Chapter 1 : W.K. Kellogg Foundation Logic Model Development Guide

Note: Citations are based on reference standards. However, formatting rules can vary widely between applications and fields of interest or study. The specific requirements or preferences of your reviewing publisher, classroom teacher, institution or organization should be applied.

Implementation refers to how a service or intervention gets delivered and what gets delivered in practice. Mechanisms of impact relate to the mechanisms through which the intervention works and produces changes in the intervention recipients. Outcomes are the changes that the intervention is ultimately trying to bring about for recipients, such as weight loss or diabetes prevention. Context refers to factors external to the intervention that might influence how the intervention operates. Logic models identify, describe and arrange these critical aspects of an intervention to represent how the intervention produces change, with arrows often used to indicate causal relationships between the aspects. Logic models are useful for evaluation because they can help prioritise and structure data collection and analysis to explore the main aspects of an intervention and relationships between them. These data can be used to help to explain how the intervention works to achieve its outcomes, or sometimes why it does not work. Based on this logic model, an evaluator might collect programme records and observational data on the quantity, quality and content of the drama sessions delivered to children, and interview families about their changing attitudes towards food including questions about the causal relationship between the drama sessions and their attitudes towards food. Ideally, logic models should be developed during intervention development, or in the early stages of planning an evaluation, so that they can be used to inform the design of the process evaluation and data collection. The logic model should draw on and summarise this theory. Logic models are usually designed by a study team rather than a single researcher. They tend to require multiple perspectives and careful discussion to identify the critical aspects of an intervention, and to consider how they are related. Just as stakeholders such as patients, clients and staff delivering an intervention can contribute to the development of an intervention, stakeholders can also contribute to the construction of a logic model. Good logic models share several features They do not include detail about absolutely everything that happens in an intervention, but summarise the aspects that are critically important in explaining how the intervention produces the changes that it is aiming to achieve. Therefore, it is important when creating a logic model to decide what these critical aspects are. Their inclusion should therefore be considered carefully; if an arrow is present, the study team should be able to articulate what causal relationship it represents. They are not just conceptual maps which represent intervention aspects and the relationships between them; they represent a process of change. Cause always comes before effect. The aspects should be arranged so that the arrows between them show how one aspect such as delivery of training material causes a subsequent aspect such as improved skills. This is particularly true for interventions which are large or complex and have many different components, with different theorised mechanisms. Therefore, it will not be useful in guiding the data collection and analysis. There are also several features of logic model design which are highly variable, depending on the intervention. A good logic model is designed and adapted so that it accurately represents the underpinning theory of the specific intervention, rather than being based on a standard template. Logic models may include more detail on one aspect of the intervention than others. The following examples demonstrate how this can be true for different aspects. In some interventions, the implementation process may be complex, involving different stages of staff training and re-organisation of service delivery systems. For this type of intervention, the logic model might include a number of aspects to describe the different aspects and stages of implementation. In other types of interventions, such as those using mobile phone apps, the implementation process is likely to be much simpler and the logic model would not need to include much detail on this aspect of the intervention. Some interventions may only impact on outcomes at one point in time, and this will be represented in the final section of a logic model. An additional factor to consider relates to the level of intervention. For example, whether the intervention is targeted at an individual, family, organisational or community level, as this will affect the content of the logic model at: It helps to focus the process evaluation on the most important research questions and make best use of limited resources for data collection and analysis. Several researchers who contributed to case studies included in the MRC process evaluation guidance were asked what they would have done differently in their studies. They commented that they would have developed the intervention theory and logic model earlier, to allow them to address the major process evaluation questions in a more focused way. Limitations of logic models Logic models tread a fine line between being simple, easy to understand and use, and reflecting the complexity of the real world. A good logic model will include the critical aspects of an intervention that contribute to its outcomes. In practice, these may be hard to identify in advance, and therefore the logic model may not include every factor that explains outcomes. On the other hand, a very complex logic model may become unwieldy and impractical. The evaluator therefore has the tricky task of finding a balance between these 2 demands. Logic models have also been criticised for representing interventions as linear and mechanistic, and for overplaying the predictability of an intervention. For example, they tend to give the impression of steady change over time, whereas change may occur in jumps at certain points or problems may initially get worse before they get better. Logic models could be adapted to a certain extent to accommodate some aspects of complexity theory, such as feedback loops these are present in the MRC process evaluation framework. However, logic models will remain relatively mechanistic, linear representations of processes of change which do not reflect the full complexity of the real world but, as noted above, provide a simplicity that has advantages for planning and conducting evaluations. For example, a school may be part of the context for a child bullying intervention which provides counselling for individuals. Alternatively, if an intervention is designed to change the school culture in order to reduce bullying, then the school is part of the intervention not the context. To decide where aspects of a logic model fit, it can be helpful to think through the intervention in as simple terms as possible. Implementation What are the major features that characterise your intervention delivery for example, what resources and services is the intervention providing; what activities are intervention staff required to undertake; how is the intervention or service delivered? Outcomes What are the ultimate aims of the intervention for example, what changes the intervention is aiming to achieve? In addition, difficulties can arise where aspects of the logic model fall into grey areas on the boundaries between categories. Alternatively, a short-term outcome for example, increased used of a sports facility could reflect a mechanism of impact in an intervention with an ultimate goal of increasing physical activity. If you are having problems identifying what categories the aspects of your logic model fall into, and if some aspects seem to be on the boundaries, then it can be more useful to concentrate on what the critical aspects of your intervention are. Developing a logic model for exploratory interventions If you have designed an intervention, you will have some hypothesis about how it is expected to produce change to resolve the problem you are trying to address. This hypothesis can form the basis of a logic model. However, there may be some aspects of how the intervention might work or processes that may occur which due to large gaps in knowledge are genuinely unknown. For example, it may be that the intervention is being delivered in a new setting where the contextual factors that could affect the intervention are unknown. Alternatively, the participant response to the intervention may be very uncertain. In these cases, there may be gaps in logic models which can be specifically explored during the process evaluation with the findings contributing to a more complete logic model at the end of the study.

Chapter 2 : Templates, Examples, Bibliography â€“ Program Development and Evaluation

Introduction to Logic for Systems Modelling (Information Technology and Systems) V. Pinkava. from: $

Alethic modality Modalities of necessity and possibility are called alethic modalities. They are also sometimes called special modalities, from the Latin species. Modal logic was first developed to deal with these concepts, and only afterward was extended to others. For this reason, or perhaps for their familiarity and simplicity, necessity and possibility are often casually treated as the subject matter of modal logic. Moreover, it is easier to make sense of relativizing necessity, e. In classical modal logic , a proposition is said to be possible if it is not necessarily false regardless of whether it is actually true or actually false ; necessary if it is not possibly false i. In classical modal logic, therefore, the notion of either possibility or necessity may be taken to be basic, where these other notions are defined in terms of it in the manner of De Morgan duality. Intuitionistic modal logic treats possibility and necessity as not perfectly symmetric. On the way back, we observe that they have been turned on. All of the above statements are possible. It is impossible that Socrates who has been dead for over two thousand years turned the lights on. Of course, this analogy does not apply alethic modality in a truly rigorous fashion; for it to do so, it would have to axiomatically make such statements as "human beings cannot rise from the dead", "Socrates was a human being and not an immortal vampire", and "we did not take hallucinogenic drugs which caused us to falsely believe the lights were on", ad infinitum. Absolute certainty of truth or falsehood exists only in the sense of logically constructed abstract concepts such as "it is impossible to draw a triangle with four sides" and "all bachelors are unmarried". For those with difficulty with the concept of something being possible but not true, the meaning of these terms may be made more comprehensible by thinking of multiple "possible worlds" in the sense of Leibniz or "alternate universes"; something "necessary" is true in all possible worlds, something "possible" is true in at least one possible world. These "possible world semantics" are formalized with Kripke semantics. Physical possibility[edit] Something is physically, or nomically, possible if it is permitted by the laws of physics. In contrast, while it is logically possible i. For example, it might be metaphysically necessary, as some who advocate physicalism have thought, that all thinking beings have bodies [21] and can experience the passage of time. Saul Kripke has argued that every person necessarily has the parents they do have: However, its exact relation if any to logical possibility or to physical possibility is a matter of dispute. Epistemic logic Epistemic modalities from the Greek episteme, knowledge , deal with the certainty of sentences. A person, Jones, might reasonably say both: What Jones means by 1 is that, given all the available information, there is no question remaining as to whether Bigfoot exists. This is an epistemic claim. By 2 he makes the metaphysical claim that it is possible for Bigfoot to exist, even though he does not: Logical possibility is a form of alethic possibility; 4 makes a claim about whether it is possible i. It is worthwhile to observe that Jones is not necessarily correct: Metaphysical possibilities bear on ways the world might have been, but epistemic possibilities bear on the way the world may be for all we know. Suppose, for example, that I want to know whether or not to take an umbrella before I leave. If you tell me "it is possible that it is raining outside" â€” in the sense of epistemic possibility â€” then that would weigh on whether or not I take the umbrella. But if you just tell me that "it is possible for it to rain outside" â€” in the sense of metaphysical possibility â€” then I am no better off for this bit of modal enlightenment. Some features of epistemic modal logic are in debate. For example, if x knows that p, does x know that it knows that p? While the answer to this question is unclear, [25] there is at least one axiom that is generally included in epistemic modal logic, because it is minimally true of all normal modal logics see the section on axiomatic systems:

Chapter 3 : Introduction to Logic Models (9/6/) | Philanthropy Massachusetts

*Introduction to VLSI Systems: A Logic, Circuit, and System Perspective [Ming-Bo Lin] on www.nxgvision.com *FREE* shipping on qualifying offers. With the advance of semiconductors and ubiquitous computing, the use of system-on-a-chip (SoC) has become an essential technique to reduce product cost.*

There is no single way to create a logic model. Who creates the model? This depends on your situation. The same people who will use the model - planners, program managers, trainers, evaluators, advocates and other stakeholders - can help create it. For practical reasons, though, you will probably start with a core group, and then take the working draft to others for continued refinement. Remember that your logic model is a living document, one that tells the story of your efforts in the community. As your strategy changes, so should the model. On the other hand, while developing the model you might see new pathways that are worth exploring in real life. Two main development strategies are usually combined when constructing a logic model. Moving forward from the activities also known as forward logic. This approach explores the rationale for activities that are proposed or currently under way. It is driven by But why? But why should we focus on briefing Senate staffers? But why do we need them to better understand the issues affecting kids? But why would they create policies and programs to support mentoring? But why would new policies make a difference? That same line of reasoning could also be uncovered using if-then statements: If we focus on briefing legislators, then they will better understand the issues affecting kids. If legislators understand, then they will enact new policies Moving backward from the effects also known as reverse logic. This approach begins with the end in mind. It starts with a clearly identified value, a change that you and your colleagues would definitely like to see occur, and asks a series of "But how? But how do we overcome fear and stigma? But how can we ensure our services are culturally competent? At first, you may not agree with the answers that certain stakeholders give for these questions. Their logic may not seem convincing or even logical. But therein lies the power of logic modeling. You can talk about it, clarify misinterpretations, ask for other opinions, check the assumptions, compare them with research findings, and in the end develop a solid system of program logic. This product then becomes a powerful tool for planning, implementation, orientation, evaluation, and advocacy, as described above. By now you have probably guessed that there is not a rigid step-by-step process for developing a logic model. Like the rest of community work, logic modeling is an ongoing process. Nevertheless, there are a few tasks you should be sure to accomplish. Home Ownership Mobilization Effort. It does this through a combination of educating community residents, organizing the neighborhood, and building relationships with partners such as businesses. Steps for drafting a logic model Find the logic in existing written materials to produce your first draft. Available written materials often contain more than enough information to get started. Collect narrative descriptions, justifications, grant applications, or overview documents that explain the basic idea behind the intervention effort. For the HOME campaign, we collected documents from planners who proposed the idea, as well as mortgage companies, homeowner associations, and other neighborhood organizations. Your job as a logic modeler is to decode these documents. Keep a piece of paper by your side and sketch out the logical links as you find them. This work can be done in a group to save time and engage more people if you prefer. Read each document with an eye for the logical structure of the program. Sometimes that logic will be clearly spelled out e. Other times the logic will be buried in vague language, with big leaps from actions to downstream effects e. As you read each document, ask yourself the But why? See if the writing provides an answer. Pay close attention to parts of speech. Verbs such as teach, inform, support, or refer are often connected to descriptions of program activities. Adjectives like reduced, improved, higher, or better are often used when describing expected effects. Determine the appropriate scope of the model for its intended users and uses. Consider creating a family of models for multiple users. The HOME initiative , for instance, created different models to address the unique needs of their financial partners, program managers, and community educators. Mortgage companies, grant makers, and other decision makers who decided whether to allocate resources for the effort found the global view from space most helpful for setting context. Program managers wanted the closer, yet still broad view from the mountaintop. And community educators benefited most from the you are here version. The important thing to remember is that these are not three different programs, but different ways of understanding how the same program works. Check whether the model makes sense and is complete. Logic models convey the story of community change. As you iteratively refine the model, ask yourself and others if it captures the full story. Here are the plot points common in most community change initiatives, presented with their "storytelling" names. The Promised Land desired effects. Does the model show specific measurable results that you hope to achieve? Does it contain big leaps of faith or does it show change through a logical sequence of effects? Are crucial behavioral changes identified e. And if those behavior changes are supposed to be sustained, does the model explain how community conditions will change to reinforce new behaviors e. In the HOME model, we specified the following sequence of effects: Short-term - Potential home owners attain greater understanding of how credit ratings are calculated and more accurate information about the steps to improve a credit rating; mortgage companies create new policies and procedures allowing renters to buy their own homes; local businesses start incentive programs; and anti-discrimination lawsuits are filed against illegal lending practices. Longer-term - The proportion of owner-occupied housing rises; economic revitalization takes off as businesses invest in the community; residents work together to create walking trails, crime patrols, and fire safety screenings; rates of obesity, crime, and injury fall dramatically. An advantage of the graphic model is that it can display both the sequence and the interactions of effects. For example, in the HOME model, credit counseling leads to better understanding of credit ratings, while loan assistance leads to more loan submissions, but the two together plus other activities such as more new buyer programs are needed for increased home ownership. How will obstacles be overcome? Who is doing what? What kinds of conflict and cooperation are evident? What new services or conditions are being introduced? Your activities, based on a clear analysis of risk and protective factors, are the answers to these kinds of questions, Your interventions reveal the drama in your story of directed social change. Dramatic actions in the HOME initiative include offering educational sessions and forming business alliances, homeowner support groups, and a neighborhood organizing council. At evaluation time, each of these actions is closely connected to output indicators that document whether the program is on track and how fast it is moving. These outputs could be the number of educational sessions held, their average attendance, the size of the business alliance, etc. These outputs are not depicted in the global model, but that could be done if valuable for users. Raw Materials inputs, resources, or infrastructure. Real resources must come into the system. Those resources may be financial, but they may also include people, space, information, technology, equipment, and other assets. The HOME campaign runs because of the input from volunteer educators, support from schools and faith institutions in the neighborhood, discounts provided by lenders and local businesses, revenue from neighborhood revitalization, and increasing social capital among community residents. Setting background, context and conditions. Really good stories convey facts, but they also have texture. There is a backdrop against which the main action takes place. Community change always takes place in the context of history, geography, politics, etc. Although it is impossible to represent all of those factors in a model, you can strive to include features that remind users those conditions exist and will affect how change unfolds. Stakeholders working on the HOME campaign understood that they were challenging a history of racial discrimination and economic injustice. They saw gentrification occurring in nearby neighborhoods. They were aware of backlash from outside property owners who benefit from the status quo. None of these facts are included in the model per se, but a shaded box labeled History and Context was added to serve as a visual reminder that these things are in the background. Attend to the nuts and bolts of drawing the model. Draft the logic model using both sides of your brain and all the talents of your stakeholders. Use your artistic and your analytic abilities. Arrange activities and intended effects in the expected time sequence. Link components by drawing arrows or using other visual methods that communicate the order of activities and effects. Remember - the model does not have to be linear or read from left to right, top to bottom. A circle may better express a repeating cycle.

DOWNLOAD PDF INTRODUCTION TO LOGIC FOR SYSTEMS MODELLING

Chapter 4 : Control Tutorials for MATLAB and Simulink - Introduction: System Modeling

What is a Logic Model? â€¢Brief definition: A logic model is a "graphic representation of a program showing the intended relationships between investments and.

Note that when finding transfer functions, we always assume that the each of the initial conditions, , , etc. The transfer function from input to output is, therefore: The poles of the transfer function, , are the roots of the denominator polynomial, i. Both the zeros and poles may be complex valued have both real and imaginary parts. The system Gain is. Note that we can also determine the transfer function directly from the state-space representation as follows: Mass-Spring-Damper System The free-body diagram for this system is shown below. The spring force is proportional to the displacement of the mass, , and the viscous damping force is proportional to the velocity of the mass,. Both forces oppose the motion of the mass and are, therefore, shown in the negative -direction. Note also that corresponds to the position of the mass when the spring is unstretched. In this case, there are no forces acting in the -direction; however, in the -direction we have: Later, we will see how to use this to calculate the response of the system to any external input, , as well as to analyze system properties such as stability and performance. To determine the state-space representation of the mass-spring-damper system, we must reduce the second-order governing equation to a set of two first-order differential equations. To this end, we choose the position and velocity as our state variables. Often when choosing state variables it is helpful to consider what variables capture the energy stored in the system. The state equation in this case is: Enter the following commands into the m-file in which you defined the system parameters. Note that we have used the symbolic s variable here to define our transfer function model. We recommend using this method most of the time; however, in some circumstances, for instance in older versions of MATLAB or when interfacing with SIMULINK, you may need to define the transfer function model using the numerator and denominator polynomial coefficients directly. In these cases, use the following commands: When applying KVL, the source voltages are typically taken as positive and the load voltages are taken as negative. RLC Circuit We will now consider a simple series combination of three passive electrical elements: Since this circuit is a single loop, each node only has one input and one output; therefore, application of KCL simply shows that the current is the same throughout the circuit at any given time,. Now applying KVL around the loop and using the sign conventions indicated in the diagram, we arrive at the following governing equation. In particular, they are both second-order systems where the charge integral of current corresponds to displacement, the inductance corresponds to mass, the resistance corresponds to viscous damping, and the inverse capacitance corresponds to the spring stiffness. These analogies and others like them turn out to be quite useful conceptually in understanding the behavior of dynamical systems. The state-space representation is found by choosing the charge on the capacitor and current through the circuit inductor as the state variables.

Chapter 5 : Modal logic - Wikipedia

Logic models are gaining more and more popularity. In fact, many grantors are now requiring nonprofits to submit their logic models with grant applications, and for good reason. In fact, many grantors are now requiring nonprofits to submit their logic models with grant applications, and for good reason.

Logic Model Bibliography Alter, C. A tool for teaching critical thinking in social work practice. Journal of Social Work Education, 33 1. A tool for teaching practice evaluation. Using theory of change in program planning and evaluation. A research based model for designing and evaluating the impact of youth development programs. Analyzing impacts of extension programs, ESC Targeting outcomes of programs TOP: An integrated approach to planning and evaluation. The functions of program theory. Using the logic model to organize and report research results in a collaborative project. Journal of Family and Consumer Science, 93 4 , A tool for planning and evaluating health and recreation prevention projects. Center for Substance Abuse Prevention. Evaluation Review, 7, Learning from logic models: Harvard Family Research Project. Getting ready for outcome evaluation: Developing a logic model. Community Youth Development Journal, 16 1 , Performance based measurement and community building. Rural Development News, 22 1. Application of program logic model to agricultural technology transfer program. The Canadian Journal of Program Evaluation, 10 2. Barriers to the use of program logic models in the real world of program activities. Michigan Public Health Institute. Michigan safe and drug-free schools and communities evaluation training workshop, Phase I workbook. An adaptable tool for designing and evaluating programs. Performance Improvement Poverty, Ltd. Developing and using a program theory matrix for program evaluation and performance monitoring. Challenges and Opportunities, New Directions for Evaluation, 87, Using logic models and program theory to build outcome accountability. The state of the art of logic modeling: Measuring the performance of research and technology programs: A balanced scorecard approach. Journal of Technology Transfer, 22 2 , The utilization of the logic model as a system level planning and evaluation device. Evaluation and Program Planning, 20 3 , Open systems evaluation and the logic model: Program planning and evaluation tools. Evaluation and Program Planning, 18 4 , Logic model development guide: The program logic model: What, why and how? A process for enhancing program effects and evaluation results. The Program Design Institute. Assessing alcohol and other drug prevention programs at the school and community level. Life cycle program management and evaluation: How to design better programs: A staff-centered stakeholder approach to program logic modeling. Journal of Extension, 39 3. Using a logic models to focus health services on population health goals. The Canadian Journal of Program Evaluation, 12, Evaluating and Program Planning, 22, A systems tool for performance management. Evaluation and Program Planning, 24, Impact Analysis for Program Evaluation, 2nd Edition. Outcomes measurement in the human services: Cross-cutting issues and methods. National Association of Social Work Press. A context and boundaries for theory-driven approach to validity. Evaluation and Program Planning, 12, Utilization-focused evaluation, 3rd Edition. Approach and training materials developed for U. Agency for International Development, Washington. A field guide to outcome-based program evaluation. Alternative causal models in program theory and evaluation. Causal models in program theory evaluation. Eds , Program theory in evaluation: Challenges and opportunities, New Directions in Program Evaluation, 87, Program theory in evaluation: New Directions for Evaluation, Expanding their role and structure for program planning and evaluation. The Canadian Journal of Program Evaluation, 6 2. A precursor to program monitoring and quality improvement. Evaluation Thesaurus, 4th Edition. The art and practice of the learning organization. The logical framework approach to project design, review and evaluation in A. Genesis, impact problems and opportunities. Principles and practice in public service and social action programs. Targeting Outcomes of Programs TOP includes a seven-level hierarchy that integrates program evaluation within the program development process. It has been developed by Dr. The results framework â€" An innovative tool for program planning and evaluation. Evaluation Review, 23 3 , United States Agency for International Development. Building a results framework. Performance monitoring and evaluation TIPS. United Way of America. A results-based approach to accountability. Evaluation and Program Planning, 23, Using logic models in a multi-site, multi-level evaluation. Evaluation, 2nd Edition, Chapter 3. Upper Saddle River, NJ: A new approach to targeted grantmaking, 2nd Edition. Evaluation and Systems Thinking. Introduction to logic modeling. Centers for Disease Control and Prevention: Office on Smoking and Health.

Chapter 6 : Formats and Editions of Introduction to logic for systems modelling [www.nxgvision.com]

Logic modelling is a way of expressing this theory of change, wherein particular programmes or interventions should be determined with reference to a clearly articulated description of the expected mechanisms of change.

Chapter 7 : Download [PDF] fuzzy logic and hydrological modeling

A review of: "INTRODUCTION TO LOGIC FOR SYSTEMS MODELLING", by Vaclav Pinkava. Abacus, Cambridge, Mass., and Tunbridge Wells (UK), pp.

Chapter 8 : | European Bioinformatics Institute

Introduction to logic for systems modelling: 5. Introduction to logic for systems modelling. by Vaclav Pinkava Print book: English. Cambridge, Mass.: Abacus P.

Chapter 9 : Download Logic In Computer Science Modelling And Reasoning About Systems PDF â€“ PDF

logic model results in effective programming and offers greater learning opportunities, better documentation of outcomes, and shared knowledge about what works and why. The logic model is a beneficial evaluation tool that facilitates effective program.