Energy Efficiency Program Evaluation

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2/23/2010

Last Month

- What is Demand Side Management
  - Load Profiles
  - Types of programs
- Program Planning and Design
- DSM Economics
  - How to calculate a cost benefit value
- Impact Evaluation
  - Methods of assessment

Outline for today's discussion

- What is Program Evaluation
  - Energy Efficiency Program Evaluation
- Types of Evaluation
  - Market Characterization / Baselines
  - Process Assessments
  - Market Transformation
- Program Tracking
- The Research Toolbox
- What we are doing for Michigan

Three Key Points

To be good consumers of the evaluation reports and understand what different types of evaluation can provide:

1. What you should expect to see in that type of assessment
2. When the assessment should occur in the life cycle of a program
3. What you do with the information from the evaluation

What is a Program?

- An organized, planned, and usually ongoing effort designed to ameliorate a specific problem
- Consists of funding and human resources that are used to put in place activities with a specific focus
- Reasons why programs will bring about change are often assumed

Program Evaluation

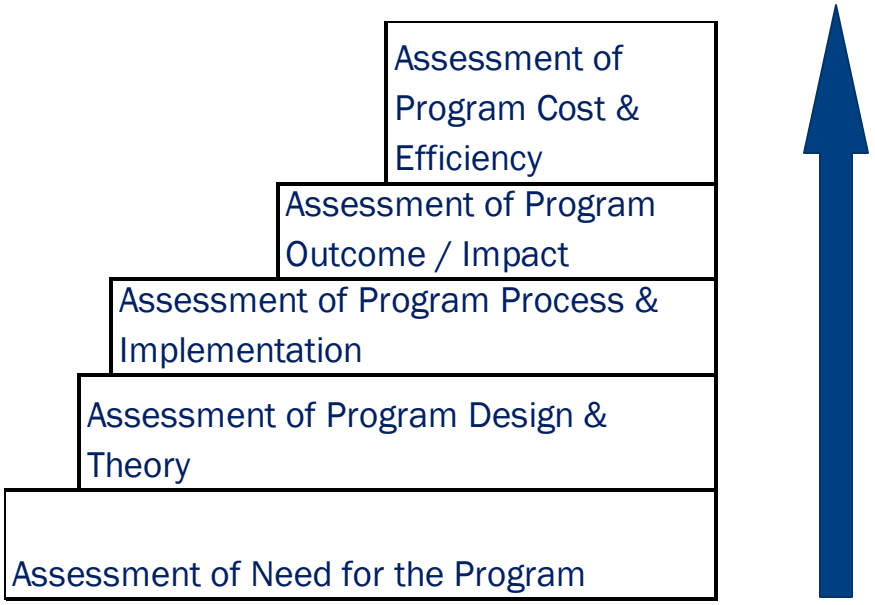
- The systematic investigation of the worth or merit of an object. (Joint Committee on Standards for Educational Evaluation, 1994)
- Evaluation is the systematic assessment of an object's merit, worth, probity, feasibility, safety, significance, and/or equity. (Sufflebeam & Shinkfield, 2007)
- Evaluation is the *systematic assessment* of the *operation* and/or the *outcomes* of a program or policy, compared to a set of *explicit* or *implicit standards*, as a means of contributing to the *improvement* of the program or policy. (Weiss, 1998)

So you have/want a Program….

Typically Recognized Program Questions

- Do you need this program?
- What should it include?
- What is the best way to put the program into action?
- What is occurring because of the program?
- Are the costs worth the benefits from the program?

How Evaluation Answers those Questions



Energy Efficiency Programs

- Social Component
  - Volunteer program
    - Inform the public of availability
    - Talk them into participating
  - Equity issues
    - Who pays into the program
    - Who benefits from the program
- Engineering Component
  - Pipes and wires
  - Equipment in the physical world

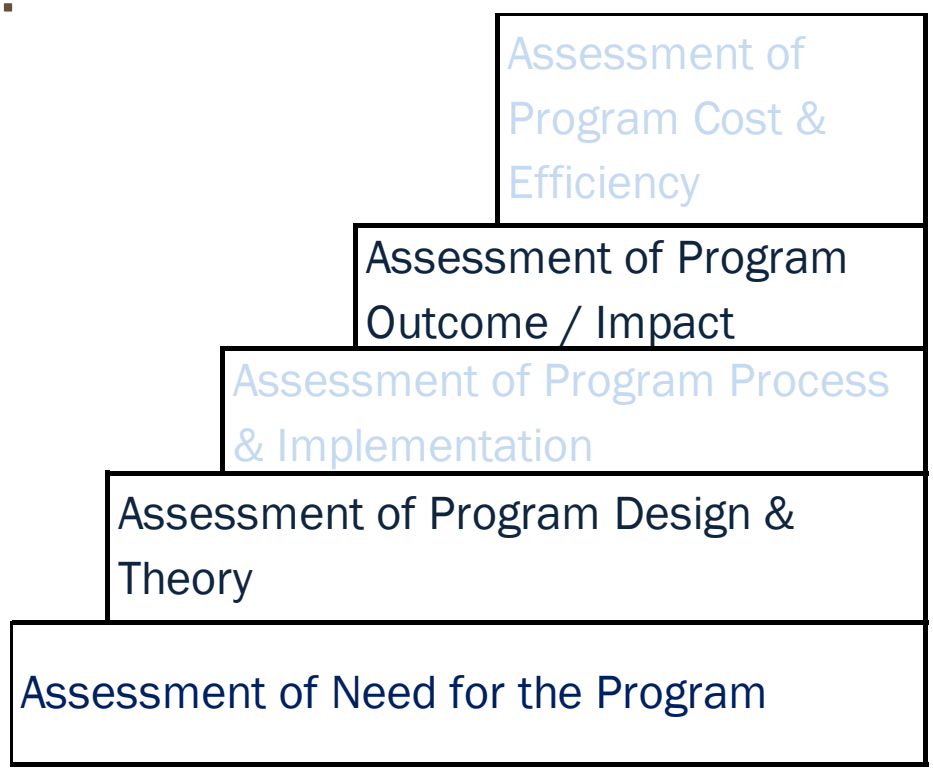
Example

Residential HVAC Quality Installation

- What are the engineering components?
  - Refrigerant charge
    - Measuring the charge
    - Changing the charge
  - Air flow
- What does the customer see?
  - A technician doing something
  - Intangible benefits

Market Characterization / Baseline

These Inform:



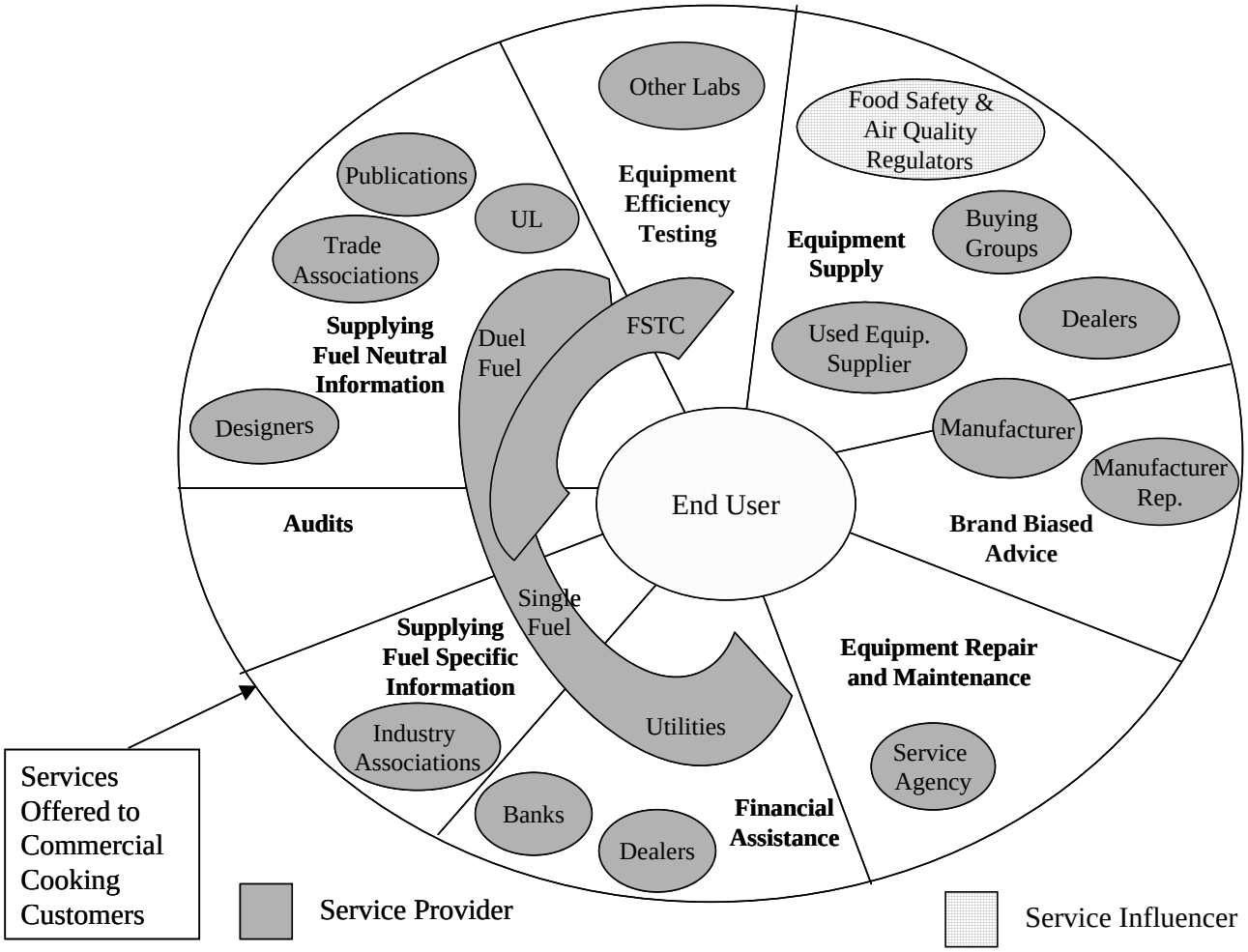
Market Characterization

- What you should expect to see in this type of assessment
  - Description of the specific market or market segments targeted by the program (technologies, services or products offered).
  - The geographic boundaries of the market or market segment, the structure of the market, and a description of the type of interactions and the market events (such as a decision to remodel) that trigger an interaction between buyers, intermediaries, and sellers.
  - Approximate estimates of the number of buyers, intermediaries, and sellers in the market, and the order of magnitude of the annual sales of any technologies targeted by the program.

Market Characterization (cont)

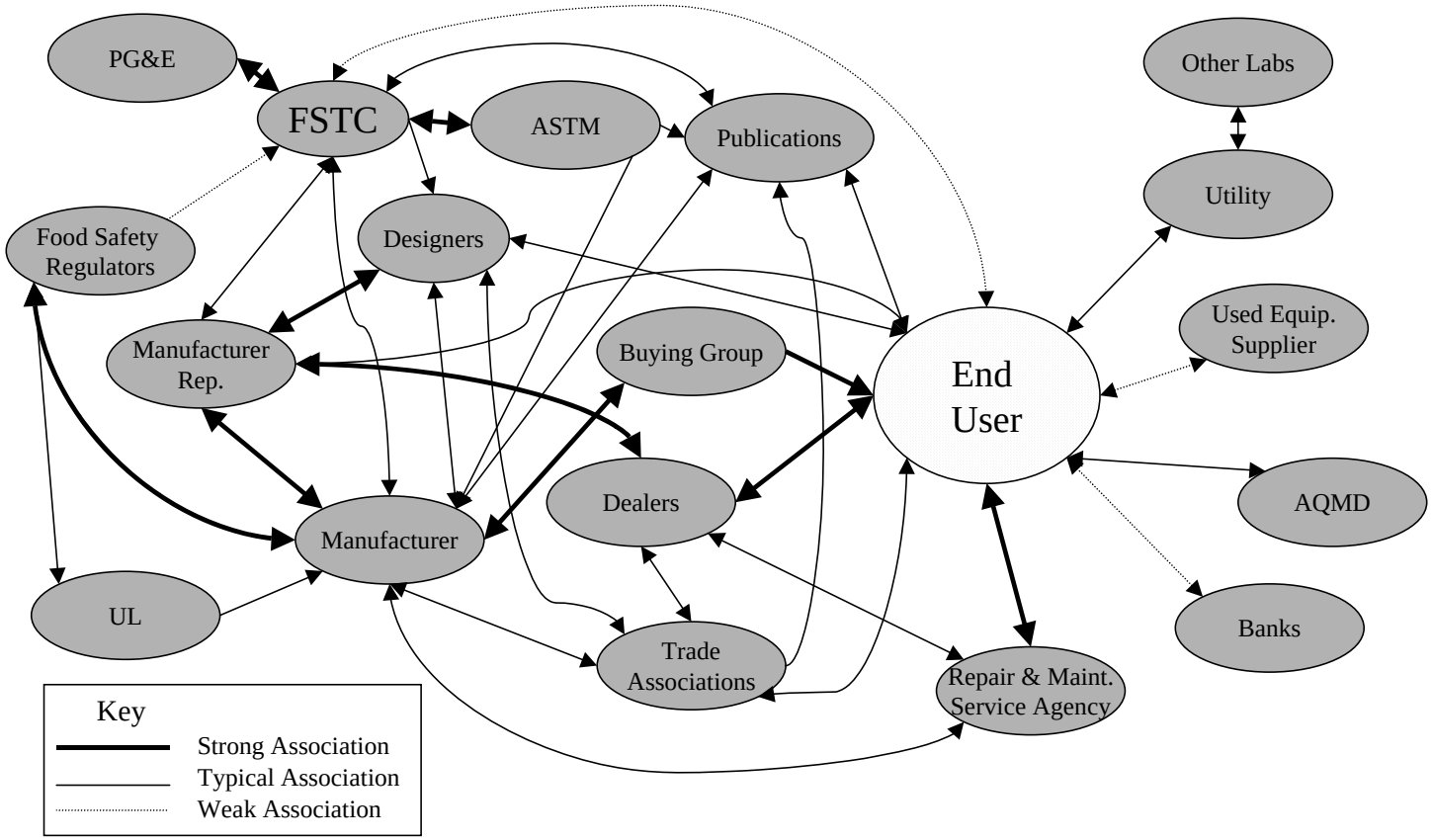
- When it should occur
  - Ideally when designing the program, but can occur anytime within a program cycle
- What you do with the information
  - Use in design to determine where to intervene and get an idea of possible effects of intervention
  - Use to see if the current program as designed is working with the correct market actors
  - As snapshot of the market

Example of Products / Services Offered



Example of Market Interactions

Medium Customers

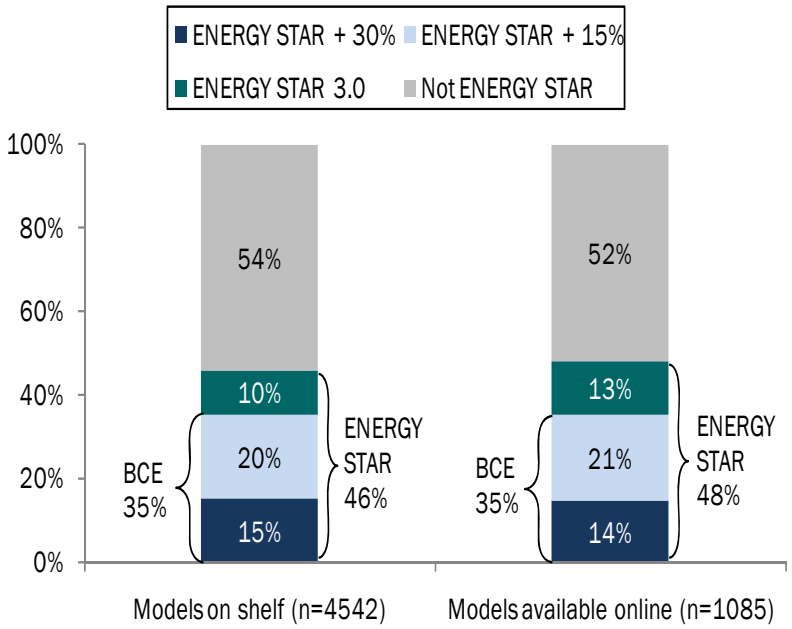


Baseline Assessment

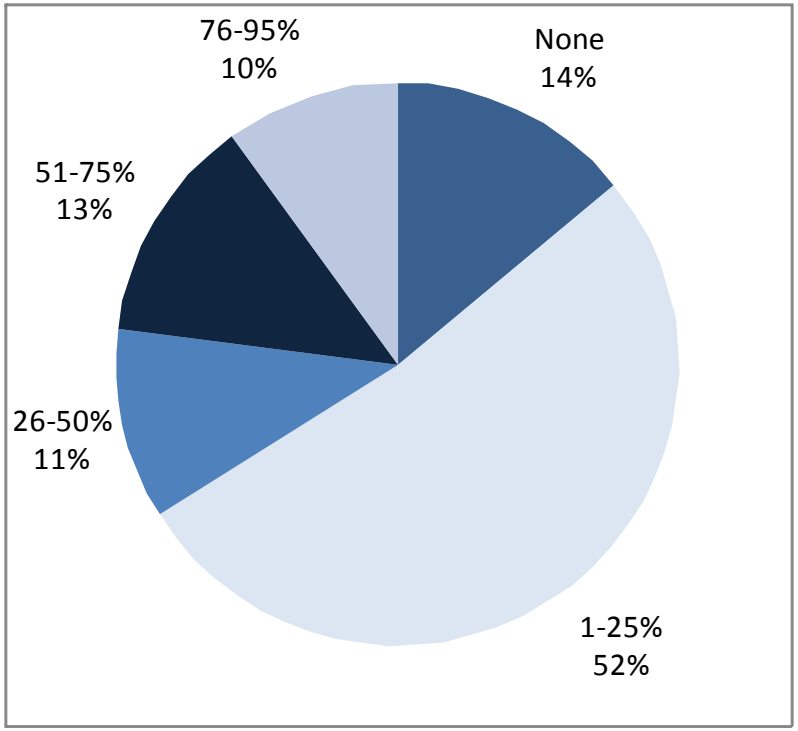
- What you should expect to see in this type of assessment
  - Descriptive statistics of the information under assessment (e.g. market share, awareness)
- When it should occur
  - At the beginning of a program or before a new component is begun
- What you do with the information
  - Assess needs in the population
    - Energy efficient equipment
    - Awareness / Knowledge
  - Used as a “first value” for later impact work (pre/post)

Example of Baseline Information

- TV's by efficiency



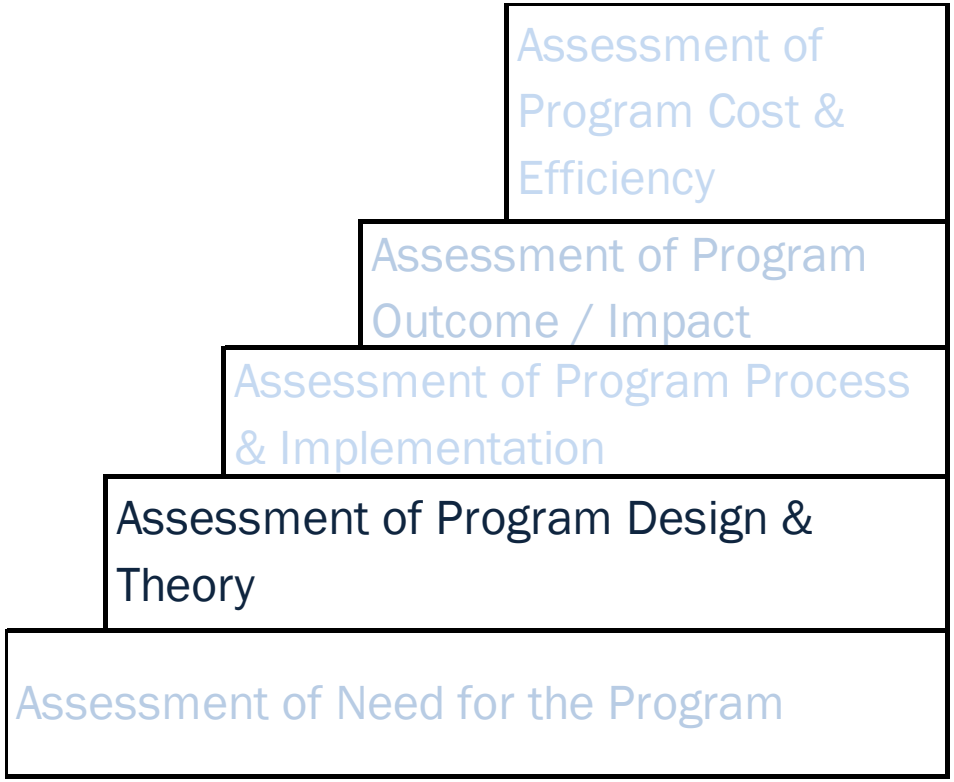
- Saturation of CFL's in a home



Potential Study

- Discussed by Sami last month
- What you should expect to see in this type of assessment
  - The magnitude of energy savings possible in an area
- When it should occur
  - Any time, but good at the beginning of a program and a few years in for program re-design
- What you do with the information
  - Set program design
  - Set achievable goals

Program Design & Theory



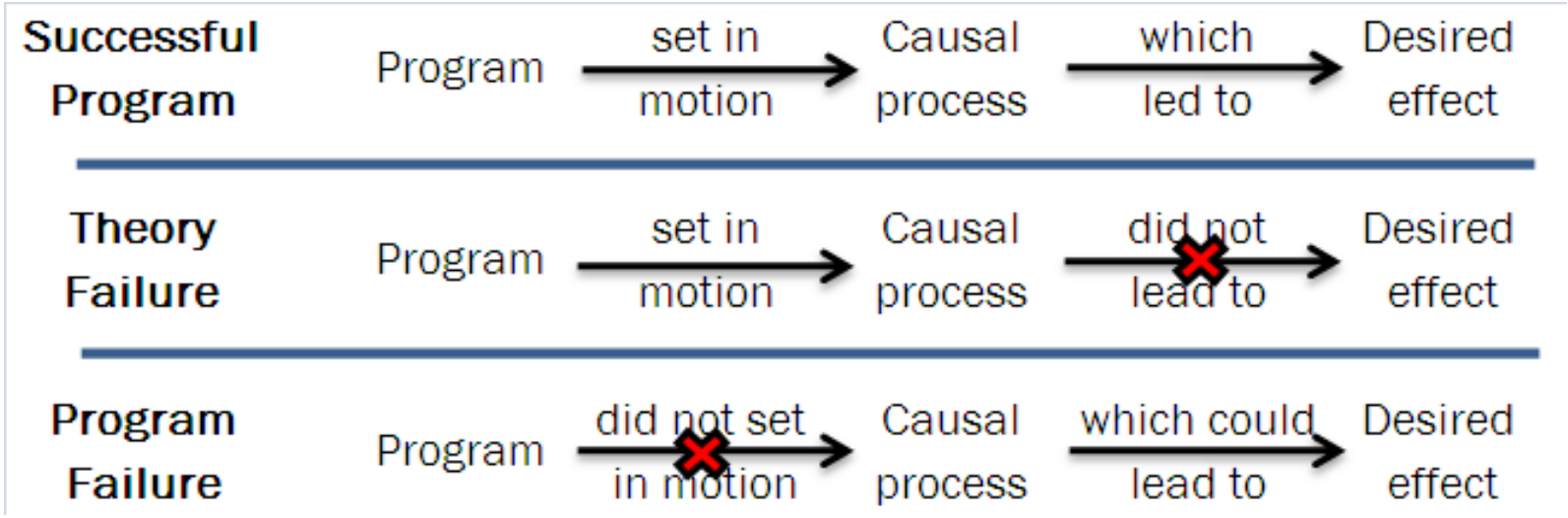
Program Design & Theory

- What you should expect to see in this type of assessment
  - Logic Models (implementation, impact)
  - Assessment of plausibility of the theory behind the program
  - Assigning attribution through testing multiple hypotheses
  - Assessment of process flows within a program
- When it should occur
  - Anytime within a program cycle, but best at the beginning

Program Design & Theory (cont)

- What you do with the information
  - Create plans for assessment of certain areas
  - Obtain clear understanding of the processes involved
  - Obtain clear understanding of why outcomes are expected from the intervention
  - Set performance metrics
  - Build evidence for causality when looked at holistically
- Program Theory Evaluation - Making explicit and testing the program's theory of change – what is it and to what extent do empirical findings support the theory in practice?

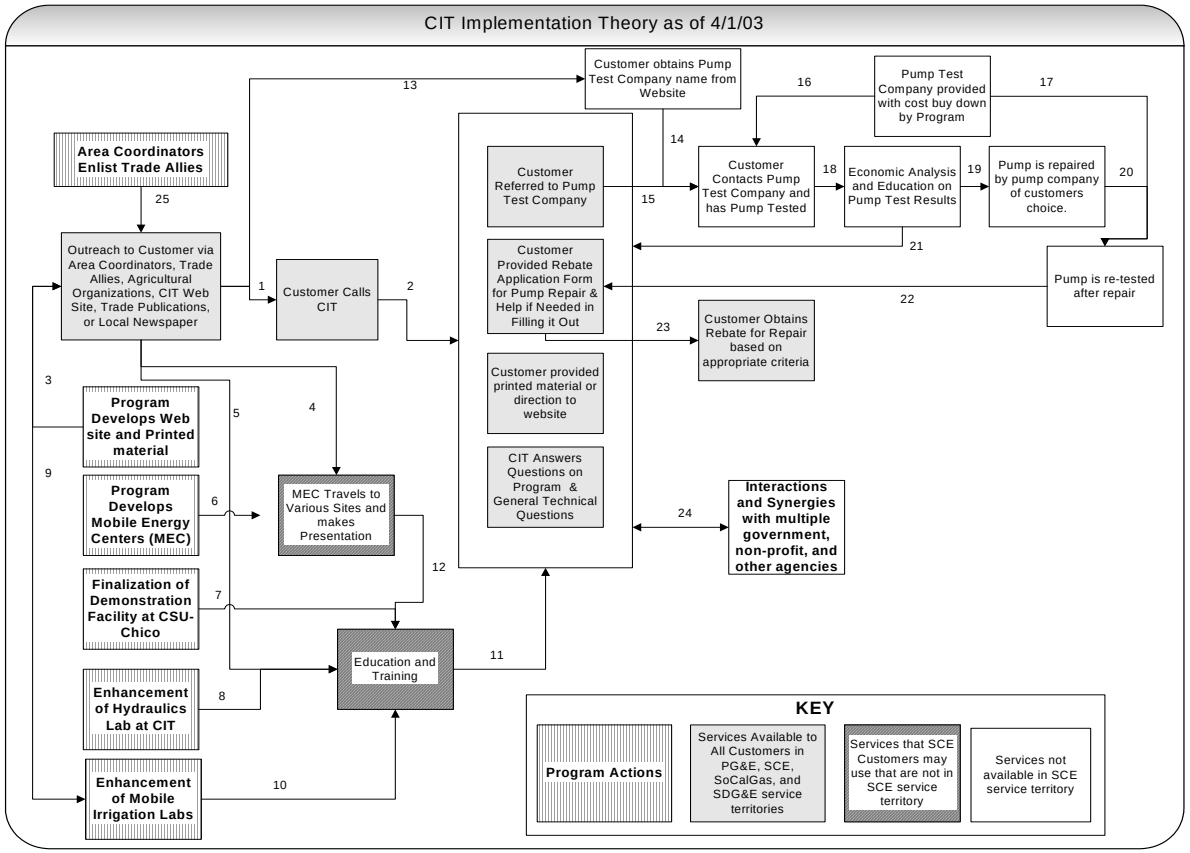
Program Design & Theory (cont)



Evaluation: Methods for Studying Programs and Policies. Weiss, page 129

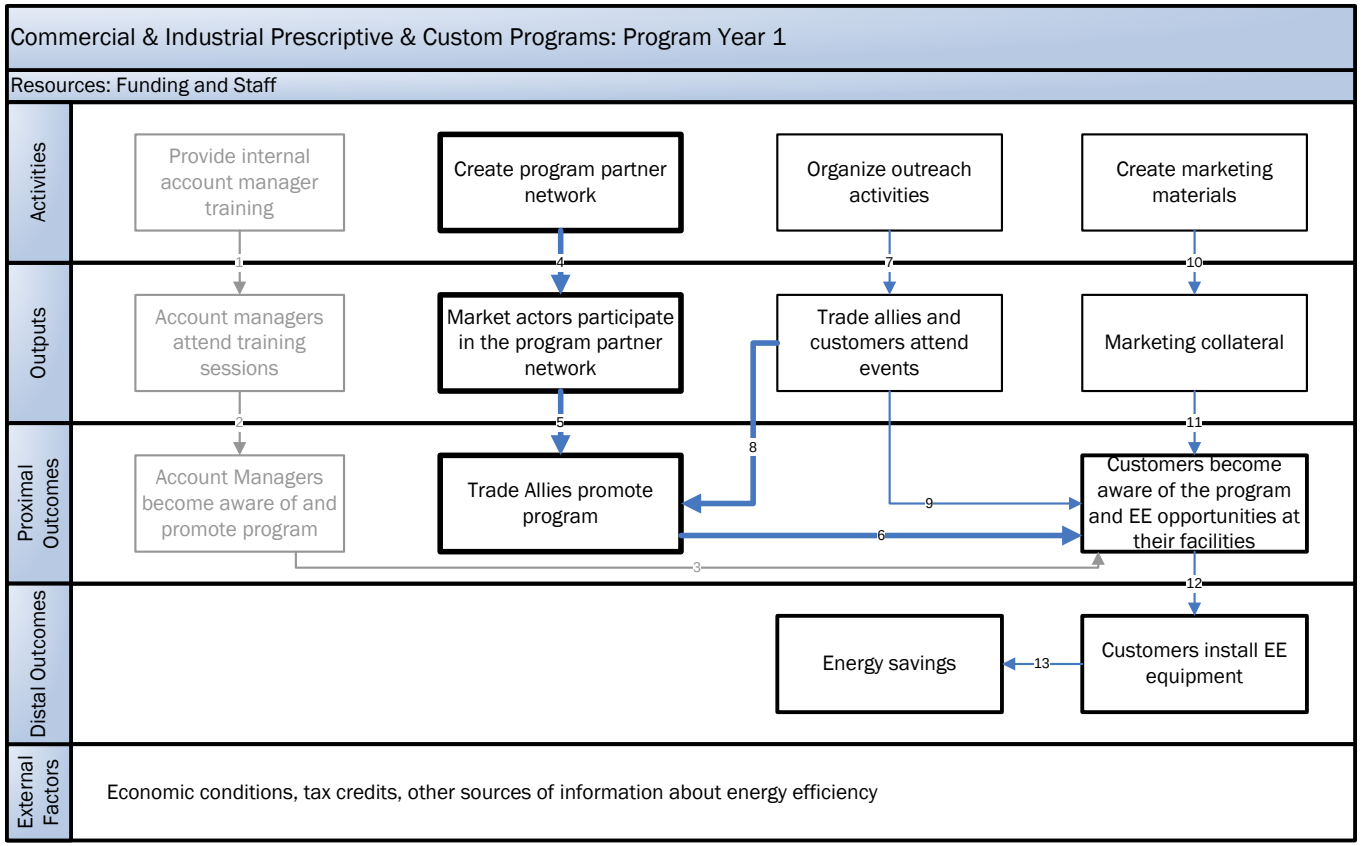
Logic Models

- Implementation of the Program



Logic Models (cont)

- Impact of the Program



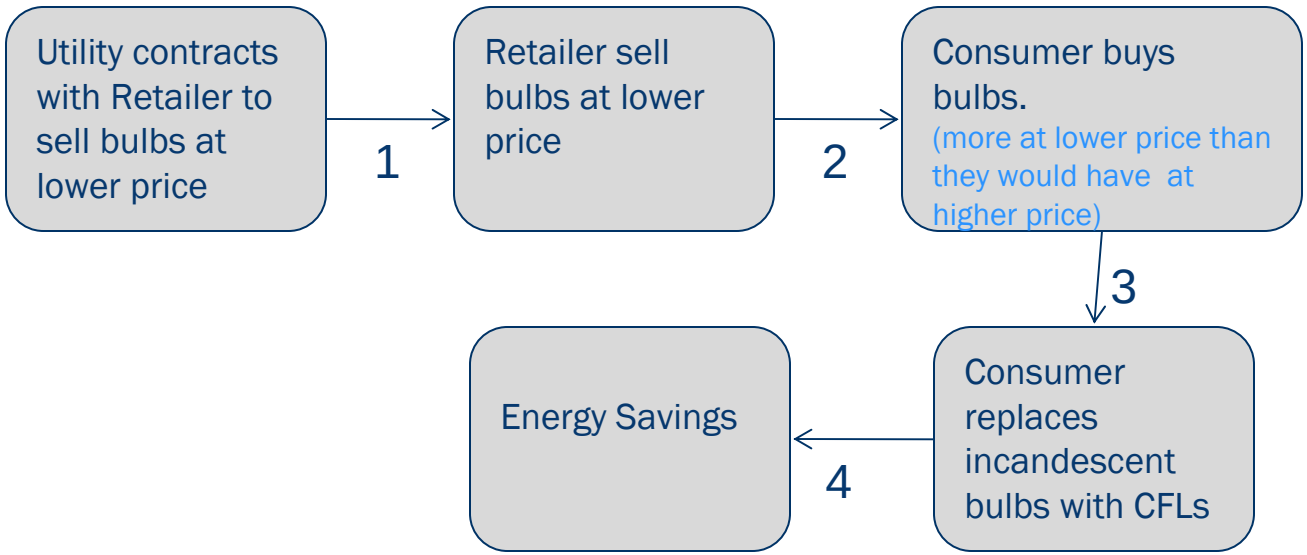
Notes: Boxes in light gray shading represent activities that are part of the program design but were not fully implemented in PY1.
Thicker lines indicate a greater emphasis of activity in program implementation.

Example of Link Information

Link	Potential Performance Indicator	Potential Success Criteria for Performance Indicator
4	1) Number of assessments begun.	1) 45 assessments during cycle with PCG funds from current program cycle.
5	1) Number of assessment reports created.	1) 100% of completed assessments have assessment report.
6	1) Quality of the report.	1) 100% of assessment reports are complete, well written, highlight knowledge gained, and has sufficient details to enable decisions about the technology by the IOU.

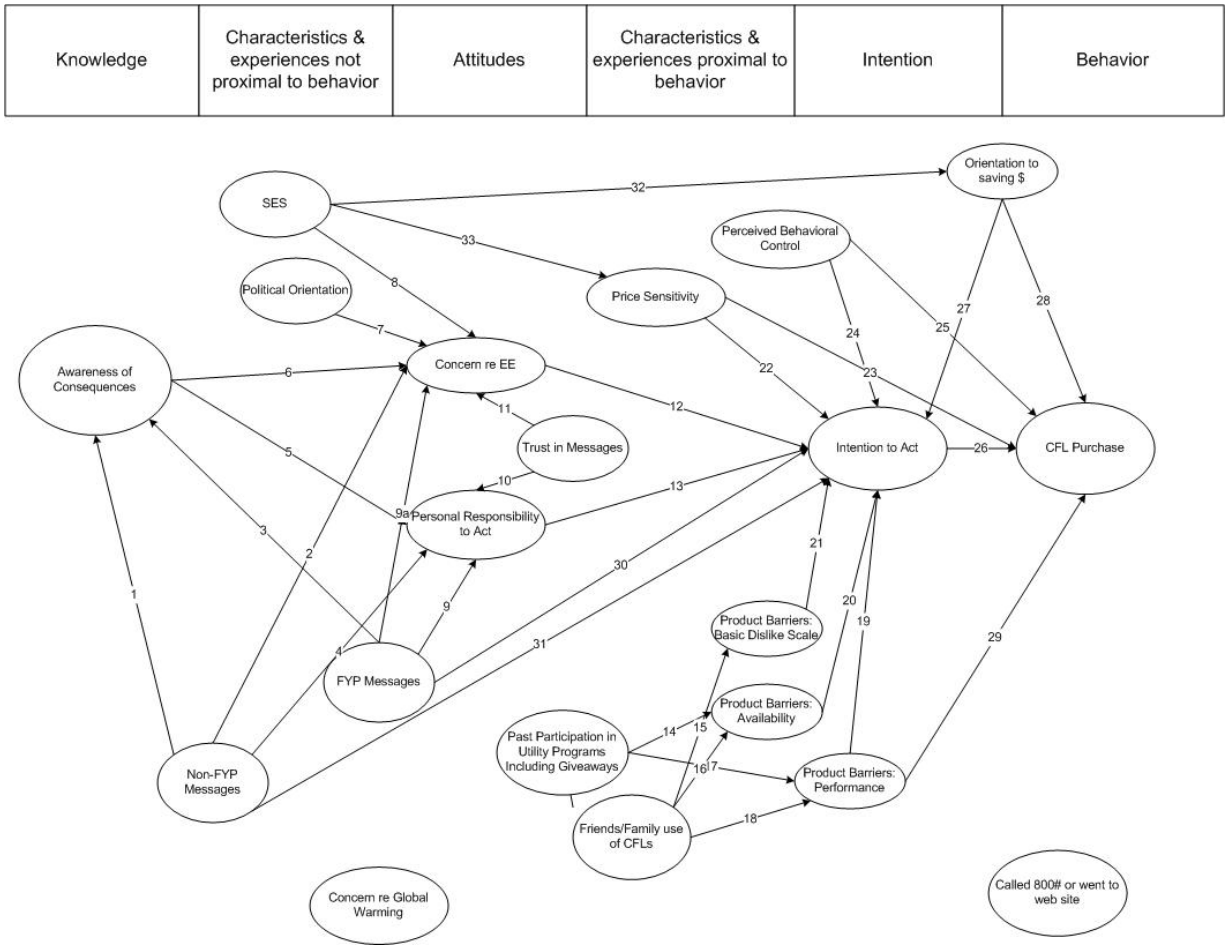
Use of Logic Models

- Hypothesis testing (linear model)

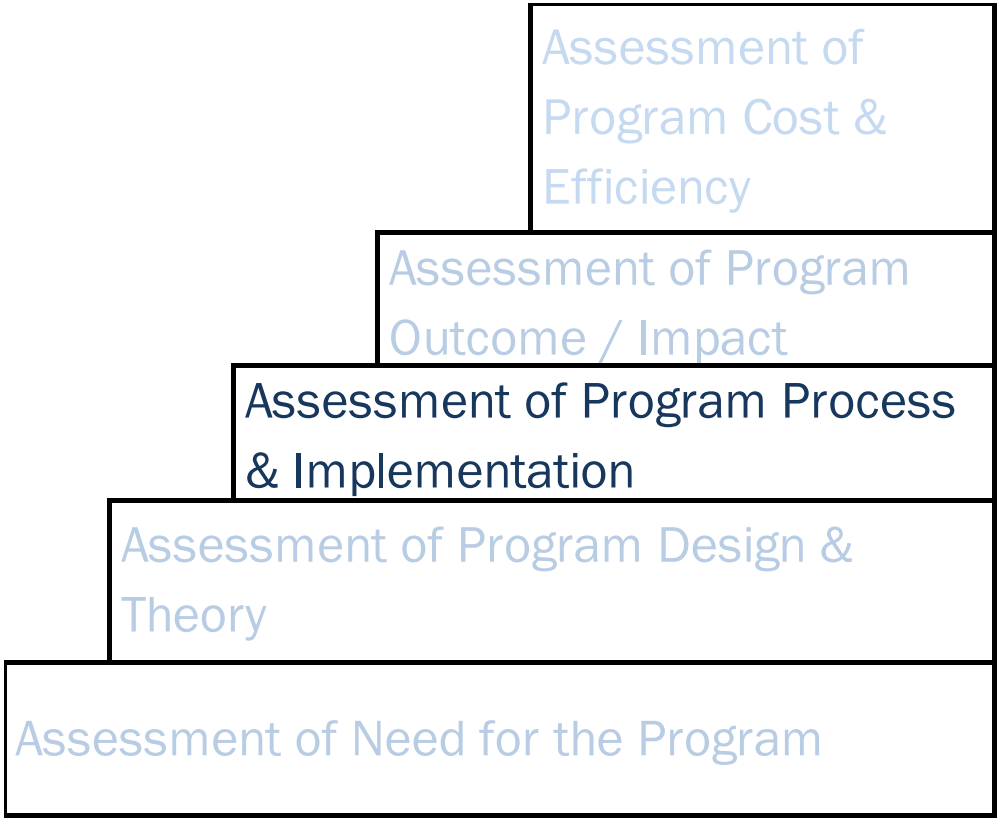


Use of Logic Models

- Hypothesis testing (web of influence)



Program Process and Implementation



Process Evaluation

- What you should expect to see in this type of assessment
  - Formative
    - What are characteristics of the program, of participants
    - What is working well, poorly (how can program be improved)
  - Summative
    - How stable is the implementation over time
    - What are the start-up and continuing costs of the program
    - What is the merit and worth of the program
  - Implementation – is the program implemented as designed

Process Evaluation (cont)

- When it should occur
  - Anytime within a program cycle
  - Different focus during different times
- What you do with the information
  - Change the design of the program
  - Improve the program processes
  - Assure stakeholders that program implemented with fidelity
  - Understand what the program does

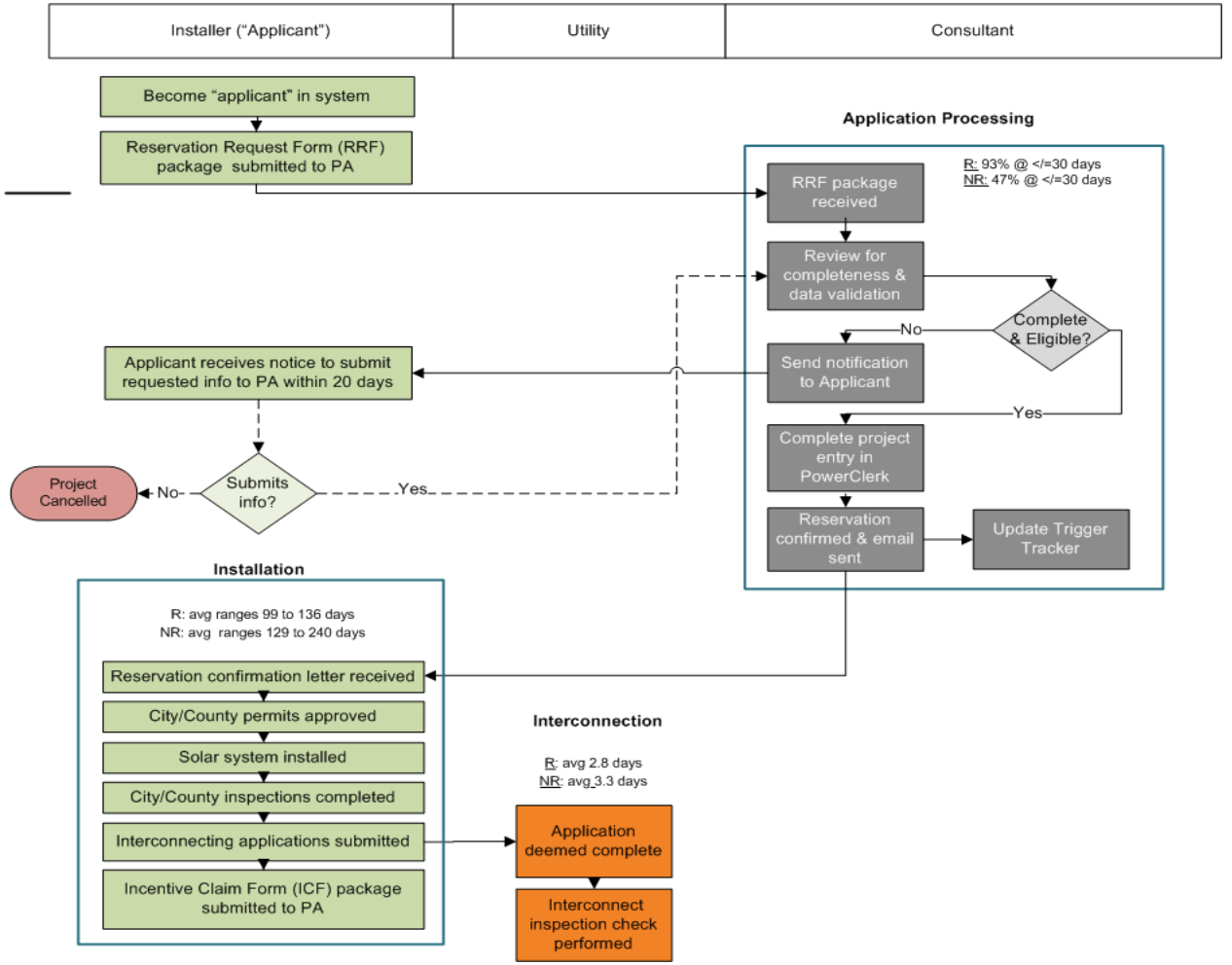
Examples of Process Work

What is energy efficiency?

What is energy conservation?

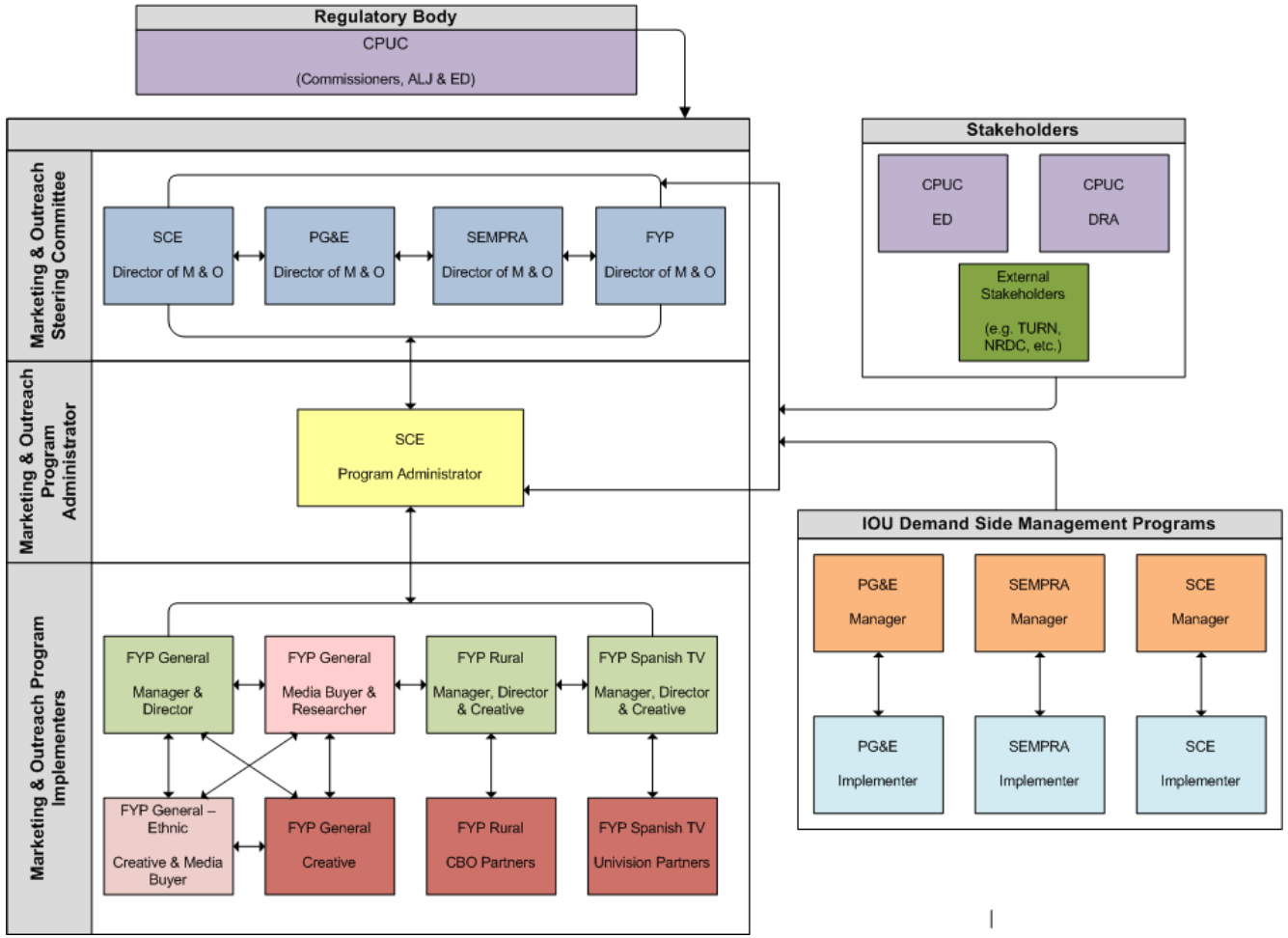
Examples of Process Work

- Bottlenecks in processes



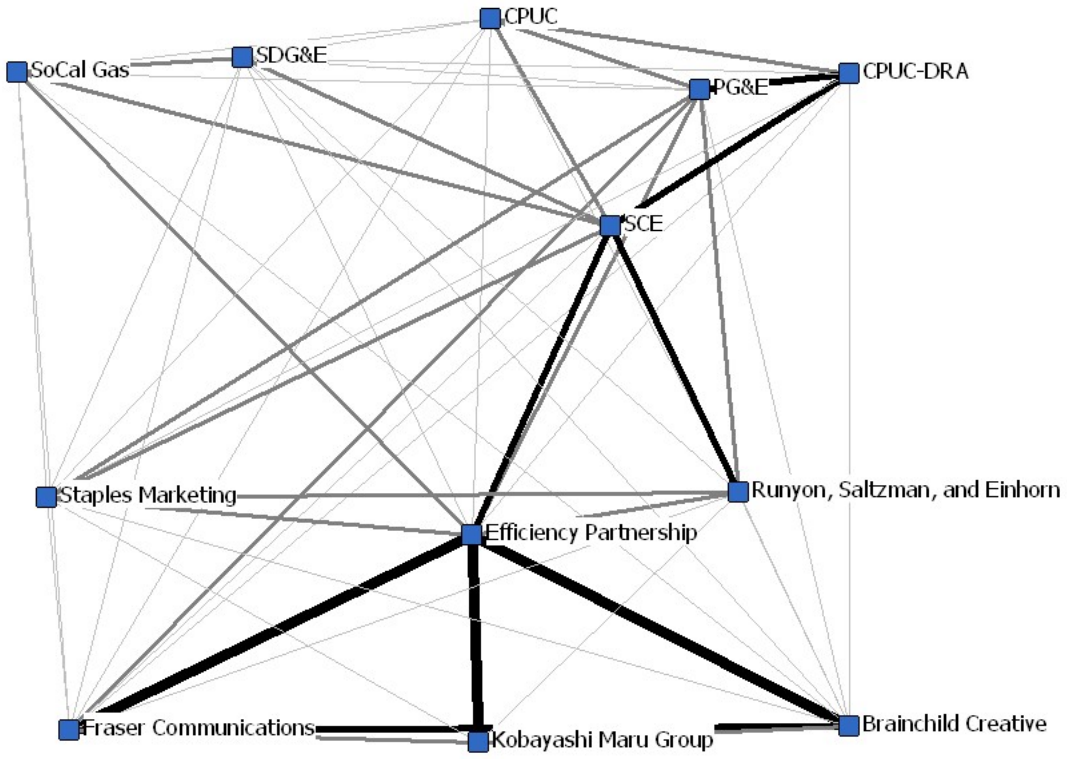
Examples of Process Work

- Descriptive



Examples of Process Work

- Collaboration / Cooperation
  - Density
    - 38%
    - Fair, but room for improvement
  - Centrality
    - Efficiency Partnership
    - SCE
    - Etc.

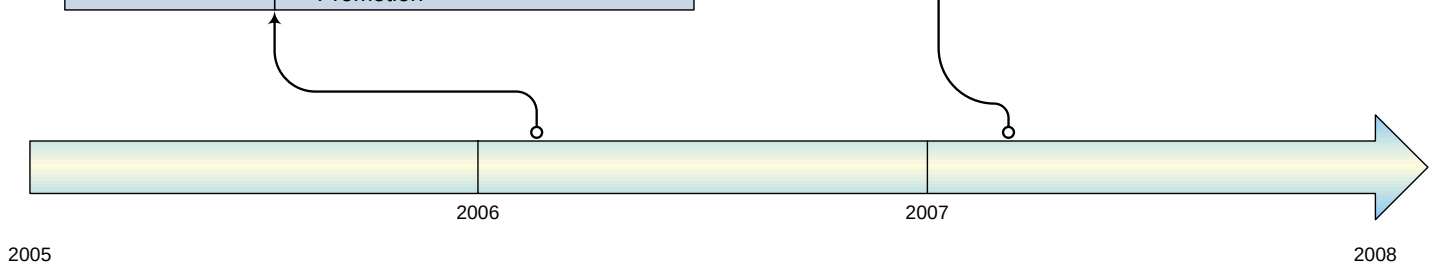


Examples of Process Work

- Descriptive

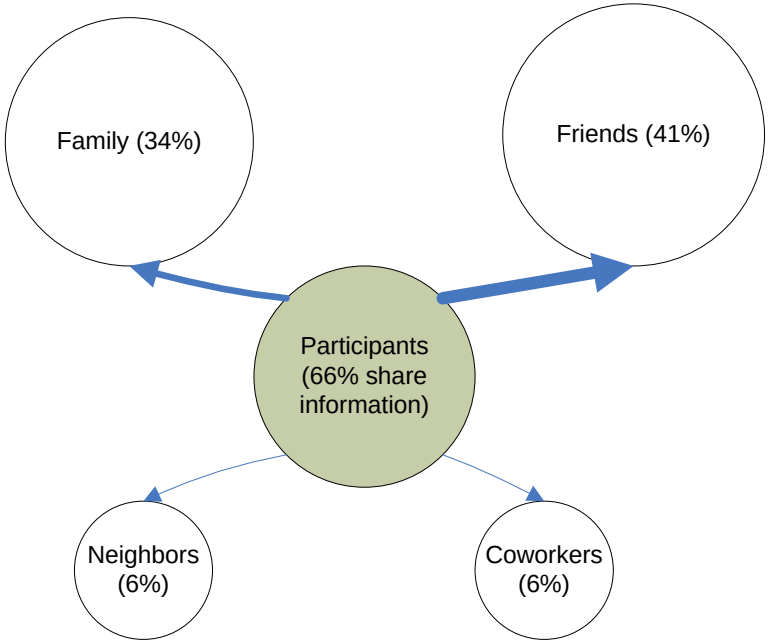
2006 Flex Your Power Campaign	
Campaign	**Changes from the 2005 Campaign**
All Statewide Programs	o Adopted FYP Brand o Improved Coordination Between Three Statewide Programs o Developed Integration Strategy with IOUs
FYP Rural	o Moved to Generalized Awareness Campaign o Discontinued DSM Program Promotion
FYP Spanish TV	o Moved to Generalized Awareness Campaign o Discontinued DSM Program Promotion

2007 Flex Your Power Campaign	
Campaign	**Changes from the 2006 Campaign**
All Statewide Programs	o Moved to Global Warming Theme
FYP General	o Expanded Target Ages to 25-34 in addition to 35-64
FYP Rural	o Added Online Banner Component o Changed CBO composition and added two CBOs

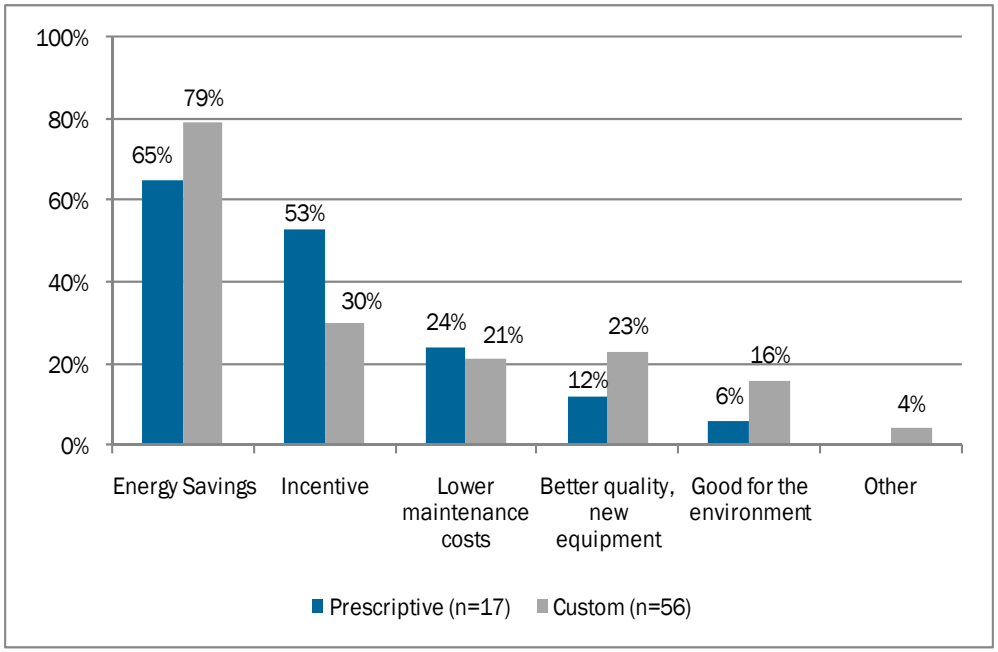


Examples of Process Work

- Sharing Information

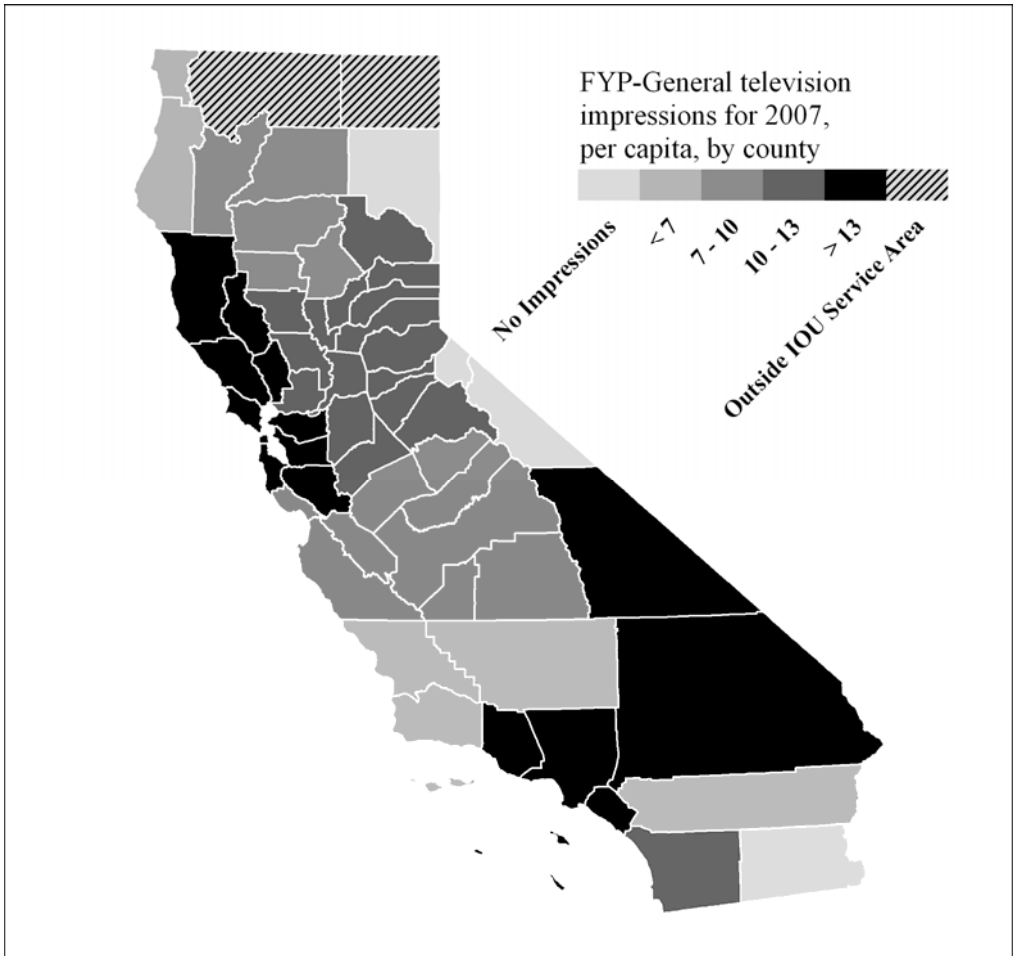


- Why Participate?



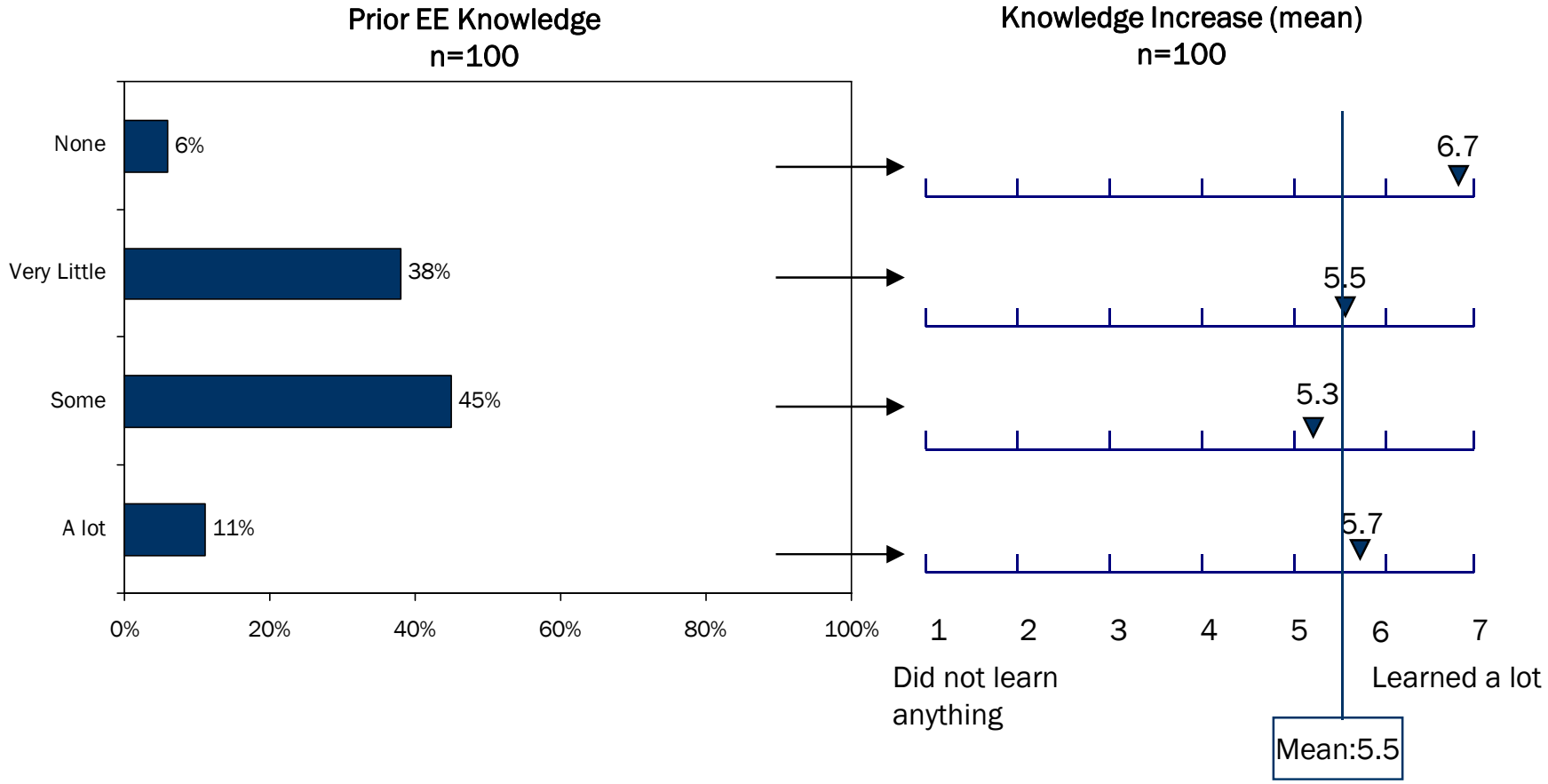
Examples of Process Work

- Descriptive
  - Where were the ads
- Effectiveness
  - Reached 72% of the expected population
  - Frequency low at 6 “hits” per person



Examples of Process Work

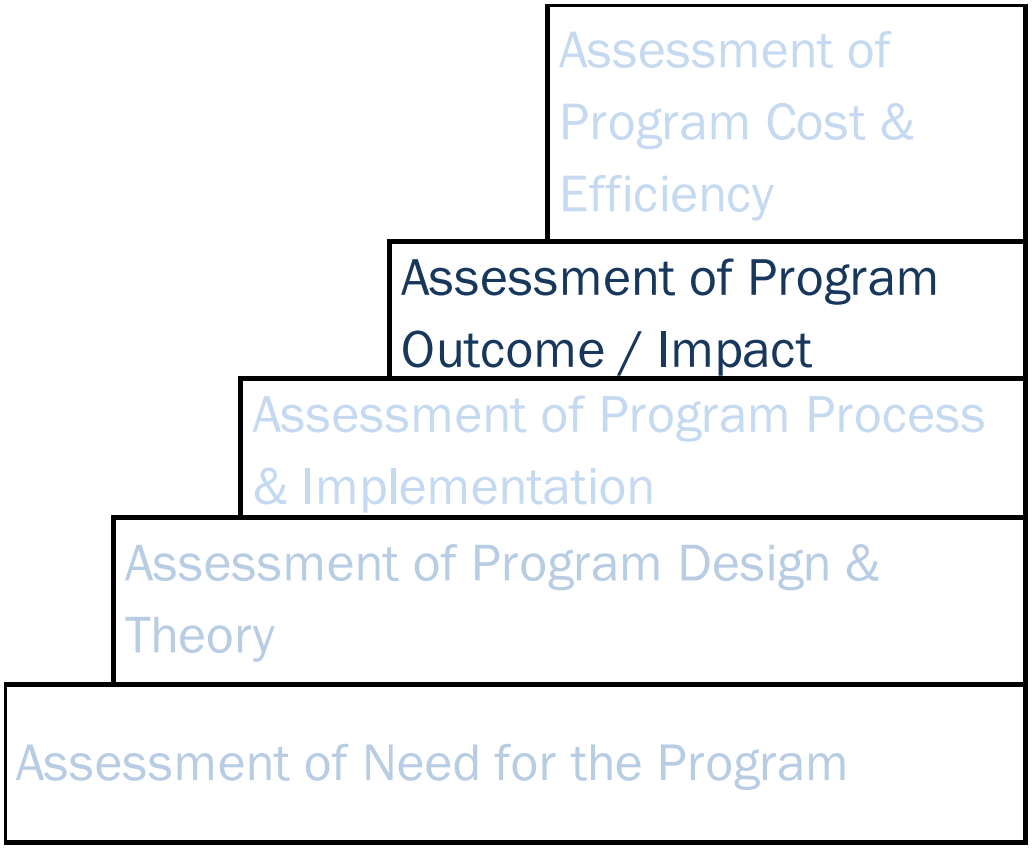
- Effectiveness



Examples of Process Work

- Effectiveness
  - Net-to-gross values as a planning tool
  - Program processes
    - Have the participation processes and program requirements been clearly explained to customers and trade allies?
    - Does the program smoothly provide incentives to customers? Do program processes create any barriers to customer participation? If yes, what barriers?
    - Does the program outreach increase awareness of the program opportunities? What is the format of the outreach? How often does the outreach occur? Who does it target? Are the messages within the outreach clear and actionable?

Program Impact / Outcomes



Impact Assessment

- Covered by Sami last month
  - What you should expect to see in this type of assessment
    - Typically, information from a backwards summative look at the program (energy, knowledge)
    - Answers “how much”, NOT “why” or “how”
  - When it should occur
    - Ideally, after programs have the “kinks” worked out
    - Energy programs - annually or every other year
  - What you do with the information
    - Determination of goal attainment
    - Used within a cost effectiveness calculation

Market Transformation

- Trifecta of concepts
  - Barriers - Assumption of market barriers to be overcome
  - Market Effects - Change in the structure of a market or behavior of participants that is reflective of an increase in the adoption of EE products, services or practices that is caused by the intervention
  - Market Transformation - Reduction in market barriers resulting from intervention as evidenced by a set of market effects, that lasts after the program is over, reduced, or changed

Market Transformation (cont)

- What you should expect to see in this type of assessment
  - Before any assessment, need agreement between implementer / evaluator on where changes might occur
  - Statement of specific barriers and effect that the program has had on their reduction
    - Information or search costs
    - Performance uncertainties
    - Bounded rationality
    - Asymmetric information and opportunism
    - Split incentives
    - Etc.

Market Transformation (cont)

- Listing of possible market effects due to the program and what was assessed. Changes in:
  - purchasing of EE equipment because of changes in awareness, attitudes, knowledge, or decision making process
  - business strategies
  - stocking practices
  - number of "players" in the market
  - services offered
  - products (type, quality, attributes) offered and manufactured
  - warranties
  - codes and standards / regulations
- Collection of market effects or post look at area where program has been withdrawn or substantially altered

Market Transformation

- When it should occur
  - After programs have been consistently in the market for at least three years – longer depending on the area of interest
  - Continuously for smaller market effect studies
- What you do with the information
  - Information to stakeholders
  - Adjust program design

Program Tracking System

- Multiple Uses
  - Program Managers
  - Evaluation Team
  - Utility Accounting
- Type of information in system
  - Contact information (name, address, phone, email)
  - Measure data (type, kWh, kW, therm savings)
  - Dates (application)
  - Ability to connect application to all measures installed
  - Program name
  - Information Events (when, who attended, etc.)

Who are program evaluators?

What is in our tool box?

About Evaluators Professional Standards

- Four Main Standards
  1. Utility – ensure that an evaluation will serve the information needs of intended users
     - Credibility (competent and trustworthy)
     - Report Clarity
  2. Feasibility – ensure that evaluation is realistic, prudent, diplomatic, and frugal
     - Practical
     - Cost Effective
     - Political Viability

About Evaluators Professional Standards

3. Propriety – evaluation conducted legally, ethically and with due regard for the welfare of those involved in the evaluation as well as those affected by its results.
   - Conflict of Interest
   - Disclosure of Findings
   - Complete and Fair Assessment

About Evaluators Professional Standards

4. Accuracy – ensure that evaluation will reveal and convey technically adequate information about the features that determine the worth or merit of the program being evaluated
   - Program documentation
   - Defensible Information Sources
   - Valid Information
   - Systematic Information
   - Analysis of Qualitative and Quantitative Information
   - Justified Conclusions
   - Impartial Reporting

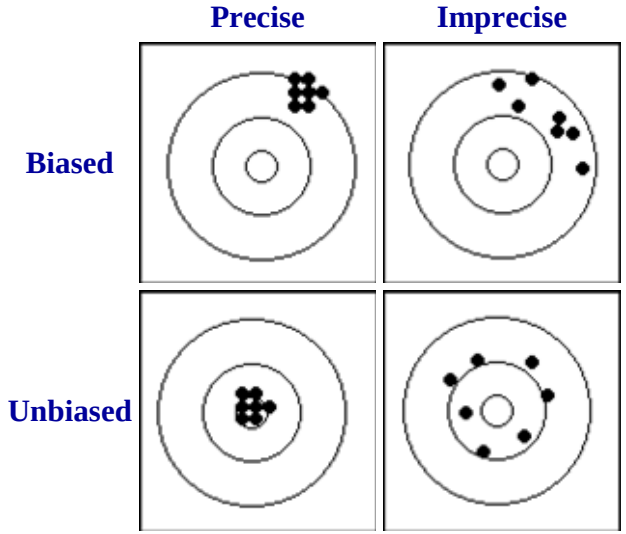
The Research Toolbox (or…the [wo]man behind the curtain)

- Primary Data Collection
  - Telephone / Internet Survey
  - Depth Interview
  - Observation
  - Focus Group
  - Content Review
  - Onsite Audit
  - Metered Data
- Secondary Data Collection
  - Billing data
  - Literature review

The Research Toolbox

- Population versus Sample

  - Bias and Precision



Low accuracy when

biased/precise

biased/imprecise

unbiased/imprecise

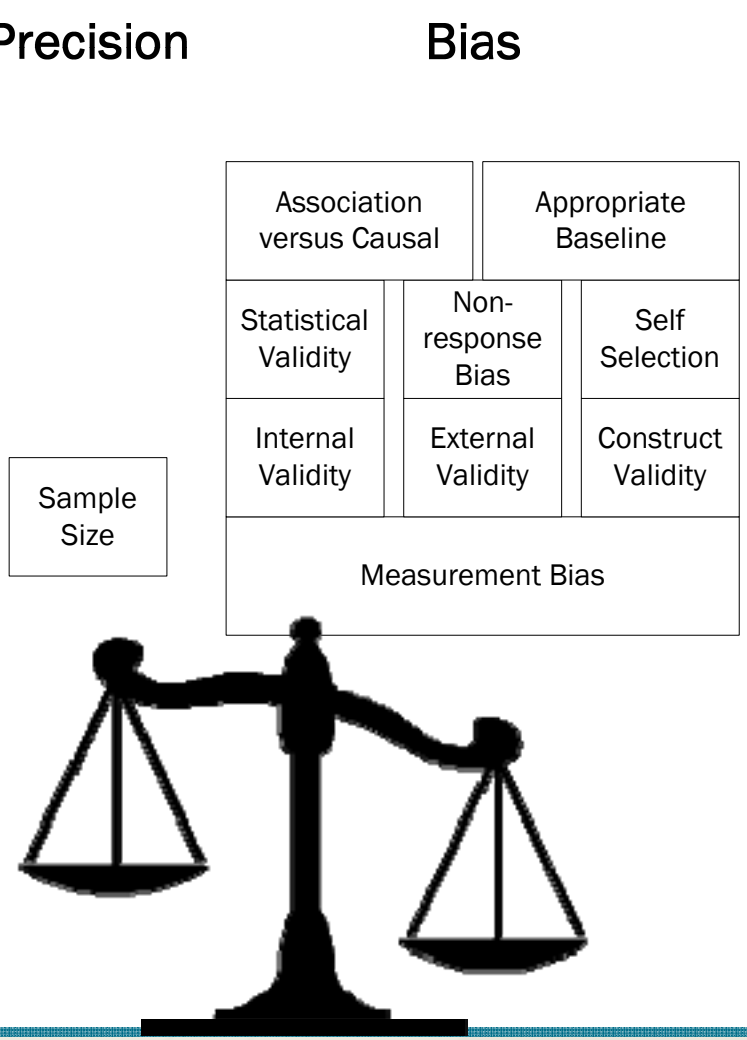
High accuracy when

unbiased and precise

The Research Toolbox

- Population versus Sample

The bias items tend to be for quantitative analyses, but can apply to a certain degree to qualitative as well.



The Research Toolbox

- Analysis
  - Qualitative (unstructured data)
    - Meaning-making using the human brain (binning, pattern matching, etc.)
    - Atlas.ti / nVivo
  - Quantitative (structured data)
    - Statistical (descriptive, inferential)
- Integration
  - Preponderance of the evidence using multiple analyses
  - Enhanced self-report method
- Judgment
  - Good / Fair / Poor based on what criteria

The Research Toolbox

Tool	Mkt. Char.	Baseline	Potential	Process	Impact	Mkt. Effects
Survey	X	X	X	X	X	X
Interview	X	X	X	X	X	X
Observation				X	X	
Onsite Audit		X	X		X	
Metered					X	
Billing data			X		X	
Focus Group	X			X		X
Secondary Data	X		X	X	X	X

Evaluation in Michigan

Evaluation Effort	PY1	PY2	PY3
Baseline	Yes	Yes (to inform impact)	Possibly
Potential	Yes	No	No
Process	Yes	Yes	Yes
Impact	Verification Only	Yes, informed by baseline and other data	Yes
Market Effects	No	None planned	None planned

Evaluation in Michigan

- Portfolio Approach Means:
  - Putting evaluation dollars where the highest energy saving programs are
  - Adjustment of evaluation plan based on constant internal assessment of changes in programs
  - Consistent data collection that reduces measurement error
  - Integrated reporting on the whole effort for stakeholders as well as program level information for program managers

Policy and Evaluation

Policy

- Changing political climate brings about different questions
- Set by organizing body that is not always the people interpreting the policy and making it actionable
- Open process that can be slow

Program Evaluation

Has the ability to answer many questions

Timing can be not-ideal for certain policy issues

Need for clarity to effectively assess

Transparent process, but with many "expert" areas, so not always easily understood

Thank You!

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