Meaningful Metrics: Selecting the Right Ones for Your Gateway

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SGCI webinar, Sept. 12, 2018
About Ann Zimmerman

I collaborate with people who want to make a difference.

• Plan
  – Design activities & services to meet goals

• Implement
  – Execute plans

• Evaluate
  – Understand progress toward goals

• Take action
  – Facilitate the use of information from evaluation

• Communicate
  – Share what’s been learned
Overview

Foundations

Metrics defined

Developing
Objectives

I hope you will leave the webinar inspired to take a stab at devising/re-evaluating your gateway’s metrics, and with a straightforward approach to help you develop more meaningful metrics, and believing that this approach will help your gateway succeed.
Foundations:
Goals & Outcomes
Goals and outcomes are defined by metrics. Metrics are given meaning through goals & outcomes. They go together like peanut butter, caramel & chocolate.

Image by Evan-Amos [CC0], https://commons.wikimedia.org/wiki/File:Snickers-Peanut-Butter-Squared.jpg
Goals

• Goals are a general statement of your purpose.

• Goals are what your success looks like.

Photo by Marco Verch (CC BY 2.0):
https://www.flickr.com/photos/30478819@N08/42013225814
Example Gateway Goal

Offer students a personal experience to work like real scientists with their scientist mentors, enhancing their team skills, and their understanding of authentic science.

https://plantingscience.org/aboutus

Gateways were found through the SGCI Gateway Catalog:
https://catalog.sciencegateways.org/#/home
Example Goal 2

Make your data accessible and useful to the broader scientific community

[http://www.nersc.gov/users/data-analytics/science-gateways/]
Example Goal 3

With the help of Zooniverse volunteers, researchers can analyze their information more quickly & accurately than would otherwise be possible, saving time and resources, advancing the ability of computers to do the same tasks, & leading to faster progress and understanding of the world, getting to exciting results more quickly.

[https://www.zooniverse.org/about]

Image by Grant Miller for the Zooniverse - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=35339750
Outcome

In the context of evaluation, an outcome is the level of performance or achievement that occurred because of the activity or services your gateway provided.
Outcomes are about changes

- Awareness
- Knowledge
- Attitude
- Skills
- Behaviors
- Policies
Example Outcomes

• Undergraduate students understand the types of job opportunities to be found with science gateways.
• Citizen scientists collect data according to established protocols.
• Sociologists generate results through the use of the gateway tools that are accepted by their peers.
• Scientists provide high-quality online mentoring to middle & high school student teams as they design studies, collect & analyze data, & report findings.
Chain of “outcomes”

People do something they couldn’t have done easily – or at all – without it.

People use the gateway

People learn about the gateway

The gateway exists
Metrics Indicators Defined
Metrics are situational

**Scorecard**

- Regular, systematic, relies on quantitative metrics
- Monitors the key progress of organizational goals
- Observational in nature – lets you visualize key metrics at a glance
- Lead to actions at the operational level

**Evaluation**

- Periodic, systematic, qual. & quant. metrics
- Digs deeper to assess if activities are leading to desired outcomes
- Judgmental in nature -- assesses value
- Leads to understanding about whether you’re doing the right things & if they’re working the way you thought.
## A Sample PCO KPI Summary

**Data to 29 Feb 2012**

### Smoking Cessation - to 31/12/2011

<table>
<thead>
<tr>
<th></th>
<th>Feb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attempted</td>
<td>263</td>
</tr>
<tr>
<td>Quit</td>
<td>57</td>
</tr>
<tr>
<td>Not Quit</td>
<td>42</td>
</tr>
<tr>
<td>LTFU</td>
<td>162</td>
</tr>
<tr>
<td>Quit % (normal 25-42 days followup)</td>
<td>22%</td>
</tr>
<tr>
<td>Not Quit %</td>
<td>16%</td>
</tr>
<tr>
<td>LTFU %</td>
<td>62%</td>
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### Flu Vaccinations

<table>
<thead>
<tr>
<th></th>
<th>Feb</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Under 65’s at risk</td>
<td>11869</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 65’s at risk vaccinated</td>
<td>5744</td>
<td>1039</td>
<td>912</td>
<td>825</td>
<td>389</td>
<td>1267</td>
<td>739</td>
<td>267</td>
</tr>
<tr>
<td>Over 65s</td>
<td>11575</td>
<td>462</td>
<td>436</td>
<td>356</td>
<td>162</td>
<td>723</td>
<td>426</td>
<td>116</td>
</tr>
<tr>
<td>Over 65s vaccinated</td>
<td>8219</td>
<td>594</td>
<td>1218</td>
<td>850</td>
<td>818</td>
<td>1372</td>
<td>894</td>
<td>698</td>
</tr>
<tr>
<td>Coverage (under 65 at risk)</td>
<td>48.39%</td>
<td>44.47%</td>
<td>47.81%</td>
<td>43.15%</td>
<td>41.65%</td>
<td>57.06%</td>
<td>57.65%</td>
<td>43.45%</td>
</tr>
<tr>
<td>Coverage (over 65)</td>
<td>71.01%</td>
<td>63.13%</td>
<td>72.99%</td>
<td>69.06%</td>
<td>82.64%</td>
<td>64.50%</td>
<td>72.82%</td>
<td>70.63%</td>
</tr>
</tbody>
</table>

### Child Imms

<table>
<thead>
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<th></th>
<th>Feb</th>
</tr>
</thead>
<tbody>
<tr>
<td>DES 2 year cohort last 3m, Diptheria, Tetanus, Polio, Pertussis, HIB Primary Course</td>
<td>97%</td>
</tr>
<tr>
<td>DES 2 year cohort last 3m, MMR1</td>
<td>87%</td>
</tr>
<tr>
<td>DES 2 year cohort last 3m, Meningitis C Primary Course</td>
<td>96%</td>
</tr>
</tbody>
</table>
Evaluation

Metrics for evaluation is the focus of this webinar
Qualitative or quantitative evidence

– whether your program was implemented as planned
– reflect changes connected to a desired result
  • (Is progress being made? If not, make adjustments. You don’t wait to wait 5 years to find out!)
– whether a desired outcome was achieved
Indicator

• Quantitative
  – Strengths: provide timely & relevant information
  – Weaknesses: don’t answer important *how* and *why* questions; some take time & expertise

• Qualitative
  – Strengths: answer important *how* and *why* questions
  – Weaknesses: can take more time and expertise; not everyone values this type of evidence
Meaningful Metrics?

- Number of workshops offered
- Number of students trained
- Number of people who attended the workshops
- Satisfaction scores
- Number of co-authored publications
- Number of compute jobs run
- Number of publications produced using the gateway
- Number of citations to publications
- Number of times datasets are acknowledged
- Number of downloads
- Number of unique visitors
Developing Meaningful Metrics
<table>
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<th><strong>Goal</strong></th>
<th><strong>Outcomes</strong></th>
<th><strong>Indicators</strong></th>
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</thead>
</table>
| 1) Citizen scientists participate in science by contributing high quality data. | 1) Citizen scientists collect data following scientific protocols | • Training workshop is developed  
• People attend (targets met)  
• Attendees pass written & observational tests  
• Citizen scientists are certified  
• # of data contributions  
• Metadata fields are completed  
• Successful quality checks |
| 2) Scientists use data collected by citizen scientists to make new discoveries | 2) Citizen scientists upload data to the gateway. | • Scientists register to use the gateway (#)  
• Scientists use the gateway (#)  
• Scientists provide feedback on data quality  
• Scientists acknowledge use of data |
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| 1) Scientist mentors provide high-quality online mentoring to middle & high school student teams as they design and think through their own research projects. | 1) Interactions between teachers, mentors, and student teams are facilitated through the gateway platform. | • Teachers find mentors for their students  
• # of posts between student teams & mentors  
• The mentors follow effective mentoring practices  
• Mentor motivations are satisfied |
<p>| 2) Students gain experience to work like real scientists, enhancing their team skills &amp; their understanding of authentic science | | |
| 3) Teachers... | | |</p>
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| The gateway enables high-impact science for researchers who otherwise lack access and the specialized expertise needed to use high-end computing resources. | 1) Identify a user base the can’t do their work without HPC access  
2) Users obtain access to the key software elements they require  
3) Users obtain results they couldn’t otherwise achieve. | • Potential users register following a conference presentation  
• Percentage of XSEDE users who run jobs from the gateway  
• # of users from R1 institutions  
• Feedback from users  
• # of users in EPSCOR states who run jobs  
• # of users that acknowledge the gateway in presentations, pubs, etc. |

Inspired by & adapted from a presentation on CIPRES by Mark Miller: https://www.monash.edu/__data/assets/pdf_file/0008/646811/MURPA-Miller-s.pdf
Meaningful Metrics Checklist

- State goals
- Draft main outcomes for goals
- Decide high-priority outcomes
- Brainstorm metrics indicators
- Consider/investigate data collection methods
- Determine what’s possible with your resources
Prioritizing what to evaluate

Which outcomes...

• does your gateway realistically have the resources to achieve?
• are most important to your gateway’s success? (i.e. if this doesn’t happen, it will be difficult to have impact )
• will be the most useful to understand your gateway’s progress?
• are most important to gateway users?
• are most important to other key stakeholders?
• are within your control?/are outside your control?
Summary

• Clearly stated goals & outcomes are the foundation to meaningful metrics.

• When developing metrics indicators think about what changes needs to occur in order for an outcome to be achieved.

• Alas, not everything you want to know can be measured or can you afford to measure.

Giulia Forsythe. Goals! (CC BY 2.0): https://www.flickr.com/photos/gforsythe/36919630336
Be convincing!

In order to give themselves an edge, nonprofits need to be able to report on more than just their output, such as how many meals were served, and dig deeper to reveal how they are making a difference in their community.

“Organizations need to measure their social value, and need to be tracking where they are in the chain of moving towards making a difference in their community or with their client.”

Jane Addams

https://charityvillage.com/cms/content/topic/measuring_impact_how_small_and_medium_size d_nonprofits_canBenefitFromEffectivelyMeasuringTheirImpact#.W5keps5JHIV
Thank you for attending!

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