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# Gantt charts revisited: A critical analysis of its roots and implications to the management of projects today

Article in *International Journal of Managing Projects in Business* · September 2012

DOI: 10.1108/17538371211268889

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## **Abstract**

**Purpose –**

**Design/methodology/approach**

**Findings**

**Originality/value**

## Keywords

## 1 Introduction

## 2 Gantt Chart: Origin and Development

*Figure 1 here*

*“Plants were scattered all over the nation, shipments were late, warehouses crowded or disorganized, and the Ordnance Department and the Navy used their resources poorly”*

*Figure 2 here*

*“The Gantt progress chart enables the manager to keep before him all the promises he has made, to concentrate his attention on overcoming obstacles and avoiding delays, and, when it is impossible to live up to a promise, it enables him to give the customer advance notice of the fact” (Clark, 1925, p. 84).*

*“The Gantt chart is perhaps the most effective form of graphical schedules”*

**3    Current Use of the Gantt Chart and its underlining Assumptions and Principles**

*Table 1 here*



3.1 Unidimensional

*unidimensional*

### 3.2 Objective

*day's work"*

*"deliberately working slowly so as to avoid doing a full*

*fair day's work*

*fair pay*

*possible*

*"Whilst computer-generated graphics and colour print-outs have given Henry Gantt's production planning bar chart a perceived new lease of life by imbuing a sense of certainty and they have retained their credibility despite contrary evidence, particular problems arise here." (Maylor, 2001, pp. 95)*

*duration and interdependencies.*

*define      measure work, its*

3.3 Deterministic

*a priori*

*a priori*

*a priori*

---

*the*

**3.4 Analytic and Accountable**

### 3.5 Sequential

*a priori*

### 3.6 Summary of the Implications of the Gantt Chart's Logic to Project Management



*Table 2 here*

## 4 Discussion, Conclusion and Outlook

## 5 BOX 1: Life and work of Henry Lawrence Gantt

*“Gantt and Taylor were an usual team; they had mutual interests in their quest for science in management and developed a deep mutual admiration for each other’s world. Gantt grasped the essence of Taylor’s work and, though they clashed at times, became a prime disciple of Taylor” (Wren, 1987, pp. 133)*

## 6 BOX 2: Principles of Taylorism

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- **Development of a true science of work**

*systematic soldiering*                      *the best way*                      *rate busters*                      *fair day's work*

- **Scientific selection and progressive development of the worker**

- **Bridging Scientific Management and Employee:** “[Managers] heartily cooperate with the men so as to insure all of the work being done in accordance with the principles of the science which has been developed”  
**control and reward**
- **Co-operation between manager and worker:** “There is an almost equal division of the work and the responsibility between the management and the workmen. The management take over all work for which they are better fitted than the workmen, while in the past almost all of the work and the greater part of the responsibility were thrown upon the men.”  
**managers and employees.** **both**

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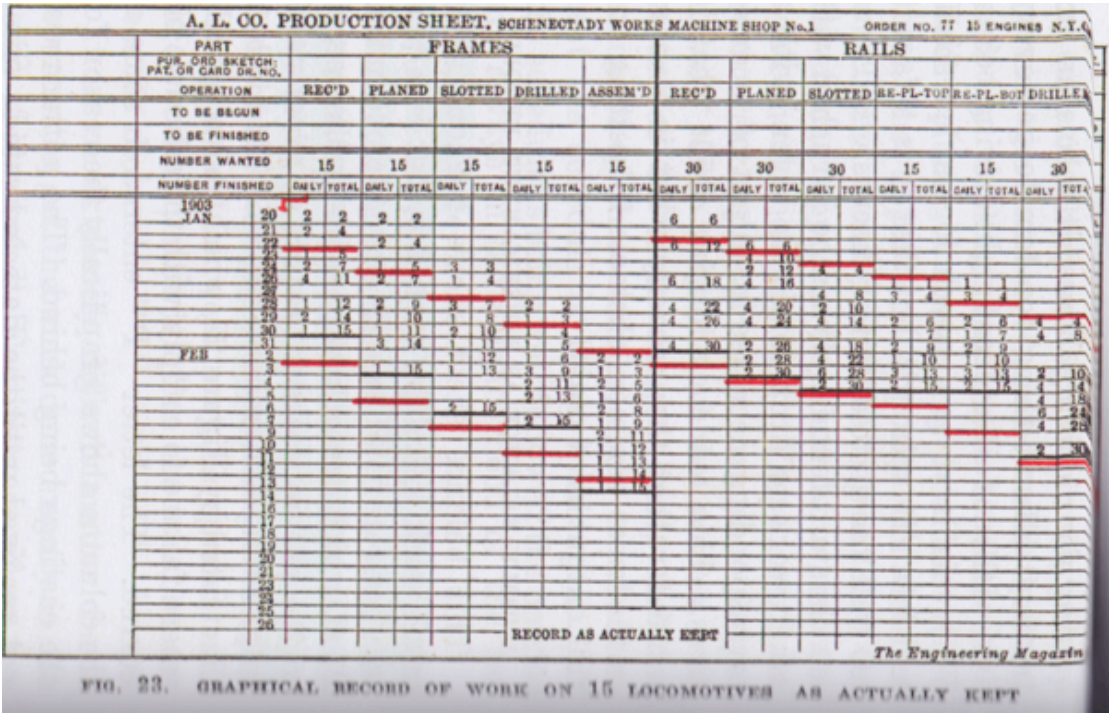
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Figures



## Tables

**Table 1:** Exploring Assumptions and Principles embedded of the current Use of the Gantt Chart

Steps	Implied assumptions	Principles
Define the activities: Breakdown the project scope and translate work packages into activities	<ul style="list-style-type: none"> <li>• Scope can be translated into activities <i>a priori</i></li> <li>• There is <i>one</i> best way to execute the project</li> <li>• There is clarity both in terms of scope and process</li> <li>• The most appropriate way to do projects is by dividing it into activities</li> <li>• The whole is the sum of the parts</li> </ul>	<ul style="list-style-type: none"> <li>• Deterministic</li> <li>• Objective</li> <li>• Deterministic</li> <li>• Analytic</li> <li>• Analytic</li> </ul>
Define the sequence: identify and document the relationship between the tasks and define its sequence	<ul style="list-style-type: none"> <li>• Type of dependency can be pre-defined and quantified in terms of time, e.g. AB SS+1</li> <li>• Task dependencies remain stable</li> <li>• There is a clear and discrete interface between tasks</li> <li>• Task execution is sequential only</li> <li>• Interfaces are defined and managed in terms of time and sequence, not content; pooled interfaces are discouraged</li> </ul>	<ul style="list-style-type: none"> <li>• Objective</li> <li>• Unidimensional</li> <li>• Deterministic</li> <li>• Objective</li> <li>• Sequential</li> <li>• Sequential</li> <li>• Unidimensional</li> </ul>
Estimate activities resources <sup>1</sup> , budget and durations	<ul style="list-style-type: none"> <li>• It is possible to estimate the duration of each task with a high degree of certainty<sup>2</sup></li> <li>• Clear accountability to task execution could be defined<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Deterministic</li> <li>• Objective</li> <li>• Accountable</li> </ul>
Monitor the progress by comparing the actual work and the baseline	<ul style="list-style-type: none"> <li>• Progress is sequential (Waterfall process), i.e. it follows a pre-defined order of what comes first and what comes later, and when a task is 'completed' it will not be revisited</li> <li>• Progress is measured against the completion of the tasks on time</li> <li>• Potential opportunities for alternative approaches to manage projects emerging during the project process are not exploited and discouraged</li> </ul>	<ul style="list-style-type: none"> <li>• Sequential</li> <li>• Unidimensional</li> <li>• Determinism</li> </ul>
Document and manage changes to the baseline	<ul style="list-style-type: none"> <li>• Potential issues that the project may face should have been identified <i>a priori</i>. The impact of 'truly' unknown-unknowns are not recognised, but instead recognised as lack of foresight.</li> <li>• Management by minimising the gap: efficiency and effectiveness are the objective and achieved by 'sticking' to the plan. Change is avoided and should be mitigated.</li> </ul>	<ul style="list-style-type: none"> <li>• Deterministic</li> <li>• Deterministic</li> <li>• Unidimensional</li> </ul>
Identify the reasons for delays and note in the Gantt Chart <sup>4</sup>	<ul style="list-style-type: none"> <li>• It is possible to define the reason (or very limited number of reasons) to delays</li> </ul>	<ul style="list-style-type: none"> <li>• Deterministic</li> <li>• Objective</li> <li>• Accountable</li> </ul>

<sup>1</sup> This activity implies that it is possible to define skills and knowledge necessary to manage each task *a priori* and therefore objectively define the 'best man for the job', a clear principle of scientific management. In Taylor's words "scientifically select and then train, teach, and develop the workman, whereas in the past he chose his own work and trained himself as best he could." (Taylor, 1911)

<sup>2</sup> One could argue that Gantt Chart, if used with tools such as PERT, could show pessimistic, optimistic and likely scenarios, and therefore consider the accuracy of the estimations. However, we still assume accuracy in the determination of the inaccuracy of the estimates.

<sup>3</sup> In the use of Gantt Chart the focus is on durations, however accountability is also implicit in the tool, and software such as MS Project express the resource accountable for the task in the Gantt Chart.

<sup>4</sup> This practice is no longer in use, but part of the original tool, as described in Section 2.



Table 2: Implications of the Gantt Chart Logic to Projects

Implications of the Gantt Chart's Logic						
	Unidimensional	Objective	Deterministic	Analytic	Accountable	Sequential
<b>General Definition</b>	Focus on one dimension over others	There is one truth, one right way, and that can be determined.	It is possible to determine everything that will happen	Break a task into pieces. The whole is the sum of the parts	Clear definition of who is responsible for something or some action	Characterised by regular sequence
<b>Principles in the context and mindset of the Scientific Management</b>	Reduction of waste of human effort, maximise work that can be done in a given period of time	Systematically define what is the right task performance and the fair day's work	Task performance is detailed <i>a priori</i> in routine repetitive operations	Division of work, increase in efficiency, accountability and control over the execution of the task		Sequential manufacturing process
<b>Principles in the current use of Gantt Chart - The Gantt Chart Logic</b>	Visual control based on efficiency, work/time	Gantt Chart is the statement of reality, <i>the</i> best way to execute the project	It is possible to determine <i>the</i> scope and process <i>a priori</i>	Divide the work into tasks	Define who is responsible for each task	Linear sequence of activities in projects
<b>Implications to:</b>						
<b>Project</b>	Project is a process with clear start and finish	Project exists and can be defined <i>a priori</i> , independent from people enacting it	Project is about turning <i>the</i> plan into reality	Project is the sum of the tasks to be executed	-	-
<b>Project Management</b>	Managing through deadlines to meet pre-defined delivery date	Follow the Gantt Chart. Estimates are defined rationally, and progress reports are valid and reliable	Define <i>the</i> scope and process and execute it; avoid and manage the gap between plan and actual	Break down the scope, and transform it into tasks	Assign clear accountability to the different pieces of the project	Management through a waterfall project process. Projects progress linearly
<b>Project Manager's Role</b>	Make sure people deliver on time	Plan the best way to do the project and control progress against this baseline	Plan to avoid gaps between plan and actual, or at least identify and put project back on track	Ensure an optimal division of work. Define roles and responsibilities, including of the PMer	Emphasise accountability over each task, and 'blame' those who fail to deliver	Ensure tasks are executed in the 'right' sequence, and each step is completed and freeze, so the project can move to the next
<b>Success</b>	Delivery on time	Meet the baseline...	... without surprises	Deliver every task...	... that one is accountable for	Right first time – no loops
<b>Most appropriate Context</b>	Time is the most important success criteria	Low uncertainty and behavioural complexity		Low complexity and interdependence	Clear scope and liner project progress	
<b>Inherent</b>	Need to balance several dimensions	Such conditions are rather rare in		Focus on low level delivery,	Cycles and 'convergence' to solutions	

<b>Limitations</b>	project contexts	individualistic behaviour, losing sight of the project benefit	are discouraged
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