



FIELD
ROBOTICS



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SMART Project

Bologna - 6th October 2022

THE TEAM



A Spin-off company of the University of Bologna



Founders



Andrea Sala
Mechanical Engineer



Dario Mengoli
Computer Engineer



Lorenzo Marconi
Automation Engineer,
Professor



Riccardo Fini
Industrial Engineer,
Professor

Board of Advisors



Alessandro Bonfiglioli
General Manager
CAAB

Collaborators

- Bruno Strano, PhD
 - Lorenzo Gentilini, PhD
 - Simone Rossi, PhD
- } Automation Engineers
- Giorgio Bordini
- Mechanical Engineer
- Francesco Guaraldi
- Financial Planning and Resource acquisition

Partnerships

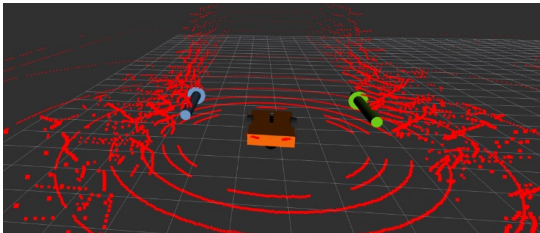
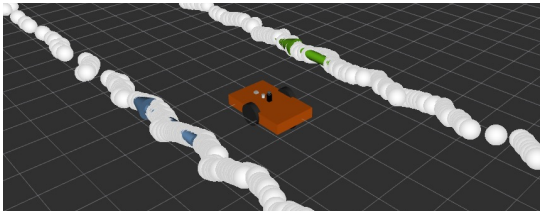


Commercial

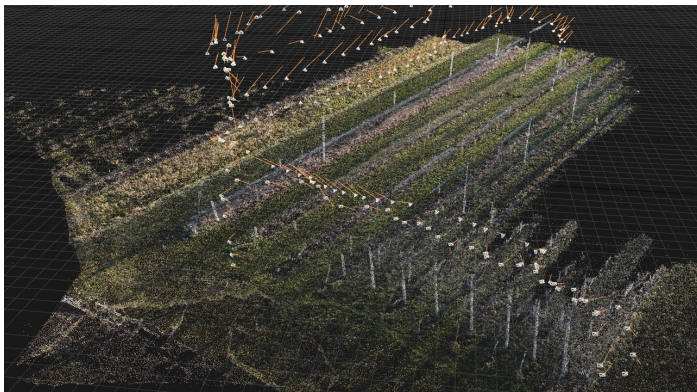


Industrial

THE CORE EXPERTISE

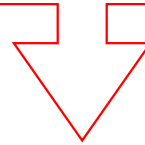


- Autonomous navigation system in cluttered environments and GPS-denied scenarios
- AI-powered solutions: **object recognition**, image segmentation and data-driven predictions
- **Aerial and ground robotic platforms** design and development, systems integration and teleoperation software
- In-field **data harvesting** and processing



APPLICATION EXAMPLES and CLIENT/CONTACT PORTFOLIO

- A newly-established start-up with 10+ years of collaboration-track history with the University of Bologna
- The navigation algorithms and AI models developed in collaboration with:



- Technology tested with 100+ hours of flight



- Technology tested inside a –pilot– innovative orchard of the University of Bologna
- 800+ hours of autonomous navigation



FieldRobotics

Application division

AGRICULTURE
GREENHOUSE & HEROIC AGRICULTURE



SEARCH AND RESCUE
LAND AND SEA
DEFENSE



AGRICULTURE GREENHOUSE & HEROIC AGRICULTURE



MISSION & VISION



Mission

"To develop and commercialize a robotized platform with electric traction and autonomous/remote guiding to carry out field works, leveraging its interoperability and an array of plug&play elements."



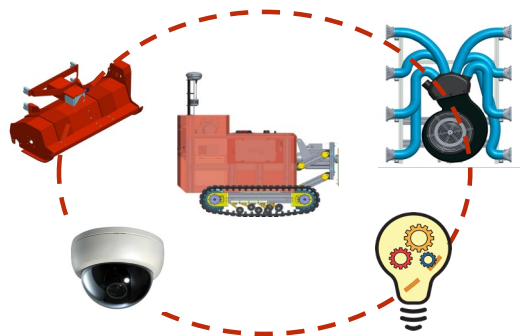
Vision

"To inspire the new generation of farming, increasing crops' quality and sustainability, enhancing safety and productivity, through autonomous robots."

The concept

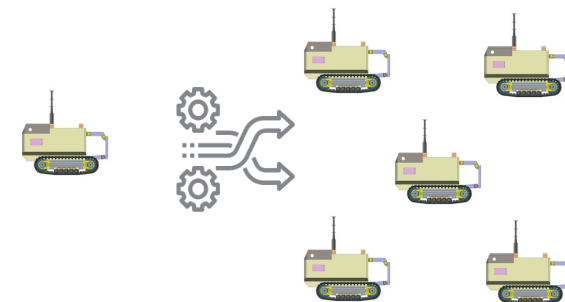
“Motorized implement” vs. “Tractor pulling the implement”

- Integrated compact design
- Lightweight structure (soil compaction, all-weather)



Adaptability and Flexibility

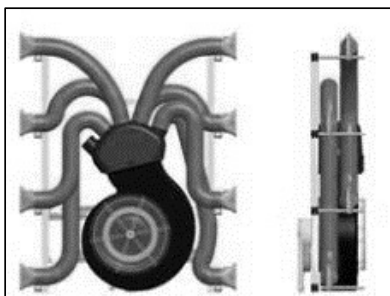
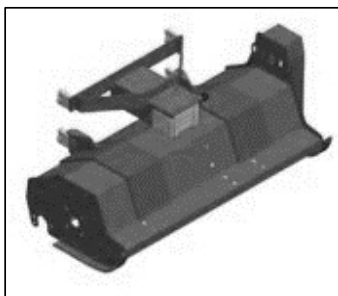
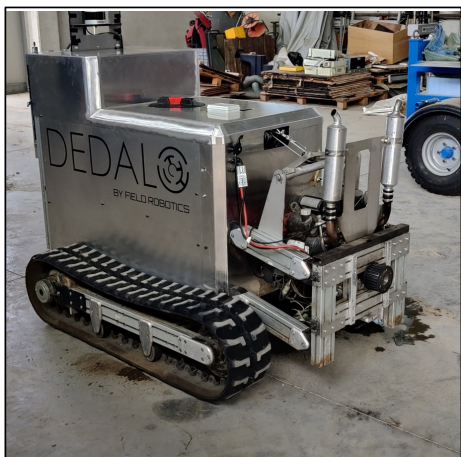
- New generation “plug & play” implements
- (Automatic) Electric plug in the field



Scalability and Expandability

- “Having a larger number of smaller tractors rather than a smaller number of larger ones”

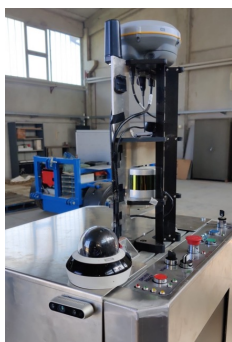
THE PRODUCT | Dedalo – as of today



- Power storage configurations (12 Kw, + mult.6 Kw)
- Two power train solutions (Full Electric, Hybrid)

Key Features:

- Superior stability and weight/power ratio, able to carry more than 1000kg payload
- A real all-weather machine (uneven terrains)
- Autonomous in-row navigation able to automatically recognize crop lines
- Almost zero-configuration system, with immediate deploy and operation
- Modularity of implements, battery size, and mechanical configuration



- Un-matched **temporal** and **spatial** resolution
- **Data harvesting** (precision farming)
- **Digital twin** of the crop

PATENTED TECHNOLOGY
(pending):
1 patent – navigation
4 patents - mechanics

DEDALO 2.0 – as of today – EIMA 2022



A power-efficient, “green” multi-purpose platform

ON GOING DEVELOPMENTS - SOFTWARE



UAV DATA HARVESTING KIT

Predictions on average diameters and fruit size class distribution, Information on fruits growth, accurate forecasts on total production.

ON GOING DEVELOPMENTS - HARDWARE



SHELTER

Completely independent machine able to return autonomously to the shelter base equipped with high technological and design photovoltaic system



REDUCED DISPERSION SPRAYER

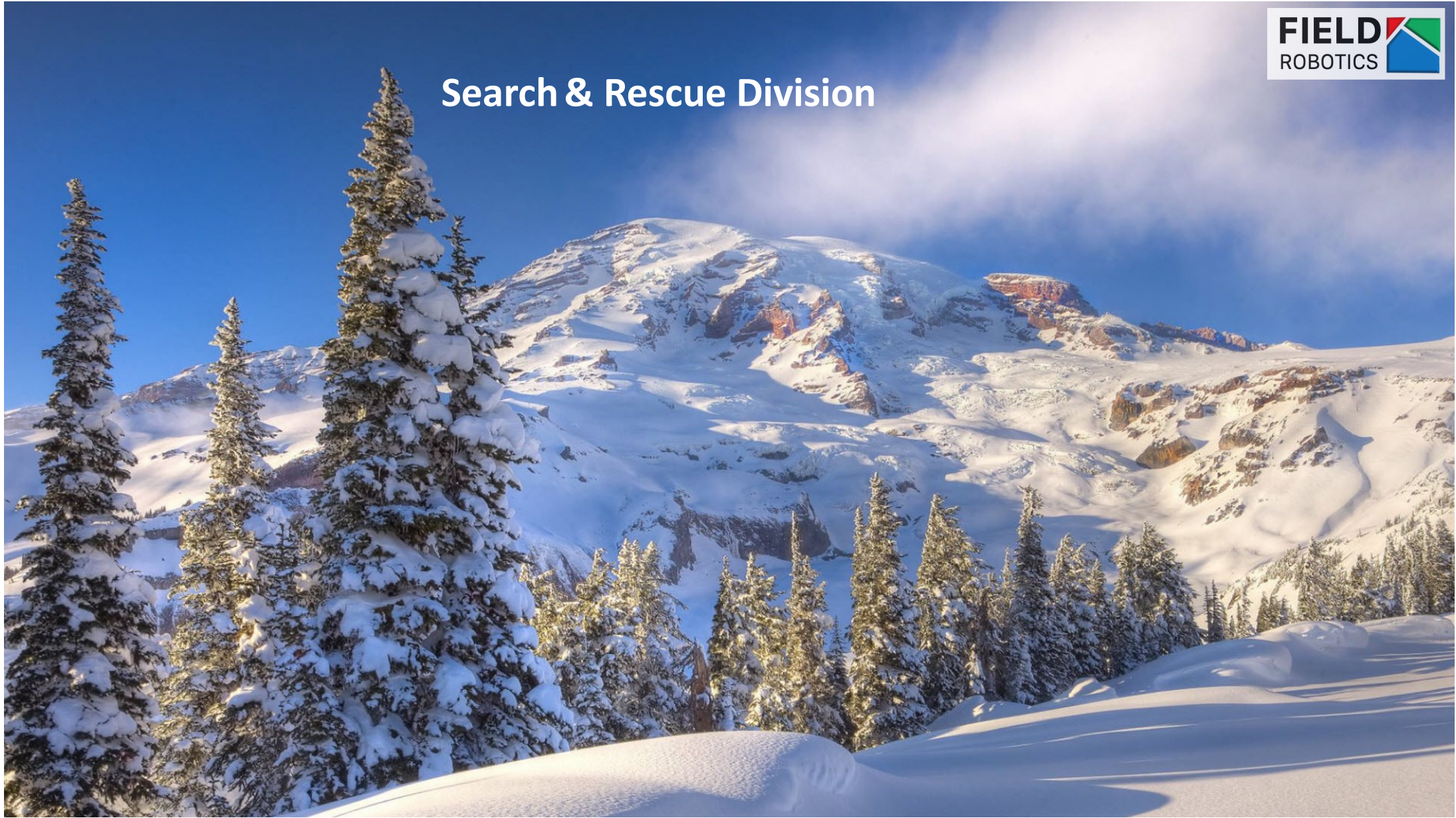
Implement: A new version of the sprayer to reduce emission and increase efficiency



ROBOTIC ARM FOR PICKING IN THE FIELD

Implement: Modular system consisting of a series of joints with different characteristics and performances according to their role in the composition during automated harvesting

Search & Rescue Division



MISSION & VISION



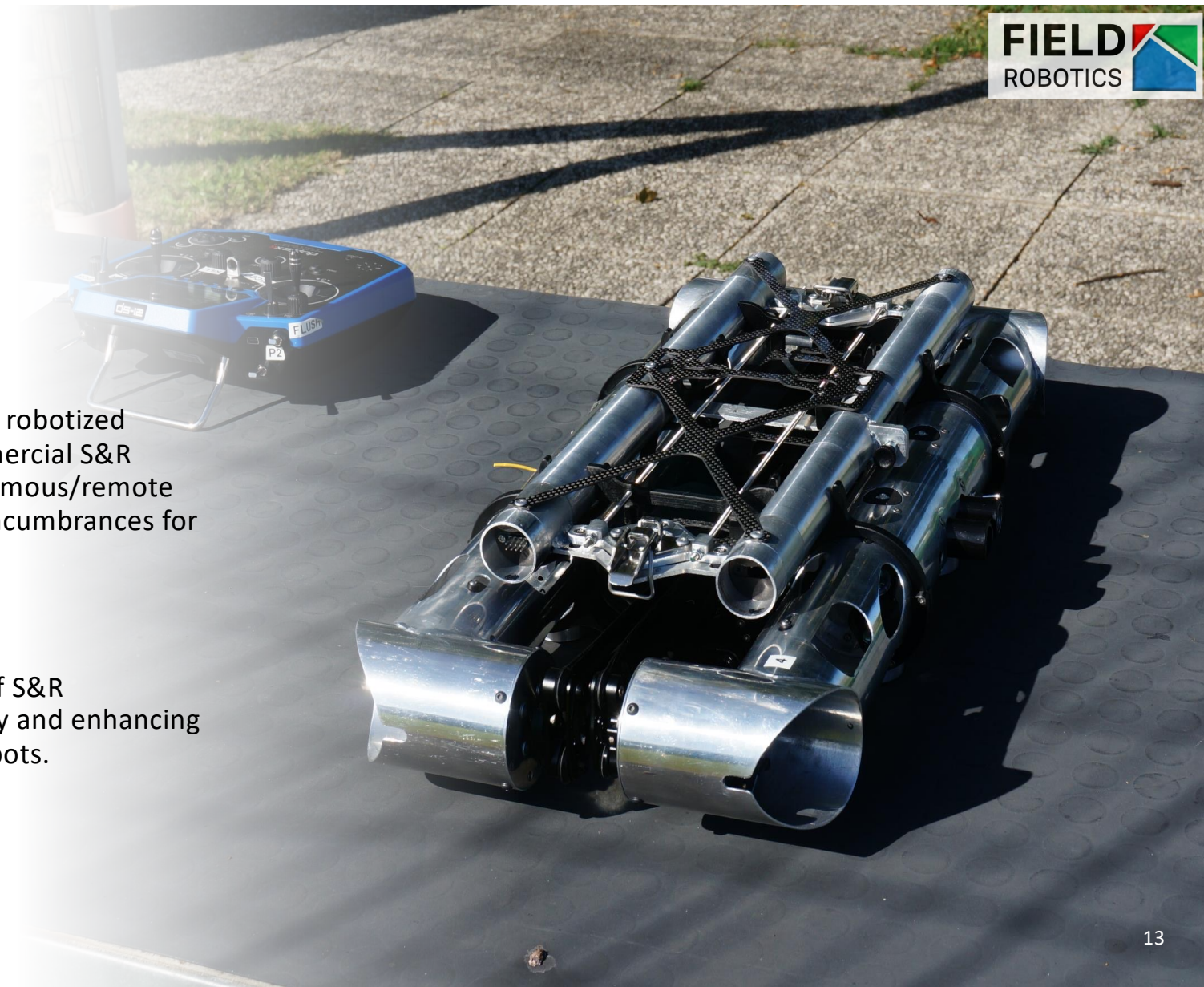
- **Mission**

To develop and commercialize a robotized platform compatible with commercial S&R technologies and having autonomous/remote guiding, maintaining reduced encumbrances for be easily carried by a rescuer



- **Vision**

To inspire the new generation of S&R procedures, increasing efficiency and enhancing safety, through autonomous robots.



The product | Airborne

A small/medium-sized modular quadrotor with interchangeable payload, to be used for quick localization of victims buried during avalanches.

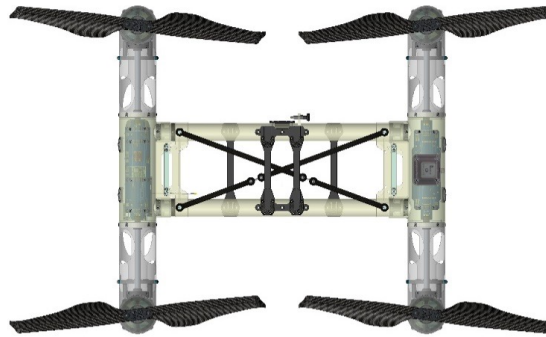


- ARTVA/RECCO interchangeable payloads;
- Machine carriable by human operator;
- Autonomous search patterns;
- Terrain following feature;
- At least 20 min of flight time;
- Wind/Snow/Cold resistance;

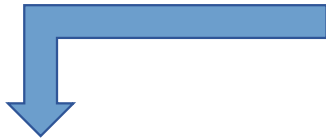
Modular Structure

AIRBORNE

PATENTED TECHNOLOGY

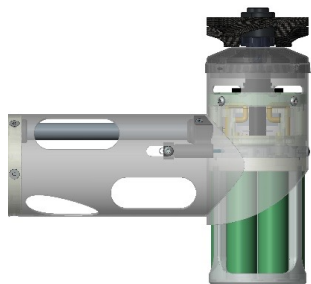
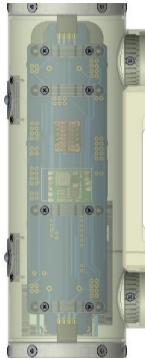


Structure designed to reduce the EMI coming from avionic and motors. All the components can be inserted into cans of different materials, based on the frequency we want to reject. In our case we selected Aluminum.



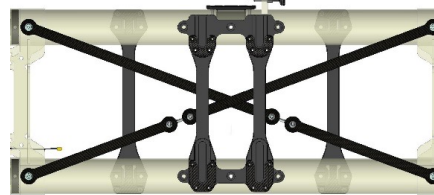
Sx Can:

- Internal logic boards;
- MKR GSM;
- PCBs;
- SD board;
- Jeti radio;



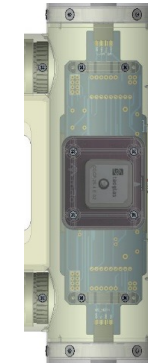
Power train Can:

- Propeller;
- Motor;
- ESC;
- PCB;
- Internal logic board;



Central Can:

- Connection Cables;
- Payloads common interface;



Dx Can

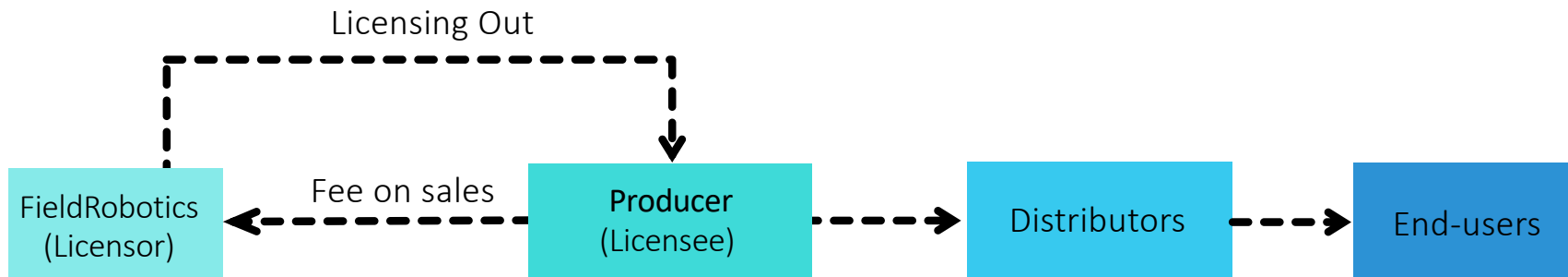
- Flight Controller;
- GPS;
- PCBs;
- Lidars;
- Lidars fusion board;

The BUSINESS MODEL

Stage 1: From TRL7 to TRL9 and early adopters

- In-house production & co-development with end-users

Stage 2: Full industrialization and production





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THANK YOU!

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