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CONSTRUCTING AND VERIFYING PROGRAM THEORY USING SOURCE DOCUMENTATION

Ralph Renger
College of Public Health, University of Arizona
Tucson, Arizona

Abstract: Making the program theory explicit is an essential first step in Theory Driven Evaluation (TDE). Once explicit, the program logic can be established making necessary links between the program theory, activities, and outcomes. Despite its importance evaluators often encounter situations where the program theory is not explicitly stated. Under such circumstances evaluators require alternatives to generate a program theory with limited time and resources. Using source documentation (e.g., lesson plans, mission statements) to develop program theory is discussed in the evaluation literature as a viable alternative when time and resources do not permit *a priori* program theory development. Unfortunately, the evaluation literature is devoid of methodology illustrating how to translate source documentation into an explicitly stated program theory. The article describes the steps in using source documentation to develop and verify a program theory and illustrates the application of these steps. It concludes with a discussion about the feasibility and limitations of this methodology.

Résumé : Expliciter la théorie d'un programme constitue l'une des premières étapes essentielles de l'évaluation fondée sur la théorie. Une fois explicite, la logique de programme peut être décrite en établissant les liens essentiels entre la théorie, les activités, et les résultats du programme. Malgré son importance, l'évaluateur se retrouve souvent dans des situations où la théorie du programme n'est pas explicitée. Dans ces circonstances, l'évaluateur doit recourir à une solution de rechange pour concevoir une théorie de programme en fonction d'un délai et de ressources limités. Recourir à la documentation source (e.g., plans de cours, énoncés de mission) afin d'élaborer la théorie d'un programme est considéré, dans la littérature sur l'évaluation, comme une option de rechange viable, lorsque le délai et les ressources ne favorisent pas cette élaboration a priori. Malheureusement, la littérature sur l'évaluation est dépourvue d'une méthodologie illustrant la façon

Corresponding author: Ralph Renger, Professor, Mel and Enid Zuckerman College of Public Health, University of Arizona, 1295 N. Martin Ave., Building 202, PO Box 245210, Tucson, AZ, USA 85724; <renger@email.arizona.edu>

de traduire la documentation source en théorie de programme explicite. L'article décrit les étapes du recours à la documentation source en vue de l'élaboration et de la vérification de la théorie de programme, en plus d'illustrer l'application de ces étapes. Il se conclut par une analyse de la faisabilité et des limites de cette méthodologie.

During the last three decades extensive literature has been published on the importance of program theory in evaluation (Chapel & Cotten, 1996; Chen, 1990, 2005; Chen & Rossi, 1983; Fitz–Gibbon & Morris, 1996; McLaughlin & Jordan, 1999; Patton, 1986; Provus, 1971; Renger & Titcomb, 2002, Torvatn, 1999; Weiss, 1995; Worthen, 1996). Program theory is one of the central tenets of Theory Driven Evaluation (TDE) and is the "process through which program components are presumed to affect outcomes and the conditions under which these processes are believed to operate" (Donaldson, 2001, p. 471). A similar definition is offered by Rogers (2009) who defined program theory as the "process by which change comes about (for an individual, organisation, or community)" (p. 3).

Over the decades a consistent starting point for TDE evaluators has been to begin by conducting a situational analysis, by clearly defining the problem and its context (Cole, 1999; Donaldson, 2005; McLaughlin & Jordan, 1999; Renger & Titcomb, 2002; Rosas, 2005). This is necessary to begin to define the program logic, which describes the linkages between the program theory, the inputs, activities, and outcomes (Leeuw, 2003). It is the identification and measurement of these outcomes that is essential to evaluating the merit and worth of a program (Chen, 1990, 2005; Gargani, 2003; Mark, Henry, & Julnes, 2000; Weiss, 1995). It is necessary to make the conditions the program is trying to change explicit, for it is the evaluation of the change in these conditions that determines whether the program made any difference to participants, or the program's merit and worth.

Despite its importance, TDE evaluators frequently encounter situations where programs are operating in the absence of an explicitly defined program theory. There may be many possible reasons for this. It may be the program staff is operating from an implicit theory. Agency staff may tacitly understand what they are trying to change and the need for an explicitly stated program theory only becomes salient when there is a need for a formal evaluation. It may also be the case that during the planning phase agency staff may simply be unaware of the importance of program theory. Alternatively, agency staff may be aware of the potential benefit but unwilling to commit resources

to what is often perceived as a theoretical exercise (Scriven, 1998). Finally, Cole (1999) notes three additional reasons why a program's theory may not be made explicit prior to its evaluation, including *the lack of available methods for constructing program theory*.

TDE evaluators are often faced with the challenge of how to create an explicitly defined program theory after program implementation, with limited resources, or when there is a lack of agency commitment to the process. Leeuw (2003) offered three suggestions on how to meet those challenges. One of them, the policy-scientific approach, emphasizes the use of documents, interviews, and argumentational analysis to establish the program theory.

In the absence of time and resources the use of existing documentation (e.g., minutes, lesson plans, mission statements, etc.—hereinafter referred to as source documentation) could prove useful for generating a program theory. Making the program theory explicit has been referred to as cracking the Da Vinci code (Donaldson, 2005). Building on this analogy, the process of establishing and determining a program's intended theory which is encrypted within the source documentation requires some reverse engineering. This is similar to what Brouselle (2010) refers to as retrofitting. Unfortunately the evaluation literature is devoid of instruction on how to translate source documentation into a program theory. As Leeuw (2003) points out ". . . rather limited attention is spent on methods for articulating underlying theories when they are not already made explicit by stakeholders themselves" (p. 6).

The purpose of this article is to begin to fill this methodological void by demonstrating how a program theory can be developed from source documentation. Three TDE approaches are first described to demonstrate common principles used in generating program theory. All three approaches are grounded in situational analysis and prospectively use stakeholders to develop program theory. It will be shown how constructing program theory from source documentation follows the same principles as these methods, but uses a different informational source to do so. The steps in using source documentation to develop a program theory are then illustrated using a case example. The conditions under which using source documentation is feasible as well as the limitations of this methodology are discussed. The steps described herein were refined over the course of several years and based on experience working with several public health programs which were required to develop a program theory with limited time and resources.

EXAMPLES OF TDE APPROACHES GROUNDED IN SITUATIONAL ANALYSIS

Three approaches to constructing program theory grounded in situational analysis are now described. To the author's knowledge, they have not been explicitly categorized in the literature as TDE approaches. However, it was reasoned that since each approach begins by using methods to develop a program theory, the necessary first step of TDE (Donaldson, 2005; McLaughlin & Jordan, 1999), they could be classified as TDE approaches.

The ATM Approach

The ATM approach (Renger & Titcomb, 2002) is a three-step process designed to engage stakeholders in the development of a logic model outlining key elements (e.g., activity/strategy, assumptions, outcomes) of their program. The goal of the first step, "A: Antecedent conditions," is to use root cause analysis (RCA) to develop a visual map of the relationships between the problem of interest and its antecedent conditions. Consistent with TDE, RCA is the process by which the processes operating (Donaldson, 2002) are made explicit.

A trained facilitator leads subject matter experts (SMEs) through individual 45-minute interviews to develop a visual map of antecedent conditions. After completing interviews, the individual results are combined into a final summary map. In Step 2, Targeting, antecedent conditions are prioritized and objectives are established. It is this prioritized thread of antecedent conditions which define the programmatic assumptions, or program theory. In Step 3, Measurement, these prioritized conditions are evaluated.

Aetiologic Theory Structuring Guide

Aetiologic Theory Structuring Guide (ATSG) is one of the three strategies comprised in a conceptual framework proposed by Cole (1999). ATSG is based on the rationale addressing the root causes of a problem and establishing the discrepancy between the standards and the observed condition, and clearly illustrating the cause and dimension of the problem are the pillars of a successful program. The emphasis on establishing root causes is consistent with the ATM approach. The three basic steps of ATSG include defining the problem, establishing the determinants of the problem, and visually depicting the relation-

ship. ATSG involves creating a hypothetical problem etiology chart that addresses the underlying conditions of the issue of interest. The chart is constructed by placing the problem on the left side of the page and then adding the underlying causes from proximal to distal in a logical flow. Although this left to right orientation is opposite to the ATM approach, the purpose of establishing underlying causes and depicting them visually remains consistent. Information is derived from expert opinions, a literature review, or in some cases primary data collection. The result is a "visual illustration of the etiologic routes that constitute the direct and the indirect causes of the problem" (Cole, p. 459). Cole then describes how the theory can be used to guide intervention development.

Concept Mapping

According to Rosas (2005), "concept mapping is a multistep process that helps articulate and delineate concepts and their interrelationships through group process (brainstorming, sorting, rating), multivariate statistical analyses (multidimensional scaling [MDS], hierarchical cluster analysis), and group interpretation of the conceptual maps produced" (p. 390). Concept mapping has been shown to have the potential to improve evaluation in various ways (Caracelli & Riggin, 1994; Shern, Trochim, & LaComb, 1999; Yampolskaya, Nesman, Hernandez, & Koch, 2004).

STEPS TO CONSTRUCTING A PROGRAM THEORY USING SOURCE DOCUMENTATION

All three TDE approaches begin by conducting a situational analysis using a variation of root cause analysis (RCA). RCA is used to make explicit the underlying conditions of a problem the program is designed to target. The methodology described below remains true to these TDE approaches and the principle of making the problem and relationship between underlying conditions explicit. However, the methodology does not initially use SMEs to develop the program theory and instead uses available documentation to generate program theory. This is especially important if resources for developing the program theory are scarce or the evaluator is under time constraints that restrict prospective data collection. The method described does use SMEs to verify the theory derived from the source documentation; however, the relative cost of the verification process to the cost of prospective theory generation is minimal. The methodology should

not be viewed as a substitute for *a priori* program theory development. It should be considered a last resort. Nevertheless, evaluators too frequently find themselves in situations where there are no other options.

Step 1. Gather Source Documentation

Collecting all relevant information is a basic starting point for all TDE approaches (Leeuw, 2003; McLaughlin & Jordan, 1999). Source documentation may include the original grant proposal, program manuals, activity descriptions, newsletters, lesson plans, meeting minutes, a program website or informational brochure, and basic program information such as the mission statement and objectives. These source documents are systematically examined for clues about the antecedent conditions the program is trying to change.

Step 2. Identify Antecedent Conditions

A program theory, and its associated programmatic assumptions, describes what a program is trying to change. These things are sometimes referred to as risk factors, protective factors, behavioral conditions, environmental factors, predisposing factors, and so forth. Renger & Titcomb (2002) collectively refer to these factors as antecedent conditions. Source documentation is used to uncover the antecedent conditions being targeted by a program. For example, mission and vision statements often provide insight into potential long-term conditions targeted for change. Descriptions of activities or interventions often contain insight into more immediate and intermediate conditions targeted for change such as behavioral or environmental conditions.

Step 3. Sequence Antecedent Conditions

As a result of step 2, numerous antecedent conditions are identified. It is reasonable to posit that relationships exist between these antecedent conditions. The challenge is to determine how these antecedent conditions are in fact related, to crack the Da Vinci code (Donaldson, 2005). In attempting to sequence these antecedent conditions, it is advantageous to use an approach that emphasizes creating a visual representation of the program theory. Such an approach is used by numerous evaluators when generating a program theory (Caracelli & Riggin, 1994; Donaldson, 2005; Leeuw, 2003; Renger & Titcomb, 2002;

Rosas, 2005; Yampolskaya et al., 2004). These approaches typically place long-term outcomes on the far right side of the page and then employ an if-then methodology to establish sequencing, or the relationship between immediate and intermediate outcomes (e.g., Kellogg Foundation, 2004; McLaughlin & Jordan, 1999; Renger & Titcomb, 2002). For instance, *if* children are not physically active, *then* they are likely to become obese. Experience has shown project timelines can be useful in providing clues about how activities (and the underlying issues they target) might be sequenced chronologically.

Step 4. Verify Program Theory with Stakeholders

Once the initial visual representation of the program theory has been created, it is important to verify it with key stakeholders. This will help create buy-in and acceptance of the results of the evaluation. This is similar to the member check used by other evaluators (Renger & Bourdeau, 2004). The verification process should also be extended to an actual field check, in the form of a process evaluation, to ensure there is consistency between what is written and what is being done. This is because programs may not always be delivered as the documentation suggests. The inconsistencies between documentation and delivery may occur for very good reasons such as adjustments made based on previous experience with delivering the program, a changing context in which the program is being delivered, or organizational turnover leading to inconsistencies in delivery. In a recent evaluation of a childhood obesity program in Arizona the author verified the program theory constructed from source documentation by speaking with staff responsible for delivering several components of the program (Renger & Billowitz, 2010). Staff were simply asked to discuss the steps they took in delivering the program and why they conducted each step. These data were then used to verify and make adjustments to the program theory. A similar methodology has been used by other evaluators. For example, Roorda and Nunns (2009) suspected that the document-derived theory did not accurately capture complexity and engaged stakeholders to assist with the reconceptualization and validation.

A Case Illustration

The Arizona Comprehensive Cancer Control Program (AzCCC) is a state-sponsored program designed to address Arizona's cancer burden. The AzCCC engaged in a one-year planning process which included

creating a steering committee consisting of SMEs from the medical, public health, business administration, and health economics professions. Coalitions were formed that aligned with the continuum of care model and consisted of SMEs in the areas of prevention, early detection, treatment, quality of life, and research. Each coalition was charged with developing goals, objectives, and activities for each area. As coalitions developed plans, they consulted the steering committee for clarification and direction. Personal communication with state Bureau Chiefs revealed that many of the coalitions partitioned the work, creating three separate subcommittees to write the goals, objectives, and strategies. Further, coalitions operated independently from each other in completing their mandate. At the end of the one-year planning process, the AzCCC developed a comprehensive 200-page document containing background information on cancer in Arizona and the program's mission, objectives, and activities (Arizona Department of Health Services, 2005). The complete plan can be downloaded at <http://www.azcancercontrol.gov/pdf/cancercontrolplan.pdf>.

The AzCCC plan was divided into five chapters corresponding to the areas of prevention, early detection, treatment, quality of life, and research. Each chapter has at least one goal followed by a set of more specific objectives and strategies, for example:

I. Early Detection and Screening
   Goal: To promote, increase, and optimize the appropriate utilization of high quality cancer screening and follow-up services
   a. Breast Cancer
      i. Objective 2.1: Increase the proportion of women aged 40 years and over who have received a mammogram and clinical breast exam within in the past year to 70% by 2010
         1. Strategies:
            a. Educate Arizona residents about the known and researched risk factors specific to breast cancer in order to dispel myths and reduce the likelihood of misinformation about breast cancer
            b. Reduce barriers to screening by collaborating with other women's health initiatives to make breast cancer screening convenient, affordable, and accessible. (Arizona Department of Health Services, 2005, p. 91)

After completing the one-year planning process the author was contacted by the state for evaluation assistance. An initial inspection of the plan suggested significant disconnects between goals, objectives, activities, and measures. Thus the author recommended engaging in a logic modeling process to better connect these key elements. When asked about the likelihood of engaging the coalition in this process, the state feared volunteers would view it as another time-consuming planning process. Further, the state had already spent its planning budget and was eager to proceed with implementation and evaluation.

The possibility of conducting a literature review to develop a program theory was first examined. This was problematic for a few reasons. First, the literature review would require significant time and resources to complete; time was of the essence. Second, the author did not have cancer expertise and did not want to assume responsibility for the validity of the program theory. Third, access to SMEs would be difficult to obtain in the short turnaround time.

Given the resource and time restrictions, it was decided to use source documentation to develop the program theory. The process of generating the program theory began by first identifying the long-term outcome(s). This was identified from the mission statement which was to "work together to reduce Arizona's cancer burden" (Arizona Department of Health Services, 2005, p. 11). This is placed on the right hand side of the page as shown in Figure 1.

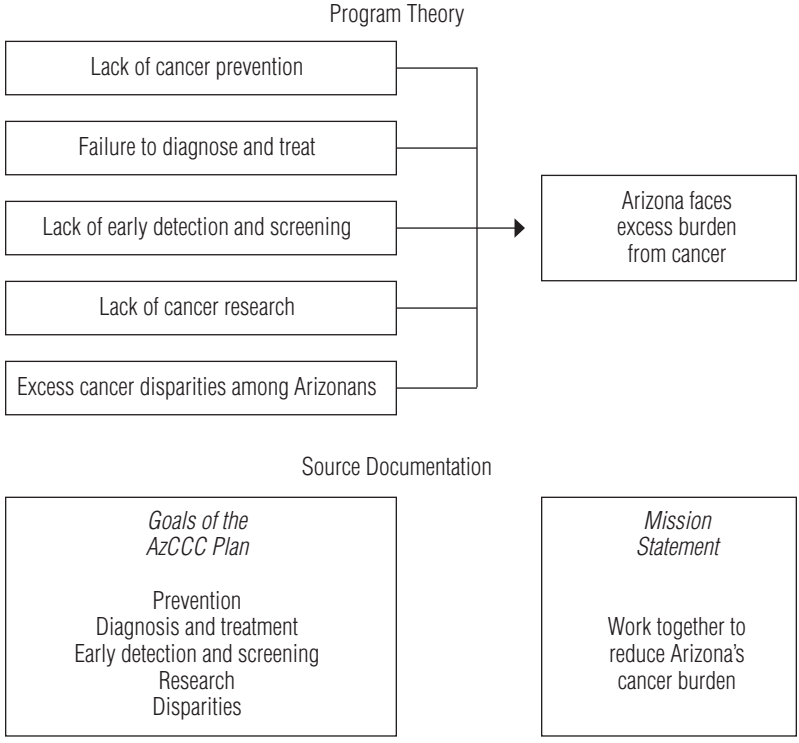
In the same way, immediate and intermediate outcomes, in the form of antecedent conditions, can be culled from existing documentation. Continuing with the AzCCC Program example, the five chapters (Prevention, Early Detection, Treatment, Quality of Life, Research, and Disparities) were reasoned to be first level of antecedent causes. The evolving program theory is shown in Figure 1.

Another look at the AzCCC Program will serve to complete the example. In the Early Detection section, the AzCCC Plan states the objective to "Increase the proportion of women aged 40 years and over who have received a mammogram and clinical breast exam within in the past year to 70% by 2010" (Arizona Department of Health Services, 2005, p. 34). This can be added to the evolving program theory and checked using if-then statements. For example, *if* women do not receive breast cancer screening, *then* there will be a lack of early cancer detection.

This process was repeated with the strategies listed under each goal. An inspection of the strategy descriptions reveals two main approaches: a media campaign and a mobile screening van. In the description of these strategies, the source document describes the purpose for these strategies as being to improve knowledge regarding risk factors specific to breast cancer and to decrease barriers to screening including convenience, affordability, and accessibility. Again, this is checked using if-then logic. If women do not have access to breast cancer screening, then there will be a lack of early detection. Figure 2 shows the integration of the antecedent conditions based on strategy descriptions.

Using the source documentation to derive the goal and antecedent conditions provides an evaluator with a basic understanding of the program theory. As illustrated, the mission of an institution, the goal of a program, its objectives and strategies, and other program

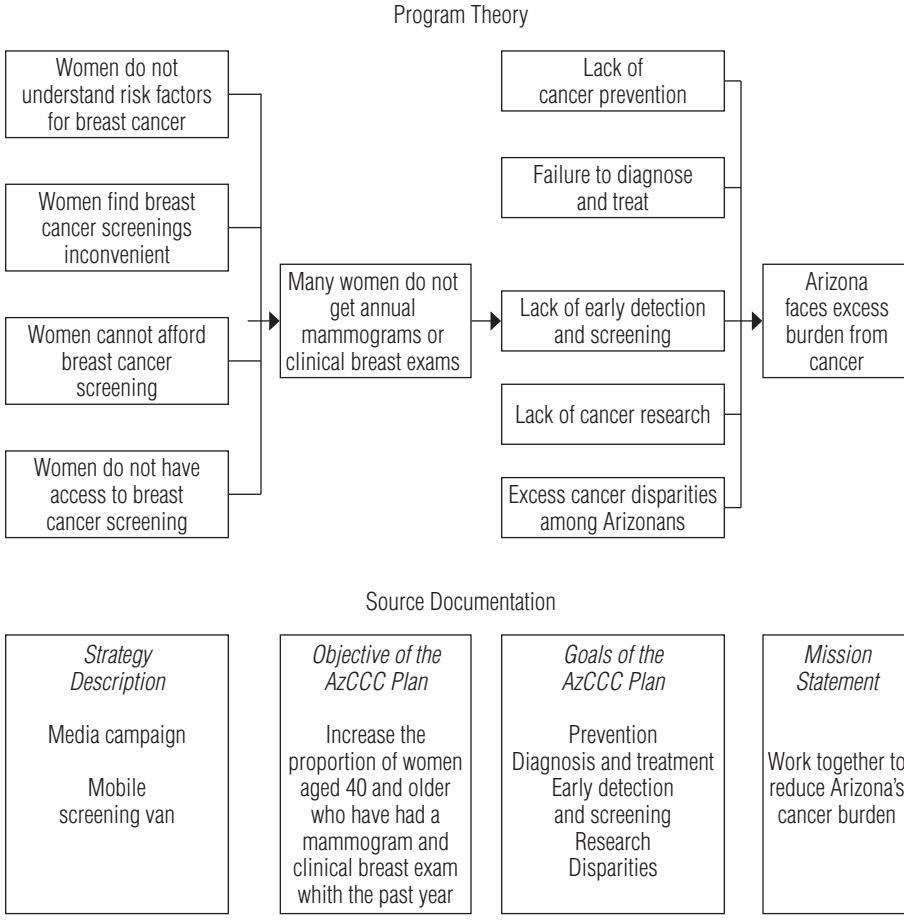
Figure 1
Initial Step in Developing Program Theory Using Source Documentation



documentation elaborating the problem of interest (typically found in a grant proposal or other program document) may contain clues regarding important elements to crack the Da Vinci code of the program theory.

The program theory was then presented to the steering committee and each coalition. The former was asked to review the accuracy of the entire program theory, while the latter reviewed only those components of the program theory related to the coalition to which they were assigned. Feedback was used to make minor modifications to the program theory, including the re-sequencing of some antecedent

Figure 2
Further Evolving the Program Theory Using Source Documentation



conditions, the removal of others thought to be redundant, and the addition of a few antecedent conditions coalition members felt were salient during their meeting but were not captured in the documentation. In each case the verification process was completed in a 90-minute face-to-face session with coalition members during one of their regularly scheduled meetings. The validation process proved to be time and resource effective.

Once the program theory was validated, the relationship between the goals, objectives, and activities was revisited and recommendations forwarded as to which areas seemed well aligned versus those that appeared misaligned. This information was used by the coalition to better connect all elements in their plan before moving forward with implementation.

DISCUSSION

Program theory is one of the central tenets of TDE and is needed to evaluate the merit and worth of a program. One challenge is often the lack of an explicitly stated program theory. This can be further complicated by a lack of time, resources, or commitment to developing the program theory. Under such circumstances generating a program theory from source documentation may be a viable option for evaluators. Clearly the use of source documentation is **not** a preferred methodology; *a priori* theory development is always preferred if time and resources permit.

Although using source documentation offers evaluators an alternative for generating program theory, it is not without its limitations. Often the very organizational characteristics that led to the lack of an explicitly stated program theory are the reason for the lack of available, detailed source documentation. Further, even when source documentation exists and a program theory can be derived, it is possible the program is not being delivered as initially documented and for this reason the validity of the model should be checked with agency staff.

Another challenge is that source documents are seldom written for the express purpose of developing a program theory. This is akin to the problem of using secondary data (Smith, 2008). Thus, it may not be possible to identify all of the antecedent conditions targeted by the program or the relationship between them. Not doing so can create a problem developing the program logic as it would be impossible

to establish linkages between strategies and missing antecedent conditions.

Ensuring the program theory derived from source documentation accurately reflects what is happening "on the ground" is another challenge. Engaging program staff or SMEs in qualitative approaches to review and provide feedback on the program theory (i.e., step 4) is important. Assembling a small group of program staff and content experts and presenting the program theory in a face-to-face or virtual meeting have proved successful requiring little time to achieve consensus and validation. Suggestions can be incorporated immediately and subsequent iterations of the program theory can be reviewed and approved right away.

Ironically, another potential limitation derives from the approach's reliance on retrofitting using source documentation. If a program theory is derived directly from a description of program goals and activities, then other critical antecedent conditions could be missed. When the program theory is derived from source documentation, it says nothing about whether a program is targeting the most appropriate antecedent conditions, only those for which there was written documentation. In essence, the approach generally is subject to the same criticisms of intervention-driven logic models including that the context in which programs actually operate is oversimplified and that they do not capture the truth or the contextual complexity underlying a program (Hummelbrunner, 2010; Rogers, 2010; Williams, 2010).

The case illustration focused on a public health program that was primarily behaviourally based. It was deliberately chosen to be able to illustrate the methodology. The resulting program theory depicts a very simplistic if A then B logic. However, an oversimplified program theory is not always the end result of applying the approach. The sophistication of the final program theory depends on both the sophistication of the program and the availability of detailed documentation. For example, the Community Food Bank (CFB) of Tucson is a not-for-profit organization consisting of multiple branches all with the same goal, to end hunger. Activities include community gardens, emergency food assistance, agency markets, and so forth. A review of source documentation resulted in a program theory consisting of environmental factors (e.g., best food to grow in certain soils), behavioural factors (e.g., teaching people how to grow their own food), and policy factors (e.g., incentives for markets to locate in low-income areas) which all contributed to the agency's goal. The complexity of

the resulting program theory was directly related to the richness of the program and the extent to which this was documented.

In summary, making the program theory explicit is central to TDE. Because of the importance of program theory in setting the stage for the entire program logic, deriving a program theory from source documentation can be a useful alternative for evaluators who find themselves in situations where time and resources are limited. This methodology is best viewed as a last resort, when resources and time are in limited supply. Nevertheless, these conditions are not uncommon to evaluators and under such circumstances deriving and validating a program theory from source documentation might be the only option available to TDE evaluators.

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Ralph Renger, Ph.D., is a transplanted Canadian, a professor in the College of Public Health at the University of Arizona. He teaches program planning courses in the MPH and DrPH programs. He has conducted numerous local, state, and federal evaluations. His interests and contributions to the field of evaluation are primarily related to theory-driven evaluation.