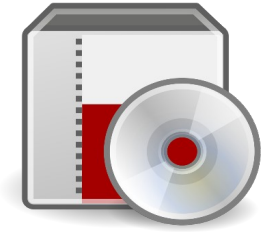
Software Technology 02

Software Development Process and Life Cycle

What is a Software?

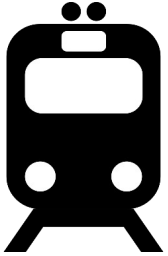
The goal is to make a Software, but is it a

- Product?



- Service?

- Infrastructure?



History of Product Handling and Optimization

We force software to be a Product →

- Division of Labor
- Mass Production
- Interchangeable Parts
- Specialization →

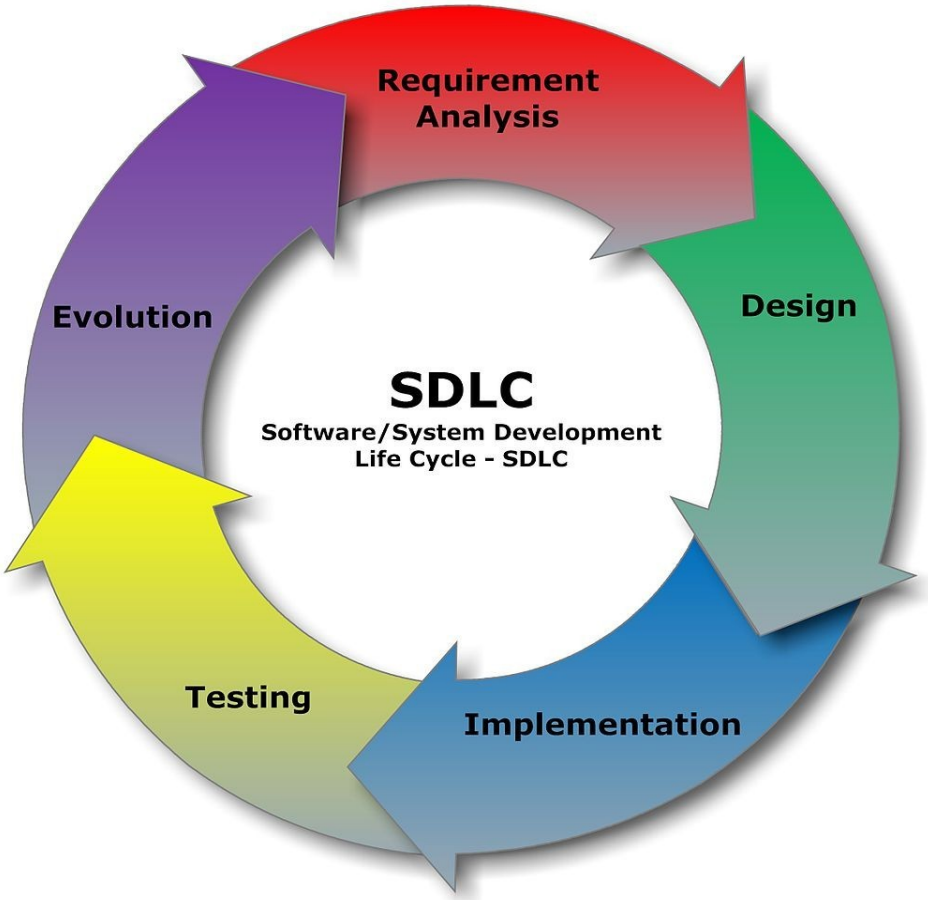
  The Assembly Line / Production Line

- Predictability

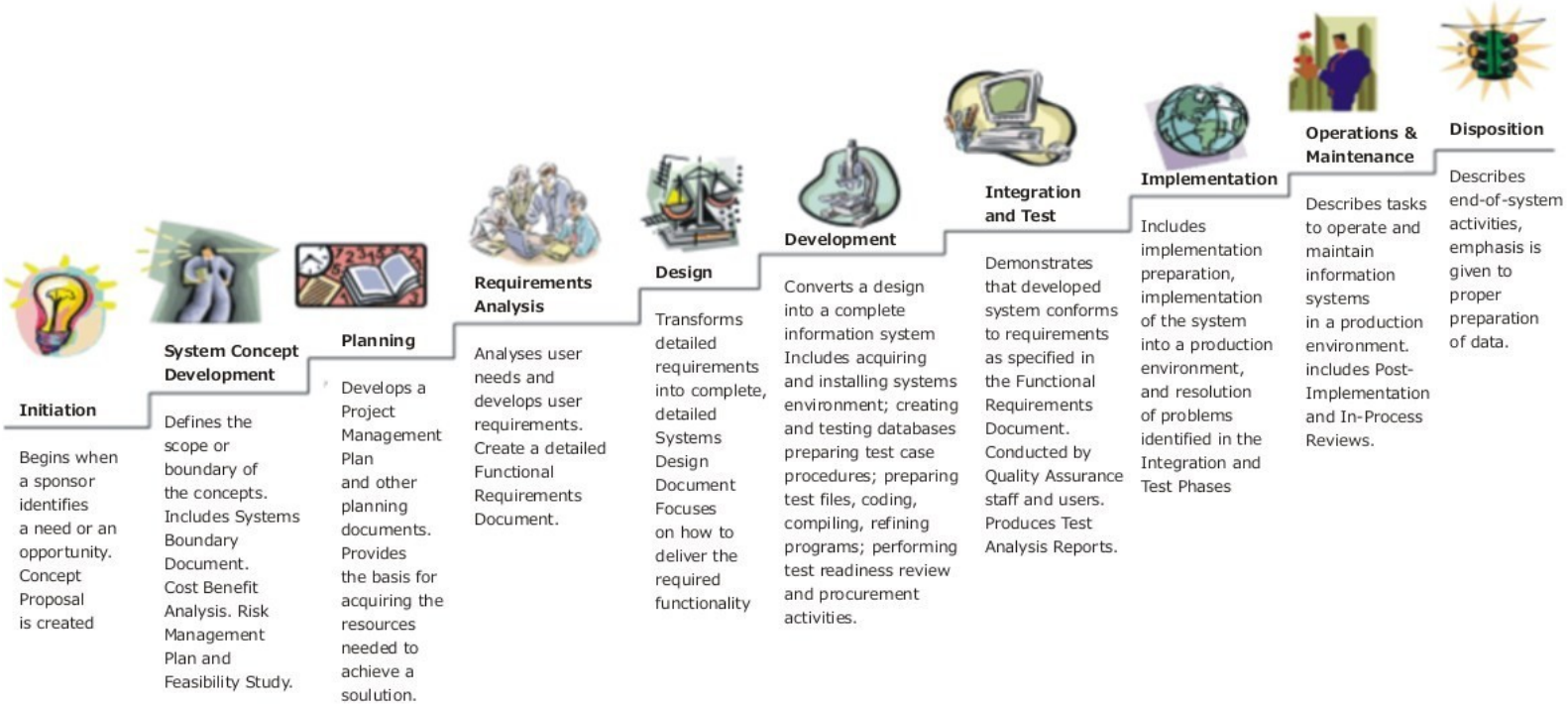
Assembly Line Features

- Consists of Phases
  - Phase uses Results of Previous Phases
- High Quality (involves separate QA phases)
  - QA checks, but quality comes from …?
- Based on Customer Requirements
- Predictably meets
  - Time Schedules
  - Cost Estimates

SDLC

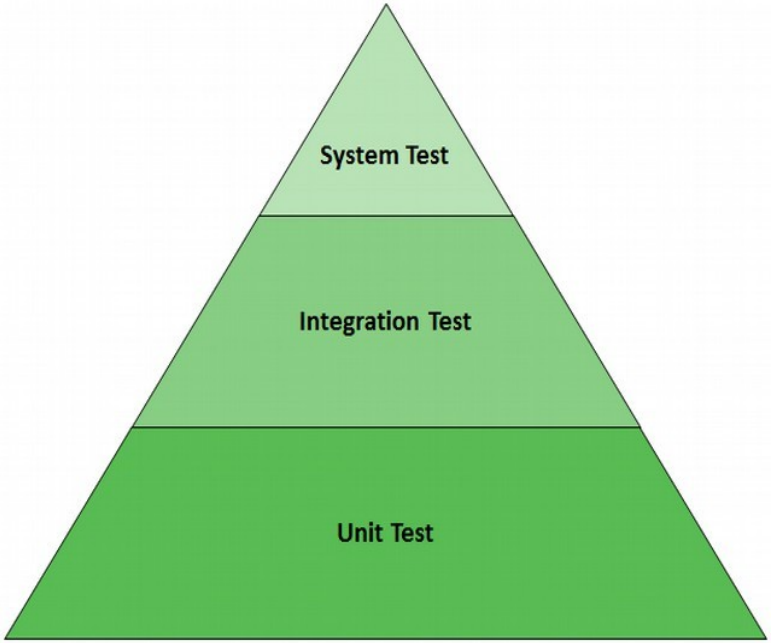

Requirement Analysis
Design
Implementation
Testing
Evolution
SDLC
Software/System Development Life Cycle - SDLC

Systems Development Life Cycle (SDLC)
Life-Cycle Phases



Testing (QA)

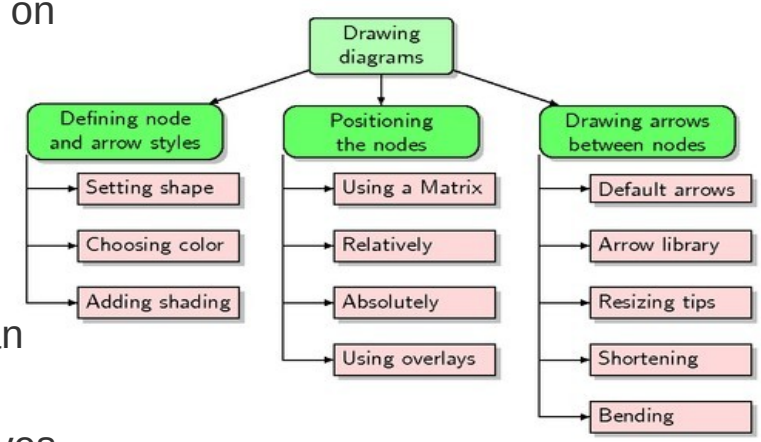
- Unit / Integration (+interface) / System testing
- White-box / Black-box / (Gray-box) testing
- Smoke testing
- Acceptance testing
- Regression testing
- Alpha / Beta testing
- Usability / Accessibility testing
- Performance testing
- Destructive (Stress and Crash) testing
- Security testing
- A/B testing



WBS

Measurement and control is important, but can only be done on manageable parts→

- **Work Breakdown Structure**
  - Hierarchical (**Tree**) structure
  - Contains the whole **Scope** of the Project
  - Only tells scope, not schedule or detailed execution plan (resource allocations)
  - Breakdown is **Complete** (parent element equals all leaves added)
  - Declares acceptance criteria / **outcomes**, not actions
  - Breaks down until work unit
    - Can be reliably **estimated**
    - Is **measurable**
    - Fits in a reporting period



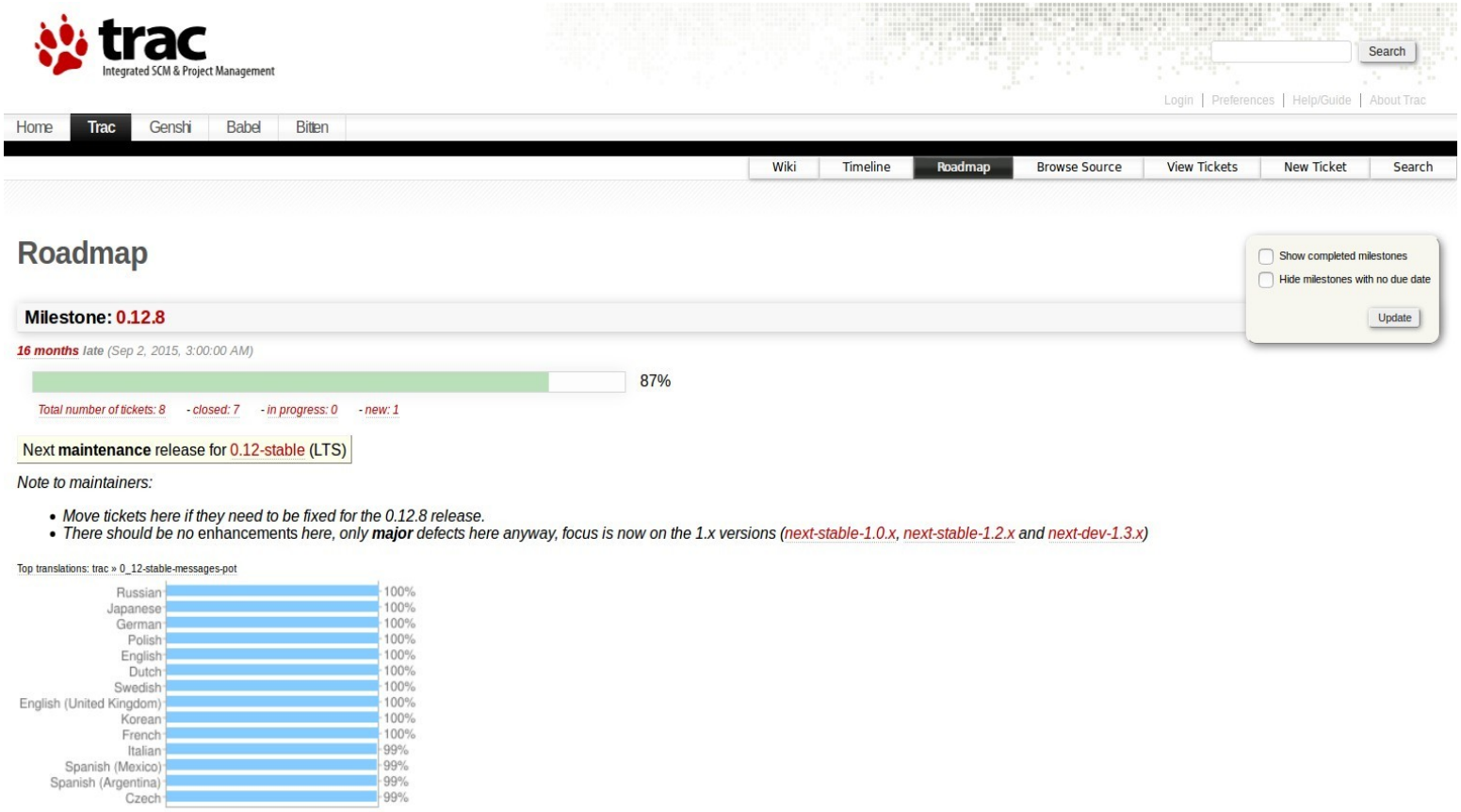
Top-down vs Bottom-up Design

- WBS is a Top-down approach
  - Focuses on high-level features
  - Delivers value (can give the highest value possible to the client / user)
  - Keeps focus on solution requirements
- While Bottom-up can be better in
  - Find simplest / cheapest solutions
  - Reuse existing technology and solutions
  - Find most efficient composition of already made stuff

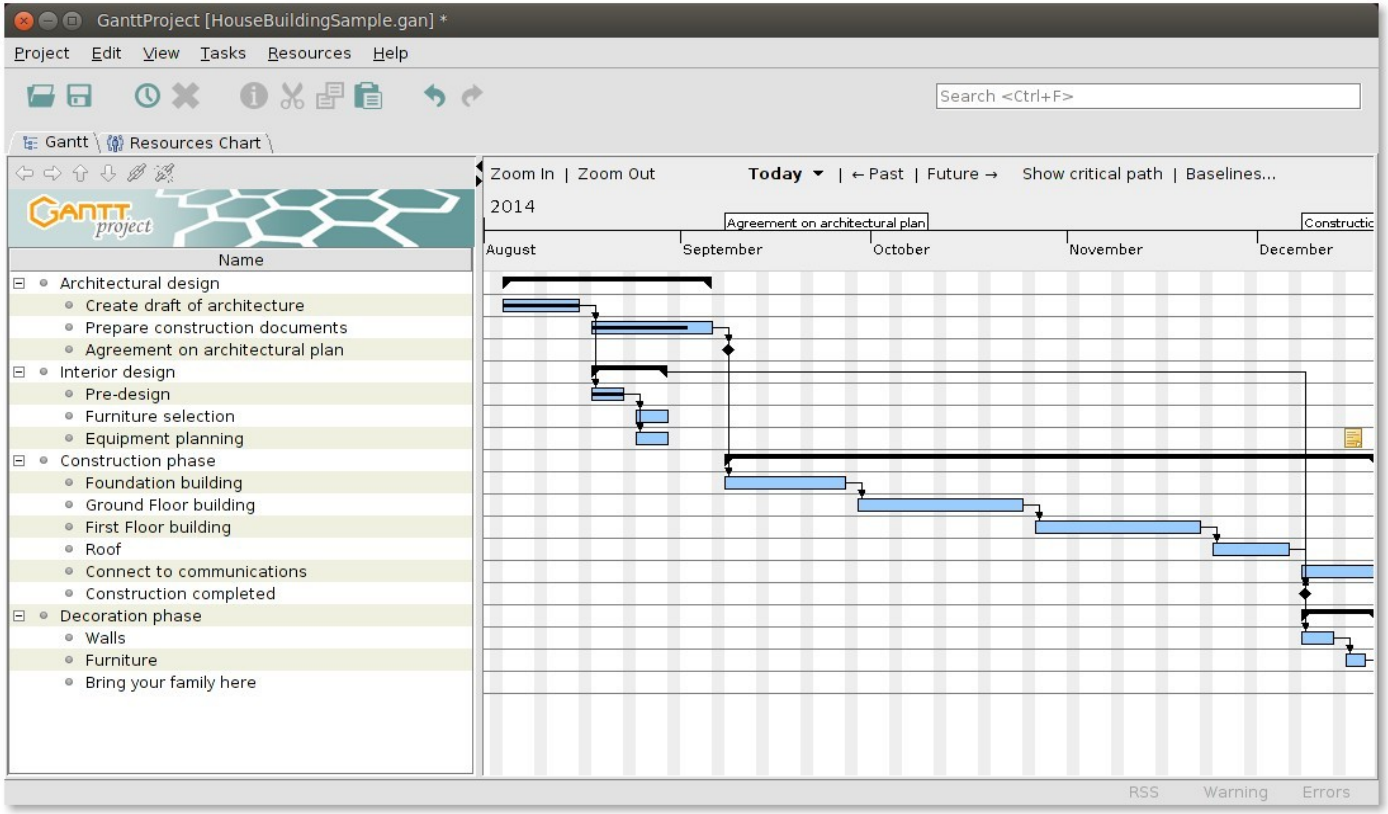
Probably Top-down with good sense for technological details works,

but needs manager-engineer cooperation

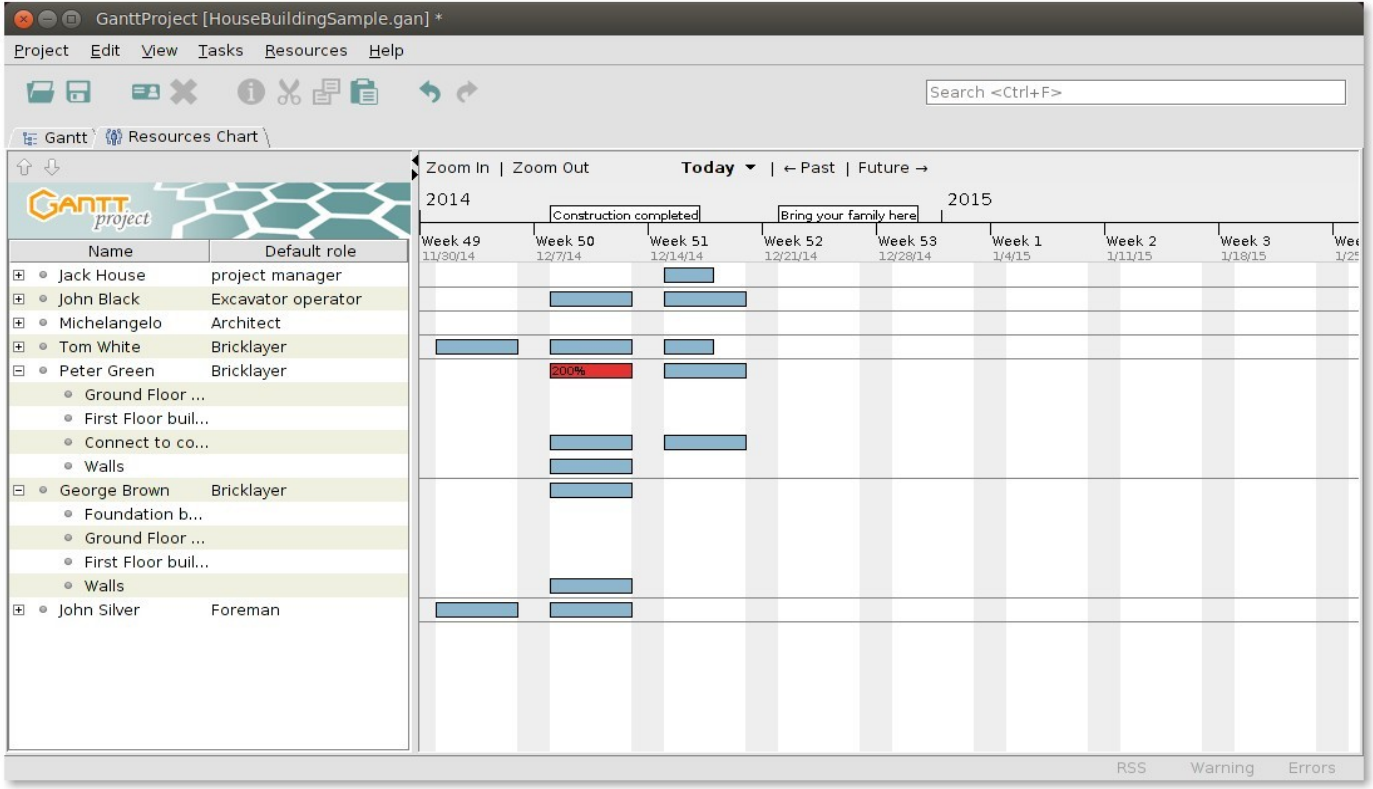
Tools for WBS and beyond (Trac)



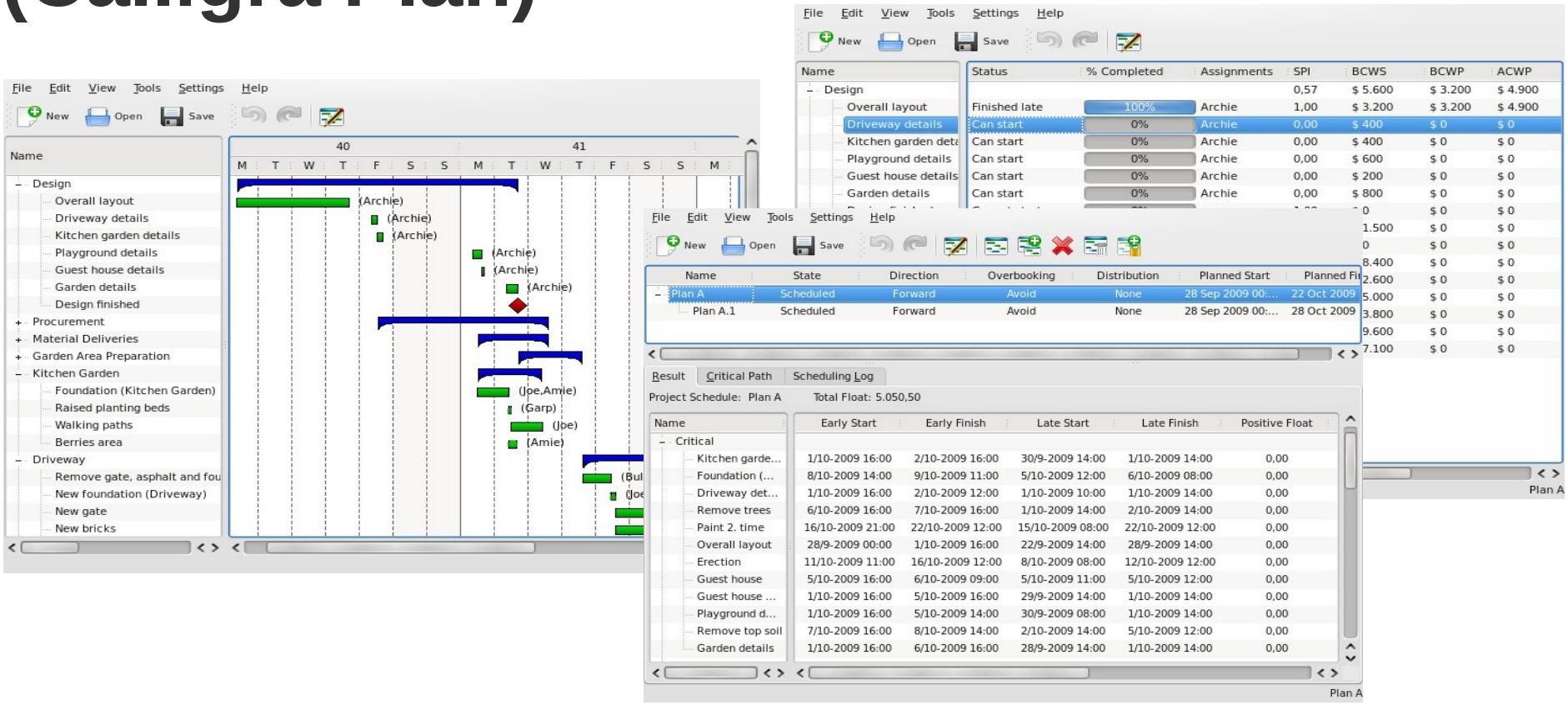
Tools for WBS and beyond (GanttProject)



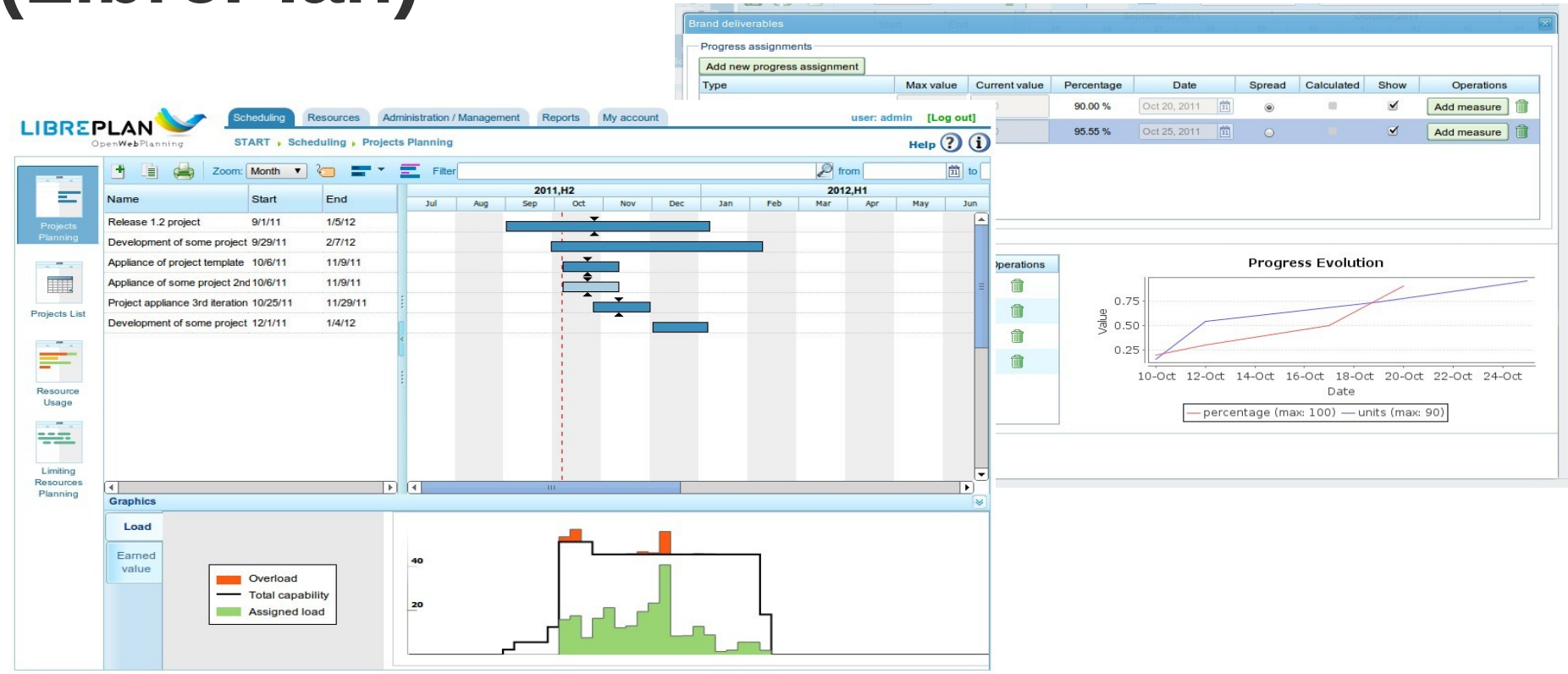
Tools for WBS and beyond (GanttProject)



Tools for WBS and beyond (Calligra Plan)



Tools for WBS and beyond (LibrePlan)

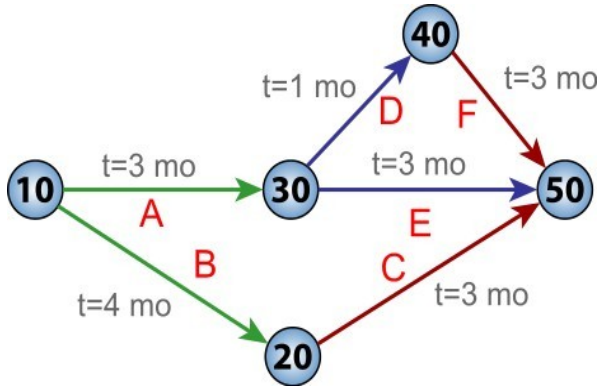


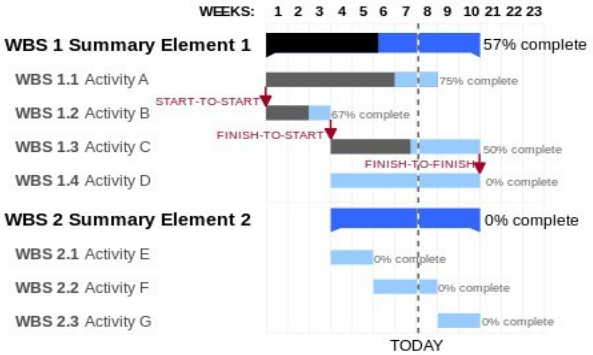
Tools for WBS and beyond (LibrePlan)

Tools for WBS and beyond

For more see:
https://en.wikipedia.org/wiki/Comparison_of_project_management_software

Also see:
Critical Chain Project Management and
Critical Path Method
PERT (Project Evaluation and Review Technique)
Gantt Chart





Other Tools for Project

- Project Execution – *Kanban board*
- Communication – *Chat??? (spoiler alert: NO)*
- Version Control – *github, gitlab, gitea*
- Build
- Testing Framework
- Deployment

  → All DevOps

SDLC Criticism

- **Good** in
  - Large projects, complex solutions
  - Detailed, well documented
  - Ease of maintenance
  - Can follow (and certify) standards
- **Bad** in
  - Time and cost is increased
  - Not flexible, cannot handle problems without full-design-first approach
- There are other life cycle approaches
  - Project Life Cycle
  - Application Life Cycle
- Example: SSADM (Structured Systems Analysis and Design Method)
  - Takeaway: Works well on similar problems / projects (in this case information systems)

SDLC vs Assembly Line Analogy

- Assembly Line Features:
  - Every Product is exactly the same we make
  - All work phases are the same, we know
    - How long do they take
    - How much do they cost
  - Workers know everything after training, no further self-development is needed

→ Process risk is very low

NOT TRUE for SW Development!!!