Using a Free App to Resolve Commonplace Control Chart, Process Capability, and KPI Reporting Issues

Forrest W. Breyfogle III

forrest@smartersolutions.com, 512-695-4424 (M)

Send me an email if you would like for me to send you a copy of these presentation slides, which contains links to the referenced metric reporting app, videos, articles, and books.

I will again provide my email at the end of this session

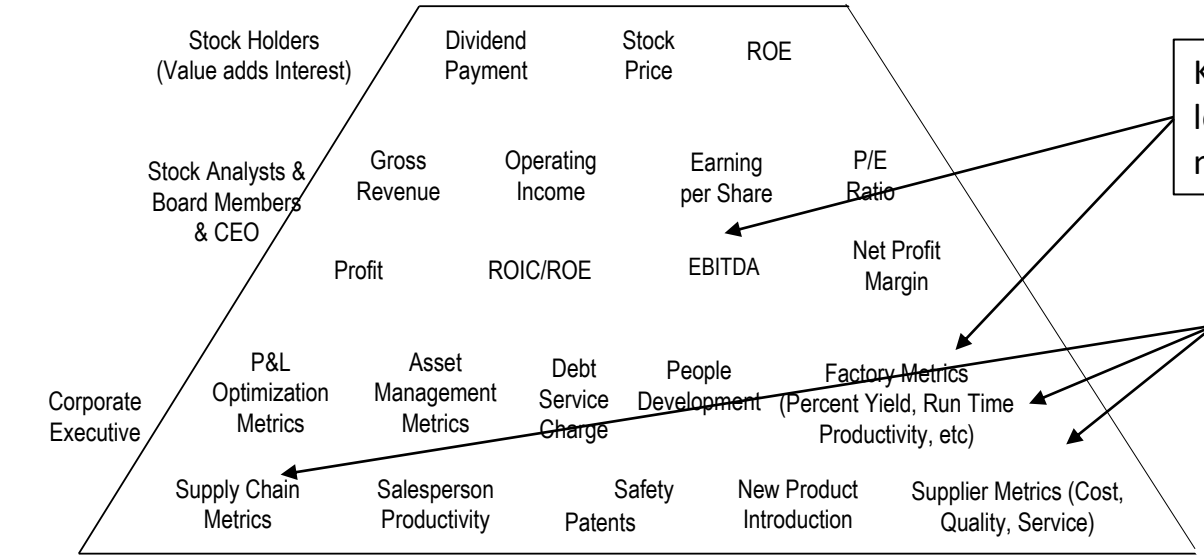
Objectives

- Performance metric reports should lead to the best actions or non-actions throughout an organization; however, this typically does not occur.

- This session illustrates the shortcomings of the traditional reporting practices of
  - Control charts for a Y response in the relationship Y=f(x)
  - Process capability indices (Cp, Cpk, Pp, and Ppk)
  - Process-performance metrics
  - Key Performance Indices (KPIs) reporting

- This session shows the benefits and how to use a free app to resolve these organizational reporting issues and associated process improvement efforts.

Organizational Metrics and their Traditional Reporting



Key Performance Indicator (KPI) and high-level performance reporting, e.g., a table of numbers or red-yellow-green scorecard

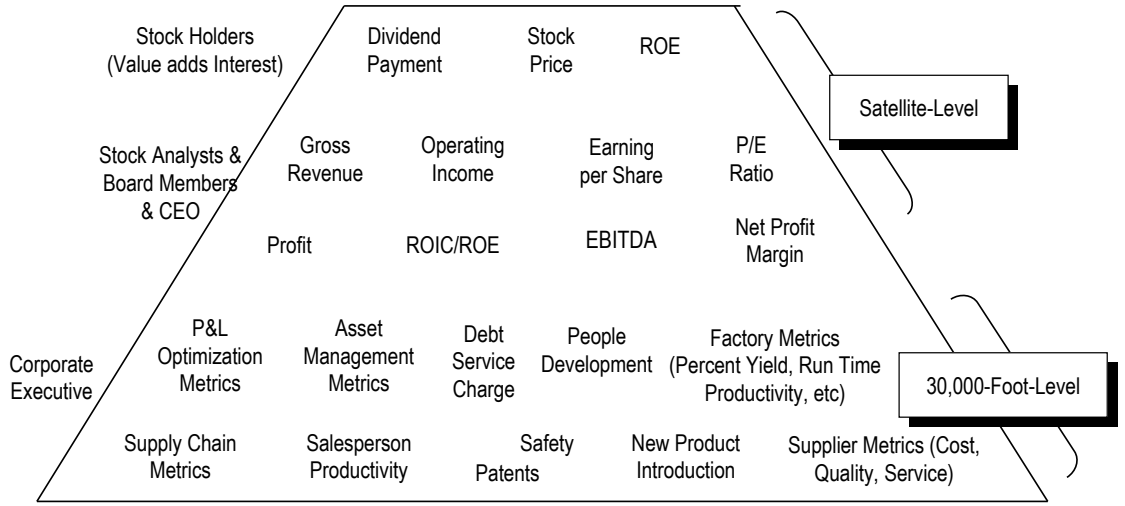
Control charts and Process capability indices (Cp, Cpk, Pp, and Ppk) reporting

EBITDA is earnings before interest, taxes, depreciation, and amortization

ROE = Return on Equity; OI = Operating Income; P/E = Price to Earnings; ROIC = Return on Invested Capital

P&L = Profit & Loss; EBITDA = Earnings Before Interest Taxes Depreciation Amortization; VOC = Voice of the Customer

Organizational Metrics and Integrated Enterprise Excellence (IEE) Metric Reporting



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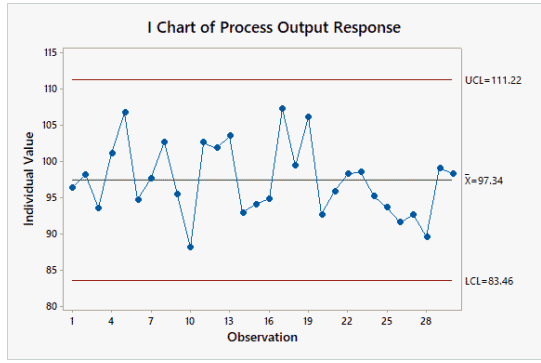
This session will describe the benefits and how to use a free app for creating satellite-level and 30,000-foot-level metrics: www.smartersolutions.com/eprs-metrics-software

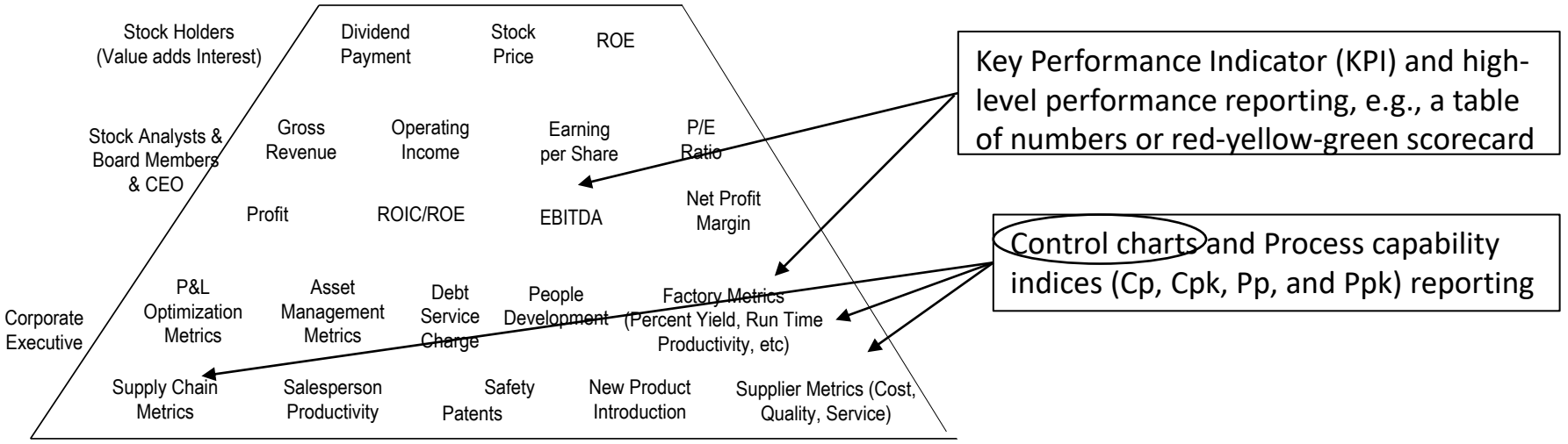
Issues with Traditional Metrics Reporting

Control Charts



Control charts (what they do and don't do)

1. Purpose: Identify "out-of-control" signals for timely actions
2. Do not do: State whether a process is good or bad relative to customer needs
3. Unintended consequence: Can create false out-of-control signals



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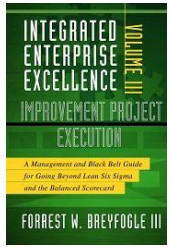
UCL and LCL Calculations

1. Purpose of Upper Control Limit (UCL) and Lower Control Limit (LCL) values
2. Identification of common and special cause events
3. Consideration when calculating UCL and LCL values
4. Value of an individuals control chart over other charts

Supporting articles and book

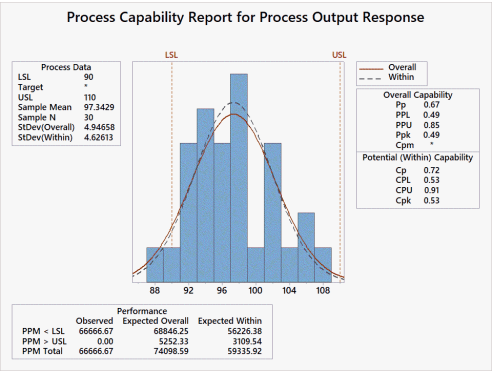
https://smartersolutions.com/resources/x-bar-and-r-control-chart-issues-and-resolution
https://smartersolutions.com/resources/p-chart-issues-and-resolution
https://smartersolutions.com/resources/c-chart-issues-and-resolution



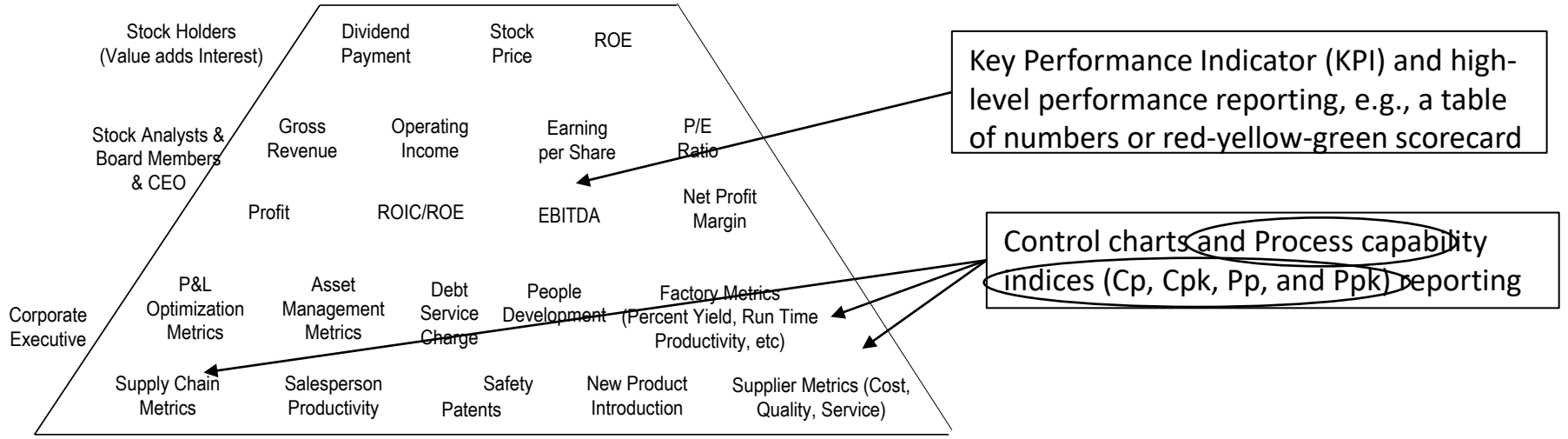
Chapters 12 & 13

This presentation-provided free 30,000-foot-level reporting app addresses these issues.

Process Capability Indices



1. Process Capability/Performance Indices (i.e., Cp, Cpk, Pp, and Ppk) reported values
2. Interpretation and their dependency issues
3. Only a snapshot in time



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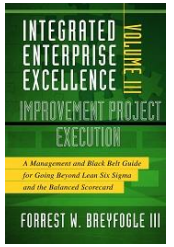
Process Capability and Performance Indices

- Organizational need for process output response understanding
- Traditional process capability and performance indices do not fulfill this need
- Cp, Cpk, Pp, and Ppk reported values have issues
  1. Process stability
  2. Data distribution
  3. Difficult to understand
  4. Depends on how data were collected
  5. Requires a specification
  6. Calculated at one point in time
  7. Provides no prediction statement
  8. Does not encourage process improvement

Supporting article and book

https://smartersolutions.com/resources/process-capability-Cp-Cpk-Pp-Ppk-issues-and-resolution

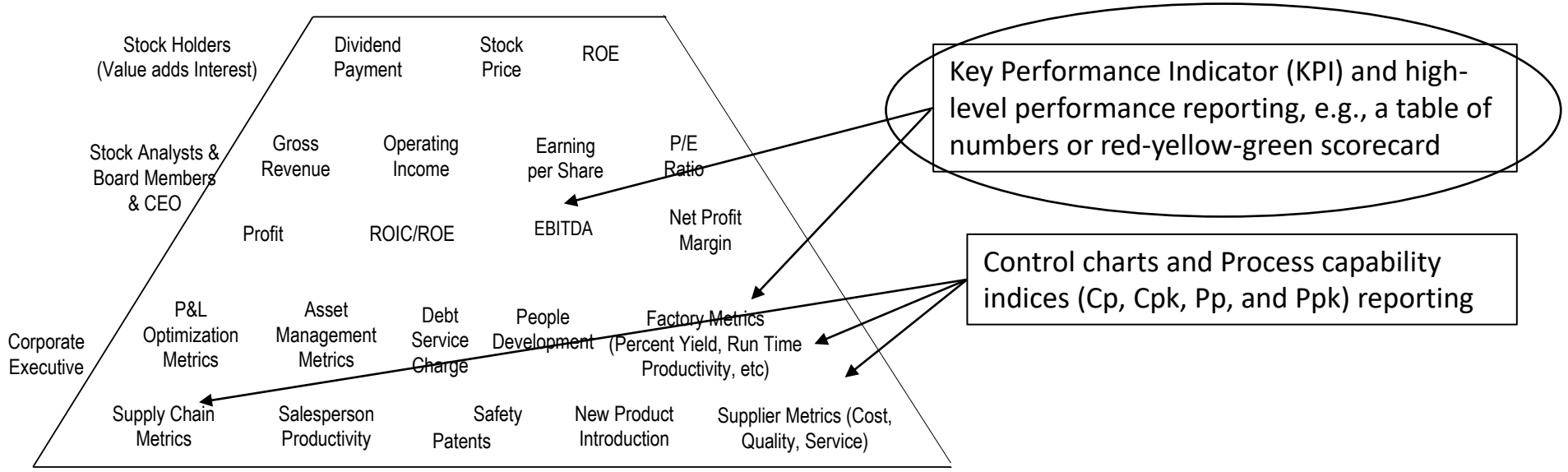


Chapters 12 & 13

This presentation-provided free 30,000-foot-level reporting app addresses these issues.

Key Performance Indicator (KPI) and High-Level Performance Metric Reporting

1. Use and objectives of this reporting
2. Do reporting formats lead to best behaviors?
3. Process Improvement Encouragement?



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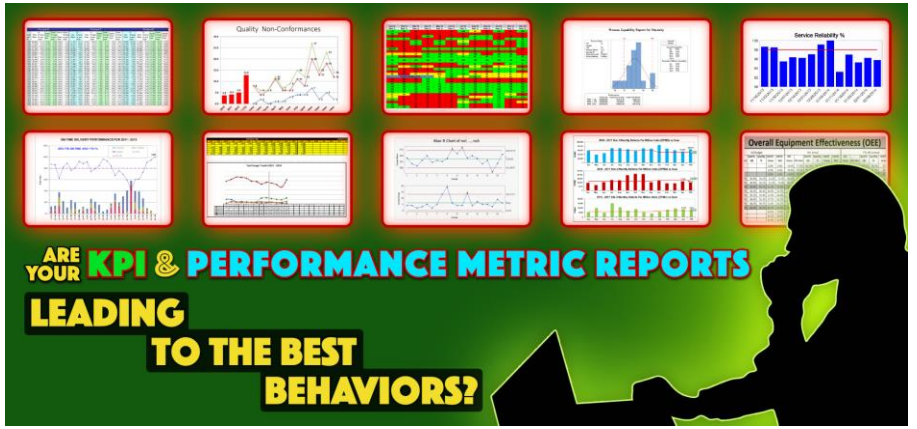
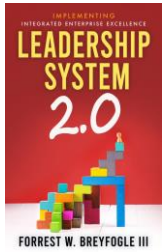
KPI and Performance Metric Reporting



1. KPI and Performance reporting formats
2. Y management in the relationship Y = f(X) in an organization
3. Not encouraging improving the X's
4. Implication of reporting format

Supporting article and books
https://smartersolutions.com/kpi-and-performance-metrics-reporting-2-0.html

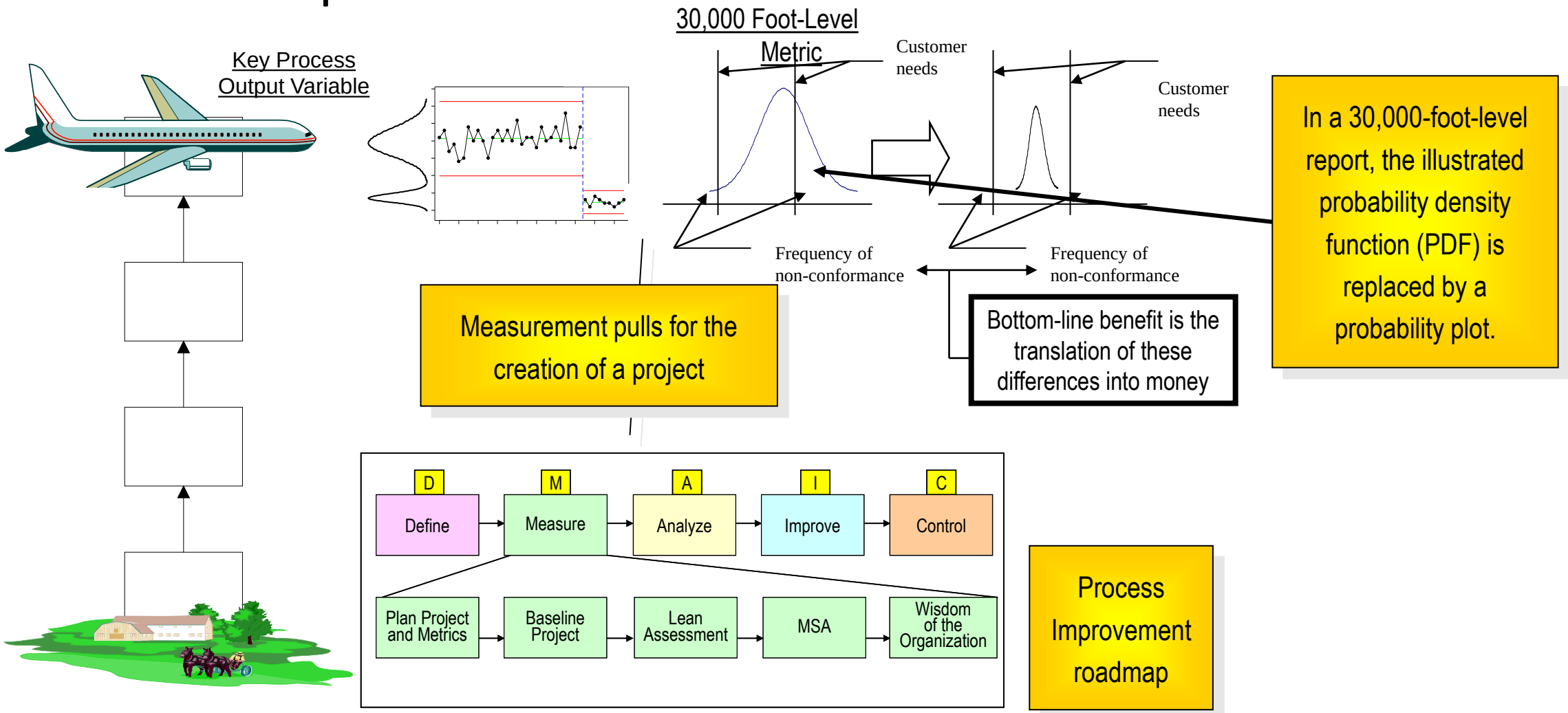


This presentation-provided free 30,000-foot-level reporting app addresses these issues.

IEE Reporting that Resolves Traditional Metrics Reporting Issues

30,000-foot-level reporting and Process Improvement

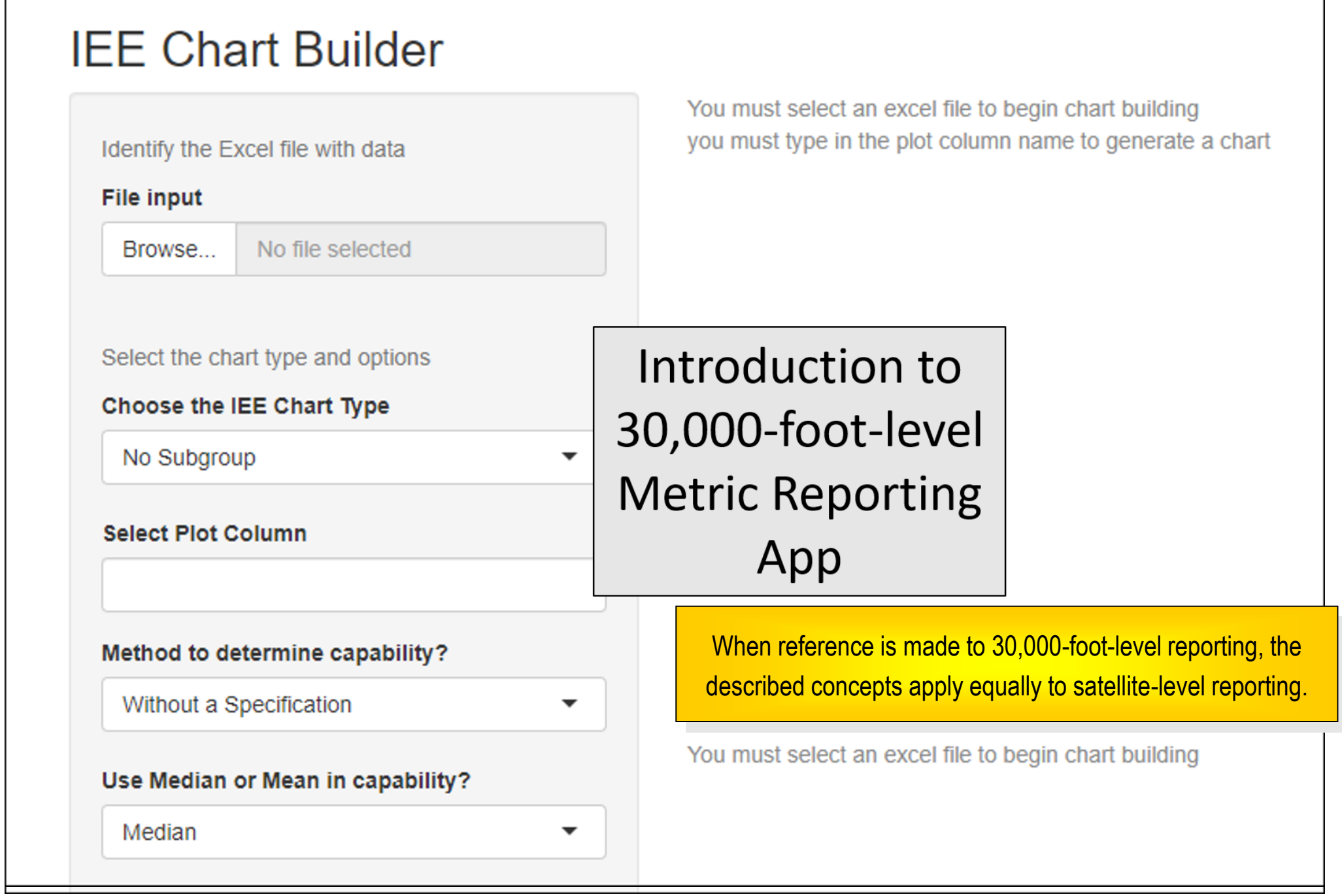
Continuous Response



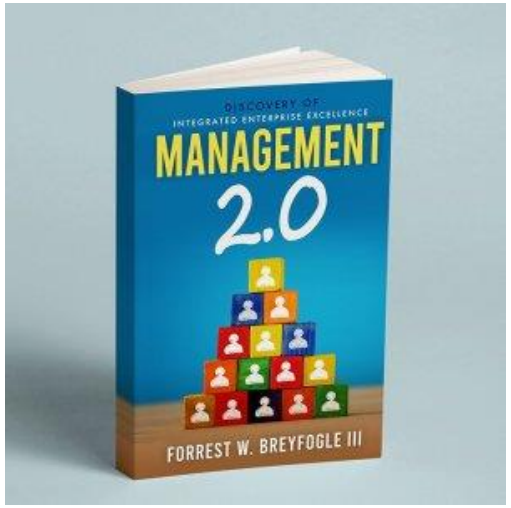
30,000-foot-level/Satellite-level reporting

30,000-foot-level/satellite-level reporting provides:

1. One chart process stability and capability reporting
2. Easy to understand wording
3. No specification need
4. Prediction statement and process improvement
5. Consistent reporting
6. Process change reporting
7. Organizational consistency in reporting


IEE Chart Builder
Identify the Excel file with data
File input
Browse...
No file selected
Select the chart type and options
Choose the IEE Chart Type
No Subgroup
Select Plot Column
Method to determine capability?
Without a Specification
Use Median or Mean in capability?
Median
You must select an excel file to begin chart building
you must type in the plot column name to generate a chart
Introduction to 30,000-foot-level Metric Reporting App
When reference is made to 30,000-foot-level reporting, the described concepts apply equally to satellite-level reporting.
You must select an excel file to begin chart building

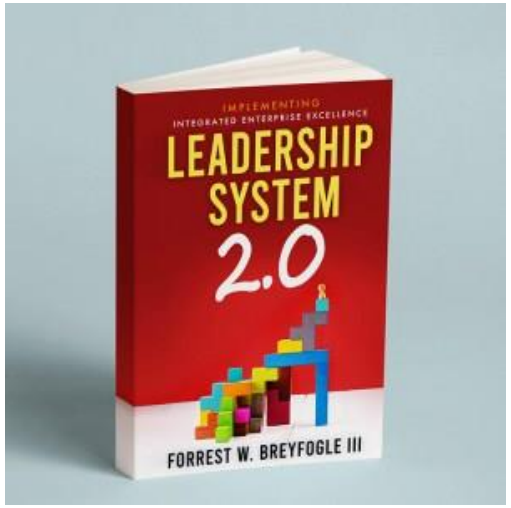
30,000-foot-level Metric Reporting: Enterprise Performance Reporting System (EPRS) Software App



Appendix A

Twenty 30,000-foot-level metric reporting application examples are described in the *Management 2.0* and *Leadership System 2.0* books.

Access to a free 30,000-foot-level metric creation app is provided in the books' appendix.



Appendix B

Web page 13: EPRS-Metrics Software – 30,000-foot-level and Satellite-level Performance Metrics Reporting Summary: Provides software for the creation of 30,000-foot-level and satellite-level performance metric reports for various types of time-series data, using EPRS-metrics software. Web page: www.smartersolutions.com/eprs-metrics-software

The above appendix-provided link will go to the webpage …

30,000-foot-level Metric Reporting: Enterprise Performance Reporting System (EPRS) Software App

Free Business Process Management Software

This free business process management software can provide a prediction statement for stable output response processes.

When a high-level (or 30,000-foot-level) process management response is undesirable, this unsatisfactory response "pulls" for the creation of an improvement project.

This free Enterprise Performance Reporting System (EPRS) software app (CLICK THIS TEXT LINK FOR ACCESS TO THE SOFTWARE) can, for example, create the 30,000-foot-level figures shown in the books *Management 2.0: Discovery of Integrated Enterprise Excellence* and *Leadership System 2.0: Implementing Integrated Enterprise Excellence*.

Instructional videos for application of this app are shown below.

This webpage provides access to the 30,000-foot-level free app and instructional videos

Instructional videos

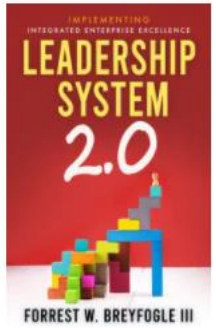
Clicking on this link will go to the sign-up/log-in page…

Home / EPRS Metrics Tool

EPRS-Metrics Software – 30,000-foot-level and Satellite-level Performance Metrics Reporting

Enterprise Performance Reporting System metrics (EPRS-metrics) software provides 30,000-foot-level and satellite-level performance metric reporting for various types of time-series data.

It was stated in **Management 2.0: Discovery of Integrated Enterprise Excellence** & **Leadership System 2.0: Implementing Integrated Enterprise Excellence** that the author intends to have a no-charge licensing fee for use of this software.



One can register and login through the provided links.

Login to the app will lead to …

If you have any problems setting up an account or signing in, contact us at info@smartersolutions.com or 512-918-0280 with the details of your issue.

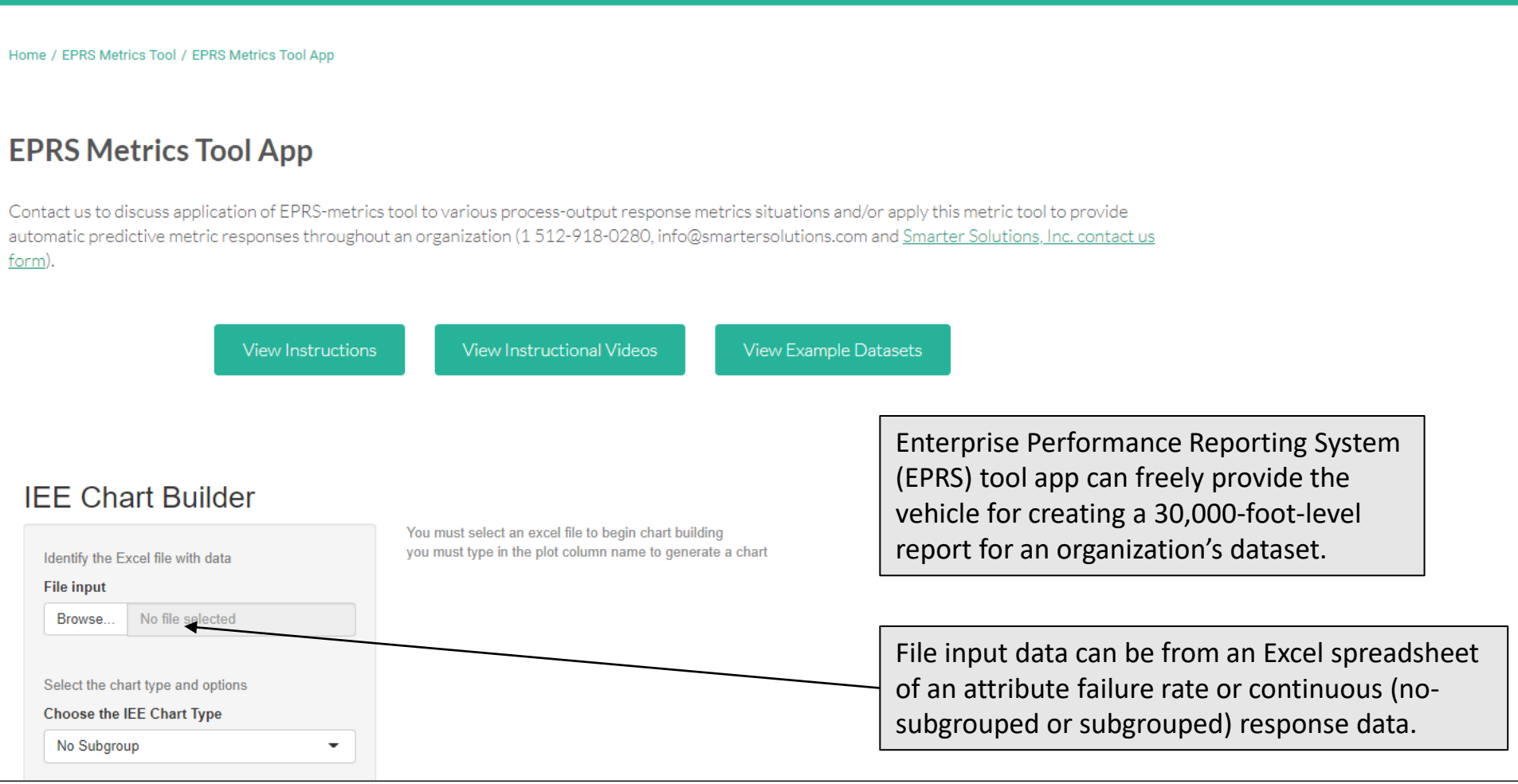
Register Today!

You are only moments away from gaining access to the EPRS Metrics Tool when you register today!

Login Today!

If you already have an EPRS Metrics Tool account, then login here.

EPRS Metrics Tool App



Enterprise Performance Reporting System (EPRS) tool app can freely provide the vehicle for creating a 30,000-foot-level report for an organization's dataset.

File input data can be from an Excel spreadsheet of an attribute failure rate or continuous (no-subgrouped or subgrouped) response data.

IEE Chart Builder

Identify the Excel file with data

File input

Browse... No file selected

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

- No Subgroup
- Subgroup
- Attribute
- Time Series
- Pareto Chart

You must select an excel file to begin chart building
you must type in the plot column name to generate a chart

You must select an excel file to begin chart building

Use Median or Mean in capability?

Median

Stage Column Name

Column to use for I-chart X-axis (may not have repeat values)

Data Distribution Choice

Normal

Arrow is used to select the appropriate data type to create a 30,000-foot-level report.

IEE Chart Builder

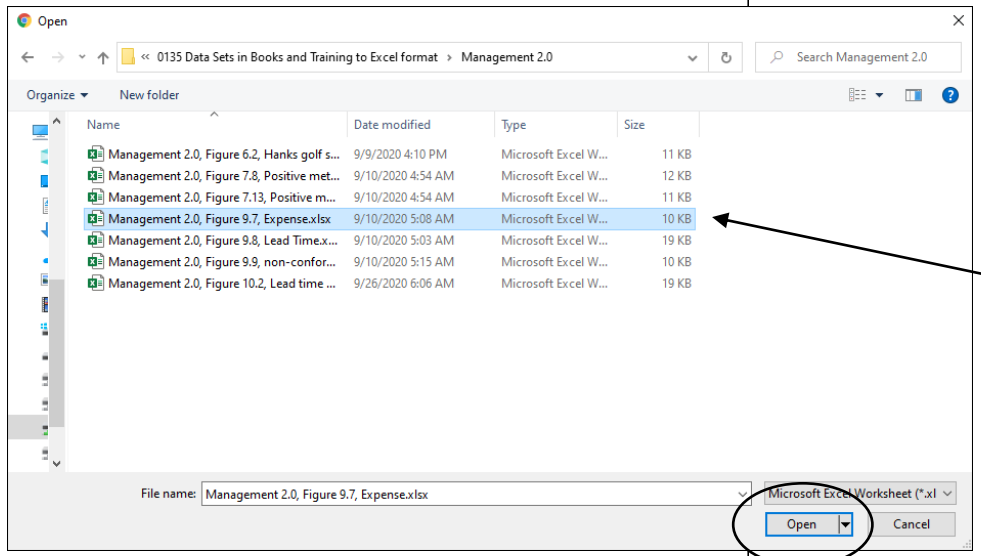
Identify the Excel file with data

File input

Browse... No file selected

You must select an excel file to begin chart building
you must type in the plot column name to generate a chart

Click on browse then select/open an Excel spreadsheet that contains data (in the illustrated format) to create a 30,000-foot-level report.



	A	B
1	Month	Expense
2	1/1/2018	93775
3	2/1/2018	110227
4	3/1/2018	103807
5	4/1/2018	101687
6	5/1/2018	104395
7	6/1/2018	96925
8	7/1/2018	91662
9	8/1/2018	107527
10	9/1/2018	92272
11	10/1/2018	106026
12	11/1/2018	100058
13	12/1/2018	103634
14	1/1/2019	94531
15	2/1/2019	110784
16	3/1/2019	115965
17	4/1/2019	87983
18	5/1/2019	100520
19	6/1/2019	88103
20	7/1/2019	92422
21	8/1/2019	98831
22	9/1/2019	96741
23	10/1/2019	111167

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Method to determine capability?

Without a Specification

Use Median or Mean in capability?

Median

Stage Column Name

Column to use for I-chart X-axis (may not have repeat values)

Data Distribution Choice

Normal

IEE Chart Builder

you must type in the plot column name to generate a chart

Identify the Excel file with data

File input

Browse... | Management 2.0, Figure 9.7, Exp

Upload complete

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Method to determine capability?

Without a Specification

Use Median or Mean in capability?

Median

Stage Column Name

Column to use for I-chart X-axis (may not have repeat values)

Data Distribution Choice

Normal

Month	Expense
2018-01-01	93774.99
2018-02-01	110227.47
2018-03-01	103807.24
2018-04-01	101687.46
2018-05-01	104394.58
2018-06-01	96924.90

A snippet of the upper left corner of the loaded spreadsheet will then appear.

IEE Chart Builder

Identify the Excel file with data

File input

Browse... | Management 2.0, Figure 9.7, Exp

Upload complete

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Expense

Method to determine capability?

Without a Specification

Use Median or Mean in capability?

Median

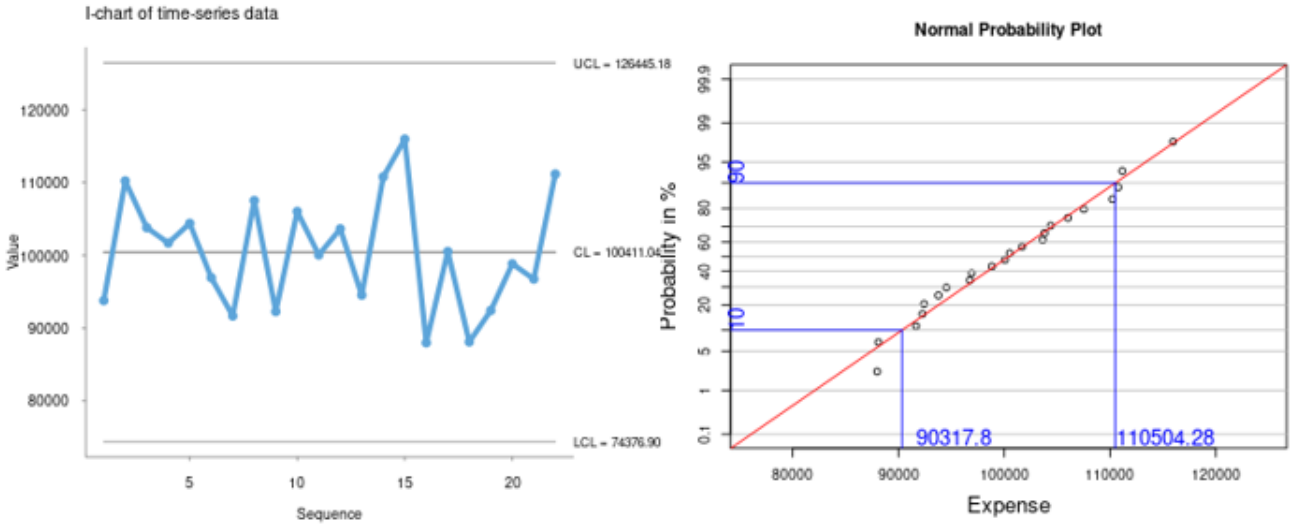
Stage Column Name

Column to use for I-chart X-axis (may not have repeat values)

Data Distribution Choice

Normal

IEE Scorecard for Expense



The current process response is predictable.

The estimated median is 100411.04 with an 80% frequency of occurrence between 90317.8 and 110504.28

Month	Expense
2018-01-01	93774.99
2018-02-01	110227.47
2018-03-01	103807.24
2018-04-01	101687.46
2018-05-01	104394.58
2018-06-01	96924.90

No subgroup is appropriate for this dataset

Copy and paste a data column name to be reported into “Select Plot Column”

A 30,000-foot-level chart will immediately be displayed applying the inputs shown on left.

One can save the report as a PNG image by right clicking on the graphic.

IEE Chart Builder

Identify the Excel file with data

File input

Browse... | Management 2.0, Figure 9.7, Exp

Upload complete

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Expense

Method to determine capability?

Without a Specification

Use Median or Mean in capability?

Median

Median

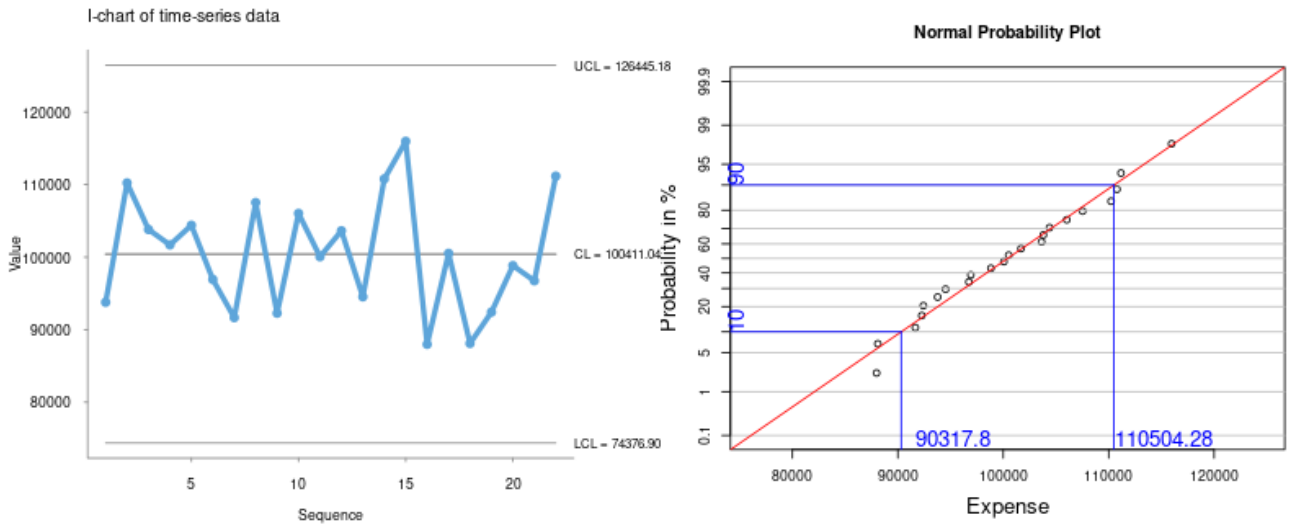
Mean

Column to use for I-chart X-axis (may not have repeat values)

Data Distribution Choice

Normal

IEE Scorecard for Expense



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2018-03-01	103807.24
2018-04-01	101687.46
2018-05-01	104394.58
2018-06-01	96924.90

"Method to determine capability?" option default is no specification, where expected median is reported below the graphic with 80% frequency of occurrence, but one can change this entry to a specification.

Default is the median response is reported, but can change to a mean.

IEE Chart Builder

Identify the Excel file with data

File input

Browse... | Management 2.0, Figure 9.7, Exp

Upload complete

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Expense

Method to determine capability?

Without a Specification

Use Median or Mean in capability?

Mean

Stage Column Name

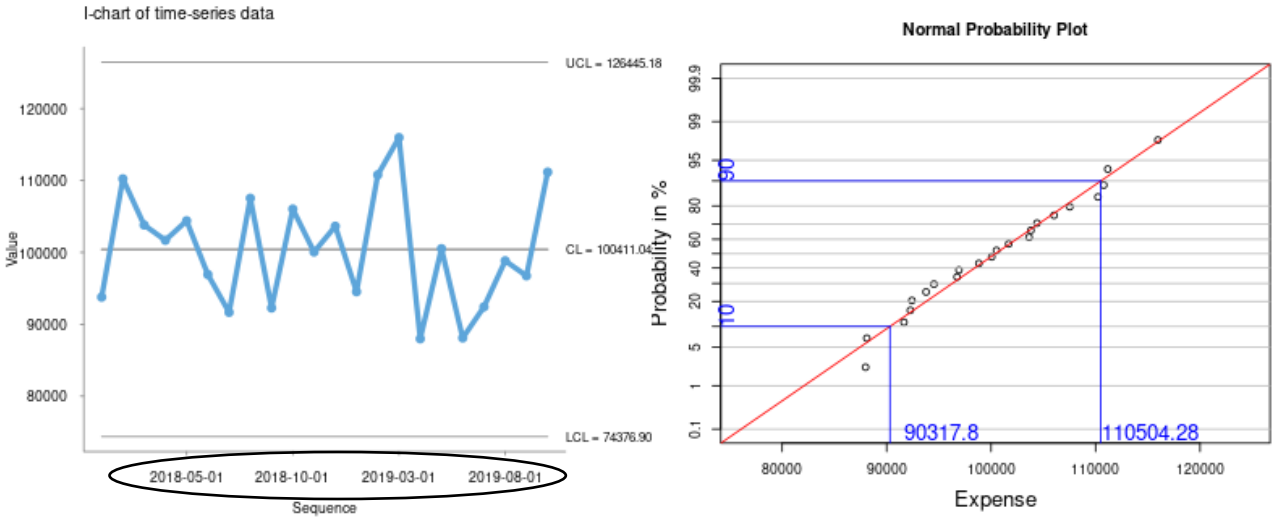
Column to use for I-chart X-axis (may not have repeat values)

Month

Data Distribution Choice

Normal

IEE Scorecard for Expense



The current process response is predictable.

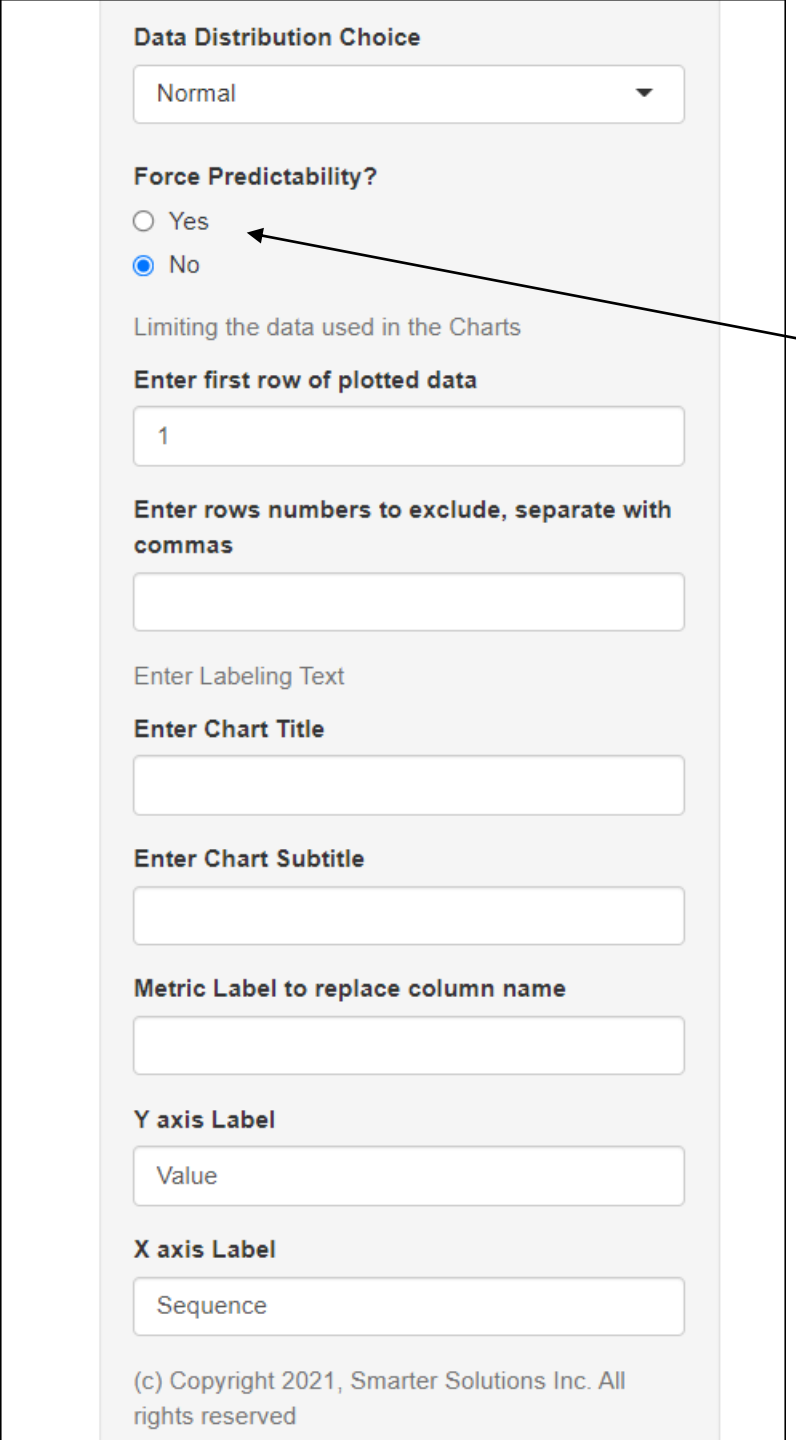
The estimated mean is 100411.04 with an 80% frequency of occurrence between 90317.8 and 110504.28

Month	Expense
2018-01-01	93774.99
2018-02-01	110227.47
2018-03-01	103807.24
2018-04-01	101687.46
2018-05-01	104394.58
2018-06-01	96924.90

To create an x-axis label, copy and paste the title of a column that contains the data time sequence; e.g., month.

Enter a stage column name (e.g., Month) when appropriate. Staging would be appropriate when a process response was enhanced at some point in time because of an improvement project.

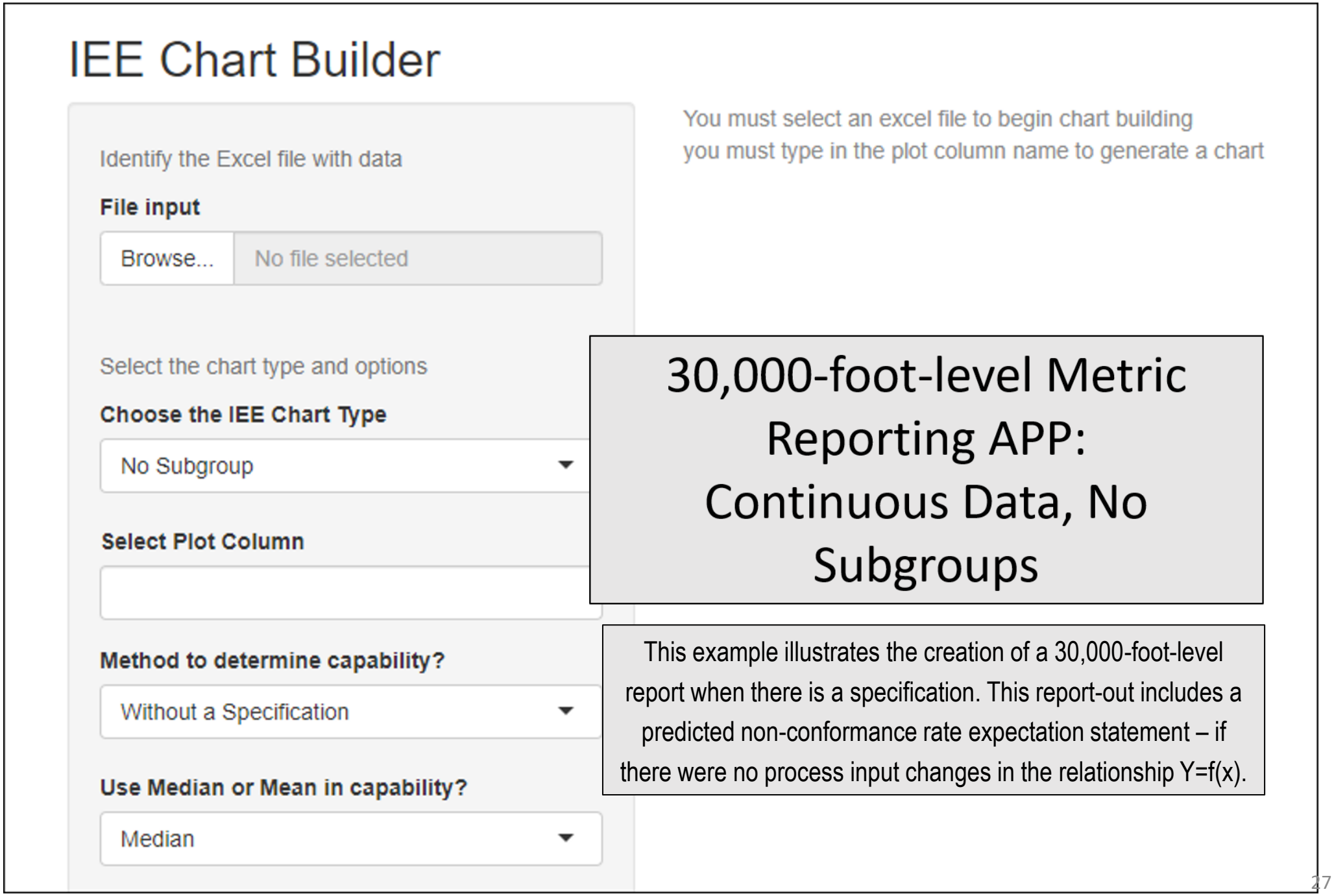
Can change the distribution used to lognormal. Often a log distribution is appropriate when a process is bounded by a value; e.g., zero when tracking time to task completion or flatness of a part, where negative values are not possible.



When a 30,000-foot-level individuals chart has one or more points beyond the chart's UCL or LCL boundaries a "not predictable" statement is reported at the bottom of the chart.

When an individuals chart indicates no trends, a stable process response can have one or more points outside UCL and LCL limits by chance. For this and other situations, a user can select the "yes" "Force Predictability?" option so that a prediction statement will be reported at the bottom of the chart.

Many other functions are available to address specific charting desires.


IEE Chart Builder
Identify the Excel file with data
File input
Browse...
No file selected
You must select an excel file to begin chart building
you must type in the plot column name to generate a chart
Select the chart type and options
Choose the IEE Chart Type
No Subgroup
Select Plot Column
Method to determine capability?
Without a Specification
Use Median or Mean in capability?
Median
30,000-foot-level Metric Reporting APP: Continuous Data, No Subgroups
This example illustrates the creation of a 30,000-foot-level report when there is a specification. This report-out includes a predicted non-conformance rate expectation statement – if there were no process input changes in the relationship Y=f(x).

Dataset used in this app illustration

For this app illustration, 100 randomly generated data values were created to simulate the measurement of one part's manufactured dimension over time.

The part's specification tolerance is 0.495 to 0.505.

Day	Measurement		Day	Measurement		Day	Measurement		Day	Measurement		Day	Measurement
1	0.501456431		21	0.507839262		41	0.49966366		61	0.498911615		81	0.502292762
2	0.499269121		22	0.499839163		42	0.503606367		62	0.503805696		82	0.495027447
3	0.498845162		23	0.50026069		43	0.502290917		63	0.498468229		83	0.502119521
4	0.497646839		24	0.497342361		44	0.500786803		64	0.496795668		84	0.501136571
5	0.508297648		25	0.497998445		45	0.505805232		65	0.50036268		85	0.501033904
6	0.500222242		26	0.494002628		46	0.502065954		66	0.502348168		86	0.495794396
7	0.50220793		27	0.497576581		47	0.504492285		67	0.500756677		87	0.504959907
8	0.501227596		28	0.499881434		48	0.5020162		68	0.499716265		88	0.504424442
9	0.498499		29	0.50129101		49	0.509409996		69	0.502612742		89	0.495888556
10	0.499784204		30	0.495514031		50	0.499179415		70	0.503196228		90	0.498007613
11	0.504754015		31	0.500937739		51	0.500492522		71	0.498329288		91	0.500850165
12	0.498025887		32	0.499082002		52	0.496853533		72	0.498000164		92	0.496946301
13	0.502553888		33	0.49797026		53	0.496556558		73	0.496152374		93	0.500448379
14	0.497576581		34	0.499917259		54	0.499525844		74	0.49829892		94	0.49588915
15	0.5030917		35	0.504062099		55	0.491802761		75	0.497662105		95	0.498075205
16	0.502865897		36	0.501200448		56	0.500585349		76	0.499538156		96	0.494998211
17	0.498026174		37	0.500533043		57	0.497621471		77	0.50214493		97	0.500241116
18	0.497169041		38	0.498768908		58	0.497484801		78	0.49751727		98	0.501467283
19	0.499519569		39	0.496645076		59	0.496582151		79	0.494065602		99	0.499680515
20	0.498578074		40	0.492973117		60	0.499648182		80	0.499889933		100	0.502037536

IEE Chart Builder

Identify the Excel file with data

File input

Browse... | Individual 100 Part Measuremen

Upload complete

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Measurement

Method to determine capability?

Upper and Lower Specification

Upper Specification

0.505

Lower Specification

0.495

Stage Column Name

Column to use for I-chart X-axis (may not have repeat values)

Day

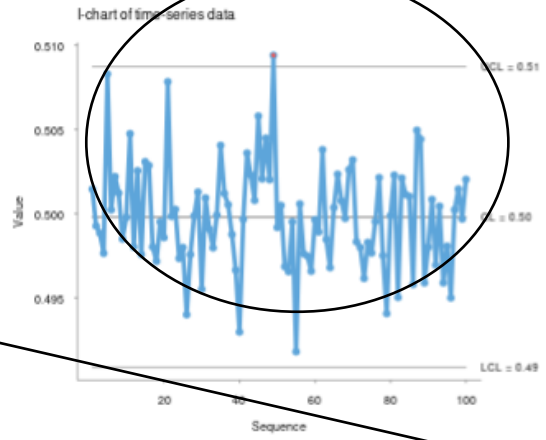
Data Distribution Choice

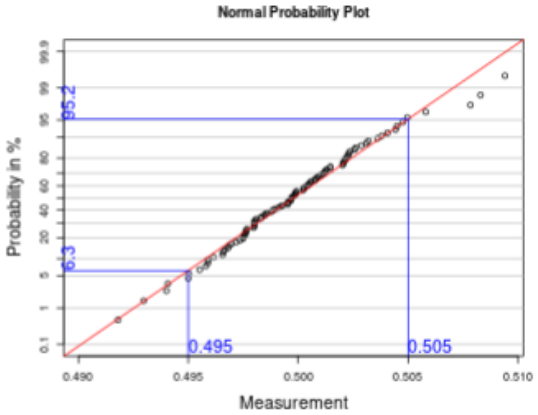
Normal

Force Predictability?

- ○ Yes
- ◉ No

IEE Scorecard for Measurement





The current process response is not predictable.
No predictability estimate is possible

Day	Measurement	...3	Specifications
1.00	0.50	NA	0.49
2.00	0.50	NA	0.51
3.00	0.50	NA	NA
4.00	0.50	NA	NA
5.00	0.51	NA	NA
6.00	0.50	NA	NA

Selected No Subgroup

Copied and pasted “Measurement” column name

Selected “Upper and Lower Specification” Option

Entered Upper Specification Value of 0.505

Entered Lower Specification Value of 0.495

Copied and pasted “Day” column name

- From the individuals chart, it looks like there could have been some data trends; however, this data were randomly generated; hence, the values are what could occur from “common-cause” variation from a process; i.e., as opposed to “special-cause” variation.
- There was one point slightly beyond the UCL limit; hence, the “no predictability” statement at the bottom of the 30,000-foot-level report-out. When there are many data values in an individuals chart, one or more points can be beyond UCL and LCL values by chance; i.e., originate from common-cause not special-cause variation.

Next will enter “Yes” in “Force Predictability?” option

IEE Chart Builder

Identify the Excel file with data

File input

Browse... | Individual 100 Part Measuremen

Upload complete

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Measurement

Method to determine capability?

Upper and Lower Specification

Upper Specification

0.505

Lower Specification

0.495

Stage Column Name

Column to use for I-chart X-axis (may not have repeat values)

Day

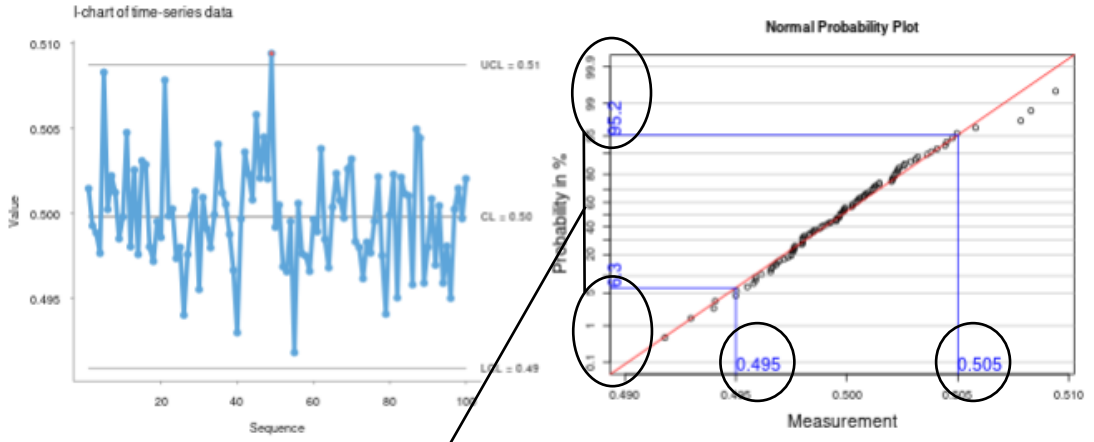
Data Distribution Choice

Normal

Force Predictability?

- (•) Yes
- ( ) No

IEE Scorecard for Measurement



The current process response assumed to be predictable.

The estimated non-conformance rate is 11.1%

Day	Measurement	...3	Specifications
1.00	0.50	NA	0.49
2.00	0.50	NA	0.51
3.00	0.50	NA	NA
4.00	0.50	NA	NA
5.00	0.51	NA	NA
6.00	0.50	NA	NA

"Yes" response will consider all the data in the individuals chart to be from common cause variation of a stable process to determine from the probability plot (for the specification limits of 0.495 and 0.505 inches) an estimated non-conformance rate of 11.1%.

If the estimated non-conformance rate of 11.1% is unsatisfactory, process improvement is needed.

"Proof" that a process non-conformance rate was enhanced through a process-improvement effort is the staging of the individuals chart to an enhanced level of performance.

Force Predictability?

- (●) Yes
- ( ) No

Limiting the data used in the Charts

Enter first row of plotted data

1

Enter rows numbers to exclude, separate with commas

Enter Labeling Text

Enter Chart Title

A Manufactured Part's Dimension

Enter Chart Subtitle

Metric Label to replace column name

Y axis Label

Inches

X axis Label

Day

Additional entries to create the previous shown 30,000-foot-level report-out

Typed “A Manufactured Part’s Dimension” entry

Typed “inches” entry

Typed “Day” entry

IEE Chart Builder

Identify the Excel file with data

File input

Browse... Individual 100 Part Measuremen

Upload complete

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Measurement

Method to determine capability?

Upper and Lower Specification

Upper Specification

0.505

Lower Specification

0.495

Stage Column Name

Column to use for I-chart X-axis (may not have repeat values)

Day

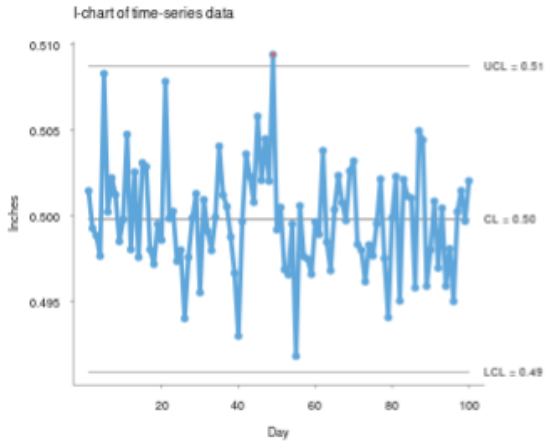
Data Distribution Choice

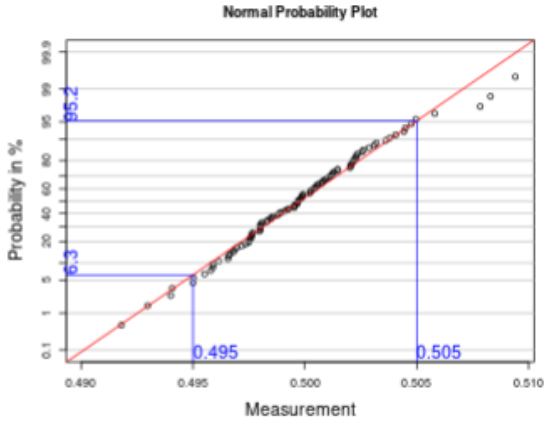
Normal

Force Predictability?

- (•) Yes
- ( ) No

A Manufactured Part's Dimension





The current process response assumed to be predictable.

The estimated non-conformance rate is 11.1%

Day	Measurement	...3	Specifications
1.00	0.50	NA	0.49
2.00	0.50	NA	0.51
3.00	0.50	NA	NA
4.00	0.50	NA	NA
5.00	0.51	NA	NA
6.00	0.50	NA	NA

The resulting 30,000-foot-level report

One can save the report as a PNG image by right clicking on the graphic.

IEE Chart Builder

Identify the Excel file with data

File input

Browse... No file selected

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Method to determine capability?

Without a Specification

Use Median or Mean in capability?

Median

You must select an excel file to begin chart building
you must type in the plot column name to generate a chart

30,000-foot-level Metric Reporting APP: Continuous Data, No Subgroups, Process Improvement

You must select an excel file to begin chart building

Dataset used in this app illustration

For this app illustration, a 30,000-foot-level report is created for John's 51 actual hemoglobin A1C diabetes test measurements.

There is no "specification" for an A1C measurement. A normal A1C level is below 5.7%, a level of 5.7% to 6.4% indicates prediabetes, and a level of 6.5% or more indicates diabetes. Within the 5.7% to 6.4% prediabetes range, the higher A1C, the greater risk for developing type 2 diabetes.

Date	Hemoglobin A1C		Date	Hemoglobin A1C		Date	Hemoglobin A1C
7/26/2001	8.5		11/9/2005	6.5		10/12/2010	6.6
10/30/2001	7.7		2/10/2006	6.5		3/23/2011	6.5
1/25/2002	8.0		5/26/2006	6.1		6/29/2011	7.3
3/26/2002	7.0		8/15/2006	6.2		10/7/2011	7.1
6/19/2002	6.2		11/3/2006	6.3		1/5/2012	6.8
10/17/2002	6.7		1/31/2007	6.1		4/11/2012	6.3
1/15/2003	6.5		5/1/2007	6.2		7/1/2012	6.5
4/15/2003	7.0		7/30/2007	6.6		10/1/2012	7.0
7/17/2003	6.7		10/29/2007	6.6		1/10/2013	6.1
10/15/2003	7.2		1/15/2008	7.1		4/12/2013	6.4
1/9/2004	6.5		3/15/2008	6.2		7/26/2013	5.7
4/9/2004	6.8		7/7/2008	5.8		10/28/2013	6.4
7/23/2004	7.0		10/24/2008	6.0		1/27/2014	6.2
10/27/2004	6.7		5/10/2009	6.2		6/9/2014	6.2
1/25/2005	6.5		11/2/2009	6.3		9/15/2014	6.2
4/28/2005	6.6		3/24/2010	6.6		12/15/2014	6.2
7/24/2005	5.9		6/25/2010	6.3		3/20/2015	6.0

Reference will later be made to control chart pattern rule numbers for determining whether a 30,000-foot-level individuals chart response changed over time.

These control charting rules are described in *Integrated Enterprise Excellence Volume III*, Section 10.3.

IEE Chart Builder

Excel dataset is identified and loaded into Integrated Enterprise Excellence (IEE) Chart Builder app.

Identify the Excel file with data

File input

Browse... | A1C and Sugar level test results

Upload complete

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Hemoglobin.A1C

Method to determine capability?

Without a Specification

Use Median or Mean in capability?

Mean

Stage Column Name

Column to use for I-chart X-axis (may not have repeat values)

Date

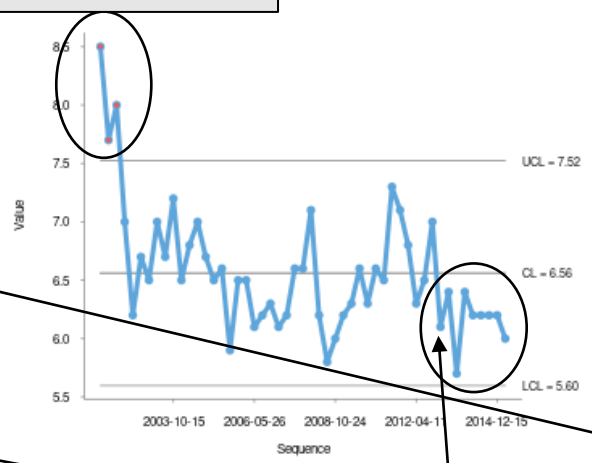
Data Distribution Choice

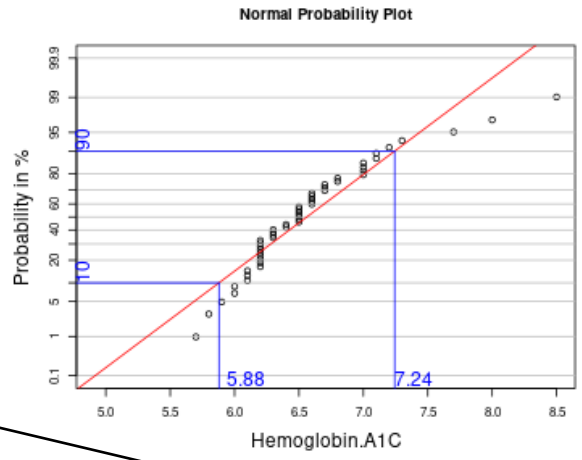
Normal

Force Predictability?

- Yes
- No

IEE Scorecard for Hemoglobin.A1C





The current process response is not predictable.
No predictability estimate is possible

Date	Hemoglobin.A1C	Date.of.last.apparent.metric.improvement
2001-07-26	8.50	2013-01-10
2001-10-30	7.70	NA
2002-01-25	8.00	NA
2002-03-26	7.00	NA
2002-06-19	6.20	NA
2002-10-17	6.70	NA

No Subgroup is appropriate for this data type

Excel column name to be reported is copied and entered into this field. (Note, this program was written in R, which replaces spaces with periods.)

Changed from Median to Mean

Entered the Excel column name that contained test dates

Chart observations:

Individuals chart: Control charting rule 1 suggests the measurement response changed after the first three data points.

Individuals chart: Control charting rule 4 suggests the measurement response changed on 2013-01-10.

Next step: Will stage the individuals chart on 2013-01-10

IEE Chart Builder

Identify the Excel file with data

File input

Browse... | A1C and Sugar level test results

Upload complete

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Hemoglobin.A1C

Method to determine capability?

Without a Specification

Use Median or Mean in capability?

Mean

Stage Column Name

Date

Optional: Choose the format of Stage Value

Date

Enter Stage Value. Entry must exist in Stage column.

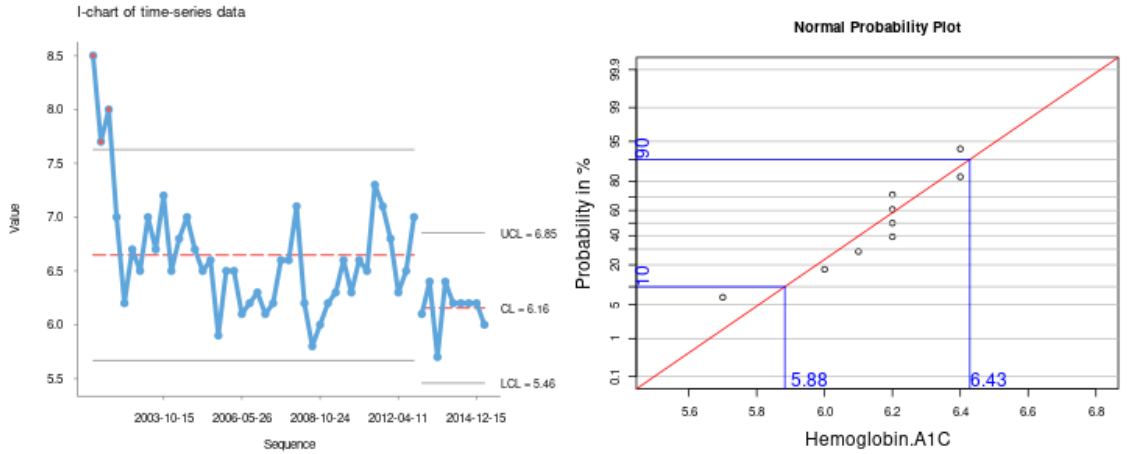
2013-01-10

Date Stage Values must use Format 'yyyy-mm-dd'

Column to use for I-chart X-axis (may not have repeat values)

Date

IEE Scorecard for Hemoglobin.A1C



The current process response is predictable.

The estimated mean is 6.16 with an 80% frequency of occurrence between 5.88 and 6.43

Date	Hemoglobin.A1C	Date.of.last.apparent.metric.improvement
2001-07-26	8.50	2013-01-10
2001-10-30	7.70	NA
2002-01-25	8.00	NA
2002-03-26	7.00	NA
2002-06-19	6.20	NA
2002-10-17	6.70	NA

Staging the Individuals chart

Copy the Excel column name that will be used to identify the time-series point for staging the individuals chart.

Select from the options which type of data will be used to identify the staging value. “Date” was selected for this illustration.

Enter the value in the “Stage Column Name” where staging is to occur.

Column to use for I-chart X-axis (may not have repeat values)

Date

Data Distribution Choice

Normal

Force Predictability?

- Yes
- No

Limiting the data used in the Charts

Enter first row of plotted data

1

Enter rows numbers to exclude, separate with commas

Enter Labeling Text

Enter Chart Title

John's Hemoglobin A1C

Enter Chart Subtitle

Metric Label to replace column name

Y axis Label

Hemoglobin A1C (%)

X axis Label

Test Date

Additional entries to create the previous shown 30,000-foot-level report-out

Entered a chart title

Entered a Y axis Label

Entered a x axis Label

IEE Chart Builder

Identify the Excel file with data

File input

Browse... A1C and Sugar level test results

Upload complete

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Hemoglobin.A1C

Method to determine capability?

Without a Specification

Use Median or Mean in capability?

Mean

Stage Column Name

Date

Optional: Choose the format of Stage Value

Date

Enter Stage Value. Entry must exist in Stage column.

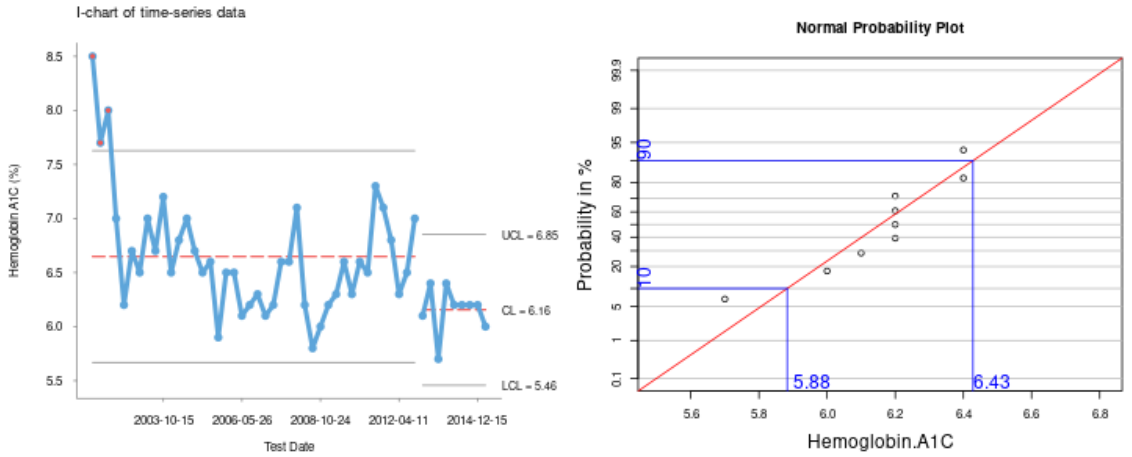
2013-01-10

Date Stage Values must use Format 'yyyy-mm-dd'

Column to use for I-chart X-axis (may not have repeat values)

Date

John's Hemoglobin A1C



The current process response is predictable.

The estimated mean is 6.16 with an 80% frequency of occurrence between 5.88 and 6.43

Date	Hemoglobin.A1C	Date.of.last.apparent.metric.improvement
2001-07-26	8.50	2013-01-10
2001-10-30	7.70	NA
2002-01-25	8.00	NA
2002-03-26	7.00	NA
2002-06-19	6.20	NA
2002-10-17	6.70	NA

Conclusions

Dramatic improvements have been made in this reported A1C measurement over the years.

Current expectation is that future A1C measurements will have an approximate mean of 6.16 with 80% (4 out of 5 readings) between 5.88 and 6.43, assuming John continues his current eating and medication practices.

If this futuristic A1C measurement expectation is undesirable, John needs to further improve his eating behaviors and perhaps his medication too.

30,000-foot-level Metric Reporting App Applications

Month	Expense
1/1/2018	93775
2/1/2018	110227
3/1/2018	103807
4/1/2018	101687
5/1/2018	104395
6/1/2018	96925
7/1/2018	91662

- Continuous Data No Subgroups (Tracking so can Detect Process Degradation and Improvements)
  - Monthly reporting of an organization's profit margin or EBITDA over several years; mean and 80% frequency of occurrence rate reporting
  - Lead time from order initiation to completion; mean and 80% frequency of occurrence rate reporting
  - A kaizen event's baseline of cycle time to improve in a manufacturing process; mean and 80% frequency of occurrence rate reporting
  - A measurement on one daily manufactured part that is randomly selected and has a specification requirement; non-conformance rate reporting
  - Replacement to current Cp, Cpk, Pp, and Ppk reporting with a non-conformance rate statement that provides a consistent report-out format which is easier to understand than process capability/performance indices reports
  - Time taken to complete ISO 9001 or supplier audits; also, the number of issues reported in the audit

IEE Chart Builder

Identify the Excel file with data

File input

Browse... No file selected

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Method to determine capability?

Without a Specification

Use Median or Mean in capability?

Median

You must select an excel file to begin chart building
you must type in the plot column name to generate a chart

30,000-foot-level Metric Reporting APP: Continuous Data, With Subgroups

You must select an excel file to begin chart building

Dataset used in this app illustration

For this app illustration, a 30,000-foot-level report is created for the situation where five sample measurements are reported over ten days. The specification range for acceptable measurements is 95 – 105.

This dataset app situation and 30,000-foot-level report is further discussed in *Integrated Enterprise Excellence Volume III*, Example 12.2.

Measurements

Day	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
1	102.7	102.2	102.7	103.3	103.6
2	108.2	108.8	106.7	106.6	109.1
3	101.9	103.0	100.6	101.4	101.3
4	103.9	105.5	104.3	104.5	104.5
5	97.2	99.0	96.5	94.9	96.5
6	94.4	93.0	93.0	95.2	93.6
7	104.7	103.6	103.7	104.7	104.5
8	102.5	102.7	101.2	100.6	103.1
9	101.9	103.1	101.0	101.2	101.4
10	95.0	95.3	95.3	94.4	94.2

App Data Entry Format

Day	Sample Number	Measurement	Specification
1	Sample 1	102.7	95-105
1	Sample 2	102.2	
1	Sample 3	102.7	
1	Sample 4	103.3	
1	Sample 5	103.6	
2	Sample 1	108.2	
2	Sample 2	108.8	
2	Sample 3	106.7	
2	Sample 4	106.6	

IEE Chart Builder

Identify the Excel file with data

File input

Browse... V3 C12, Exam 12-02.1, subgroup

Upload complete

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Measurement

Method to determine capability?

Without a Specification

Use Median or Mean in capability?

Median

Stage Column Name

Column to use for I-chart X-axis (may not have repeat values)

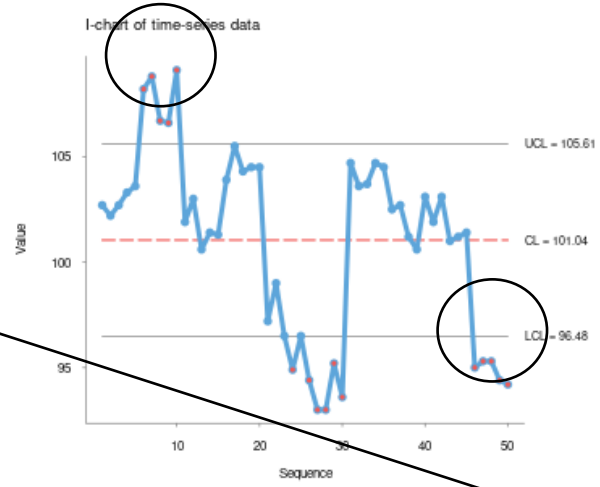
Data Distribution Choice

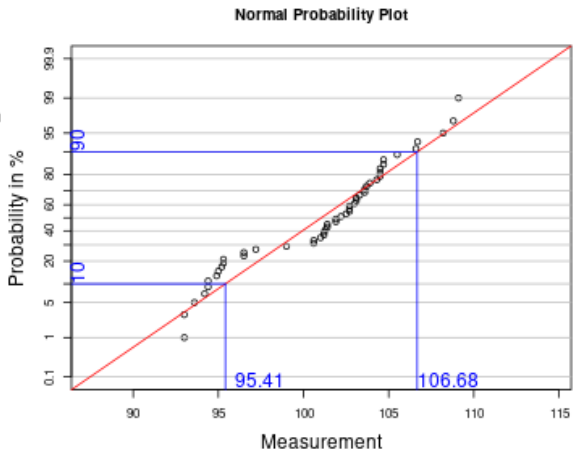
Normal

Force Predictability?

- Yes
- No

IEE Scorecard for Measurement





The current process response is not predictable.
No predictability estimate is possible

Day	Sample.Number	Measurement	Specification
1.00	Sample 1	102.70	95-105
1.00	Sample 2	102.20	NA
1.00	Sample 3	102.70	NA
1.00	Sample 4	103.30	NA
1.00	Sample 5	103.60	NA

One might initially decide to track these reported measurements with no “Daily” subgroups.

Excel column name is copied and entered into this field.

Chart observations and comments

There is a clustering of the 5 daily measurements in the individuals chart.

This no subgroup individuals chart does not consider between-day variation as a source of common-cause variability. Could this no subgrouping of within daily reading of values be creating false out-of-control signals shown in the chart?

Conclusion: Let’s use the “Subgroup” IEE Chart Type option.

IEE Chart Builder

Identify the Excel file with data

File input

Browse... | V3 C12, Exam 12-02.1, subgrou

Upload complete

Select the chart type and options

Choose the IEE Chart Type

Subgroup

Select Plot Column

Measurement

Subgrouping column

Day

☐ Apply Ln to Std. Dev

Add Box-Plot Column (optional)

Method to determine capability?

Upper and Lower Specification

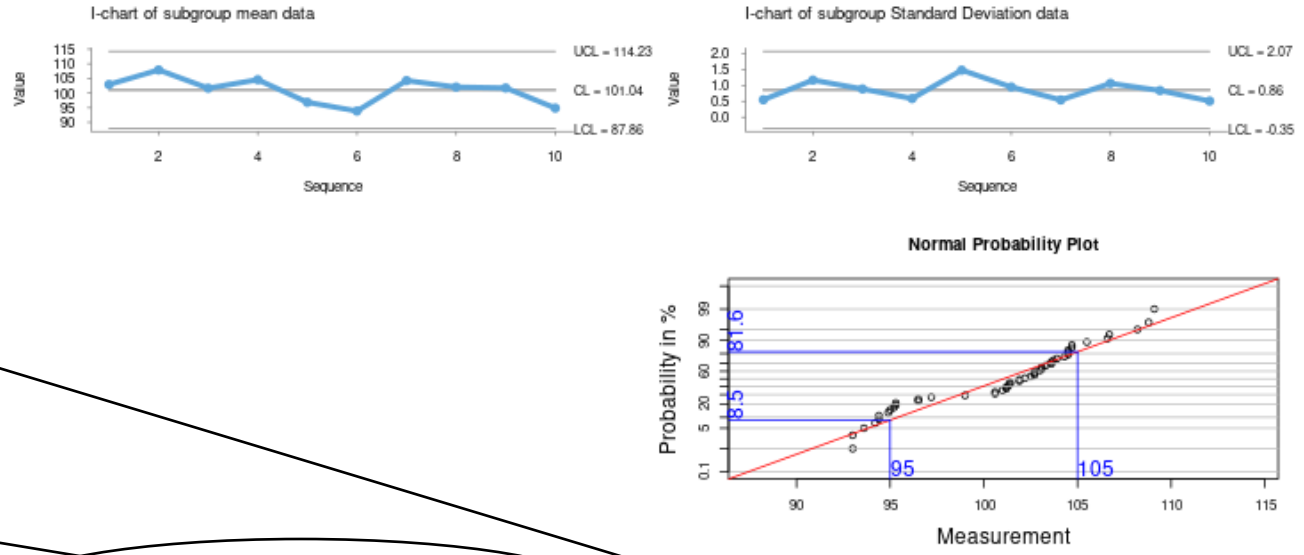
Upper Specification

105

Lower Specification

95

IEE Scorecard for Measurement



The current process response is predictable.
The estimated non-conformance rate is 26.9%

Day	Sample.Number	Measurement	Specification
1.00	Sample 1	102.70	95-105
1.00	Sample 2	102.20	NA
1.00	Sample 3	102.70	NA
1.00	Sample 4	103.30	NA

Subgroup is appropriate for this data type

Excel column name is copied and entered into this field.

Excel column name is copied and entered into this field.

Upper and Lower Specification option is selected.

Upper Specification is entered.

Lower Specification is entered.

Chart observations and comments

30,000-foot-level subgroup report-out indicates process stability, where prediction statement from probability plot includes all individual measurements. NOTE: Stability conclusion is very different than from a “no subgroup” plot.

Since the Standard Deviation individuals chart cannot have less than zero values, a chart could show false out-of-control signals. One can apply a logarithm transformation to standard deviation chart creation, if needed/desired.

Column to use for I-chart X-axis (may not have repeat values)

Day

Data Distribution Choice

Normal

Force Predictability?

- Yes
- No

Limiting the data used in the Charts

Enter first row of plotted data

1

Enter rows numbers to exclude, separate with commas

Enter Labeling Text

Enter Chart Title

Samples Measurements

Enter Chart Subtitle

Metric Label to replace column name

Y axis Label

Measurement

X axis Label

Day

Additional entries to create the previous shown 30,000-foot-level report-out

Entered Chart Title.

Entered Y axis Label.

Entered X axis Label.

IEE Chart Builder

Identify the Excel file with data

File input

Browse... V3 C12, Exam 12-02.1, subgrou

Upload complete

Select the chart type and options

Choose the IEE Chart Type

Subgroup

Select Plot Column

Measurement

Subgrouping column

Day

☐ Apply Ln to Std. Dev

Add Box-Plot Column (optional)

Method to determine capability?

Upper and Lower Specification

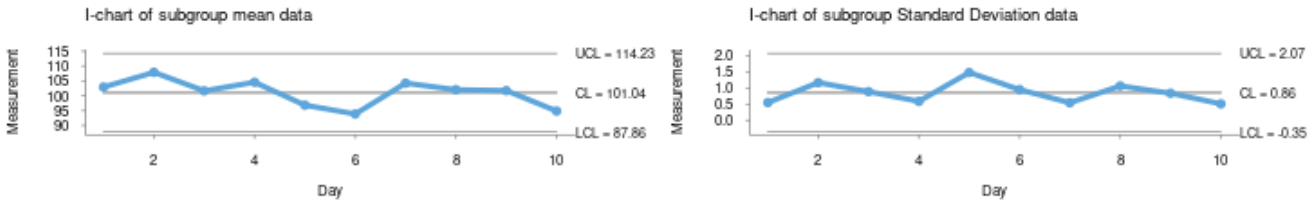
Upper Specification

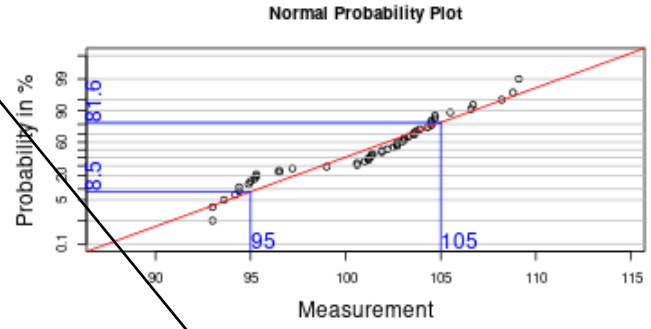
105

Lower Specification

95

Samples Measurements





The current process response is predictable.
The estimated non-conformance rate is 26.9%

Day	Sample.Number	Measurement	Specification
1.00	Sample 1	102.70	95-105
1.00	Sample 2	102.20	NA
1.00	Sample 3	102.70	NA
1.00	Sample 4	103.30	NA
			NA

One can save this 30,000-foot-level graph as a PNG file by right clicking on the image.

Chart observations and comments

A predication statement is now shown below the 30,000-foot-level report-out charts, i.e., expected percentage of occurrences beyond the 95 and 105 specification limits.

If this expected 26.9% non-conformance rate percentage is unacceptable, process improvement is needed.

30,000-foot-level Metric Reporting App Applications

Day	Sample Number	Measurement
1	Sample 1	102.7
1	Sample 2	102.2
1	Sample 3	102.7
1	Sample 4	103.3
1	Sample 5	103.6
2	Sample 1	108.2
2	Sample 2	108.8
2	Sample 3	106.7
2	Sample 4	106.6

- Continuous Data with Subgroups (Tracking so can Detect Process Degradation and Improvements)
  - Lead time from order initiation to completion; mean and 80% frequency of occurrence rate reporting; **weekly subgrouping of data**
  - A kaizen event's baseline of cycle time to improve in a manufacturing process; mean and 80% frequency of occurrence rate reporting; **weekly subgrouping of data**
  - A measurement on five daily manufactured parts that are randomly selected and have a specification requirement; non-conformance rate reporting; **daily subgrouping of data**
  - Replacement to current Cp, Cpk, Pp, and Ppk reporting; Non-conformance rate reporting, which is easier to understand than process capability/performance indices; **subgrouping of data where five samples are measured in each lot**
  - Measurement of five part's dimension from supplier-lot shipments, **subgroup by lots**

IEE Chart Builder

Identify the Excel file with data

File input

Browse... No file selected

Select the chart type and options

Choose the IEE Chart Type

No Subgroup

Select Plot Column

Method to determine capability?

Without a Specification

Use Median or Mean in capability?

Median

You must select an excel file to begin chart building
you must type in the plot column name to generate a chart

30,000-foot-level Metric Reporting APP: Attribute Data, Failure Rate

You must select an excel file to begin chart building

Dataset used in this app illustration

For this app illustration, a 30,000-foot-level report is created for the situation where the number of failures in lots of 50 is monitored over time. When creating a 30,000-foot-level chart, failure rate is tracked and reported over time, where the number of samples in lots have a similar size.

This dataset app situation and 30,000-foot-level report is further discussed in *Integrated Enterprise Excellence Volume III.* Example 10.2 use a traditional p-chart reporting approach and Example 13.2 uses a 30,000-foot-level reporting methodology.

Measurements

Sample	Failures	N	Failure Rate		Sample	Failures	N	Failure Rate
1	12	50	0.24		16	8	50	0.16
2	15	50	0.3		17	10	50	0.2
3	8	50	0.16		18	5	50	0.1
4	10	50	0.2		19	13	50	0.26
5	4	50	0.08		20	11	50	0.22
6	7	50	0.14		21	20	50	0.4
7	16	50	0.32		22	18	50	0.36
8	9	50	0.18		23	24	50	0.48
9	14	50	0.28		24	15	50	0.3
10	10	50	0.2		25	9	50	0.18
11	5	50	0.1		26	12	50	0.24
12	6	50	0.12		27	7	50	0.14
13	17	50	0.34		28	13	50	0.26
14	12	50	0.24		29	9	50	0.18
15	22	50	0.44		30	6	50	0.12

App Data Entry Format

Sample	Failures	N	Failure Rate
1	12	50	0.24
2	15	50	0.3
3	8	50	0.16
4	10	50	0.2
5	4	50	0.08
6	7	50	0.14
7	16	50	0.32
8	9	50	0.18
9	14	50	0.28
10	10	50	0.2
11	5	50	0.1

IEE Chart Builder

Identify the Excel file with data

File input

Browse... V3 C10, Exam 10-03, p chart 10-

Upload complete

Select the chart type and options

Choose the IEE Chart Type

Attribute

Select Plot Column

Failure.Rate

Use Median or Mean in capability?

Median

Stage Column Name

Column to use for I-chart X-axis (may not have repeat values)

Choose Type of Attribute

Rate

Box-Cox Lambda value

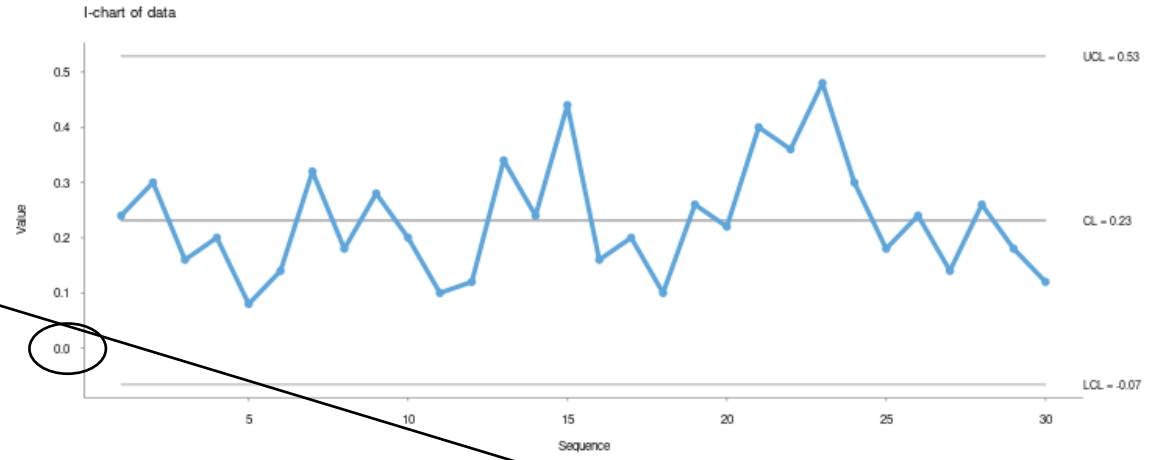
1

If any data values are <0, no tranform will be performed

Force Predictability?

- Yes
- No

IEE Attribute Scorecard for Failure.Rate



The current process response is predictable.
The estimated performance is 0.231

Sample	Failures	N	Failure.Rate
1.00	12.00	50.00	0.24
2.00	15.00	50.00	0.30
3.00	8.00	50.00	0.16
4.00	10.00	50.00	0.20
5.00	4.00	50.00	0.08
6.00	7.00	50.00	0.14

Attribute is appropriate for this data type

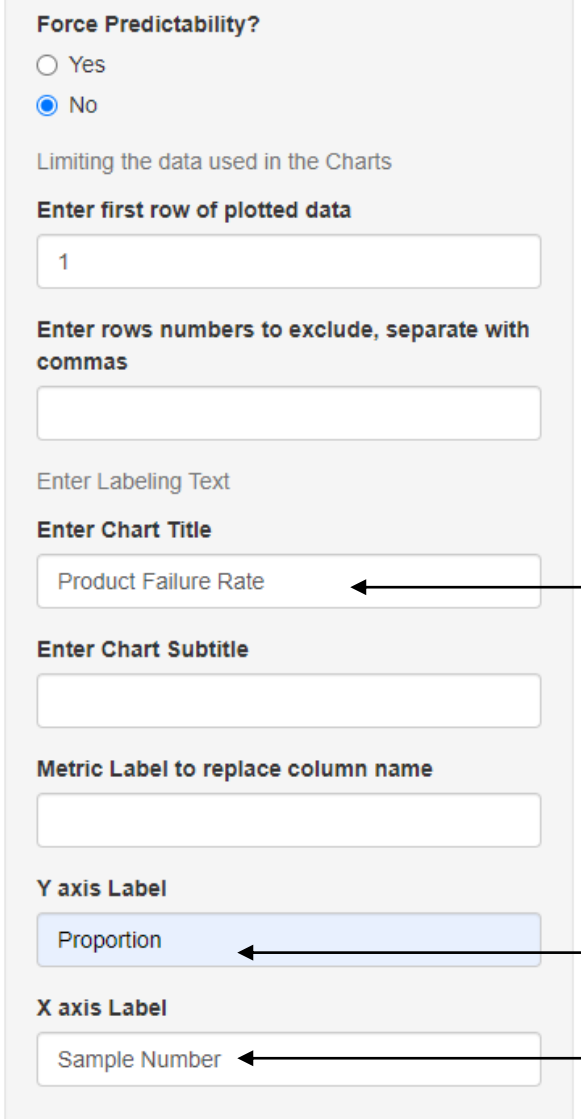
Excel column name is copied and entered into this field.

Type of Attribute is changed to “Rate”

Chart observations and comments

Process is stable and predictable

Note: Zero is within UCL and LCL lines. Since a failure rate cannot be negative, a Box-Cox transformation may be appropriate to avoid invalid out-of-control signals. A lambda of 0.5 is often used for binomial proportions transformation situations (reference Table 9.3 *Integrated Enterprise Excellence Volume III*)



Additional entries to create the previous shown 30,000-foot-level report-out

Entered Chart Title.

Entered Y axis Label.

Entered X axis Label.

IEE Chart Builder

Identify the Excel file with data

File input

Browse... V3 C10, Exam 10-03, p chart 10-

Upload complete

Select the chart type and options

Choose the IEE Chart Type

Attribute

Select Plot Column

Failure.Rate

Use Median or Mean in capability?

Median

Stage Column Name

Column to use for I-chart X-axis (may not have repeat values)

Choose Type of Attribute

Rate

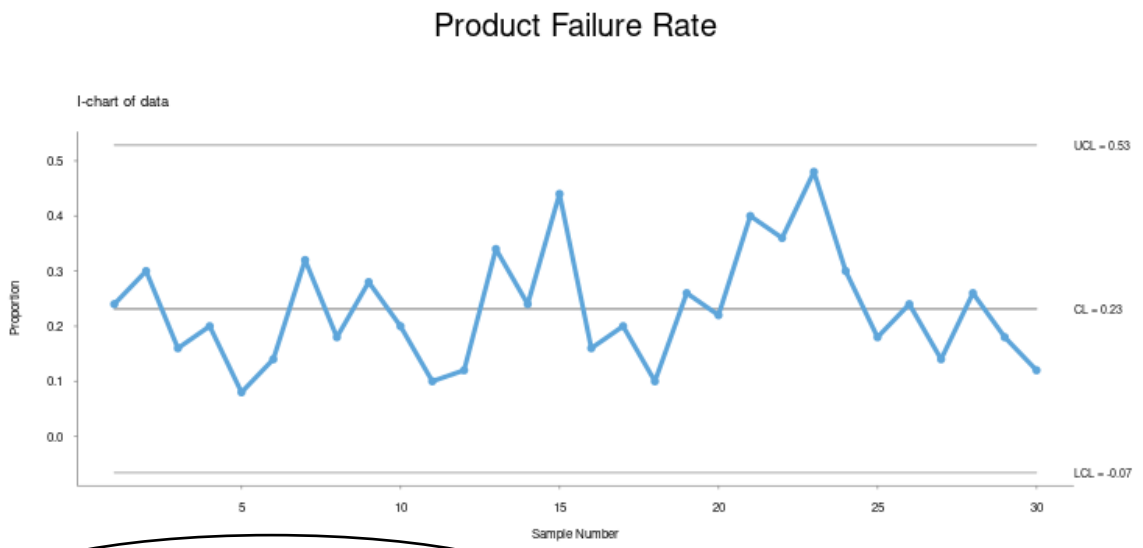
Box-Cox Lambda value

1

If any data values are <0, no tranform will be performed

Force Predictability?

- ○ Yes
- ◉ No



The current process response is predictable.
The estimated performance is 0.231

Sample	Failures	N	Failure.Rate
1.00	12.00	50.00	0.24
2.00	15.00	50.00	0.30
3.00	8.00	50.00	0.16
4.00	10.00	50.00	0.20
5.00	4.00	50.00	0.08
6.00	7.00	50.00	0.14

Chart observations and comments

A predication statement is shown below the 30,000-foot-level report-out chart, i.e., expected non-conformance rate is 0.231.

If this expected non-conformance rate of 0.231 is unacceptable, process improvement is needed.

30,000-foot-level Metric Function Applications

Sample Number	FailureRate
1	0.24
2	0.3
3	0.16
4	0.2
5	0.08
6	0.14
7	0.32
8	0.18
9	0.28
10	0.2
11	0.1
12	0.12

- Attribute Data Failure Rate (Tracking so can Detect Process Degradation and Improvements)
  - Proportion of manufacturing end-of-test non-conformances, tracked monthly
  - Proportion of proposals that were not accepted, tracked monthly
  - Proportion of Acceptable Quality Level (AQL) tests that were non-compliant, tracked monthly
  - Proportion of supplier shipments not received on time, tracked monthly

Wrap Up

30,000-foot-level/Satellite-level Metric Functional Applications

As a summary, the three previously described metric-reporting app situations with one of the listed application examples are:

1. Continuous Data No Subgroups (Tracking so can Detect Process Degradation and Improvements)
   - Example Application: Replacement to current Cp, Cpk, Pp, and Ppk reporting with a non-conformance rate statement that provides a consistent report-out format which is easier to understand than process capability/performance indices reports
2. Continuous Data with Subgroups (Tracking so can Detect Process Degradation and Improvements)
   - Example Application: A kaizen event's baseline of cycle time to improve in a manufacturing process; mean and 80% frequency of occurrence rate reporting; weekly subgrouping of data
3. Attribute Data Failure Rate (Tracking so can Detect Process Degradation and Improvements)
   - Example Application: Proportion of proposals that were not accepted, tracked monthly

Automatic Updates of 30,000-foot-level Metrics

- This presentation described the use of a free app (www.smartersolutions.com/eprs-metrics-software) for creating 30,000-foot-level reports that can be saved and referenced in other documents.
- Software is available that can be installed on a server behind an organization's firewall, which provides automatic 30,000-foot-level metric updates that have 24x7 accessibility – and more.
  - A software description is provided at the webpage "Enterprise Performance Reporting System (EPRS) IEE Software" https://smartersolutions.com/integrated-enterprise-excellence-iee-business-management-system-software
  - Send an email to (forrest@smartersolutions.com) if you would like to discuss application of this software to your situation and see a demo application.

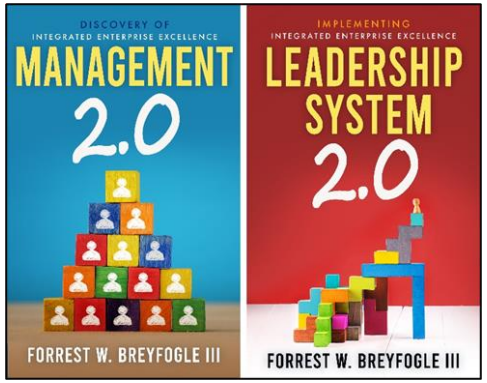
Common Question: How to Explaining IEE Metrics-reporting and Benefits to Others

- The “Integrated Enterprise Excellence (IEE) Explanation to Others” article (www.smartersolutions.com/iee-explanation-to-others) provides three approaches to explain the benefits of IEE to others, which is more than IEE-metrics reporting.
- Approach two of the IEE value explanation to others article is “Demonstrating the Value of 30,000-foot-level Performance Reporting”.
- For this number two approach:
    1. Compile important KPI data over a long period of time and enter data into a spreadsheet.
    2. Use the free 30,000-foot-level app to create a 30,000-foot-level report-out for this KPI.
    3. Create a PowerPoint presentation that shows both the current reporting format and 30,000-foot-level reporting alternative.
    4. Describe in the PowerPoint presentation what the 30,000-foot-level reporting format provides over the current reporting format.

Watch John Daly’s video on “Advocacy Selling” (https://smartersolutions.com/selling-your-ideas-learning-the-skills-to-be-a-great-advocate.html) to determine how to best use this PowerPoint presentation in your organization to gain buy-in for the consideration of using IEE metric-reporting concepts.

I can help with this “gaining buy-in for IEE metrics” effort. Contact me at forrest@smartersolutions.com to discuss.

Q&A



These novel-books are available in paperback, e-book, and audio book formats from Amazon and other book retailers.

For questions about the IEE business management system and its application, contact
Forrest Breyfogle
forrest@smartersolutions.com
+1.512.918.0280 (o)
+1.512.695.4424 (m)

I have a **passion** for showing people how to apply and benefit from our free 30,000-foot-level app for THEIR dataset. Let me know some good times for you to have a ½ hour free Zoom application demonstration session.

- For this session, all that is needed is your process-output data provided in the format structure shown in www.smartersolutions.com/30000-foot-level-spreadsheet.

For a copy of this PowerPoint presentation, send your request to forrest@smartersolutions.com

I respond to my e-mails. If I you did not see an e-mail response from me, check your spam filter. Also, call me to resolve any email problem.