Creating & Using Logic Models:
Examples from the Field

Space Grant Communications Working Group:
Promising Programs & Practices
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Program Evaluation

The application of systematic analytical (social science research) methods to address questions about program operations & results.

How was it implemented?  
What was the effect?
Why Evaluate?

Accountability to funders/sponsors

Demonstrate & celebrate success

Program improvement/development
**Logic Model**

**Inputs**
- Resources that will be used to enact strategies

**Activities**
- Specific ways in which you implement your strategies/objectives

**Outputs**
- Counts that tell you to what degree your work is being completed as planned

**Short-term Outcomes**
- Changes in knowledge, skills, capacity or perception

**Mid-term Outcomes**
- Changes in behaviors, practices, or systems

**Long-term Outcome**
- The result or condition you are trying to achieve

**More Influence**

**Less Influence**
Ingredients of the Logic Model

- **Inputs**
- **Activities**
- **Outputs**

- **Outcomes**
  - Short-term
  - Mid-term
  - Long-term
  - Population

**What resources will we use to enact our strategies?**
What are we doing to implement our strategies?

Ingredients of the Logic Model

- Inputs
- Activities
- Outputs

- Outcomes
  - Short-term
  - Mid-term
  - Long-term
  - Population
Ingredients of the Logic Model

- **Inputs**
- **Activities**
- **Outputs**
- **Outcomes**
  - Short-term
  - Mid-term
  - Long-term
  - Population

*How do we know we are doing the work (how many, how much)?*
Ingredients of the Logic Model

- Inputs
- Activities
- Outputs
- Outcomes
  - Short-term
  - Mid-term
  - Long-term
  - Population

What knowledge, skills, capacity or perceptions will change?
Ingredients of the Logic Model

- **Inputs**
- **Activities**
- **Outputs**

- **Outcomes**
  - *Short-term*
  - **Mid-term**
  - *Long-term*
  - *Population*

*What behaviors, practices or systems will change?*
What long-term conditions will change for program participants?
What/who is impacted by our work (to what do we contribute)?

Program
• Percent of participants graduating from high school.

Population
• Percent of Mainers graduating from High School.

Ingredients of the Logic Model

• Inputs
• Activities
• Outputs

• Outcomes
  • Short-term
  • Mid-term
  • Long-term
• Population
Examples from the Field
Montana & South Dakota
# Montana Space Grant Consortium Logic Model/Theory of Change

<table>
<thead>
<tr>
<th>Goals</th>
<th>Inputs</th>
<th>Outputs/Measures</th>
<th>Short Term</th>
<th>Mid Term</th>
<th>Long Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop and connect programs</td>
<td>Participants: Student participants, Affiliate Representatives, MSEG leadership, Faculty members, Evaluation team, MSEG Advisory Board, Research mentors, Organizations: All MT institutions of higher education, Museum and industry partners, NASA OSTEM, US Hill leaders, MT Legislature, Lead institution: Montana State University</td>
<td>Post activity surveys, Participant presentations, reports, and publications, Documentation of milestones and tasks, e.g., 12% of student participants are underrepresented, 50% are women, 90% indicate positive impact, 90% continue to STEM employment or an advance STEM degree. Communications and interviews with leaders, participants, and partners, Advisory Board feedback</td>
<td>For student participants: Improved knowledge of related STEM topics, Improved attitudes toward STEM, For all participants: Increased engagement with peers, Increased engagement with diverse role models, Increased participation in equitable, accessible learner-centered experiences, Increased understanding of the research process</td>
<td>For student participants: Improved career skills, Increased understanding of diversity in education and the workplace, Improved understanding of diverse cultural perspectives of science, Increased ability to conduct research, For all participants: Increased participation in community of STEM activities</td>
<td>Student participants continue on to graduate school or STEM careers, Student participants feel prepared to lead future STEM research, Increased number of Montana professionals that engage learners in NASA-related research, Increased collaborations amongst MT NASA-related researchers, Increased capacities among participants, leaders, and SMEs to offer inclusive, equitable STEM education, Increased connections with other STEM networks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Major Activities</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students want to participate, Communication structure sufficient, Colleges and universities are supportive</td>
<td>See SMART Objectives Document</td>
<td>Recruiting, selecting, and supporting students, Montana pay and housing challenges</td>
</tr>
</tbody>
</table>

**Evidence of Outputs and Outcomes**
Space Act Goals – Never changing, literally an act of congress!

All SG (should) have SMART Objectives with metrics.
Living document: Look at what is the ROI. (Through evaluation)

What areas need work (midcourse improvements).

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### NEBP Logic Model/Theory of Change

#### Goals
- Enable inclusive STEM education
- Advance understanding of the process of science
- Create and enhance networks and partnerships

#### Assumptions
- Teams want to participate
- Pod communication structure sufficient
- Local Space Grant Consortia are supportive

#### Risks
- Recruiting, selecting, and supporting teams
- Logistical constraints
- Event weather

#### Inputs
- Participants:
  - Student participants
  - Team leads
  - NEBP leadership
  - Subject Matter Experts
  - Evaluation team
  - Education Advisory Board
  - Guest educators
- Organizations:
  - Space Grant Consortia
  - Home institutions
  - NASA, OSTEM
  - NASA Balloon Program Office
  - Eclipse Soundscapes
  - Heliophysics Education Activation Team
  - Science Activation
  - Industry partners

#### Outputs/Measures
- Annual surveys of (1) student participants, (2) leaders, (3) other participants, and (4) significant partners (see details in evaluation plan)
- Post activity surveys
- Student portfolios
- Team reports, media, and publications
- Documentation of milestones and tasks (e.g., 50% of student participants are underrepresented or underserved, team preliminary and critical design reviews and tasks completions, utilization of external partners, etc.)
- Communications and interviews with leaders, participants, and partners

#### Outcomes and Impacts

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<tr>
<td>For student participants:</td>
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<td>Student participants continue on to graduate school or STEM careers</td>
</tr>
<tr>
<td>Improved knowledge of related STEM topics</td>
<td>Improved career skills</td>
<td>Student participants feel prepared to lead future STEM research</td>
</tr>
<tr>
<td>Improved attitudes toward STEM</td>
<td>Improved development of STEM identities</td>
<td>Increased number of institutions that engage learners in research involving remote sensing platforms</td>
</tr>
<tr>
<td>For all participants:</td>
<td>Increased understanding of STEM careers and access to SMEs</td>
<td>Increased collaborations amongst academic ballooning programs</td>
</tr>
<tr>
<td>Increased engagement with peers</td>
<td>For all participants:</td>
<td>Increased capacities among participants, leaders, and SMEs to offer inclusive, equitable STEM education</td>
</tr>
<tr>
<td>Increased engagement with diverse role models</td>
<td>Increased understanding of the importance of diversity in education and the workplace</td>
<td>Increased national eclipse education capabilities</td>
</tr>
<tr>
<td>Increased participation in equitable, accessible learner-centered experiences</td>
<td>Improved understanding of diverse cultural perspectives of science</td>
<td>Increased connections with other STEM networks</td>
</tr>
<tr>
<td>Increased understanding of the design, build, test, fly, analyze, and report process</td>
<td>Increased ability to conduct research</td>
<td></td>
</tr>
<tr>
<td>For project:</td>
<td>Increased participation in community of STEM activities</td>
<td></td>
</tr>
<tr>
<td>Increased NASA solar eclipse efforts</td>
<td>For project:</td>
<td></td>
</tr>
</tbody>
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#### Major Activities
- See project tasks in Section 2.5 and learner experiences in Figure 3.

#### Evaluation

Evidence of Outputs and Outcomes

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A lot of overlap from MSGC’s Logic Model.
South Dakota Space Grant Consortium

SDSGC Logic Model

<table>
<thead>
<tr>
<th>INPUTS</th>
<th>STRATEGIES</th>
<th>OUTPUTS</th>
<th>SHORT TERM OUTCOMES</th>
<th>MEDIUM TERM OUTCOMES</th>
<th>LONG TERM OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDSGC Management Team</td>
<td>Educate target audiences and general public of SDSGC programs</td>
<td>Strong social media presence, brochures, flyers</td>
<td>Underrepresented individuals pursue STEM</td>
<td>Statewide network of scientists, engineers, and educators provide a pathway to careers that will contribute to a highly trained and diverse workforce for South Dakota and NASA, and expand the state’s and nation’s research and development capacity</td>
<td></td>
</tr>
<tr>
<td>State and Federal Government Affiliates</td>
<td>Fund fellowships and/or internships to undergraduate and graduate students and K-12 education teachers</td>
<td>Presentation and personal visits</td>
<td>Undergraduate, graduate and underrepresented students experience STEM related careers</td>
<td>Participants are employed in STEM related careers that support NASA’s Strategic Goals</td>
<td></td>
</tr>
<tr>
<td>Industrial Affiliates</td>
<td>Tribal higher education institutions participate in placing supplementations of resources.</td>
<td>Database of affiliate researchers interested in participating in SDSGC programs</td>
<td>Underrepresented individuals actively participate in statewide research programs</td>
<td>Multidisciplinary and collaborative research that supports NASA’s Mission Directives, mission &amp; challenges in sustained at affiliate institutions</td>
<td></td>
</tr>
<tr>
<td>SD NASA EPSCOR</td>
<td>Provide funds for new and developing interdisciplinary and collaborative research</td>
<td>Research Experience for Teachers (RET)</td>
<td>Research collaborations within and outside the state</td>
<td>Researchers &amp; K-12 educators develop quality collaborative relationships</td>
<td></td>
</tr>
<tr>
<td>NASA Space Grant and Matching Funds</td>
<td>Foster research and interdisciplinary design teams managing education, research and development</td>
<td>Project Innovation Grants (PIG)</td>
<td>Multi-disciplinary and collaborative research initiatives aligned with NASA’s mission</td>
<td>Research groups and engineering design teams (Along-graduate) integrate education, research and development to contribute to NASA’s mission and work</td>
<td></td>
</tr>
<tr>
<td>NASA Mission Directorates, Priorities, Challenges and Solutions</td>
<td>SD STEM Standards</td>
<td>College research and design teams</td>
<td>Increase in knowledge &amp;/or understanding of the research process, engineering design process, STEM content &amp;/or STEM careers</td>
<td>Active research and research methods are integrated into the middle and secondary school</td>
<td></td>
</tr>
<tr>
<td>External Evaluation</td>
<td>Assessment Tools (e.g. on-line surveys, on-site surveys, report. Longitudinal Tracking, OEM)</td>
<td>Youth (K-12) research &amp; design team products</td>
<td>K-12 classrooms and informal educators integrate earth science and NASA resources into their curriculum</td>
<td>K-12 classrooms and informal educators makes aerospace, earth science and NASA resources a cornerstone of their curriculum</td>
<td></td>
</tr>
</tbody>
</table>

South Dakota creates understanding and participation in NASA’s endeavors and space projects by supporting and advancing science and engineering education, research and public outreach efforts.

Steckelberg Consulting
Skill Builder Exercise

For each item listed, decide if it is a:

1) resource/input
2) activity/strategy
3) output
4) goal
Logic Model Game

Educational Affiliates

- Strengthen the capacity of educators to use NASA resources & content into their classroom & programs.

Academic Affiliates

- Workshops, conferences, camps
- Provide travel funds for student & faculty researchers
- Faculty researchers visit NASA centers
- Direct research collaborations with NASA centers/personnel

Educators integrate aerospace, earth science & NASA resources into their curriculum.
Logic Model Game

- NASA Space Grant & matching funds
- Fund fellowships & internships to undergraduate & graduate students
- Undergrad, graduate, & under-represented participate in internships & fellowships
- Alumni are employed in STEM related careers that support NASA’s Strategic Goals
- Increase in knowledge &/or understanding of the research process

- State Space Grant Consortium
- Pilot/small-scale research projects
- Students attend graduate school
Provide funds to inspire & support youth participation in mission-driven challenges & competitions.

NASA Mission Directorates, Priorities, Challenges, & Scientists

Underrepresented individuals pursue STEM careers creating a more diverse workforce

Evaluator

Provide funds for new & developing interdisciplinary & collaborative research

Research capacity & graduate programs are enhanced, enabling more competitive & diverse STEM research & education

Statewide network of scientists, engineers, & educators

Youth research & design teams

Logic Model Game
Logic Model Game

Tribal higher education institutions participate in planning & implementation of programs.

Researchers & K-12 educators develop quality collaborative relationships.

Assessment & survey data, data analysis.

Provide funds to inspire & support youth participation in mission-driven challenges & competitions.

Career fairs.

STEM Standards.