

The Logic of Indirect Programs to Diffuse Technologies or Practices: The Example of Training

American Evaluation Association

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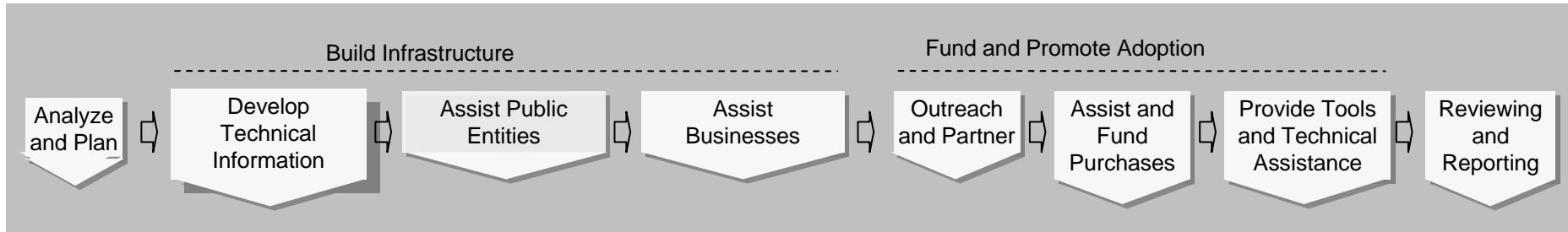
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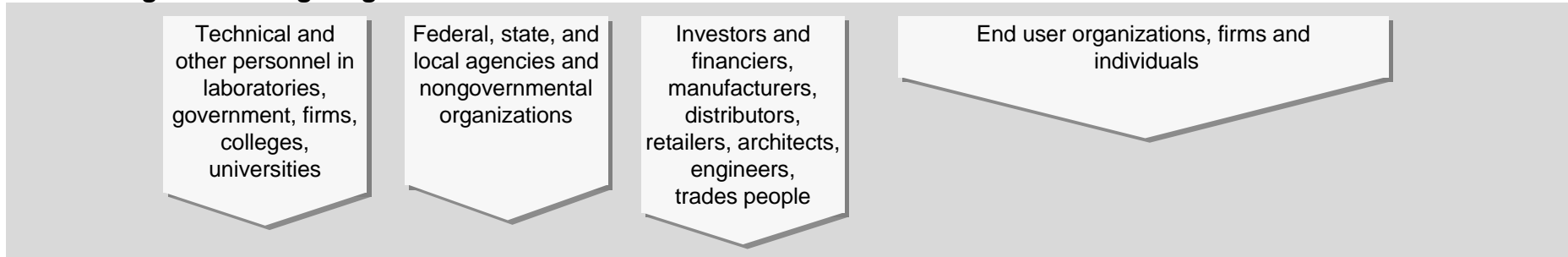
The Logic of the Presentation

- Setting the problem using a high level logic model for a multi-program multi-activity organization.
- Where training arises in the logic of a specific program.
- Using domains and diffusion of innovation to cut through the complexity.
- Delivering training to program intermediaries who influence customers who actually implement what the training teaches.
- Sorting out the market effects and the impacts. Or, what did the training accomplish?

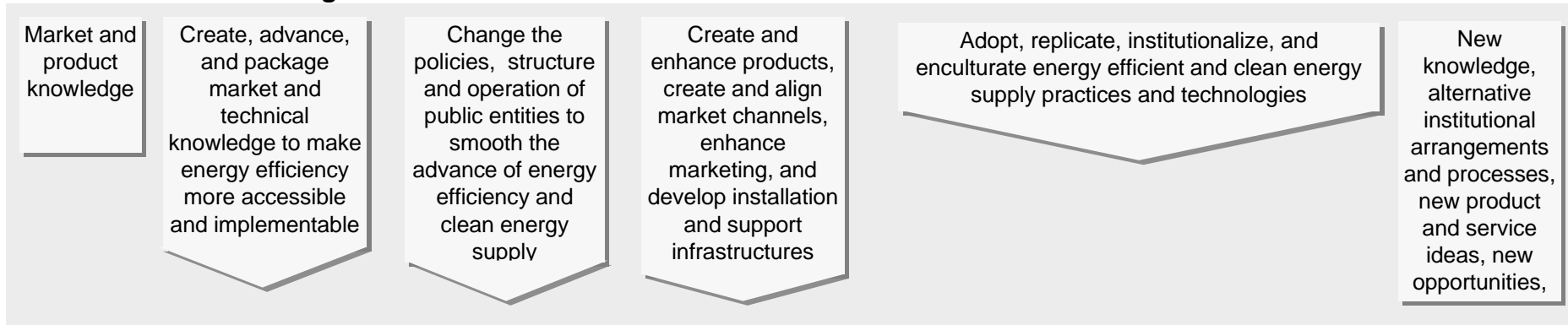
EERE programs typically undertake these activities



Partnering with or targeting these audiences



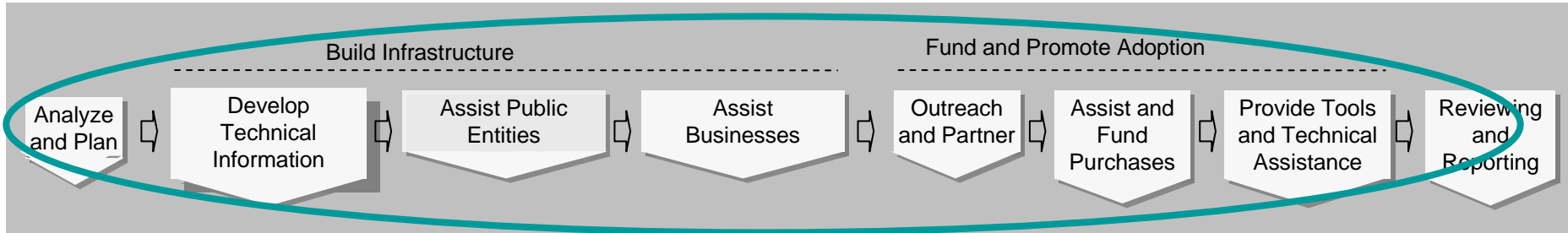
To achieve the following intermediate outcomes



That produce the following long-term outcomes or impacts

Reduced energy use and emissions, increased clean energy supply, and enhanced productivity and global security

EERE programs typically undertake these activities

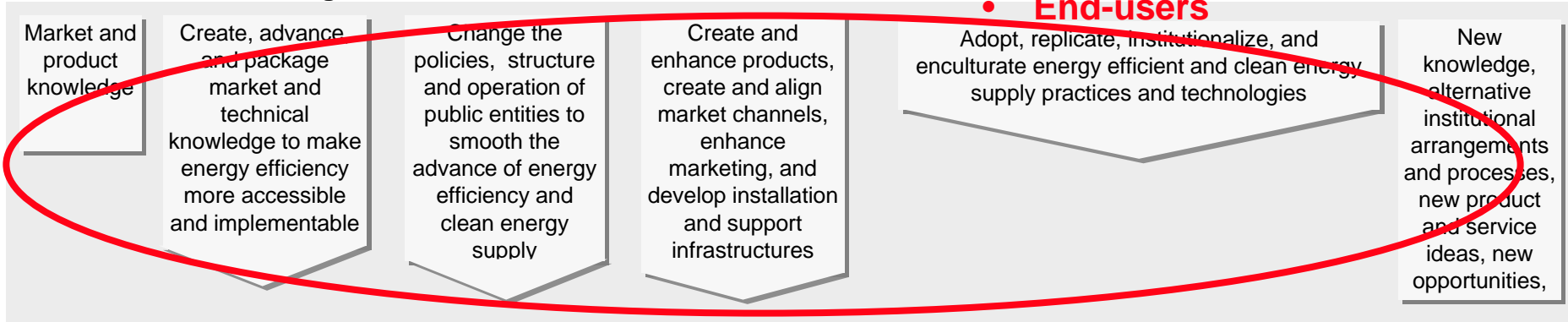


Knowing these activities and their corresponding outputs

We need to describe and measure the expected response of:

- Knowledge workers
- Public Entities
- Businesses and manufacturing

To achieve the following intermediate outcomes



- End-users

That produce the following long-term outcomes or impacts

Reduced energy use and emissions, increased clean energy supply, and enhanced productivity and global security

Actors in the Four Domains

Knowledge firms / organizations	Policy makers / public entities	Business	End-users
<ul style="list-style-type: none">• Laboratories• Universities• Research labs• Consultants• Media specialists• Web developers• Modelers	<ul style="list-style-type: none">• Regulatory commissions• State energy offices• Legislatures• Public Goods Charge programs• Utilities	<ul style="list-style-type: none">• Materials suppliers• Product manufacturers• Distributors/wholesalers• Utilities• Retailers / Builders• Service providers i.e., auditors, consultants,• Installers / contractors• Maintenance contractors	<ul style="list-style-type: none">• Households• Commercial building owners• Tenants in commercial buildings• The buildings of retailers• The facilities and processes of industrial firms

Examples of Actions in Each of Four Domains

Knowledge workers:

- Assemble a steam system audit program
- Establish a website
- Run 10,000 building simulations to assess the potential for zero energy commercial buildings

Public Entities:

- Implement efficient public purchasing
- Adopt efficient codes and standards
- Establish green ordinances

Business:

- Manufacture an efficient product
- Distribute a new product line
- Promote, sell, and install an efficient product (retailer)
- Train to service a product

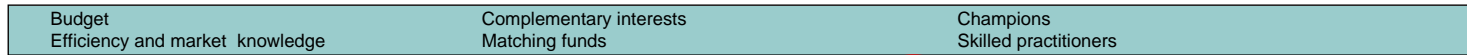
End-user examples:

- Purchase and install an energy efficient household product
- Make an industrial process more efficient
- Build a “zero energy” office building

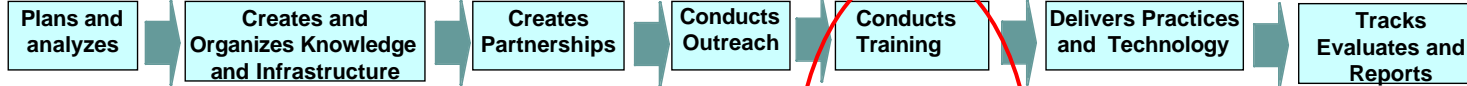
Industrial Technology Deployment Program

- Tasked with assisting industry to become more efficient
- Some experts estimate that industrial energy use could be reduced by 40 percent or more through the introduction of efficient technologies and practices
- Ways of achieving the reduction
 - Introduce more efficient technology (efficient motors, compressors, etc.)
 - Improve the efficiency of processes
 - Improve the efficiency of operations and maintenance

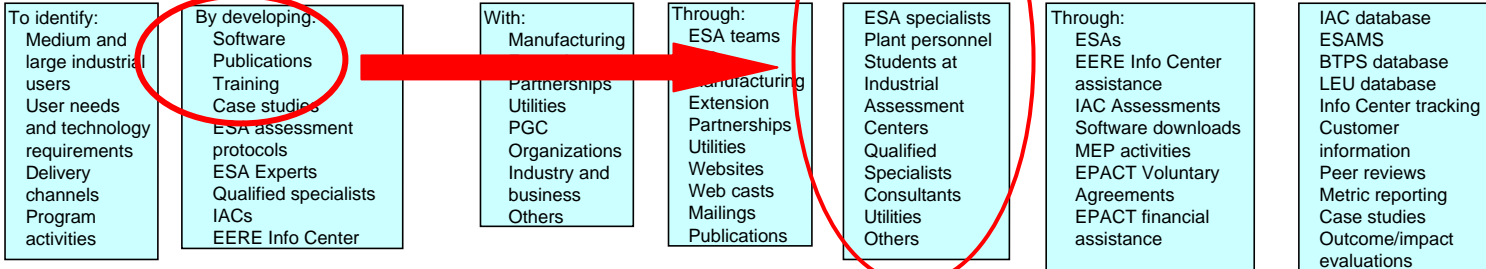
The Industrial Technology Delivery Program uses these resources



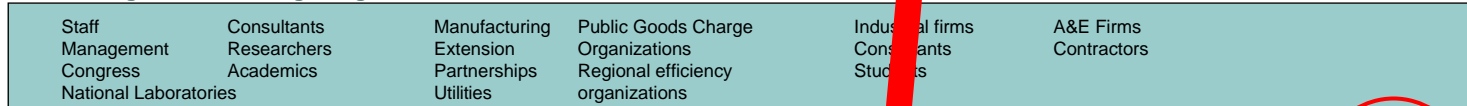
To conduct these activities



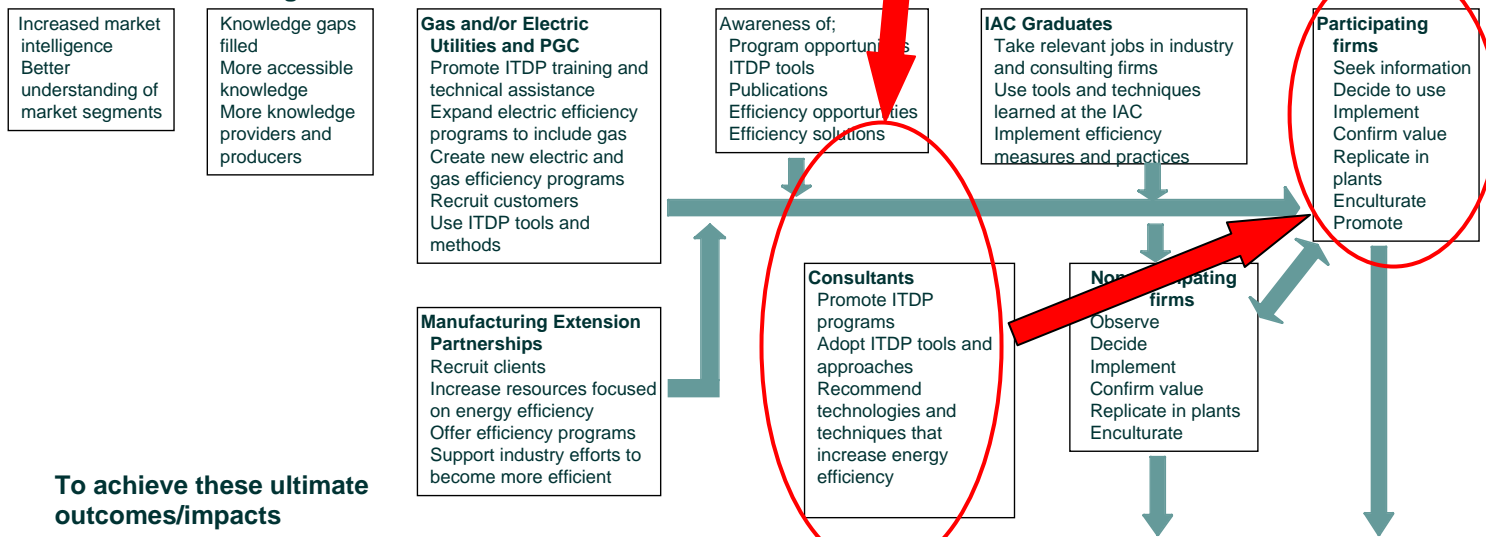
Producing these outputs



Partnering with and targeting



To induce the following interim outcomes

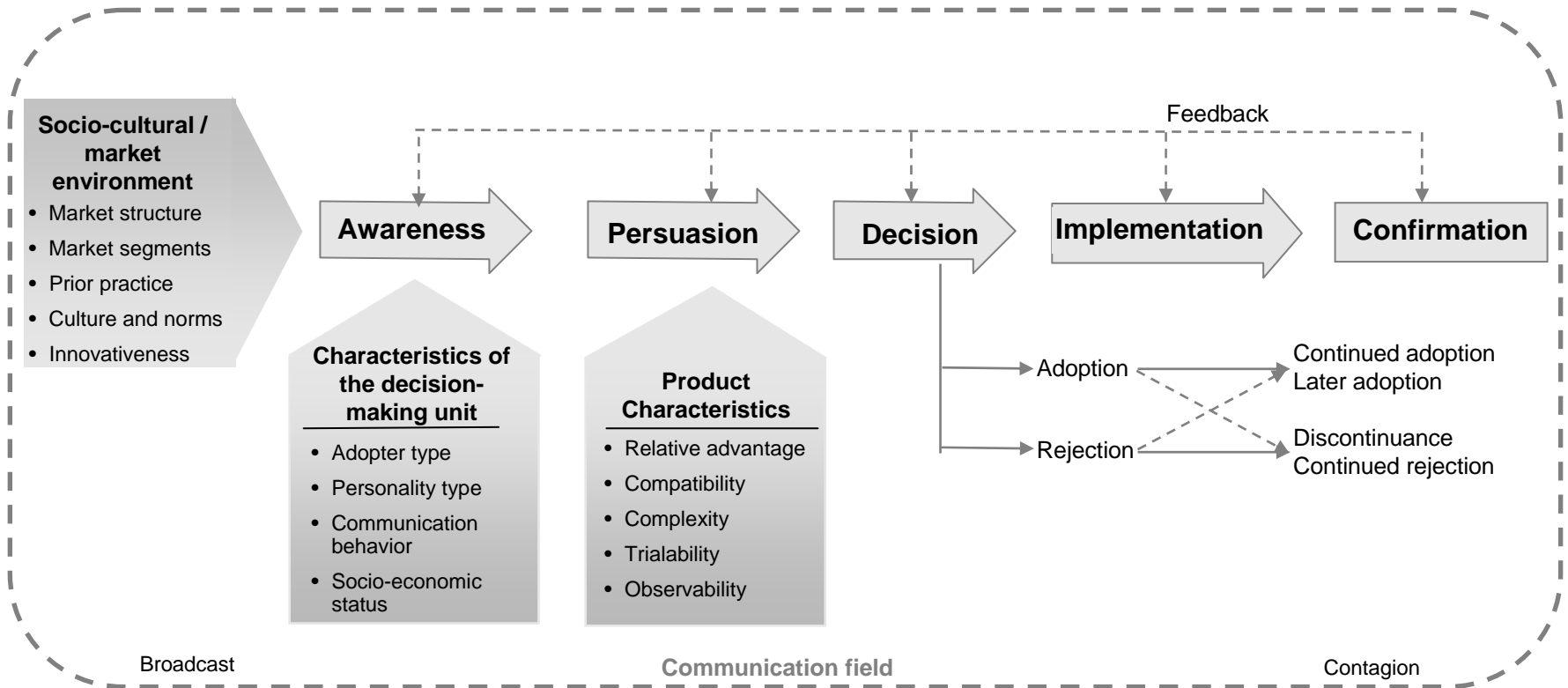


To achieve these ultimate outcomes/impacts

Reduced energy use intensity, reduced emissions, managed costs, moderated fuel price effects, and improved productivity benefits

- External Factors
- Funding
- State and local programs
- Utility programs
- Energy Policies
- Fuel prices
- Structure changes to the economy
- International competition
- Outsourcing
- Emerging products
- Environmental regulation / policy
- Capital availability

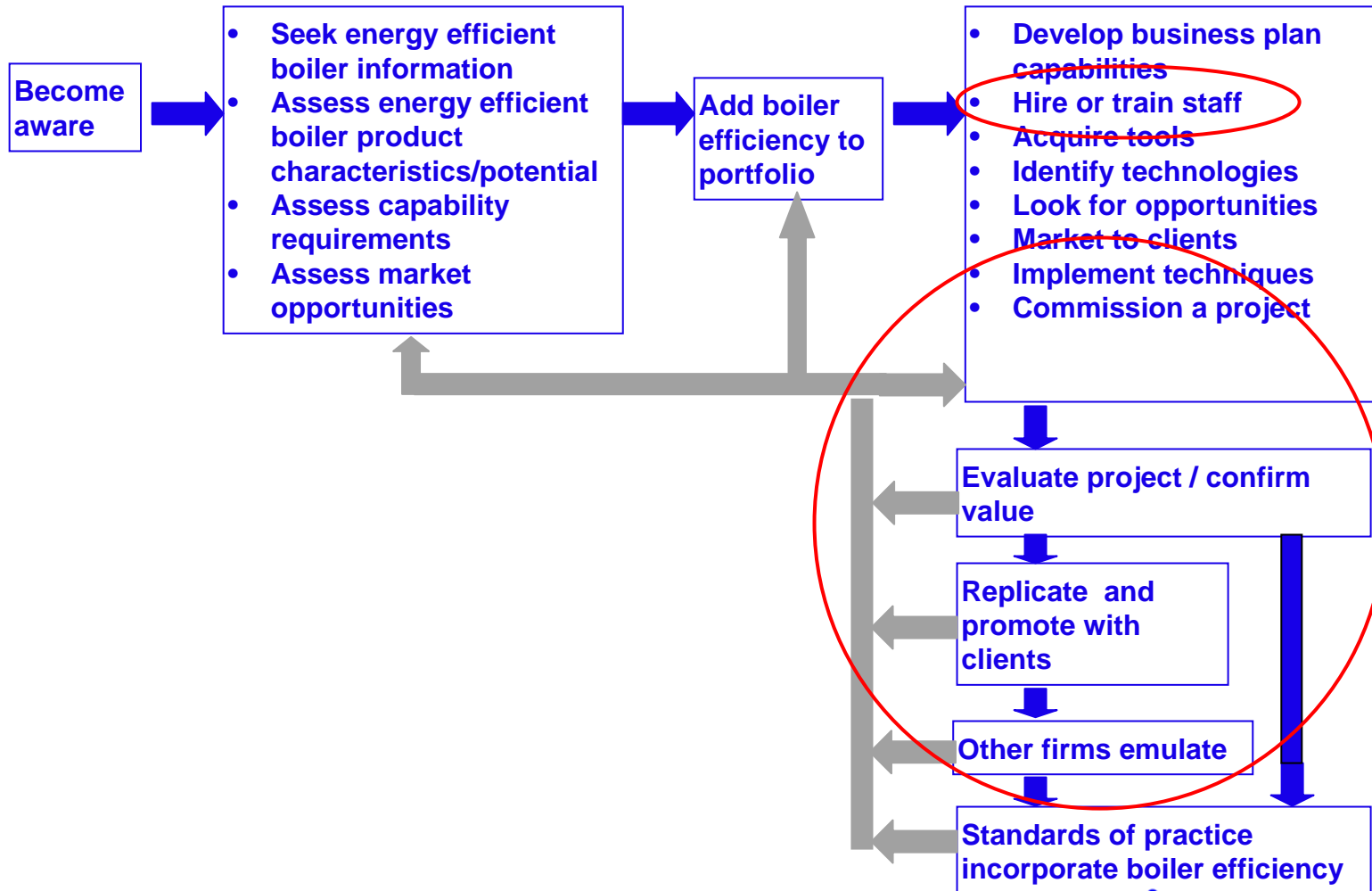
Diffusion of Innovations



Source: Everett Rogers 1994 as modified by Innovologie, LLC. 2005

How an Architectural and Engineering firm might add Boiler Efficiency to Its

Product Mix and the Effects



Principles of Boiler Efficiency Software Training - I

- Boiler efficiency is determined
- Hot spots on the shell are identified
- Flue gas oxygen content is monitored
- Flue gas oxygen content is maintained within limits
- Condenser heat transfer components are clean
- A schematic of the system is available
- A system mass and energy balance is available

Principles of Boiler Efficiency

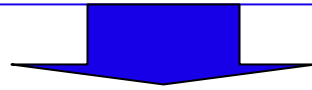
Software Training - II

- Steam flow through vents and pressure reducing stations is understood
- The effects of changing boiler pressure are understood
- Piping is monitored for steam leaks
- A steam trap database exists
- The operation of steam traps is checked annually
- Traps are of proper size and type
- Condensate loops are clear
- ¹²Pipes are insulated

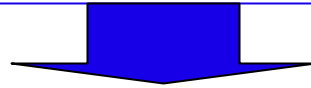
Another Little Logic Model

Representing the Results of Training

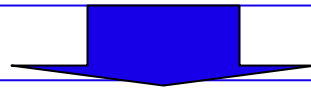
Architectural and engineering firm changes recommendations to end-users



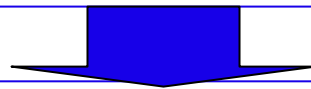
End-user adopts some subset of recommendations



The changed recommendations that are adopted result in incremental energy savings



Architectural and engineering firms confirm the savings of recommendations to end-users



Architectural and engineering firms and/or customers replicate at other sites owned by the end-user and emulate at other sites (multiplier effect)

Approach

1. Focus on behaviors
2. Collect behavioral data from before and after the training
3. Make use of the training opportunity to gather data
4. Address attribution (e.g., by including some kind of comparison group)

Three sets of effects

- Changes in the recommendations the architectural and engineering firm makes
- The recommendations that are changed that are actually implemented
- The resulting energy savings from the recommended changes

The Resulting Market Effects and Impact Questions - I

- What practices are/were in place at the customer's site?
- What steps would the architectural and engineering firm have recommended prior to the training?
- What does/did the architectural and engineering firm recommend after the training?
- What changes in recommendations are a result of the training?
- What changes were actually implemented
- To what extent did the training and recommendations accelerate the implementation at the customer's site?

The Resulting Market Effects and Impact Questions - II

- What are the incremental savings from the recommendations that were implemented that would not have been done and from recommendations that would have been done but were accelerated?
- How many times were these repeated at the customer's site?
- How many times did the A&E firm use this at other customer sites?
- How many other firms observed and decided to improve the efficiency of boilers?

Summary

- Training can take credit for:
 - Changes in the types of recommendations that are made
 - The energy savings impacts for the changes in recommendations that are implemented or from the accelerated implementation of recommendations
 - Energy savings summed across the instances of replication by the firm and by user sites

For Information

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- To obtain a copy of the *Impact Evaluation Framework for Technology Deployment Programs: An Approach for Quantifying Retrospective Energy Savings, Clean Energy Advances, and Market effects* (Main Report) go to:
- www.evalframework.com