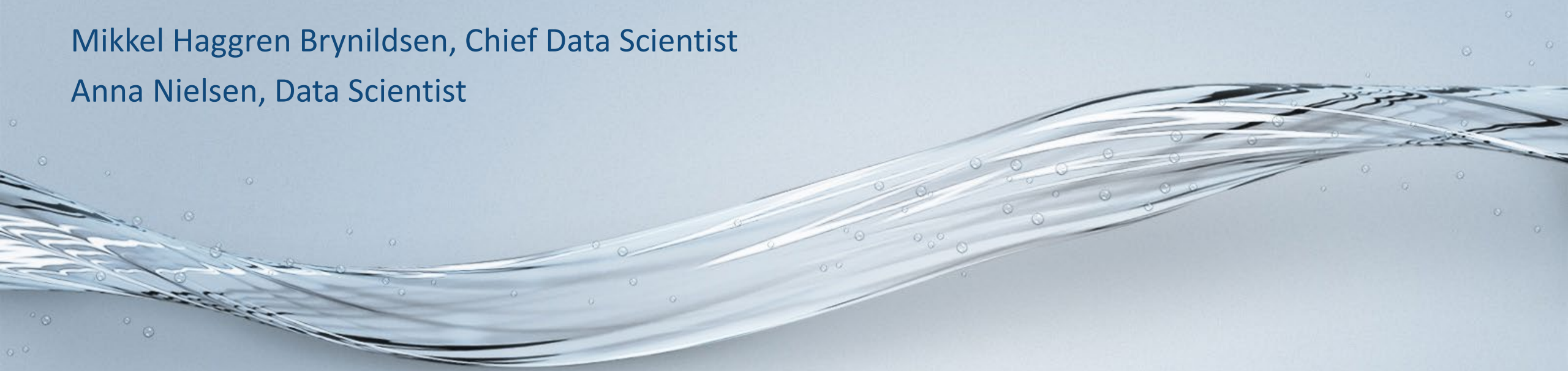


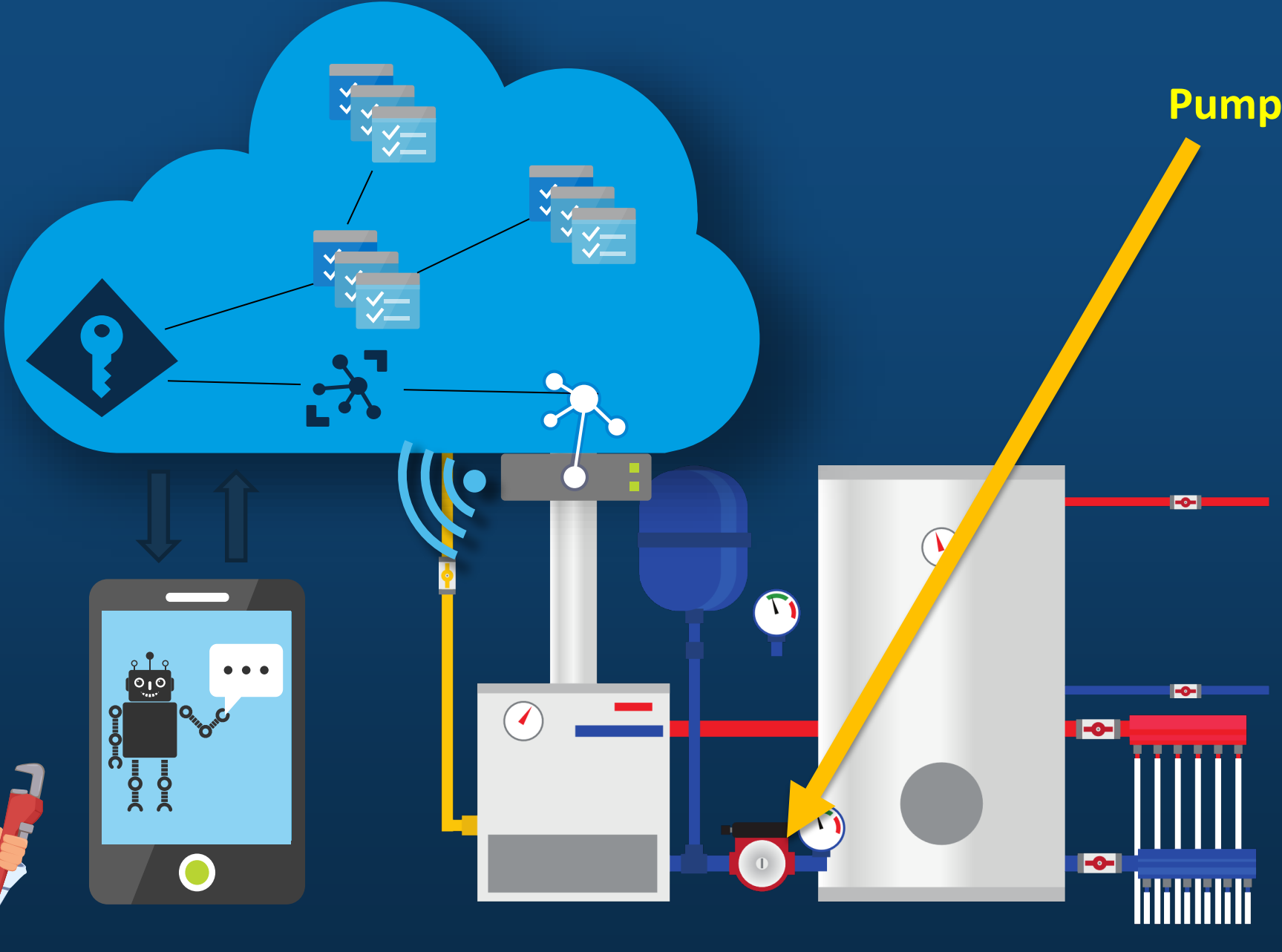
Technical communication with users

Mikkel Haggren Brynildsen, Chief Data Scientist

Anna Nielsen, Data Scientist



OUR WORLD

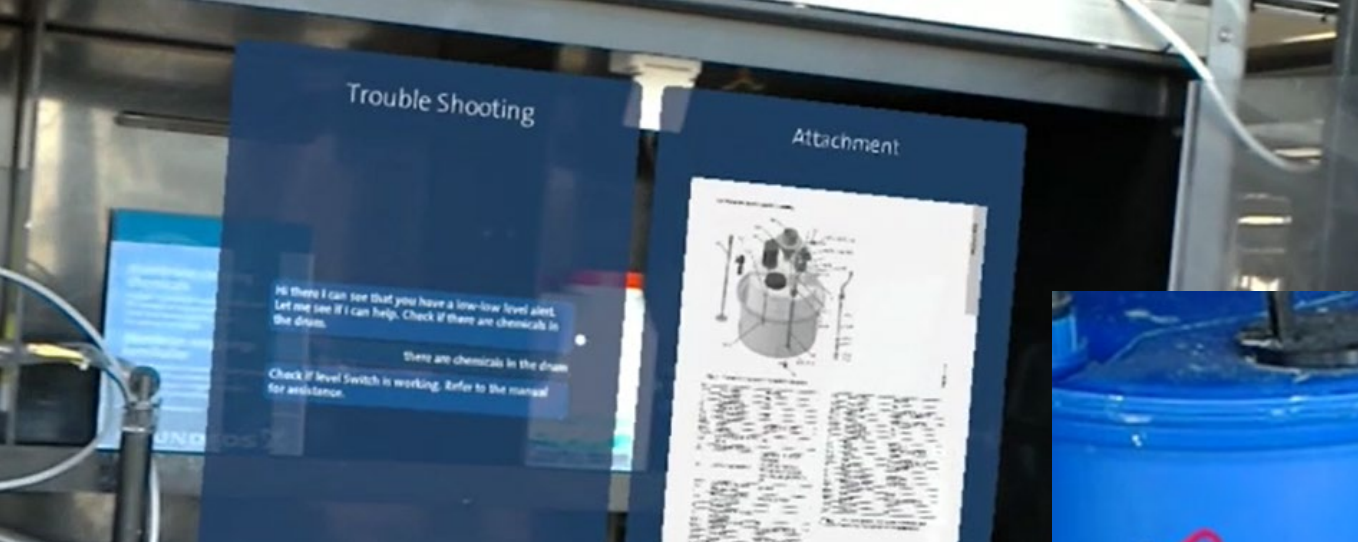


LANGUAGE PROCESSING IN GRUNDFOS

- Self service chatbots (internal/external)
- Virtual assistants
- Touchless document handling
- Knowledge extraction from historic documents
- Technical audits of systems
- Analysis of voice recordings

A FEW EXAMPLES

Supported maintenance, BioBooster aR chatbot



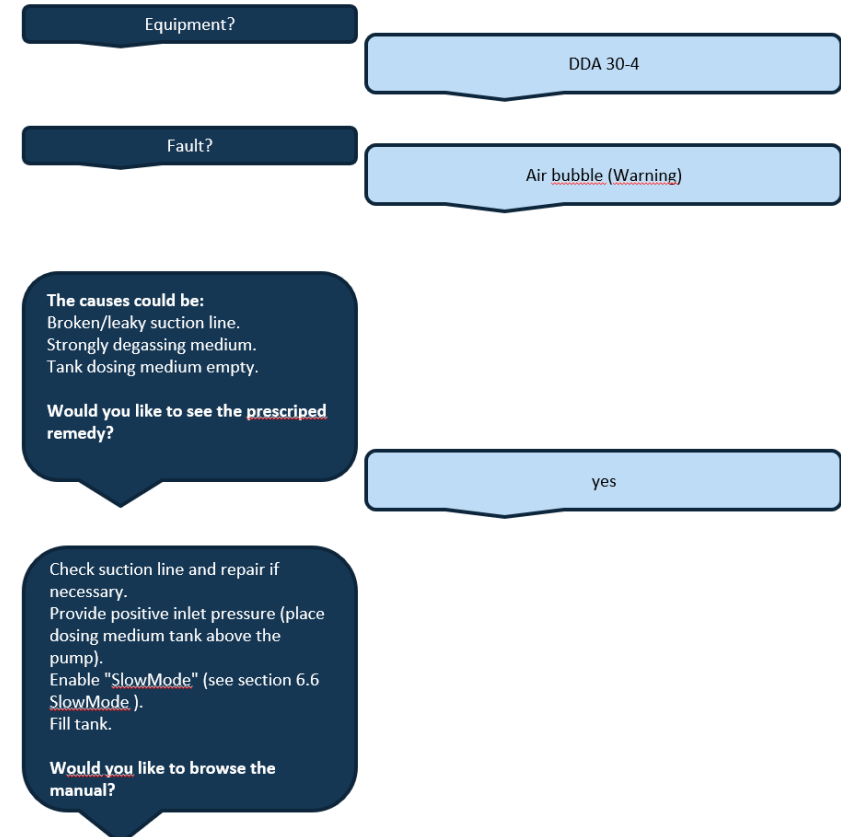
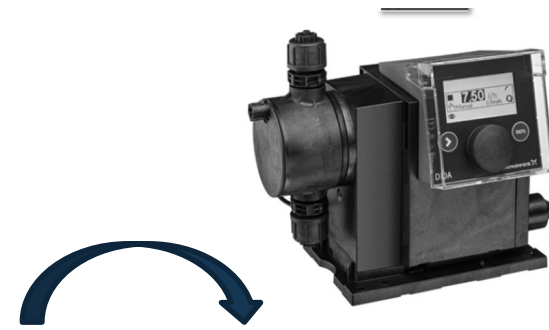
BioBooster / Dosing Pump.

Talking to the manual:

8.1 List of faults

8.1.1 Faults with error message

Display in the "Alarm" menu	Possible cause	Possible remedy
▼ Empty (Alarm)	<ul style="list-style-type: none"> Dosing medium tank empty 	<ul style="list-style-type: none"> Fill tank. Check contact setting (NO/NC).
▼ Low level (Warning)	<ul style="list-style-type: none"> Dosing medium tank almost empty 	
Overpressure (Alarm)	<ul style="list-style-type: none"> Discharge valve blocked Isolating valve in discharge line closed Pressure peaks due to high viscosity Max. pressure set too low (see section 6.8 Pressure monitoring) 	<ul style="list-style-type: none"> Replace valve if necessary (see section 7.4 Perform service). Check flow direction of valves (arrow) and correct if necessary. Open the isolating valve (on the discharge side). Enlarge diameter of discharge line. Change pressure setting (see section 6.8 Pressure monitoring).
Low backpressure (Warning/alarm*)	<ul style="list-style-type: none"> Faulty diaphragm Broken discharge line Pressure differential between suction and discharge side too low Leakage in the pressure loading valve at Q < 1 l/h Deaeration valve open 	<ul style="list-style-type: none"> Change the diaphragm (see section 7.4 Perform service). Check discharge line and repair if necessary. Install additional spring-loaded valve (approx. 3 bar) on the discharge side. Close the deaeration valve.

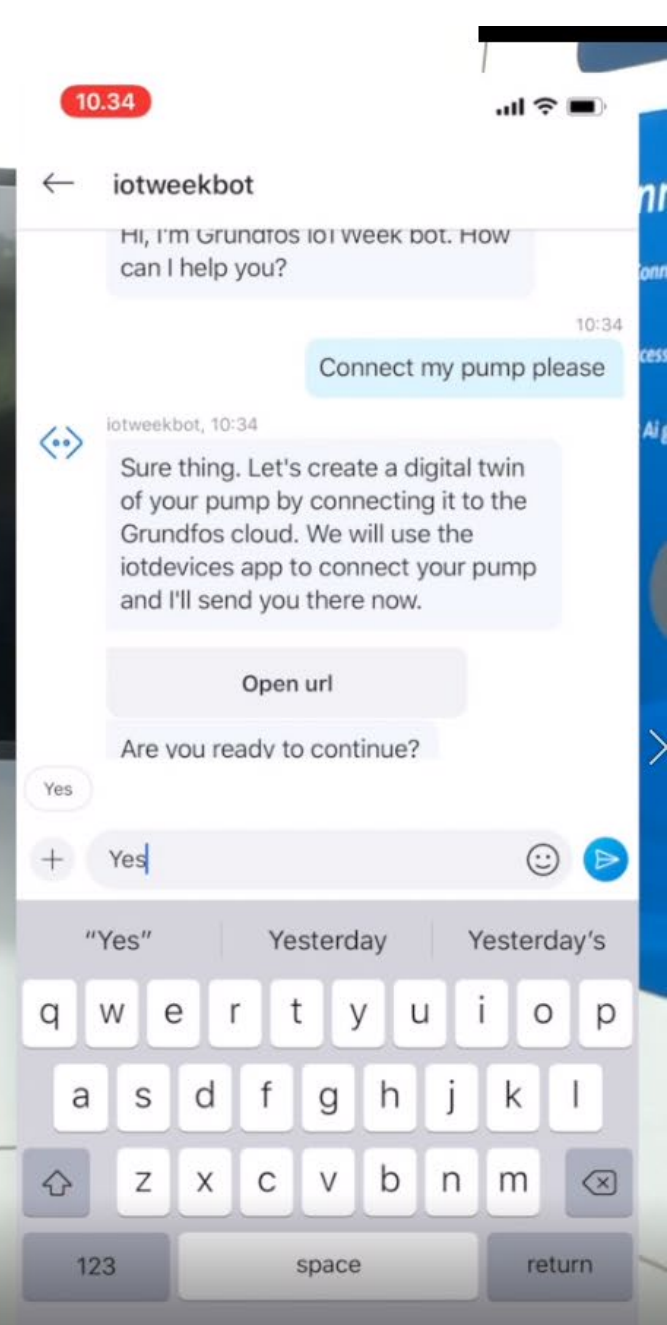
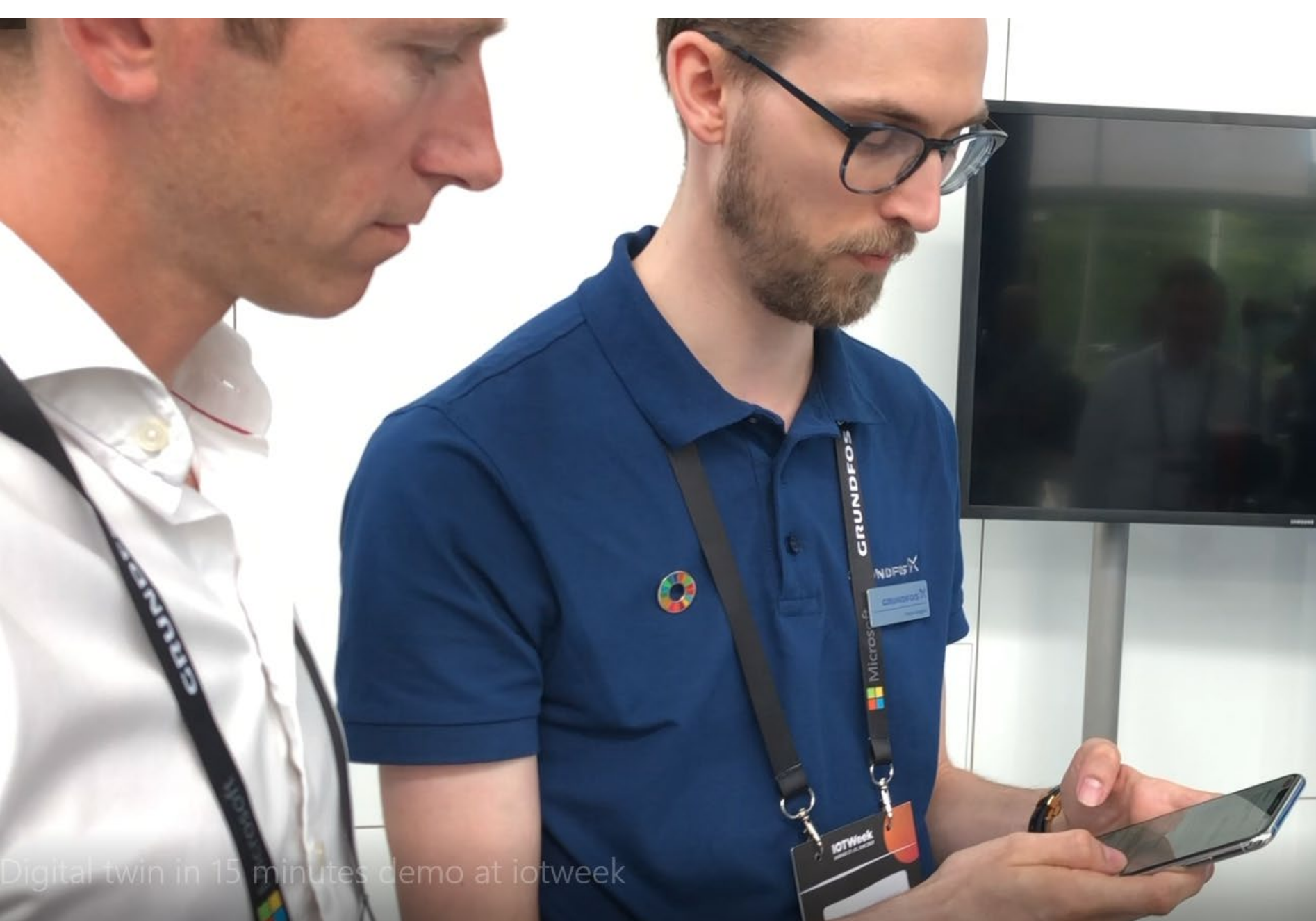


GRUNDFOS DIGITAL TWIN IN 15 MINUTES

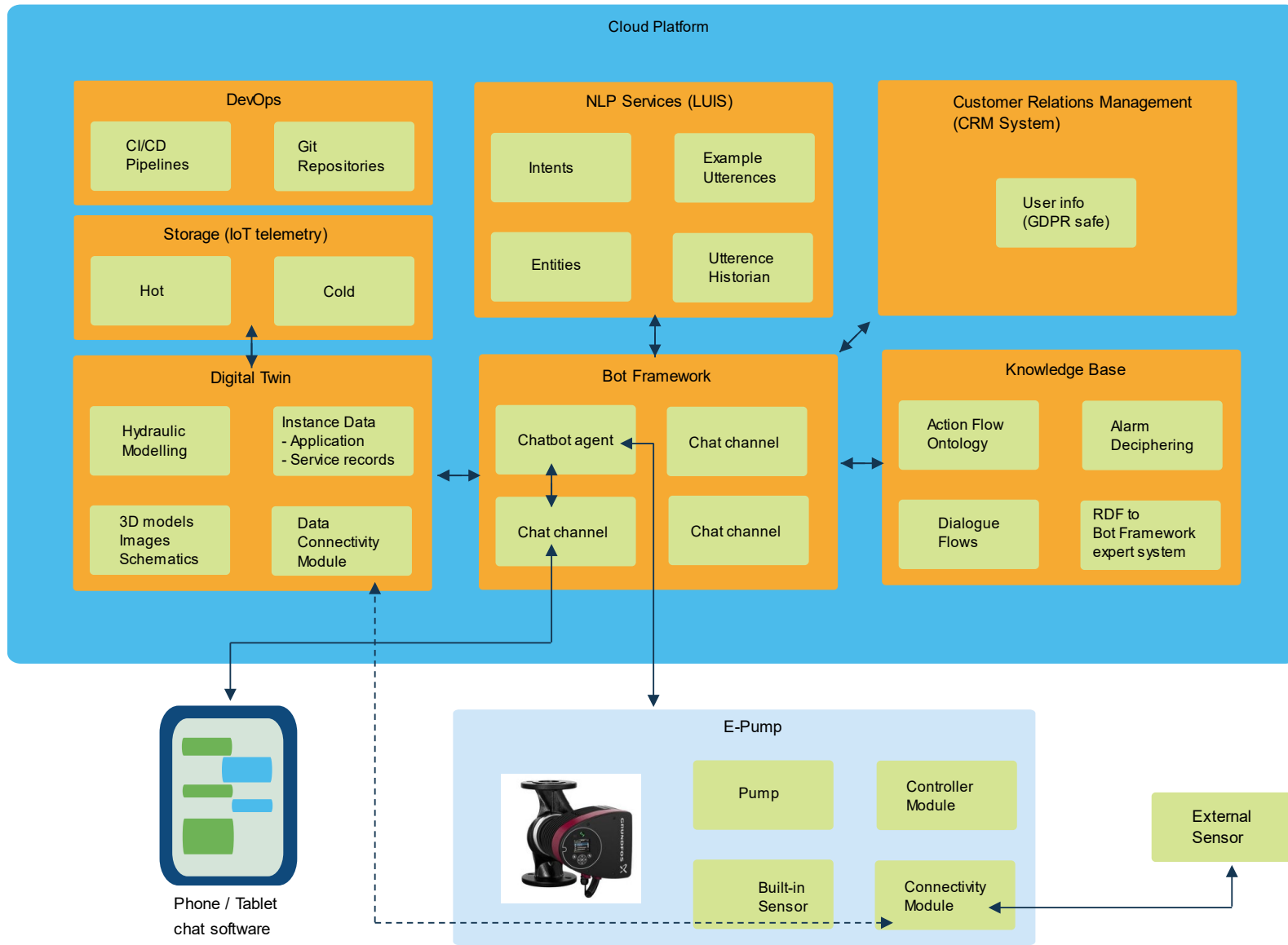
Connect, monitor, and control your Grundfos system within 15 minutes

- Connect and Early Insights
- Access and Monitor System using Chat Bot
- Get AI Guided Support when Problems Arise





Digital twin in 15 minutes demo at iotweek



TLP Corpus

```
1 # Loop through PDF files in directory
2 for i in files :
3     if ".pdf" in i :
4         pdfName = path + "\\\" + i
5         pdfFile = open(pdfName)
6
7         auth_set = auth_choice[0]
8
9     # Convert
10        converted = extract_text(pdfName)
11
12    # Get tokenised words
13        tokens = tokenizer.tokenize(converted)
14        words = ' '.join(w.lower() for w in tokens)
15        tagged_doc = [words, i]
16        tagged_token = [tagged_doc, auth_set]
17
18        corpus.append(tagged_token)
19
20 print(corpus)
```

Audacity

GRUNDFOS DATA BOOKLET

GRUNDFOS ALPHA2

Circulator pumps
50/60 Hz



013 716633 (UK/USA/CA)

GRUNDFOS

9. Product numbers

ALPHA3 for the D-A-CH market (Germany, Austria and Switzerland)

Pump type	Port-to-port length [mm]	Product number	Data sheet Page
ALPHA3 15-40	150	99371967	15
ALPHA3 15-60	150	99371968	15
ALPHA3 15-80	150	99371969	15
ALPHA3 20-40	150	99371970	16
ALPHA3 20-60	150	99371971	16
ALPHA3 20-80	150	99371972	16
ALPHA3 25-40	180	99371973	16
ALPHA3 25-60	180	99371974	16
ALPHA3 25-80	180	99371975	16
ALPHA3 32-40	180	99371976	16
ALPHA3 32-60	180	99371977	16
ALPHA3 32-80	180	99371978	16
ALPHA3 40-40	180	99371979	16
ALPHA3 40-60	180	99371980	16
ALPHA3 40-80	180	99371981	16
ALPHA3 50-40	180	99371982	16
ALPHA3 50-60	180	99371983	16
ALPHA3 50-80	180	99371984	16
ALPHA3 65-40	180	99371985	16
ALPHA3 65-60	180	99371986	16
ALPHA3 65-80	180	99371987	16

Note: Click on the product number and go directly to the performance curve in Grundfos Product Center (GPC).

ALPHA3 for the international market

Pump type	Port-to-port length [mm]	Product number	Data sheet Page
ALPHA3 15-40	150	99371967	15
ALPHA3 15-60	150	99371968	15
ALPHA3 15-80	150	99371969	15
ALPHA3 20-40	150	99371970	16
ALPHA3 20-60	150	99371971	16
ALPHA3 20-80	150	99371972	16
ALPHA3 25-40	180	99371973	16
ALPHA3 25-60	180	99371974	16
ALPHA3 25-80	180	99371975	16
ALPHA3 32-40	180	99371976	16
ALPHA3 32-60	180	99371977	16
ALPHA3 32-80	180	99371978	16
ALPHA3 40-40	180	99371979	16
ALPHA3 40-60	180	99371980	16
ALPHA3 40-80	180	99371981	16
ALPHA3 50-40	180	99371982	16
ALPHA3 50-60	180	99371983	16
ALPHA3 50-80	180	99371984	16
ALPHA3 65-40	180	99371985	16
ALPHA3 65-60	180	99371986	16
ALPHA3 65-80	180	99371987	16

Note: Click on the product number and go directly to the performance curve in Grundfos Product Center (GPC).

ALPHA3 for the UK market

Pump type	Port-to-port length [mm]	Product number	Data sheet Page
ALPHA3 15-60-UK	150	99371968	15

Note: Click on the product number and go directly to the performance curve in Grundfos Product Center (GPC).

ALPHA3 for the EAC market

Pump type	Port-to-port length [mm]	Product number	Data sheet Page
ALPHA3 15-40	150	99371970	16
ALPHA3 15-60	150	99371971	16
ALPHA3 15-80	150	99371972	16
ALPHA3 20-40	150	99371973	16
ALPHA3 20-60	150	99371974	16
ALPHA3 20-80	150	99371975	16
ALPHA3 25-40	180	99371976	16
ALPHA3 25-60	180	99371977	16
ALPHA3 25-80	180	99371978	16

Note: Click on the product number and go directly to the performance curve in Grundfos Product Center (GPC).

* including extra 40 mm

Pump type	Port-to-port length [mm]	Product number	Data sheet Page
ALPHA3 25-40*	180	99371970	16
ALPHA3 25-60*	180	99371971	18
ALPHA3 25-80*	180	99371972	20
ALPHA3 32-40	180	99371983	16
ALPHA3 32-60	180	99371985	18
ALPHA3 32-80	180	99371987	20
ALPHA3 32-60	180	99371985	18
ALPHA3 32-80	180	99371987	20



Augmented Intelligence in service visits



Contact: mbrynildsen (at) grundfos.com