“Cheshire Puss,” she began, rather timidly, as she did not at all know whether it would like the name: however, it only grinned a little wider.

“Come, it's pleased so far,' thought Alice, and she went on. `Would you tell me, please, which way I ought to go from here?'

“That depends a good deal on where you want to get to,” said the Cat.

“I don't much care where—” said Alice.

“Then it doesn't matter which way you go,” said the Cat.

“--so long as I get *somewhere,*” Alice added as an explanation.

“Oh, you're sure to do that,' said the Cat, `if you only walk long enough”
Logic Models for Strategic Planning & Evaluation

ERC Webinar

December 18 & 19, 2017
Learning Objectives

Webinar attendees will be aware of the:

• Evaluative inquiry cycle
• Role of models in strategic planning
• Terms used in creating a theory of change and logic model
• Steps in creating models
• Steps to align models and strategic plan
Evaluation Overview

NSF Approach, Principles & Expectations
Evaluative Inquiry Process

1. Strategic Plan
   - criteria for what constitutes evidence

2. Evaluation Plan
   - processes & methods for obtaining evidence

3. Annual Report
   - how evidence, once analyzed and synthesized, can be used
Strategic Planning

Current State

Comprehensive Vision

research and other activities
Creating Focus

Strategic Plan
How will we do our work? How do we monitor progress and define success?

Evaluation Plan
What evidence do we need to manage and improve the project? How will we gather and use evidence?
Mapping & Assessing Progress

Current State

Theory of Change

Get

Comprehensive Vision

research and other activities

DO
Do

Get

Give us SUPPORT

We all WIN

freshspectrum.com
Developing Models

Strategic Plans are Blueprints for Success
Do

- Research
- Engineering Workforce Development
- Innovation Ecosystem
- Culture of Inclusion
- Infrastructure & Management

Get

- Increased research capabilities and new knowledge
- Diverse, globally competitive, team-oriented workforce
- Improved value chain, technology transfer, and entrepreneurial culture
- Participants from all backgrounds participate and succeed
- Improved management, infrastructure, and implementation

Theory of Change Example
Modeling a Theory of Change for your Strategic Plan

1. Use a sheet of easel post-it.
2. Identify the foundational components and their major thrusts for your project and write each on a 5x7 post-it.
3. Identify the overarching result for each component/thrust and write each on a 5x7 post-it.

Take Home Exercise 1
Do

- Research
- Engineering Workforce Development
- Innovation Ecosystem
- Culture of Inclusion
- Infrastructure & Management

Get

- ?
- ?
- ?
- ?
- ?
Simple Logic Model

DO
- Strategies

GET
- Results

Inputs → Activities → Outputs → Short-term Outcomes → Intermediate-term Outcomes → Long-term Outcomes → Impact
## Logic Model Component Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs</td>
<td>Include financial, human, organizational, community or systems resources essential to implement the project.</td>
</tr>
<tr>
<td>Activities</td>
<td>The specific actions that make up the project. They can include tools, processes, products, events, technology and other aspects of the intervention deployed to achieve desired results.</td>
</tr>
<tr>
<td>Outputs</td>
<td>Include descriptions of the types, levels and audience or targets for the project. Countable attributes of the activities if accomplished. (Frequency, Intensity, Targets)</td>
</tr>
<tr>
<td>Outcomes</td>
<td>The changes in project participants or organizations, as a result of the project. Can include changes in awareness, knowledge, skill, and behavior. (Specific, Measurable, Actionable, Realistic, Timed)</td>
</tr>
<tr>
<td>Impact</td>
<td>The ultimate change in an organization, community or other system. Often occurs after the grant cycle has ended.</td>
</tr>
</tbody>
</table>
Program-level Logic Model Examples
Updated Logic Model for NSF EFRI Program

**Resources/Input**
- Funding
- NSF Program Officers to manage logistics
- Other coordinating entities
- Researchers with transformative ideas

**Activities**
- Grantees engage in cutting edge/frontier research
- Grantees collaborate:
  - across disciplines
  - across institutions
  - internationally
- Researchers recruit traditionally underrepresented groups to participate in projects
- Students work in labs
  - Exchange with labs in different disciplines at own institution
  - Exchange with other institutions

**Outputs**
- Grantees develop new methodologies
- Grantees build knowledge base with new findings
- Grantees advance theory based on empirical results
- Grantees publish results with coauthors
  - from other disciplines
  - from other institutions
  - internationally
- Grantee contributions are recognized by awards/promotions
- Students
  - Form research groups
  - Continue in research fields
  - Make contributions

**Short-term outcomes**
- Grantees receive additional funding from NSF or other funders
- Companies partner with EFRI grantees
- New researchers begin working in fields supported by EFRI
- New technology is licensed
- Diverse research teams make distinct contributions to science
- Increase in scientific contributions made by traditionally underrepresented groups

**Long-term outcomes**
- Grantees research increases in high-risk projects
- Grantees or project participants from traditionally underrepresented groups remain in career fields supported by EFRI
- Schools and universities change curricula to incorporate knowledge and discoveries
- Discoveries lead to a paradigm shift
- Grantees start new companies based on EFRI research

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BIC LONG-TERM LOGIC MODEL

**INPUTS**
- Initial discovery
- Funding and Logistics (up to $800K for 3 years)
- Expertise of engineers, computer scientists, cognitive, social, or behavioral scientists, and other researchers and industry participants
- Resources to help connect BIC awardees with industry participants
- PI training
- Process, Materials and Resources (facilities contributed by industry and academic)
- Descriptions of the potential impact
- Other coordinating entities
- Student and Postdoc Mentoring Plans
- Cooperative Research Agreements between partners and Partnership Letters detailing their respective commitments

**PROJECT ACTIVITIES**
- Interdisciplinary research considerations of service systems as they relate to needs of the users and to advance the platform technology
- Inclusion of service industry R&D
- Partners jointly identify possible markets and commercial applications for the platform technology
- Partners jointly identify and overcome technical and/or market barriers to the success of the platform technology
- Establishment of a sustainable relationship between academic research team and industry partners
- Education of students in design process
- Leveraging of additional capital from sources outside the university or NSF

**OUTPUTS**
- Interdisciplinary publications on platform technology are developed from BIC-funded awards
- Technical barriers to commercialization feasibility are overcome
- Marketing obstacles to commercialization are overcome
- A subset of partners continue the relationship after the life of the award
- Students are trained in interdisciplinary approach to service system engineering
- Memoranda of Understanding or Cooperative Research Agreements between partners are renewed if appropriate for continuation of the relationship
- A business plan for commercialization is developed, where appropriate

**IMMEDIATE OUTCOMES**
- Feasibility of commercialization is tested
- New research directions are developed
- Patent and license applications of new technology developed from BIC awards (a subset of awardees)
- Researchers and/or students (academic and/or industry) working on BIC research become innovators and/or entrepreneurs in other contexts
- Researchers and/or students pursue further funding for the platform technology
- Students contextualize their attitudes to and proclivities for innovation

**INTERMEDIATE OUTCOMES**
- Platform technologies tested in new contexts considering needs of customers
- Platform technology generation cycle shortened due to involvement of industry participants and customers
- Licensing of platform technology to industry
- Partnerships from BIC awards sustained over time to work on new technologies
- New academia-industry partnerships formed by BIC awardees
- Student participants pursue career in similarly interdisciplinary research
- Research and partnership increase academic institutional reputation as an “innovation hub”
- “Best practices” for academic-industry partnerships established and disseminated
- Workforce development as new positions or employee training opportunities are created by BIC partnership

**LONG-TERM OUTCOMES/IMPACT**
- Improved “smart” technology available to the service industry
- Increased retention of BIC-funded students to engineering careers/research and/or entrepreneurship
- A subset of BIC awardees form start-up or spin-off companies
- Continuation of the cycle of innovation as BIC funded students become PIs with industry partnerships or industry researchers with academic partnerships
- University continues to promote and support similar partnerships via BIC or other avenues
- Adoption/dissemination of the BIC partnership model by other institutions

Life of award 1 yr post-award 2-5 yrs post-award 5-10 yrs post-award
PS-OC Program Logic Model: Dec 2013

**Inputs and Activities**

**Individual-Level**
- Research findings: pre-award publications, grants, patents, clinical trials and business development
- Research discipline
- Organization associations (location, Title/Rank, department)
- Degrees received
- Other demographics

**Center-Level**
- Primary leading physical scientist and cancer researcher
- Research framework: 3-5 projects
- Shared Resources: 1-3 non-redundant core facilities
- Pilot Projects
- Transdisciplinary lectures, workshops, working groups, courses

**Network-Level**
- Coordinate Expertise
- Trans-network Projects
- Physical or virtual infrastructure
- Integrative training
- Data Coordinating Center
- Research Contracts to further support clinical translation, cross-validation and integration of datasets, techniques, technologies, bi-specimens
- Communicate with PS-OC and Broader Research Community

**Outputs**

**Individual-Level**
- Publications
- Patents
- Grants (NIH, other)
- Science Awards (innovative, translational, training)
- Clinical Trials
- Conference presentations
- Courses and workshops taught
- Trainee disciplines

**Center-Level**
- Cost, content and people involved in research projects, pilot projects and cores
- Stage, content and people involved in collaborations
- Datasets, techniques, technologies and bio-specimens generated and utilized
- Enumeration and content of transdisciplinary team science activities

**Network-Level**
- Cost, content and people involved in trans-network projects and outside network pilot projects
- Stage, content and people involved in collaborations
- Datasets, techniques, technologies and bio-specimens generated and utilized
- People and centers involved in trainee exchanges
- Location and content of outreach activities

**Outcomes Relative to Comparison Groups**

**Generated Robust Collaborations that Resulted in Significant Transdisciplinary Research**
- Accelerated the formation of a greater quantity of transdisciplinary collaborations
- Accelerated the creation of a greater quantity of field convergent research
- Communicated effectively across disciplines to form optimal team sizes
- Effectively contributed to team based activities and outreach

**Connected Physical Sciences Perspectives with Clinical Research**
- Accelerated the formation of a greater quantity of collaborations among physical and physician scientists
- Reduced the time between the appearance of a physical sciences perspective or technology to its application in translational research
- Acted as key investigators leading a convergence of physical sciences perspectives within translational research and motivating transdisciplinary translational research

**Bridged Oncology Research Gaps**
- Accelerated the generation of innovative and impactful transdisciplinary solutions to outstanding questions in oncology (e.g., integrated transdisciplinary datasets, technologies and bio-specimens, prominently positioned in citation networks and commercialized cancer-relevant patented technology)

**Trained a New Generation of Transdisciplinary Scientists**
- Conducted a greater quantity of transdisciplinary training activities
- Attracted a greater volume of training grant applications to the PS-OC program
- Graduated a greater quantity of transdisciplinary scientists
- Accelerated the trainee development path toward a career in physical sciences-oncology

**Generated a Sustainable Transdisciplinary Infrastructure**
- PS-OC alumni sustained a transdisciplinary perspective by integrating team science into their infrastructure and attracting new investigators to the field
- Motivated the formation of other inter-/intra-national programs promoting physical sciences perspectives in cancer research
GOALI LONG-TERM LOGIC MODEL

INPUTS
- Funding and logistics
  - GOALI provides 18-20% of award, reviewing program provides the remainder
  - Industry commitment to the partnership with documentation Intellectual Property agreement
- Expertise NSF-funded researchers
- Process, Materials, and Resources
  - Industry professionals compensated time
  - Industry equipment and maintenance
  - Proprietary data
- Student and Postdoc Mentoring Plans
- Dissemination Plan

PROJECT ACTIVITIES
- Educate and train academics to consider commercialization for research products
- Provide on-the-job experience in industry for graduate students, postdocs, and faculty
- Establishment of a relationship between academic research and industry partners
- Leveraging of additional capital from sources outside the university or NSF e.g. other Federal agencies

OUTPUTS
- Students, Postdocs and PhIs are trained for industrial positions
- Transfer of new knowledge about industry practices and standards
- Facilitation of High Risk/High Reward projects
- Publications with industry partners are developed
- Intellectual Property is created
- A subset of partners continue the relationship after the life of the award

IMMEDIATE OUTCOMES
- Industry
  - Enlarged recruiting talent pool
  - Diverse perspectives improve R&D
  - Patent and license applications for technology developed during GOALI collaborations
  - Academia
    - Extension of in-house research capability
    - Alignment of efforts with viable technology options
    - Direct and more immediate impact of research on technology
    - New applications of GOALI research are developed
    - Researchers and/or students pursue further funding for the technology
  - NSF
    - GOALI funds enable collaboration across directorates

INTERMEDIATE OUTCOMES
- Industry
  - Increased fundamental research efforts
  - Increased number of cross-trained professionals which can be resources for both industry and academic projects
  - Improved manufacturing processes
  - Increased efficiency due to fresh perspectives and new insight from academic partners
- Academia
  - Increase in academically trained staff transitioning to industry careers
  - Increased appeal of classes delivered by educators with industry experience
  - Academics incorporate new companies and apply for NSF transition funds (H-Corps, SBIR)

LONG-TERM OUTCOMES/IMPACT
- Industry
  - Small and medium sized businesses have continued opportunities for mutually beneficial partnerships
  - Highly qualified and diverse workforce
- Academia
  - Improved transition of GOALI funded trainees to careers in industry
  - University continues to support and promote similar partnerships
## Goals Characterized by Measurable Outputs & Outcomes

<table>
<thead>
<tr>
<th>Goals</th>
<th>Outputs &amp; Outcomes</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakthrough Technologies</td>
<td>New products</td>
<td>#/5 years/university partners</td>
</tr>
<tr>
<td></td>
<td>New methods</td>
<td></td>
</tr>
<tr>
<td></td>
<td>New processes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Papers</td>
<td># of journal publications/5 years/partners</td>
</tr>
<tr>
<td>Stakeholder Satisfaction</td>
<td>IAB member satisfaction</td>
<td>% of membership renewals averaged over a 4-year period</td>
</tr>
<tr>
<td></td>
<td>Leveraged funding</td>
<td>$ other new sources : $ NSF/5 years</td>
</tr>
<tr>
<td></td>
<td>Researcher satisfaction</td>
<td>Likert scale satisfaction</td>
</tr>
<tr>
<td>Student Outreach</td>
<td>Graduate research grants</td>
<td># of grants for theses and dissertations</td>
</tr>
<tr>
<td></td>
<td>Student participation</td>
<td># of student members/5 years</td>
</tr>
<tr>
<td>Student Development</td>
<td>Student projects</td>
<td># of student publications/presentations/5 years</td>
</tr>
<tr>
<td></td>
<td>Mentorships</td>
<td>Median ratio researcher : graduates/5 years</td>
</tr>
<tr>
<td>Technology Commercialization</td>
<td># Degrees</td>
<td># (BS + MS + PhD)/5 years</td>
</tr>
<tr>
<td></td>
<td>Licensing</td>
<td># of new licenses/5 years</td>
</tr>
<tr>
<td></td>
<td>Students hired by IAB member</td>
<td>% of participating graduates hired by IAB member firms averaged/5 years</td>
</tr>
<tr>
<td></td>
<td>Consulting</td>
<td># of consulting contracts for researchers to IAB member companies/5 years</td>
</tr>
<tr>
<td>Knowledge Transfer</td>
<td>Website</td>
<td>Quality of information dissemination on website</td>
</tr>
<tr>
<td></td>
<td>Prof org memberships</td>
<td># of professional memberships held by IAB members/5 years</td>
</tr>
<tr>
<td></td>
<td>Papers</td>
<td># of co-publications (researcher and industry member)/5 years</td>
</tr>
<tr>
<td></td>
<td>Conference presentations</td>
<td># of conference presentations/5 years</td>
</tr>
<tr>
<td></td>
<td>Workshops</td>
<td># of seminars and workshops held</td>
</tr>
</tbody>
</table>

Proposal Logic Model Strategic Plan

1. For each foundational component and strategy, complete the activities column.

2. List the expected results (goals) and show interrelationships if needed.

3. Fill in the gaps (inputs, outputs, short- and intermediate term outcomes) to show the links between your “do” and “get.”

4. Check to assure the links from left to right are in a logical, feasible, sequence.

5. Ensure that the model represents the project (w/o unnecessary detail.

6. Revised and update the model periodically to reflect changes in the project.
## Logic Model & Strategic Plan

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Activities</th>
<th>Outputs</th>
<th>Short- &amp; Intermediate Outcomes</th>
<th>Long-term Outcomes &amp; Impact</th>
</tr>
</thead>
</table>


Questions to Guide Review of the Logic Model & Strategic Plan

1. Are the major inputs, activities, and outputs consistent and sufficient to achieve desired outcomes?
2. Are the strategic goals outcome oriented?
3. Are there missing strategic goals?
4. How do colleagues not familiar with your project, interpret your model?
Models for Evaluation Planning

Context
Relationships & Capacity
- INFLUENCES
- INPUTS

Process
Quality, Use & Satisfaction
- ACTIVITIES
- OUTPUTS
- SHORTER-TERM OUTCOMES
- LONGER-TERM OUTCOMES

Outcomes
Effectiveness
- IMPACT

Formative Evaluation
Are we doing the “right” work?
1

Summative Evaluation
Are we doing the work “right”?
Are products/services accessed and used as intended?
What difference have we made?
2 3 4

5 What have we learned about what it takes to do & sustain this work?
Resources

- https://fyi.uwex.edu/programdevelopment/logic-models/
Generic Strategic Plan Template

Project Thrust 1: Description...

Get

Do
Another View

**THRUST 1**

**OBJECTIVE 1.1**
- Activity 1.1.1
- Activity 1.1.2
- Outputs, Milestones, Accomplishments for Activity 1.1.1
- Outputs, Milestones, Accomplishments for Activity 1.1.2

**OBJECTIVE 1.2**
- Activity 1.2.1
- Activity 1.2.2
- Outputs, Milestones, Accomplishments for Activity 1.2.1
- Outputs, Milestones, Accomplishments for Activity 1.2.2

**GOAL 1**

**THRUST 2**

**OBJECTIVE 2.1**
- Activity 2.1.1
- Activity 2.1.2
- Outputs, Milestones, Accomplishments for Activity 2.1.1
- Outputs, Milestones, Accomplishments for Activity 2.1.2

**OBJECTIVE 2.2**
- Activity 2.2.1
- Activity 2.2.2
- Outputs, Milestones, Accomplishments for Activity 2.2.1
- Outputs, Milestones, Accomplishments for Activity 2.2.2

**GOAL 2**

*Do Get*