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**  
  - CRV  
  - Data Gene  
  - Lactanet  
  - NDHIA  
  - NCDX ApS  
  - RDV  
  - vit

- **Designated Area Responsibilities**  
  - The Netherlands & Belgium  
  - Australia  
  - Canada  
  - USA  
  - Den, Ice, Fin, Nor, Swe  
  - Austria, Germany  
  - Germany, Luxemburg

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

• Purchase of the NCDX solution from the NCDX group
• Expansion of the current solution to handle also cloud based repositories 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

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMS</td>
<td>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.</td>
</tr>
<tr>
<td>Cloud</td>
<td>Cloud provider – This is the central cloud system of some software running on the farm. It gets some data directly from the FMS</td>
</tr>
<tr>
<td>Data Integrator</td>
<td>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.</td>
</tr>
<tr>
<td>Hub</td>
<td>iDDEN or NCDX system responsible for transformation of data</td>
</tr>
</tbody>
</table>
Messaging in iDDEN (architecture)

- **FMS** (client) to **Cloud** (server)
  - Active
  - Passive

- **HUB**
  - No data storage
  - Forwarding / transforming

- **Data Integrator**
  - Server to **Cloud** (active)
  - Client to **FMS** (passive)
  - Existing NCDX
  - New 4 IDDEN
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 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)
• 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-22cvbnnqoicx9qzzpoiljk89nv
  – not allowed: öööööööööööö123 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

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

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

FMS

Data Request
Token
FMS Manufacturer iDDEN-Api-Key

iDDEN HUB

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

Data Request
Token

MRO

Data Response
MRO Data

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

Data Request
Token

MRO

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
• 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

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

- 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

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

- 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
  – 2\textsuperscript{nd} 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 2\textsuperscript{nd} MRO/OEM
iDDEN

Thank you