KESTREL

SYSTEMS

KONGSBERG

Universitetet i Sørøst-Norge

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Computer Engineer

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Mechanical Engineer

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Mechanical Engineer

Kristian E. Myren

Electrical Engineer

Project Client

- Kongsberg Defence & Aerospace
  - DMS - Missile and space
  - Defence Products
  - Surveillance
- Local Hawk
  - Drone Technology Project
  - Future Project Development

Kongsberg Defence & Aerospace 2024©

The Project

Advanced Aerial Drone Surveillance System

Task Description

Develop a system to improve the response time and preparedness of emergency responders through autonomous drone technology.

Application

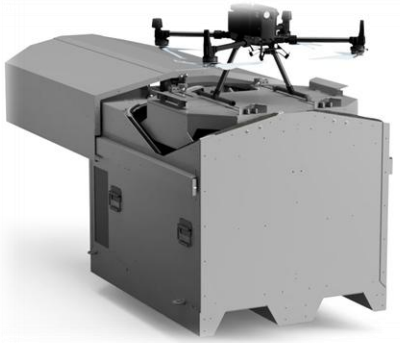
Natural Disasters

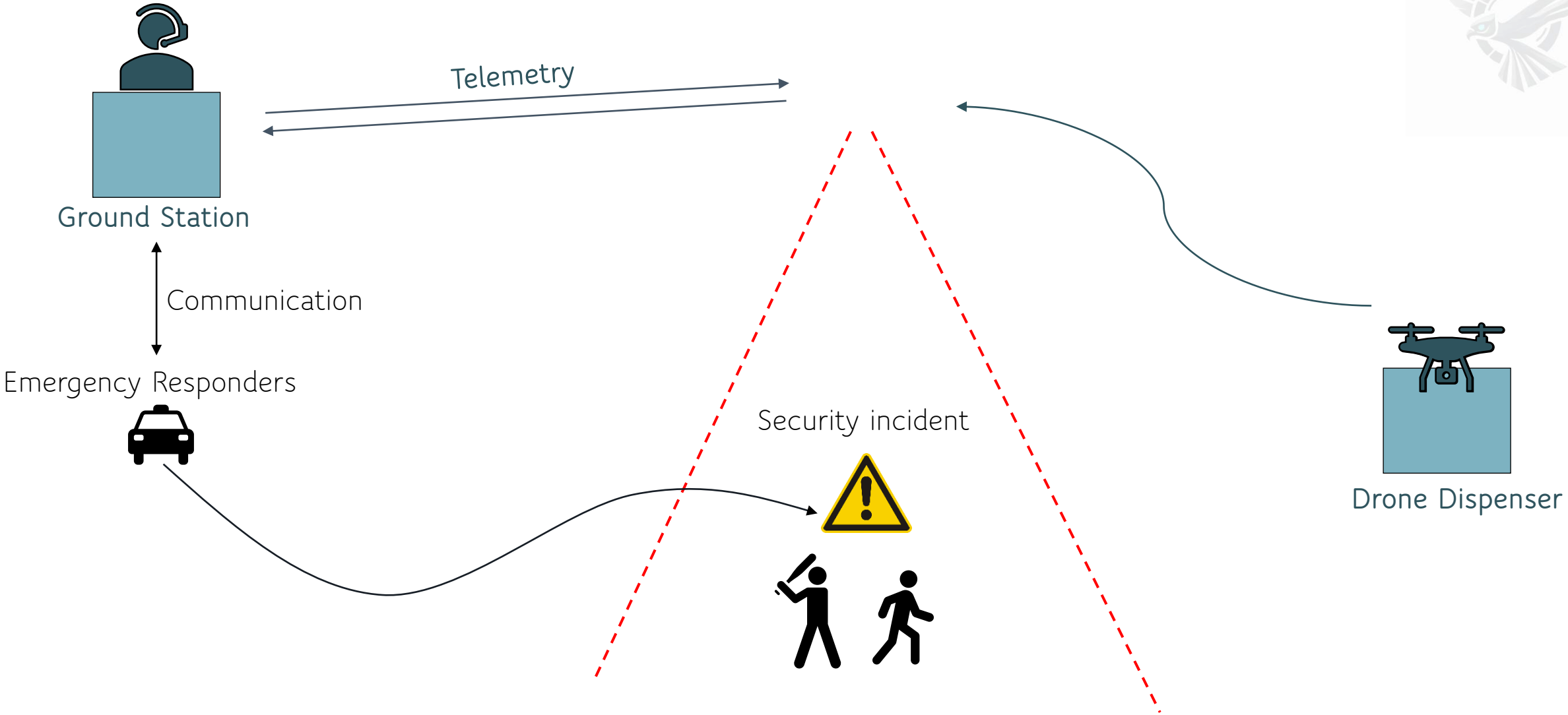
Emergencies

Security

Existing Solutions

- FLIR Black Recon™
- DJI Dock
- Hextronics Drone Dock
- IDIPLOYER Nexus Dock
- Hive Droneport Docking Station

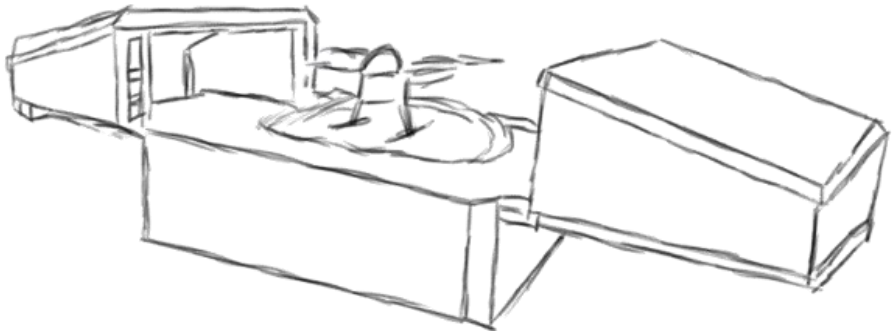




Who — What — Why — How

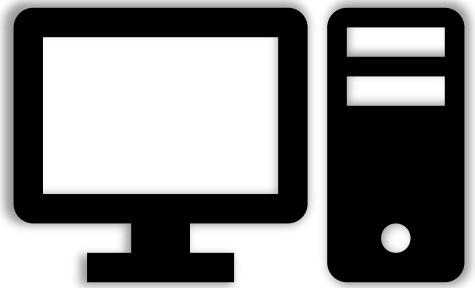
Task Decomposition: Dispenser

Design drone dispenser to deploy and charge surveillance drone



Task Decomposition: Ground Station

Create a centralized hub to monitor and remotely control the drones



Task Decomposition: Communication

Create communication between dispenser and hub

Task Decomposition: Drone

Design communication protocols between drones and dispenser

Requirements

Task Description	Requirement	Verification	Priority	Status
1) The drone dispenser shall enclose the drone while idle and open to deploy the drones.	**1.1)** The Drone Dispenser shall enclose the Modal AI Starling Drone. Minimum size of 370x435x120 mm. (TBD)	Fitment test	A	In Progress
	1.2) The drone dispenser shall weigh less than 25 kg	Weighing Dispenser with and without drone(s)	A	In Progress
	1.3) The drone dispensers shall be modular in such a way that they are easy to move to new locations	Function test	A	In Progress
	1.4) The drone dispensers shall provide full functionality regardless of weather conditions	Test I.A.W. MIL-STD-810	B	In Progress
	1.5) The Dispenser shall be painted to match the environment	Consensus	C	In Progress

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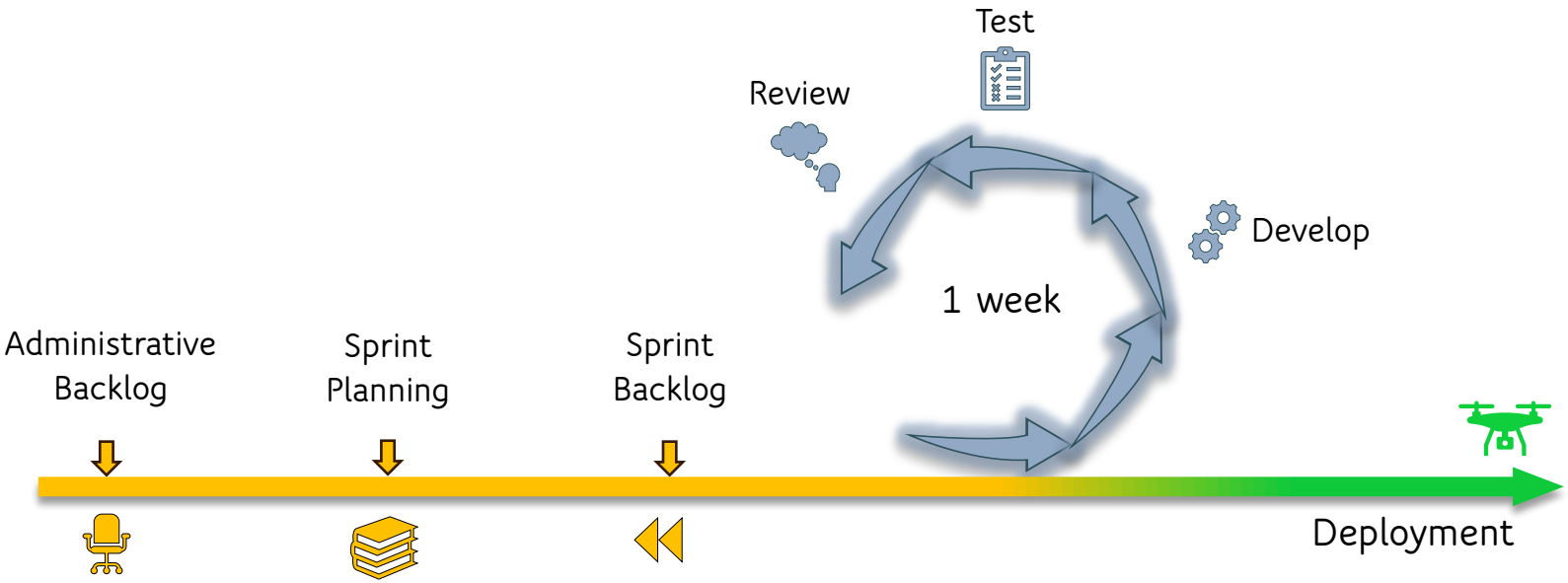
	1.5) The Dispenser shall be painted to match the environment	Consensus	C	In Progress
2) The drone dispensers shall supply a power	**2.1)** The Drone Dispenser shall charge the drones automatically	Function test	A	In Progress

Requ

5) The system should utilize a ground station that commands and monitors the dispatch drones via telemetry and live video feed	5.1) The ground station shall have reliable communication with the drones using 5G	Function test	A	In Progress
	5.2) The ground station should display telemetry data such as altitude, speed and battery level	Function test	B	In Progress
6) The drones should be able to record and live stream video from their destination	6.1) The drone should timestamp all recordings	Function test	B	In Progress
	6.2) The drone should automatically start recording on takeoff	Function test	B	In Progress
7) The ground station should have the option to take manual control of the dispatched drones at will	7.1) The system should allow switching between autonomous and manual control without disturbing drone operations	Function test	C	In Progress
	7.2) The system should have a button that will make the drone return home immediately	Function test	C	In Progress
8) The response time for the drone to be in the air from the alert should not exceed 30 seconds.	8.1) The dispenser should open in less than 25 seconds.	Function test	A	In Progress

Agile Work Model



Who What Why How

Why the Agile Model?

- Adapt the plan as we go
- Limits work in progress
- Continuous evaluation/prioritization

SPRINT TIMELINE

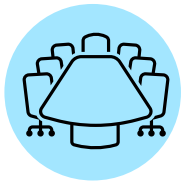
Monday

Lectures for all disciplines

Tuesday

Sprint start

Planning



Wednesday

Internal Supervisor Meeting

Thursday

Work on project

Friday

External Supervisor Meeting

Sprint Finish and evaluation

Saturday & Sunday

Make up for unfinished work

Relax and recharge

ROADMAP

First Presentation

31st of January

Present our task

Second Presentation

End of march

Showcase our technical solutions

Submission

20th of May

Deliver report & documentation

Final Presentation

End of May – start of June

Showcase our implementation and documentation

USN EXPO

22nd of May

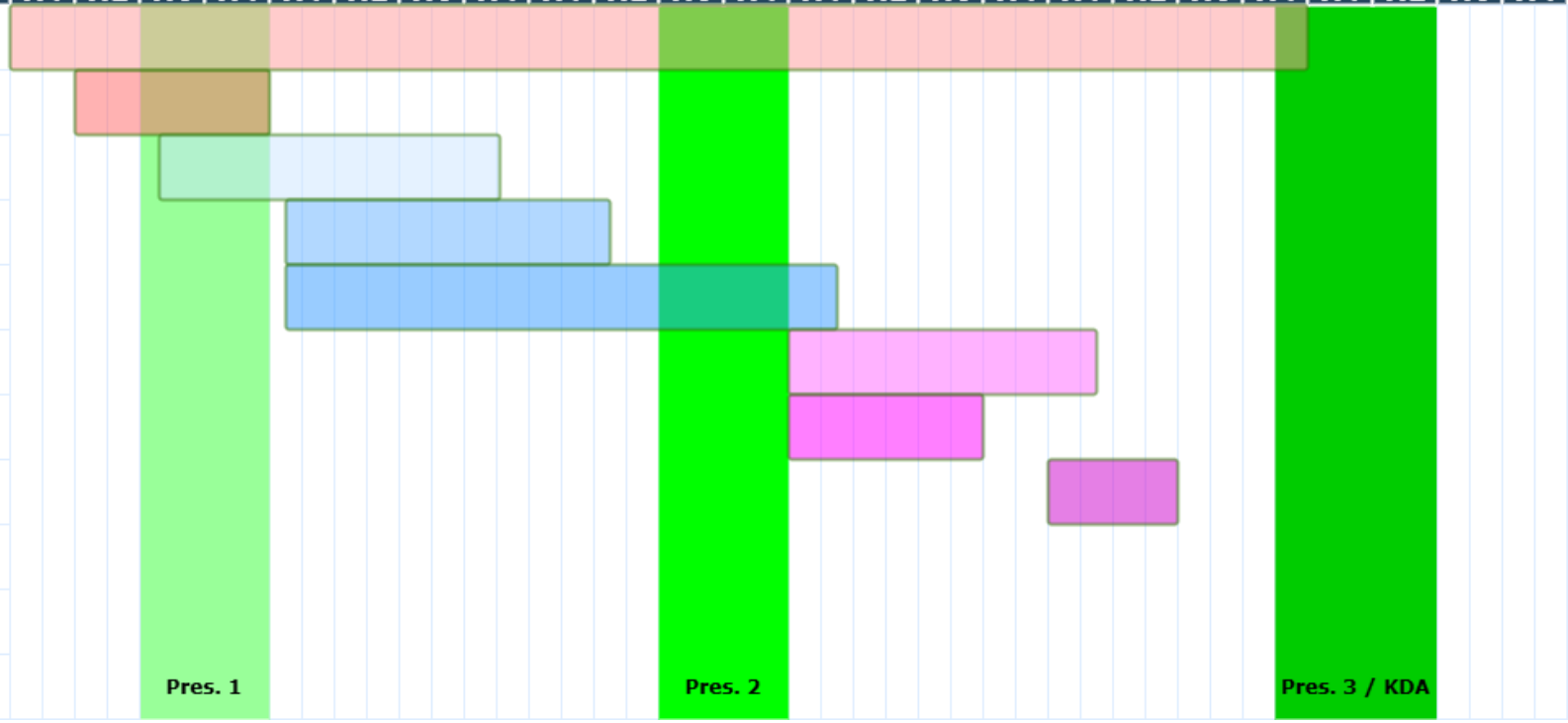
Showcase the product

Presentation for KDA

Visit to Teknologiparken to showcase our finished project

Scope

	Task Name	Duration	Start	ETA
1	Documentation	142 days	06.01.25	25.05.25
2	Planning	25 days	06.01..25	31.01.25
3	Research	40 day	20.01.25	28.02.25
4	Design & Modelling	28 days	03.02.25	09.03.25
5	Prototyping	61 days	03.03.25	04.05.25
6	Testing	42 days	31.03.25	04.05.25
7	Minimum Viable Product	21 day	01.04.25	21.04.25
8	Submission	14 days	28.04.25	11.05.25
9	Presentation 1	1 day	31.01.25	31.01.25
10	Presentation 2	1 day	28.02.25	31.02.25
11	Presentation 3 / KDA	1 day	28.05.25	06.06.25



Who — What — Why — How

Project Management

- Specified roles
- Support across disciplines
- Jira Project Management

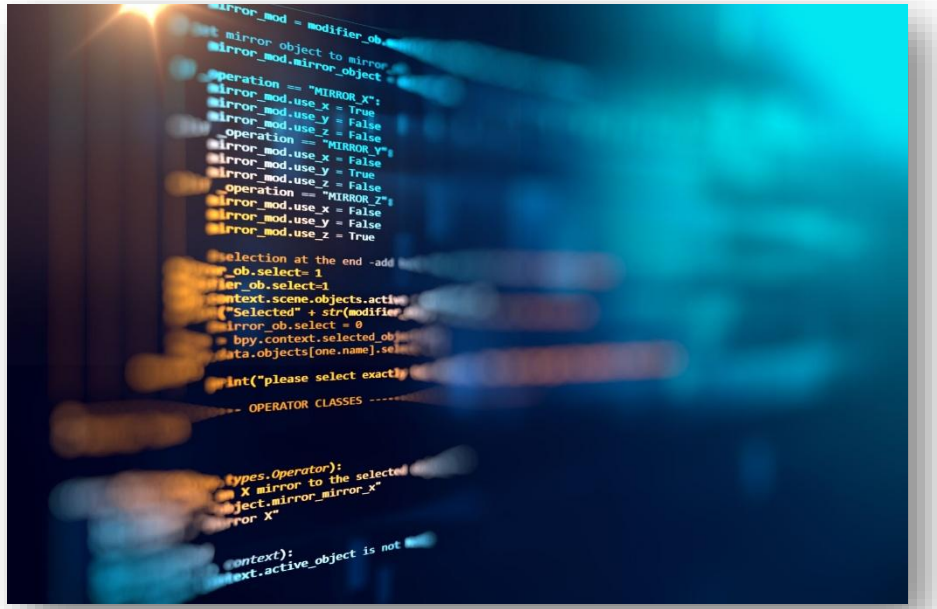
Risk Management Model

Risk Matrix		Consequence			
		1 Insignificant	2 Minor	3 Moderate	4 Critical
Probability	4 Very likely	M	M	H	H
	3 Likely	L	M	M	H
	2 Unlikely	L	M	M	M
	1 Rare	L	L	L	M

Who — What — Why — How

Tools & Applications

- Software
  - Azure DevOps(GitHub)
  - C++
  - SolidWorks
  - Overleaf LateX
  - Matlab
  - Pspice
- Hardware
  - 3D-printing
  - Composites
  - Laser Cutting



Documentation

- Doxygen
- Overleaf Report
- Jira
- Timetable
- Personal Documentation
- Website/Instagram

Documentation

Timeliste for måned:

Dato	Start	Slutt	Timer	Hva har du gjort?
1	09:00	13:00	4,0	Brainstorming, jobbing med 1. presentasjon
2	10:00	16:00	6,0	Skrive på rapporten og jobbe med dokumentasjon
3	08:45	14:30	5,8	Møte med ekstern veileder og research
...			0,0	
...			0,0	
31	09:00	15:00	6,0	Research og kodedokumentasjon
		Antall timer:	**15,75**	

@kestrelsystems on Instagram