Monitoring and Evaluation Analysis 2

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Version: DevTreks 2.1.4

A. Introduction

This reference explains how to start to collect, measure, and analyze, basic monitoring and evaluation data (**1***). DevTreks believes that every project, program, and technology, from malnutrition improvement projects to garment factory safety programs to new climate change abatement technologies, has a story to tell and lessons to teach. Those lessons can only be learned when monitoring and evaluation data about work progress and performance is collected, measured, aggregated, analyzed, explained, and saved in online knowledge banks. A full, uniform, and accurate accounting of work progress and performance for investments made in malnutrition improvements, medical treatments, conservation practices, flood prevention technologies, factory safety programs, and public infrastructure, should be one or two links away for everyone. If a business owner, lender, nonprofit member, government official, parent, or citizen, needs to make a decision involving project, program, and technology progress and performance, they should have ready access to the best data available. This reference introduces another DevTreks way to build these knowledge banks.

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The analyses documented in this reference derive from the M&E frameworks and calculators documented in the M&E Calculation tutorial. That tutorial should be completed prior to this tutorial.

B. Data URLs (2*)

The *Construction Analysis 1, Health Care Analysis 1, Ag Production Analysis 1, Malnutrition Analysis 1, and Work Breakdown Structures,* tutorials demonstrate how basic monitoring and evaluation data can be structured to support the analyses shown in this reference.

The Calculators and Analyzers explained in this reference can be found at the following URIs (**3***). **Appendix B** includes examples that explain the analytic results.

M&E Calculators

https://www.devtreks.org/hometreks/preview/farmworkers/linkedviewgroup/Monitoring and Evaluation Calculators/53/none/

M&E 2 Analyzers

https://www.devtreks.org/hometreks/preview/farmworkers/linkedviewgroup/ Monitoring and Evaluation 2 Analyzers/61/none/

Sample datasets, containing M&E analyses, can be found at the following URLs. **Appendix B** includes examples that explain the analytic results. These datasets are mainly used to test whether or not the calculators and analyzers work as documented and that all of their styles are

correct. They are by no means examples of really good M&E analysis (refer to Footnote 2 in the M&E Introduction reference).

Version 2.1.0 tests are documented in the M&E Calculation reference.

Input Service URI

https://www.devtreks.org/hometreks/select/farmworkers/servicebase/M and E Malnutrition Inputs/2651/none/

Output Service URI

https://www.devtreks.org/hometreks/select/farmworkers/servicebase/M and E Malnutrition Outputs/2656/none/

Operation Service URI

https://www.devtreks.org/hometreks/select/farmworkers/servicebase/M and E Malnutrition Operations/2654/none/

Component Service URI

https://www.devtreks.org/hometreks/select/farmworkers/servicebase/M and E Malnutrition Components/2650/none/

Outcome Service URI

https://www.devtreks.org/hometreks/select/farmworkers/servicebase/M and E Malnutrition Outcomes/2655/none/

Operating Budget Service URI

https://www.devtreks.org/hometreks/select/farmworkers/servicebase/M and E Malnutrition Op Budgets/2653/none/

Capital Budget Service URI

https://www.devtreks.org/hometreks/select/farmworkers/servicebase/M and E Malnutrition Investments/2652/none/

Multimedia URI:

https://www.devtreks.org/hometreks/select/farmworkers/resourcegroup/M and E Stories/144/none/

Story URI:

https://www.devtreks.org/hometreks/preview/farmworkers/linkedviewgroup/Monitoring and Evaluation Malnutrition Stories/54/none

Localhost URIs

The Food Nutrition Club in the HomeTreks Network Group owns this data (i.e. if needed, switch clubs).

http://localhost/hometreks/preview/farmworkers/outcomegroup/ME2 Food Consumed/40/none/

http://localhost/hometreks/preview/farmworkers/investmentgroup/ME2 Malnutrition Projects/275505679/none/

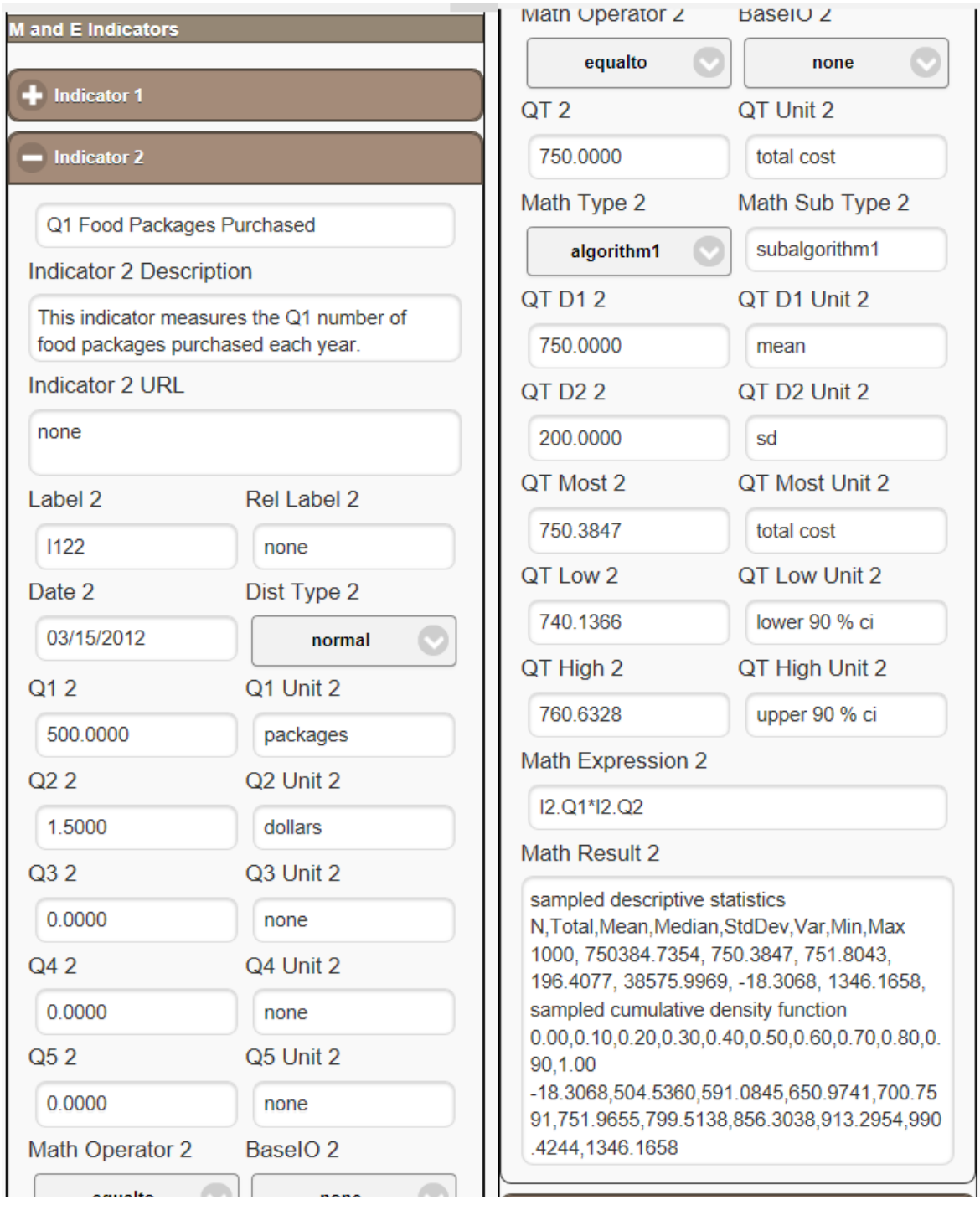
http://localhost/hometreks/preview/farmworkers/budget/ME2 Project 01/273083907/none/

Additional examples of Progress Analysis data sets can be found in the *Earned Value Management 1* reference. Additional examples of Change Analysis data sets can be found in the *Change Analysis 1* reference. Additional examples of Input and Output data sets can be found in the *Price Analysis 1* reference. Examples of additional M&E datasets, dealing with climate change, can be found in the Technology Assessment 2 tutorial. Examples of using custom algorithms, Indicators, and TEXT datasets, for conducting more advanced M&E can be found in the Social Performance Analysis tutorial.

C. Base Element M&E Calculations

Analyses use the results of base element calculations. The M&E 2 Calculation tutorial explains that each calculation is specific to a specific type of base element. Output calculations are only pertinent to Output elements, Input calculations to Input elements, Time Period calculations to Time Period elements, and so on (**4***). Make sure to understand the references in that tutorial prior to running M&E analyses.

The following image displays a typical Indicator calculation.



D. M&E Analyses

Separate M&E analyzers are available for all base elements. The *Calculator and Analyzer 1* reference documents how all DevTreks' Analyzers work. The *Analysis Type* property of M&E Analyzers is used to specify the type of analysis to run. Although these analyzers use similar patterns to the analyzers documented in the Resource Stock Analysis tutorial, some differences require explanation.

- **No 10 Indicator Limit**: These analyzers do not implement the 10 aggregated Indicator limit found in the Resource Stock Analyzers because descendent Indicators are not aggregated into ancestors. Even so, the M&E Introduction reference points out that only the most important Indicators should be calculated and analyzed –online, html, data has limitations.

- **Indicator.Labels**: The Resource Stock Calculator requires unique Indicator.Labels. That calculator references Indicators in TEXT datasets by their Indicator.Label. The M&E 2 Calculator does not require that Indicators have unique Labels. Instead, the calculator references Indicators in TEXT datasets by their index position (i.e. Score = index position 0, Indicator 1 = index position 1, Indicator 15 = index position 15), rather than their Label.

- **Scores**: Version 2.0.4 began allowing a Score to be used in M&E calculations. Unlike the Resource Stock Analyzers, the Score is actually just another Indicator stored in the zero index position of collections of Indicators. In most cases, care must be taken not to aggregate the Score with its sibling Indicators. In most cases, Scores should be analyzed as standalone Indicators (i.e. calculated as an aggregation of the sibling Indicators) by setting their Labels to different values than their sibling Indicators' Labels. The Social Performance tutorial includes an example of a Score being used to carry out Multi Criteria Analysis, with the sibling Indicators being the Criteria.

M&E analyses are carried out in two stages. The first stage aggregates base elements using standard Analyzer aggregators, such as Year or Label. The second stage then aggregates the

index-defined Indicators that have been aggregated in each base element. Unlike Net Present Value (NPV) and Life Cycle (LCA) analysis, the number of observations is not based on the number of aggregated based elements, but the number of distinct Indicators in the aggregated base elements. With the exception of Input and Output analysis, NPV calculators must be run prior to running an analysis –the NPV calculator is used to pull fresh database data together.

Another difference from Resource Stock, LCA, and NPV analysis is that children elements are not aggregated into ancestors. Input Series Indicators are treated as pertinent only to Input Series, Inputs to Inputs, Operations to Operations, Outcomes to Outcomes, Time Periods to Time Periods, and so on (**4***).

Analysis Result Properties

The results of running analyses are displayed using the following basic properties for all base elements:

M and E Stage: The stage of the monitoring and evaluation analysis. Options include baseline, realtime, midterm, final, and expost. Each M&E Analyzer includes a selection list for setting this property.

Total Name: name of the total Indicator (**5***)

Total Label: WBS Indicator label used to aggregate Indicators (**5***)

Total Date: Date that the Indicator was measured

Most Likely Estimate Total: total of the Indicator.IndTMAmount, or Indicator Most Likely Estimate, calculations

Most Likely Unit: corresponds to Indicator.TMUnit

Lower Estimate Total: total of the Indicator.IndTLAmount, or Indicator Lower Estimate, calculations

Lower Estimate Unit: corresponds to Indicator.TLUnit

Upper Estimate Total: total of the Indicator.IndTUAmount, or Indicator Upper Estimate, calculations

Upper Estimate Unit: corresponds to Indicator.TUUnit

The following image displays a typical view of an M&E analysis.

https://www.devtreks.org/hom
Home Tr...
Search
Preview
Select
Edit
Pack
Views
Club
Select
PackIt
Edit Linked Views
Make base
M and E 2 Input Totals An
Get
Media
Mobile
Desktop
Dataset: 2013 Nutrition Training Manual Development IRI This food nutritional training manual explains food nutritional best practices. The indicators measure material, labor, and equipment needed to develop the manual. The input cost is based on $35 hour average staff time.
FoodNutritionMandE02
Input
Process
Outputs
Outcomes
Impact
Process/Output indicators
Outcome indicators
Impact indicators
Project Monitoring and Evaluation
This food nutritional training manual explains food nutritional best practices. The indicators measure material, labor, and equipment needed to develop the manual. The input cost is based on $35 hour average staff time.
Download Resource

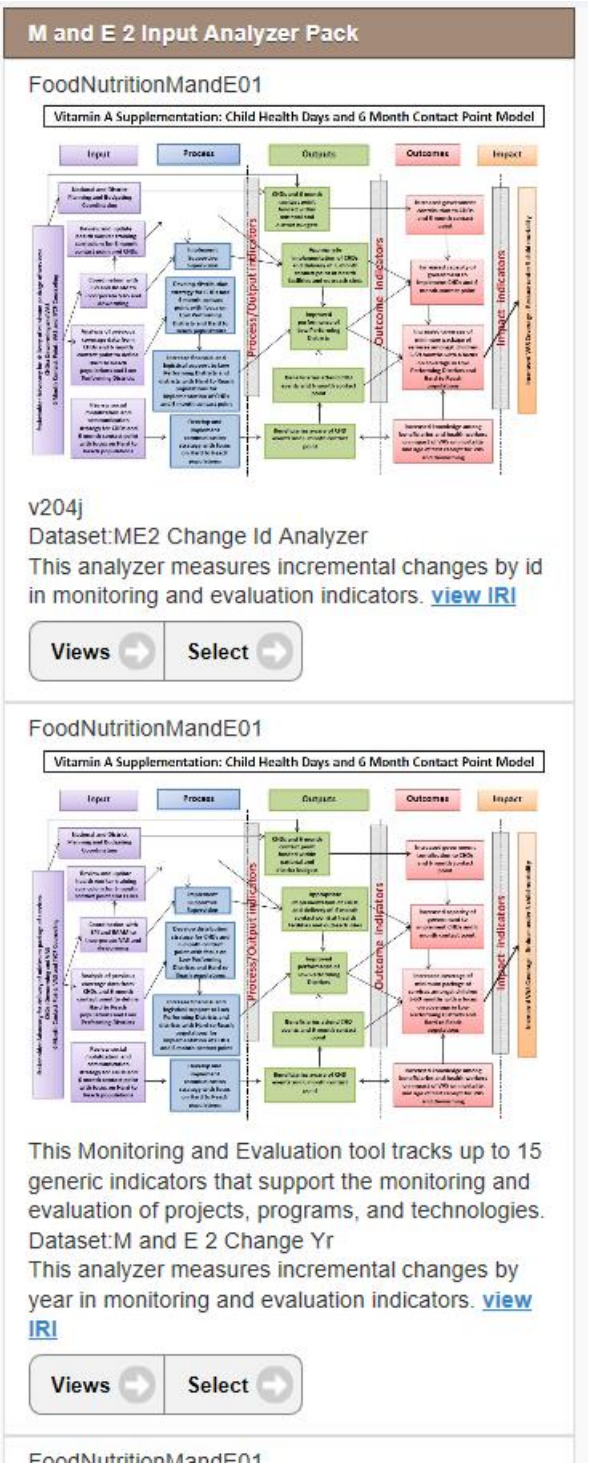
E. Multipliers

Base element multipliers, such an Operation Amount, Time Period Amount, or Input Times, are used to change the quantity of Indicators for each base element. Version 1.9.4 simplified the use of multipliers by multiplying the quantitative analyzer properties (i.e. Most Likely Estimate, Lower Estimate, and Upper Estimate) by these multipliers. Multipliers come from before-aggregated base elements.

Appendix A gives examples demonstrating the use of multipliers. In hindsight, the author probably would have preferred that the multipliers also change the calculations, rather than just the analytic results. The standard protocol for this type of decision is for Network administrators to inform their information technologists about their preferences.

F. Multimedia Support

Version 2.0.2 began displaying the first image or video contained in an analyzer's Media URL property on the Preview panel. That allows good contextual information about the analytic results to be evaluated prior to loading the analysis. The following image, from the Preview panel of an Input base element, shows that multimedia is not being used properly. The same image is being displayed for all analyses and the description field of the first Analyzer has been left blank. Decision makers might conclude that these analyses do not supply serious decision support. Professional M&E analysis requires effort (and staff) to complete. Serious content development is not the role of a software development company, but it is the role of members and clubs in social networks.



G. Performance Analysis

The *Performance Analysis and Social Performance* tutorials demonstrates how to use various Performance Measures, such as Incremental Cost Effectiveness Ratio, to support decisions that combine monitoring and evaluation data with benefit and cost data. Indicators can include prices, quantities, costs, or benefits, which means they can be used in Performance Measures such as Cost per Unit Output or Output per Unit Input (**6***).

H. M&E Analysis and Net Present Value Analysis (NPV), Life Cycle Analysis (LCA), and Resource Stock Analysis

These analyzers match the same set of analyzers found in the *Benefit Cost Analysis 1*, *Life Cycle Analysis 2, and Resource Stock Analysis 1* references. *Section M's Sample Data Sets* contain M&E, NPV, and LCA Analyzers that demonstrate how these techniques relate to one another. The tools are often used together to tie monetary benefits and costs to nonmonetary Indicators of performance, outcomes, and impacts. Cost effectiveness analyses are conducted using both sets of data (**6***).

I. Custom Analysis

This reference explains how to analyze base element M&E data. The structure of base element data may not support many types of analyses, such as CTAs that use randomized control trial data or comparisons of base elements that are not siblings. Three options for custom analysis can be used to overcome this shortfall:

1. **DevPacks**: The DevPacks tutorial introduces base elements that allow analysis of arbitrary structures of hierarchical data, including randomized control trial data and non-sibling base elements. **Appendix C**, **DevPacks M&E Analysis** begins to demonstrate how to use them to analyze M&E data.
2. **Data URLs**: The introductory reference introduces the use of Indicator.URL and Score.JointDataURL properties of calculators and analyzers that allow custom datasets to be linked directly to calculators and analyzers.

3. **Packages**: The *Calculators and Analyzers* and *Performance Analysis* references explain that datasets can be packaged, downloaded as zip files, cleaned up, imported into statistical packages, and further analyzed.

The *Conservation Technology Assessment* and Social Performance Analysis tutorials explains these techniques further. Future releases and references will also explain these techniques further.

J. Knowledge Bank Standards

All monitoring and evaluation analyses should be entered into online knowledge banks (i.e. production servers as contrasted to development servers) that can be used to monitor and evaluate projects, programs, and technologies. That structured evidence must be passed down to future generations. These knowledge banks aggregate and analyze all of the data in a network. Future references will demonstrate how these knowledge banks will evolve (i.e. semantic data, forecasts, national decision support systems) to support future decision making needs. The flexibility offered by DevTreks in documenting M&E means that networks need to develop "rules" explaining the "standards" that should be followed by clubs in their network. The "standards" make it possible to build knowledge banks.

Summary and Conclusions

Clubs using DevTreks can start to carry out the basic monitoring and evaluation analysis of projects, programs, and technologies. Clubs can solicit help when projects falter, programs fail, or technology fumbles. They can share structured evidence explaining how to increase accountability, stay on budget, improve performance, and eliminate waste. Networks can build knowledge banks that explain why projects, programs, and technologies, succeed or fail and pass that knowledge down to future generations. The result may be malnutrition projects that improve children's long term health, agricultural development programs that reduce farmers' risks, factory safety programs that save factory workers' lives, hospitals that treat patients more affordably, schools that educate children more effectively, governments that mitigate climate change more convincingly, and people who improve their lives and livelihoods.

Footnotes

1. Monitoring and Evaluation Analysis includes more advanced analytic techniques than those used in this reference. Future releases, such as Version 2.1.4's Social Performance Analysis algorithms, include some of these techniques.
2. The August, 2014 upgrade found a lot of gaps in these data sets on the cloud site, but found that the binaries work as documented. The December, 2015 upgrade found several bugs or flaws, including mistakes with how multipliers were used and how the Indicator.QTotal property was used. That release was a CTAP release and the Technology Assessment 2 tutorial further demonstrates best M and E practices. The August, 2016 refactor deprecated the M&E 1 Calculator and Analyzers to focus on the M&E 2 Tools. Version 2.0.4 upgraded the M&E 2 calculator to similar patterns as the Resource Stock Calculators, thereby allowing the nascent CTA algorithms documented in the Technology Assessment tutorials to be used in M&E calculation and analysis. Version 2.14 upgraded the calculator patterns to support the more advanced M&E demonstrated in the Social Performance Analysis tutorial.
3. The Monitoring and Evaluation Calculation tutorial documents that the M&E 1 tools found in some of these URIs have been deprecated in favor of the M&E 2 tools. Some of the datasets that were built for the deprecated M&E Calculator 1 may have been updated to test state management for the M&E 2 Calculator. State management should not be confused with content management.
4. The M&E references, found in the *Monitoring and Evaluation Calculation 1* reference, explain why descendant Indicators are not aggregated into ancestors. Those references treat the Indicators associated with different base elements as serving distinctly different purposes in an M&E analysis. An Operation element is not a simple aggregation of children Input Indicators (as would be the case for the Inputs' costs). Instead, the Input Indicators track the resources used in a project, while Operations track the actual activities being carried out. The *Resource Stock* tutorials demonstrate an alternative set of Indicators and analytic techniques where the Indicators are aggregated in the same manner as costs and benefits.

5. The Totals are generated by aggregating each individual Indicator by its WBS Label. The names and units derive from the first Indicator being aggregated.
6. The current calculator and analyzer patterns do not allow mathematical operations that use combinations of different base elements, such as Cost per Unit Output, Output per Unit Input, or Optimal Farm Activities given known Input and Output constraints. Instead, the calculated and analytic results must be manually manipulated to produce those types of calculations. The Version 2.14 release includes examples of algorithms that address this need.
7. Indicators for Investment, Budget, and Time Period base elements measure M&E Impacts. That is, what evidence exists that money has been, or is being, spent well? Have lives and livelihoods actually improved? A useful experiment is to try to find this evidence for just about any government expenditure, anywhere. As another example of "doing it right", interpret the following question: "Other than institutional factors, is there any technical reason that this data can't be completed online, stored uniformly online, and easily accessed online by people and machines, for every major government expenditure in the world?"
8. These types of analyses are based on the general principle "is it better to give a community another 'expert' analysis, or is it better to give them the tools needed to build the analyses and make the decisions themselves about consequent courses of action?".

References

References can be found in the *Monitoring and Evaluation 1: Food Nutrition* reference.

References Note

We try to use references that are open access or that do not charge fees.

Improvements, Errors, and New Features

Please notify DevTreks (devtrekkers@gmail.com) if you find errors or can recommend improvements.

Video tutorials explaining this reference can be found at:

https://www.devtreks.org/commontreks/preview/commons/resourcepack/M and E Analysis 2/519/none/

Appendix A. Multipliers

All analyses use the multiplier-adjusted Most Likely Estimate, Lower Estimate, and Upper Estimate, properties. Ancestor multipliers are not used. For example, the Operation Amount property will not be used to change children Input Indicators (but they will change the Operation's Indicators). Inputs that are children of Operations use the Input.OCAmount, as a multiplier (along with the Times multiplier). As of 1.9.4, Inputs that are children of Components use the Input.CAPAmount, as a multiplier (along with the Times multiplier). The Input.AOHAmount is not used as a multiplier.

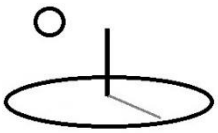
Careful use of multipliers makes it easier to use generic "unit Indicators" rather than Indicators that are always tied to one specific project or technology. That's the same way that base element unit Input and Output prices work. Rather than being useful in only one particular project or technology, the Indicators can then be used in any project or technology.

The following images display the initial M&E calculations in one year of an Operating Budget that has not been adjusted by any multipliers (default values = 1). The bottom image of each base element shows the before and after results of a Totals Analysis after changing base element multipliers. The calculations don't change, but the analytic results, specifically the base Totals used in all analyses, change by the multiplier. Some of the Scores have Indicator.RandomSeed = 0 and will vary each time the Monte Carlo algorithm, algorithm1 and subalgorithm1, is run.

Time Periods

Budget Group									
M and E 2 Malnutrition Projects									
Budget									
ME2 Project 01									
Time Period									
Food Secure Households, Project 01									
Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Food Security Score		I122	11/01/2016	none	algorithm1	normal	none	equalto	subalgorithm1
167,900.0000	security score	168,000.0000	50,000.0000	170,981.3006	security score	168,172.8706	lower 80 % ci	173,789.7306	upper 80 % ci
(I1.QTM+I2.QTM+I3.QTM+I4.QTM)/100000									
Q1 Food Security		TP122	03/15/2013	none	none	none	none	equalto	none
10,000.0000	hhs secure	90,000.0000	hh population	0.0000	none	0.0000	none	0.0000	none
900,000,000.0000	total secure	0.0000	0.0000	900,000,000.0000	total secure	0.0000	none	0.0000	none
This indicator measures the proportion of households that receive adequate food each quarter.									
I1.Q1*I1.Q2									
Q2 Food Security		TP122	06/15/2013	none	none	none	none	equalto	none
21,000.0000	hhs secure	90,000.0000	hh population	0.0000	none	0.0000	none	0.0000	none
1,890,000,000.0000	total secure	0.0000	0.0000	1,890,000,000.0000	total secure	0.0000	none	0.0000	none
This indicator measures the proportion of households that receive adequate food each quarter.									
I2.Q1*I2.Q2									
Q3 Food Security		TP122	09/15/2013	none	none	none	none	equalto	none
55,000.0000	hhs secure	100,000.0000	hh population	0.0000	none	0.0000	none	0.0000	none
5,500,000,000.0000	total secure	0.0000	0.0000	5,500,000,000.0000	total secure	0.0000	none	0.0000	none
This indicator measures the proportion of households that receive adequate food each quarter.									
I3.Q1*I3.Q2									

Totals Analysis TimePeriod.Amount = 1



Budget Group									
M and E 2 Malnutrition Projects									
Budget									
ME2 Project 01									
Time Period									
Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Food Security Score (1.0)		I122	11/01/2016	none	algorithm1	normal	1.0	equalto	subalgorithm1
167,900.0000	security score	168,000.0000	50,000.0000	170,981.3006	security score	168,172.8706	lower 80 % ci	173,789.7306	upper 80 % ci
(I1.QTM+I2.QTM+I3.QTM+I4.QTM)/100000									
Q1 Food Security (4.0)		TP122	03/15/2013	none	none	none	4.0	equalto	none
171,000.0000	hhs secure	380,000.0000	hh population	0.0000	none	0.0000	none	0.0000	none
16,790,000,000.0000	total secure	0.0000	0.0000	16,790,000,000.0000	total secure	0.0000	none	0.0000	none
This indicator measures the proportion of households that receive adequate food each quarter.									
I1.Q1*I1.Q2									

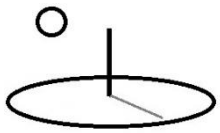
Totals Analysis TimePeriod.Amount = 2

Budget Group									
M and E 2 Malnutrition Projects									
Budget									
ME2 Project 01									
Time Period									
Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Food Security Score (1.0)		I122	11/01/2016	none	algorithm1	normal	1.0	equalto	subalgorithm1
167,900.0000	security score	168,000.0000	50,000.0000	341,962.6012	security score	336,345.7412	lower 80 % ci	347,579.4612	upper 80 % ci
(I1.QTM+I2.QTM+I3.QTM+I4.QTM)/100000									
Q1 Food Security (4.0)		TP122	03/15/2013	none	none	none	4.0	equalto	none
171,000.0000	hhs secure	380,000.0000	hh population	0.0000	none	0.0000	none	0.0000	none
16,790,000,000.0000	total secure	0.0000	0.0000	33,580,000,000.0000	total secure	0.0000	none	0.0000	none
This indicator measures the proportion of households that receive adequate food each quarter.									

Outcomes

Outcomes									
Outcome									
2013 BM Food Consumed									
Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Total Food Consumed		OC122A	03/15/2013	OC122	algorithm1	normal	none	equalto	subalgorithm1
7,532,000.0000	total cost	7,500,000.0000	2,000,000.0000	7,432,625.9097	total cost	7,286,060.7608	lower 90 % ci	7,579,191.0586	upper 90 % ci
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Q2 Food Consumed		OC122B	06/15/2013	none	none	none	none	equalto	none
3,300.0000	tons	530.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
1,749,000.0000	total cost	0.0000	0.0000	1,749,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures the amount and cost of food products consumed made each quarter.									
I1.Q1*I1.Q2									
Q3 Food Consumed		OC122B	09/15/2013	none	none	none	none	equalto	none
3,500.0000	tons	610.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
2,135,000.0000		0.0000	0.0000	2,135,000.0000		0.0000	none	0.0000	none
This indicator measures the amount and cost of food products consumed made each quarter.									
I2.Q1*I2.Q2									
Q4 Food Consumed		OC122B	12/15/2013	none	none	none	none	equalto	none
4,000.0000	tons	450.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
1,800,000.0000		0.0000	0.0000	1,800,000.0000		0.0000	none	0.0000	none
This indicator measures the amount and cost of food products consumed made each quarter.									
I3.Q1*I3.Q2									
Q4 Food Consumed		OC122B	12/15/2013	none	none	none	none	equalto	none
4,200.0000	tons	440.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
1,848,000.0000	total cost	0.0000	0.0000	1,848,000.0000	total cost	0.0000	none	0.0000	none

Totals Analysis Outcome.Amount = 1



Outcomes									
Outcome									
2013 BM Food Consumed									
Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Total Food Consumed (1.0)		OC122A	03/15/2013	OC122	algorithm1	normal	1.0	equalto	subalgorithm1
7,532,000.0000	total cost	7,500,000.0000	2,000,000.0000	7,432,625.9097	total cost	7,286,060.7608	lower 90 % ci	7,579,191.0586	upper 90 % ci
This indicator measures the amount and cost of food products consumed made each quarter.									
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Q2 Food Consumed (4.0)		OC122B	06/15/2013	none	none	none	4.0	equalto	none
15,000.0000	tons	2,030.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
7,532,000.0000	total cost	0.0000	0.0000	7,532,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures the amount and cost of food products consumed made each quarter.									
I1.Q1*I1.Q2									
Output : 2013 BM ME2 Food Package Distributed									

Totals Analysis Outcome.Amount = 2

Outcomes									
Outcome									
2013 BM Food Consumed									
Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Total Food Consumed (1.0)		OC122A	03/15/2013	OC122	algorithm1	normal	1.0	equalto	subalgorithm1
7,532,000.0000	total cost	7,500,000.0000	2,000,000.0000	14,865,251.8194	total cost	14,572,121.5216	lower 90 % ci	15,158,382.1172	upper 90 % ci
This indicator measures the amount and cost of food products consumed made each quarter.									
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Q2 Food Consumed (4.0)		OC122B	06/15/2013	none	none	none	4.0	equalto	none
15,000.0000	tons	2,030.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
7,532,000.0000	total cost	0.0000	0.0000	15,064,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures the amount and cost of food products consumed made each quarter.									
I1.Q1*I1.Q2									
Output : 2013 BM ME2 Food Package Distributed									

Outputs

Output : 2013 BM ME2 Food Package Distributed

Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Package Cost		I120	11/01/2016	I120A	algorithm1	normal	none	equalto	subalgorithm1
60,785.1286	total cost	60,800.0000	15,000.0000	60,785.8816	total cost	59,996.9553	lower 90 % ci	61,574.8079	upper 90 % ci
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Q1 Food Packages Distributed		O122A	03/15/2014	none	algorithm1	normal	none	equalto	subalgorithm1
29,000.0000	packages	0.5500	dollars	0.0000	none	0.0000	none	0.0000	none
15,950.0000	total cost	16,000.0000	4,000.0000	15,996.2351	total cost	15,785.8548	lower 90 % ci	16,206.6154	upper 90 % ci
This indicator measures number of food packages distributed each year.									
I1.Q1*I1.Q2									
Q2 Food Packages Distributed		O122A	06/15/2014	none	algorithm1	normal	none	equalto	subalgorithm1
27,000.0000	packages	0.6000	dollars	0.0000	none	0.0000	none	0.0000	none
16,200.0000	total cost	16,200.0000	4,100.0000	16,196.1410	total cost	15,980.5012	lower 90 % ci	16,411.7808	upper 90 % ci
This indicator measures number of food packages distributed each year.									
I2.Q1*I2.Q2									
Q3 Food Packages Distributed		O122A	09/15/2014	none	algorithm1	normal	none	equalto	subalgorithm1
19,000.0000	packages	0.4800	dollars	0.0000	none	0.0000	none	0.0000	none
9,120.0000	total cost	9,100.0000	3,000.0000	9,097.1763	total cost	8,939.3910	lower 90 % ci	9,254.9616	upper 90 % ci
This indicator measures number of food packages distributed each year.									
I3.Q1*I3.Q2									
Q4 Food Packages Distributed		O122A	12/15/2014	none	algorithm1	normal	none	equalto	subalgorithm1
39,000.0000	packages	0.5000	dollars	0.0000	none	0.0000	none	0.0000	none
19,500.0000	total cost	19,500.0000	4,700.0000	19,495.5762	total cost	19,248.3793	lower 90 % ci	19,742.7731	upper 90 % ci

Totals Analysis Output.Amount = 1, Output.CompositionAmount = 1, Output.Times = 1

Output : 2013 BM ME2 Food Package Distributed

Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Package Cost (1.0)		I120	11/01/2016	I120A	algorithm1	normal	1.0	equalto	subalgorithm1
60,785.1286	total cost	60,800.0000	15,000.0000	60,785.8816	total cost	59,996.9553	lower 90 % ci	61,574.8079	upper 90 % ci
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Q1 Food Packages Distributed (4.0)		O122A	03/15/2014	none	algorithm1	normal	4.0	equalto	subalgorithm1
114,000.0000	packages	2.1300	dollars	0.0000	none	0.0000	none	0.0000	none
60,770.0000	total cost	16,000.0000	4,000.0000	60,785.1286	total cost	59,954.1263	lower 90 % ci	61,616.1309	upper 90 % ci
This indicator measures number of food packages distributed each year.									
I1.Q1*I1.Q2									

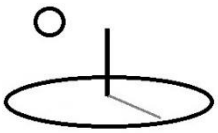
Totals Analysis Output.Amount = 2, Output.CompositionAmount = 2, Output.Times = 2

(2*2*2 = 8 is the multiplier)

Output : 2013 BM ME2 Food Package Distributed

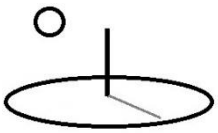
Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Package Cost (1.0)		I120	11/01/2016	I120A	algorithm1	normal	1.0	equalto	subalgorithm1
60,785.1286	total cost	60,800.0000	15,000.0000	486,287.0528	total cost	479,975.6424	lower 90 % ci	492,598.4632	upper 90 % ci
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Q1 Food Packages Distributed (4.0)		O122A	03/15/2014	none	algorithm1	normal	4.0	equalto	subalgorithm1
114,000.0000	packages	2.1300	dollars	0.0000	none	0.0000	none	0.0000	none
60,770.0000	total cost	16,000.0000	4,000.0000	486,281.0288	total cost	479,633.0104	lower 90 % ci	492,929.0472	upper 90 % ci
This indicator measures number of food packages distributed each year.									
I1.Q1*I1.Q2									

Operations



Operations									
Operation									
2013 BM Food Center Product Delivery									
Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Food Purchase Cost		OP122	11/03/2016	none	algorithm1	normal	none	equalto	subalgorithm1
5,397,000.0000	total cost	5,400,000.0000	1,500,000.0000	5,425,450.3678	total cost	5,345,037.0138	lower 75 % ci	5,505,863.7218	upper 75 % ci
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Q1 Food Center Product Delivery		OP122A	03/15/2013	none	none	none	none	equalto	none
2,500.0000	tons	500.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
1,250,000.0000	total cost	0.0000	0.0000	1,250,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures the amount and cost of food product deliveries made each quarter.v150c									
I1.Q1*I1.Q2									
Q2 Food Center Product Delivery		OP122A	06/15/2013	none	none	none	none	equalto	none
2,700.0000	tons	550.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
1,250,000.0000	total cost	0.0000	0.0000	1,250,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures the amount and cost of food product deliveries made each quarter.									
I1.Q1*I1.Q2									
Q3 Food Center Product Delivery		OP122B	09/15/2013	none	none	none	none	equalto	none
3,000.0000	tons	475.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
1,425,000.0000	total cost	0.0000	0.0000	1,425,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures the amount and cost of food product deliveries made each quarter.									
I3.Q1*I3.Q2									
Q4 Food Center Product Delivery		OP122B	12/15/2013	none	none	none	none	equalto	none
3,200.0000	tons	460.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
1,472,000.0000	total cost	0.0000	0.0000	1,472,000.0000	total cost	0.0000	none	0.0000	none

Totals Analysis Operation.Amount = 1



Operations									
Operation									
2013 BM Food Center Product Delivery									
Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Food Purchase Cost (1.0)		OP122	11/03/2016	none	algorithm1	normal	1.0	equalto	subalgorithm1
5,397,000.0000	total cost	5,400,000.0000	1,500,000.0000	5,375,794.3730	total cost	5,294,229.8996	lower 75 % ci	5,457,358.8464	upper 75 % ci
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Q1 Food Center Product Delivery (2.0)		OP122A	03/15/2013	none	none	none	2.0	equalto	none
5,200.0000	tons	1,050.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
2,500,000.0000	total cost	0.0000	0.0000	2,500,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures the amount and cost of food product deliveries made each quarter.v150c									
I1.Q1*I1.Q2									
Q3 Food Center Product Delivery (2.0)		OP122B	09/15/2013	none	none	none	2.0	equalto	none
6,200.0000	tons	935.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
2,897,000.0000	total cost	0.0000	0.0000	2,897,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures the amount and cost of food product deliveries made each quarter.									
I3.Q1*I3.Q2									

Totals Analysis Operation.Amount = 2

Operations									
Operation									
2013 BM Food Center Product Delivery									
Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Food Purchase Cost (1.0)		OP122	11/03/2016	none	algorithm1	normal	1.0	equalto	subalgorithm1
5,397,000.0000	total cost	5,400,000.0000	1,500,000.0000	10,751,588.7460	total cost	10,588,459.7992	lower 75 % ci	10,914,717.6928	upper 75 % ci
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Q1 Food Center Product Delivery (2.0)		OP122A	03/15/2013	none	none	none	2.0	equalto	none
5,200.0000	tons	1,050.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
2,500,000.0000	total cost	0.0000	0.0000	5,000,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures the amount and cost of food product deliveries made each quarter.v150c									
I1.Q1*I1.Q2									
Q3 Food Center Product Delivery (2.0)		OP122B	09/15/2013	none	none	none	2.0	equalto	none
6,200.0000	tons	935.0000	dollar price	0.0000	none	0.0000	none	0.0000	none
2,897,000.0000	total cost	0.0000	0.0000	5,794,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures the amount and cost of food product deliveries made each quarter.									
I3.Q1*I3.Q2									
Input : 2013 BM Food Package Purchases									

Inputs

Input : 2013 BM Food Package Purchases

Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Total Food Cost		I122A	10/31/2016	none	algorithm1	normal	none	equalto	subalgorithm1
140,080.0000	total cost	140,000.0000	30,000.0000	139,514.8037	total cost	137,922.8656	lower 90 % ci	141,106.7418	upper 90 % ci
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Q1 Food Packages Purchased		I122	03/15/2014	none	algorithm1	none	none	equalto	none
25,000.0000	package	1.5600	dollar price	0.0000	none	0.0000	none	0.0000	none
39,000.0000	total cost	0.0000	0.0000	39,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures number of food packages purchased each year.									
I1.Q1*I1.Q2									
Q2 Food Packages Purchased		I122	06/15/2014	none	none	none	none	equalto	none
25,000.0000	package	1.5600	dollar price	0.0000	none	0.0000	none	0.0000	none
39,000.0000	total cost	0.0000	0.0000	39,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures number of food packages purchased each year.									
I2.Q1*I2.Q2									
Q3 Food Packages Purchased		I122	09/15/2014	none	none	none	none	equalto	none
35,000.0000	package	1.6000	dollar price	0.0000	none	0.0000	none	0.0000	none
56,000.0000	total cost	0.0000	0.0000	56,000.0000	total cost	0.0000	none	0.0000	none
This indicator measures number of food packages purchased each year.									
I3.Q1*I3.Q2									
Q4 Food Packages Purchased		I122	12/15/2014	none	none	none	none	equalto	none
4,000.0000	package	1.5200	dollar price	0.0000	none	0.0000	none	0.0000	none
6,080.0000	total cost	0.0000	0.0000	6,080.0000	total cost	0.0000	none	0.0000	none

Totals Analysis Input.OCAmount = 1, Input.Times = 1

Input : 2013 BM Food Package Purchases

Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Total Food Cost (1.0)		I122A	10/31/2016	none	algorithm1	normal	1.0	equalto	subalgorithm1
140,080.0000	total cost	140,000.0000	30,000.0000	139,514.8037	total cost	137,922.8656	lower 90 % ci	141,106.7418	upper 90 % ci
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Q1 Food Packages Purchased (4.0)		I122	03/15/2014	none	algorithm1	none	4.0	equalto	none
89,000.0000	package	6.2400	dollar price	0.0000	none	0.0000	none	0.0000	none
140,080.0000	total cost	0.0000	0.0000	140,080.0000	total cost	0.0000	none	0.0000	none
This indicator measures number of food packages purchased each year.									
I1.Q1*I1.Q2									

Totals Analysis Input.OCAmount = 2, Input.Times = 2 (Investments and Components use Input.CAPAmount as the multiplier)

(2*2 = 4 is the multiplier)

Input : 2013 BM Food Package Purchases

Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Total Food Cost (1.0)		I122A	10/31/2016	none	algorithm1	normal	1.0	equalto	subalgorithm1
140,080.0000	total cost	140,000.0000	30,000.0000	558,059.2148	total cost	551,691.4624	lower 90 % ci	564,426.9672	upper 90 % ci
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Q1 Food Packages Purchased (4.0)		I122	03/15/2014	none	algorithm1	none	4.0	equalto	none
89,000.0000	package	6.2400	dollar price	0.0000	none	0.0000	none	0.0000	none
140,080.0000	total cost	0.0000	0.0000	560,320.0000	total cost	0.0000	none	0.0000	none
This indicator measures number of food packages purchased each year.									
I1.Q1*I1.Q2									
Time Period									

Appendix B. Monitoring and Evaluation Analysis Examples

Although the following examples show that the current crop of analyzers use simple mathematical operations, such as addition and subtraction, when their underlying calculations derive from the algorithms documented in the Technology Assessment and Social Performance tutorials, the resultant metadata analysis can be quite powerful.

In most cases, the comparative analyses shown in the following images do not display Inputs and Outputs because the quantity of data becomes difficult to interpret. Descendent base elements, such as Inputs and Outputs, can still be evaluated by running a Totals Analysis, and in some cases, by setting the "Compare Using" option to "none".

All of these datasets were strictly used to test the M&E tools. No attempt was made to ensure that the underlying economic content, found in the base elements and evaluated using NPV calculators, was meaningful. In general, equal attention must be given to base element economic content and Indicator content. Decision making is enhanced when benefit and cost, or economic, content is used together with performance, or Indicator, content.

1. Totals Analysis

A *Totals Analysis* sums Indicators for every base element in an analysis. All analyzers run this analysis for each aggregated base element before carrying out additional calculations. All totals derive from initial base element M&E calculations. This is the only analysis that includes Inputs and Outputs in Operation, Component, Outcome, Budgets, and Investment analyses. The remaining analyses do not display Inputs and Outputs because the quantity of data becomes difficult to interpret. Version 2.0.4 stopped rerunning M&E base element calculations prior to summing the calculations because the original base element calculations aren't changed during analyses. **Appendix A** explains how to use multipliers to adjust the original base element calculations.

So what is the difference between the results of running M&E calculators and this particular analysis? This analysis aggregates M&E calculations using each Indicator's WBS label (**4***). For

example, the following Input Totals Analysis has aggregated 4 quarterly Indicators in the 2013 Series element and 4 quarterly Indicators in the 2014 Series element. Although not shown, 2015 and 2016 Input Series Indicators were similarly aggregated. The Indicators in both series were aggregated because they had the same WBS label. The Score Indicator has 1 Observation because each set of base elements has 1 Score.

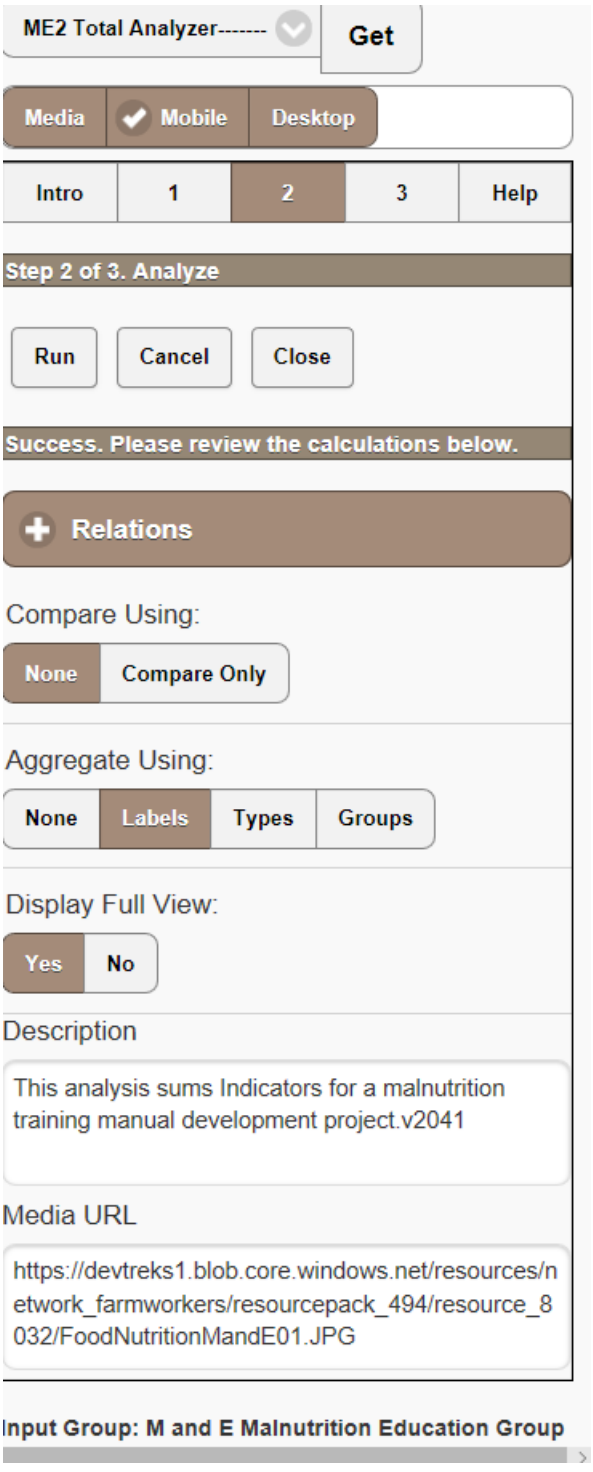
Input Series: 2013 Nutrition Training Manual

Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Total Manual Development Cost (1.0)		I120	10/25/2016	I120A	none	none	1.0	equalto	none
91,800.0000	total cost	0.0000	0.0000	91,800.0000	total cost	0.0000	none	0.0000	none
I1.QTM+I2.QTM+I3.QTM+I4.QTM									
Labor, Q1 Training Development (4.0)		I120A	03/30/2013	none	none	none	4.0	equalto	none
2,550.0000	hours	144.0000	dollars per hour	0.0000	none	0.0000	none	0.0000	none
91,800.0000	total cost	0.0000	0.0000	91,800.0000	total cost	0.0000	none	0.0000	none
This measures the benchmark number of staff hours spent on developing training materials for nutrition workshops. The initial benchmark is no time or expense spent yet on training material development.									
I1.Q1*I1.Q2									

Input Series: 2014 Nutrition Training Manual Development

Name (N)		Label	Date	Rel Label	Math Type	Dist Type	Base IO	Math Operator	Math Sub Type
Q1 Amount	Q1 Unit	Q2 Amount	Q2 Unit	Q3 Amount	Q3 Unit	Q4 Amount	Q4 Unit	Q5 Amount	Q5 Unit
QT Amount	QT Unit	QT D1 Amount	QT D2 Amount	QT Most Amount	QT Most Unit	QT Low Amount	QT Low Unit	QT High Amount	QT High Unit
Total Manual Development Cost (1.0)		I120	10/25/2016	I120A	none	none	1.0	equalto	none

The following image shows a Totals Analysis that has set the Aggregate Using Option to Labels. The previous Totals Analysis set this option to None. Although the Totals Analyzers may display the same "Compare Using" option as the remaining Analyzers, it's not supported –aligning too much data does not necessarily enhance decision making.



The following image displays the results of this analysis. In this case, the 4 Input Series base elements had the same WBS Label resulting in the final aggregation of the 16 Indicators, or 4

Indicators * 4 Series. The Score Indicator has 4 Observation because each set of the 4 base elements has 1 Score. The base elements were first aggregated and then the Indicators within the base elements were aggregated.

Input Series : 2013 Nutrition Training Manual

Indicators Details

M and E Stage: **realtime**
Indic 0 Name: Total Manual Development Cost Label: I120
Date: 10/25/2016 Rel Label: I120A
Math Type: none Dist Type: none
Math Sub Type: none Base IO: none
Math Express: I1.QTM+I2.QTM+I3.QTM+I4.QTM Math Operator: equalto
QT Amount: 246,600.0000 QT Unit: total cost
QT D1 Amount: 0.0000 QT D1 Unit: none
QT D2 Amount: 0.0000 QT D2 Unit: none
QT Most Amount: 246,600.0000 QT Most Unit: total cost
QT Low Amount: 0.0000 QT Low Unit: none
QT High Amount: 0.0000 QT High Unit: none
Observations: 4.0
Indic 0 Description:
Score Math Result:
Indic 1 Name: Labor, Q1 Training Development Label: I120A
Date: 03/30/2013 Rel Label: none
Math Type: none Dist Type: none
Math Sub Type: none Base IO: none
Q1 Amount: 6,850.0000 Q1 Unit: hours
Q2 Amount: 576.0000 Q2 Unit: dollars per hour
Q3 Amount: 0.0000 Q3 Unit: none
Q4 Amount: 0.0000 Q4 Unit: none
Q5 Amount: 0.0000 Q5 Unit: none
Math Express: I1.Q1*I1.Q2 Math Operator: equalto
QT Amount: 246,600.0000 QT Unit: total cost
QT D1 Amount: 0.0000 QT D1 Unit: none
QT D2 Amount: 0.0000 QT D2 Unit: none
QT Most Amount: 246,600.0000 QT Most Unit: total cost
QT Low Amount: 0.0000 QT Low Unit: none
QT High Amount: 0.0000 QT High Unit: none
Observations: 16.0
Indic 1 Description: This measures the benchmark number of staff hours spent on developing training

When the equivalent analyses were run on the cloud dataset, the parent Input's Total Amounts all showed zeros. The investigation revealed that the Input.OCAmount, a multiplier used to set Totals, had been set to zero. The error with the cloud dataset was left in place to make this point.

2. Statistics 1 Analysis

A *Statistics Analysis* uses the Totals calculations to measure basic statistical properties of aggregated Indicators. Total, Median, Mean, Variance, and Standard Deviation statistics are generated for all of the Indicators in aggregated base elements. A Statistical Analysis of the quarterly data shown for the first of the previous Totals Analysis, or Aggregate Using = None, confirms that 4 separate quarterly Indicators are being aggregated, that is Observations = 4.

Input Series: 2013 Nutrition Training Manual

Monitoring and Evaluation Type: realtime

Total Type	Unit	Total	Mean	Median	Variance	Std Dev
Total Manual Development Cost **Observations:** 1.0 : I120						
Most Likely	total cost	91,800.0000	91,800.000	91,800.000	0.000	0.000
Lower	none	0.0000	0.000	0.000	0.000	0.000
Upper	none	0.0000	0.000	0.000	0.000	0.000
Labor, Q1 Training Development **Observations:** 4.0 : I120A						
Most Likely	total cost	91,800.0000	22,950.000	23,400.000	141,210,000.000	11,883.181
Lower	none	0.0000	0.000	0.000	0.000	0.000
Upper	none	0.0000	0.000	0.000	0.000	0.000

This measures the benchmark number of staff hours spent on developing training materials for nutrition workshops. The initial benchmark is no time or expense spent yet on training material development.

Input Series: 2014 Nutrition Training Manual Development

Monitoring and Evaluation Type: realtime

Total Type	Unit	Total	Mean	Median	Variance	Std Dev
Total Manual Development Cost **Observations:** 1.0 : I120						
Most Likely	total cost	77,400.0000	77,400.000	77,400.000	0.000	0.000
Lower	none	0.0000	0.000	0.000	0.000	0.000
Upper	none	0.0000	0.000	0.000	0.000	0.000
Labor, Q1 Training Development **Observations:** 4.0 : I120A						
Most Likely	total cost	77,400.0000	19,350.000	19,800.000	141,210,000.000	11,883.181
Lower	none	0.0000	0.000	0.000	0.000	0.000
Upper	none	0.0000	0.000	0.000	0.000	0.000

A Statistical Analysis of the quarterly data shown for the second of the previous Totals Analysis, or Aggregate Using = Labels, confirms that 16 separate quarterly Indicators are being aggregated, that is Observations = 16. The base elements were first aggregated by their InputSeries.Labels, and then their Indicators were aggregated by their Indicators.Labels. The

Indicators will be aggregated by Label regardless of the type of aggregator being used in the analysis.

Input Series : 2013 Nutrition Training Manual

Indicator Totals

M and E Stage: **realtime**
Indicator 1 Name : **Total Manual Development Cost** Label : I120
Observations : 4.0
Most Likely : 246,600.0000 Unit : total cost
Mean : 61,650.000 Median : 70,200.000
Variance : 1,130,490,000.000 Std Dev : 33,622.760
Lower Total : 0.0000 Lower Unit : none
Lower Mean : 0.000 Lower Median : 0.000
Lower Variance : 0.000 Lower Std Dev : 0.000
Upper Total : 0.0000 Upper Unit : none
Upper Mean : 0.000 Upper Median : 0.000
Upper Variance : 0.000 Upper Std Dev : 0.000
Description :
Indicator 1 Name : **Labor, Q1 Training Development** Label : I120A
Observations : 16.0
Most Likely : 246,600.0000 Unit : total cost
Mean : 15,412.500 Median : 12,600.000
Variance : 141,250,500.000 Std Dev : 11,884.885
Lower Total : 0.0000 Lower Unit : none
Lower Mean : 0.000 Lower Median : 0.000
Lower Variance : 0.000 Lower Std Dev : 0.000
Upper Most Likely : 0.0000 Upper Unit : none
Upper Mean : 0.000 Upper Median : 0.000
Upper Variance : 0.000 Upper Std Dev : 0.000
Description : This measures the benchmark number of staff hours spent on developing training materials for nutrition workshops. The initial benchmark is no time or expense spent yet on training material development.

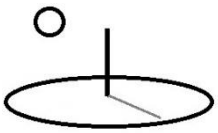
Feedback About farmworkers/input/2013 Nutrition

The following *Operation Statistical Analysis* displays basic statistics associated with malnutrition Operations. The Operation elements track Indicators that are different than the Input elements. Note that base elements, such as Inputs, that don't have Indicators will still be displayed, but no analysis can take place of base elements that don't have M&E calculations. Notice the use of 3 different Labels for the Operation's Indicators.

Operation							
2013 BM Food Center Product Delivery OP122 12/31/2013							
Monitoring and Evaluation Type: realtime							
Total Type	Unit	Total	Mean	Median	Variance	Std Dev	
Food Purchase Cost **Observations:** 1.0 : OP122							
Most Likely	total cost	5,375,794.3730	5,375,794.373	5,375,794.373	0.000	0.000	
Lower	lower 75 % ci	5,294,229.8996	5,294,229.900	5,294,229.900	0.000	0.000	
Upper	upper 75 % ci	5,457,358.8464	5,457,358.846	5,457,358.846	0.000	0.000	
Q1 Food Center Product Delivery **Observations:** 2.0 : OP122A							
Most Likely	total cost	2,500,000.0000	1,250,000.000	1,250,000.000	0.000	0.000	
Lower	none	0.0000	0.000	0.000	0.000	0.000	
Upper	none	0.0000	0.000	0.000	0.000	0.000	
This indicator measures the amount and cost of food product deliveries made each quarter.v150c							
Q3 Food Center Product Delivery **Observations:** 2.0 : OP122B							
Most Likely	total cost	2,897,000.0000	1,448,500.000	1,448,500.000	1,104,500,000.000	33,234.019	
Lower	none	0.0000	0.000	0.000	0.000	0.000	
Upper	none	0.0000	0.000	0.000	0.000	0.000	
This indicator measures the amount and cost of food product deliveries made each quarter.							
Inputs							
Input: 2013 BM Food Package Purchases I122 02/13/2013							
Monitoring and Evaluation Type: realtime							

The following Statistical Analysis for Capital Budgets demonstrates the use of the Compare Only option (**7***). Scores will have the same number of observations as the number of base

elements that have been aggregated, while sibling Indicators will have the same number of observations as the number of base element Indicators that have been aggregated.



Investment Group : ME2 Malnutrition Projects ; 02/13/2014			
Investment	All	Alt. 0	Alt. 1
Name		ME2 Project 01	ME2 Project 02
Date		11/03/2016	11/03/2016
Label		BUD01	BUD02
Indicator 0		Food Security Score	Food Security Score
Observations 0		1.0	1.0
Label 0		I122	I122
Most Likely Unit		security score	food security score
Most Likely		96,554.2192	340,793.8931
Most Likely Mean		96,554.219	340,793.893
Most Likely Median		96,554.219	340,793.893
Most Likely Variance		0.000	0.000
Most Likely SD		0.000	0.000
Lower Unit		lower 80 % ci	lower 80 % ci
Lower Total		95,817.9202	336,508.8562
Lower Mean		95,817.920	336,508.856
Lower Median		95,817.920	336,508.856
Lower Variance		0.000	0.000
Lower SD		0.000	0.000
Upper Unit		upper 80 % ci	upper 80 % ci
Upper Total		97,290.5182	345,078.9300

Upper Total	97,290.5182	345,078.9300
Upper Mean	97,290.518	345,078.930
Upper Median	97,290.518	345,078.930
Upper Variance	0.000	0.000
Upper SD	0.000	0.000
Indicator 1	Q1 Food Security	Q1 Food Security
Observations 1	4.0	4.0
Label 1	TP122	TP122
Most Likely Unit	total food security	food secure
Most Likely	10,000,000,000.0000	34,200,000,000.0000
Most Likely Mean	2,500,000,000.000	8,550,000,000.000
Most Likely Median	2,000,000,000.000	8,400,000,000.000
Most Likely Variance	3,166,666,666,666,670,000.000	1,770,000,000,000,000,(
Most Likely SD	1,779,513,042.005	1,330,413,469.565
Lower Unit	none	none

3. Change 1 Analyses

The *Change 1 Analyses* use the Totals calculations to measure incremental changes in aggregated Indicators. A *Change by Year Analysis* measures incremental changes between aggregated Indicators that have different Years. A *Change by Id Analysis* measures incremental changes between Indicators that have different Ids. A *Change by AlternativeType Analysis* measures incremental changes between aggregated Indicators that have different Alternative Types. Changes are analyzed in ascending order (Id = 1,2,3; Year = 2000, 2001, 2002;

AlternativeType = A, B, C). The first member of the sequence will be used as a "Base" element to make comparisons. The sibling sequence member immediately before the current sequence member will be used as an "x-1" element to make comparisons. Gaps in the sequence, such as a missing Year, will be ignored.

Further documentation about these analyses can be found in the *Change Analysis 1* reference.

A Change by Year Analysis of the quarterly data shown for the first of the previous Totals Analysis, or Aggregate Using = None, confirms that 4 separate quarterly Indicators are being aggregated, that is Observations = 4 and then compared between the 4 years of Input Series. In this analysis the second year, 2013, is being compared to the first year, 2012, and only shows Base changes. The third year, 2014, is being compared to the first and second years, 2012 and 2013, and shows Base changes and Amount, or x-1, changes.

Given that the Score's Math Expression aggregates its 4 sibling Indicators, both the Score and Indicator changes are equal.

Input Series: 2014 Nutrition Training Manual Development

Alternative Type: **B**

Indicator Property	Most Likely	Amount Change	Percent Change	Base Change	Base Percent Change	Label	Date	Observations	Unit
Total Manual Development Cost I120									
Most Likely 0	77,400.0000	0.00	0.00	-14,400.00	-15.69	I120	10/25/2016	1.0	total cost
Lower	0.0000	0.00	0.00	0.00	0.00				none
Upper	0.0000	0.00	0.00	0.00	0.00				none
Labor, Q1 Training Development I120A									
Most Likely 1	77,400.0000	0.00	0.00	-14,400.00	-15.69	I120A	03/30/2014	4.0	total cost
Lower	0.0000	0.00	0.00	0.00	0.00				none
Upper	0.0000	0.00	0.00	0.00	0.00				none

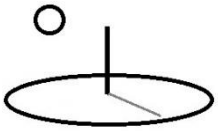
This measures the benchmark number of staff hours spent on developing training materials for nutrition workshops. The initial benchmark is no time or expense spent yet on training material development.

Input Series: 2015 Nutrition Training Manual Development

Alternative Type: **C**

Indicator Property	Most Likely	Amount Change	Percent Change	Base Change	Base Percent Change	Label	Date	Observations	Unit
Total Manual Development Cost I120									
Most Likely 0	63,000.0000	-14,400.00	-18.60	-28,800.00	-31.37	I120	10/25/2016	1.0	total cost
Lower	0.0000	0.00	0.00	0.00	0.00				none
Upper	0.0000	0.00	0.00	0.00	0.00				none
Labor, Q1 Training Development I120A									
Most Likely 1	63,000.0000	-14,400.00	-18.60	-28,800.00	-31.37	I120A	03/30/2015	4.0	total cost
Lower	0.0000	0.00	0.00	0.00	0.00				none

The following image displays an Outcome Change by Alternative Analysis. The Indicators in two alternative Outcomes, A and B, are being aggregated and then compared. The Alternative Types and Labels had to be set correctly in the Outcomes being compared. For example, if Outcome A's Indicators mistakenly had an Alternative Type = B, no changes would occur.



Outcome Group : ME2 Food Consumed ; OC122			
Outcome	All	Alt. 0	Alt. 1
Name		2013 BM Food Consumed	2013 Act Food Consumed
Date		12/31/2013	12/31/2013
Label		OC122	OC122
Alternative		A	B
Indicator 0		Total Food Consumed	Total Food Consumed
Observations		2.0	2.0
Date		03/15/2013	03/15/2013
Label		OC122A	OC122A
Most Unit		total cost	total cost
Most		12,982,095.3420	11,473,938.8646
Most Amount Change		0.00	0.00
Most Percent Change		0.00	0.00
Most Base Change		0.00	-1,508,156.48
Most Base Percent Change		0.00	-11.62
Lower Unit		lower 90 % ci	lower 90 % ci
Lower		12,725,606.3315	11,254,091.1414
Lower Amount Change		0.00	0.00
Lower Percent Change		0.00	0.00
Lower Base Change		0.00	-1,471,515.19
Lower Base Percent Change		0.00	-11.56
Upper Unit		upper 90 % ci	upper 90 % ci
Upper		13,238,584.3525	11,693,786.5878
Upper Amount Change		0.00	0.00
Upper Percent Change		0.00	0.00

The following Operating Budget Change by Year Analysis shows the results of comparing a 2013 Time Period to a 2012 Time Period (**7***). The analysis compares Indicators that have different base element years, but that have the same Indicator Labels. The 2013 Time Period found the corresponding 2012 Time Period, Outcome, and Operation Indicators because the Indicator Labels were the same. Inputs and Outputs are not included in Budget Change Analysis because too much data needs interpretation. No Amount Changes took place because no xminus1 Time Periods were present.

Note the mistake with the Time Period base element Label. Not setting this properly (i.e. to none) doesn't affect this particular analysis but it will affect other types of analyses.

Budget Group : M and E 2 Malnutrition Projects ; 03/12/2013			
Budget	**All**	**Alt. 0**	
Name		ME2 Project 01	
Date		11/03/2016	
Label		B122	
Alternative		0.00	
Time Period	**All**	**Alt. 0**	**Alt. 1**
Name		2013 Food Security	2014 Food Security
Date		12/31/2013	12/31/2014
Label		none	none
Alternative		A	B
Indicator 0		Food Security Score	Food Security Score
Observations		1.0	1.0
Date		11/01/2016	11/01/2016
Label		I122	I122
Most Unit		security score	food security score
Most		170,981.3006	157,476.3359
Most Amount Change		0.00	0.00
Most Percent Change		0.00	0.00
Most Base Change		0.00	-13,504.96
Most Base Percent Change		0.00	-7.90
Lower Unit		lower 80 % ci	lower 80 % ci
Lower		168,172.8706	154,905.3137

To successfully compare Time Periods in Budgets, the Time Periods must have Indicators with the correct Labels, Years, and Alternative Types (**7***). To successfully compare Budgets in Budget or Investment Groups, the Budgets and Time Periods must have Indicators with the

correct Labels, Years, and Alternative Types. The following analysis is comparing Investment A to Investment B. No aggregators were chosen when the analysis was run. Each Budget has two time periods. All of the elements in Budget A have Alternative Type = A, while all of the elements in Budget B have Alternative Type = B. This image displays Budget A's Time Periods and 1 Outcome. Note that 2013 Time Period is an aggregation of the Indicators in two Time Periods because they all had Alternative Type = A.

This dataset can be found on localhost. The equivalent cloud dataset is missing the second Investment. The original 98 M&E tools, which included the ME1 Calculators and Analyzers, were hard to maintain and test.

Investment Group : ME2 Malnutrition Projects ; 02/13/2014			
Investment	All	Alt. 0	Alt. 1
Name		ME2 Project 01	ME2 Project 02
Date		11/03/2016	11/03/2016
Label		BUD01	BUD01
Alternative		A	B
Indicator 0		Food Security Score	Food Security Score
Observations		1.0	1.0
Date		11/01/2016	11/01/2016
Label		I122	I122
Most Unit		security score	food security score
Most		96,554.2192	340,793.8931
Most Amount Change		0.00	0.00
Most Percent Change		0.00	0.00
Most Base Change		0.00	244,239.67
Most Base Percent Change		0.00	252.96
Lower Unit		lower 80 % ci	lower 80 % ci
Lower		95,817.9202	336,508.8562
Lower Amount Change		0.00	0.00
Lower Percent Change		0.00	0.00
Lower Base Change		0.00	240,690.94
Lower Base Percent Change		0.00	251.20
Upper Unit		upper 80 % ci	upper 80 % ci
Upper		97,290.5182	345,078.9300
Upper Amount Change		0.00	0.00
Upper Percent Change		0.00	0.00
Upper Base Change		0.00	247,788.41

4. Progress 1 Analysis

A *Progress 1 Analysis* uses the Totals calculations to measure actual versus planned progress for aggregated Indicators. The planned Indicators use a Target Type property of Benchmark. The actual Indicators use a Target Type property of Actual. The U.S. GAO (2009) emphasizes using Earned Value Management (EVM) best practices to ensure the cost of work completed aligns with the value of work performed. A key requirement of EVM is to measure budget variances and scheduling variances. Budget variances measure the costs (and benefits) of work planned versus actual work completed. Scheduling variances measure the amount, quality, and timeliness of work planned versus actual work completed. EVM uses both variances to measure changes in the value of work planned versus actual work completed. A *Progress 1 Analysis* measures all of these variances. DevTreks' best practices extend EVM to include Outputs (work progress), Outcomes (technical performance), Benefits (earned value), and M&E Indicators (performance effectiveness).

Further documentation about these analyses can be found in the *Earned Value Management Analysis 1* reference.

A Progress Analysis of the quarterly data shown for the first of the previous Totals Analysis, or Aggregate Using = None, shows that, the Target Types for the 2013, 2014, 2015, and 2016, years have been set, respectively, to benchmark, actual, benchmark, and actual. Progress is being compared between the 2013 benchmark and 2014 actual, and the 2015 benchmark and 2016 actual. This image displays the Score analysis only.

A real Progress Analysis should compare 4 benchmark years with 4 actual years.

Input Series	All	Alt. 0	Alt. 1	Alt. 2	Alt. 3
Name		2013 Nutrition Training Manual	2014 Nutrition Training Manual Development	2015 Nutrition Training Manual Development	2016 Nutrition Training Manual Development
Label		I120	I120	I120	I120
Target Type		benchmark	actual	benchmark	actual
Indicator 0		Total Manual Development Cost	Total Manual Development Cost	Total Manual Development Cost	Total Manual Cost
Observations		1.0	1.0	1.0	1.0
Date		12/30/2013	12/30/2014	12/30/2015	12/30/2016
Label		I120	I120	I120	I120
Most Unit		total cost	total cost	total cost	total cost
Most Planned Period		91,800.0000	91,800.0000	63,000.0000	63,000.0000
Most Planned Full		154,800.00	154,800.00	154,800.00	154,800.00
Most Planned Cumulative		91,800.00	91,800.00	154,800.00	154,800.00
Most Actual Period		0.00	77,400.00	0.00	14,400.00
Most Actual Cumulative		0.00	77,400.00	0.00	91,800.00
Most Actual Period Progress		0.00	-14,400.00	0.00	-48,600.00
Most Actual Cumul Progress		0.00	-14,400.00	0.00	-63,000.00
Most Plan P Percent		0.00	84.31	0.00	22.86
Most Plan C Percent		0.00	84.31	0.00	59.30
Most Plan Full Percent		0.00	50.00	0.00	59.30
L Unit		none	none	none	none

The following image of the Indicator Progress Analysis shows that the 4 separate quarterly Indicators have been aggregated in each year prior to the final analysis, that is Observations = 4.

Indicator 1	Labor, Q1 Training Development	Labor, Q1 Training Development	Labor, Q1 Training Development	Q1 Manual Development
Observations	4.0	4.0	4.0	4.0
Date	03/30/2013	03/30/2014	03/30/2015	03/30/2016
Label	I120A	I120A	I120A	I120A
Most Unit	total cost	total cost	total cost	total cost
Most Planned Period	91,800.0000	91,800.0000	63,000.0000	63,000.0000
Most Planned Full	154,800.00	154,800.00	154,800.00	154,800.00
Most Planned Cumulative	91,800.00	91,800.00	154,800.00	154,800.00
Most Actual Period	0.00	77,400.00	0.00	14,400.00
Most Actual Cumulative	0.00	77,400.00	0.00	91,800.00
Most Actual Period Progress	0.00	-14,400.00	0.00	-48,600.00
Most Actual Cumul Progress	0.00	-14,400.00	0.00	-63,000.00
Most Plan P Percent	0.00	84.31	0.00	22.86
Most Plan C Percent	0.00	84.31	0.00	59.30
Most Plan Full Percent	0.00	50.00	0.00	59.30
L Unit	none	none	none	none
L Planned Period	0.0000	0.0000	0.0000	0.0000

The following image displays an Operation Progress Analysis. The Indicators in two Operations with different Target types (benchmark and actual) and their children Inputs (also benchmark and actual) are being aggregated and then compared. The Target Types and Labels had to be set correctly in the Operation and Input Indicators being compared. For example, if the Benchmark Operation's Input Indicators mistakenly had a Target Type = none, no Input Indicator changes would occur. The Score has Upper and Lower numbers because it uses CTA algorithms to set those numbers while the sibling Indicators do not use any algorithms.

Operation

2013 Act Food Center Product Delivery OP122 12/31/1901

Target Type: **actual**

Indicator Property	Plan Period	Plan Full	Plan Cumul	Actual Period	Actual Cumul	Actual Period Progress	Actual Cumul Progress	Plan P Percent ; Plan C Percent	Plan Full Percent
Food Purchase Cost OP122 Date: 11/03/2016; Observations: 1.0 Most Unit: total cost; L Unit: lower 75 % ci; U Unit: upper 75 % ci									
Most Likely	5,375,794.3730	10,772,893.91	5,375,794.37	4,508,899.63	4,508,899.63	-866,894.75	-866,894.75	83.87 ; 83.87	41.85
L	5,294,229.8996	10,615,994.65	5,294,229.90	4,430,897.20	4,430,897.20	-863,332.70	-863,332.70	83.69 ; 83.69	41.74
U	5,457,358.8464	10,929,793.17	5,457,358.85	4,586,902.05	4,586,902.05	-870,456.80	-870,456.80	84.05 ; 84.05	41.97
Q1 Food Center Product Delivery OP122A Date: 03/15/2013; Observations: 2.0 Most Unit: total cost; L Unit: none; U Unit: none									
Most Likely	2,500,000.0000	5,000,000.00	2,500,000.00	2,300,000.00	2,300,000.00	-200,000.00	-200,000.00	92.00 ; 92.00	46.00
L	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00 ; 0.00	0.00
U	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00 ; 0.00	0.00
This indicator measures the amount and cost of food product deliveries made each quarter.v150c									
Q3 Food Center Product Delivery OP122B Date: 09/15/2013; Observations: 2.0 Most Unit: total cost; L Unit: none; U Unit: none									
Most Likely	2,897,000.0000	5,794,000.00	2,897,000.00	2,330,000.00	2,330,000.00	-567,000.00	-567,000.00	80.43 ; 80.43	40.21
L	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00 ; 0.00	0.00
U	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00 ; 0.00	0.00
This indicator measures the amount and cost of food product deliveries made each quarter.									

Inputs

Input: 2013 Act Food Package Purchases I122 02/13/2013

Target Type: **actual**

Indicator				Actual		Actual Period	Actual Cumul	Plan P Percent ; Plan	Plan Full

To successfully compare Time Periods in Budgets, the Time Periods must have Indicators with the correct Labels, Years, and Target Types (**7***). To successfully compare Budgets in Budget Groups, the Budgets and Time Periods must have Indicators with the correct Labels, Years, and Target Types. The current version does not display Input or Output Indicators in Capital or Operating Budget Analysis. The quantity of data displayed can make interpretation of the data difficult. If demand warrants, they can be included in future releases. The following Progress Analysis for Operating Budgets shows how the Compare Only option works:

Budget Group : M and E 2 Malnutrition Projects ; 03/12/2013			
Budget	All	Alt. 0	
Name		ME2 Project 01	
Date		11/01/2016	
Label		B122	
Target Type		0.00	
Time Period	All	Alt. 0	Alt. 1
Name		2013 Food Security	2014 Food Security
Date		12/31/2013	12/31/2014
Label		none	none
Target Type		benchmark	actual
Indicator 0		Food Security Score	Food Security Score
Observations		1.0	1.0
Date		11/01/2016	11/01/2016
Label		I122	I122
Most Unit		security score	food security score
Most Planned Period		170,981.3006	170,981.3006
Most Planned Full		170,981.30	170,981.30
Most Planned Cumulative		170,981.30	170,981.30
Most Actual Period		0.00	157,476.34
Most Actual Cumulative		0.00	157,476.34
Most Actual Period Progress		0.00	-13,504.96
Most Actual Cumul Progress		0.00	-13,504.96

The following image displays a Progress Analysis of 2 Malnutrition projects. Note how the Target Type properties have been properly set. Also note that the Investment.Labels for the 2 Investments are the same (BUD01), as well as the Investment.Indicator.Labels (I122). The

second Investment uses the Investment.Labels to find the base element comparator, ME Project 01. It uses Investment.Indicators.Labels to find the Indicator comparator, Food Security Score. It's useful to experiment by changing Labels in selected base elements to understand how Labels affect analyses (i.e. take a close look at the Labels used for the Investment Statistical and Change Analyses in the examples above).

Investment Group : ME2 Malnutrition Projects ; 02/13/2014			
Investment	**All**	**Alt. 0**	**Alt. 1**
Name		ME2 Project 01	ME2 Project 02
Date		11/03/2016	11/03/2016
Label		BUD01	BUD01
Target Type		benchmark	actual
Indicator 0		Food Security Score	Food Security Score
Observations		1.0	1.0
Date		11/01/2016	11/01/2016
Label		I122	I122
Most Unit		security score	food security score
Most Planned Period		96,554.2192	96,554.2192
Most Planned Full		96,554.22	96,554.22
Most Planned Cumulative		96,554.22	96,554.22
Most Actual Period		0.00	340,793.89
Most Actual Cumulative		0.00	340,793.89
Most Actual Period Progress		0.00	244,239.67
Most Actual Cumul Progress		0.00	244,239.67
Most Plan P Percent		0.00	352.96
Most Plan C Percent		0.00	352.96
Most Plan Full Percent		0.00	352.96
L Unit		lower 80 % ci	lower 80 % ci
L Planned Period		95,817.9202	95,817.9202
L Planned Full		95,817.92	95,817.92
L Planned Cumulative		95,817.92	95,817.92
L Actual Period		0.00	336,508.86
L Actual Cumulative		0.00	336,508.86

Appendix C. DevPacks M&E Analysis (8*)

DevPacks support the analysis of arbitrary hierarchies of data, such as randomized control trial data. They also support a variety of custom analyses, such as the comparisons of base elements that are not siblings. When the data being analyzed is observational M&E data stored in Data URL TEXT files, the resultant metadata analysis can provide scalable and powerful decision support. This appendix contains examples demonstrating different ways to use DevPacks to conduct M&E Analysis. The DevPacks tutorial should be read prior to this Appendix.

Example 1. Change by Alternative (non-sibling base element analysis)

Appendix B displays images of comparative M&E analysis of 2 Capital Investments in 2 alternative malnutrition projects. Although the following localhost URL shows that these are 2 sibling Investments in 1 Investment Group, what if they were not siblings? How could the same **Appendix B** analyses be conducted?

http://localhost:5000/hometreks/preview/farmworkers/investmentgroup/ME2 Malnutrition Projects/275505679/none

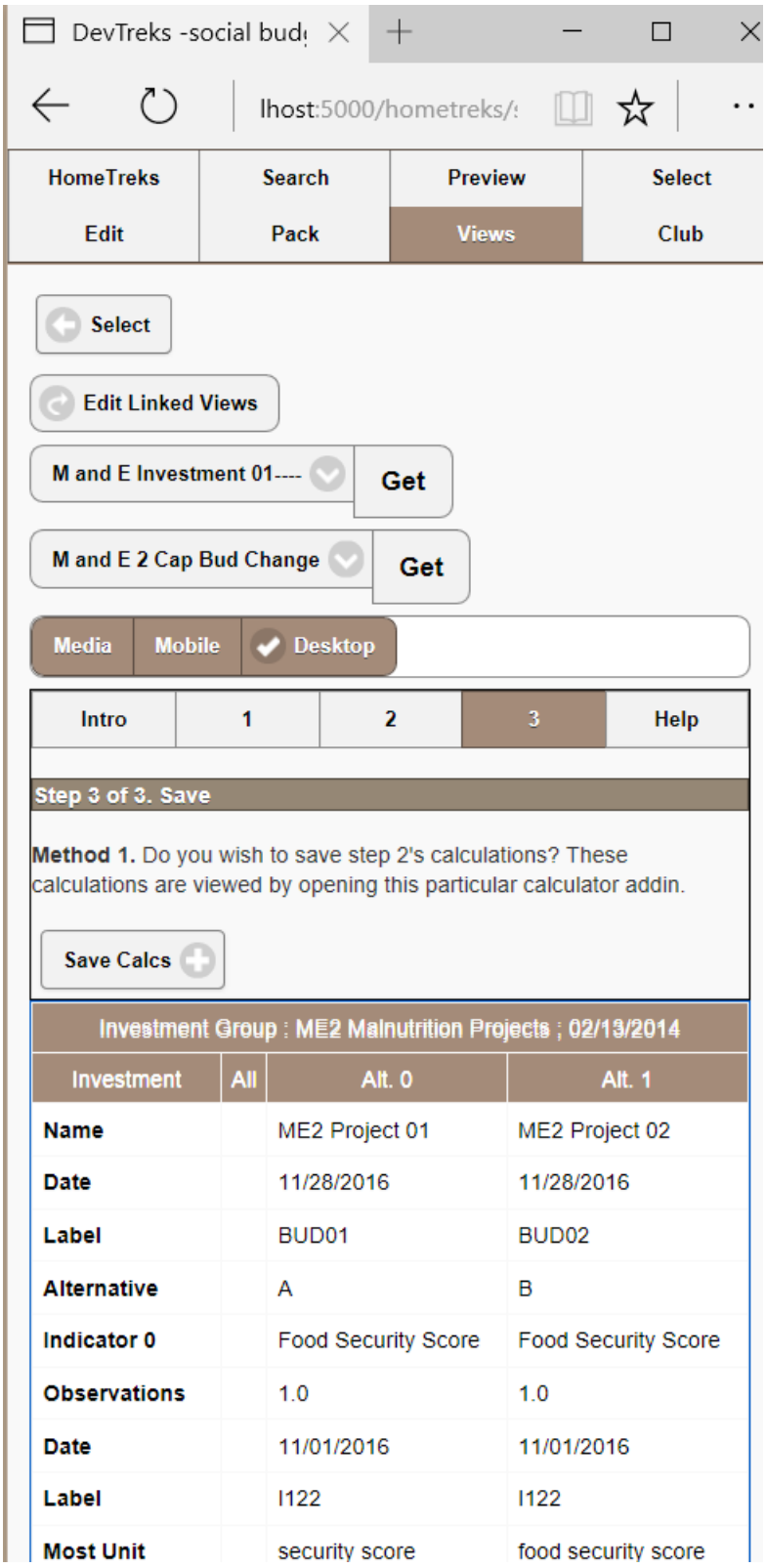
[The following cloud URL shows why cloud URLs aren't being used. Labor constraints resulted in incomplete data for the 2nd investment.

https://www.devtreks.org/hometreks/preview/farmworkers/investmentgroup/M and E 2 Malnutrition Projects/275505679/none]

Example 1 in **Appendix C** of the Resource Stock Analysis tutorial demonstrates how to use DevPacks data services to compare 3 non-sibling Operating Budgets. The following URL demonstrates how to use the same techniques with the M&E tools to compare these two non-sibling Capital Budgets.

http://localhost:5000/hometreks/preview/smallholders/devpackgroup/M and E RCT Tests/78/none

The following image shows the resultant Change by Alternative analysis being completed using the more flexible DevPacks data services. This analysis used 2 of the 4 possible levels of DevPacks base elements. The Resource Stock Analysis tutorial discusses current limitations with this approach.


DevTreks -social bud
lhost:5000/hometreks/
HomeTreks
Search
Preview
Select
Edit
Pack
Views
Club
Select
Edit Linked Views
M and E Investment 01----
Get
M and E 2 Cap Bud Change
Get
Media
Mobile
Desktop
Intro
1
2
3
Help
Step 3 of 3. Save
Method 1. Do you wish to save step 2's calculations? These calculations are viewed by opening this particular calculator addin.
Save Calcs
Investment Group : ME2 Malnutrition Projects ; 02/13/2014
Investment
All
Alt. 0
Alt. 1
Name
ME2 Project 01
ME2 Project 02
Date
11/28/2016
11/28/2016
Label
BUD01
BUD02
Alternative
A
B
Indicator 0
Food Security Score
Food Security Score
Observations
1.0
1.0
Date
11/01/2016
11/01/2016
Label
I122
I122
Most Unit
security score
food security score