E-book

The Basics of Gantt Charts - The Ultimate Cheat Sheet
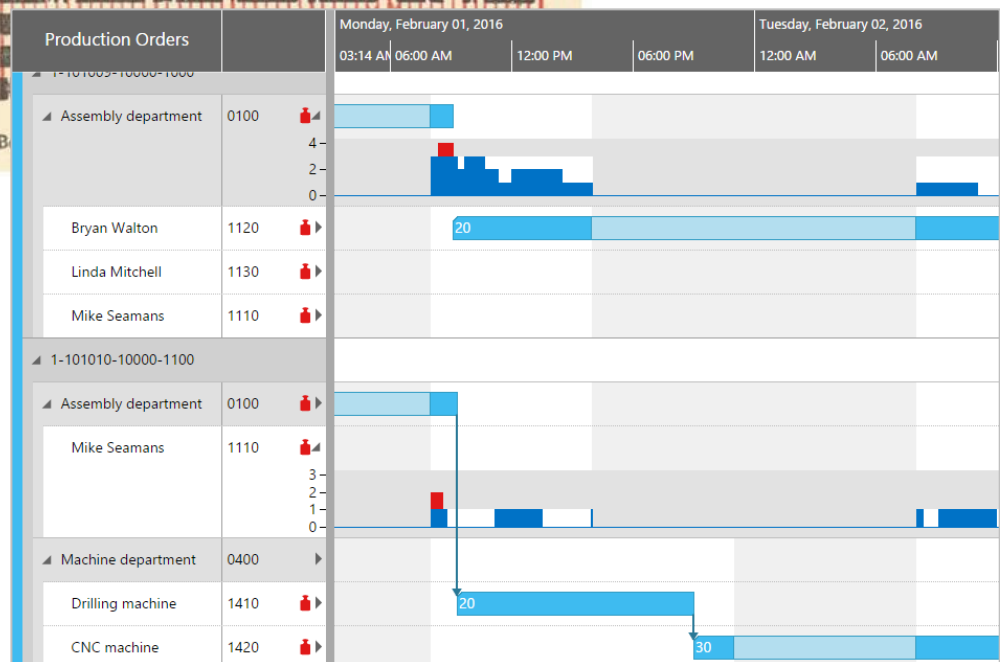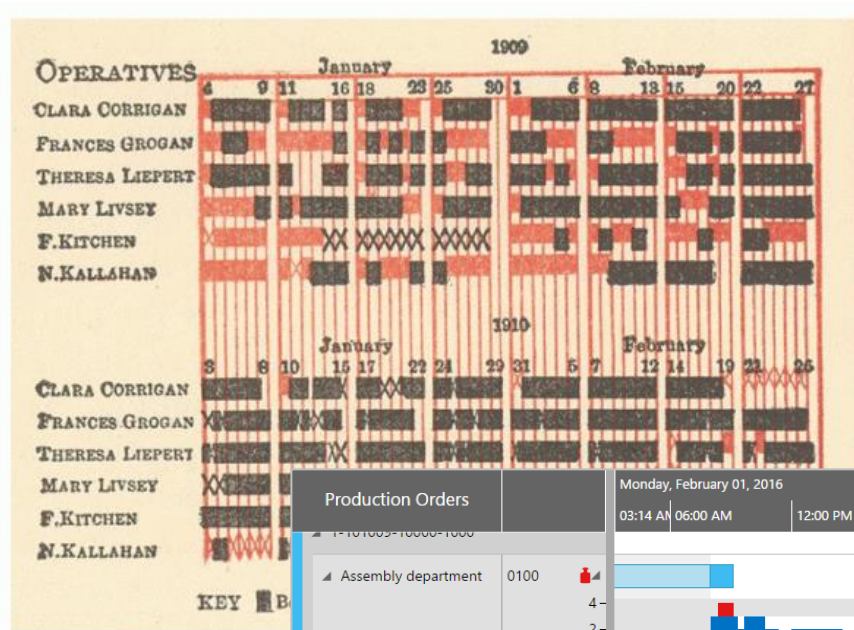

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Introduction

"Gantt charts are uncool", "Gantt charts are dead" - these and many other similar statements can be read and heard in the media again and again. But – interestingly enough - in spite of all declarations of death, Gantt charts are still very alive and are still a tool that is most commonly used for visualizing schedules of many different kinds.

The contradiction between all prophecies of doom and the longevity and up-to-dateness aroused our interest and so we did a bit of research and came up with this e-book that wants to shed light on the origin of Gantt charts, their fields of application in the past and today, and their evolution in terms of function and features. Simply spoken, this document can work as the 1x1 of the Gantt chart.

What is a Gantt Chart?

Before we dive deeper into origin and nature of Gantt charts, let's clarify what a Gantt chart is in the first place.

A Gantt chart is a type of bar chart, showing activities (tasks or events) displayed against time. A table on the left contains a list of the activities, at the top a time scale is displayed.

Each activity is visualized by a bar, illustrating start and end date and duration of each activity by the bar's position and length. They are the ideal tool for visualizing all kinds of time and resource-oriented planning data.
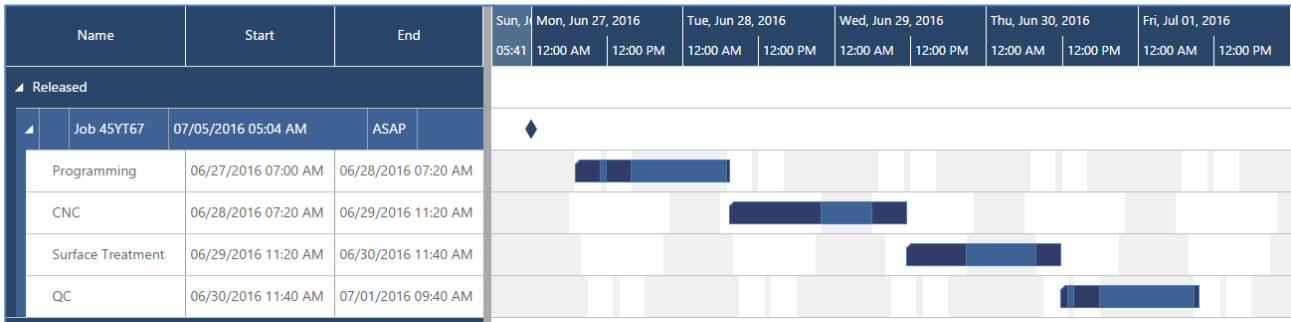
Due to their structure, Gantt charts offer clear overview of the **activities'**

- type
- start and end date
- duration
- Possible conflicts ("overlapping" activities)

And the **whole project's**

- start and end date

To sum up a Gantt chart lets you recognize at a glance which tasks (activities) have to be worked off when.

Name	Start	End	Sun, J 05:41	Mon, Jun 27, 2016 12:00 AM	12:00 PM	Tue, Jun 28, 2016 12:00 AM	12:00 PM	Wed, Jun 29, 2016 12:00 AM	12:00 PM	Thu, Jun 30, 2016 12:00 AM	12:00 PM	Fri, Jul 01, 2016 12:00 AM	12:00 PM
◢ Released													
◢ Job 45YT67	07/05/2016 05:04 AM	ASAP	◆										
Programming	06/27/2016 07:00 AM	06/28/2016 07:20 AM											
CNC	06/28/2016 07:20 AM	06/29/2016 11:20 AM											
Surface Treatment	06/29/2016 11:20 AM	06/30/2016 11:40 AM											
QC	06/30/2016 11:40 AM	07/01/2016 09:40 AM											

History of Gantt Charts

Origin of Name

Did you know that Henry Gantt wasn't the one who first used bar charts for scheduling? During my research I came upon some interesting insights as to the origins of this chart type. It seems that what we today call a Gantt chart goes back much further than only 1910. In fact, "…This marriage of numbers and geometry to create a graph was first achieved by Nicole d'Oresme in the middle of the 14th century…"[1]

Some four hundred years later, in the 1890s, Polish economist, engineer and management researcher Karol Adamiecki came up with a planning tool called "Harmonogram (or Harmonygraph), a "… methodology for 'work harmonization' that was based on graphical analysis….Adamiecki emphasised the importance of creating harmonious teams, practical scheduling, and compatible, measurable means of production. It is claimed that companies implementing his method saw productivity increases of up to 400%."[2]

The Harmonogram shows a vertical time scale on the left while the activities are displayed across the top. Scaled paper strips were used to represent the activities, the position and length of the strips indicating the activities' duration and position in time. The strips had a header in which name and duration of the activity as well as the list of preceding activities were written. The activities' chronological order was from left to right.

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[1]http://www.mosaicprojects.com.au/PDF_Papers/P182_The_origins_of_bar_charting.pdf, S.3. This document provides very profound details on the history of bar charts.
[2] http://www.mosaicprojects.com.au/PDF_Papers/P042_History%20of%20Scheduing.pdf

time	From	—	—	—	A-1	B-1	...
	To	A-2	B-2,C	D-2	A-3	E-1	..
	activity	A-1<4>	B-1<4>	D-1<2>	A-2<4>	B-2<3>	...
1		■	■	■			
2		■	■	■			
3		■	■				
4		■	■				
5					■	■	
6					■	■	
7					■	■	
8					■		
9							
10							
11							
12							
13							
14							

Adamiecki's Harmonogram[3]

However, these were not the times to make things known to a wider public and so Adamiecki could publish his invention only in 1931 and then only in Polish.

In the meantime, Henry Laurence Gantt (1861-1919), a mechanical engineer, management consultant and industry advisor, "in the 1910s developed a method to chart work planned and work done in the same space in relation to each other and in relation to time".[4] The image below shows a Gantt chart used for planning the work in a machine shop.[5]

FIGURE 18.   How Work Behind Schedule Is Shown by the Gantt Layout Chart

During the First World War Henry Gantt developed his charts to assist the Ordnance Department at Washington to track the progress of the large orders for arms and munitions

Gantt's chart almost immediately were a great success and considered revolutionary. Moreover,"…they were popular with workers because they were easy to understand and enabled the workforce to be involved improving productivity."[6] They became widely known and popular in western countries so that it was Henry Gantt that the charts of this type were named after.

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[3] http://www.mosaicprojects.com.au/PDF_Papers/P042_History%20of%20Scheduing.pdf
[4] Wallace Clark: The Gantt chart. The Ronald press company New York 1922
[5] Ibd. p 61
[6] http://www.stakeholdermap.com/plan-project/gantt-charts.html#clark

Gantt did not patent his charts but gave them away to anyone that wished to use them. They were published in his book "Organizing for Work"[7] from 1919, as well as in several magazines.

Karol Adamiecki   Henry Gantt

Original Purpose

Though Gantt charts are mostly mentioned in connection with project management, Henry Gantt originally wanted to improve batch production in steel factories. In order to optimize the productivity of machines and staff, he had the idea that, if full capacity wasn't reached, the reason for this was to be written next to the bar so that the degree of utilization was clearly visible for everyone. Easy comparison between scheduled and actually completed work became possible, thus delivering information on whether production was on schedule or not.

Throughout its development, the Gantt chart was also designed to be a way of viewing the comparison between performances and promises as well as to make definite project plans and have them executed.

The environment, for which Henry Laurence Gantt invented his charts, was the production/ manufacturing industry and the prime use case was the improvement of managerial decision-making in the scheduling process. The design of the Gantt chart followed the question which information a foreman or supervisor needed to see to quickly understand whether a production was on schedule, ahead of time or running late. Gantt introduced the idea to use time and resource usage and no longer quantity as a yardstick for making scheduling decisions, and created various types of charts depending on the individual needs of the production managers. These managers at that time had to manage bottlenecks, were supposed to deal with uncertainty and needed to cope with all problems resulting from the still high degree of human contribution to industrial production.

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[7] Gantt, Henry L., *Organizing for Work,* Harcourt, Brace, and Howe, New York, 1919. Reprinted by Hive Publishing Company, Easton, Maryland, 1973

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For this environment, Henry Gantt created a chart that summarized all relevant information to make profound scheduling decisions.

Evolution of the Gantt Chart

From the beginning, Gantt charts were a success and were considered a great innovation. One could perhaps say that Gantt's approach laid the foundation for traditional project management.

Gantt charts could even keep up with the demands of more complicated projects: They were used on large construction projects such as the Hoover Dam, started in 1931 and finished ahead of schedule, and the interstate highway network construction project that started in 1956.

There are, however, some differences between today's Gantt charts and those of Henry Gantt's time, as you can easily imagine. While, of course, the basic concept hasn't changed, they underwent some considerable developments in appearance and functionality so that the simple structure, that at the time of Henry Gantt was considered revolutionary, got remarkably enhanced over times.

The original Gantt charts naturally had to be drawn by hand so that every change required the plan to be amended or redrawn – an extremely arduous task that of course considerably limited the usefulness, continual change a feature of most projects.
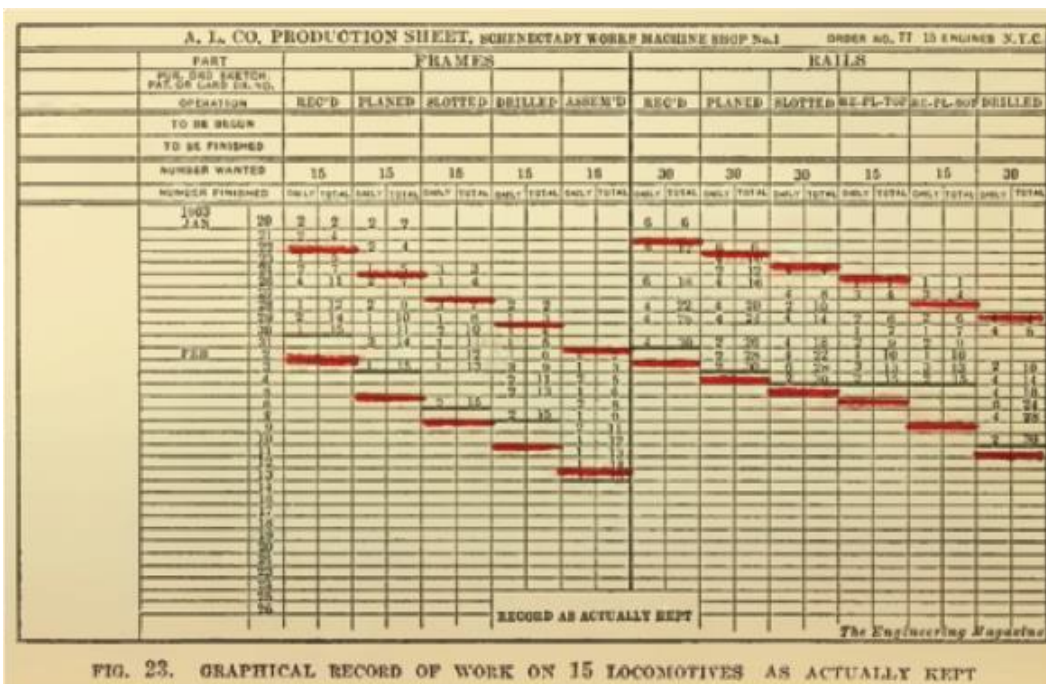

An "old school" Gantt[8]

[8] Source: http://www.randomant.net/wp-content/uploads/2014/07/old-school-gantt-chart.png

Along with the advent of modern technology, especially the personal computers in the 1980s, creating, updating, sharing and printing of complex and elaborate Gantt charts have nearly become "a walk in the park".

The upcoming Internet allowed for increased collaboration over networks so that Gantt charts are nowadays often used in web-based applications. These are typically created using hypertext markup language (HTML) tables and cascading stylesheets (CSS)

Especially during the last few years, the Gantt chart underwent a major development from being a merely static and often backward looking project management tool to enabling operative planning processes.

Gantt charts of today have to meet the demands of modern scheduling - they should be able to show all relevant information about the various tasks or phases of the project, as shown in the Gantt chart below:

- Dependencies between activities.
- The current schedule status using percent-complete shadings.
- A vertical "TODAY" line.
- A histogram to visualize capacity load and imminent bottlenecks.
- Different calendars for different resources
- Indicators for critical processes (e.g. belated deliveries)
- Various resolutions (days, weeks, months, quarters, etc.)
- Several Gantt views for one planning problem (e.g. job view, resource view, load view)
- etc.
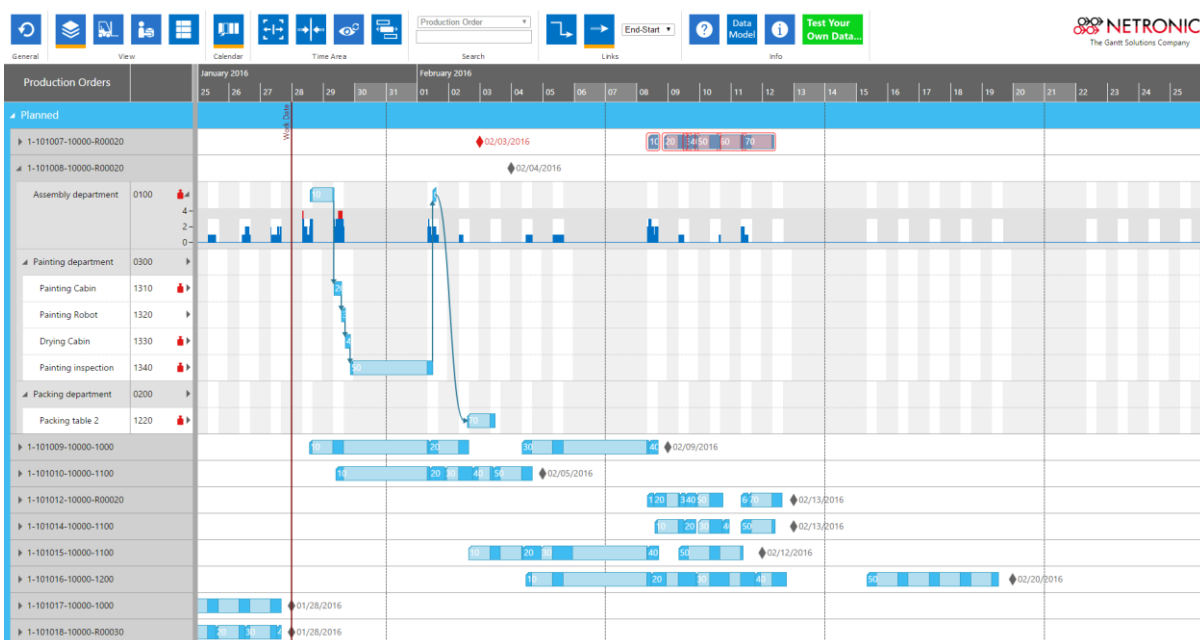
Why Use Gantt Charts?

After having discussed history and structure of Gantt charts, now would be the right time to learn why Gantt charts are still so popular. What are the advantages of this "old stager" for modern and high-performance time- and resource-oriented planning?

Advantages of a Gantt Chart

In short, the above mentioned features are at the same time the great advantages of a Gantt chart for scheduling. You get a clear-cut overview of

- A project's/ job's tasks
- The tasks' relation between one another
- Progress of the tasks
- Duration of tasks and project
- Resources and their utilization
- Dependencies
- Impacts of schedule changes
- Visual alerts in case of scheduling conflicts

Application Fields of Gantt Charts

Gantt charts offer multiple advantages: thousands of companies now use them to enhance communications, become more productive, improve collaboration, track and manage resources, make long-term forecasts, and track project results. Due to their universal applicability,

- they are used in:
  - logistics companies
  - fleet management
  - service personnel scheduling
  - production scheduling
  - construction companies
  - project management
  - organizing trade shows
  - producing publications
  - website content creation
  - product launches
  - training staff
  - by people who are, for example:

        o   production supervisors or production schedulers

        o   software developers

        o   software architects

        o   ERP system Microsoft Dynamics NAV resellers whose clients are in manufacturing, construction, professional services or services

- They are indispensable for
  - communicating the plan or status of a project
  - monitoring tasks within a project
  - communicating the sequence and duration of certain tasks or processes of a project
  - knowing what tasks depend on completion of previous tasks
  - taking **immediate** corrective action

How to Create a Gantt Chart

Now that you've learned the basics of a Gantt chart and its useful features, you might want to create a chart of your own. This will be quite easy if you take into account some preliminary considerations.

Preliminary considerations

One thing you should always keep in mind when planning a Gantt chart is that without a carefully thought out and precise planning no Gantt chart will bring the desired results. So, this having been said, you should start thinking about your project.

- **Type of project: Existing or new application**

  In case you want to replace an existing application:
  - List the three most valued capabilities of your current solution which are indispensable in your new solution.
  - List the three capabilities that you miss most in your current solution.
  - Prepare screenshots of the existing application and sketches of the desired look and feel of the new application

- **Application use case**
  - Kind of application you develop
  - Problem/business issue you want to solve
  - Typical user of your application
  - Process that should get visualized in the Gantt chart
  - KPIs (key performance indicators) you are to be monitored/managed
  - One planner/multiple viewers of the schedule or multi-user application (many people can interactively change the data at the same time)

- **GANTT chart essentials**
    - Resource groups that need to get visualized: How many hierarchical levels are required?
    - Dependencies between the tasks to be visualized
    - Specific calendars e.g. shift calendars or work free periods
    - Tasks with different statuses to be visualized or not
    - Feedback on the changes needed
    - Number of tasks and links between the tasks needed to be visualized
    - Different views on the same data needed (e.g. an order based-view and a resource-based view)?
    - Gantt chart needed for reporting purposes (viewing only) or for scheduling purposes (data editing, changing and saving)?
- **Business logic**
    - Visual alerts needed for certain cases (that are to be specified)
    - Data fields and properties to be specifically highlighted
    - Business rules to be taken into account (e.g. for drag & drop interactions if, perhaps, certain machines cannot handle certain orders, interaction thresholds for delivery dates, etc.)?
    - Auto-assignment/scheduling:
        Rules to be taken into account (e.g. JIT or ASAP)

- **Development related**
    - Programming language to be used
    - Runtime environment
- **Data infrastructure**
    - Integration of the application into your existing system
    - Usage of other applications in the same workflow. Interaction of the Gantt application with other applications?
    - Usage of a database to store task information: What kind of database?
    - Usage of a framework for object-relational mapping

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Construction of a Gantt Chart

After having carefully planned your chart the construction will be no big deal.

A Gantt chart can be made of any size. The earliest ones were created from bond paper with no watermark present. The watermark would interfere with the lines on the chart.

Today's Gantt charts are mainly developed using any kind of software.

Follow these steps and you're on your way:

- **Draw the chart**
  Take your chosen Gantt chart tool and put your tasks into major headings. You'll then add the time intervals as you have determined them previously. Draw a horizontal time axis on the bottom of the spreadsheet, page, or whatever tool you're using.

- **Prepare a column on the left side of the spreadsheet**
  Record each task and milestone in their order of occurrence.

- **Add activities or milestones that occur at a specific point in time**
  You'll represent them using a diamond under the time the activity must occur.

- **Tasks occurring over a set period of time**
  You'll draw horizontal bars or an empty rectangle that begins from the first day the task will take place and finishes when the task ends. Be sure not to fill in the inside of the rectangle.

- **List every task in the Gantt chart**
  You need to add every task into your chart. Don't miss even the smallest task.

- **Fill in the diamond or rectangle**
  This should be done as each task is performed.

Conclusion

After having read this e-book, you should have become a bit of a Gantt expert. Nevertheless, it could be helpful to sum up for you the key reasons why to use a Gantt chart. Gantt charts offer:

- **Intuitiveness**
  The Gantt chart's basic idea and the inherent simplicity are striking. Intuition will tell planners how to use them.

- **Clarity**
  The manager/employee communication will be eased considerably. Gantt charts are easy to work with for operations and nevertheless they provide the information that management typically seeks.

- **Straight-forwardness of reporting**
  As Gantt charts are easy-to-use for employees, and highly appreciated by management, they are a great tool to report on the progress with the scheduled activities. E.g., they can be easily used in a status report to show how much of the schedule has been completed so far by displaying the progress of an activity in a specific color.

- **Increasing efficiency**
  By consistently using Gantt charts to visualize and track the schedule, these Gantt charts over time incorporate and document best practices in a format that is crystal clear for everybody and that for sure will bring new scheduling staff up to speed rapidly. This will increase organizational efficiency, and as such Gantt charts can make a valid contribution to knowledge management.

- **Insight: making dependencies transparent**.
  A Gantt chart does not only deliver an overview of the sequence of events. It also provides important information for project/process managers as it visualizes the critical path and hence guides the schedulers' attention to those activities that are crucial and deserve a specific treatment.

- **Management relief**
  With clearly showing all process step dependencies no employee can try to step out of his area of responsibility. The "excuse department" gets closed with applying a meaningful Gantt chart.

- **Detailed as well as high-level views**
  State-of-the-art Gantt software tools allow to group and sort the data so that you can start with a high-level view and quickly drill-down into all relevant details.

- **Achieving agility**
  A Gantt chart that is built with interactive software enables the schedulers to quickly react to these changes, alter the schedule and even develop scenarios. That way, a Gantt-centric schedule is a great catalyst for achieving operational agility.

See how a modern Gantt Chart Works

In spite of the above mentioned disadvantages, a Gantt chart is still indispensable in modern project scheduling.

Time-related data such as tasks, orders, activities, or resources are still best displayed in Gantt charts. A modern Gantt chart should be interactive, let the planner take corrective action in the planning and zoom into details without losing overview. These and more functions for realizing even tricky and complex planning and controlling tasks are offered by our Gantt products.

Let us show you how to best add visual scheduling capabilities to your project plan. As you know, we are "The Gantt Company" and we have worked hard to implement all described features required for modern interactive scheduling into our Gantt products:

Want to know more?

CONTACT us!
Call: +49 2408 1410
or click to reach out

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