International Dairy Data Exchange Network
A Cooperation Coming to Implementation

Overview and Status of iDDEN

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Agenda

- Technical Overview
  - iDDEN as worldwide solution for data exchange
  - Technical solution and design goals
  - Roles and Architecture
  - Mandates, iDDEN-ID and registration

- State of the Project
  - Organizations
  - Messages
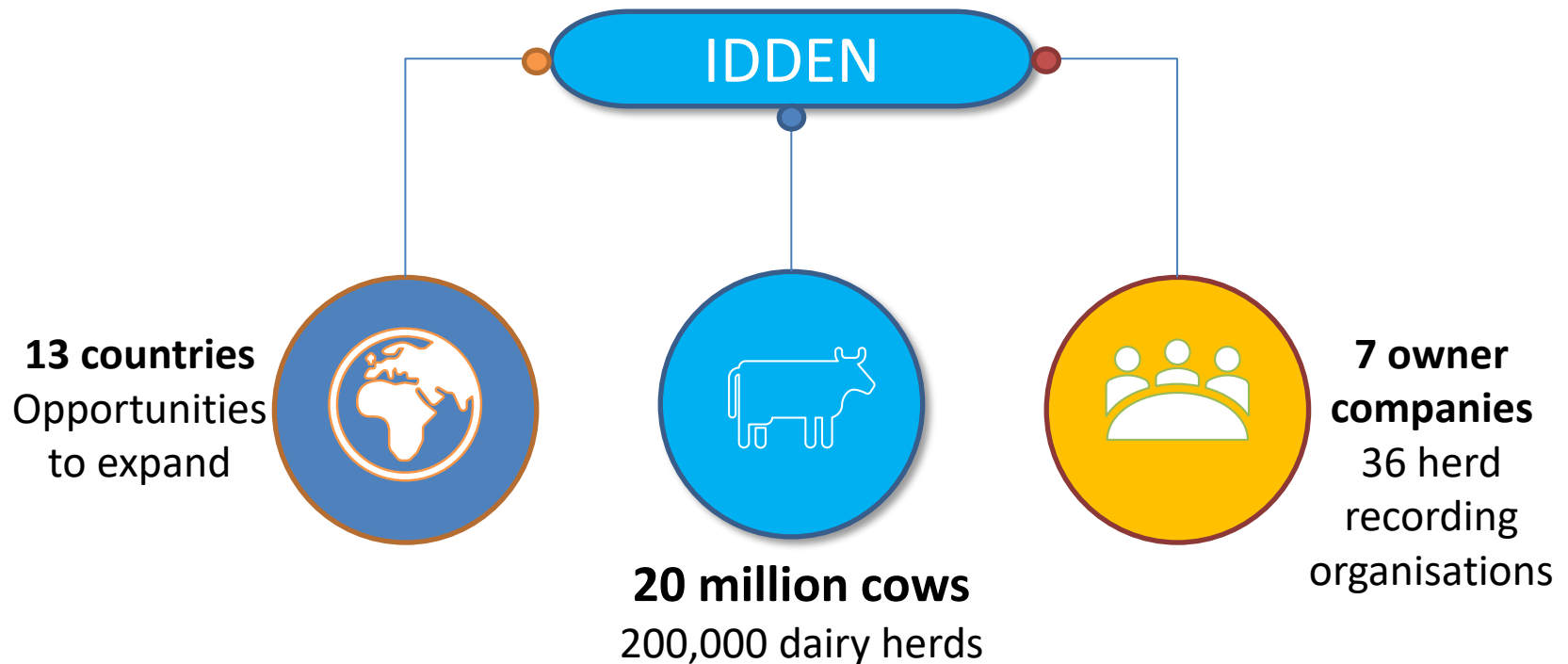 - Implementation
  - Outlook for 2022

Why iDDEN

- Digitalization on farms
- Numerous new ways of collecting data on farms
  - Mainly sensors
- More data from traditional milk samples
  - MIR spectral data
- More use of this kind of data in advisory services
  - Increasing need to exchange all this data
- Many national and company specific interfaces and data exchange mechanisms

The International Dairy Data Exchange Network enables the common exchange of these different data sources in an efficient manner

Worldwide Potential

IDDEN

13 countries
Opportunities to expand

20 million cows
200,000 dairy herds

7 owner companies
36 herd recording organisations

Current owners/shareholders

- Shareholder   Designated Area Responsibilities
    - CRV   The Netherlands & Belgium
    - Data Gene   Australia
    - Lactanet   Canada
    - NDHIA   USA
    - NCDX ApS   Den, Ice, Fin, Nor, Swe
    - RDV   Austria, Germany
    - vit   Germany, Luxemburg

- iDDEN has been created as a GmbH under German law on May 6, 2020, acting CEO → Reinhard Reents

Current shareholders
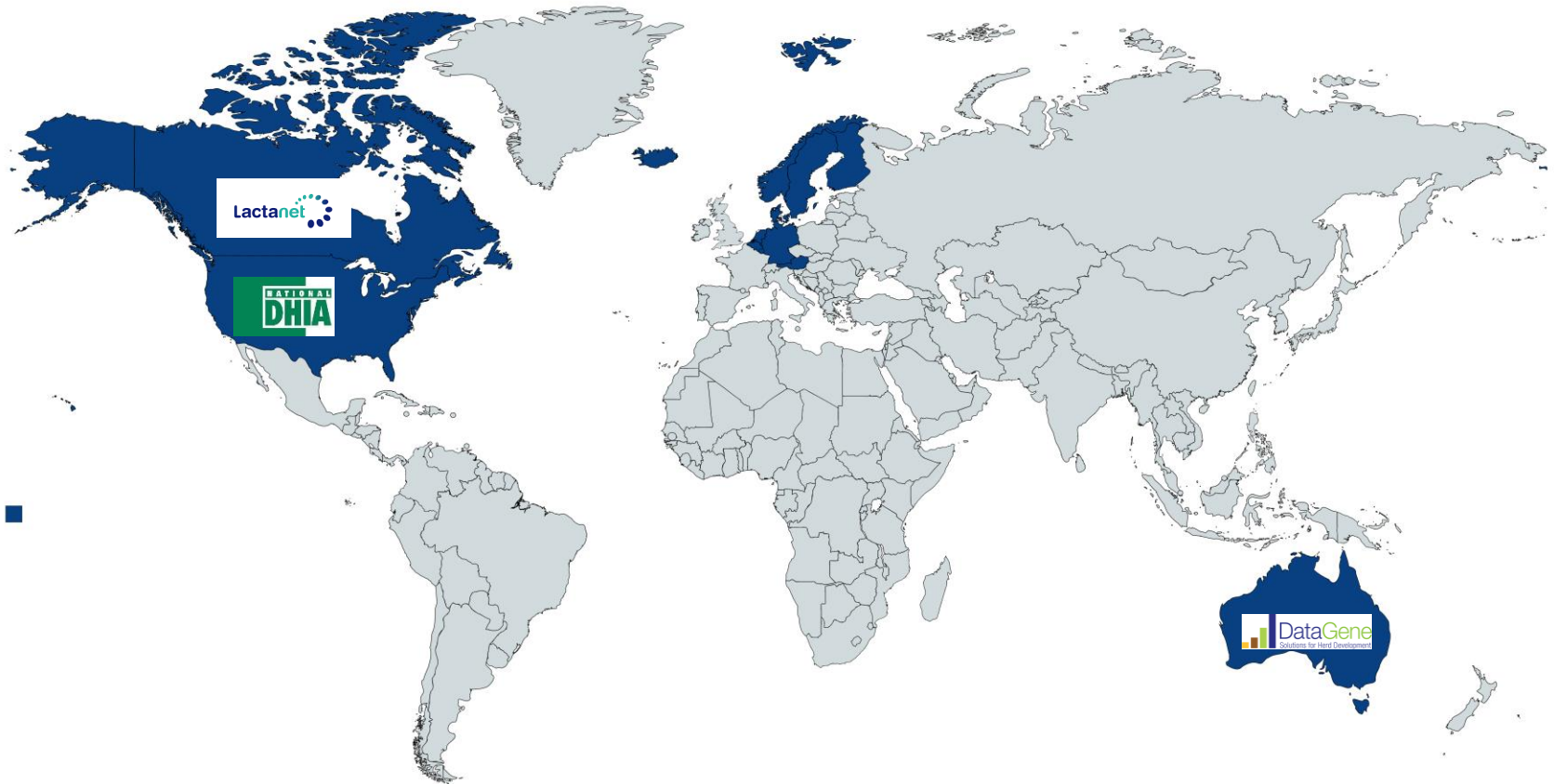
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Current shareholders

Technical implementation

- Purchase of the NCDX solution from the NCDX group

- Expansion of the current solution to handle also cloud based repositorys of data

- Contract between iDDEN GmbH and Mtech (Finland) to house, expand and maintain the iDDEN system

- Implementation of the ICAR ADE standard
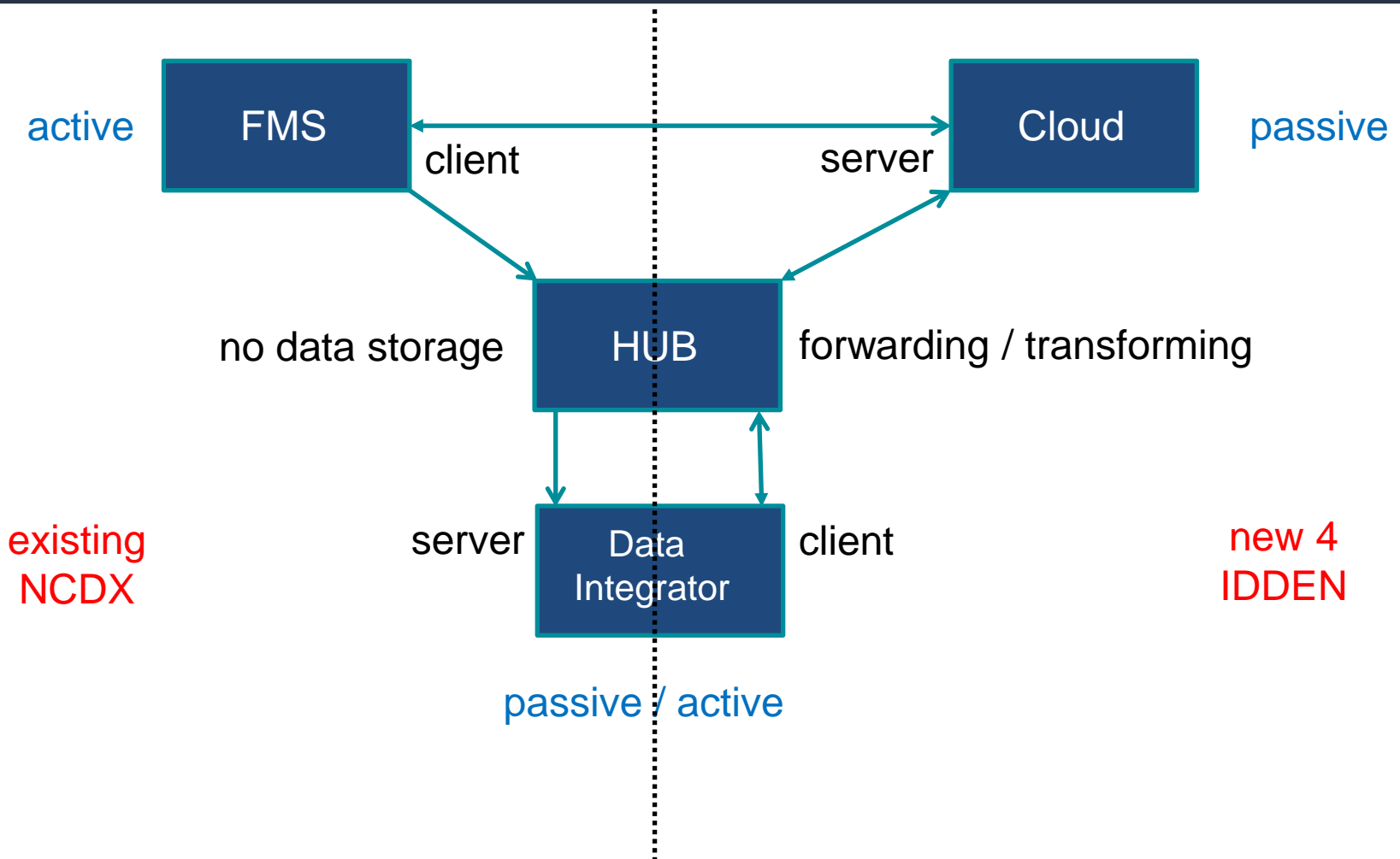
Design Goals

- Reuse as much as possible
  - Authentication / Authorization
  - NCDX Infrastructure

- Standardize as much as possible
  - ADE Messages
  - Open Standards

- Integrate only once
  - Make national specialties easy

Roles in iDDEN

FMS	Farm Management System - This can be any software running on the farm which is interested in data exchange. It could be a herd management software or a robot system or any analytic software.
Cloud	Cloud provider – This is the central cloud system of some software running on the farm. It gets some data directly from the FMS
Data Integrator	Data Integrator – This is the role of the iDDEN participant parties. It can be a MRO (Milk Recording Organization) or any other data integration system.
Hub	iDDEN or NCDX system responsible for transformation of data

Messaging in iDDEN (architecture)

iDDEN
The international dairy data exchange network

active   **FMS** ⟷ **Cloud**   passive

client   server

no data storage   **HUB**   forwarding / transforming

existing
NCDX   server   **Data Integrator**   client   new 4
IDDEN

passive / active

Mandates in iDDEN

- Rights are managed and validated by data delivering partners
  - Reuse existing authentication services
  - Use standardized login request

- Centralized iDDEN-ID
  - Provide **iDDEN-ID** during registration for Hub-API-Key
  - One **iDDEN-ID** for each organization
    - Used as identifier for mandates and rights checks
  - Organization uses **iDDEN-ID** to login to data delivering partner
    - Identify every partner uniquely

Registration

- Registration process
  - Will be handled manually in the beginning

- Setup a new Organization (e.g. MRO)
  - Register with iDDEN:
    -> Receive iDDEN-API-Key   and
    -> unique **iDDEN-ID**

  - Register at data providing partner (OEM or MRO)
    -> using the **iDDEN-ID** as identifier
    -> Receiving a secret on a side channel (e.g. password)

Formats

- **iDDEN-ID Format**
  - 3 characters for country (ISO, using INT for intern. Org.)
  - 3 characters for kind of Organization (MRO or OEM…)
  - 12 digit random generated Number (added after dash)
  - e.g. DEU-MRO-123231423123 or INT-OEM-567867245325

- **Format of Token (verify login)**
  - Which token to use is up to Issuer
  - Max Length has to be defined
  - Only using ASCII-7bit characters (base64-encoded)
  - e.g. 0938uusdgfv937f-2349dfsdfeff-22cvbnbnqoicx9qzzpoiljk89nv
  - not allowed: ööööööööööö123 or äääüüßß or other special char
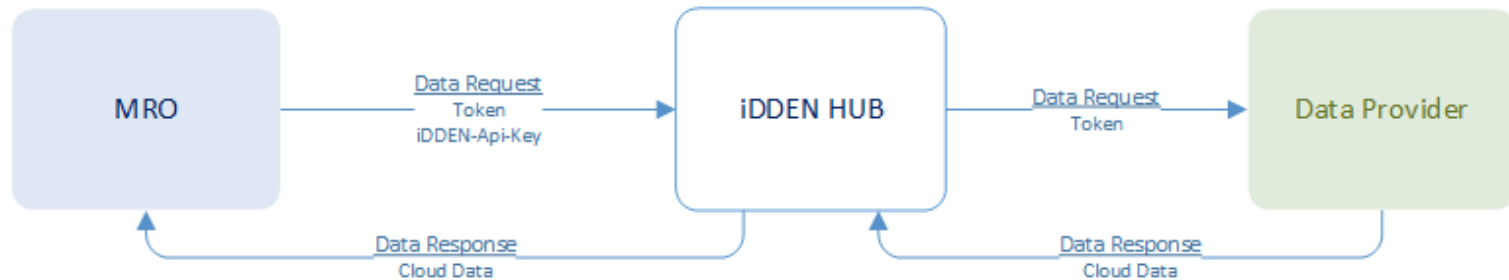
Example Data Exchange

Get data from data provider

1. The MRO authenticates to the data provider and receives a Token to use afterwards

MRO → Data Provider

Authentication Request
Organisation Id
Password

Authentication Response
Token
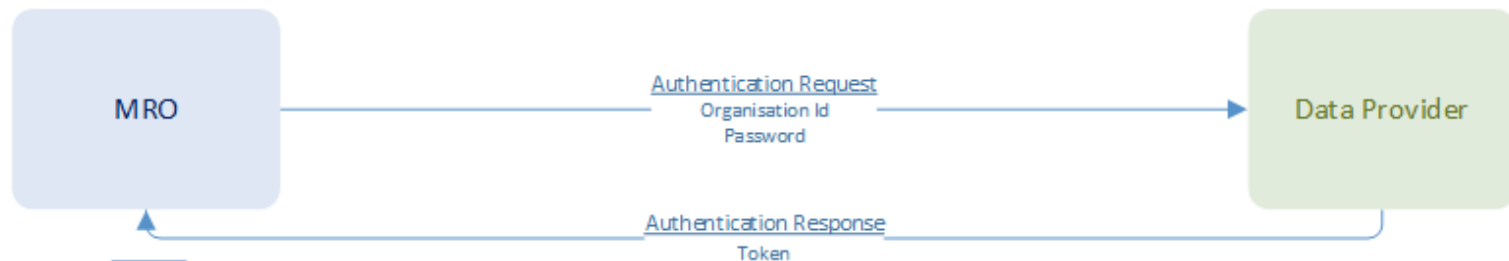
2. The MRO sends a data request to the iDDEN Hub to get data from the data provider

3. The iDDEN Hub verifies the iDDEN-Api-Key and forward the data request to the data provider

4. The data provider verifies:
- the Token to authenticate the MRO
- the mandate between the farm and the MRO

MRO → **iDDEN HUB** → Data Provider

Data Request
Token
iDDEN-Api-Key

Data Request
Token

Data Response
Cloud Data

Data Response
Cloud Data

5. The data provider sends the requested data to the iDDEN Hub and the iDDEN Hub forwards the data back to the MRO
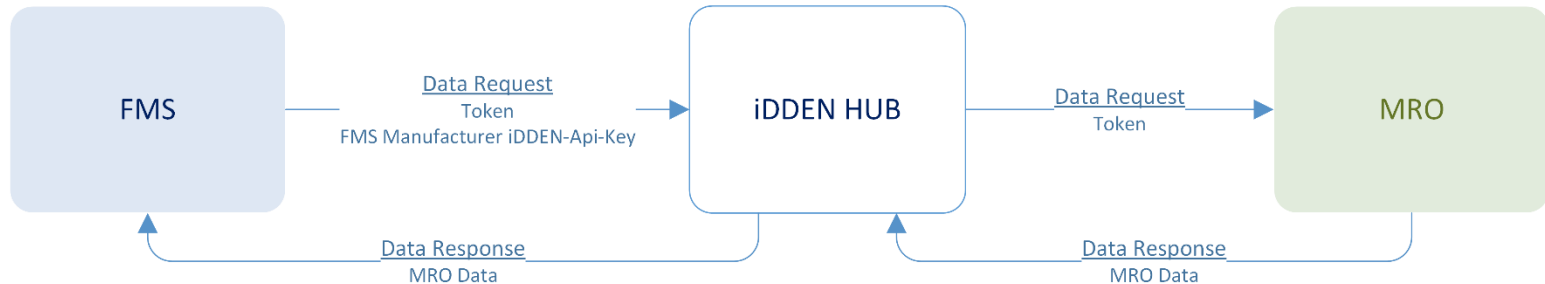
Get data from MRO to FMS

Get data from MRO

1. The FMS authenticates to the MRO and receives a Token to use afterwards

FMS	Authentication Request Farm login Password →	MRO
	← Authentication Response Token	

2. The FMS sends a data request to the iDDEN Hub to get data from the MRO

3. The iDDEN Hub verifies the iDDEN-Api-Key and forward the data request to the MRO

4. The MRO verifies:
- the Token to authenticate the farm
- the mandate between the farm and the MRO

FMS	Data Request Token FMS Manufacturer iDDEN-Api-Key →	iDDEN HUB	Data Request Token →	MRO
	← Data Response MRO Data		← Data Response MRO Data	

5. The MRO sends the requested data to the iDDEN Hub and the iDDEN Hub forwards the data back to the FMS

State of Project

- Current status for iDDEN-Organizations
  - 8 Organizations are already registered with iDDEN
  - 4 Organizations started developing in 2021
    - 1 OEM partners with 1 MRO (data integrator) [2 times]
    - Pilot implementation to mature the system
  - More partners will follow in 2022
    - Ramp up with more parallel development
  - Contact to more MROs and OEMs

Status of Messages Pack 1

Priority	Event	Comments
1	Milking	Individual milking events
2	Milking complex	Milking events supplemented by sensor data
3	Milking by quarter	Teat coordinates, milk weights & time by quarter
4	Herd list	Animals in the herd
5	Feed Intake	Feed consumption on the farm
6	Feedstuffs	Feedstuffs available at the farm
7	Available Identities	Free animal identities / tags for use for newborn calves
8	Body Condition	Animal body condition score

- Done
- Feeding messages added later

Status of Messages Pack 2

Priority	Event	Comments
9	Milk recording result	Milk analysis and 24-hour yield
10	Birth	I&R births
11	Stillbirth	I&R stillbirths
12	On movement	I&R entering stock
13	Off movement	I&R exiting stock
14	Death	I&R deaths

- Done

Status of Messages Pack 3

Priority	Event	Comments
15	Insemination	Artificial insemination/ embryo transplant event
16	Natural mating	Natural mating event
17	Running with a bull	Cow running with a bull event
18	Keep open	Cow not to calve again
19	Dry off	Dry off event
20	Pregnancy check	Pregnancy diagnosis event
21	Abortion	Pre-term abortion event
22	Calving	Calving event, difficulties etc.
23	Device data	On-farm device information
24	Heat	Heat observation event
25	Weights	Weighing results

- Done

State of Development

- Implementation of iDDEN-Hub
    - Setup of Infrastructure ✓
    - Create initial Logging mechanism ✓
    - Create routing mechanism ✓
    - Implementation of messages ✓
        - Pack 1, 2 and 3
    - Validation of mandatory fields ✓
    - Provide an AdminTool
        - Troubleshooting ✓
        - Dashboard ✓

State of Development

- Implementation of data exchange pilots
  - Register to iDDEN ✓
  - Setup of Infrastructure ✓
  - Registration of partner ✓
  - Create login services and authentication ✓
  - Verify token and authorization ✓

  - Implementation of messages ✓
    - Pack 1, 2 and 3

Plans for 2022

- Bring first pilot implementation to Production
  - 2nd Quarter of 2022

- Define and implement more messages
  - Discuss and Design in ICAR ADE working group
  - Implement for HUB to be ready for partners
    - Starting with diagnosis and treatment
    - More to come over the year

- Add more partners to the project
  - iDDEN shareholders are privileged
  - Link pilot partners to 2nd MRO/OEM

iDDEN

Thank you