



Meaningful Metrics

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The Basic Problem

Do your contractors provide a multitude of measures that have little impact or value?

Do you find it difficult to derive meaningful insights and actionable information from the measurement reports you receive?

Does the information in your measurement reports seem to be more lagging than predictive?

Solution

Design and develop measures that meet identified information needs.

Use GQIM and the SEI Indicator Template

What are Meaningless Metrics?

About 434,000 results on Google

The 4 Most Meaningless IT Metrics - Heller Search Associates

<https://www.hellersearch.com/blog/the-4-most-meaningless-metrics-in-it> ▼

Jan 27, 2016 - 6-time CIO Mark Settle shares 4 common IT performance **metrics** he feels ... broadcast time devoted to the discussion of **meaningless** statistics.

You're So Vain: 7 Meaningless Metrics That Only Feed Your Ego

<https://www.forbes.com/.../youre-so-vain-7-meaningless-metrics-that-only-feed-your-...> ▼

Dec 22, 2013 - Though we all have vain tendencies, few leaders would describe “vanity” as a cornerstone of their business strategy. (Unless we're talking ...

Are Your Business Metrics Meaningless? - CBS News

<https://www.cbsnews.com › MoneyWatch › MoneyWatch Small Business> ▼

Jun 15, 2011 - Want to measure the true heartbeat of your business? One way is to create your own **metrics**.

Meaningless metrics - Word to the Wise

<https://wordtothewise.com/2012/12/meaningless-metrics/> ▼

Dec 27, 2012 - I've been having some conversations with fellow delivery folks about **metrics** and delivery and bad practices. Sometimes, a sender will have ...

What Should a CSIRT Measure: Very Large Spreadsheet

Screenshot of an Excel spreadsheet titled "april - 2017 big table of metrics and questions v5 new categories - Excel". The spreadsheet is a large table with columns labeled A through AC and rows numbered 1 through 99. The table is organized into sections: "1. Mission Success" (rows 1-2), "1a. Meeting goals/objectives" (rows 3-4), "1b Meeting customer requirements" (rows 3-4), "1c Meeting compliance reqts for this org/service" (rows 3-4), "1d Financial - effective use of funding" (rows 3-4), and "2a Security Posture" (rows 3-4). The table contains various metrics and questions, such as "Does the CSIRT have a long-term strategy for its future mission?", "Does the CSIRT meet its operational and technical mission?", "Does the CSIRT routinely identify and assess its weaknesses/gaps/inefficiencies?", "How much loss has occurred due to undetected, unprevented, uncontained incidents?", "What were the types of incidents and vulnerabilities that were detected or stopped (something like...)", "What is the impact and cost of incidents and vulnerabilities that weren't detected or stopped (something like...)", "What is the % of detected incidents?", "What is the % of detected incidents?", "What is the % of detected incidents?". The table also includes a "Metric/Question" column on the left. The spreadsheet is displayed in a window with a ribbon at the top containing tabs for FILE, HOME, INSERT, PAGE LAYOUT, FORMULAS, DATA, REVIEW, VIEW, ACROBAT, and POWERPivot. The ribbon includes various toolbars for font, alignment, number, styles, cells, and editing. The status bar at the bottom shows "READY" and "100%".

Basic Principles

Measure with a purpose in mind and make the results actionable

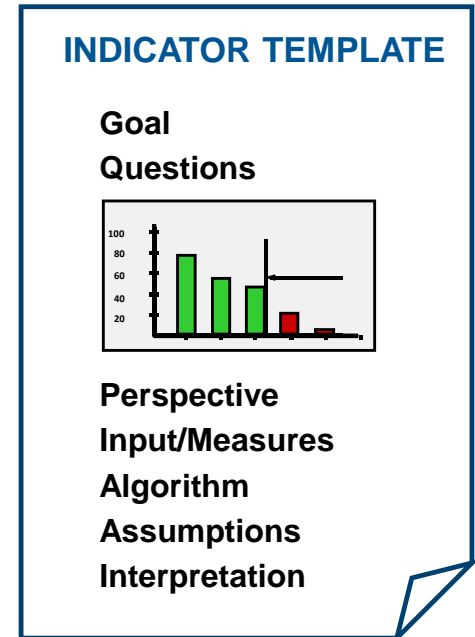
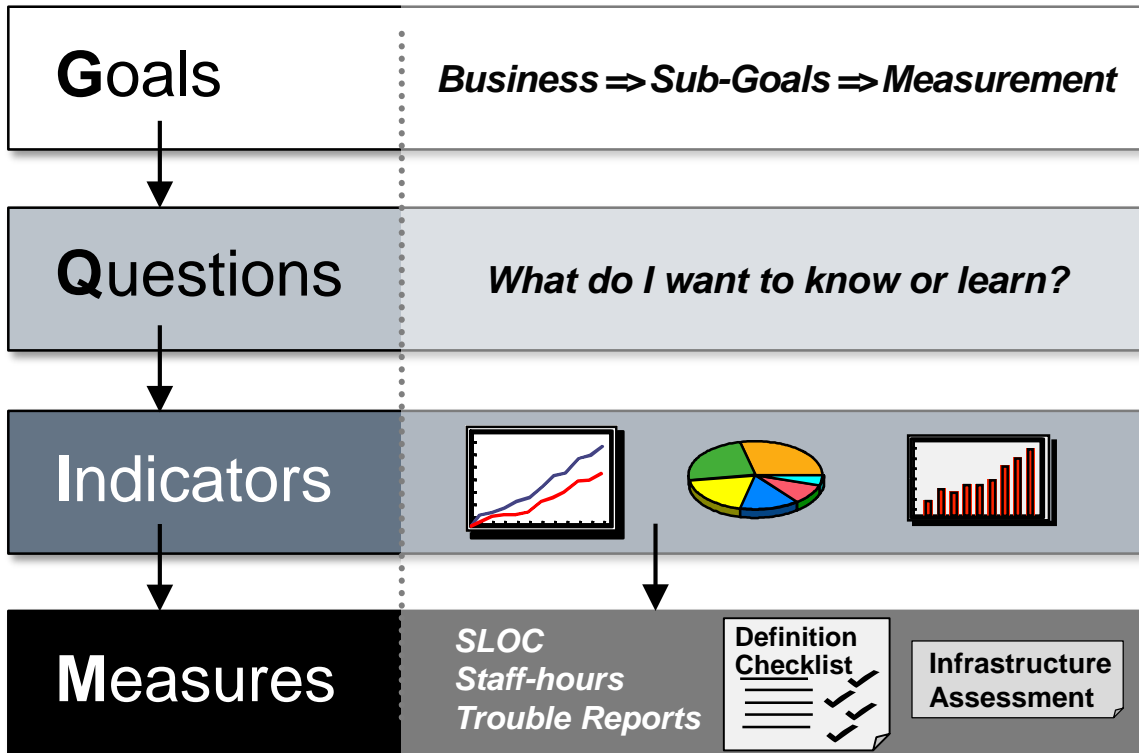
Design the indicator/graphic to inform and communicate

Pay attention to operational definitions to eliminate noise and ambiguity

Foundation for project management and process improvement measurement and analysis

Goal Question Indicator Measure

Goal-Driven Measurement Workshop



Indicator Template

Documents the who, what, when, where, why, and how.

INDICATOR TEMPLATE

INDICATOR TEMPLATE

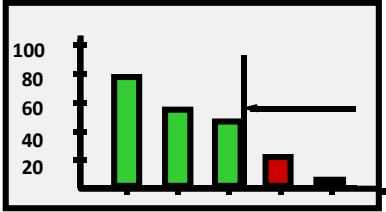
INDICATOR TEMPLATE

Measurement Goal # _____:

Objective _____

Questions _____

Visual Display



Bar Color	Approximate Value
Green	80
Green	60
Green	50
Red	25
Black	10

Perspective _____

Input(s)

Data Elements _____

Responsibility for Reporting _____

Form(s) _____

Algorithm _____

Assumptions _____

Interpretation _____

X-reference _____

Probing Questions _____

Evolution _____

Completed indicator templates are the output of GQ(I)M work.



Measurement Handbook

Contents of Indicator Template – 1

Indicator objective Objective or purpose of the indicator

Questions List of questions that the indicator is trying to answer

Perspective or viewpoint Description of the audience for whom this indicator is intended

Visual display Graphical view of the indicator

Data Elements List of data elements (measures) required to construct the display/indicator

Data Collection Information Information pertaining to how, when, how often, and by whom for the data elements required to construct the indicator. Also identify any specific forms or tools to be used

Contents of Indicator Template – 2

Data Reporting Information	Information about who is responsible for reporting the data, to whom, and how often
Data Storage	Information on the storage, management, access, and security of the data and reports
Algorithm	Description of the algorithm used to construct the display/indicator
Assumptions	List of assumptions about the organization, its processes, life-cycle model, and so on that are important conditions for understanding this indicator
Analysis and Interpretation of Results	Guidance on the analysis and interpretation of the indicator. Often useful to note common misinterpretations or misuses. Related fields include “probing questions” and “cross-references.”
Evolution and Feedback	A place to capture ideas for improving the indicator over time, especially as more data become available and processes mature



How to Complete the Indicator Template – 1

Indicator objective	Strategic plan, project goals, stakeholder workshop, interview intended users
Questions	Stakeholder workshop or interviews. Ask what specific questions are important.
Perspective or viewpoint	Elicit as part of identifying the objective
Visual display	Have stakeholders sketch what they want
Data elements	Derive from sketched display and confirm with those producing the data
Data collection information	Look at existing process descriptions for opportunities to instrument the process. Find out from those generating and providing the data how it is really done, what tools and forms are used, what triggers the collection of the data, and so forth. Don't rely solely on documentation.



How to Complete the Indicator Template – 2

Data Reporting Information

Collect requirements about format, timing, and content from the intended recipients. Provide samples and collect feedback. Allow for a change request procedure.

Data Storage

Work with IT staff to establish the infrastructure including storage, configuration management, access management, and archiving of data and reports. Also, be clear about what data are stored in raw format and what will be summarized and stored.

Algorithm

Confirm this with stakeholders. Does it align with the questions and objective? Are there any hidden assumptions?



How to Complete the Indicator Template – 3

Assumptions

Review and confirm with stakeholders and subject matter experts. Be sure to get understanding about the details associated with data collection. Are there important gaps in the data collection?

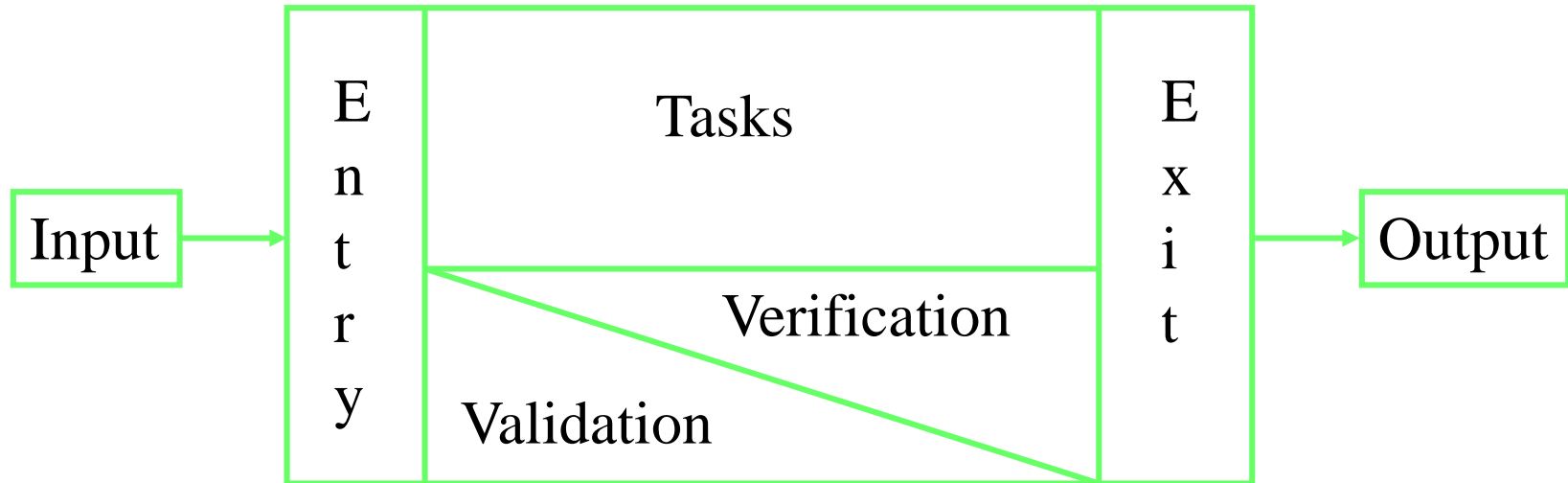
Analysis and Interpretation of Results

Draw different patterns of results on the indicator and describe what they mean. For line charts, what does it mean if lines are parallel, converging, or diverging? Often useful to note common misinterpretations or misuses. Related fields include “probing questions” and “cross-references.” Consider the PSM Analysis Model as a tool.

Evolution and Feedback

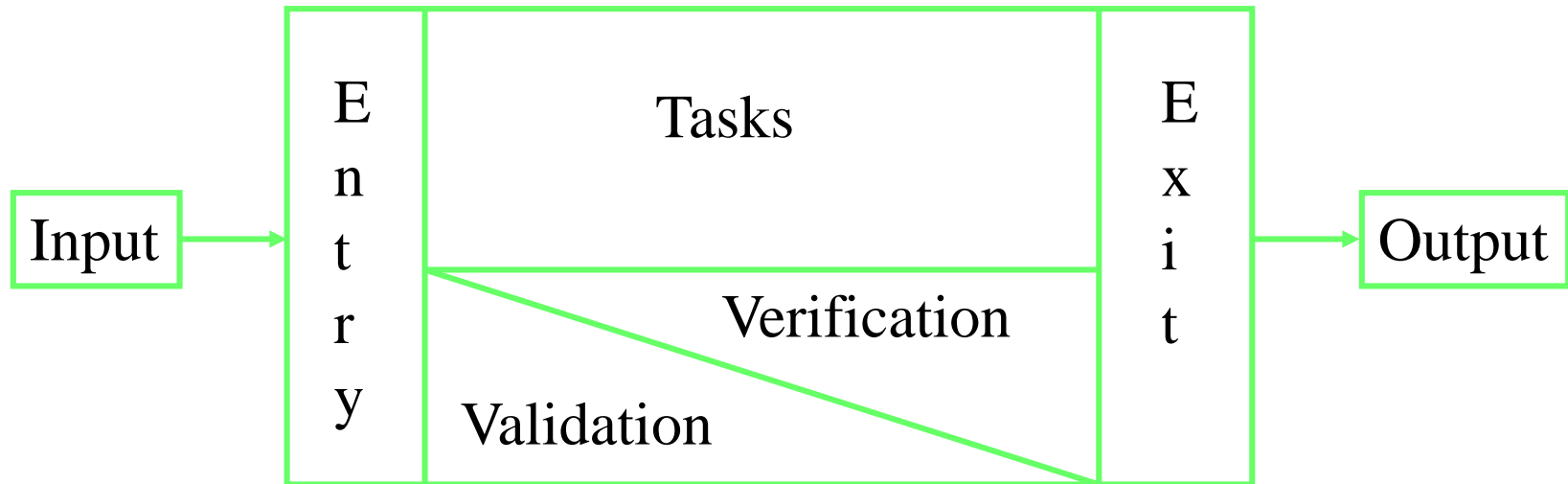
Capture ideas for improving the indicator over time, especially as more data become available and processes mature. Allow for a change request process. Note comments and feedback.

Integrating Measurement and Analysis into Processes



Where are the data generated and how?
Who needs to use the information and when?

ETVX Derived Measures



Cycle time

Time to perform tasks
Time from assessing entry criteria to meeting exit criteria

Efficiency

$\text{Output} / (\text{Input} + \text{Tasks} + \text{V\&V})$

Effectiveness

$1 - (\# \text{outputs fail exit} / \text{total outputs})$

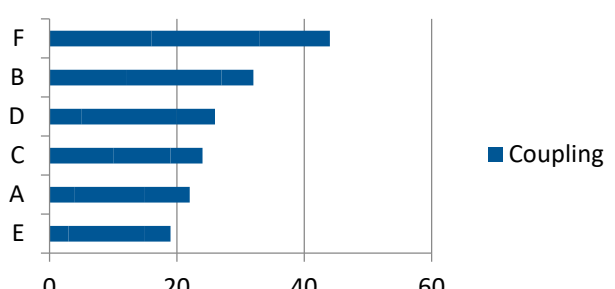
Input Quality

$\text{Input meeting entry criteria} / \text{Total Input}$

Operational Definitions

Start & End Date
Milestone Definition Checklist
Project Start Date
<input checked="" type="checkbox"/> Sign-off of user requirements that are detailed enough to start functional specification
<input checked="" type="checkbox"/> Kick-off meeting
Project End Date
<input checked="" type="checkbox"/> Actual UAT sign-off by customer
<hr/>
Estimation Start Date
<input checked="" type="checkbox"/> Start of code construction

Code Complexity – 1

Indicator objective	Identify components that should be re-engineered or require extra inspection. Re-engineering could involve partitioning or layering to reduce complexity															
Questions	<p>Which components have the highest complexity values? How many components have complexity values higher than the threshold?</p> <p><i>List the question(s) the indicator user is trying to answer. Examples: Is the project on schedule? Is the product ready to ship? Should we invest in moving more software organizations to CMMI maturity level 3? (Refer to the Goal Achievement Questions section of the Operationalized Goal Worksheet)</i></p>															
Perspective	<ul style="list-style-type: none"> •Development and project managers •Testers and QA <p><i>Describe the audience for whom this visual display is intended. (Refer to the name of the perspective in the heading of the Operationalized Goal Worksheet)</i></p>															
Visual display	<p><i>Provide a graphical view of the indicator. (Refer to the Visual Display section of the Operationalized Goal Worksheet).</i></p> <p>Note: The visual display shown is an example.</p>	<p style="text-align: center;">Component Complexity</p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <caption>Component Complexity Data</caption> <thead> <tr> <th>Component</th> <th>Coupling Value</th> </tr> </thead> <tbody> <tr> <td>F</td> <td>45</td> </tr> <tr> <td>B</td> <td>32</td> </tr> <tr> <td>D</td> <td>28</td> </tr> <tr> <td>C</td> <td>25</td> </tr> <tr> <td>A</td> <td>22</td> </tr> <tr> <td>E</td> <td>18</td> </tr> </tbody> </table>	Component	Coupling Value	F	45	B	32	D	28	C	25	A	22	E	18
Component	Coupling Value															
F	45															
B	32															
D	28															
C	25															
A	22															
E	18															

Code Complexity – 2

Data elements	Component ID Coupling Complexity <i>List each data element in the production of the indicator.</i>	<i>(A-F shown above, but names should be used)</i>
Algorithm	Coupling Complexity	$(Calls_In * Calls_Out) + (Message_In * Message_Out)$
How collected	Static code analysis or UML Diagram analysis	
When and how often collected	As part of a design review or code check-in. (Refer to the Source column in the Indicator Availability and Source Worksheet).	
Analysis and Interpretation	Top 10-20% of components with highest complexity may be candidates for re-engineering, especially if they exceed the threshold <i>Describe what different values of the indicator mean. Make it clear how the indicator answers the “Questions” section above. Provide any important cautions about how the data could be misinterpreted and measures to take to avoid misinterpretation.</i>	

Code Complexity – 3

Probing questions	<p>Is there a design rationale for the high complexity component? Is it a legacy component? What is its change history? Who owns the component? Has the component been modified?</p> <p><i>List questions that delve into the possible reasons for the value of an indicator, whether performance is meeting expectations or whether appropriate action is being taken.</i></p>
Evolution	<p>Incorporate measures of functional and cyclomatic complexity. Develop a weighted measure of complexity.</p> <p>Thresholds could be established based on defect frequency and/or effort to sustain.</p> <p><i>Specify how the indicator can be improved over time, especially as more historical data accumulates (e.g., by comparison of projects using new processes, tools, environments with a baseline; using baseline data to establish control limits around some anticipated value based on project characteristics.)</i></p>

Elements of a Good Chart

- Unique Name or Title
- Date produced
- Legends and annotations
- Reference or source
- “As of Date” for the data on the chart
- Axes
 - Y: Frequency (counts, %, magnitude)
 - X: Distribution (time, categories)
- Goodness (“Good” arrow, stoplight color)

Defect Phase Containment Chart

Data as of 1/31/2016

Phase Found	Reqts	Design	Code	Unit Test	Integration Test	System Test	Customer	Total Found by Phase
Phase Originated								
Reqts	25	8	3	1	2	1	1	41
Design		55	30	10	15	4	1	115
Code			250	67	25	15	7	364
Unit Test				22	4	2	0	28
Integration Test					35	3	0	38
System Test						14	0	14
Customer							0	0
Total by Type	25	63	283	100	81	39	9	600

Risk color based on cell value exceeding historical data model prediction at this point in time. Values are counts of severity 1 and 2 defects.

Project A PMR: 2/15/2016

Back to the Basics

Measure with a purpose in mind and make the results actionable

- *Understand the concerns and decisions that will need to be made*

Design the indicator/graphic to inform and communicate

- *Make it easy to get the point and understand*

Pay attention to operational definitions to eliminate noise and ambiguity

- *Be sure you are getting a signal and that the data collection process has not changed*

Foundation for project management and process improvement measurement and analysis

- *Making good decisions to take action or stay the course is the goal*
- *It's all about providing insight*

Goal Question Indicator Measure

Contact Information

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