

Gathering, Displaying and Understanding Data

Development of Self, Teams and Workgroups
LC Notebook Tab IV

Agenda

10am or 1pm	Welcome and Overview of Workshop
	Problem or Project Definition
	How to Gather Data
	Tools to Use With Ideas and Tools to Use With Numbers
	Review of Charts and Graphs Using Excel
	Wrap-Up

Objectives:

By the end of the session, participants will:

- Understand when you need data for a project or to solve a problem
- Understand the processes used for gathering data
- Understand how the **Radar Chart** and the **Pareto Chart** can be used to display data
- Understand how different display tools, including charts and graphs can be used in decision-making
- Be aware of other tools for gathering, displaying and understanding data

Handout Table of Contents:

Problem or Project Definition	p. 2	Pareto Chart	p. 13
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Problem or Project Definition

Questions to Consider	Notes
<p>Purpose</p> <ul style="list-style-type: none"> • What is important to the customers about the product, process or service? • What problems do customers have with the product or service? • What is wrong or not working? What problems is the team addressing? 	
<p>Importance</p> <ul style="list-style-type: none"> • How will reducing the problem affect: <ul style="list-style-type: none"> ▪ the customers? ▪ the organization? ▪ employees? • Why should this project or work be done now? 	
<p>Data</p> <ul style="list-style-type: none"> • What information will you/the team collect to identify urgent problems? • What data is needed? • What data currently exists or what needs to be collected? • How much time is needed to collect the data? • What questions will the data help answer? 	
<p>Scope</p> <ul style="list-style-type: none"> • How will you/the team focus its work? • What areas are inside and/or outside the team's authority? • What are the boundaries (process start and end points?) • What specific parts of the process will you/the team focus on? • What are the project deadlines? Milestones for review? • What business constraints must be taken into account in scheduling the project or work? 	

Questions to Consider	Notes
<p>Deliverables</p> <ul style="list-style-type: none"> • What must the team deliver to be successful? • How will we know when the work is done? 	
<p>Measures</p> <ul style="list-style-type: none"> • What will be the primary measures of success? • How will they be measured and tracked? • How much improvement is needed by when? (Provide target dates.) • What defects will be tracked? 	
<p>Resources</p> <ul style="list-style-type: none"> • To whom is the team accountable? • Who is the manager or sponsor? • Who are the key stakeholders? • Who is on the team? • Who will lead the effort? • Who can the team turn to for expert guidance and coaching on improvement? • Has the process owner been identified? • What budget does the team have? • Who should approve expenditures? • How much can the team spend without seeking additional authority? 	

Information taken from:

Peter R. Scholtes, Brian L. Joiner and Barbara J. Streibel. The TEAM® Handbook. Third Edition. Oriel Incorporated, 2003.

Progress Checklist

Study the Process or Problem

- Construct flowchart of process
- Interview customers to identify needs
- Design data gathering procedures
- Gather data on process or problem
- Analyze data to see if process is stable
- Identify problems with process
- Other: _____
- Other: _____

Localize Problems and Identify Causes

- Pinpoint the occurrence of the problem
- Identify possible causes of problems
- Select likely causes
- Gather data to verify root causes
- Analyze data
- Develop appropriate solutions
- Other: _____
- Other: _____

Make Changes / Document Improvement

- Develop a plan to test changes
- Implement test
- Gather data on new process
- Analyze data; critique changes in light of data
- Redesign improvements in process; repeat this step if necessary
- Implement further changes, or refer matter to appropriate person or group
- Monitor results of changes
- Establish a system to monitor in the future
- Other: _____
- Other: _____

Closure

- Prepare presentation on improvement
- Deliver presentation
- Evaluate team's process
- Evaluate team's results
- Document
- Other: _____
- Other: _____

Information taken from:

Peter R. Scholtes, Brian L. Joiner and Barbara J. Streibel. *The TEAM® Handbook*. Third Edition. Oriel Incorporated, 2003.

Data Types and Methods

- ◆ Qualitative – observation of events and behaviors from the perspective of those involved
 - Interviews
 - Focus Groups
 - Observations
 - Literature review

- ◆ Quantitative – structured approach that relies on the quantification of concepts
 - Transaction Counts
 - Sampling
 - Flow Charts
 - Reports
 - Usage Information
 - Help Desk Area
 - System
 - User Surveys

- ◆ Anecdotal – a story about a real person or event

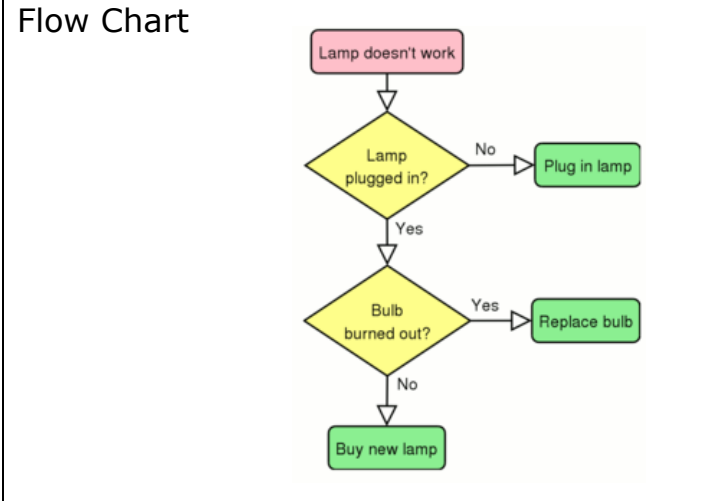
Charts, Graphs and Tools

Charts and graphs are used to pictorially represent data. Graphical representation of data is a more effective way of conveying information than tables of data. A well designed chart or graph can convey the sense of the data simply and efficiently. There are a number of tools that assist in the objective collection of data.

Purpose of the Chart, Graph or Tool	Appropriate Type
Gathering data	Check Sheet Flow Chart Work Flow Diagrams
Compare categorical data	Column Chart Check Sheet Bar Chart Line Chart Pareto Chart Radar Chart
Compare series of data over time	Area Chart Line Chart
Percentage of total comparisons	Pie Chart Donut Chart
Relationship between two variables	Scatter Plot
Relationship between three variables	3-Dimension Surface Plot

Chart or Tool Type	Characteristics																																								
Gathering Data																																									
<p>Check Sheet</p> <p style="text-align: center;">Telephone Interruptions</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Reason</th> <th colspan="5">Day</th> <th rowspan="2">Total</th> </tr> <tr> <th>Mon</th> <th>Tues</th> <th>Wed</th> <th>Thurs</th> <th>Fri</th> </tr> </thead> <tbody> <tr> <td>Wrong number</td> <td>+++</td> <td> </td> <td> </td> <td>+++</td> <td>+++ </td> <td>20</td> </tr> <tr> <td>Info request</td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td>10</td> </tr> <tr> <td>Boss</td> <td>+++</td> <td> </td> <td>+++ </td> <td> </td> <td> </td> <td>19</td> </tr> <tr> <td>Total</td> <td>12</td> <td>6</td> <td>10</td> <td>8</td> <td>13</td> <td>49</td> </tr> </tbody> </table>	Reason	Day					Total	Mon	Tues	Wed	Thurs	Fri	Wrong number	+++			+++	+++	20	Info request						10	Boss	+++		+++			19	Total	12	6	10	8	13	49	<p>Used to systematically record and compile data from a variety of sources so that patterns or trends can be seen.</p> <p>Agreement must be reached on the events, conditions or observations to be made.</p> <p>Collect the data of a sufficient period of time to be sure the data represents "typical" results during a "typical" cycle of time.</p>
Reason		Day						Total																																	
	Mon	Tues	Wed	Thurs	Fri																																				
Wrong number	+++			+++	+++	20																																			
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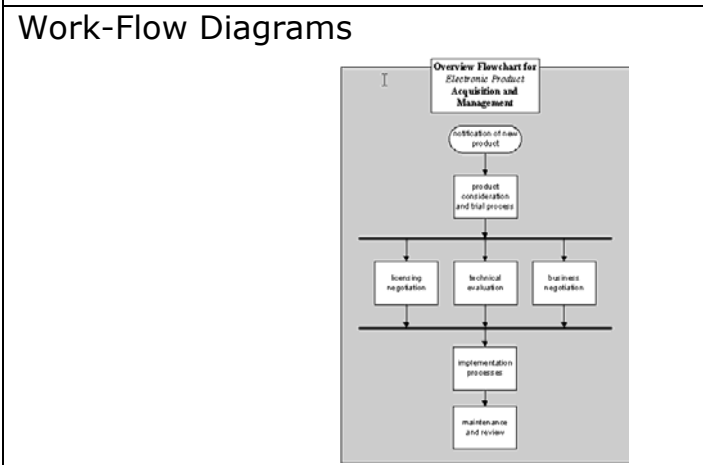
Chart or Tool Type	Characteristics
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Used to identify the actual flow of or sequence of events in a process that any service or product follows.
 Flow charts can show:

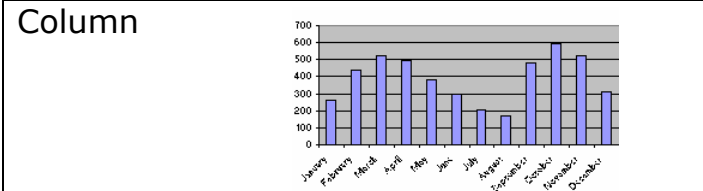
- Unexpected complexity
- Problem areas
- Redundancy
- Possibility of simplification

Flow charts compare and contrast the actual versus the ideal flow of a process.

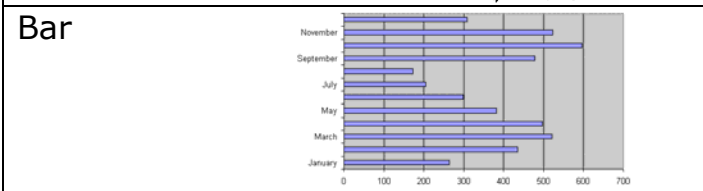


Used to show the flow or movement of materials, people, or information within any space, for example, in an office or on a form.

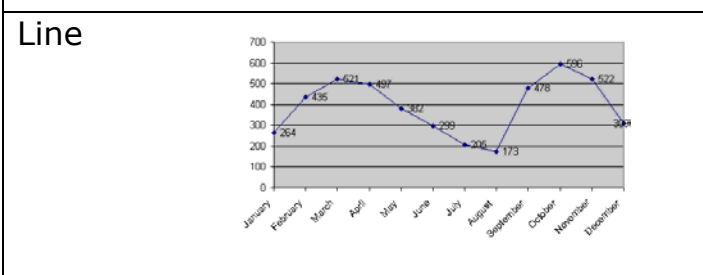
<i>Compare Categorical Data</i>	
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Used when comparing categories. Shows changes over a period of time, with time or dates as the x-axis.



Similar to the column chart but the bars extend horizontally instead of vertically. Used when emphasis is on comparisons and less on time.



Used to show trends or change in a series of data over categories or time. Line charts emphasize time flow and the rate of change, rather than the amount of change or the magnitude of values

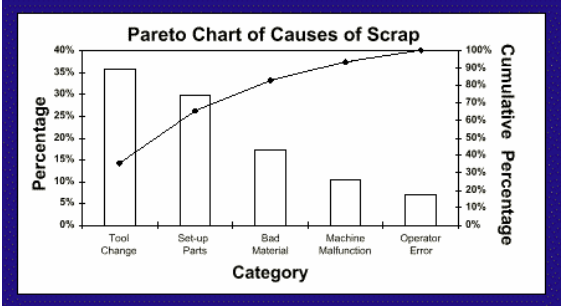
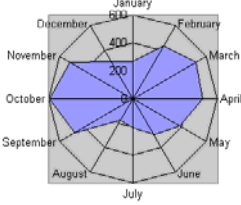
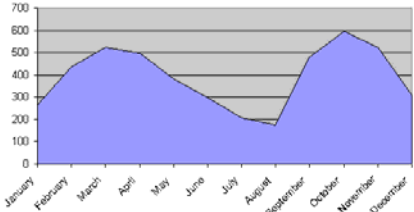

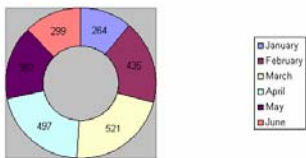
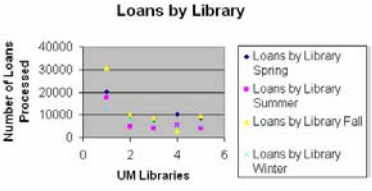
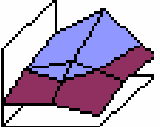
Chart or Tool Type	Characteristics
<p>Pareto Chart</p>  <p>A Pareto chart titled 'Pareto Chart of Causes of Scrap'. The x-axis is labeled 'Category' and includes Tool Change, Set-up Parts, Bad Material, Machine Malfunction, and Operator Error. The left y-axis is 'Percentage' (0% to 40%) and the right y-axis is 'Cumulative Percentage' (0% to 100%). Bars represent the percentage of scrap for each category, and a line graph shows the cumulative percentage.</p>	<p>Used to show the problems that offer the greatest potential for improvement by showing their relative frequency or size in a descending bar graph.</p> <p>Pareto Charts can:</p> <ul style="list-style-type: none"> • Display the relative importance of a problem in a simple, quickly interpreted, visual format. • Identify which problem/issue to address first.
<p>Radar</p>  <p>A radar chart with 12 axes representing months from January to December. The chart shows performance levels for each month, with values ranging from 0 to 500. The highest performance is in January (500) and the lowest is in July (0).</p>	<p>Uses a separate axis for each category radiating out from the center.</p> <p>Shows the gaps among a number of current performance areas and the ideal performance areas.</p>
Compare Series of Data Over Time	
<p>Area</p>  <p>An area chart showing data over 12 months. The y-axis ranges from 0 to 700. The data shows two peaks: one in March (around 500) and a higher one in October (around 600). The lowest values are in July and August (around 100).</p>	<p>Used to show change over time but with an emphasis on the amount or magnitude of the values, rather than time and the rate of change.</p> <p>This chart is like the combination of a line chart and a pie chart.</p>
Percentage of Total Comparisons	
<p>Pie</p> <p style="text-align: center;">Number of InterLibrary Loan Requests By Month</p>  <p>A pie chart showing the distribution of interlibrary loan requests by month. The legend indicates: January (red), February (purple), March (orange), April (yellow), May (green), and June (blue).</p>	<p>Used to show the relationship or proportions of the parts to the whole.</p> <p>Pie charts contain only one series of data.</p>
<p>Donut</p> <p style="text-align: center;">Number of InterLibrary Loan Requests By Month</p>  <p>A donut chart showing the distribution of interlibrary loan requests by month. The legend indicates: January (red, 299), February (purple, 264), March (orange, 436), April (yellow, 521), May (green, 497), and June (blue, 436).</p>	<p>Used to compare multiple pie charts.</p> <p>Donut charts shows how two or more series contributed to the wholes and a comparison of the amounts.</p>

Chart or Tool Type	Characteristics
<i>Relationship Between Two Variables</i>	
Scatter 	Used to show the correlations between two sets of values, one on the x-axis and one on the y-axis. Scatters charts are not used with time.
<i>Relationship Between Three Variables</i>	
3-Dimension Surface Plot 	Used to show three axes and how the three sets of data interact. Data shown in 3-D with the data points shown as a flat sheet, like a bent piece of paper.

Information taken from:

<http://www.lca.lehman.cuny.edu/lehman/itr/html/library/Excel-Charting-manual.pdf>

http://departments.oxy.edu/its/training/excel/excel_charts.html

Michael Brassard and Diane Ritter. *The Memory Jogger™ II*. First Edition. GOAL/QPC, 1994.

Peter R. Scholtes, Brian L. Joiner and Barbara J. Streibel. *The TEAM® Handbook*. Third Edition. Oriel Incorporated, 2003.

Radar Chart

Why Use the Radar Chart

"To visually show in one graphic the size of the gaps among a number of *both current* organization performance areas *and the ideal* performance areas."

What the Radar Chart Does

- Makes concentrations of strengths and weaknesses visible.
- Displays the important categories of performance.
- Can display full performance in each category.
- Captures the different perceptions of all the team members about organizational performance.

Creating a Radar Chart

1. Select and define the rating categories.
 - The chart can handle a wide range of categories, with 5-10 categories as an average.
 - Create new headers or use existing headers.
 - Define non-performance and full performance within each category.
2. Draw the chart.
 - Create a large wheel with as many spokes as there are rating categories.
 - Write down each rating category at the end of each spoke around the perimeter of the wheel.
 - Mark each spoke with a "0" at the center, which equals the "non-performance" of the scale. Mark the highest number on the scale at the outer ring, which equals the "full performance."
3. Rate the performance categories.
 - With existing data place markers on the respective spoke for non-performance and full performance. Mark the average score on each scale.
 - With a team, individual members place a marker on each scale that indicates his/her opinion about the performance. Calculate the average and place a marker to show this.
4. Connect the lowest markers on each spoke and connect the highest markers on each spoke. Connect the average scored on each spoke.

5. Interpret and use the results.

Key areas to review on the chart include:

- The range between the lowest and highest numbers on each spoke.
- The distance from the highest number to the outer rim of the wheel. This shows the gap from current performance to the ideal.
- The average score and its placement compared to the highest number on each spoke and its placement compared to the ideal.

Focus work on the categories with the biggest gap.

Taken from:

Michael Brassard and Diane Ritter. *The Memory Jogger™ II*. First Edition. GOAL/QPC, 1994. pp: 137-140.

Pareto Chart

Why Use a Pareto Chart

“To focus efforts on the problems that offer the greatest potential for improvement by showing their relative frequency or size in a descending bar graph.”

What the Pareto Chart Does

- Helps focus on those causes that will have the greatest impact if solved.
- Displays the relative importance of problems in a simple, quickly interpreted, visual format.
- Progress is measured in a highly visible format that provides incentive to push on for more improvement.

Creating the Pareto Chart

1. Identify the problem.
2. Identify the causes or problems that will be monitored or compared. Rank order new data or existing data.
3. Choose the most meaningful unit of measurement such as frequency or cost.
4. Choose the time period for the study.
5. Gather the data on each problem category either in “real time” or by reviewing historical data.
6. Compare the relative frequency or cost of each problem category.
7. List the problem categories on the horizontal line (X-axis) and the frequencies on the vertical line (Y-axis). List the categories in descending order from left to right.
8. Interpret the results. The tallest bars generally indicate the biggest contributors to the overall problem. Dealing with these problem categories first can lead to the greatest improvement.

Taken from: Michael Brassard and Diane Ritter. *The Memory Jogger™ II*. First Edition. GOAL/QPC, 1994. pp. 95-104.

Data Sets – ITO Survey

Individual-Team-Organization (ITO) Survey Data

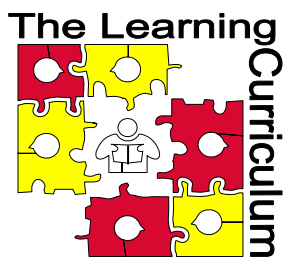
Statement	Statement Number	Team A Average	Team A High	Team A Low
Section 1				
I know what my job is.	1	4.3	5.0	2.0
The roles of my co-workers are clear to me.	2	3.9	5.0	2.0
I am satisfied with my job.	3	2.4	4.0	2.0
My work is meaningful to me.	4	2.8	5.0	1.0
I receive the recognition I deserve.	5	3.0	4.0	1.0
I believe that rewards are given fairly here.	6	3.4	5.0	1.0
I know in plenty of time when anything important happens.	7	3.0	4.0	2.0
My co-workers and I communicate clearly and effectively.	8	3.8	5.0	1.0
I assist and help my co-workers.	9	4.5	5.0	3.0
When I need help, I can find someone who is willing and able to give it to me.	10	3.8	4.0	2.0
I get things done in plenty of time to avoid a last-minute rush.	11	3.3	5.0	1.0
My co-workers have enough time to do a good job.	12	3.4	5.0	2.0
I am supported in using unique and different approaches to problem solving.	13	3.1	5.0	0.0
In this organization failures are forgiven rather than held against people forever.	14	2.6	5.0	0.0
There are people here to whom I can go for confidential help...	15	3.0	5.0	1.0
If I or my co-workers had problems with drugs or ...	16	3.4	5.0	1.0
I have the authority I need to get my job done.	17	3.0	5.0	0.0
I feel that I have made a significant impact on my impact on my work team and my organization.	18	3.3	5.0	1.0
I have a clear sense of what my goals are.	19	3.8	5.0	1.0
My work is important.	20	3.5	5.0	1.0

Data Sets – Information and Research Services

McKeldin Library Information and Research Services

Summer 2005 - Total Questions Asked

Questions	Total Number	Percentage	Cumulative %
How do I print or obtain a photocopy card?	897	23	23
How do I research this subject?	707	18	41
Does the Library own this book, journal, video, etc.?	633	16	57
How do I locate this call number?	583	15	72
Other reference questions.	291	7	79
How do I access other library services?	271	7	86
Can you help me find this article?	255	6	92
Can you help me use/print from productivity software?	192	5	97
How do I access library resources from off-campus?	133	3	100
Total	3962	100	100




Developing Your Computer Skills: Converting Data Into Graphs in Excel

Maggie Saponaro

Staff Learning and Development

If you were not able to attend one of our recent Microsoft *Excel* sessions, but you would still like to “dress up” your workbooks with charts, tables or graphs, you are in luck! Being able to easily insert charts, tables and graphs is one of the features which makes *Excel* an extremely powerful tool, and can help you represent data in a more readable fashion. Although there are several ways to create charts and graphs, here is one of the simplest methods to convert data into graphs in *Excel*:

1. Open your Excel workbook. Select the cells containing the information to be converted. (The original spreadsheet will remain intact; the graph just copies the data.)
2. Click on **Chart Wizard** icon  on the standard toolbar, or select **Insert → Chart** from the Excel menus.
3. Choose a type of chart (such as Column or Bar) that you would like to use.
4. Press the button that says **Press and Hold to View Sample** to preview this chart. When you have found a style that suits you, click **Next**.
5. Check the data range to make sure it includes what you want the chart to cover, and click **Next**.
6. Type a title for the chart, and click **Next**.
7. Choose where to place the chart. You can choose to place your chart either on its own sheet, or as a new graphic within one of your worksheets. Click on **Finish** when you have selected a location that suits you.
8. Change the size of the chart by dragging the squares. If some of the sections are not labeled, enlarging the chart may make more text appear.

The key is to experiment and see which type of chart best represents your data!

For More Information...

If you are interested in learning more about *Excel*, there are several books available for you to check out from the **Learning Curriculum Resource Library**:

Fulton, Jennifer. *Teach Yourself Microsoft Excel 2000 in 10 Minutes*. Indianapolis, IN: Sams, 1999.

Reisner, Trudi. *Teach Yourself Microsoft Excel 2000 in 24 Hours*. Indianapolis, IN: Sams, 1999.

Walkenbach, John. *Excel 2000 for Windows for Dummies: Quick Reference*. Foster City, CA: IDG Books, 1999.

A complete listing of titles in the Learning Curriculum Resource Library is available at:
<http://www.lib.umd.edu/groups/learning/lcrlibrary.html>.

[This article appeared in the July 30, 2004 issue of Library Matters.]

Resources

<http://www.lca.lehman.cuny.edu/lehman/itr/html/library/Excel-Charting-manual.pdf>

http://departments.oxy.edu/its/training/excel/excel_charts.html

<http://www.lib.umd.edu/groups/learning/handouts/excelover2003.pdf>

<http://www.lib.umd.edu/groups/learning/handouts/excelintagenda2003.pdf>

Guidelines for Teams by the Facilitators Team.

< <http://www.lib.umd.edu/groups/facteam/#guidelines> >

Michael Brassard and Diane Ritter. *The Memory Jogger™ II*. First Edition. GOAL/QPC, 1994.

Peter R. Scholtes, Brian L. Joiner and Barbara J. Streibel. *The TEAM® Handbook*. Third Edition. Oriel Incorporated, 2003.

Staff Resource

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