TENFORCE elisa company × AI·PROFICIENT

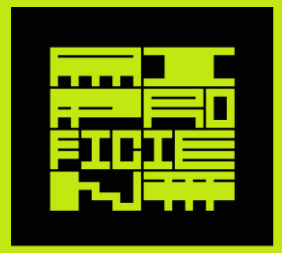
Artificial intelligence for improved production efficiency, quality and maintenance

JUNE 8TH, 2023

FUTUREWOW

THE FUTURE IS WOW 2023

BRINGING AI TECHNOLOGY TO THE PRODUCTION LINE



AI·PROFICIENT

**Artificial *in*telligence
for improved *pro*duction eff*ici*ency,
quality and mai*n*tenance**

Connected Worker – Using AI/ML and Extended Reality Interfaces on Factory Floor

Alexander Vasylchenko, Vincent Goosens and Chrispijn Keena, TenForce

This product is part of a project that has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 957391.

PREDICTIVE ALERT

Key Applications

Process Visibility

Gives management a clear picture of individual performance and creates a full, end-to-end picture of manufacturing processes

Distributed Workforce

Connective technologies make it easier to manage a distributed workforce and standardize performance across plants and lines

Machine Monitoring

Connects engineers to their entire fleet with real-time OEE and machine state dashboards and machine terminals allows operators to log issues

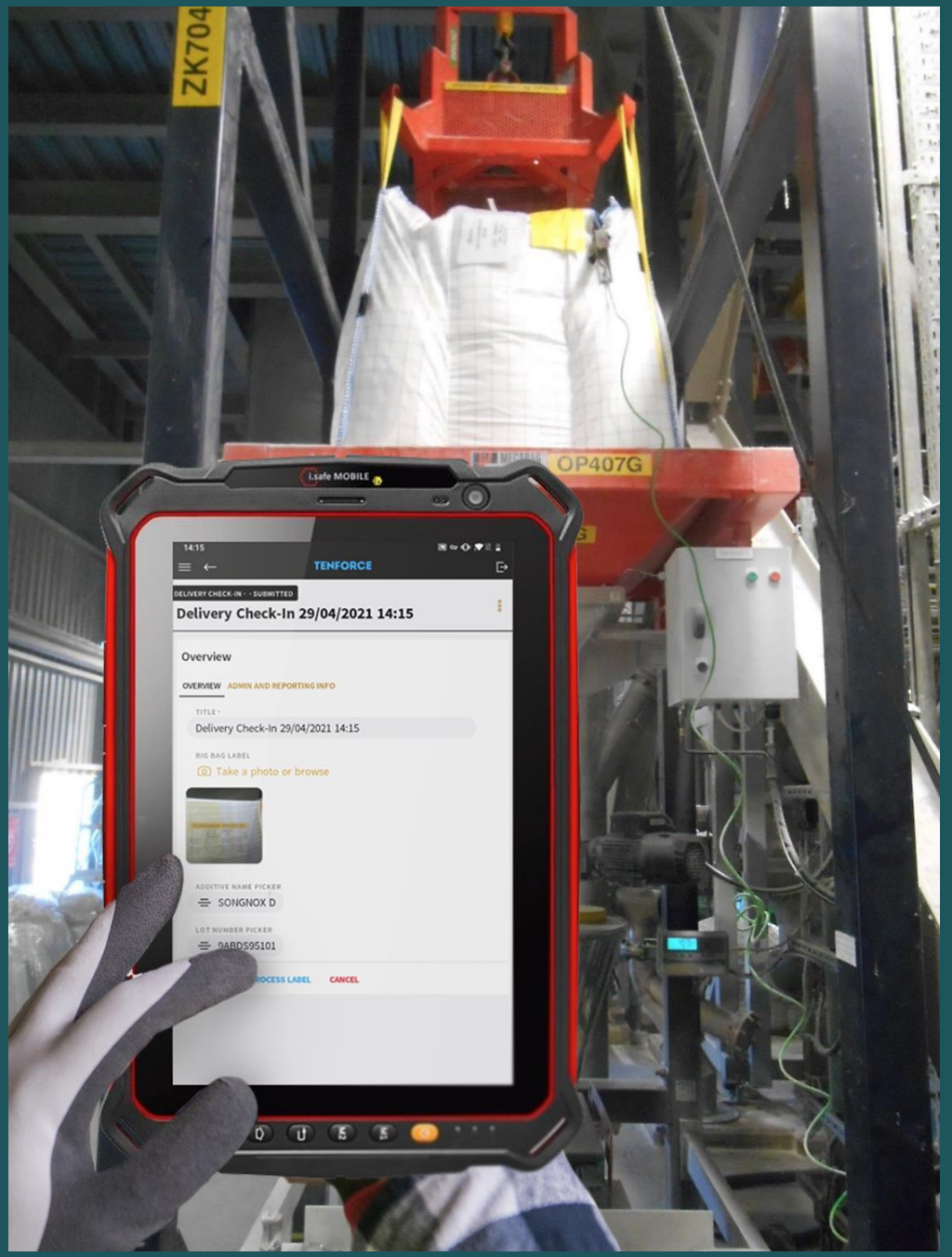
Connected Worker Use Cases in Manufacturing — TULIP

Connected worker for manufacturing

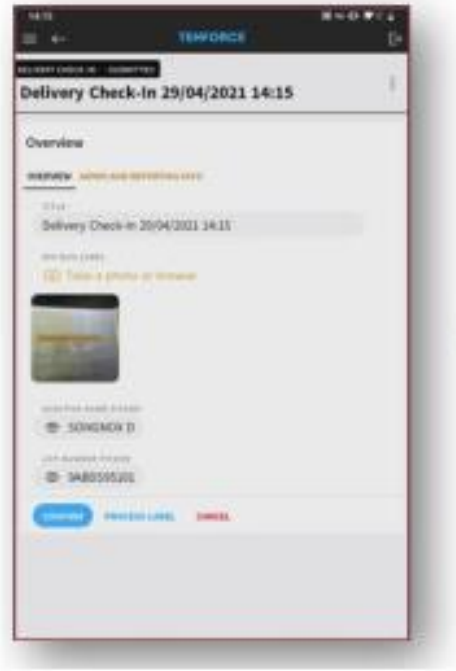
- 5G Edge
  - Recent developments in the mobile space, 5G, will reinvent the way almost every company operates, and manufacturing is not an exception to this. With 5G-enabled applications, workers can access data from different Cloud models effectively.
- Automation is the new normal
  - Manufacturers must say goodbye to paper-based processes. The growth of technologies like IoT, AI, Cloud, etc., clearly indicates that automation is the way to go forward, and only companies that invest in these ever-growing technologies will thrive in the future.
- AR and VR will be game changers
  - Augmented Reality and Virtual Reality are already transforming the user experiences for different industry verticals. Though the technology isn't widely implemented across the manufacturing vertical, its role will be crucial in the near future.
  - Many companies believe these technologies will help them train their workforce better and save lots of money on onboarding and development programs. The technology-enabled applications can also help the workers to stay from hazardous objects and machines on the premises.
- Eliminating skill gaps with technology
  - Labor shortages and skill gaps are considered to be the top most challenge for most companies. With the help of technologies AI and RPA, it is relatively easier to hire candidates with the best skills. In other words, the performance of employees can skyrocket with the help of technical assistance. Technology will also play a role in training the internal workforce whenever needed.
- Save operational costs and eliminate waste
  - In the future, avoiding the unnecessary operational cost and eliminating waste is critical for rapid growth and improved RoI. Technologies play a massive part in this. Especially, AI and IoT are used to collect and analyze data from the workforce to readjust the process and workflows to ensure zero wastage and minimal operational costs.

Image recognition

Additives big bags checking, loading and registering in the plant management system



Supported by Different Platforms

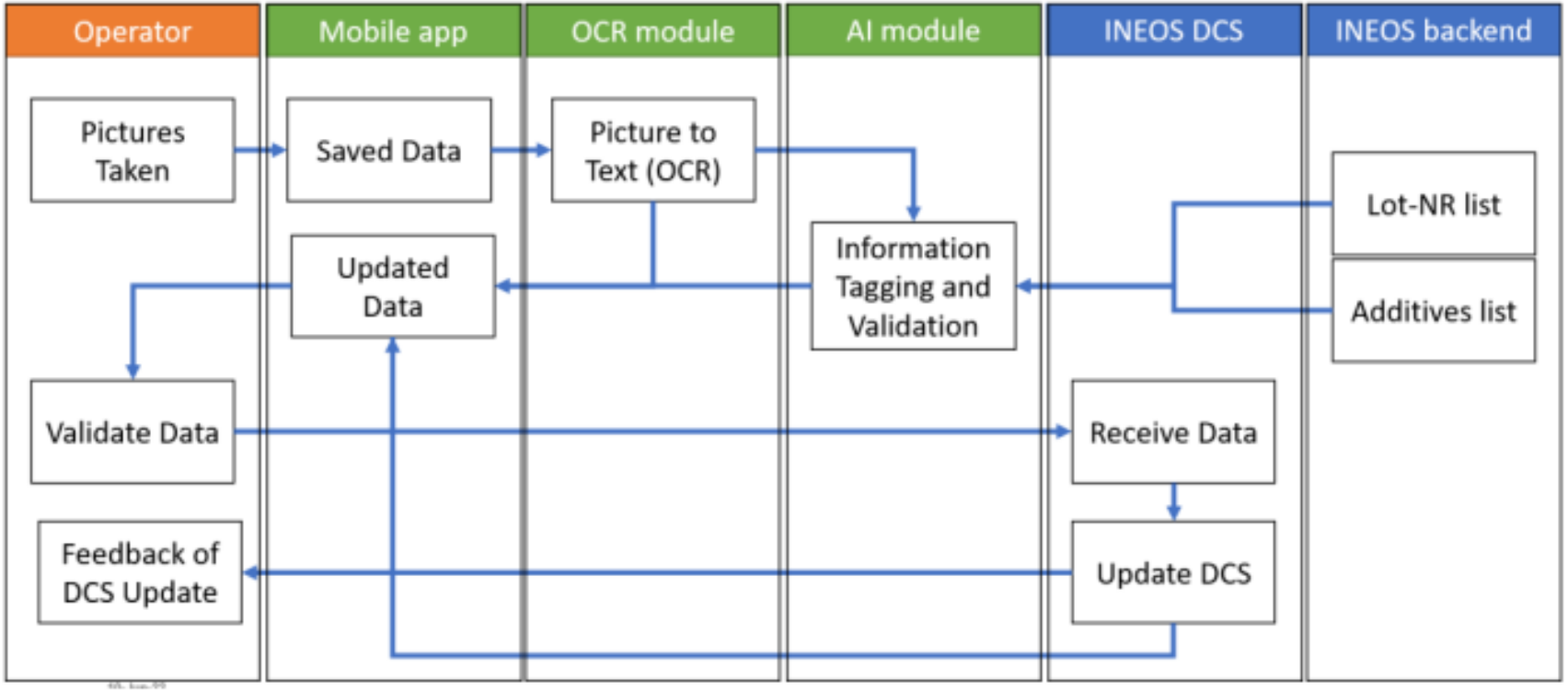


1. WEB interface

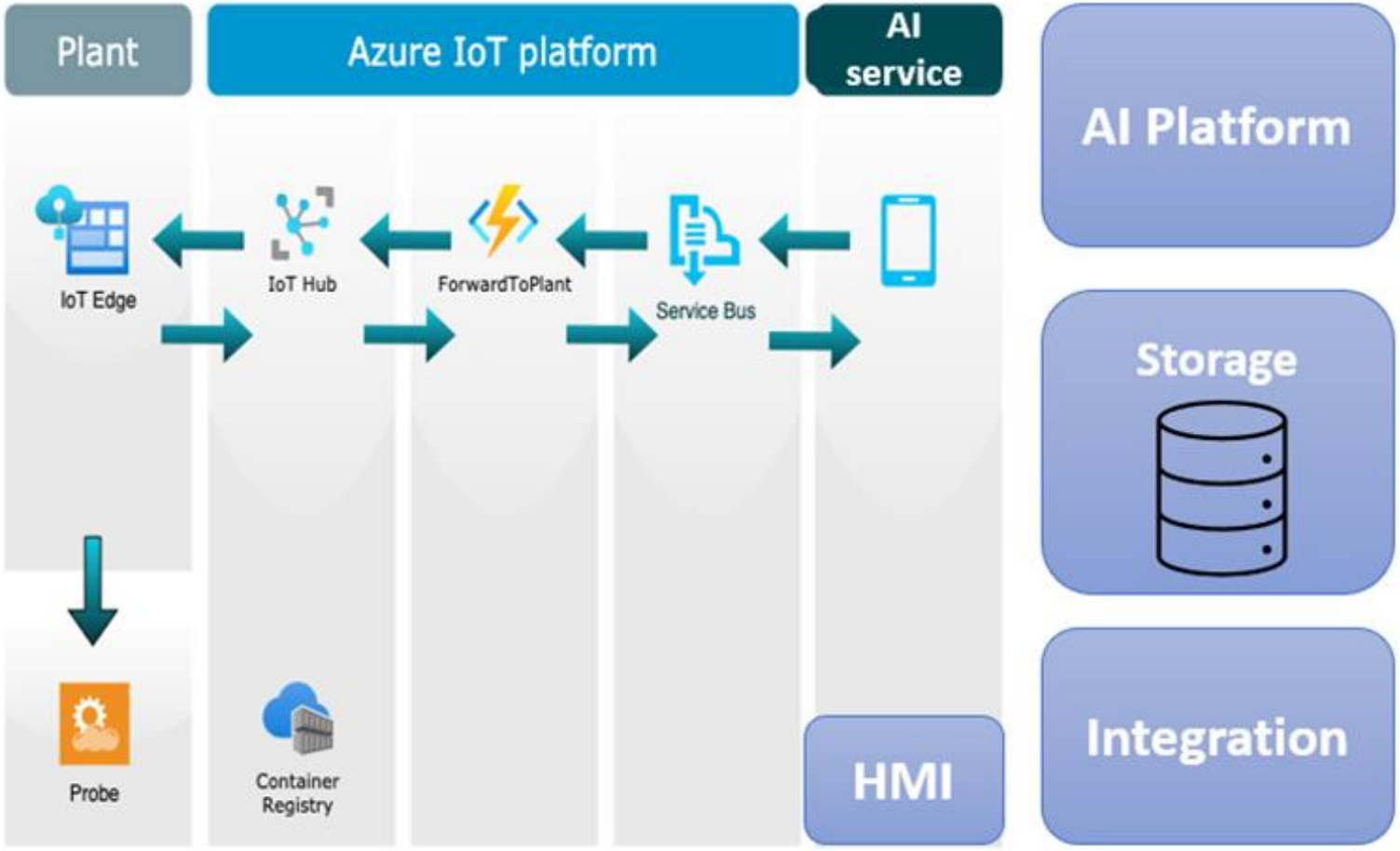
2. Handheld tablet

3. Wearable: HMT-1Z1 wearable using conversational interfaces

The Flow

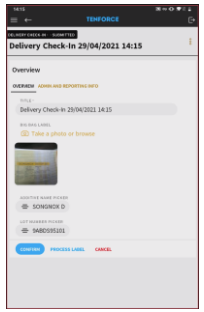

Operator
Mobile app
OCR module
AI module
INEOS DCS
INEOS backend
Pictures Taken
Saved Data
Picture to Text (OCR)
Information Tagging and Validation
Lot-NR list
Additives list
Updated Data
Validate Data
Receive Data
Feedback of DCS Update
Update DCS

Overtaking challenges in systems integration



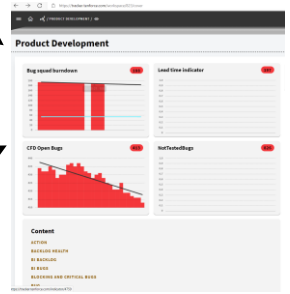
Extended reality and conversational interfaces for shop floor assistance

Mobile UI



Scanners
and sensors

Desktop/web UI



Statistics, maps,
PNID, floorplans...

Innovative HMI

Third-party
cloud AI services

WP3 WP5 WP6 Platform AI

- System-level intelligence
- Self-learning & optimization
- Data driven modelling

Interface server and edge AI services for decision support

on-premise or in the cloud

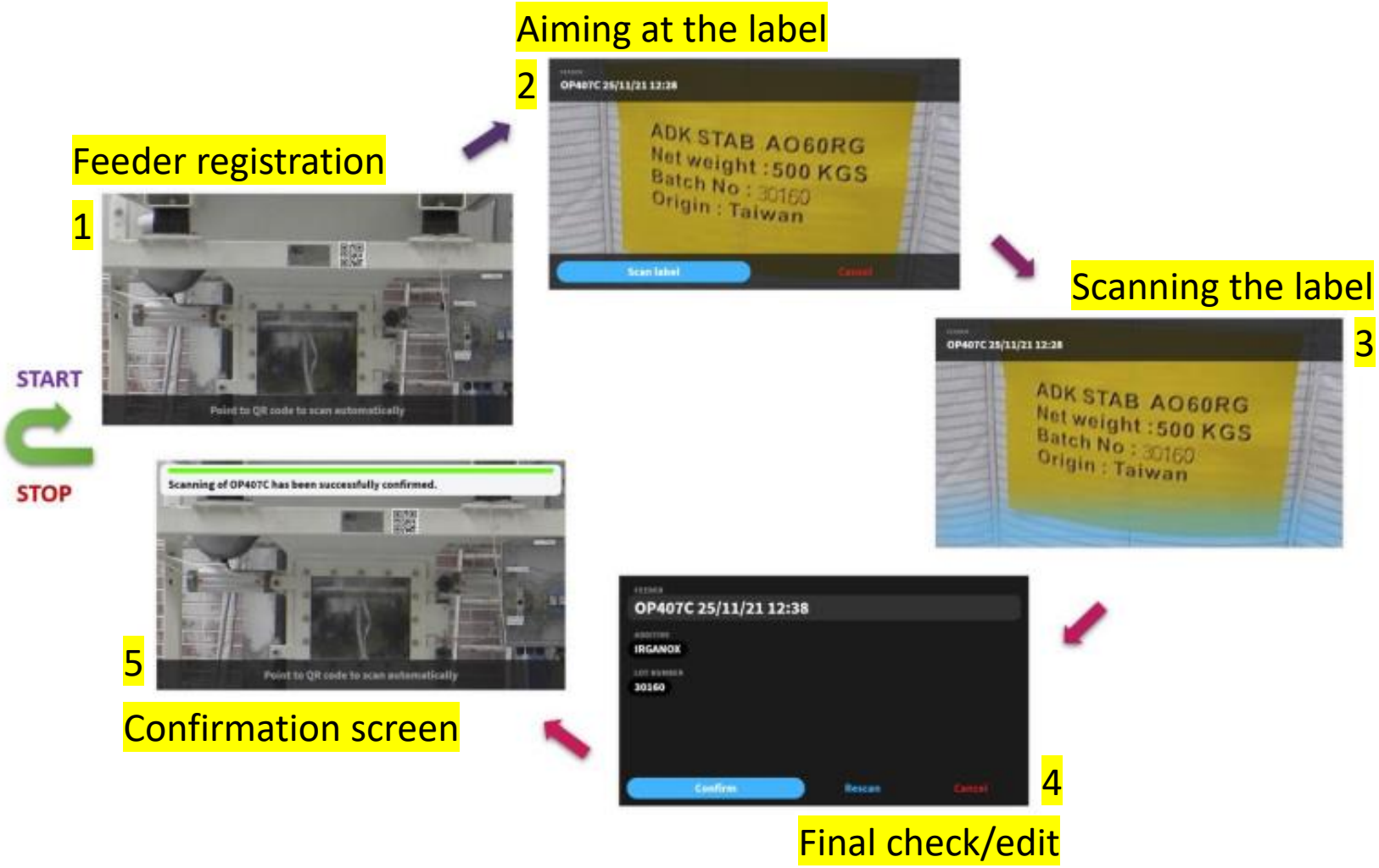
Factory secure messaging service

Data storage services

on-premise or in the cloud

Enterprise IT,
Quality Control Systems,
Product databases...

Human feedback mechanisms for AI reinforcement learning
Wearable terminal pilot running at INEOS, Geel, BE



INEOS use case demonstration video: https://youtu.be/Z_JSw5NxakQ

KPIs assessment

Reference KPI_INEOS2	Key_Performance_Indicator_INEOS2	Target	Comment
KPI1_INEOS2	Human error on use of additives	Decrease of 50%	versus 3 years before the project implementation
KPI2_INEOS2	Manual adjustment rate	< 1%	the quality of the recognition label is unsatisfactory, requiring the operator to apply a manual override
KPI3_INEOS2	Necessary 2nd photo to be taken	< 5%	photo with bad quality, blurred photo
KPI4_INEOS2	Downgraded product due to use of wrong additive	0%	requires lab testing

Demo

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