stakeholders responded. Responses

were anonymous. Roles were self-identified. Of the 18, nine were instructor presenters, four were program managers, three were analysts, one was an SME, and one was a program coordinator.

In Table 6, I present response frequencies for the five select items aggregated by role. To account for the number of instructor presenters in the population, I tally responses with and without their data.

Paper 3 Table 6

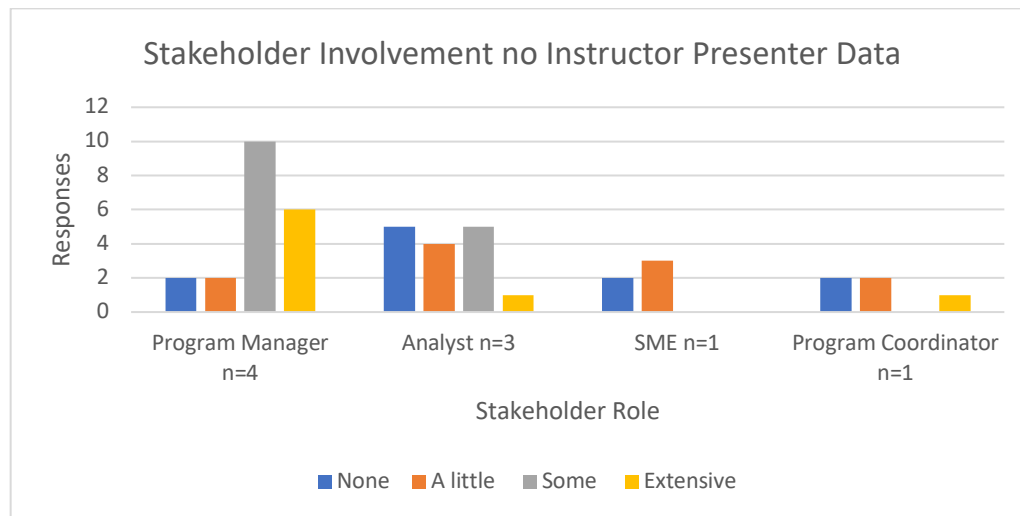
Frequency Table of Stakeholder Responses Aggregated by Role

Involvement scale response	Program Manager n=4	Analyst n=3	SME n=1	Program Coordinator n=1	Total n=9	Instructor Presenter n=9	Total n=18
None	2	5	2	2	11	24	35
A little	2	4	3	2	11	8	19
Some	10	5	0	0	15	10	25
Extensive	6	1	0	1	8	3	11
Total	20	15	5	5	45	45	90

As indicated here, fifty percent (9/18) of the responding stakeholders self-identified as instructor presenter(s). So that this group would not be over- (or under-) represented, I total the number of scale responses with and without their data. Figure 3 reflects the data in Table 6 and depicts stakeholder involvement data without the instructor presenter data.

Paper 3 Figure 3

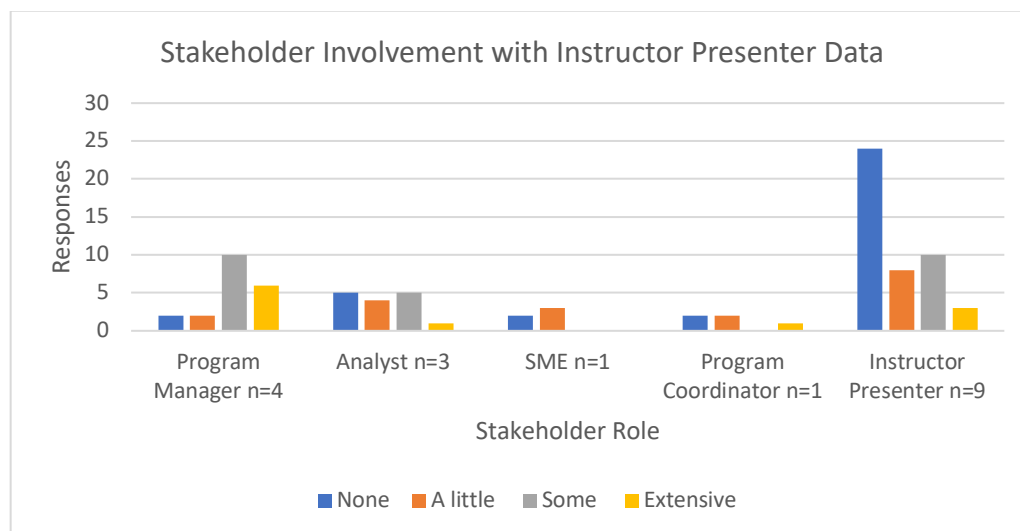
Frequency Chart – Stakeholder Involvement Data without Instructor Presenter Data



Of the 45 responses from the nine who were not instructor presenters, 34 were marked as 2 (a little), 3 (some), or 4 (extensive) involvement in the five areas corresponding to the programmatic data in the first two papers. Eleven were marked as 1 (no involvement). Figure 4 reflects the data in Table 6 with the instructor presenter data.

Paper 3 Figure 4

Frequency Chart – Stakeholder Involvement Data With Instructor Presenter Data



In contrast to the data in Figure 3, of the 45 responses from the nine instructor presenters, 21 were marked as 2 (a little), 3 (some), or 4 (extensive) involvement in the five areas corresponding to the programmatic data in the first two papers. Twenty-four (24) were marked as 1 (no involvement).

Space was provided for comments after each prompt and again at the end of the instrument. The instructor presenter comments (n=5 comments) generally reflected how they used the evaluation data and findings. Four of the five comments indicated that the findings were useful and that they informed changes to the program. One instructor presenter indicated the data were valuable since the role was voluntary [and] “the training a small part of my duties.” One called the evaluation process “a great tool to help us ensure we are on the right track and also identify areas of deficiency.”

There were more program manager comments than instructor presenter comments (n=8 comments), with three of the four program managers somewhat or extensively involved in the logic modeling and data collection processes and in presenting and using evaluation findings. One manager noted that they “used evaluation results to change certain activities related to [the programs].” Another indicated that “this evaluation is a model for training and development for NASA. The iterative improvements based on results have been crucial. The involvement of the evaluator early is key so they can understand the goals and objectives.” The exception was one program manager who noted a “reduced involvement” as a result of “entering [the] current stakeholder role after the program was already up and running.” This program manager did, however, indicate some or extensive involvement in the logic modeling process, in reviewing evaluation reports, and in developing plans based on evaluation findings.

There was one program coordinator and one analyst comment each. The coordinator indicated that they “relied on the data when planning.” The analyst indicated their involvement in the DCI construction was limited.

Findings and Discussion

In my first two papers, using the Goertz (2006) necessary and sufficient conditional argument (m of n , where $m=1$), I found that stakeholder participation in the TMT and PDL Training logic modeling and data collection processes positively influenced organizational decision-making and change. I operationalized organizational decision-making and change using implementation of evaluation recommendations.

In paper 1, I noted that participating stakeholders were high power/high interest and mentioned the importance of expanding the population to include stakeholders with less power/less interest. In response, I purposefully selected high power/high interest stakeholders as well as those with less power or interest to receive the EIS. I operationalized power and interest by role. Although not an ideal measure of either power or interest, I used role as a starting point to group the data.

In this purposeful sample, I found that the data from the program managers met the necessary and sufficient condition m of n where $m=1$ response of 3 or 4 for each of the five select EIS items. This alone fully supported the findings of my first two papers.

I then re-constrained from $m=1$ to $m = \text{mode response of 3 (some) or 4 (extensive)}$ involvement for each of the five items. Although not in the re-constrained condition, it is important to note that a mark of 2 also indicated involvement. I note this because the analysts marked 2 for EIS#12 and EIS#13; the SME marked 2 for EIS#3, EIS#5, and EIS#13; and the program coordinator and one program manager marked 2 to both EIS#3 and EIS#4.

In Table 7, I summarize stakeholder responses using the first condition. In Table 8, I summarize stakeholder responses using the re-constrained condition. In both the data are aggregated by role. The five prompts selected for discussion are italicized in Table 1 and are: EIS#3 developing the evaluation plan (logic model), EIS #4 developing data collection instruments, EIS#5 developing data collection processes, EIS #12 presenting evaluation findings (e.g., to staff, stakeholders, external audience(s), and EIS #13 developing future project plans based on evaluation results.

Paper 3 Table 7

m of n where m = 1 response of 3 (some involvement) or 4 (extensive involvement)

EIS Item	Program Manager n=4	Analyst n=3	SME n=1	Program Coordinator n=1	Instructor Presenter n=9
<i>m = 1 (observation) condition met?</i>					
#3	Yes	Yes	No	No	Yes
#4	Yes	Yes	No	No	Yes
#5	Yes	Yes	No	No	Yes
#12	Yes	No	No	No	No
#13	Yes	Yes	No	Yes	Yes

Note: EIS#3 logic model, #4 DCI, #5, data processes, #12 presenting, #13 using findings

Paper 3 Table 8

m of n where m = mode response = 3 (some involvement) and/or 4 (extensive involvement)

EIS Item	Program Manager n=4	Analyst n=3	SME n=1	Program Coordinator n=1	Instructor Presenter n=9
<i>m = 1 (mode response 3 and/or 4) condition met?</i>					
#3	Yes	No	No	No	Yes tri-modal
#4	Yes	Yes	No	No	No
#5	Yes	Yes	No	No	No
#12	Yes	No	No	No	No
#13	Yes	No	No	Yes	Yes

Note: EIS#3 logic model, #4 DCI, #5, data processes, #12 presenting, #13 using findings

As seen in these two tables, the original and re-constrained conditions were met.

The evidence is strong for program managers. Their mode response was 3 or 4 for each EIS item selected for this discussion. The evidence is weaker for the instructor presenters and for the analysts. Although the instructor presenter mode response to EIS#13 was 4, their response to EIS#3 was tri-modal – 1, 2, and 3. From their comments, we learn that they were volunteers with little time for the programs. This, I argue puts them in the less power/less interest group. Although the instructor presenters may have had both power and interest, with little time they were not able to fully involve themselves.

The analyst data met the new condition on EIS #4 and EIS#5, the items related to data collection. The analyst data did not meet the new condition on EIS#3, EIS #12, or EIS#13, the items related to logic modeling or presenting or using evaluation findings. The SME marked a 1 or 2 to each of the five selected EIS items. Unfortunately, the SME did not offer any comments to explain the responses. The program coordinator, with the exception of EIS#13, did the same. To EIS#13, the program coordinator marked 4 and commented on the importance of evaluation data in planning. In each, this may have been influenced by time-on-job.

Time-on-job (tenure in this position and time spent on job) is an important unobserved variable that may be a moderator in level of stakeholder involvement. It may also be a factor. Interestingly, time-on-job may not have surfaced had I not purposefully included stakeholders with less power and less interest as argued by Pateman (1970) and recommended in my first paper.

In addition to time-on-job, power and interest may also be factors in the process. In my first paper, I measured power and interest using the Bryson et al. (2011) matrix. I identified each participant in the logic modeling process as high power/high interest. In

this paper, I found that some stakeholders did not see themselves as such. This important difference warrants additional investigation.

Sample size was also important. A sample of 20 was small. It became even smaller when stratified by role (instructor presenter $n=9$, project manager $n=4$, analyst $n=3$, and other $n=2$). This is important because half of the respondents were instructor presenter stakeholders who, by role, were less powerful or less interested volunteers with less time-on-job. I accounted for this in the frequency table (Table 6) and in the accompanying graphs.

I use Table 9 on the next page to link the EIS data with the programmatic data from the first two papers. I include both the initial and re-constrained m of n conditions.

Paper 3 Table 9*Data Sources, Observables and Evidence*

Construct	Source(s)	Observable(s)	Observed?	EIS data?	Marked?
Stakeholder influence,	Stakeholder data from EIS	Coded meeting output(s) Evaluator observations Comparison of meeting output to accepted logic model, accepted DCI, and recommendations	Yes Yes Yes	Mode stakeholder response is 3 or 4 on EIS items #3, #4, #5, #12, and/or #13	Yes for A, IP, PC, PM
Stakeholder involvement	Stakeholder data from EIS	Coded meeting output(s) Evaluator observations	Yes Yes	Mode stakeholder response is 3 or 4 on EIS items #3, #4, #5, #12, and/or #13	Yes for A, IP, PC, PM
Stakeholder diversity	Stakeholder data from EIS	Coded meeting output(s) Evaluator observations	Yes Yes	Responding stakeholder self-identifies as non-evaluator in EIS	Yes
Stakeholder control	Stakeholder data from EIS	Coded meeting output(s) Evaluator observations Accepted logic model, accepted DCI used to collect data, public use of logic model and/or data	Yes Yes Yes	Mode stakeholder response is 3 or 4 on EIS items #12 and/or #13	Yes for PM, IP, PC
Influence arrow from constructs to outcome (KDP, proposition)	Stakeholder data from EIS	Presentations Coded output of meetings Evaluator observations	Yes Yes Yes	Mode stakeholder response is 3 or 4 on EIS items #12 and/or #13	Yes for PM, IP, PC
Outcome	Stakeholder data from EIS	Use, implementation of logic model content in DCI content and/or other data-driven changes to the program are made	Yes	Mode stakeholder response is 3 or 4 on EIS items #4, #5, #12, or #13	Yes for A, IP, PC, PM

Note. Adapted from *IQMR 2020 Alt Acts_Data Collection Plan template*. A = analyst, IP = instructor presenter, PC = program coordinator, PM = program manager, SME = subject matter expert

The findings in Table 9 fully support the causal pathway argument that stakeholder participation influences implementation. They are also consistent with and fully supported by the foundational theories upon which the argument is built. This includes the incremental theories of Lindblom (1959); the constructivist theories of Dewey (1896), Rogoff (2003) and Vygotsky (1978); the stakeholder participation work of Christie (2011), Cousins and Earl (1992), and Fetterman (2004); the planning and use and implementation and use work and theories of Toal (2009) and Weiss (1998); the participation and influence theories of Kirkhart (2000); the implementation, implementation evaluation, evaluator-partner, and continued stakeholder participation theories of Cousins (2004), Patton (2004) and Wholey (2004); the goal setting theories of Latham (2016), Locke and Latham (2019); and the findings of Locke and Latham (2006).

Strong examples of incrementalism were found throughout the process. Evidence can be found in the coded iterated logic model artifacts and in the program managers' comments about "iterative improvements" and about "using the evaluation results to change certain activities."

Strong examples of implementation through participation (including logic modeling) were also found throughout the process. The evidence here included coded collaboratively iterated logic models and DCIs, as well as EIS data on the use of evaluation findings.

Limitations and strengths are described in my first two papers and in the discussion above. Limitations include the positive response bias introduced by the sampling criteria, the small sample size, and the over-representation of volunteer

instructor presenters. As Toal (2009) indicated in her validation of the EIS, none of these is fatal.

As I consider the response bias that I introduced into this study, I wonder as a counterfactual what might have happened had there been no data or if the DCI had not been collaboratively constructed with the stakeholders. Had there been no data or participating stakeholders, one might expect different outcomes. One might also expect to expend tremendous effort proving the merits of the program and evaluation design and the significance of the recommendations. One might also expect less (if any) use of evaluation findings to plan future work. Lack of implementation speaks to item EIS#13 removed by Toal (2009) and her suggestion that the instrument was generalizable beyond the scope of her research (Wu, 2016).

Although the case described in this study is typical in the NASA Goddard ETD training and development program setting, it is an exemplar. As such, it is limited in its generalizability. Others can look at these data as a starting point for several reasons. First, this study is based in a unique siting in a team-oriented, data-driven organization. Second, I introduced a response bias through the criteria I used to define the purposeful sample. Lastly, there are likely differences unaccounted for due to participating stakeholders' time-on-job, power, and interest.

Future evaluators should consider initially limiting stakeholders to the core team then expanding to others with less power or less interest. Initially, this would likely include the program manager. While important, it is not surprising that the program managers were high power/high interest and that their data met the conditions of the outcomes. Managing the programs was their job. Their involvement was expected.

What I found even more interesting than the expected were the data from the stakeholders whose roles or responses identified them as having less power or interest. I include in this group the program manager who mentioned being less involved because the programs were already underway. Where the less involved program manager marked 2 on the logic modeling and data collection prompts, the program managers who were involved early in the process marked 3 or 4. This presents a gradation of participation that may inform influence and use (Kirkhart, 2000; Toal, 2009).

What is empirically evidenced in this study are the steps that built a program based on stakeholder participation and the links between (the KDPs). The KDPs are listed in Table 9 and include stakeholders accepting: 1) the logic model to frame evaluation and program design, 2) the DCI content to collect the data, and 3) the evaluation findings that result from the data. Beyond steps, the stakeholder data provide insights into unobserved variables, potential mechanisms, and factors. The process is the mechanism. The KDPs inform the process. The context for this case is the team-based NASA Goddard ETD culture. Factors and unobserved variables include time-on-job, power/interest, and role.

By using the case of two NASA Goddard ETD training and development programs as an exemplar, this study adds to the larger body of research on stakeholder participation and implementation of evaluation recommendations. In it, I presented programmatic and primary evidence supporting the proposition that stakeholder participation in the logic modeling process positively influences implementation. Perhaps more importantly, from the data I identified factors along the causal pathway – power and interest, time-on-job – and learned that the process itself is the mechanism.

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