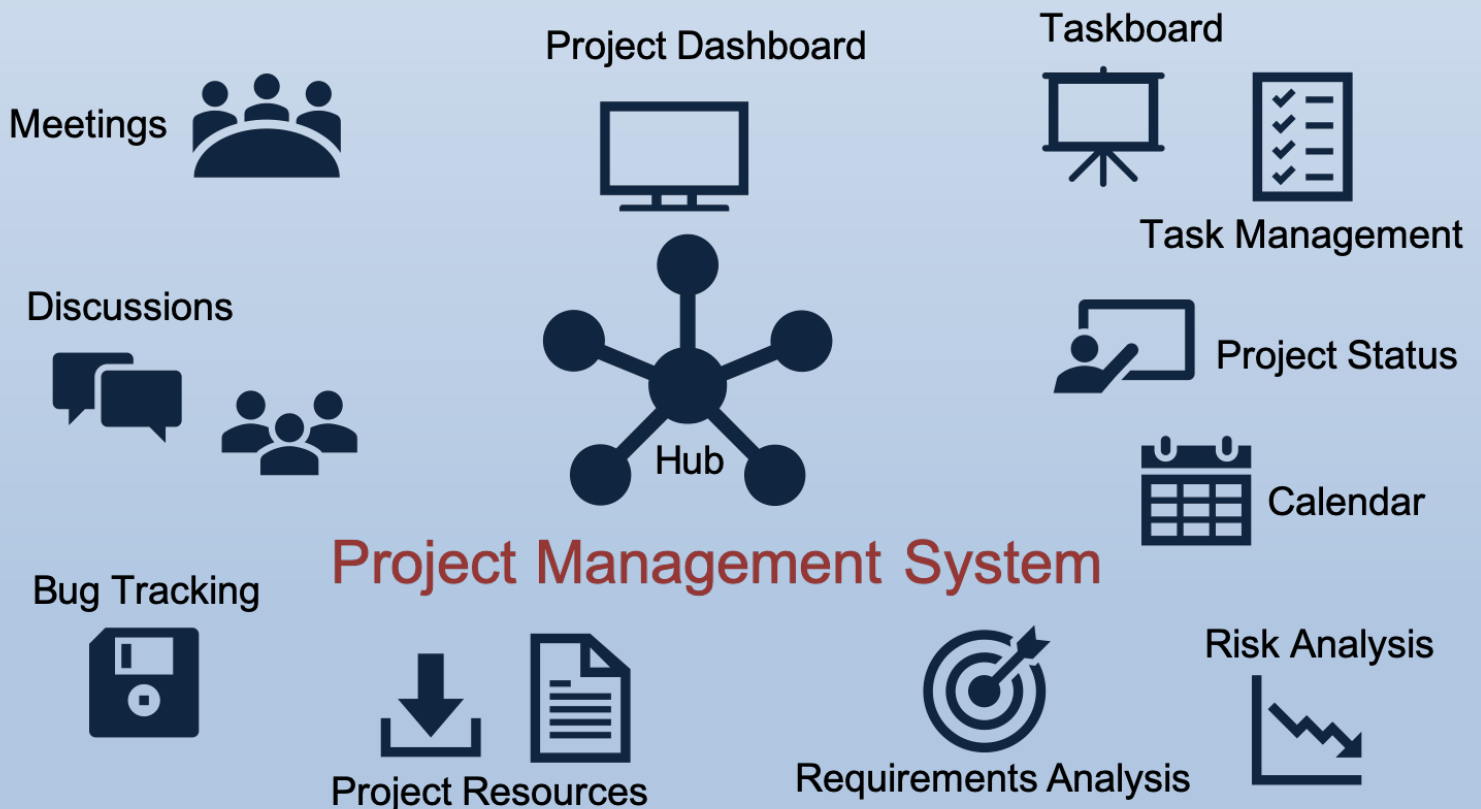


Project Engineering

Hans-Petter Halvorsen



<https://www.halvorsen.blog>

Project Engineering

Hans-Petter Halvorsen

Preface

This textbook is written for students in engineering disciplines and other that work in a project.

Information about the author:



Hans-Petter Halvorsen

The author currently works at the University of South-Eastern Norway. The author has been working with Software Engineering for more than 20 years.

For more information, visit my web site:



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Part 1 : Introduction

...

1 Introduction

...

What is a Project?

- A group of people with different skills working together to solve a specific task
- It has a Goal
- It has a Start and an End
- It involves Project Planning & Management

Definition: “Planned set of interrelated tasks to be executed over a fixed period and within certain cost and other limitations”

- To Make something that no one has made before you
- Combine existing knowledge with new knowledge in order to make something new or improve something existing
- A series of small tasks that need to be done, leading to a milestone (at the end and some underway)
- Team Work

Project – What is Important?

- Cooperation - Work together as a Team
- Brainstorming – Start the Project with Brainstorming
- Get Involved!
- Project Planning and Management

You will learn the following regarding Project Work:

- Learn how to run a Project (Project Management)
- Learn to structure and plan your work
- Learn to Cooperate/Collaborate
- Learn to Write Technical Reports

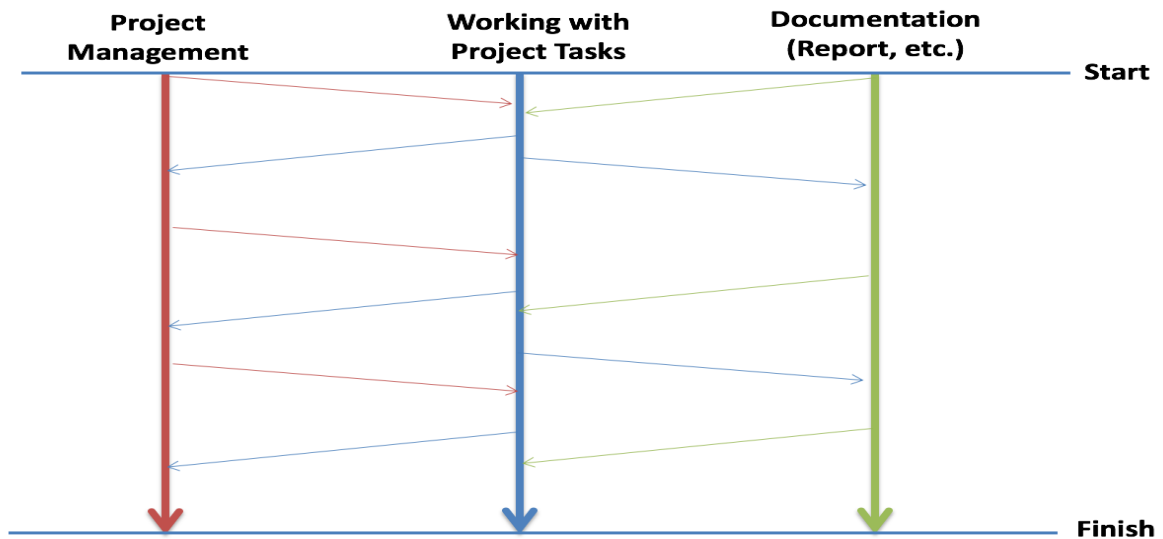


Figure 1-1: How to Work in the Project period

Important: Work with these activities in parallel

What is Project Management?

Project Management is a methodical approach to Planning and guiding project processes from Start to Finish

Why do we need Project Management?

To reach the Project Goal within the Time Limit and with the available Resources.

It is important to work in a structured manner!

Part 2 : Project Planning

...

2 xxx

...

2.1 Brainstorming

...

A Project should always start with a Brainstorming

- Involve all in the group
- Discuss what you are going to do in the project
- How are you going to solve the project?
- etc.

3 Project Roles

...

- Customer
- Supervisor
- Project Manager
- Designer
- Developer
- Tester
- ...

Project Manager

- Planning and Management of the Project
- Gantt Chart
- Keep track of Resources
- Involve the others
- Report to Management/Customer

4 Project Phases

...

In a project we have the following phases:

- Project Planning
- Requirements Analysis and making Requirements (e.g., from Customer)
- Analysis and Design
- Implementation
- Documentation
- Testing
- Deployment, Installation and Maintenance

4.1 Requirements Analysis

In the requirements, we describe what the system should do. The requirements include both functional requirements and non-functional requirements.

Functional Requirements: Statements of services the system should provide, how the system should react to inputs and how the system should behave in different situations. May state what the system should not do.

Non-Functional Requirements: Constraints on the services or functions offered by the system such as timing constraints, constraints on the development process, standards, etc. Often apply to the system rather than individual features or services.

5 Project Planning

...

6 Requirements Analysis

...

7 Tools

...

Gantt Chart:

- Define Goals
- Define Milestones
- Define Tasks and Subtasks
- Resources

Part 3 : Project Tracking

...

8 Project Plan

...

9 Meetings

...

Why do we need Meetings?

...

Before Meeting: Write a “Notice of Meeting” (NoM)

After Meeting: Write a “Minutes of Meeting” (MoM)

Meeting Rules:

Be on time

Be prepared

9.1 Notice of Meetings

...

9.2 Minutes of Meeting

...

Part 4 Project Methodologies

...

10 Introduction to Project Methodologies

...

<https://www.workamajig.com/blog/project-management-methodologies>

10.1 Plan-driven Methodologies

Waterfall

10.2 Agile Methodologies

...

Agile methodologies are a group of methods based on iterative and incremental development.

10.2.1 Scrum

...

11 Waterfall

...

The Waterfall methodology is sequential. It is also heavily requirements focused. You need to have a crystal-clear idea of what the project demands before proceeding further. There is no scope for correction once the project is underway.

...

The Waterfall Model

Planning to create a new Software

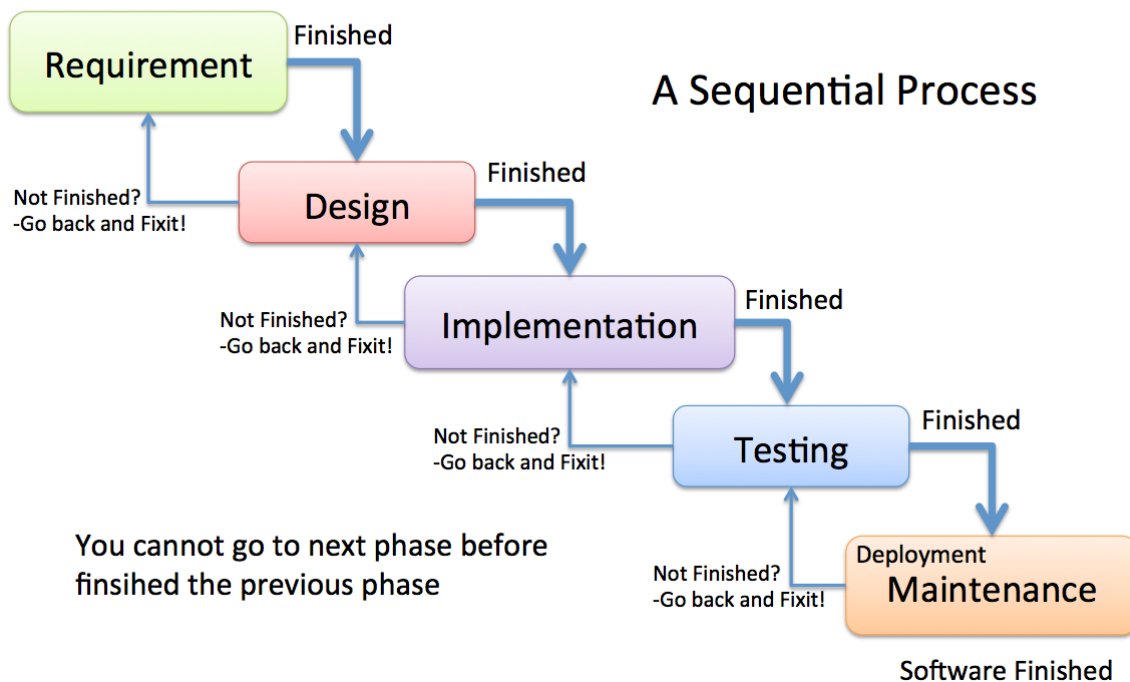


Figure 11-1: Waterfall

12 Scrum

...

12.1 Additional Resources

Web:

https://www.halvorsen.blog/documents/programming/software_engineering/scrum/

YouTube:

<https://www.youtube.com/watch?v=h3RVZv3NGWk&t>

Part 5 : Project Management Software

...

13 Project Engineering Tools

...

Microsoft Office and OneDrive

Microsoft Project

Microsoft Teams

Project Management System (PMS)

Projects involving creating some Software:

Project Management System (PMS)

Azure DevOps

14 Microsoft Office and OneDrive

...

15 Microsoft Project

...

You should use it during the entire Project (just not in the beginning)

Everybody in the Team should use it

16 Microsoft Teams

16.1 Introduction

In short Microsoft Teams is a “hub” for teamwork in your organization or for specific projects. In Figure 16-1 you see the desktop version of Teams.

<https://teams.microsoft.com>

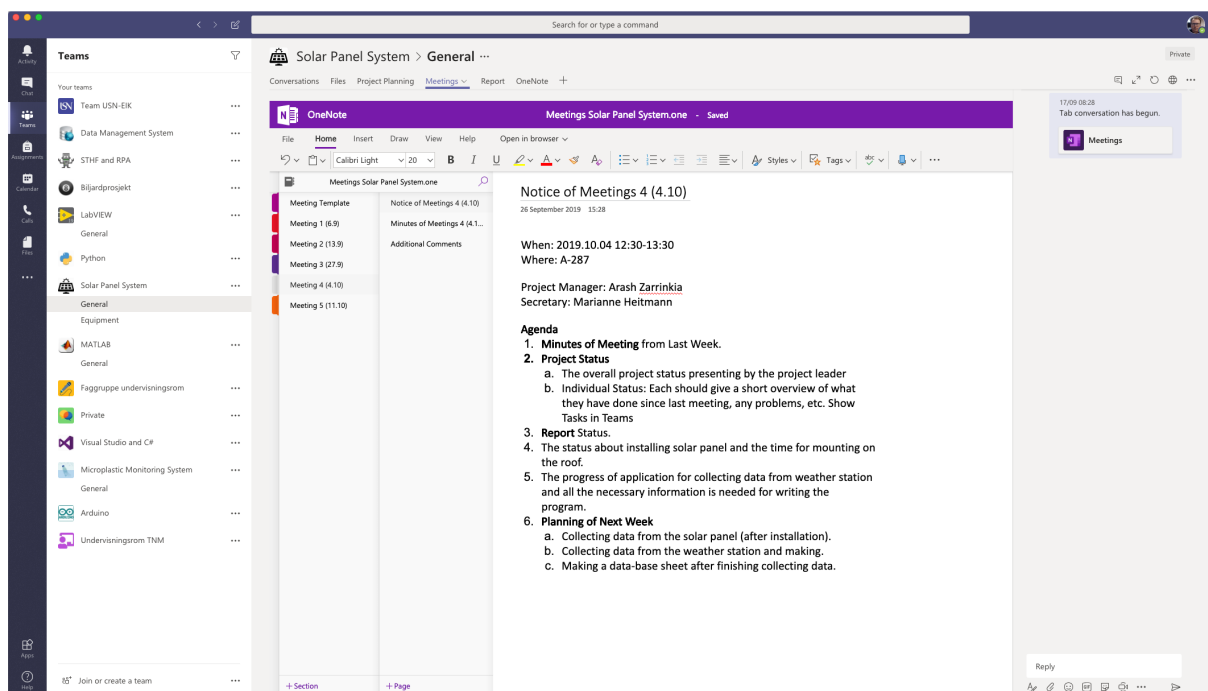


Figure 16-1: Microsoft Teams

In Teams you have:

- Conversations/Chat
- Files
- Integration with Word, Excel, PowerPoint
- Integration with OneNote
- Integration with Microsoft Planner
- Etc.

....

Alternatives to Microsoft teams is Slack.

16.1.1 Installation

Microsoft Teams can be used for free in addition to paid premium versions used for larger companies and organizations.

Microsoft Teams has desktop apps for Windows 10 and macOS. Apps for iOS/iPadOS and Android do also exist.

A Web Application also exists.

<https://teams.microsoft.com/downloads>

16.2 Microsoft Planner

...

<https://products.office.com/en-us/business/task-management-software>

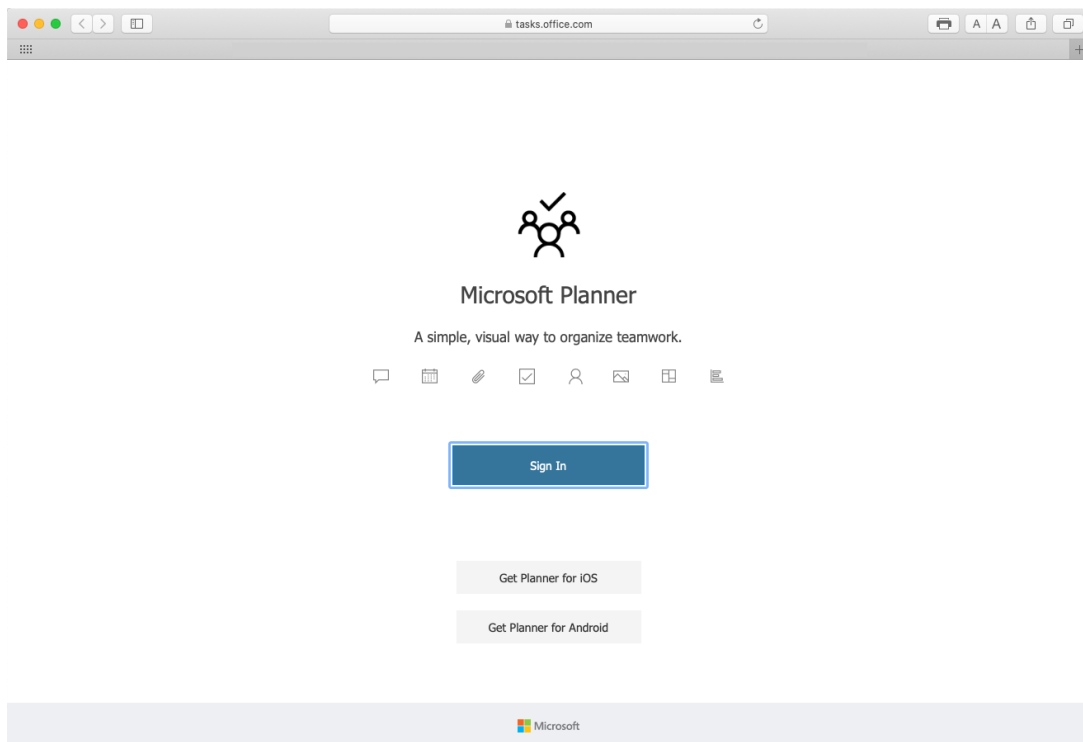


Figure 16-2: Microsoft Planner

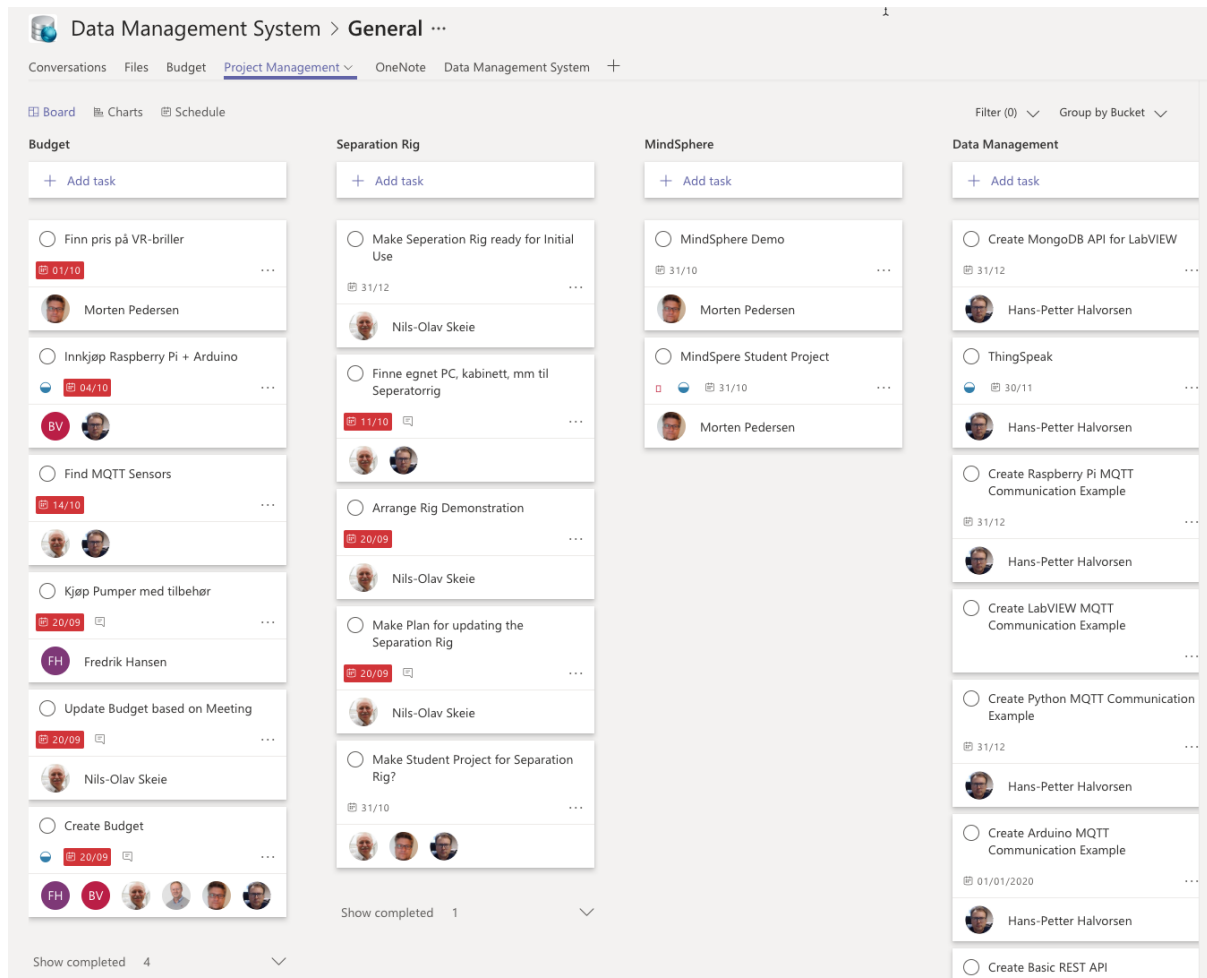
Integration of Microsoft Planner in Microsoft Teams.

...

Can also be used as a separate application (Web Application) without Teams.

<https://tasks.office.com>

Apps for iOS/iPadOS and Android do also exist.



17 Project Management System (PMS)

17.1 Introduction

With Project Management System (PMS) your Team can easily keep track of the development of your project, from the early beginning to the end of the project. PMS is a modern and flexible Web Application that handles all aspects of your project, from Requirements Analysis, Task Management including Taskboard, Meetings (Notice of Meetings, Minutes of Meetings, etc.), Discussions, Status Reporting, Issue Tracking and Management. PMS is the only tool you need to handle all aspects of your Project Planning and Management. I use this tool for all my student projects at the University of South-Eastern Norway.

In Figure 17-1 we see some of the features included in the Project Management System:

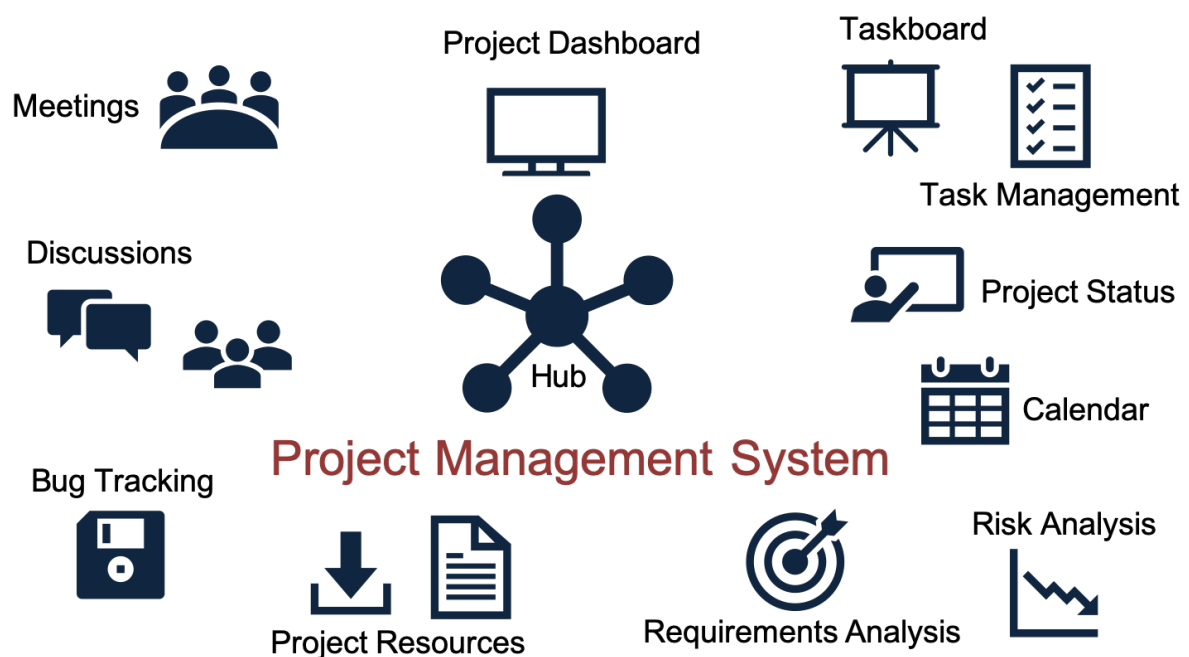


Figure 17-1: Project Management System (PMS) Overview

InFigure 17-2 you see the start page for the Project Management System:



Figure 17-2: Project Management System

PMS has the following main features:

- Project Dashboard
- Project Resources
- Project Status and Reporting
- Risk Management
- Requirements Analysis
- Task Management
- Taskboard
- Bugs and Issue Tracking

- Meetings (Notice of Meetings, Minutes of Meetings, Notifications, etc.)
- Calendar
- Discussions
- Notifications
- Notes

PMS is well suited for projects developing some kind of software, but it can be used for other projects as well. PMS follows modern Software Engineering principles using features from Agile and Scrum. See my page about Software Engineering for more resources.

Does your Team want to start using Project Management System? - Fill out this Request and a Team Project will be made, and an invitation will be sent to you. Make sure to enter a suitable name for your Project in the Additional information field. If you experience problems with filling out the form or don't receive an answer within a couple of days, send an E-mail instead.

<https://www.halvorsen.blog/documents/user/request/request.php>

PMS is made from scratch using HTML, JavaScript, CSS, Bootstrap, PHP and MariaDB (MySQL). See my page about Web Programming for more information about these technologies. Here you can read more about Database Systems. PHP is used to create dynamic web pages where data is typically stored in a database, like MariaDB (MySQL) or SQL Server. Another framework for creating dynamic web pages is ASP.NET. The system is hosted on an Apache HTTP Server, but other Cloud Hosting Services could have been used as well.

See also my pages about Programming and Software Engineering:

https://www.halvorsen.blog/documents/programming/software_engineering/

17.2 Features and Functionality

17.2.1 Project Dashboard

Here you get a quick overview of "everything" in your project.

Below you see a Dashboard example (a small part of it):

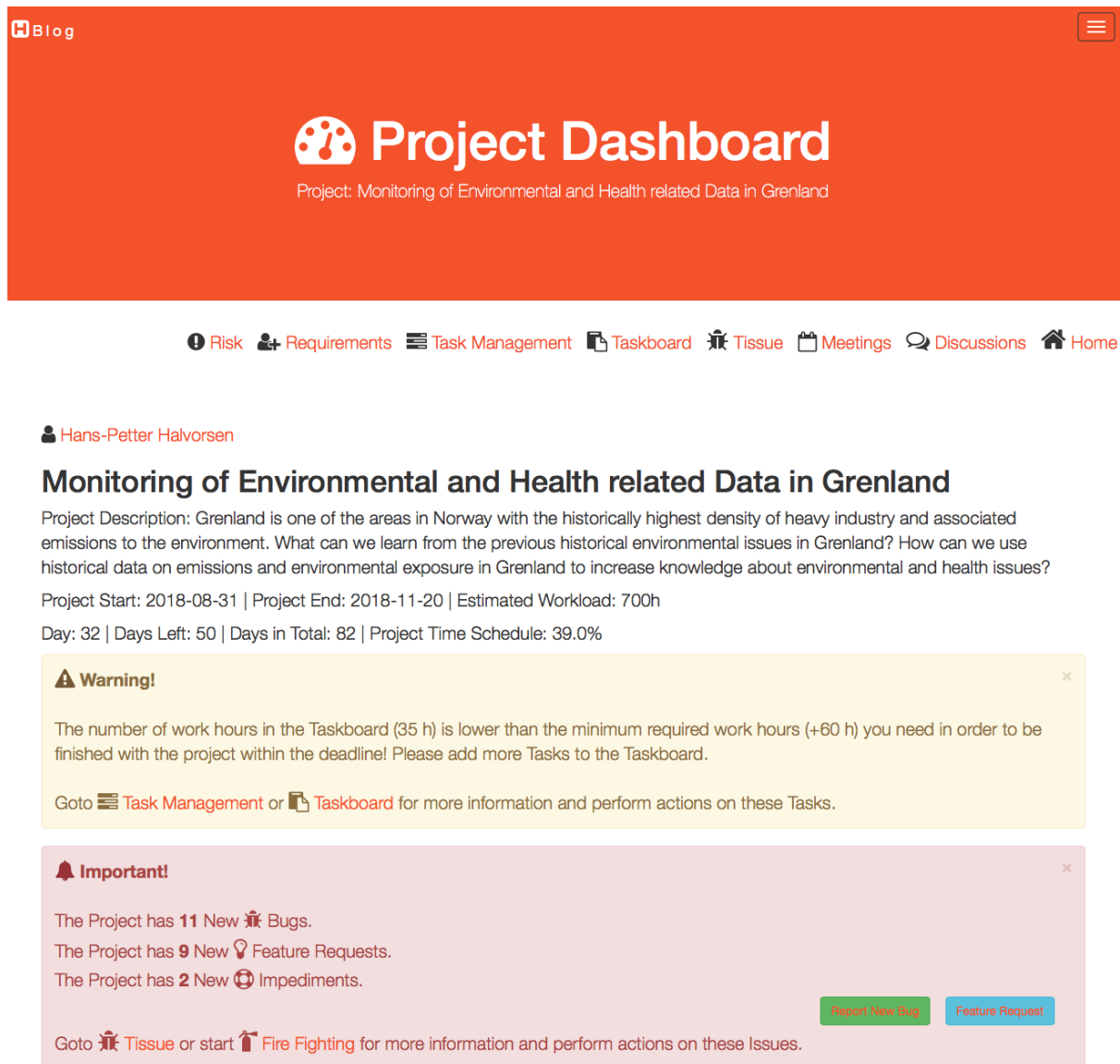


Figure 17-3: Project Dashboard

17.2.2 Taskboard

The Taskboard is a tool used in Agile/scrum to keep track of the work that shall be executed in a software development project.

Below you see an example of the Taskboard.

Taskboard

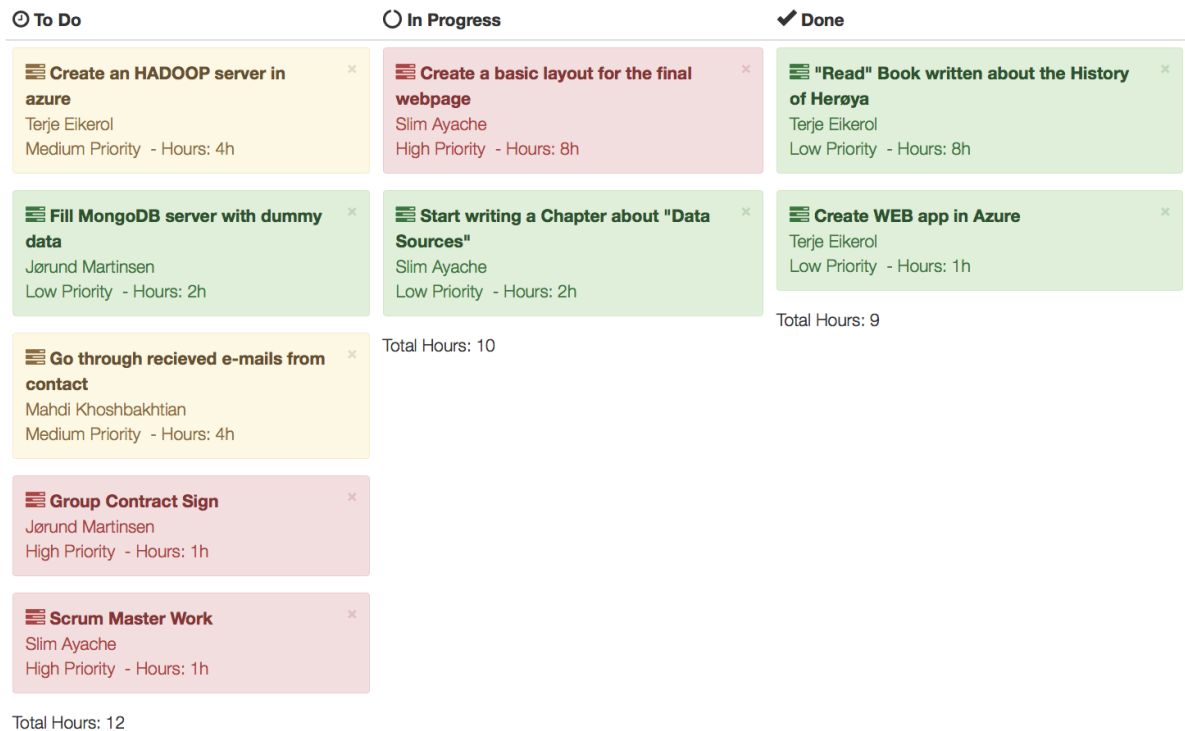


Figure 17-4: Taskboard

17.2.3 Risk Analysis

Hazard Identification and Risk Analysis is an important part of any project in the planning and start-up phase. It is important to identify what can go wrong and find good treatments to solve these issues.

Risk Analysis and Management is the identification, evaluation, and prioritization of risks.

Below you see an example of Risk Analysis.

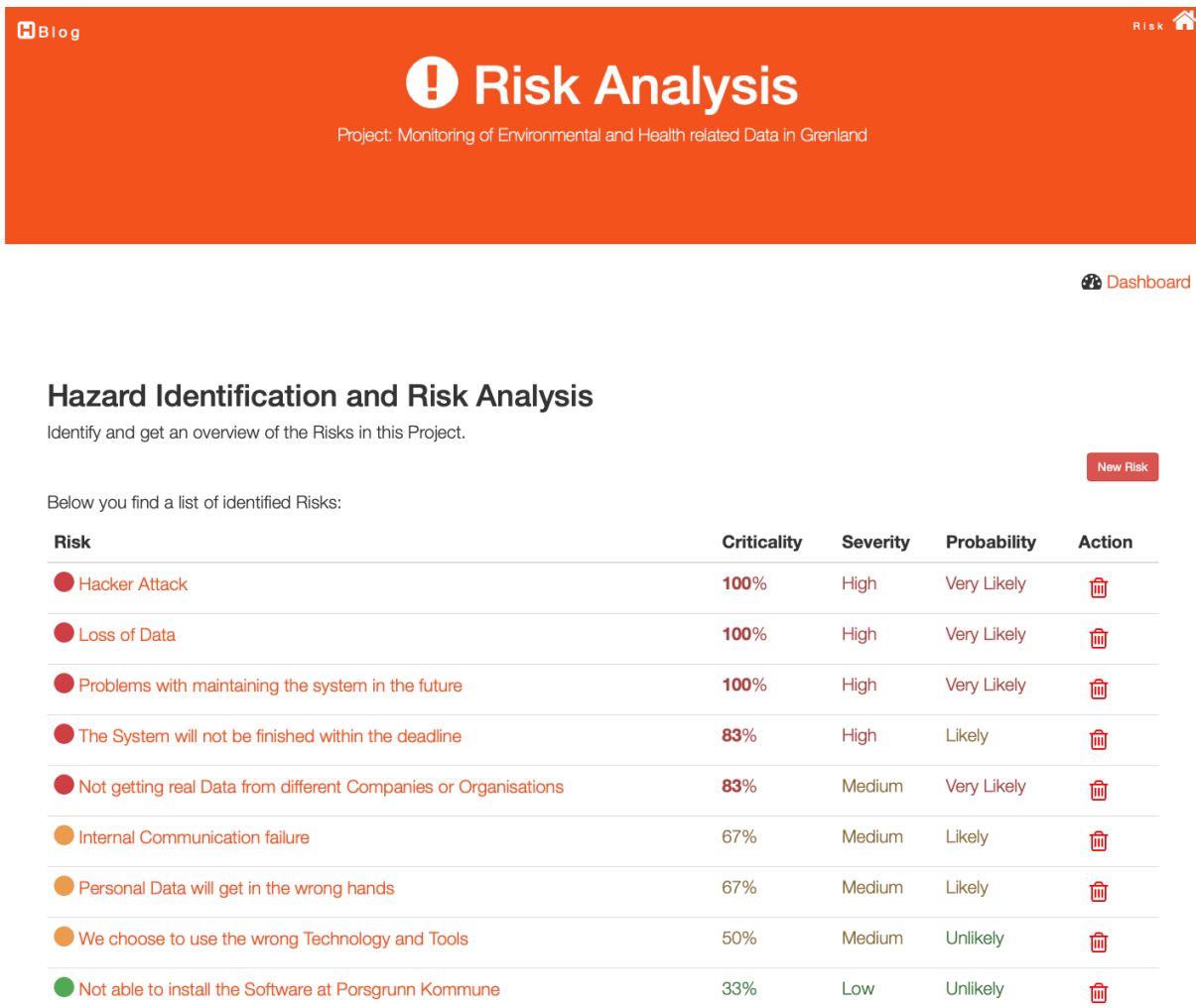


Figure 17-5: Risk Analysis

17.2.4 Bugs and Issue Tracking

Here you can report and track Bugs and other Issues.

Below you see an example of this feature.

Bugs and Issues in your Project

Search for existing Issues or create new Issues.

New Issue
Multiple Bugs
Multiple Feature Requests

Search

Select proper search criteria:

Software:

Report

Issue Type:

Feature Request

Status:

<All>

Assigned Person:





<All>

Registration Person:

<All>

List of Issues

Below you find Issues that fulfills the search criteria above:


Issuelid	Issue Title	Priority	Status	Action
126	 Add some text about ISO in context of your project and the system you are creating	Medium	 New	 

17.2.5Figure 17-6: Bugs and Issue Tracking

17.2.6 Meetings

The system keep track of all the meetings carried out in a project, including Notice of Meetings, Minutes of Meetings, Notifications, etc.

Below you see an example of this feature.



Meetings

Below you find a list of upcoming and some of the previous meetings. You can schedule Meetings, write or see Meeting Requests and Minutes of Meetings.


Meeting	Location	Date & Time	Action
! Meeting with the supervisor #4	C-139a	2018-10-05 10:30	Send Meeting Add to Calendar
Meeting with Supervisor #3	C-139a	2018-09-28 10:30	Send Meeting
Demo and Presentation #1	B-1007 Library	2018-09-26 14:00	Send Meeting
Internal meeting #3	B-1008 Library	2018-09-26 08:00	Send Meeting
Internal meeting #2	Cafe Henrikke	2018-09-24 16:00	Send Meeting


Goto the [Meeting Manager](#) to see all previous Meetings and see previous Minutes of Meetings.

[New Meeting](#)

Figure 17-7: Meetings

Below you see an example of a Notice of Meeting/Minutes of Meeting:


Blog



Meeting

Project: Monitoring of Environmental and Health related Data in Grenland

Meeting

[Dashboard](#)
[Meeting Manager](#)

Meeting Information

Below you find detailed information about the Meeting:

Meeting Title*:

Project Meeting #8

Meeting Content:

Agenda:

1. Individual Status Reports (3 Questions). Make sure to shortly answer (keywords) these 3 questions in advance using PMS. Create the necessary Tasks using the Task Manager (some of these may be added to the Taskboard in #7)
2. Project Status.
 - The Project Manager/Scrum Master should write a short (keywords) Status Report in advance using PMS.
 - In the Meeting the Project Manager gives a short Overview of the Project Status, Progress, etc. Is the Project on Track? Why/Why Not?
 - Open the Task Management to get an overview of Tasks. We have the following Tasks: Not Started, To Do, In Progress, Done, Approved.
3. Make an overview of what has been discussed with Martin and Tone and find out what should be done in relation to that.
4. Finishing Previous Iteration. See the Taskboard. Go through and Approve Done Tasks. Why have To Do and In Progress Tasks not finished?
5. Follow up the previous Status Meeting. Read the Minutes of Meeting and see if there are some things that we agreed on but have not done. Make new Tasks if necessary.
6. Bugs and Features. Go through registered Issues, make Priorities and Approve fixed Issues. Use the Fire Fighting feature in PMS.
7. Discuss Next Meeting. What should we focus on in the Next Meeting? Create necessary Tasks and update the Taskboard.

Meeting Location:

C-139a

Meeting Date: 2018-11-02 Start Time: 10:30 End Time: 11:30

Summary:

Teknisk ukeblad. Articles

- Oslo får fleksibel IKT platform

Figure 17-8: Notice of Meeting/Minutes of Meeting

17.2.7 Project Status

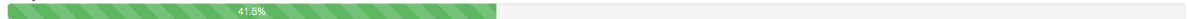
The system keep track of all the individual status for each member of the development team as well as the overall status of the project.

Below you see an example of this feature.

Project Status

Project Status. What is the current status for your project? Is your Project on track? (What is on track, What is not on Track?), etc. Please update the overall Project Status on a regular basis (e.g., weekly updates). This should be done by the Project Manager before the Weekly Status Meetings. Just a small reality check: According the Project Schedule, you should now be finished with **41.5%** of the Project $\{(\#DaysToday/\#DaysTotal)*100\}$. Are you on track? See [Tasks Overview](#) below.

Project Time Schedule:



Status Reports:

Date	Status Information	Action
2018-09-26	No response from contacts. Decided to use mock data for development. Database solution has been selected (MongoDB and HADOOP). Report has been updated. Several tasks have been created, more to come. Website GUI design is in progress. Requirements have been evaluated and risks identified. Next iteration should create mock data, begin coding, revisit contacts, start analysis process.	Edit
2018-09-21	The Structure of the project report is being formed. Initial contacts with external parties have been made. We have a good knowledge what has been done before and we know the history of the scope of the project (Here)	Edit
2018-09-14	Report Template created, Dropbox folder created etc	Edit
2018-09-04	Project Kick-off and Start-up (Week 36) Initial Meeting with Supervisor Initial Meeting with Customer Get Overview, create Requirements, etc.	Edit

[Add Project Status](#)

17.2.8 Figure 17-9: Project Status

Individual Status Report:

The Project Manager or the Scrum Master, etc. can report the overall Project Status as shown above. In addition, each project member (in the Development Team) can add Individual Status Reports.

Below you see an example of this feature.

Blog

Individual Status Reports

Each Project Member needs to answer 3 Questions. Make sure to shortly answer (keywords) these 3 questions before the Status Meeting. Then make sure to also create the necessary Tasks using the **Task Management** (some of these Tasks may then be added to the Taskboard later).

For more details, see the **Individual Status Reports** page.

3 Questions:

Q1. What have you done Last Week?

Q2. What shall you do this Week?

Q3. Any Problems or Impediments?

Latest Status Reports:

Week 44

(2018-11-02 11:07)

Q1. Created machine learning chapter. Read up on ML techniques, how they work, what can be applied to this project. Written into chapter, along with suggestions for the system.

Q2. Continue on ML chapter, continue with the request regarding MI.

Q3. Difficult to find out which ML applications that would be best. Maybe best with MI on the data, not meta-data, but most difficult to implement(when we have no data).

(2018-11-02 08:38)

(2018-11-01 22:34)

(2018-11-01 21:22)

Week 43

(2018-10-25 23:55)

(2018-10-25 22:36)

(2018-10-25 21:01)

(2018-10-25 20:52)

Figure 17-10: Individual Status Report

17.2.9 Notifications

On top of the Dashboard (Notification Center) the user gets different kinds of notifications.

Below you see an example of this feature.



Figure 17-11: Notifications

The user gets 3 different types of Notifications:

- "Information" Notifications (Blue Color) - If you have a Meeting, etc. today, you will get an "Information" Notification
- "Warning" Notifications (Yellow Color) - If you haven't enough workload in current iteration, you don't have Tasks in the Taskboard, etc., you will get a "Warning" Notification
- "Important" Notifications (Red Color) - If someone has added Bugs, etc, for modules or software that you are responsible for, you will get an "Important" Notification

17.2.10 Notes

You can organize your Notes into different Groups or Categories. With Notes you can create Text, Tables, Hyperlinks. You can format your Text using Headers, Bold, italic, you can also create Bulleted Lists and Numbered Lists. You can also Print out your Notes or create a PDF file.

Below you see the Notes Manager.

Blog

Notes-Monitoring of Environmental and Health related Data in Grenland

Notes

Project: Monitoring of Environmental and Health related Data in Grenland

Dashboard

Home

Note Group:

<All>

New Note Group

Edit Note Group

Note List

New Note


Note	Date Modified	Modified By	Action
How to apply Machine Learning in this project	2018-11-16 11:25	Hans-Petter Halvorsen	<div>Edit NoteDelete Note</div>
Project Description	2018-11-16 11:20	Hans-Petter Halvorsen	<div>Edit NoteDelete Note</div>

Figure 17-12: Notes

Below you see an example where you write a New Note.

Blog

New Note



Edit Note

Project: Monitoring of Environmental and Health related Data in Grenland

Dashboard

Notes

Edit Note

Please update information about the Note:

Note Group*:

Project Management

Note Title*:

Project Description

Note Content:

Heading 1 B I :≡ ≡≡ “ @

FM4017 Project

Title: Monitoring of Environmental and Health related Data in Grenland from a Historical perspective

USN supervisor: Hans Peter Halvorsen

External partner: Herøya industripark, Sykehuset Telemark, Porsgrunn kommune, Folkehelseinstituttet, Miljødirektoratet og Prosjekt kompetansetjenester miljø og helse.

Task background:

Grenland is one of the areas in Norway with the historically highest density of heavy industry and associated emissions to the environment. Located in the south-eastern part of the county, Grenland is composed of the municipalities Skien, Porsgrunn, Bamble, and Siljan. Throughout the last 50 years, the awareness of emissions and the effects of these has become increasingly significant. Today, emissions from most sources are severely limited by regulations, industry's own awareness of effects and responsibility, as well as through the general public's focus on the right to a safe and healthy environment. Equally, new environmental challenges are constantly evolving, and existing knowledge and experience are important for meeting them in a good way.

Figure 17-13: New Note

18 Azure DevOps

...

19 xxx

...

Part 6 Software Projects

...

20 Software Engineering

Software Engineering is the discipline for creating software applications. A systematic approach to the design, development, testing, and maintenance of software.

The main parts or phases in the Software Engineering process are:

- Planning
- Requirements Analysis
- Design
- Implementation
- Testing
- Deployment and Maintenance

Figure 20-1 shows the Software Development Lifecycle (SDLC).

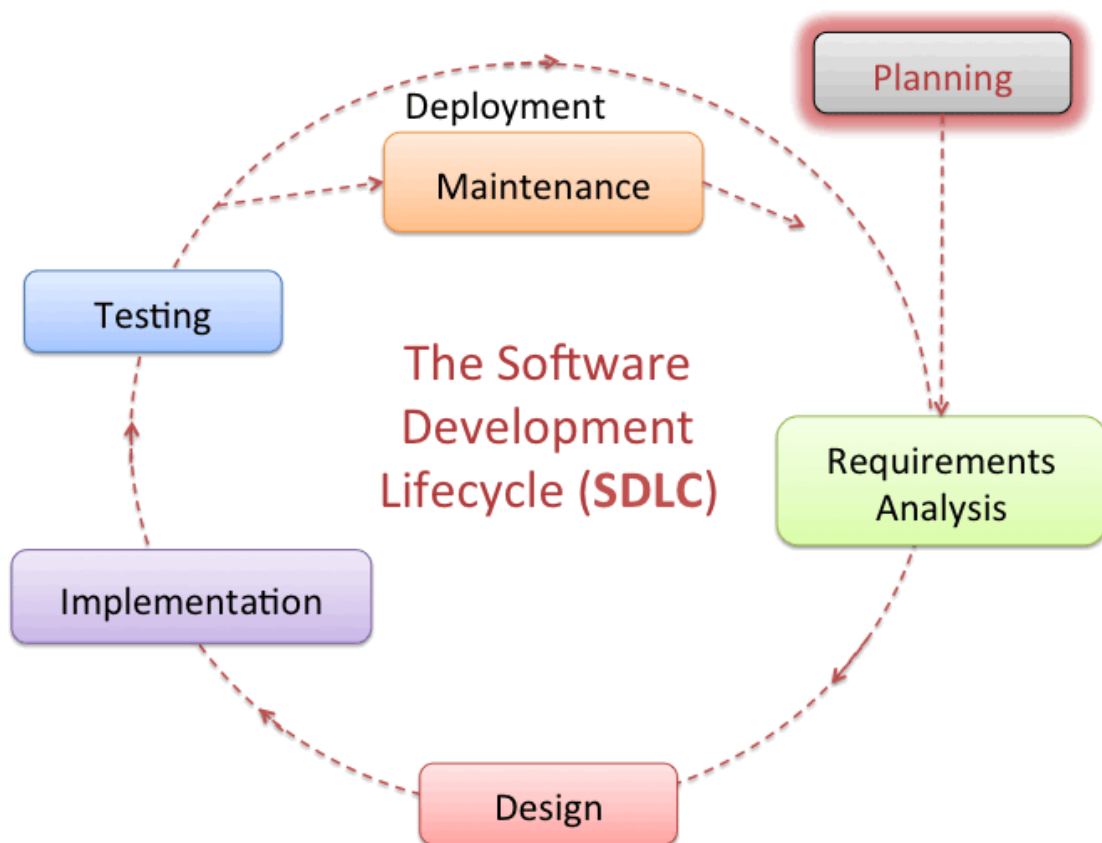


Figure 20-1: The Software Development Lifecycle (SDLC)

20.1 Additional Resources

YouTube:

<https://youtu.be/f4dpWVzpvUE>

Web Site:

https://www.halvorsen.blog/documents/programming/software_engineering/

21 Programming Tools

...

21.1 LabVIEW

...

<https://www.halvorsen.blog/documents/programming/labview/>

21.2 Visual Studio and C#

...

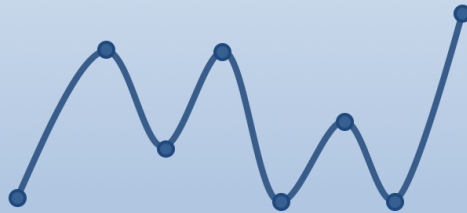
<https://www.halvorsen.blog/documents/programming/csharp/>

21.3 Python

...

Python Programming

Hans-Petter Halvorsen



<https://www.halvorsen.blog>

...

Python for Science and Engineering

Hans-Petter Halvorsen



<https://www.halvorsen.blog>

<https://www.halvorsen.blog/documents/programming/python/>

21.4 MATLAB

...

<https://www.halvorsen.blog/documents/programming/matlab/>

21.5 Simulations

...

Python

MATLAB

21.6 Web Programming

...

Part 7 Testing

...

22 Why Testing?

...

Part 8 Project Delivery

...

23 Project Deliveries

...

The system that has been developed (if any)

Software

Hardware

Etc.

The Documentation

...

24 Software

...

Part 9 Project Documentation

...

25 The Report

....

Don't take easy on the report! In the end the grade is mainly based on the report

- Start working with the report from day 1!!
- Update the report every week!!
- The report should be an attachment to the Notice of Meeting every Week
- Overview vs. Technical Details
- The grade is mainly based on the Report!

26 Referencing

...

Recommended Referencing Style:

APA 6th

APA is an abbreviation for the American Psychological Association. This reference style uses parenthesis in the text with the author's last name and the year of publication. A complete reference list is placed at the end of the text. The references in the list are in alphabetical order according to the authors' last names and should contain all necessary bibliographical data.

Example (Book with one author):

Inside your text (Autor, Year):

According to (Halvorsen, 2018) we can assume that the results can be calculated from the integral of the function.

In the reference list (Author. (year). Title in italics (edition). Publisher/URL):

List of References

...

Halvorsen, Hans-Petter. (2018). *Python for Science and Engineering*. Pearson.

...

When using this referencing style (compared to e.g., the IEEE standard) you can add your references immediately without the need for updating referencing numbers inside the text later. Someone integrates for example software like EndNote for handling automatically updates of the numbers within the text, but when using APA 6th that is not necessary.

Additional Resources:

<http://kildekompasset.no/references/apa-6th.aspx>

27 xxx

...

Part 10 xxx

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28 xxx

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29 xxx

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Part 11 xxx

...

30 : xxx

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31 xxx

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32 xxx

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Part 12 xxx

...

33 : xxx

...

34 xxx

...



Project Engineering