

Michele Bennett Jackie Flynt David Mayorga Ken Thomas

# **Graphic Visualization Tool Assessment**

## Introduction

Team projects are easily defined as more than one person working together to create a common end product or provide a common service. When one person works on an individual project, they can keep their plan in their head and don't have to explain their vision to anyone. That approach can be disastrous to a team project.

The larger the scope of the project (longer duration of work, greater number of tasks and subtasks, greater number of people working on the project, greater number of people sponsoring the project, etc.), the greater the need to be able to communicate the project's vision and plan for accomplishing that vision. Graphic visualization tools scrawled into clay were used to build the pyramids, and even today we use graphic tools that are over a hundred years old. The use of computer software has allowed for rapid development, modification, and distribution of project management graphics.

## Tools

This document analyses four sets of graphic visualization tools used in project management:

- Work Breakdown Structure (WBS) modelers (David Mayorga)
- Gantt Chat tools (Ken Thomas)
- Drawing tools (Jackie Flynt)
- Mind-map tools (Michele Bennett)

At the end of the document, we select one tool to use in our current eLearning development project with Ontario Co-op and provide an example.

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# Work Breakdown Structure (WBS) Modelers

## Description

WBS model, or diagram, is a technique for visualizing a project as smaller manageable components/tasks, which will help define and organize the scope of a project (see figure 1). A WBS modeler, such as Visio or Dia, organizes the diagram around a primary objective or project deliverable (Level 1), which serves as the foundation for a plan. From here, the objective or deliverable is broken down into major segments or phases (Level 2).

For example, if your deliverable is a an eLearning course, it may be broken down into creating a plan, hosting a kickoff meeting, creating an analysis document, etc. (Level 1). Identifying each task or phase helps determine the scope of the project, facilitate the delegation of each task to an appropriate resource, and help simplify cost estimation, scheduling and risk analysis (Level 2). Depending on the size of a phase or task, each can be broken down further (Level 3 and 4) into even more manageable chunks.



Source: Dam Good Consulting



A WBS model is a full classification of project scope; it is not a list of work. Also, it indicates what will be done, not how or when but it is not a plan or schedule.

The WBS diagram is basically a flowchart, so it can be created using flowcharting tools (Visio, SmartDraw, LucidChart, etc.), drawing tools (Microsoft PowerPoint, Adobe Fireworks, etc.), or mind-mapping tools (iMindMap, MindMeister, FreeMind, etc.). Technically, you could create a WBS using a plain graphics editor, but making updates and changes would be unwieldy.

### Pros

- Forces the team to get a better understanding of the objective or deliverable by creating detailed tasks, which can drive the team to "realize" tasks and subtasks they may have missed using another approach
- Lays the foundation to get a better cost estimate and schedule
- Creates accountability based on the tasks designated
- Allows for intuitive cost codes on large scale projects or projects requiring resources from multiple cost centers (e.g., other departments)

## Cons

- If the WBS model is large, it can take quite a bit of time to develop.
- If one is unfamiliar with the process of the deliverable, it can be painstaking to figure out the process.

## **Sites and Sources Referenced**

- http://en.wikipedia.org/wiki/Work\_breakdown\_structure
- http://www.netmba.com/operations/project/wbs/
- http://workbreakdownstructure.com/
- http://www.brighthub.com/office/project-management/articles/2645.aspx
- http://www.projectsmart.co.uk/work-breakdown-structure.html

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# **Gantt Chart Tools**

## Description

Henry Gantt (1861 – 1919) was a mechanical engineer and management consultant. He designed a visual way to immediately communicate the sequencing, duration, interrelation, and deadlines of tasks that has been in use now for almost one hundred years.

The Gantt chart starts with a vertical list of tasks and nested subtasks on the left, then a timeline on the right. Across from each listed task or subtask, a line is drawn along the timeline to illustrate start date, duration, and stop date. Relationships between tasks (e.g., if one task must be completed before another can begin, the first task is called the predecessor) are illustrated by vertical lines.

In the last twenty years or so, Project Managers have added color codes and annotations to provide even more information on the Gantt chart (resources, budgets, status, etc.).

If you're communicating your project schedule to a client, 99 times out of 100 that client is going to insist on seeing a Gantt chart. For this reason, every major project management tool (MS Project, MindTools, Gantt Project, WorkZone, etc.) includes a Gantt chart feature.

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2		Approved by the owners	9/8/2011	9/9/2011	0.5 d.	0%	Mike	-discuss with owner
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4		Measure	9/8/2011	9/9/2011	1.0 d.	0%	John	
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10		Bathroom	9/22/2011	9/28/2011	6.0 d.	0%	Carl	
11		Kitchen	9/28/2011	10/3/2011	5.0 d.	0%	Carl	
12		Building wall and wall repair	9/20/2011	10/4/2011	14.0 d.	0%	Carl	
13		Floor tile laying	10/4/2011	10/7/2011	3.0 d.	0%	Carl	
14		Woodwork	10/7/2011	10/27/2011	20.0 d.	0%	Ben	¢
15		Ceiling	10/7/2011	10/16/2011	9.0 d.	0%	Ben	
16		Fumiture	10/16/2011	10/27/2011	11.0 d.	0%	Ben	
17		Paintwork	10/27/2011	11/16/2011	20.0 d.	0%	Fred	¢
18		Cell	10/27/2011	11/2/2011	6.0 d.	0%	Fred	
19		Wall	11/2/2011	11/10/2011	8.0 d.	0%	Fred	
20		Fumiture	11/10/2011	11/16/2011	6.0 d.	0%	Fred	
21		Others	11/16/2011	11/20/2011	4.0 d.	0%	John	install lamps and curtains, clean
22		Owner check	11/20/2011	11/20/2011	0.0 d.	0%	John	

Source: www.edrawsoft.com



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Source: www.projectmanagesoft.com

## <u>Pros</u>

- Gantt charts tell a story with very few words. Simply by looking at the chart, you can see where you've been, where you are, and what's up next.
- Gantt charts allow you to quickly identify potential resource problems (specifically when resources are over allocated (double-booked) or under allocated (not booked at all).
- Gantt charts allow at a glance to determine what tasks are behind schedule or ahead of schedule.
- Gantt charts can help you streamline projects by allowing you to identify missed opportunities to move tasks forward where there are no required predecessors and there are available resources.

### Cons

- Without additional information about the project, Gantt charts alone do not communicate the magnitude or criticality of a task or project. To illustrate, the Gantt charts of two projects could be placed side by side—one representing \$50K effort, the other \$1M. This could lead to a reallocation of resources to help the \$50K project, while putting the \$1M project at risk.
- The "good" software used to create Gantt charts can be relatively expensive. There are some cheap and free packages out there, but most of these have questionable reviews at best.
- The project management software is complex and difficult to learn. While you can be creating a Gantt chart within minutes, the buried functionality (setting predecessors, assigning resources, etc.) can be unintuitive, especially to a novice Project Manager.

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# **Drawing Tools**

## Description

"Microsoft PowerPoint, usually just called PowerPoint...is part of the Microsoft Office suite, and runs on Microsoft Windows and Apple's Mac OS X operating system. The current versions are Microsoft Office PowerPoint 2010 for Windows and Microsoft Office PowerPoint 2011 for Mac." (http://en.wikipedia.org/wiki/Microsoft PowerPoint)

"PowerPoint presentations consist of a number of individual pages or "slides". The "slide" analogy is a reference to the slide projector. Slides may contain text, graphics, sound, movies, and other objects, which may be arranged freely." (http://en.wikipedia.org/wiki/Microsoft PowerPoint)

Graphics for visualizing work breakdown structures can be created in PowerPoint using the tool's SmartArt feature. The SmartArt feature is also available in other applications in the Microsoft Office suite.

"Creating designer-quality illustrations can be challenging, especially if you are not a professional designer or you cannot afford to hire a professional designer. ... With the new 2007 Office release feature called SmartArt graphics...you can create designer-quality illustrations with only a few clicks of your mouse.

"You can create a SmartArt graphic in Microsoft Office Excel 2007, Microsoft Office PowerPoint 2007, Microsoft Office Word 2007, or in an e-mail message in Microsoft Office Outlook 2007. Although you cannot create a SmartArt graphic in other 2007 Office release programs, you can copy and paste SmartArt graphics as images into those programs.

"Because Office PowerPoint 2007 presentations often contain slides with bulleted lists, you can quickly convert slide text to a SmartArt graphic. In addition, you can add animation to your SmartArt graphic in Office PowerPoint 2007 presentations."

(http://office.microsoft.com/en-us/word-help/create-a-smartart-graphic-HA001205867.aspx)

"SmartArt, found under the Insert tab in the ribbon in PowerPoint, Word, Excel, and Outlook, is a new group of editable and formatted diagrams. There are 115 preset SmartArt graphics layout templates in categories such as list, process, cycle, and hierarchy. When an instance of a SmartArt is inserted, a Text Pane appears next to it to guide the user through entering text in the hierarchical levels. Each SmartArt graphic, based on its design, maps the text outline, automatically resized for best fit, onto the graphic. There are a number of "quick styles" for each graphic that apply largely different 3D effects to the graphic, and the graphic's shapes and text can be formatted through shape styles and WordArt styles. In addition, SmartArt graphics change their colors, fonts, and



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effects to match the document's theme. (http://en.wikipedia.org/wiki/SmartArt#SmartArt)

## **Visual Examples**

"When you create a SmartArt graphic, you are prompted to choose a type of SmartArt graphic, such as Process, Hierarchy, Cycle, or Relationship. A type is similar to a category of SmartArt graphic, and each type contains several different layouts. After you choose a layout, it is easy to change the layout for your SmartArt graphic. Most of your text and other content, colors, styles, effects, and text formatting are automatically carried over to the new layout." (http://office.microsoft.com/en-us/word-help/create-a-smartart-graphic-HA001205867.aspx)

Following are examples of the Process, Hierarchy, and Relationship SmartArt graphic types.

#### **Process: Alternating Flow**



Source: http://www.dummies.com/howto/content/what-is-smartart-in-powerpoint-2007.navId-405699.html

### **Relationship: Basic Venn**



Source: http://www.hanselman.com/blog/ YourImagesAreAVirusTheyAreEVERYWHEREOn TheInternet.aspx

#### Hierarchy: Organization Charts



Source: http://www.flickr.com/photos/ 36211994@N07/5123612966/

#### **Process: Chevron Lists**



Source: http://zhouwenhan.com/category/work/



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## "Good" Uses/Pros

"Before you create your SmartArt graphic, visualize what type and layout are best for displaying your data." (http://office.microsoft.com/en-us/word-help/create-a-smartart-graphic-HA001205867.aspx)

The following SmartArt graphic was created using the Relationship type to illustrate connections between the listed purposes and graphic types.



To "Wow!" an audience or get their attention, a Gantt chart probably won't do it. Visualization tools like SmartArt graphics are effective for big-picture, overview, and proposal presentations—in which the project's overall flow is the message, rather than task deadlines.

## "Bad" Uses/Cons

"Consider the amount of text that you have, because the amount of text often determines the layout that you use and how many shapes you need in the layout. In general, SmartArt graphics are most effective when the number of shapes and the amount of text are limited to key points. Larger amounts of text can distract from the visual appeal of your SmartArt graphic and make it harder to convey your message visually."



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(http://office.microsoft.com/en-us/word-help/create-a-smartart-graphic-HA001205867.aspx)

To visualize scheduling resources (i.e. developers and reviewers), tools for creating work breakdown structure diagrams, Gantt charts, and fishbone-style mind maps will illustrate that type of concrete information.



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# **Mind Map Tools**

## Description

"A picture speaks a thousand words." Chinese Proverb

A "mind map" is a visual tool used in project/product management systems to organize thoughts and processes within the scope of the project or concept. In academic settings they can be referred to as web charts or concept mapping. Mind maps can also be used to show the relationship between *cause and effect (outcome)*.

### The Common Mind-map

The common mind map contains a central theme, idea, or process connected to a system of nodes, branches, colors, and icons. Its contents can be made as simple or complex as needed.



Source: http://pmkarma.blogspot.com/2008/ 10/mind-mapping-and-visual-thinking-in.html





Source: http://www.michellelabrosseblogs.com /category/mind-maps/page/2/

Source: unknown

Creating a mind map is a great way to begin the project plan process. To create a mind map, one can either draw by hand or employ mind mapping software programs. The hand-drawn method can be performed on a large sheet of



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newsprint/poster board or white board. The benefit to having the mind map drawn on a sheet of paper is that it can be hung in a centrally located area so other team members can observe it on a regular basis. However, this method can pose problems when trying to share it with remote team members, stakeholders, or customers. Using a mind mapping software program such as iMindMap, FreeMind, SmartDraw, etc. creates a diagram that can be shared with others and also can be integrated into advanced project planning documentation.

#### The Fishbone Diagram

"A Fishbone Diagram is a visual illustration that clearly shows the relationship between a topic and the various factors related to it. The shape of the diagram looks like the skeleton of a fish. The bones of the fish represent factors that have been combined or synthesized to form categories. The categories, in turn, come together to form the topic that is depicted in the head of the fish." <u>http://www.lpg.fsu.edu/</u>



In the case of the eLearning Developer project, the deliverables (ten eLearning modules), would be placed at the head of the diagram. The relationship to the topic could include a costs analysis outline, key milestones, organizational hierarchy, resources, or various assessment timelines.



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The fishbone diagram process also lends itself well to working with the ADDIE model.



### Pros

- Visual aid
- Team building
- Progression is easy to follow
- Intuitive
- Helps define structure and flow
- Adaptable
- Simplistic and time-saving
- Increase team participation

## Cons

- Lacks evaluation loop
- Difficult to factor in problems
- Limited to amount of detailed information
- Too linear asynchronous
- Can become convoluted
- Scope creep
- Scope limiting
- Difficult to update



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### Sites and Sources Referenced

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# Conclusion

# Selecting the Best Visualization Type and Tool

The truth is, there is no "best" visualization type, tool, or software; there are more and less appropriate strategies and tools depending on what you are trying to accomplish with your visual, and there are more or less appropriate software depending on your skill-set and budget.

The following graphic (a "SmartArt" image created in Microsoft Word 2010, by the way) illustrates the purpose (what are you trying to accomplish with your visual?), visualization type (what type of graphic will you create to achieve your purpose?), and tools (what are some of the tools available to create these graphic types?):



# **Our Choice**

There are several presentations, briefings, and status updates to provide our team, our client's sponsor, our client's stakeholders, and our client's Project Manager; each situation, as we discussed earlier, would call for a different graphic strategy.

We have decided to create the images we will use to illustrate to the client's sponsor and stakeholders why the project's deadline will need to be moved back into end of October, however they could start deploying courses to their audience as early as mid-June. We want to demonstrate to them that our approach of creating two parallel paths is a great way of maximizing our efficiencies and keeping our costs low.

*Note:* If we created more parallel paths, the overall timeline would shrink, but we would need more resources, and some of those resources would have to go through the 20 hour LCMS training. If the client is willing to expand the budget even further, we could explore the actual costs of that strategy.



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**Ontario Co-op eLearning Development Project: Module 1 Close-Up** 

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66		8	Program Prototype in LCMS	4 days	Wed 4/16/08	Tue 4/22/0	8					-	Inst	ructional	Designer	1							
67		3	Review Beta (Internal)	4 hrs	Tue 4/22/08	Tue 4/22/0	8						Edit	tor (Text)	1,Lead In	struction	nal Desi	gner					
68		8	Revise Beta	1 day	Tue 4/22/08	Wed 4/23/	08						ă, In	struction	al Designe	r 1							
69		3	Review Beta (Client)	3 days	Wed 4/23/08	Mon 4/28/	08						2										
70	10	8	- Create Final Courseware	1.5 days	Mon 4/28/08	Wed 4/30/	08							-									
71		-	Revise Graphics	4 hrs	Mon 4/28/08	Tue 4/29/0	8							Gra	phic Artist	1							
72		8	Revise Complex Interactions	4 hrs	Mon 4/28/08	Tue 4/29/0	8							🖡 Lea	d Program	mer							
73		-	Revise Screen Text	4 hrs	Mon 4/28/08	Tue 4/29/0	8							inst	ructional I	Designer	1						
74		9	Signoff Final Courseware	1 day	Tue 4/29/08	Wed 4/30/	08							ā									
75		3	Implement Courseware	4 hrs	Tue 4/29/08	Tue 4/29/0	8							Lea	d Program	mer				_			
76		-	Evaluate Courseware	2 hrs	Tue 6/10/08	Tue 6/10/0	9													1 Inc	tructions	Designer	1

The Gantt chart above (created in Microsoft Project 2010) illustrates the development tasks and subtasks required to build one module of training. It also illustrates the start date, duration, and end date, as well as the assigned resources for each task. Finally, the relationships between the tasks are illustrated. This graphic can be used in our meeting to explore options of reducing the timeline (e.g., providing fewer than three days for client review of all deliverables).



Michele Bennett Jackie Flynt David Mayorga Ken Thomas

**Ontario Co-op eLearning Development Project: Project Overview** 

P		Gantt Chart Tools			BalancingAct-On	CoOp-Pro	jectPlan-	v0-1.mpp	- Microsoft	Project			Ξ.	_					-				-	0	×
File	Task Resource	Project View Format		-				-	_		-	-		-	-	-								• 0	
Gantt Chart * View	Paste Cut Copy - Paste Format Pa Clipboard	Calibri     11     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7     7	Respect Linit ⇒	ck • 📌 s Manu Scheo	ally Auto Auto Ins Aute Schedule	ect Mov	e Mode	Task	Summary Mi Inse	lestone I	ielverabl	e Informati	on 🙀 Prope	Notes Details Add to erties	Timeline	Scro to Ta	AA F Q C k I F Editing	ind + :lear + ill +							
	1 Task	Task Name	Duration _ Start		Finish	Jary	Mar	ch	April		May		June		July	(		Augus	it .	Se	ptemb	er	Octob	er	-
1	Mode	+ Create Broject Blag	2 18 days Ed 2/	15/09	Tue 2/10/09	M	E B	ME	BN	A E	8	ME	В	M	E B	M	E	B	MI	EE	3 M	E	B	M	E
6	-	* Host Kickoff Meeting	0.97 days Tue 7	/19/08	Wed 2/20/08																				
12	8	* Create Analysis Document	10 days Wed	2/20/08	Wed 3/5/08		_																		
19	8	* Build Prototype	15.25 days Thu 2	/28/08	Fri 3/21/08	1100	-																		
38	8	* Host Internal Kickoff Meeting	0.81 days Fri 3/	14/08	Mon 3/17/08	18		-																	
43	8	* Conduct LCMS Training	3.5 days? Fri 3/	14/08	Wed 3/19/08			-																	
47	5	* Build Module 1	59.13 days Wed	3/19/08	Tue 6/10/08					_	_														
5 77	8	* Build Module 2	58.5 days Mon	4/28/08	Fri 7/18/08						_				_										
107	8	* Build Module 3	59.25 days Fri 5/	30/08	Fri 8/22/08								_	_			_	_							
5 137	8	* Build Module 4	59.75 days Fri 7/	4/08	Fri 9/26/08										-	_	_	_	_	_	_	-			
167	8	* Build Module 5	57.5 days Mon	8/11/08	Wed 10/29/0	1																			
197	8	* Build Module 6	59 days Wed	3/19/08	Tue 6/10/08			-			_														
227	3	* Build Module 7	57.5 days Mon	4/28/08	Thu 7/17/08						_		_	_	_										
257	8	* Build Module 8	57.5 days Thu 5	/29/08	Tue 8/19/08								_	_		-	_	_							
287	8	* Build Module 9	57.5 days Wed	7/2/08	Fri 9/19/08										-	_	_	_	_	_		Ψ			
317	2	* Build Module 10	178.03 days Fri 2/	15/08	Wed 10/22/0	з ( <b>у</b> —																			t 👘
347	8	* Close Project	0.25 days Fri 10	/31/08	Fri 10/31/08																				w.
					,	4																			
Ready	😤 New Tasks : Auto	Scheduled																		SI	1619		-0	-	÷.,

The Gantt chart above is just a different view of the same project file from the previous screen capture (each main task has been "collapsed" to review the overall project's duration). This view allows us to illustrate our parallel path strategy (i.e., Instructional Designer 1 works on Modules 1, 2, 3, 4, & 5, while Instructional Designer 2 works on Modules 6, 7, 8, 9, & 10). We can discuss how adding a third Instructional Designer working in parallel creates a resource problem (i.e., more resources, including Graphic Artists and Programmers, would have to be added to the development team), which we can price out if additional funds are available.

## Closing

Graphic visualization strategies and tools are critical resources to the Project Manager, who is responsible for communication across internal development teams, as well as project sponsors and stakeholders. Selection of the appropriate strategies and tools and mastery of the software are fundamental to a Project Manager's success.