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Organization of construction works

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Planning of investment

- The key to successful building development organization is plan
- **Planning consist in:**
 - designate tasks,
 - determination necessary means for each economical units,
 - coordination of cooperation between economical units.



Planning methods

Planning methods include:

- **graphical methods** - ideas, solutions of organization problems in the form of charts (including schedules), schematics or graphical symbols

- **mathematical methods** - applied for large and difficult projects (over 200 activities).

Mathematical methods include **network methods** (CPM) and electronic computational methods



Schedules: General rules

Division of schedules:

- Schedules of works concerning:
 - building units complex
 - particular buildings
 - particular works
 - fragments of units or works
- Secondary schedules:
 - employment schedules
 - machines usage schedules
 - materials supply and consumption schedules
 - cost schedules



Schedules: General rules

- Schedule can be prepared in form of:
 - subjective - established course of actions taken by subjects of investment process
 - material and financial - extended by planned financial outlays of investor for realization of each action



Scheduling: key role in building development management

- Preparing schedules lowers chance of delay and assists in recovering from delay
- Offers assistance in reasoning about huge number of details (e.g. +500 activities)
- Scheduling help in identifying resource conflicts far ahead of time



Role of schedule

Role of scheduling:

- Design (preliminary schedule),
- Establishing finish and milestone times for activities,
- Procurement time, subcontractor presence, tenant occupancy,
- Communication tool between parties,
- Monitoring,
- Assessing impacts of changes,
- Resources management (e.g. payments, resource usage),
- Allows understanding of cash flow over time.

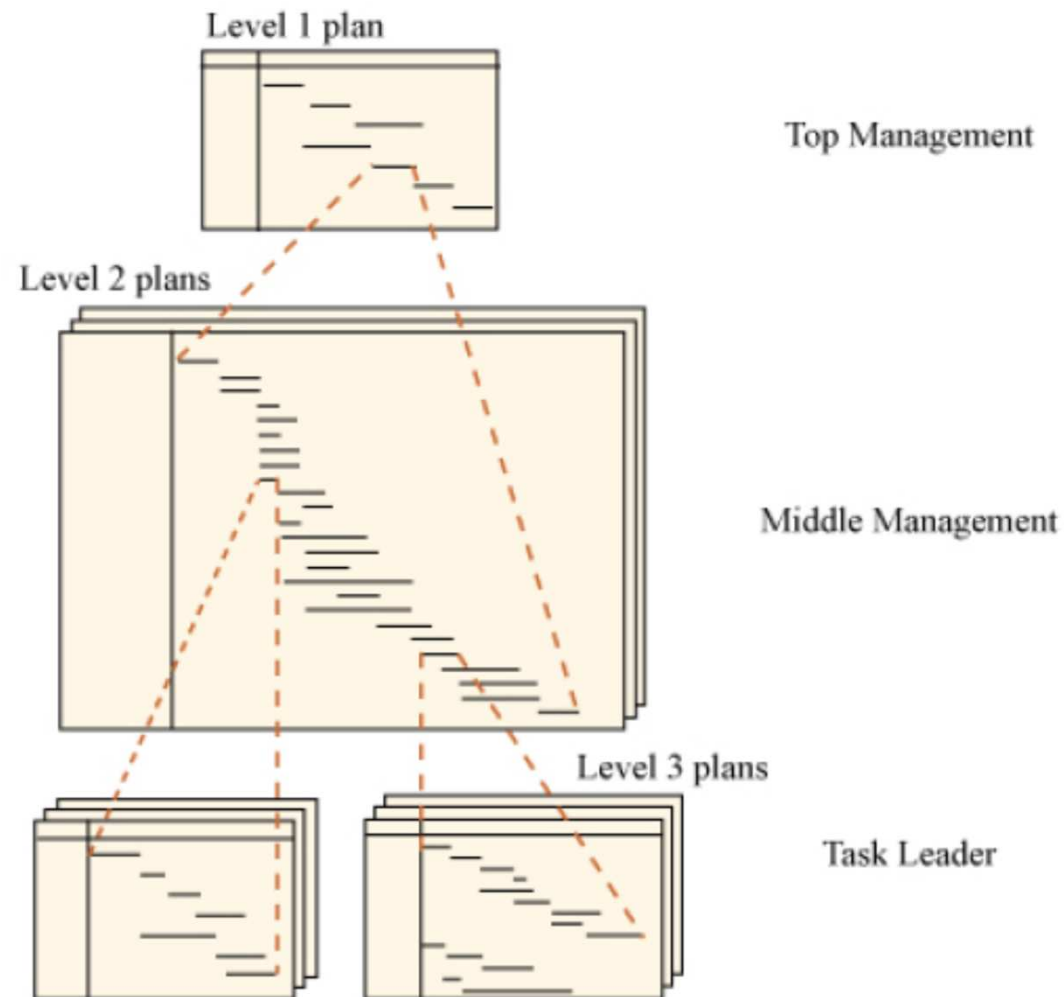


Schedules

- Schedules of work according to stage of preparation and scope can be divided:
 - directive
 - general
 - detailed



Gantt chart hierarchy





Directive schedules

- **Directive schedules** - prepared for building, installation or equipment complexes. The schedule scope the whole period of works (including preliminary works and closing building site).



Directive schedules - main steps

- Directive schedules steps are **grouped into phases:**
 - preliminary and maintenance works
 - site planning (buildings, roads and temporary installations)
 - territorial development (roads and permanent installations)
 - construction of primary buildings
 - construction of secondary (accompany) buildings and auxiliary investment
 - organization of building site (sidewalks, gardens, greenways)
 - disposal of construction site



General schedules

- **General schedules** are prepared for particular building unit
- Scope of general schedules is for the whole period of works
- General schedules consist of **three key parts**:
 - analytical part
 - graphical part
 - verification part



General schedules - analytical part

- **Analytical part** - consists general quantities and characteristics of particular actions in schedule
- Analytical part includes parameters of units and works (efficiency, labor demand, number of work units, workers and machines)



General schedules - graphical part

- **Graphical part** - main part of schedule - consist time regime of each unit or work (in connection with analytical part)



General schedules - verification part

- **Verification part** - consist charts and global statements of manpower and production means, employment or machines prepared in order to verify schedule of works.



Detailed schedules

- **Detailed schedules** - needed for complicated, multistage projects. Prepared for particular elements, units or works
- Detailed schedules are in essence same as general schedules but more detailed on particular work



Graphical representation of schedule - Gantt charts (bar charts)

- The first known tool of this type was reportedly developed in 1896 by **Karol Adamiecki**, who called it a *harmonogram*
- Adamiecki did not publish his chart until 1931 (only in Polish)
- All credits have been taken by **Henry Gantt** (1861-1919), who designed his chart around the years 1910-1915



Gantt chart

Gantt chart are very effective communication tool:

- very popular for representation of simple schedules
- limited usefulness over 50 activities
- no dependencies captured
- most effective as reporting tool than representation

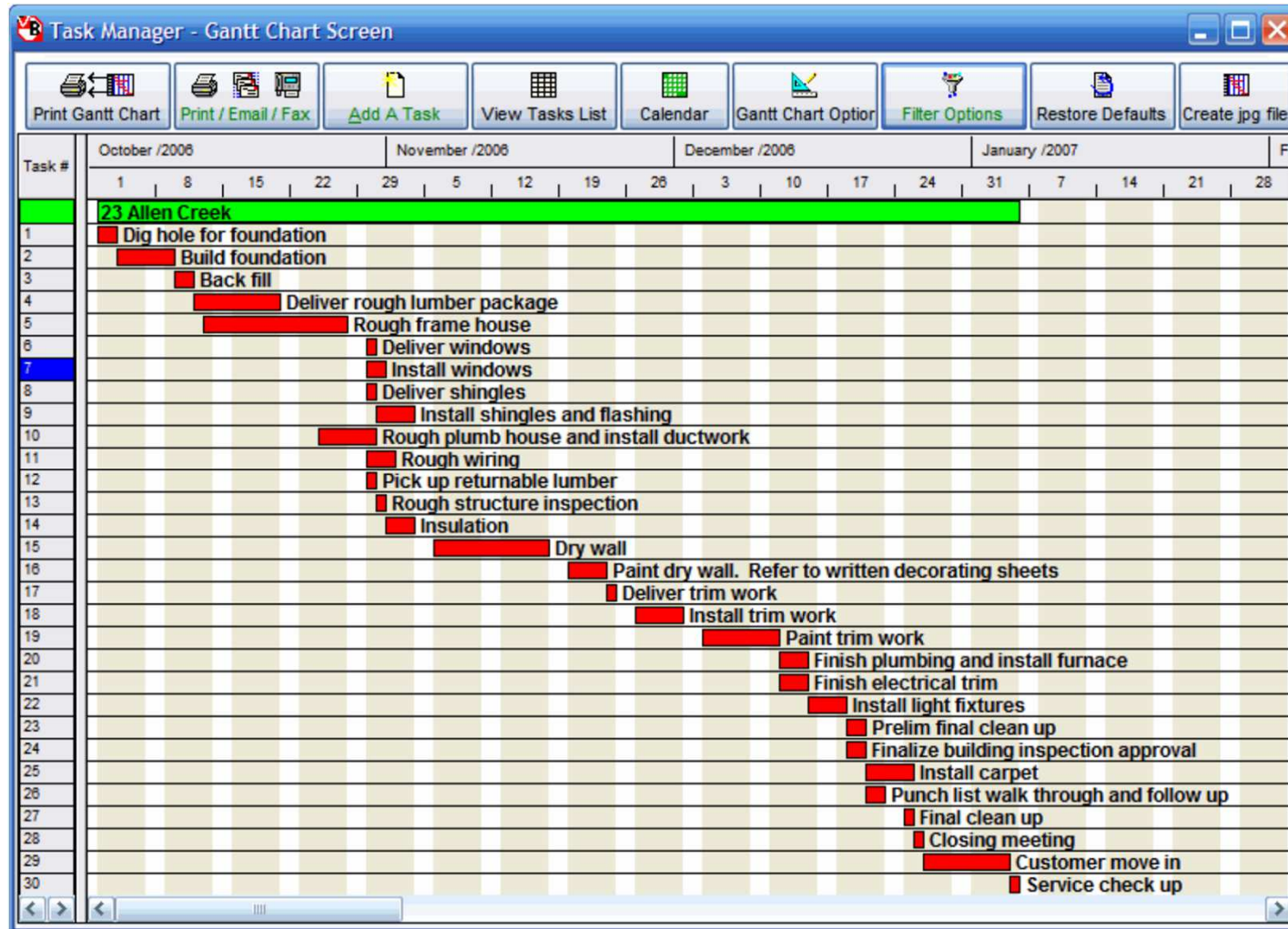


Gantt chart software

- Nowadays various software packages are available for project management:
 - Microsoft Project
 - Openproj
 - OmniProject
 - @Task
 - Merlin
 - Onepoint Project
 - more at: http://en.wikipedia.org/wiki/Comparison_of_project_management_software

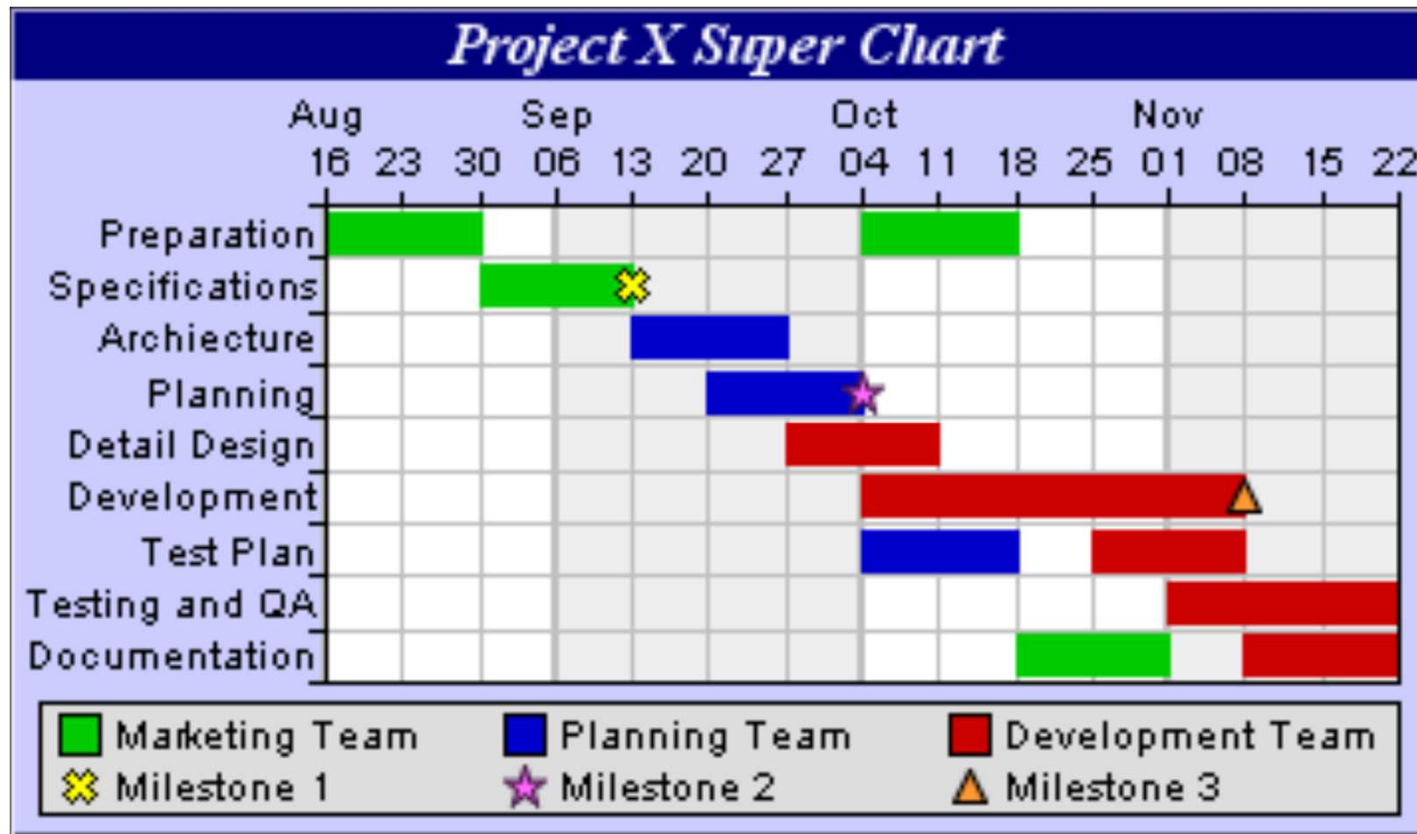


Gantt chart - examples



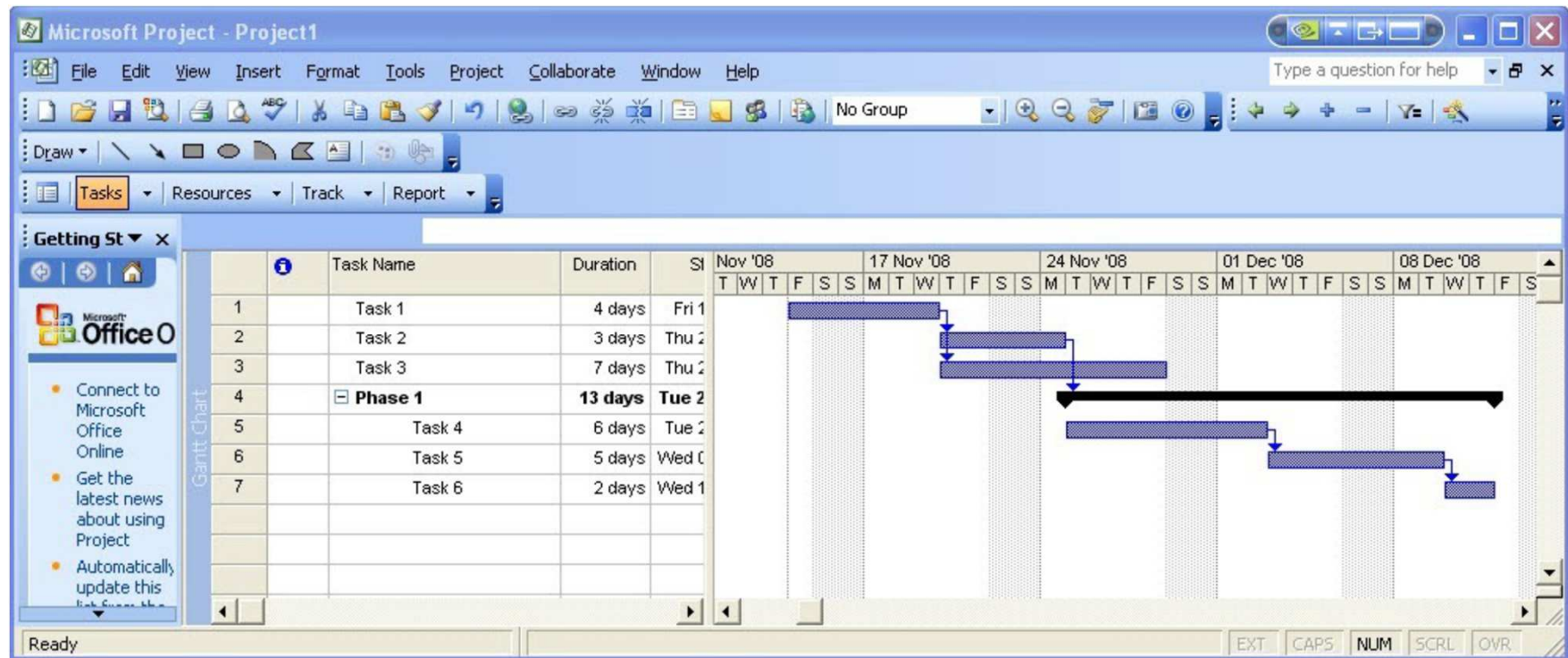


Gantt chart - examples



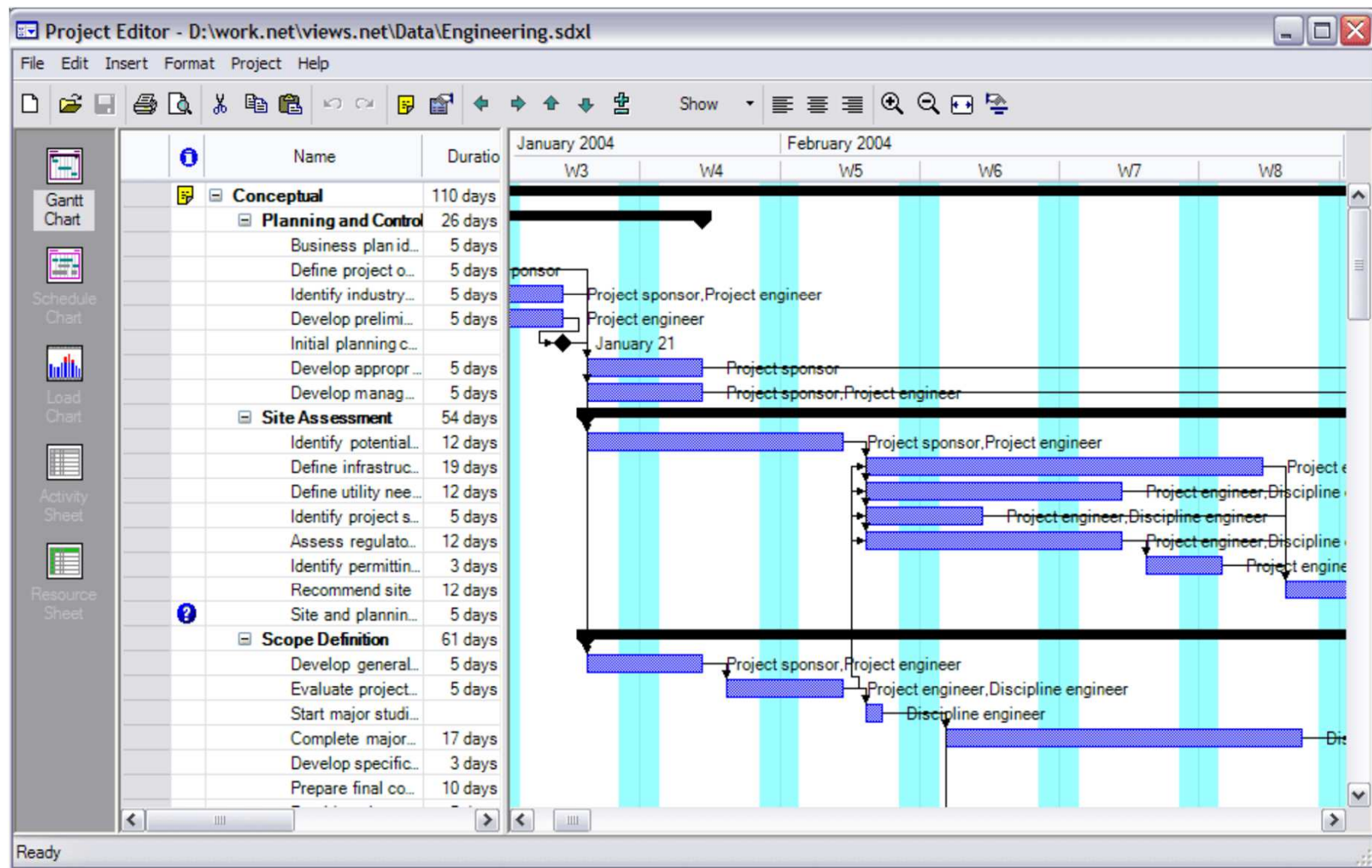


Gantt chart - MS Project





Gantt chart - examples





Graphical vs Analytical methods for project management

- **Graphical methods are not suitable for large projects involving +100 actions**
- Optimization algorithms for project management are used - network methods
- Network planning is basing on preparation of network diagram