Software Engineering Process – Economy & Quality

ETSF 01
http://cs.lth.se/etsf01

Course and project introduction,
Activity Planning
Chapters 1, 3 & 6

Elizabeth Bjarnason

Welcome to ETSF01: Software Engineering Process – Economy & Quality!

Elizabeth Bjarnason
Course resp

Johan Linåker & Daniel Helgesson
Exercise tutors

Lena Ohlsson
administration

Flickr: nearsoft

Flickr: canadianveggie

SW Development

Goal: make $ by meeting needs

Dev organisation — Factories, Campaigns

Dev project(s)

- Requirements – WHAT?
- Architectural design – Tech HOW?
- Code – Impl requirements
- Test – Verify reqts

SPM – HOW reach goal?

Measurements

Process – Practical HOW work?

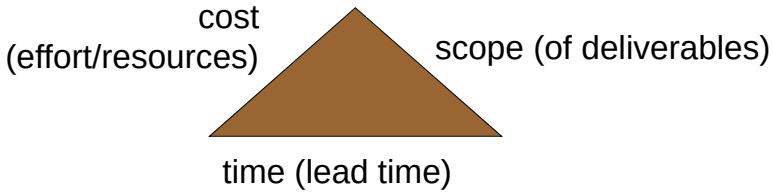
Quality – DONE?

SPM – Software Project Management

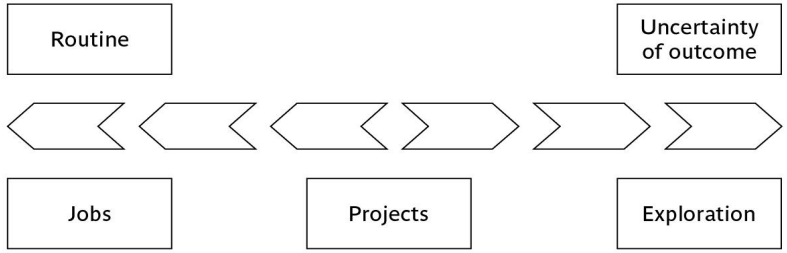
What is a project?

- Specific target
  - usual large &/ complex (e.g.) product, service, result
- Temporary: has an end!

("A Guide to the Project Management Body of Knowledge" 3:rd ed)



Jobs (Sv: uppgifter) versus projects



'Jobs' – repetition of very well-defined and well understood tasks with very little uncertainty

'Exploration' – e.g. finding a cure for cancer: the outcome is very uncertain

Projects – in the middle!

Organised as Project or Job (Sv: uppgift)?

- Develop new product or service
- Acquire/Purchase new information system
- Implement new business process or procedure
- Technical customer support
- Competitor analysis
- Prototyping a new user interface

ETSF01 vt 2017

Delta
- Revised course project descr
- Improved exercise infrastructure
- Active lectures

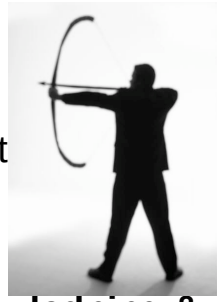
+

Research papers

Software ...
- § Metrics
- § Process Improvement
- § Quality Management

+ presentation techniques

Learning aims of the course

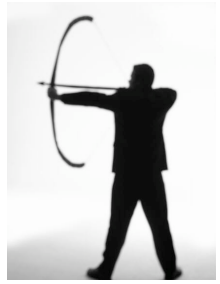


Kunskap om: planering och ledning av **utvecklingsprojekt** inklusive ekonomiska aspekt och kvalitetsarbete på organisationsnivå.

- **planering, kostnadsskattning, risk hantering, ledning & uppföljning av utvecklingsprojekt**
  Software Project Management – SPM
- projekt- och **organisation**snivåer
- föreslå, utföra och analysera **mått / mätningar**
- skriva **teknisk rapport** … struktur, referenshantering etc
- hur **kvalitetsarbete** på organisationsnivå går till (SQM)
- **mjukvaruprocessförbättring** (SPI - CMMI)

Se kursplan

Learning aims of the course



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  uppföljning av utvecklings
  Software Project Management –
- projekt- och **organisation**sr
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- skriva **teknisk rapport** … st
- hur **kvalitetsarbete** på organisationsnivå går til
- **mjukvaruprocessförbättring** (SPI - CMMI)

Kursprojekt 2 hp

Tenta 2 hp

elizabeth@cs.lth.se

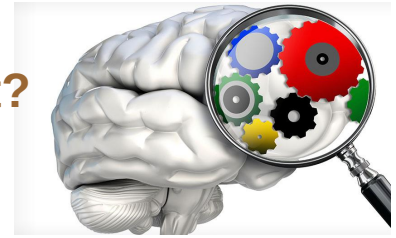
- **Current**: Biträdande universitets lektor
- **2010-2013** PhD: Integrated Requirements Engineering
- **1997** Lic: Domain-Specific Languages / Semantic analysis
- **1990** MSc: Computer Science

elizabeth@{sony[0..1]ericsson[0..1]}mobile.com

1998-2013

- Developer
- Project manager
- Requirements engineer
- Process engineer

How learn course content?



- **Read** course litterature
- **Attend** lectures
- **Practice** in course pr[illegible]t, at exercise classes, own exercises

WARNING!
Lectures slides designed for **presentation**, not reading!

REFLECT and **ASK QUESTIONS!**

What is Project Management?

What makes a software development **project** successful?

Qlik

GAMBRO

Project problems and failures

Average cost overruns of software projects 30%

One out if six IT projects is a 'black swan'* with a **cost overrun of 200%** on average, and a **schedule overrun** of almost **70%**.

*Extreme outlier that plays vastly larger role than regular occurrence

SOURCE: Flyvbjerg, B., Budzier, A. (2011): Why Your IT Project May Be Riskier Than You Think. HBR, September 2011

Energimarknadsinspektionen
Swedish Energy Markets Inspectorate

EL | NATURGAS | FJÄRRVÄRME

Nyheter | Publikationer | Internatior

Elnätsföretag | Elhandelsföretag | Naturgasfö

Elnätsföretag
Elhandelsföretag
Aktuellt för elhandelsföretag
Användarhandledning ELIN
Dokumentarkiv
Första gången - helt ny rapportör
Rapportera in via Excel- eller XML-fil
Frågor och svar ELIN
Naturgasföretag

Nya ELIN blir försenad - kommer i januari 2016!

Publicerad: 2015-11-30 Uppdaterad: 2015-11-30

Vi har tidigare informerat om att en ny förbättrad version av Elpriskollens inrapporteringssystem ELIN, ska bli tillgänglig den 8 december 2015. Tyvärr måste vi meddela att Nya ELIN blir försenad!

Vi återkommer med mer information i början på januari (efter helgerna) om nytt datum för när Nya ELIN kommer att sättas i

ComputerSweden

CSJOBB | IT24 | SÄKERHET24 | EVENT | KA

2014-02-20 13:33

Haveriet inifrån: Så gick Pust från succé till fiasko

Dela på Facebook | Tweeta | 50 delningar

DEBATT **Polisens utskällda it-system Pust skrotas. Hundratals miljoner skattekronor har gått åt till ingen nytta. Hur kunde det gå så snett? Computer Sweden kan i dag publicera en unik redogörelse inifrån Pust-projektet.**

Försenat IT-projekt skapar frustration i stans skolor

PUBLICERAD 2010-02-08 DN - Stockholm

Tech World | EVENT | PRENUMERERA | OM OSS

2013-01-31 16:32

Försenat, dåligt och dyrt - TechWorlds läsare berättar om värsta it-projekten

AF betalade 100 miljoner för ny sajt – som inte blev av

Under två år har Arbetsförmedlingen satsat 100 miljoner på att utveckla en helt ny webbplats. Efter att tidsplanen spruckit förlängs nu satsningen med ett halvår och ännu fler miljoner. Men målsättningen om en helt ny webbplats – stryks. SVT 6 mars 2016

Underskattat tekniska utmaningar

Men därefter har inriktningen i praktiken ändrats radikalt av projektets styrgrupp. Enligt Erik Sandström upptäckte man redan första halvåret 2015 att man inte skulle klara målsättningen om en ny sajt, bland annat eftersom man hade underskattat de tekniska utmaningarna. Andra halvåret 2015 användes för att komma fram till hur projektet skulle ändras, vilket nu resulterar i en reviderad projektplan.

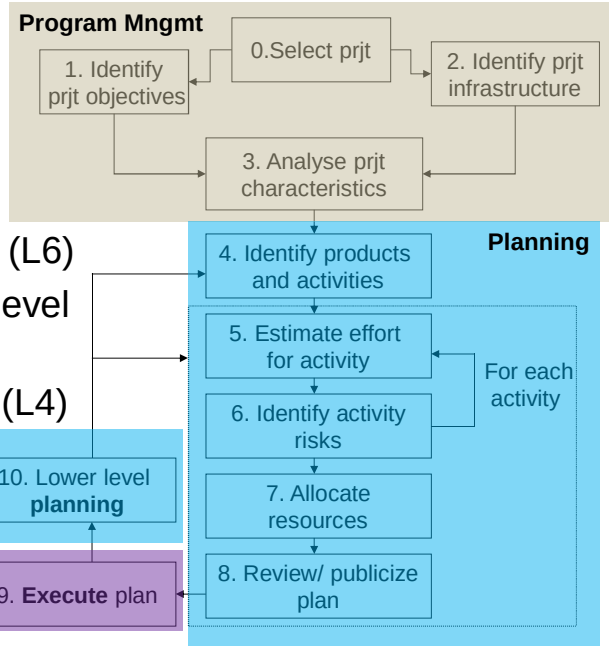
Software Project Management - SPM

Main areas

- Activity planning
- Effort estimation
- Risk management
- Resource allocation
- Monitor & control execution

Main project activities

- Start of project – program management (L6)
- Planning: High – Low level (L1-L3)
- Execute plan: Monitor (L4)



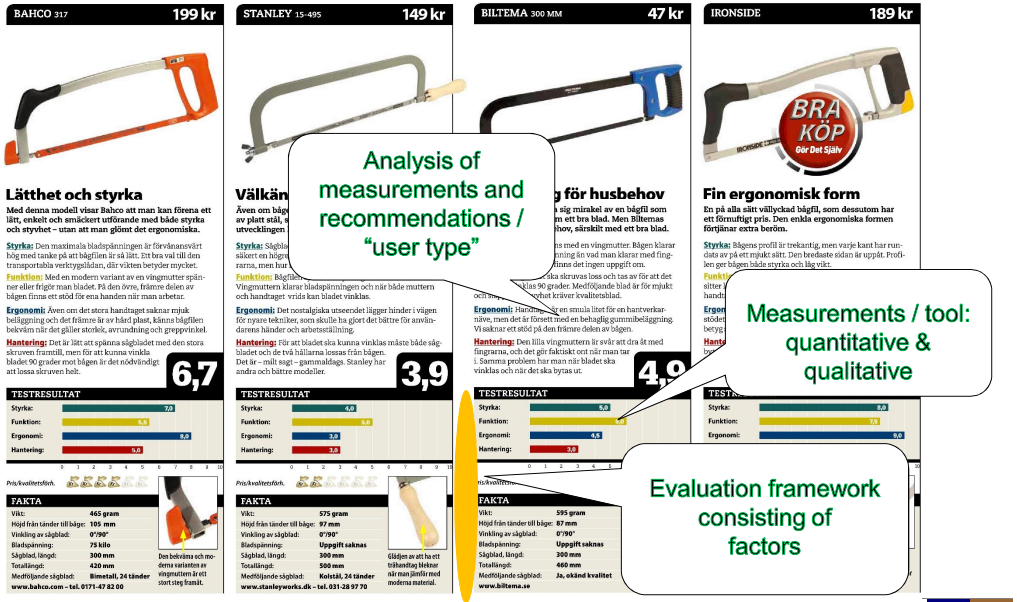
Course Project

Scope: **ETSF01 \ {SPI, SQM}**

- Evaluate **tools** for SPM for a given **case company**
- Define and apply **measurements**
- Analyse and recommend tools for two types of projects
- **Present info** in a structured way: report + presentation

§ 6 students / group
§ Exercise classes connected to project

Tool Evaluation



Tools for Software Project Management

- 2-plan
- Aceproject
- Apache Bloodhound
- Assembla
- Basecamp
- Bug-Genie
- Clarizen
- Collabtive
- Feng Office
- GanttProject
- Gemini Tracker
- MS Project (covered by LU license)
- LibrePlan
- OpenERP
- Project Open
- TACTIC
- Teamwork
- Trello
- ….

Pick 3 to evaluate!

Your Case: DauMob Ltd

Fictive, but realistic large-scale software dev company

Case-based teaching / learning

- An active learning strategy based on complex, real-life scenarios
- Stimulates analytical thinking skills and decision-making

Course Info – cs.lth.se/etsf01

COURSE SCHEDULE – updated weekly!

Läsvecka		Lectures Red references are final, Blue are preliminary		Exercises[1]	Exercise topic	Project deliveries Ex2-3 in moodle, final via email
Mar 20	1	L1	Overview, Course project overview, Activity planning Ch 1 [not 1.8, 1.9, 1.11, 1.14], Ch 3, Ch 6 [not 6.16], P1	Exercise 1	PROJECT KICK-OFF	**Define groups**
Mar 27	2	L2	Course project details, Effort estimation, Resource allocation, Organisation Ch 5 [not 5.11-5.12], Ch 8			
Apr 3	3	L3	Risk management, Agile project management Ch 2.6, Ch 7 [not 7.3, 7.8 & 7.11], Ch 4.10-11, 4.13-15, P2, P3	Exercise 2	SPA I (Student Peer Assessment)	**Draft 1**: 50 h prior to exercise class **SPA I reports**: prior to exercise class
Apr 24	5	L4	Monitor & control, SW Process Improvement, Software quality management, Ch 9 [not 9.6], 12.4, P4 [Sect 3.2], Ch 13, P5 [Sect 1-3]			
		TUE L5	Managing people, Ch 11.1-3, 11.6, 11.8 **Guest lecture:** Magnus Lidholm, Sony Mobile			
May 1	6			Exercise 3	SPA II	**Draft 2**: 50 h prior to exercise class **SPA II reports**: prior to exercise class
May 8	7	L6	Portfolio & Program management, Ch 2 [not 2.9, 2.10-13], Ch 4.2, Ch 10:1-2, **Guest lecturer**: Thomas Ohlsson, SICS			
May 15	8	L7	Exam walk-through & tips.	Exercise 4	PROJECT CONFERENCE	**Presentation material**: 26 h prior to exercise class **Final report:**
		EXAM –Wed 31/5, kl 14-19, MA9				

Examination

- Written exam based on the book, articles (P1-P5) and lectures
- Structure
  - 1 terminology: definition & examples
  - 1 practical
  - 2 essay Qs with keywords
- Project: IG / G + up to 10 BPs

Exam + bonus points	Final grade
>=30, at least 27 for exam	3
>=41	4
>=51	5

Replacement for ETSF01

ETSF25 Affärsdriven programvaruutveckling (7,5 hp)

- Överlappar ETSA05 Ingenjörsprocessen-samhällsaspekter med 4 hp

Frågor? Kontakta Roger von Moltzer, *Studievägledare*

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http://cs.lth.se/etsf01

Activity planning [Ch 6]

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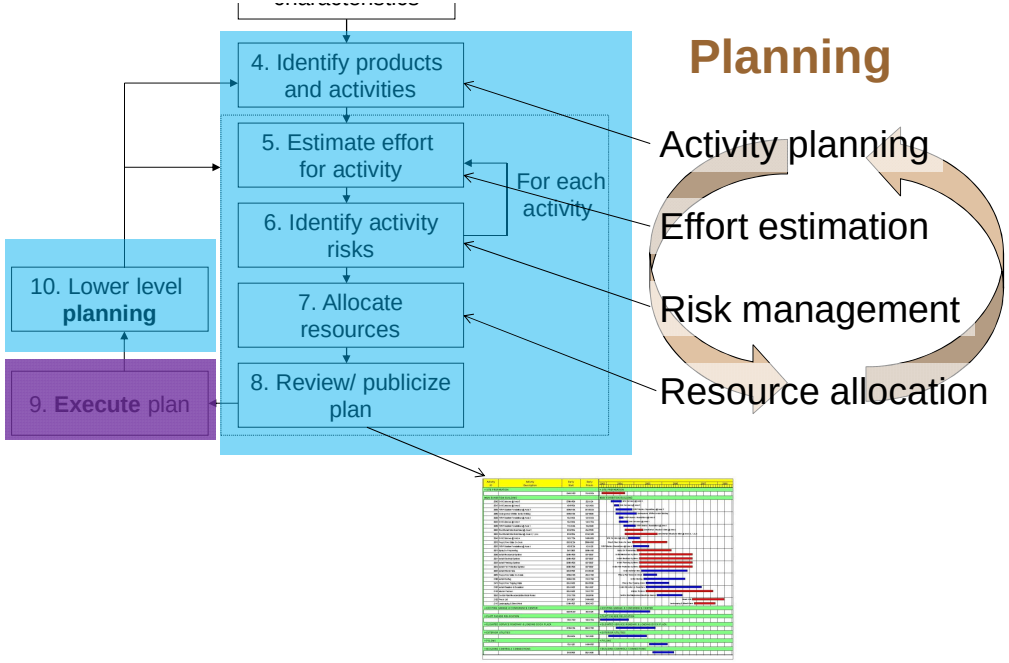


Planning

Activity planning

Effort estimation

Risk management

Resource allocation

Activity Planning

Identifies

- **What** to do?
- In which **order**?

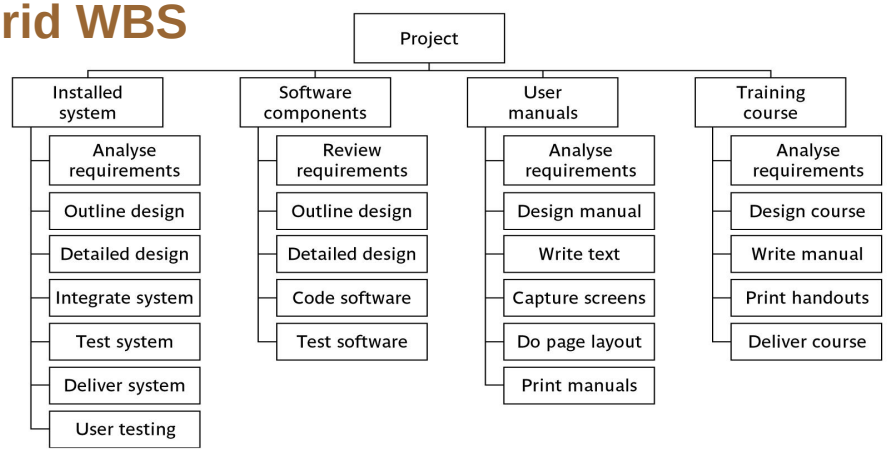
to reach project TARGET

Lund University / Faculty of Engineering/ Department of Computer Science / Software Engineering Research Group

Identifying activities

- **Activity-based approach**
  - Work Breakdown Structure (WBS), breakdown main tasks into detailed tasks
- **Product-based approach**
  - Product Breakdown Structure (PBS) list the deliverable and intermediate products of project
  - Identify the order of products
  - Identify activities needed to create the products
- **Hybrid approach**
  - Identify deliverables/products, then activities. Iterate.

Hybrid WBS



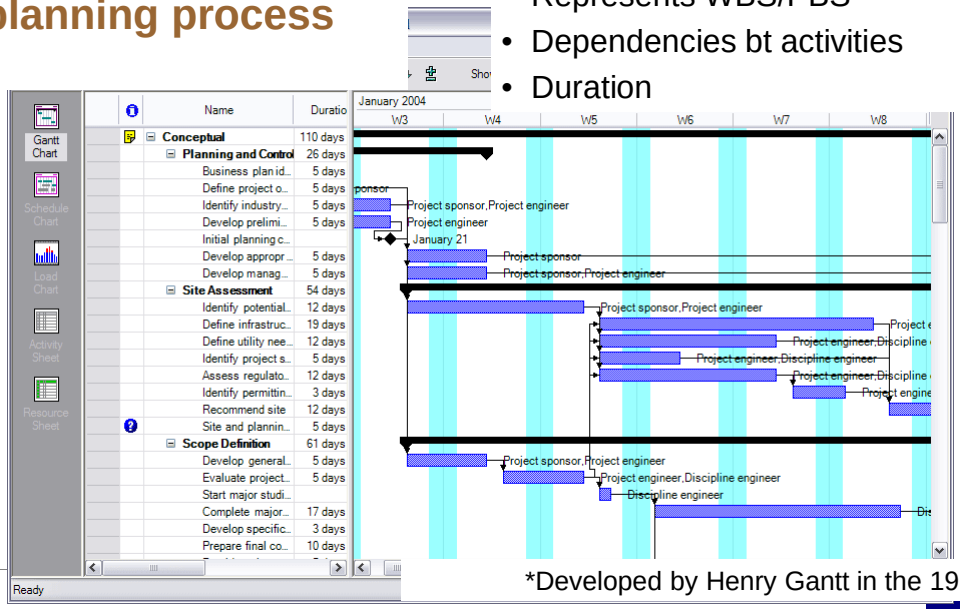
IBM's MITP approach suggests

- Level 1: Project
- Level 2: Deliverables
- Level 3: Components
- Level 4: Work packages
- Level 5: Tasks

The outcome of the planning process

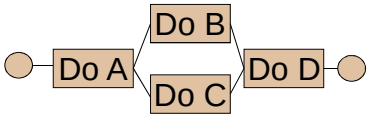
A project plan in MS Project as a **bar chart or Gantt Schema***

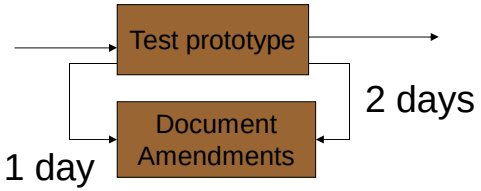
- Represents WBS/PBS
- Dependencies bt activities
- Duration



*Developed by Henry Gantt in the 1910s

Activity networks



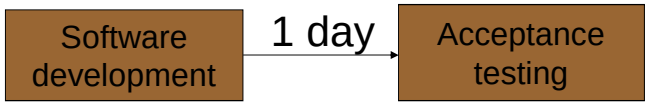


Support

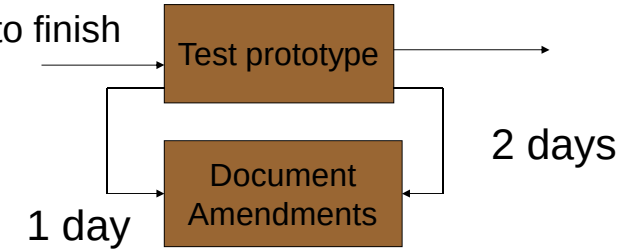
- Assess feasibility of project **completion date**
- Identify **when resources** will be needed
- Calculate **when costs** will be incurred
- Allows co-ordination and motivation of the **project team**

Dependencies between activities

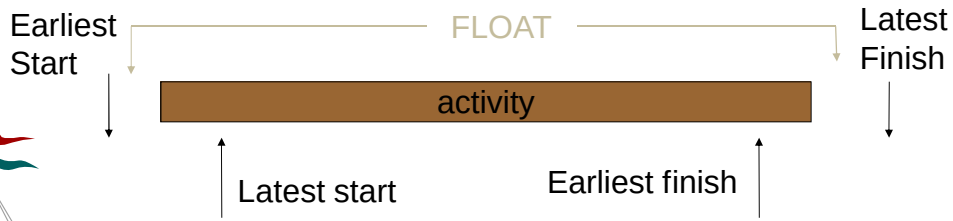
Finish to start, with planned lag/delay



Start to start/ Finish to finish

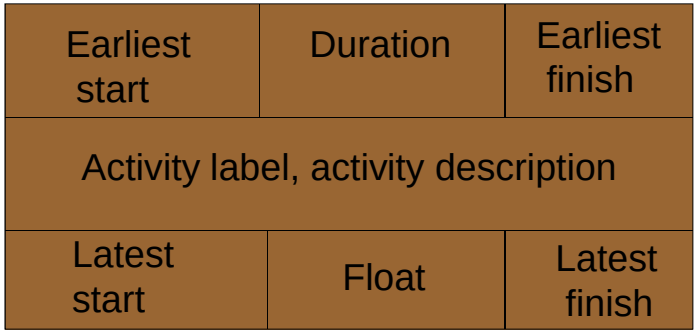


Start, Finish & Float (Sv: Glapp)

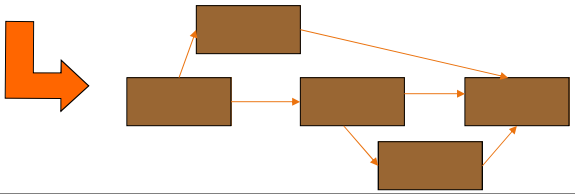


Float = Latest finish - Earliest start - Duration

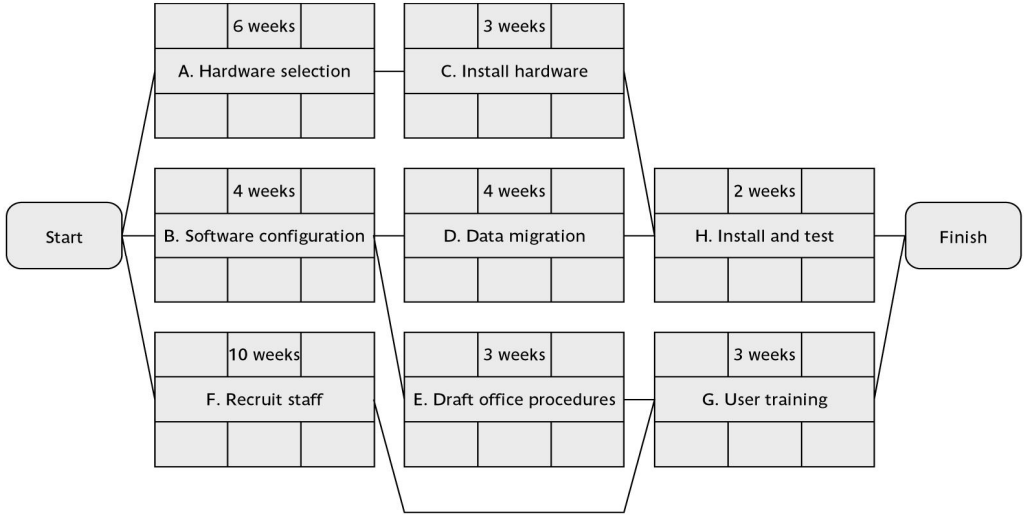
Precedence Networks



Calculated w
- Forward pass
- Backward pass



Example of an activity network



Critical path

A path through network where all activities have zero float

- any delay a critical activity will delay whole project

Questions

- Can there be more than one critical path?
- Can there be no critical path?

Activity Planning: Theory Part

Summary

- Identify activities & dependencies: ABS, PBS or Hybrid BS
- Common techniques: bar-charts (gantt), activity networks, precedence network
- Watch out for float (total, free, interfering), critical paths

Useful exercises

- 6.2-6.4 in book

For **case projects** & **course project**: do hybrid WBS & precendence network, identify earliest completion date, critical path(s)

Excluded section: 6.16

The Case – Your Story

Daumob Ltd need advice on which project management tool to use

- Large company producing consumer devices
- Many different project types
- Your focus: projects for
  - Øsoftware porting
  - Øapplication development

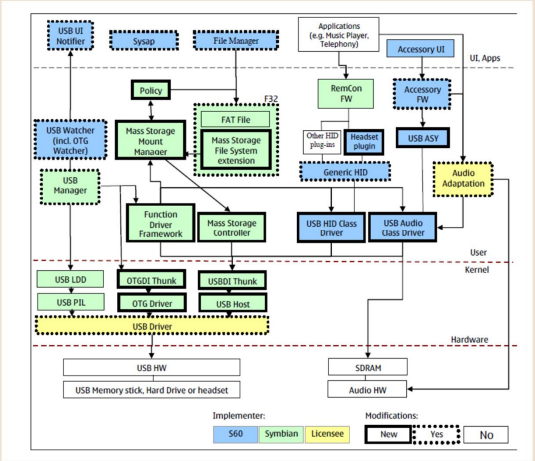
Case-based teaching
- active learning strategy
- Read/discuss/analyse complex, real-life scenarios

Your Story: DauMob Ltd

- Fictive, but realistic case
- Your focus
  - Application development
  - Software porting

Software Porting: Activity Planning

Example: USB, including OTG



Key use cases are external media (e.g. HDD), Keyboards (HID), and Audio over USB. Most of the components are supplied. The complex component is the audio adaptation.

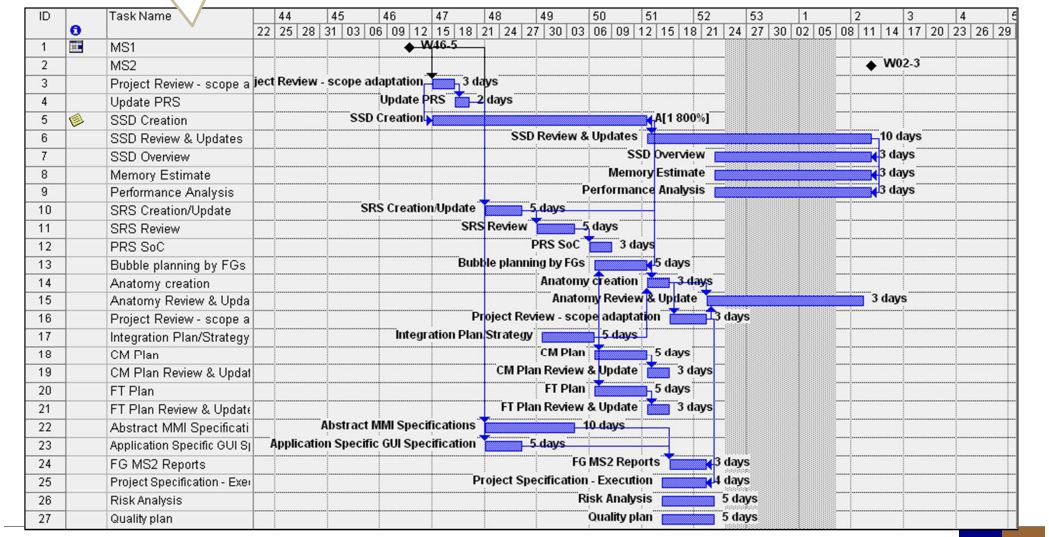
- Activities identified based on **impact** on software architecture components
- Based on documentation of **changes** in new Android cookie
- First by SW architects (Top) then refined by Software engineers per technical area (Down)

Tasks
USB adaptation
Verification
OTG (OnTheGo)
USB Audio (optional)

Software Porting: Activity Planning

Activities and Work products

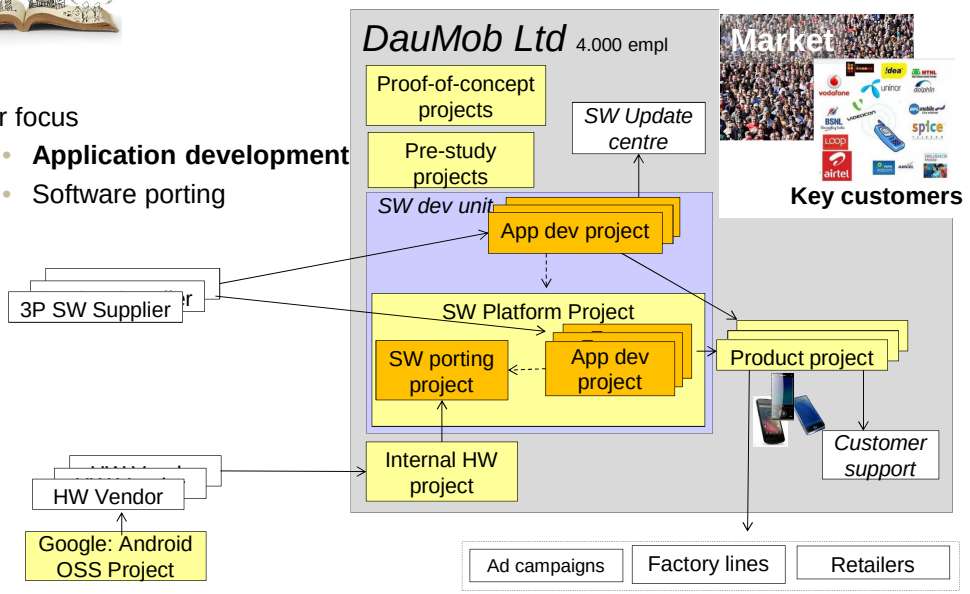
Pre-study Status, Feasibility planning



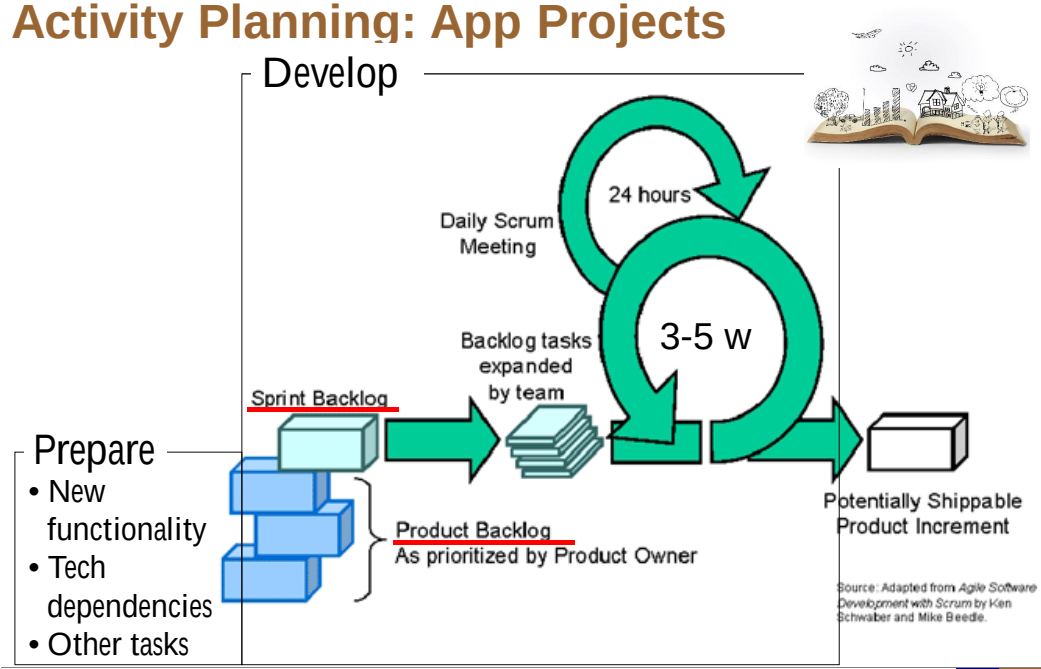
Your Story: DauMob Ltd

Your focus

- **Application development**
- Software porting



Activity Planning: App Projects



For each SPM area

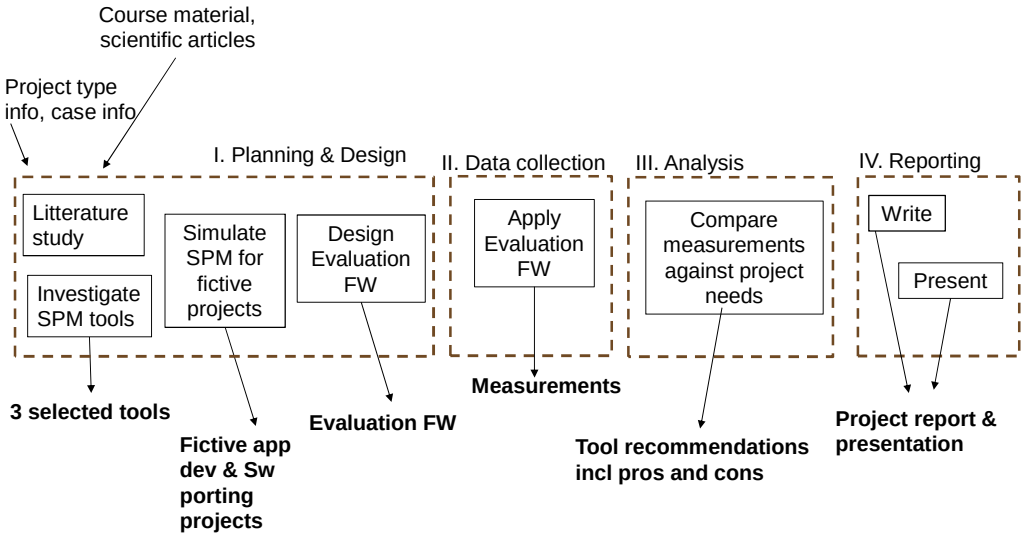
Lecture will contain:

- context and purpose
- theory, methods, approaches etc
- practical exercise
- how its done at DauMob

Your assignment

- Evaluate **3 SPM tools** for **DauMob**
- Provide recommendations for 2 types of projects
  - software porting project
  - application development project
- **Report evaluation & recommendations** in a scientific way

Course Project Activities (or Process)



Selecting tools for evaluation

Select 3 tools intended for SPM

Consider

- Access
- Available documentation
- Sufficient SPM support for case projects

Evaluation Framework

Identify suitable factors to evaluate for 5 SPM areas

- Activity planning
- Effort estimation
- Risk management
- Resource allocation
- Monitor & control execution

Approach: Goal-Question-Metric (GQM) [Paper 1]

L2

+ Quality aspects, e.g. usability (changes), performance, capacity

Define measurements for each included factor

Goal-Question-Metric (GQM)

Method for designing SW metrics to assess goal fullfillment

1. Define what the **goals** are, e.g. for activity planning
2. Define **questions** that determine if goal is met
   - Refine goals
   - Learn about progress towards goals
3. Define **metrics (== factors in your evaluation FW)** that
   - Answer / measure each question
   - Determine if goal is achieved

P1: V.R. Basili, Lindvall, Regardie, Seaman, Heidrich, Münch, Rombach, Trendowicz, “Linking Software Development and Business Strategy through Measurement”, IEEE Software, April 2010, pp. 57-65

Things To Do

- Get the textbook
- Browse the course web
- Read
  - course program & schedule
  - **project description and P1 (GQM)**
  - Book chapter for this lecture and next one
- Project
  - **Attend kick-off exercise**
  - **Contact your project group**
  - Do activity planning for your course project
  - Discuss how to collaborate, e.g. work division, group meetings etc
  - **Investigate tools and case projects**