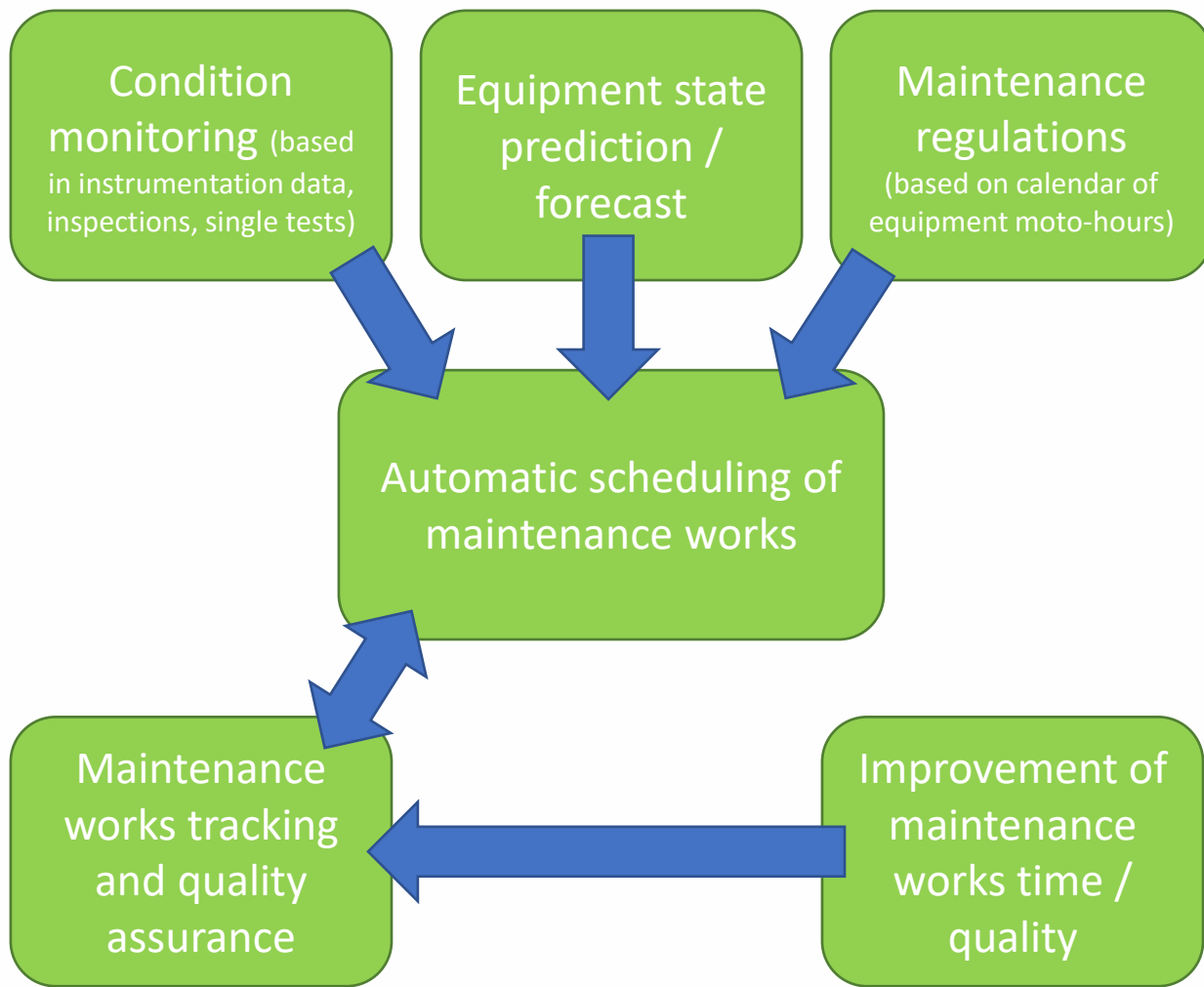


# Maintenance optimization

v 1.1

09.07.2020

# About the presentation



The general purpose of this solution is to plan and fulfil maintenance works for exactly those equipment, which causes the biggest risks of downtime or performance losses.

## Content:

1. Automatic maintenance planning
2. Improvement of maintenance works time/quality
3. Equipment condition monitoring
4. Equipment state prediction / forecast

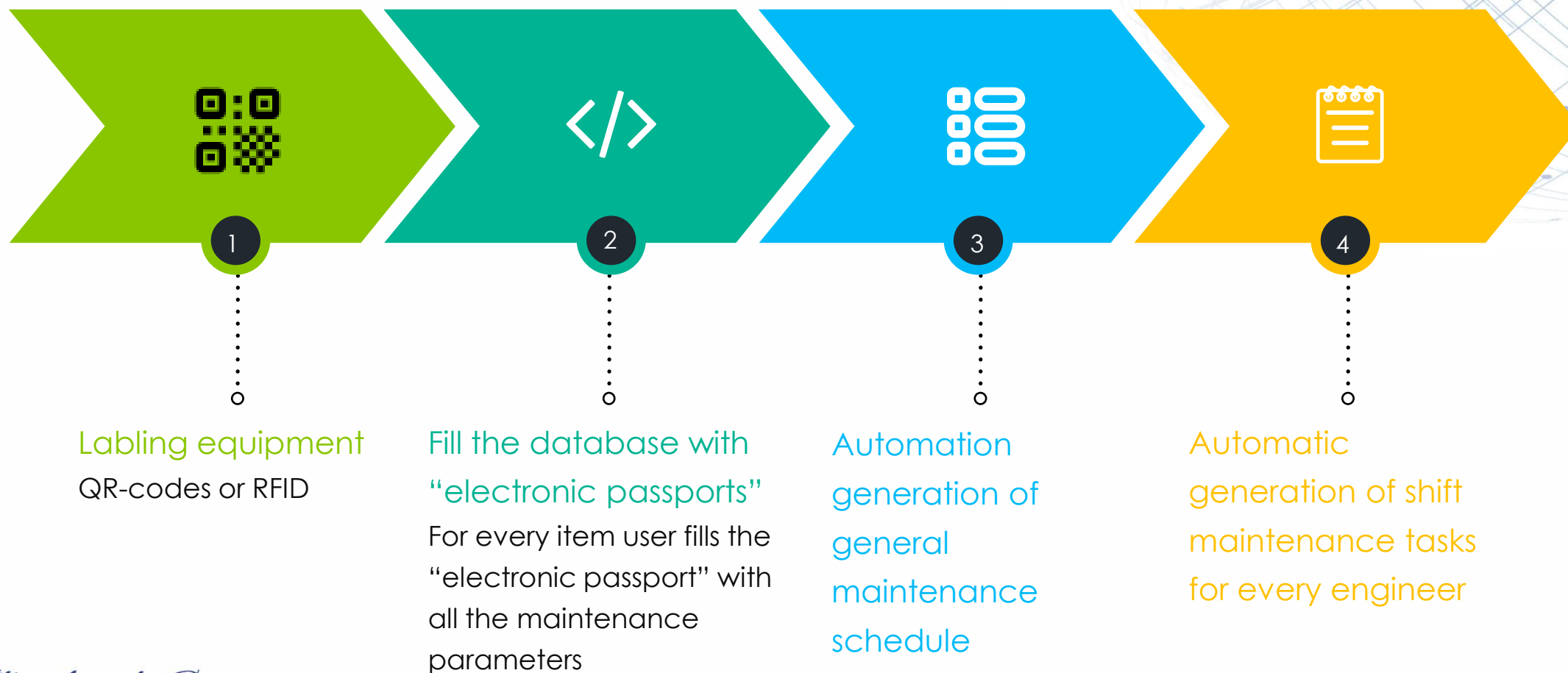
# Maintenance planning

Sakura software by ALD company is focused on the solution of the following tasks:

1. Automatic maintenance schedule creation, automatic shift tasks forming for every maintenance engineer
2. Providing an engineer with detailed information about maintenance work details:
  - a) which tools and materials are needed for a job
  - b) manuals, drawings or documents related to the item
  - c) video-manuals with the record of the same works “perfectly done” by manufacturer’s engineer
3. Quality assurance
  - a) full track of maintenance works done – who, when has done check, repairment
  - b) automatic logging of maintenance reports including related measurments, photos, text descriptions
4. Analytics regarding general state of the equipment based on the collected data

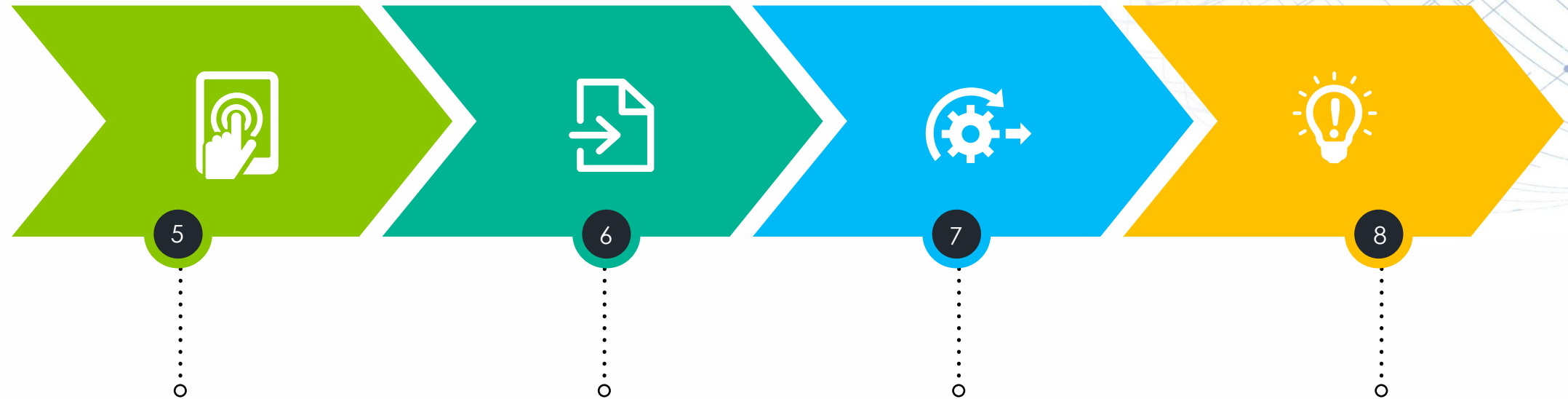


# Concept of the workflow based on Sakura





# Concept of the workflow based on Sakura



## Maintenance works / checks

All the items from the to-do-list should be done and proper reports submitted

## Engineer's shift report uploads automatically

## Reports

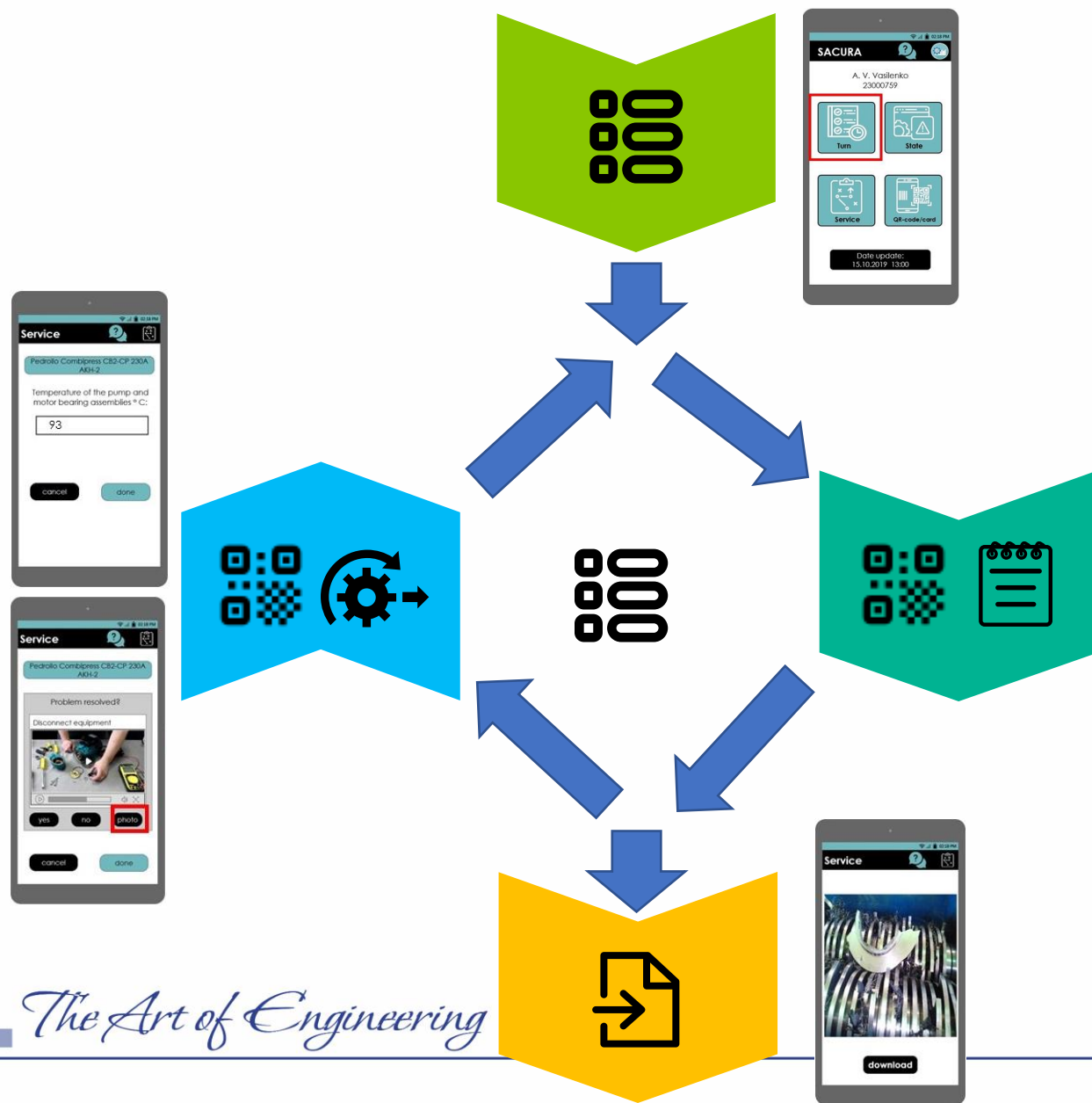
Full report regarding maintenance works done, works planned, equipment condition

## Analytics and decision making

Rugged ANDROID device with preinstalled ALD app



# How does maintenance engineer's workflow look like?



- get tasks for current shift
- fulfil received to-do- list item by item including the following steps for every item:
  - read personal label and then item's label located on the particular unit so the system logs that this exactly engineer is working with this unit/item
  - check item according to programmed questionnaire with filling proper formes and parameters in the app (photo of current state, temperature, vibration, ware, etc.)
  - or/and repair/maintenance works according to the described procedure (necessary documents, procedures, drawings, tools and materials needed are attached)
  - short report including text description, photo, parameters before and/or after works done
- upload reports to the server



# Reports examples in Sakura

- interactive map with indication of general equipment state
- detailed report with current issues/problems
- issues statistics per item
- kpi per engineer
- any other report forms requested by customer





# Maintenance planning

## Advantages of the solution

1. Solution is designed for enterprises with bad/low wifi, internet coverage in the manufacturing rooms, facilities
2. Solution has strong accent on tracking of maintenance engineers workflow
3. The solutions is very flexible in tuning and adjusting to customer's internal standards and procedures
4. The solution is very convenient for copying between similar machines.



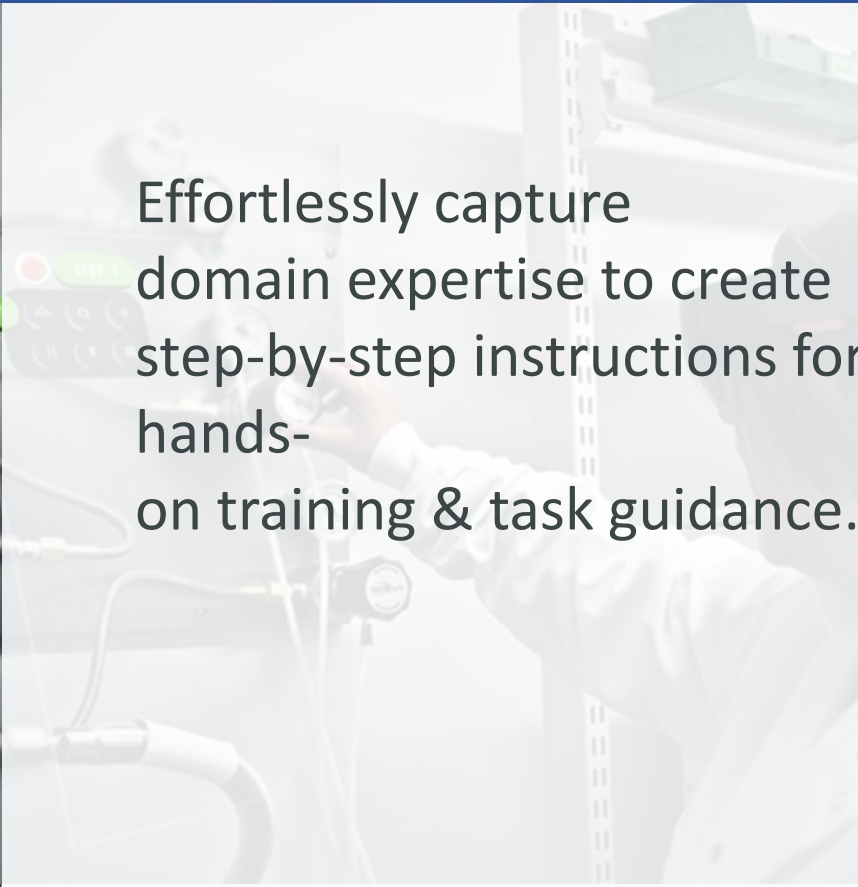
# Maintenance experience improvement

PTC company offers wide range of solutions including augmented reality products, products for industrial remote-control features, 3D modelling, digital twins, etc. In our projects we typically use only small part of the huge platform, which does not require significant investments and timeframe for implementation.


We offer our customer to use Vuforia Capture product by PTC company as a solution for the following ideas:



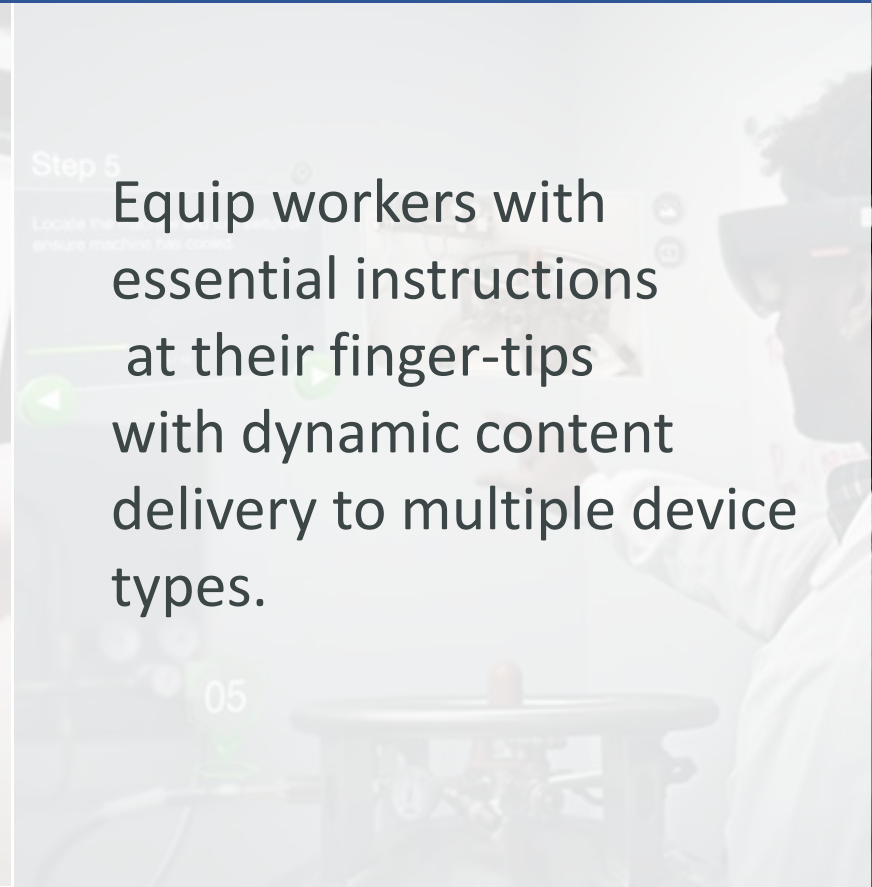
- access to the documents for every labeled unit (drawings, manuals, etc.) using mobile app and QR-code
- access to step-by-step video-manuals for every labelled unit using mobile app and QR-code
- convenient tools for making step-by-step video manuals
- providing real-time information regarding every labeled unit using mobile app and augmented reality approach
- all the features mentioned could be implemented without any coding/programming



Effortlessly capture domain expertise to create step-by-step instructions for hands-on training & task guidance.



Simplify editing, fine-tuning and publishing of AR content in an easy-to-use web-based environment.



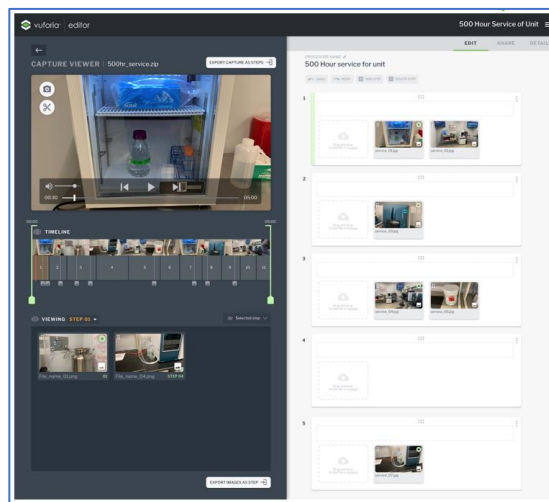
Step 5  
Locate the machine to be captured

Equip workers with essential instructions at their finger-tips with dynamic content delivery to multiple device types.

- 1) Capture expertise
- 2) Enhance expertise
- 3) Scale expertise



## vuforia® expert capture™



vuforia® capture™

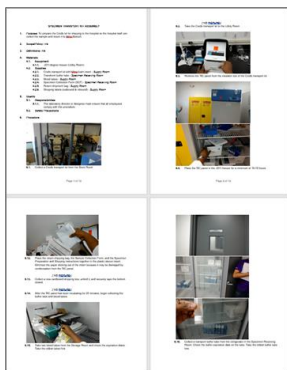


vuforia™

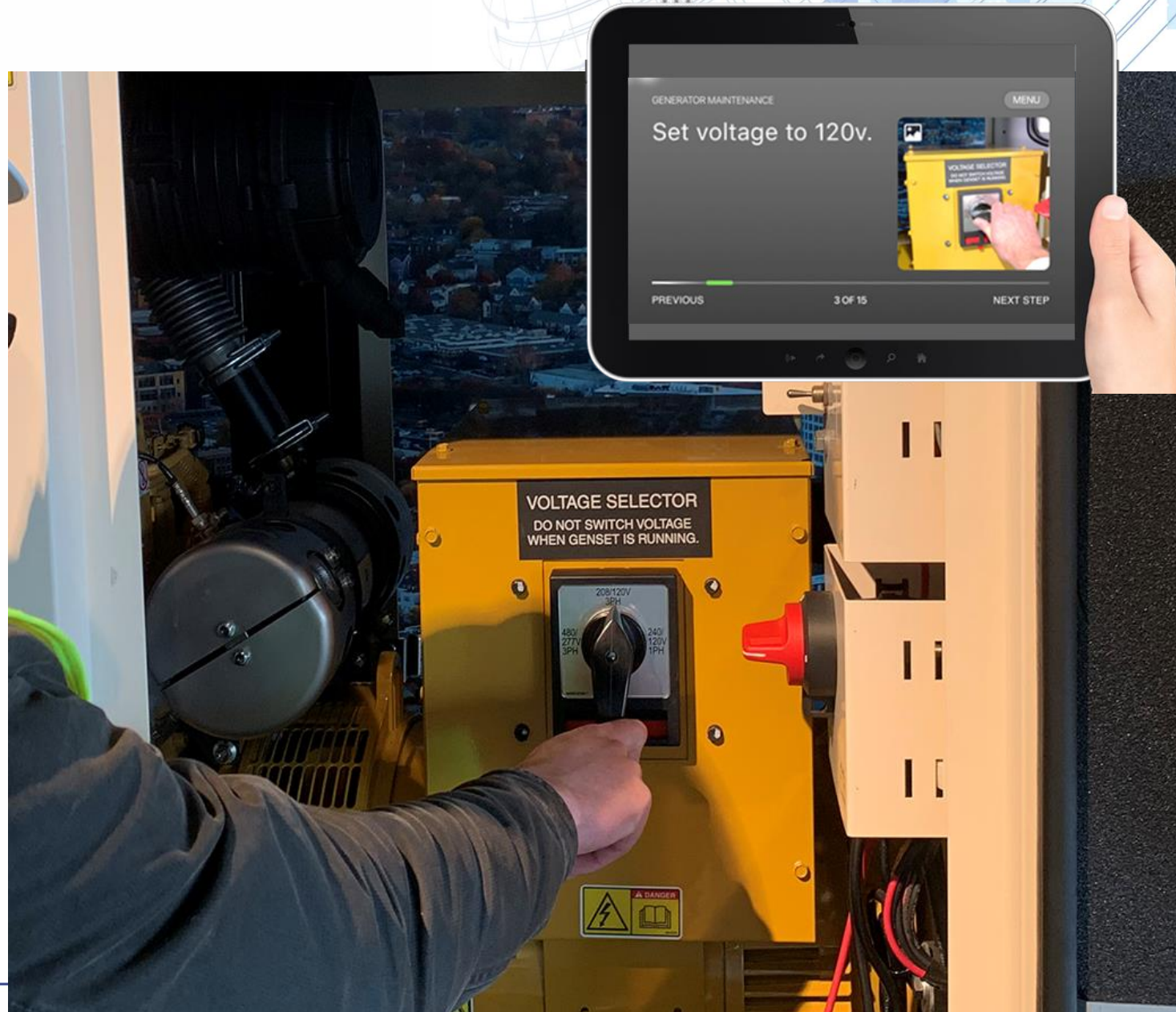
editor

vuforia® view

# Vuforia expert capture



- Single set of manuals and documents for all the assets
- Significant quality assurance improvements, reducing time for maintenance works



# Maintenance experience improvement

## Advantages of the solution

1. Very convenient toolset for creation of step-by-step video manuals
2. All the feature mentioned (including augmented reality features) are available with no programming/coding needed
3. Product is compatible with any automation platform
4. The functionality could be extended with for instance digital twins feature, etc.
5. WiFi / Internet coverage are obligatory





# Integrated condition monitoring

**Rockwell Automation**



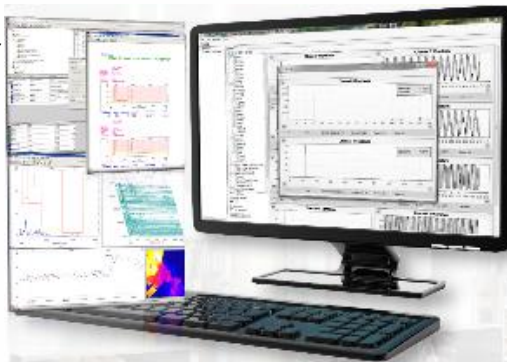
## Dynamix™ 1444 Monitors:

- Integrated condition monitoring
- API-670 capable machinery protection
- Smart machine monitoring
- Automated fault detection and identification within the Integrated Architecture
- Secure configuration in Logix Designer



## Emonitor® CMS software:

- Proven, comprehensive tools for executing any size condition-based monitoring program
- Online and offline analysis and data collection
- Automated diagnostics
- Fault frequency identification
- Built-in and user editable rule sets



## Dynamix™ 2500 portables:

- Data collector for predictive maintenance and machinery vibration diagnostics.
- Part of a comprehensive CbM program
- Download your measurements to Emonitor CMS
- A real-time, multi-channel signal analyzer
- A stand alone instrument for use in balancing, run up / coastdown analysis, bump testing and more



## Sensors:

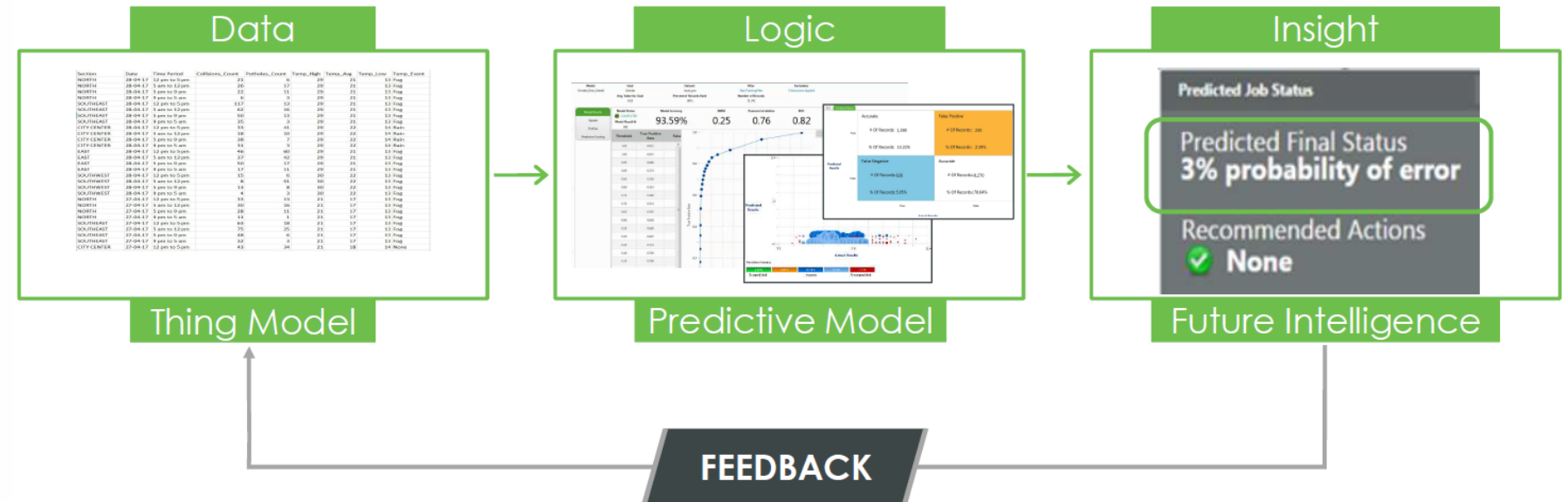
- 1442 Series Eddy Current Probes
- API-670 compliant sensors, extension cables and drivers for all common size and range requirements
- 1443 Series Sensors
- Industrial accelerometers, cables and mounting solutions



# Predictive analytics

Applies machine learning to historical data to make predictions about future outcomes.

Example Use Cases: predict failures, predict quality, determine when service is needed, predict sales, risk of churn





# Simple, intuitive model creation and deployment



Analytics builder

1. User interface for simple, intuitive interaction with data
2. Exposes complex relationships in data as simple-to-understand information
3. Simplifies the advanced analytics process, helping interpret information faster and save valuable time
4. Publish models for use in IIoT applications



Analytics Manager

1. Define and trigger analysis events within applications – executing predictive and simulation models
2. Map incoming data to model, created with ThingWorx or externally using automated time series transformations
3. Map analytic outputs to applications



# Thank you for your attention!

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