KUKA | iiQoT

Product presentation

KUKA iiQoT - product information

- **The next generation of IIoT at KUKA**
- **Central platform to connect and add value to your robots**
- **Influenced by more than 4 years of experience in IIoT and lessons learned**
- **Suitable for small and large fleets**

KUKA iiQoT – **„Increase the productivity of your robot fleet with KUKA iiQoT”**

Increase productivity
Ensure productivity of the system, detection of failure hotspots and bottlenecks more efficient maintenance
Identify improvements and ensure the overall performance

Efficient troubleshooting, maximize uptime and ensure continuous robot operation
Fast identification of issues per remote, fast recovery
Get notified in case of issues, save time in troubleshooting, ensure smooth operation and increase availability

Clear overview and fleet optimization
Transparency over robot fleet & keep fleet optimized
Access your robots from everywhere in one central platform with all data needed

Easy entry into digitalization
Entry to KUKAs ecosystem, close collaboration & simplified B2B processes
User friendly, few experience is needed to get started

KUKA iiQoT – **„Increase the productivity of your robot fleet with KUKA iiQoT”**

Increase productivity

- **Optimize operation:** Detection of failure hotspots and bottlenecks (e. g. robots with high error frequency or messages blocking operation)
- **Avoid security issues:** Security monitor allows to ensure cyber security of all robots
- **Increase efficiency for maintenance:** See and optimize maintenance tasks in one view displaying all maintenance activities done and needed. This also helps to bundle maintenance activities to save costs & reduce down-times.

Efficient troubleshooting, maximize uptime and ensure continuous robot operation

- **Get help easily and quickly:** Create, upload a diagnosis file (KRCDiag) & create a case in one workflow.
- **Save time:** In case of an error get instant & proactive notification
- **Solve complex issues:** Single view to see all messages & changes. Direct access to background information via Xpert to get troubleshooting support.
- **Avoid production issues:** Complete history of messages, conditions & changes to find source for production relevant issues. Even get proactive notifications for production critical conditions.

KUKA iiQoT – „Increase the productivity of your robot fleet with KUKA iiQoT”

Clear overview and fleet optimization

- **Keep overview:** Transparent overview of robots and equipment. This overview is complete customizable, digital, always up to date and works across different locations.
- **Easy and quick localization:** Fast identifying robots with certain criteria e.g. software versions, failures, etc. due to the powerful filters.
- **Keep fleet optimized:** Get support in unifying and updating your robot fleet due to the overview of all software or hardware versions of the robot systems.

Easy entry into digitalization

- **Low entry barrier:** User-friendly interface so few experience is needed to get started.
- **Closer collaboration:** Share information in case support is needed.
- **Entry to KUKAs ecosystem:** Integrated KUKAs digital platforms like marketplace, Xpert & Robot Selector
- **Flexible:** Deployment with support of various systems
- **Simplified B2B processes:** Connection to internal KUKA systems (e. g. case generation)

KUKA iiQoT Module

Prerequisites

- Data provisioning in KUKA Public Cloud (European server)
- KUKA.DeviceConnector pre-installed 2.1.7 (or newer, Free)
- Acceptance of the valid legal documents (T&Cs, SLA, GDPR)

Free

KUKA iiQoT.Basic
(NPI 10/21)

- **Asset Manager**
- **Messages**
- **Condition Monitoring**
- **Security Monitor**
- **Changelog**
- **Fault Diagnosis**
- **Notifications**
- **Maintenance Manager**

Free for use before 10/23

Future version

KUKA iiQoT.Advanced (NPI 10/23)

- ***Predictive Maintenance***
  - *Condition-based Maintenance*
  - *Anomaly Detection (preparation)*
- ***Efficiency Monitoring***
  - *Energy consumption analysis*
  - *Cycle time analysis*
- ***Load Analysis***
  - *Load test (Robot Selector)*
  - *Current load*
- ***Backup Management***
- ***Process Data Aggregation***

KUKA iiQoT.Basic Outlook

Free

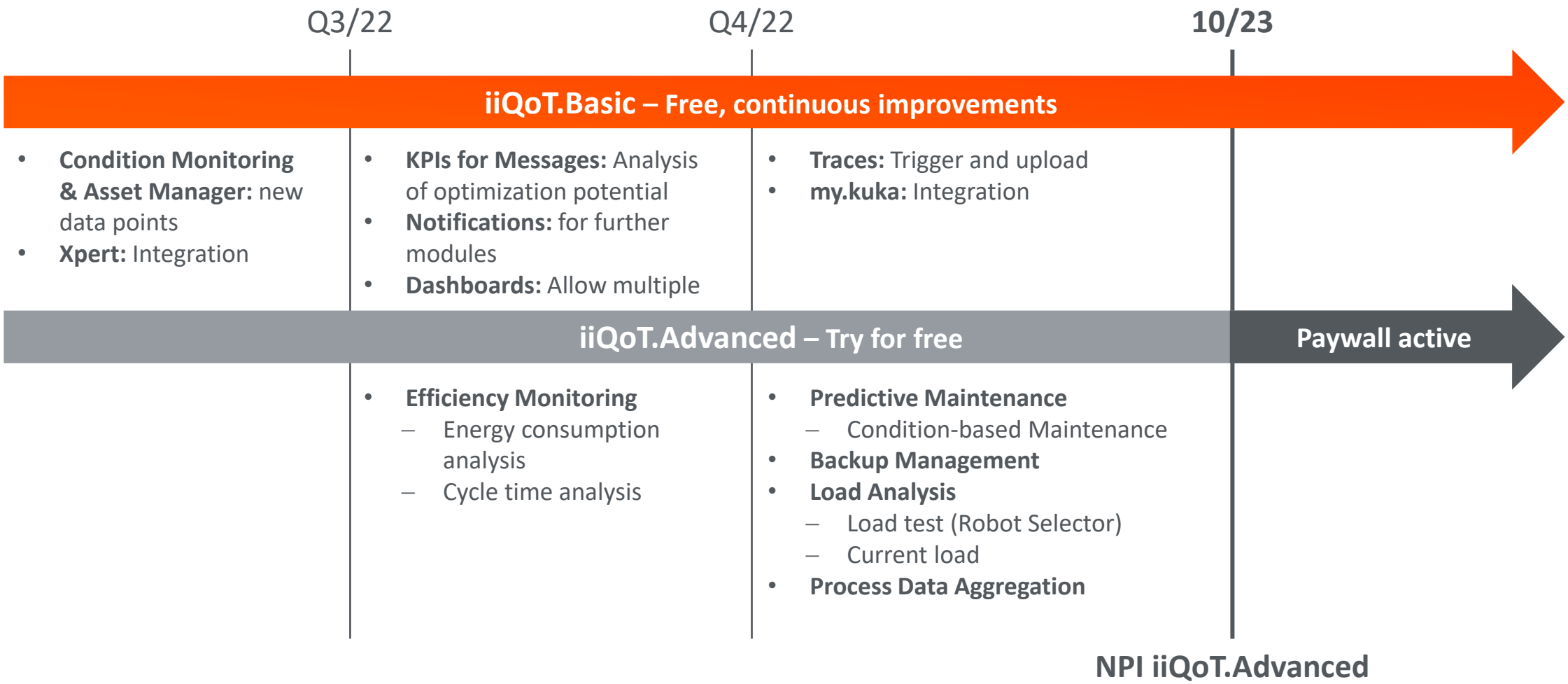
KUKA iiQoT.Basic
(NPI 10/21)

- **Asset Manager**
- **Messages**
- **Condition Monitoring**
- **Security Monitor**
- **Changelog**
- **Fault Diagnosis**
- **Notifications**
- **Maintenance Manager**

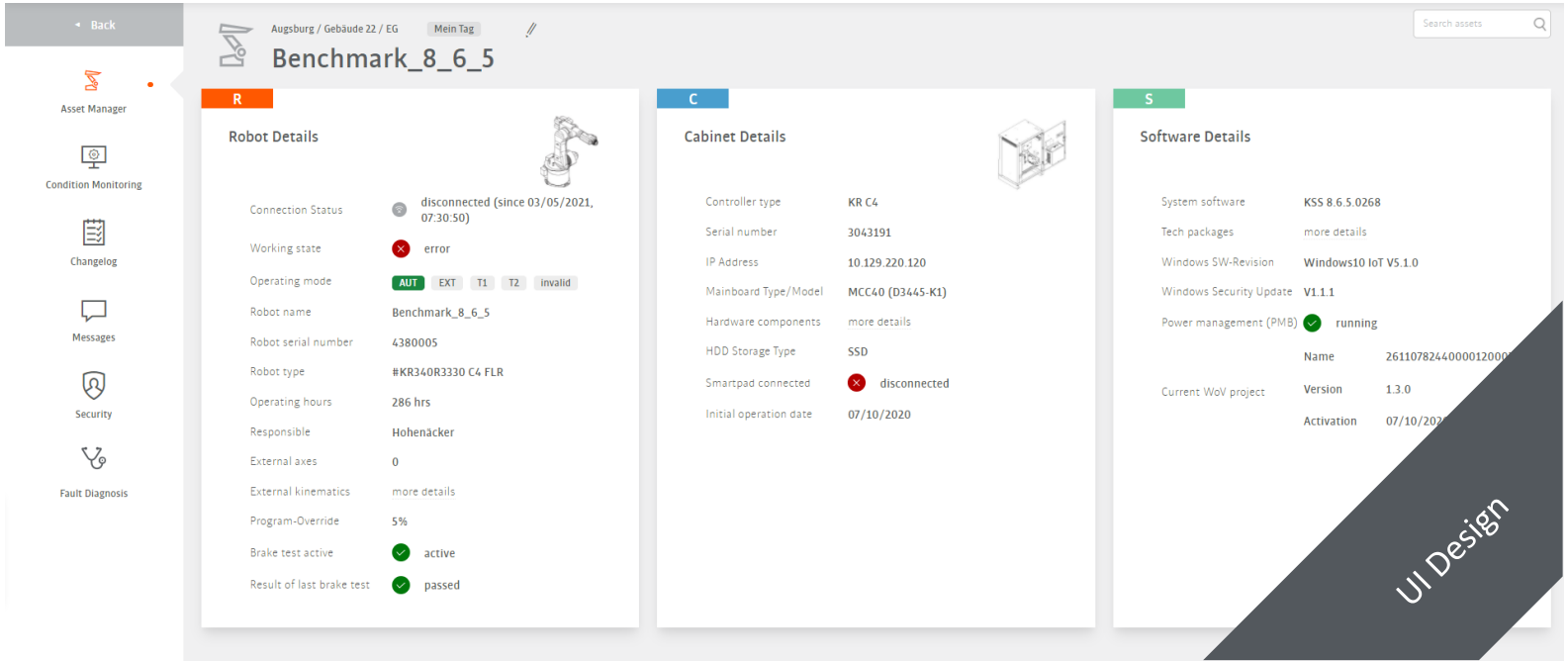
Future features

- **Condition Monitoring & Asset Manager:** new data points
- **Xpert:** Integration
- **KPIs for Messages:** Trend analysis, analysis of optimization potential
- **Notifications:** for further modules (Condition Monitoring, Maintenance Manager, Changelog)
- **Traces:** Trigger and upload
- **Dashboards:** Allow multiple
- **my.kuka:** Integration
- **Continuous improvements**

iiQoT Timeline



Asset Manager Robot Detail Page



Asset Manager

Added value

+ Up to date asset information with clear overview
+ Fast identification of assets with certain properties
+ Easily find robots by hierarchy (location) or custom attributes (tags)

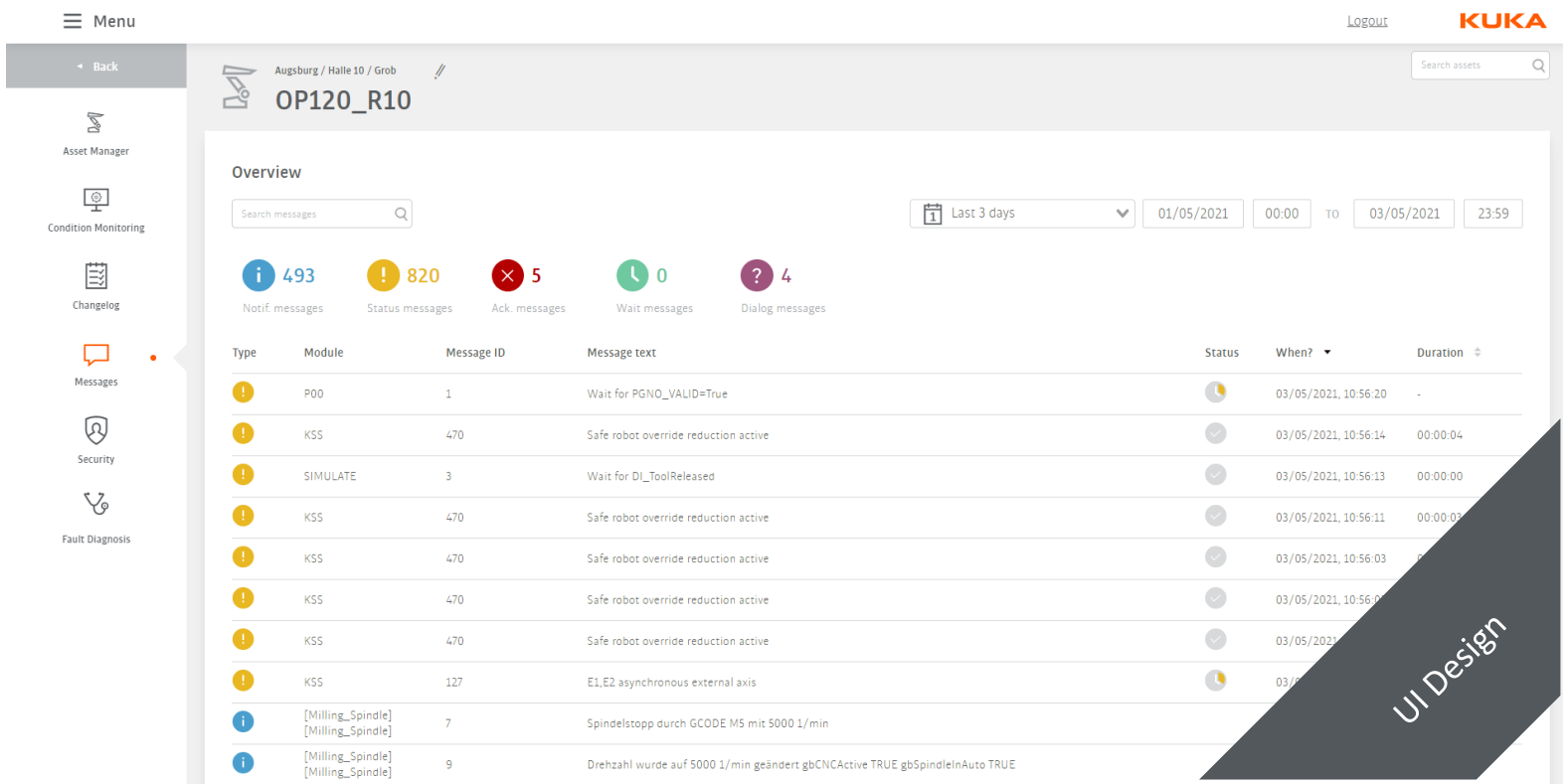
Asset Manager (2) Filters

Asset Manager

Features

- Information about the current asset status
- Definition of tags (e. g. for application) & locations (hierarchy)
- Powerful filters (attributes, tags, location) (combinable by Boolean operations)
- Sortable table and dashboard view
- Separate information on robot hardware, controller & software
- Aggregations for attributes (e. g. software version)
- Additional information on external kinematics & hardware components
- *Future releases: KUKA Xpert integration, data via KUKA data connection (product information, documentation …)*

Messages Overview



Messages

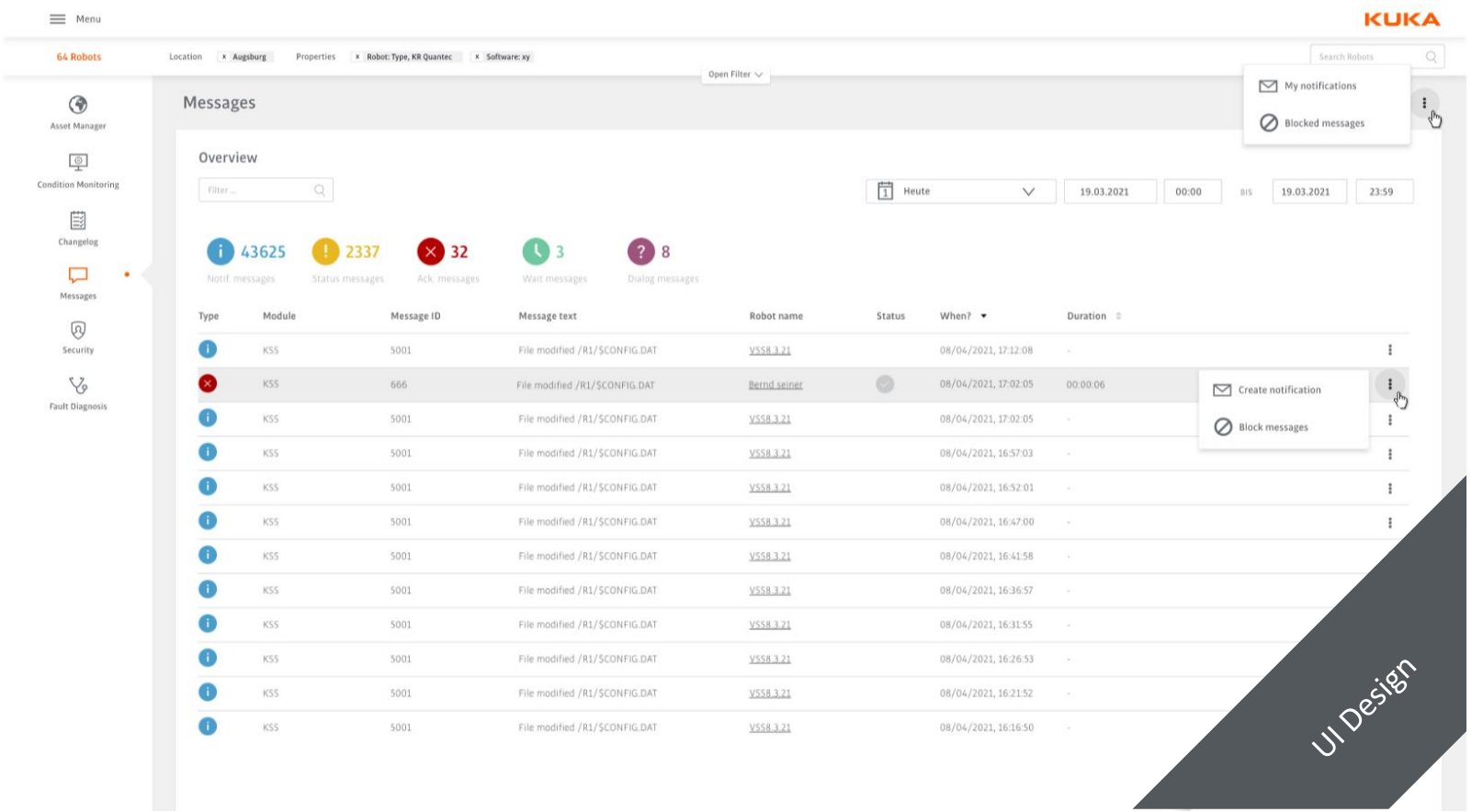
Added value

+ Fast recognition of critical events
+ Detection of failure hotspots
+ Support in fault diagnosis
+ Optimization of operation

Features

- List view of messages with relevant attributes (type, text, source …)
- Filter for attributes
- *Future releases: Display of top KPIs (most frequent messages, most frequent source, duration of acknowledgement …)*

Messages Notifications



Notifications

Added value

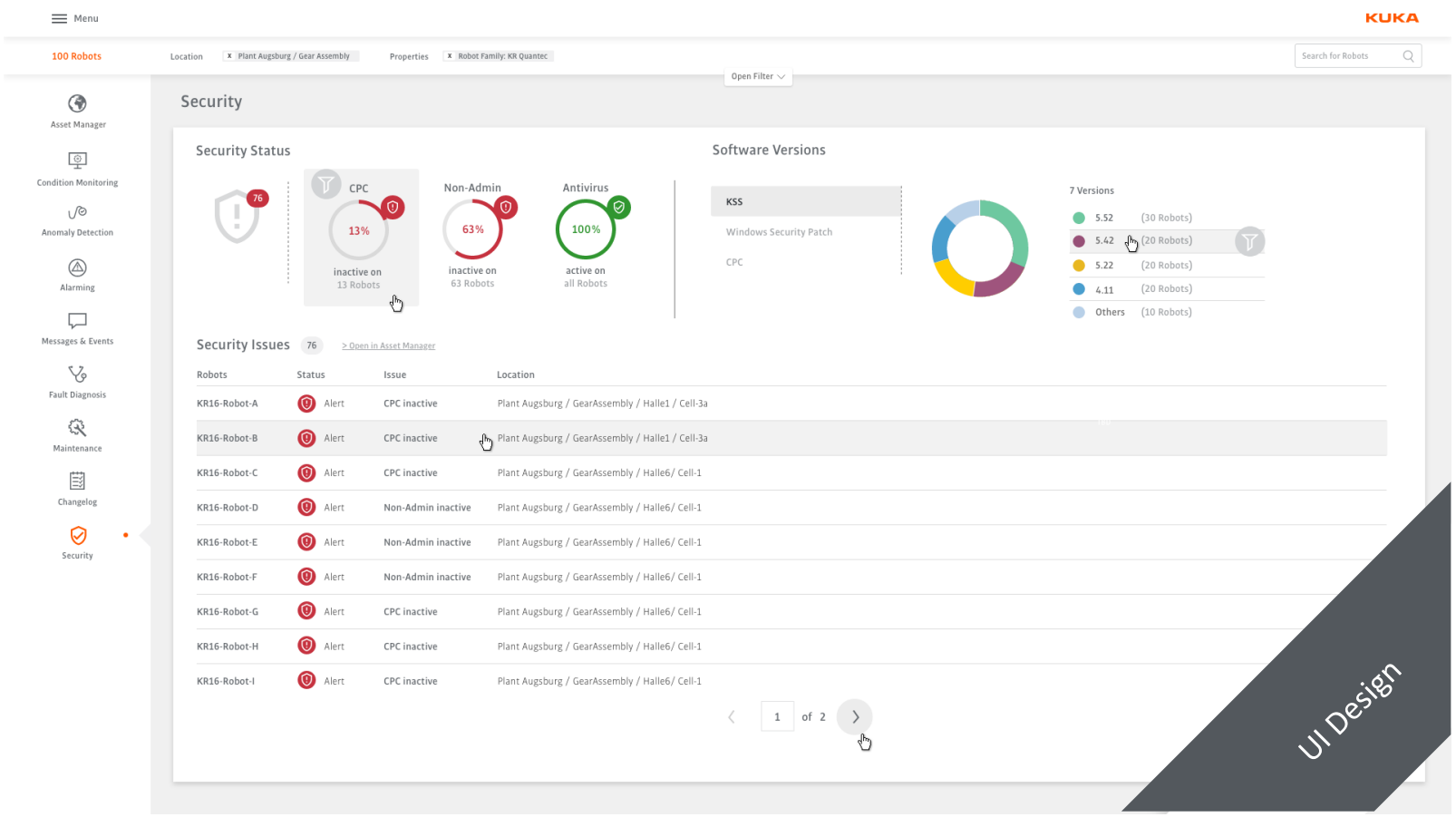
+ Get informed quickly about user relevant events
+ Proactive notifications without being online

Features

- Notifications via mail
- Triggering by defined events

Security Monitor

Overview



Security Monitor

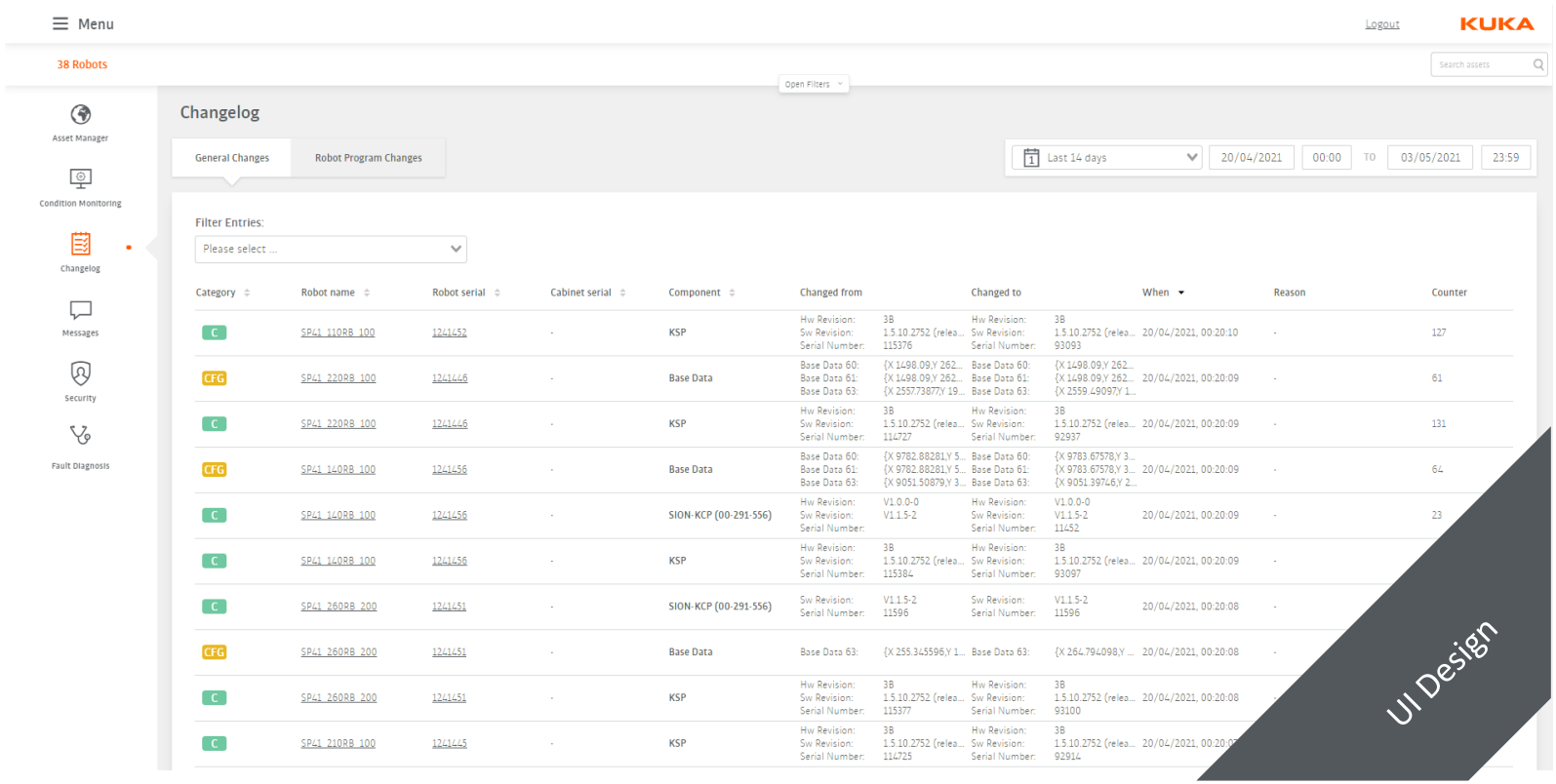
Added value

+ Ensure robot security
+ Automatically detects critical status

Features

- Security status CPC, virus scanner, open ports, NonAdmin
- Aggregation for fleet including dashboard

Changelog Overview



Changelog

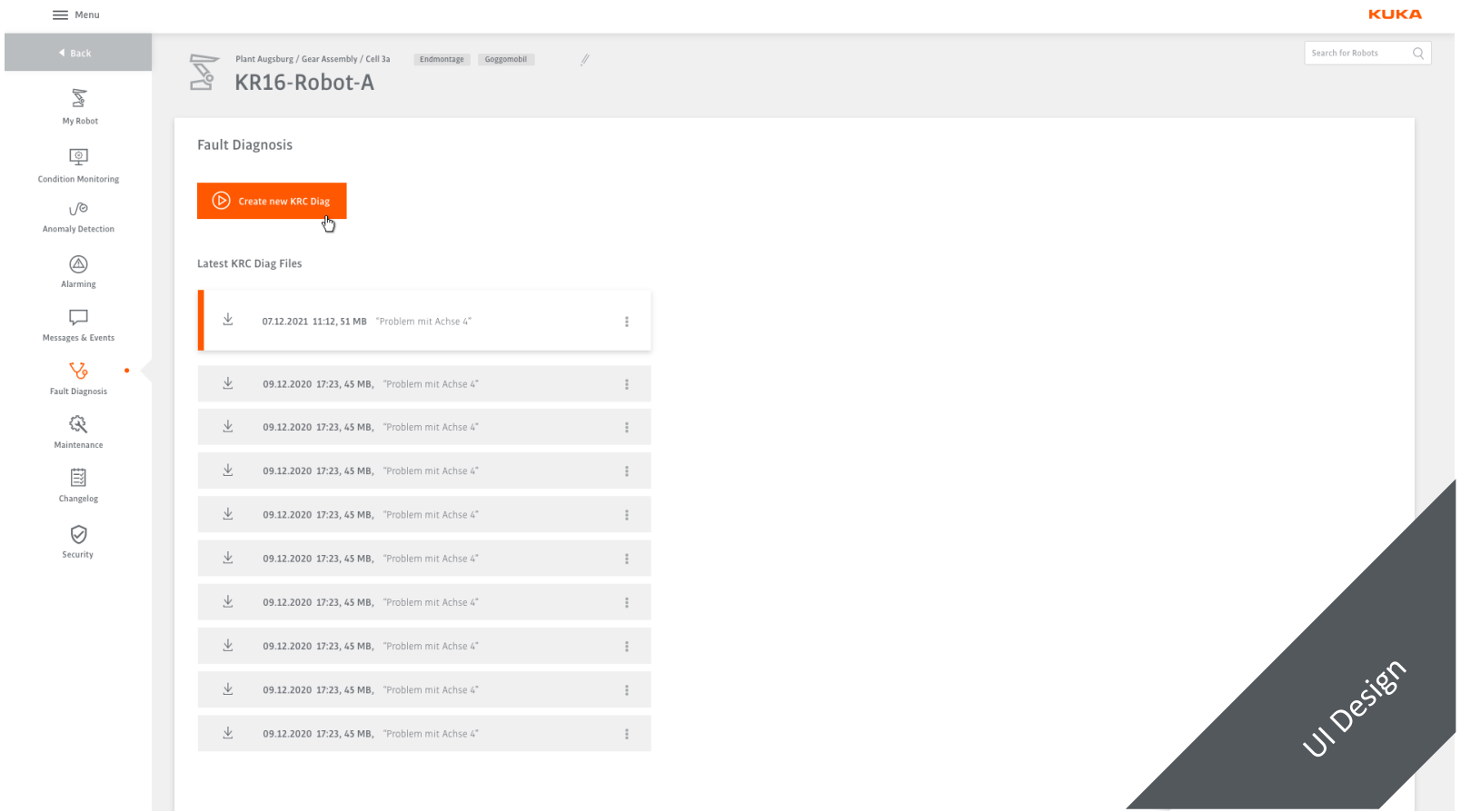
Added value

+ Digitalized and automatic log of changes
+ Tracking of external changes to the system (program, parameters …)
+ Track also manual changes

Features

- Detailed list of changes including number of changes
- Track hardware, software, checksums, programs, configuration changes
- Manual entry for custom changes (energy supply system, gear, oil change …)
- Comment function

Fault diagnosis Fetch KRCDiag



Fault Diagnosis

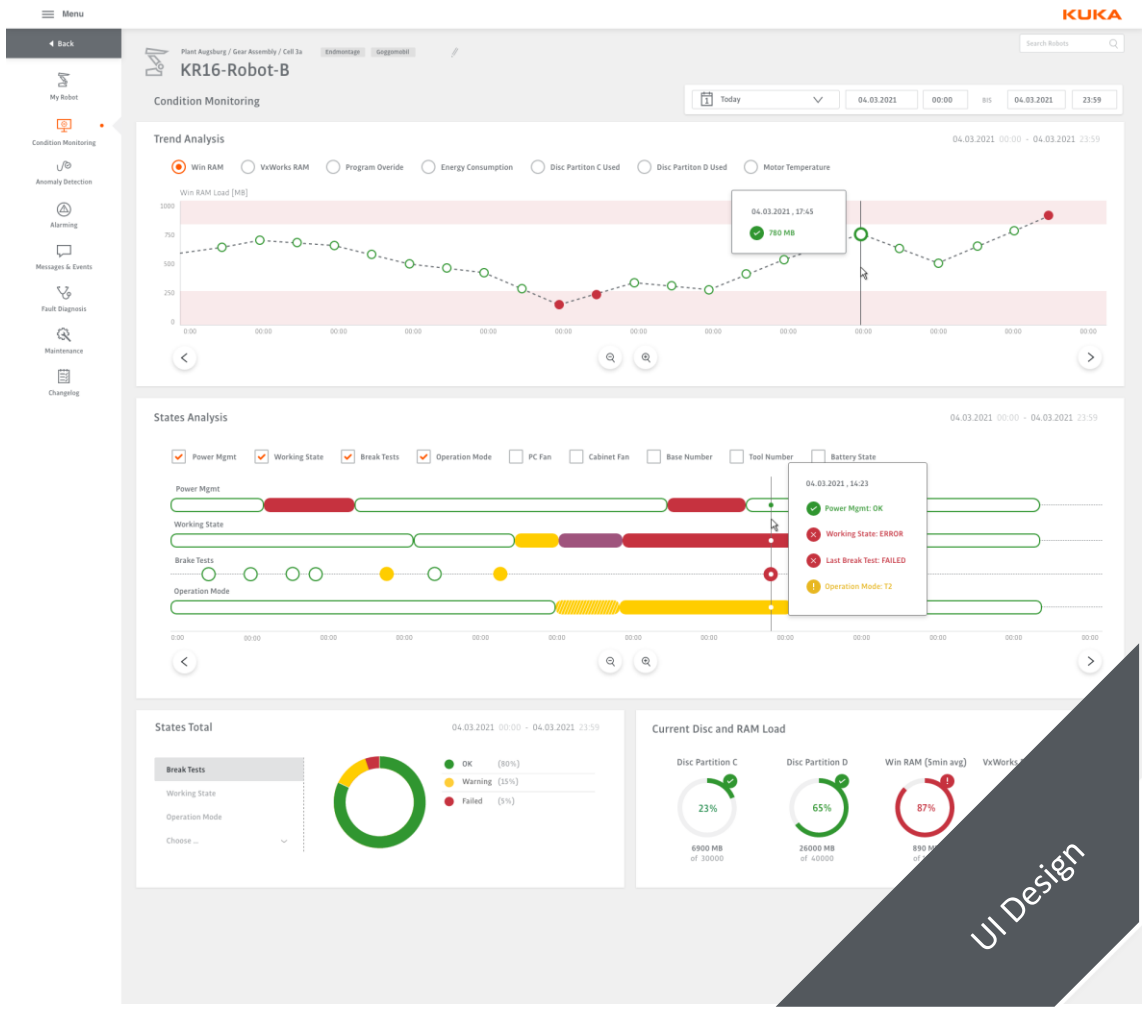
Added value

+ Helps to localize root causes and thus reducing mean time to recovery
+ Reduce production loss due to faster troubleshooting

Features

- KRCDiag handling (trigger & download)
- Automatic case generation (KUKA data connection required)
- *In future releases: KUKA Xpert integration*

Condition Monitoring Robot Detail Page



Condition Monitoring

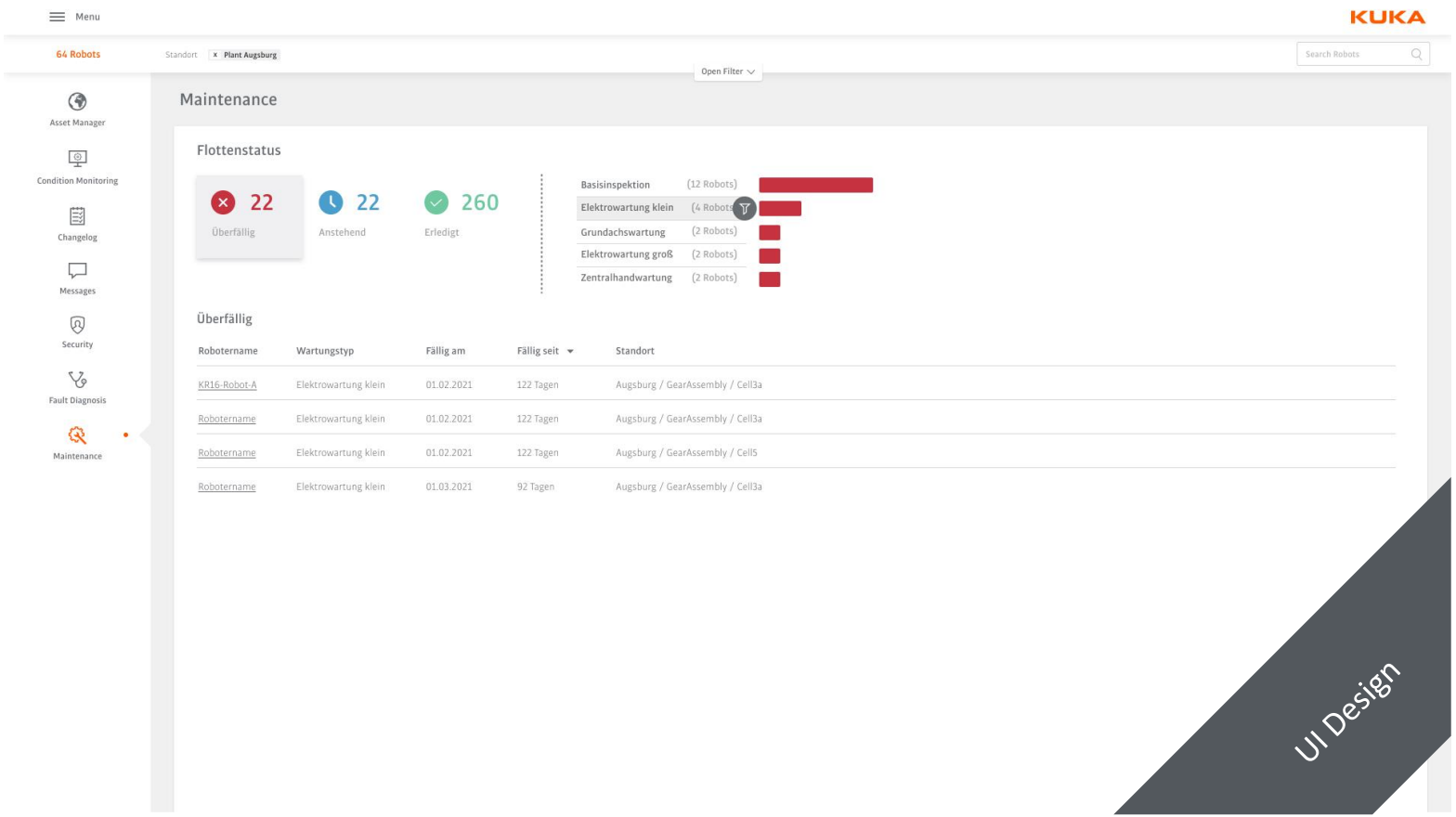
Added value

+ Tracking of the robot current condition from remote
+ Helps finding trends, irregularities or root causes

Features

- Current and historic asset information
- Visualized condition state of robot & controller
- Robot data like brake test results
- Controller data like operation mode, RAM usage, program override …
- *In future releases: More data points and program specific data, energy analysis*

Maintenance Manager Robot Detail Page



Maintenance Manager

Added value

+ Scheduling current and future maintenance tasks
+ Identifies maintenance needs of all assets in one intuitive view

Features

- Fetch maintenance information from controller
- Rescheduling of tasks

Outlook: Future modules & features

Future release

Predictive Maintenance

Added value

+ ***Wear analysis:*** *On-demand maintenance, less planned downtime, detection of robots with high wear (program optimization) for increased robot lifetime*
+ ***Anomaly Detection:*** *Early detection of problems and potential prevention of unplanned downtime, avoid production loss, detection of effects on process (e. g. position error)*

Features

- *Wear indicator for gears & motors*
- *Detection of anomalies (robot required to do reference movement frequently)*

Future release

Process Data Aggregation

Added value

+ *Track process quality of parts in different process steps*
+ *Ensure & optimize quality*
+ *Measure consumable & estimate production costs*

Features

- *Compatible to process tech packages (e. g. welding, KUKA.ProcessScreen required)*
- *Dashboards for quantity of parts (OK/NOK), error sections, consumables*
- *Notifications in case of errors*

Outlook: Future modules & features (2)

iiQoT.Basic

Future release

KUKA data connection

Added value

+ *Efficient support (e. g. ticket creation)*
+ *Smooth user experience (integration of my.kuka, Xpert, RobotSelector …)*

Features

- *Share data with KUKA for diagnosis or to improve services (e. g. Predictive Maintenance)*
- *KUKA ecosystem integration (marketplace, service data …)*

Future release

Backup Management

Added value

+ *Fast recovery*
+ *Restore working state*

Features

- *Automatic backup creation*
- *User defined schedule*
- *Store data locally (shared folder) or in the cloud*

Future release

Other

Added value

+ ***Energy monitoring:*** *track energy consumption & detect optimization potential to save costs*
+ ***Cycle time analysis:*** *track cycle time & detect optimization potential to increase throughput*
+ ***Load analysis:*** *avoid misuse of robot & automatic analysis without additional tools*

Modules – value mapping

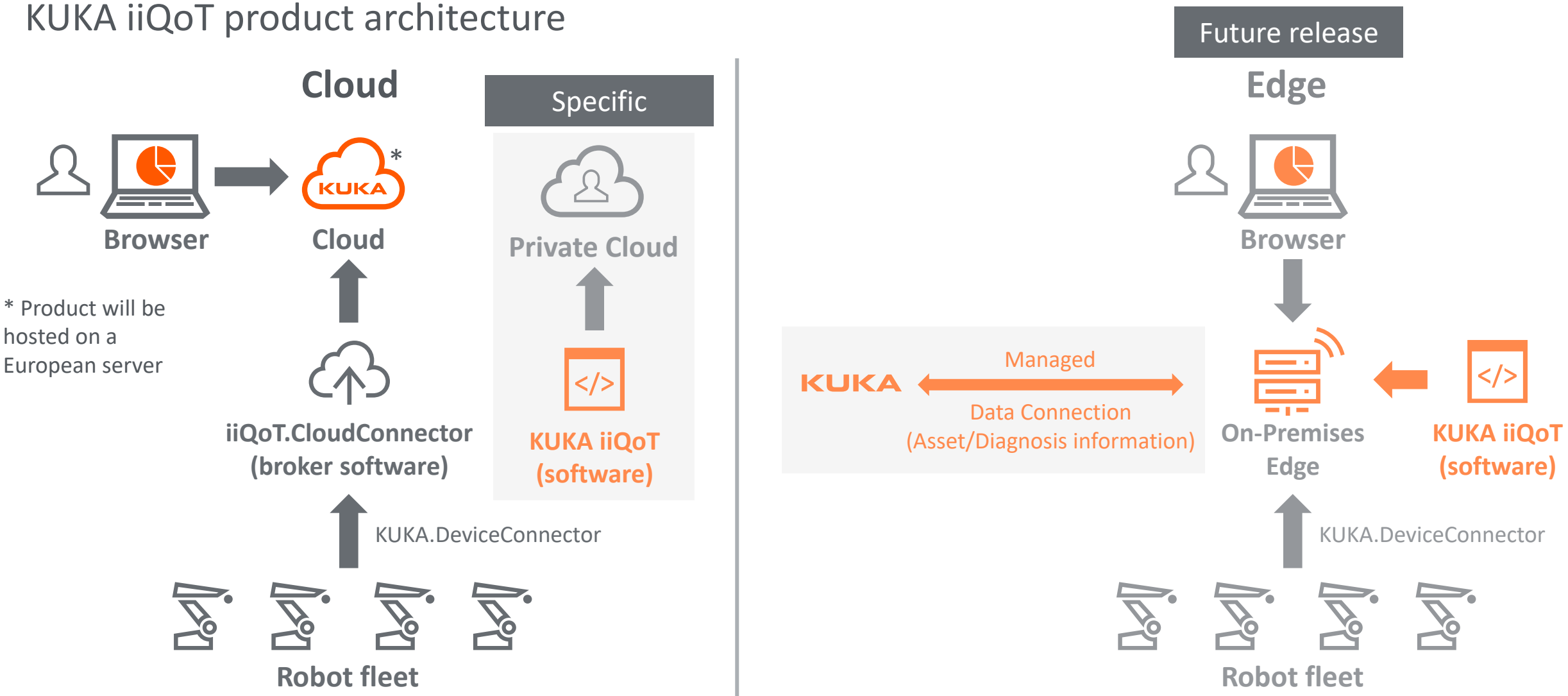
	Fleet optimization	Fast recovery, troubleshooting	Maximize uptime	Increase efficiency
Asset Manager	●			
Maintenance Manager	●		●	
Messages		●		
Condition Monitoring		●	●	●
Security Monitor	●			
Changelog		●		
Notifications		●	●	
Fault Diagnosis		●		
Predictive Maintenance*			●	
Backup Manager*		●		
Process Data Aggregation*				●

* in future releases / t. b. d.

Personas & jobs

Role	Job
IT responsible (Key stakeholder)	• Ensure data & cyber security • Check company policies • Support in integration
Standardization / OT responsible (cross-plant), Manager Maintenance (Key stakeholder)	• Defines OT strategy (cross-plant) and homogenize tools • Collect production requirements • Initiate integration of OT tools
Plant manager (Key stakeholder)	• Ensure productivity & quality of production
Integrator (Sales channel with own benefits)	• Support • Commissioning
Cell/line commissioner (2nd priority user)	• Ensure correct operation of robot (e. g. load) • Ensure process cycle time • Ensure process quality
Staff Maintenance / operator (1st priority user)	• Ensure continuous operation • Ensure consistent asset status (e. g. SW version) • Ensure fast recovery in case of errors or down-times (troubleshooting, root cause analysis) • Early recognition of potential errors & problems • Planning of routine maintenance

KUKA iiQoT product architecture



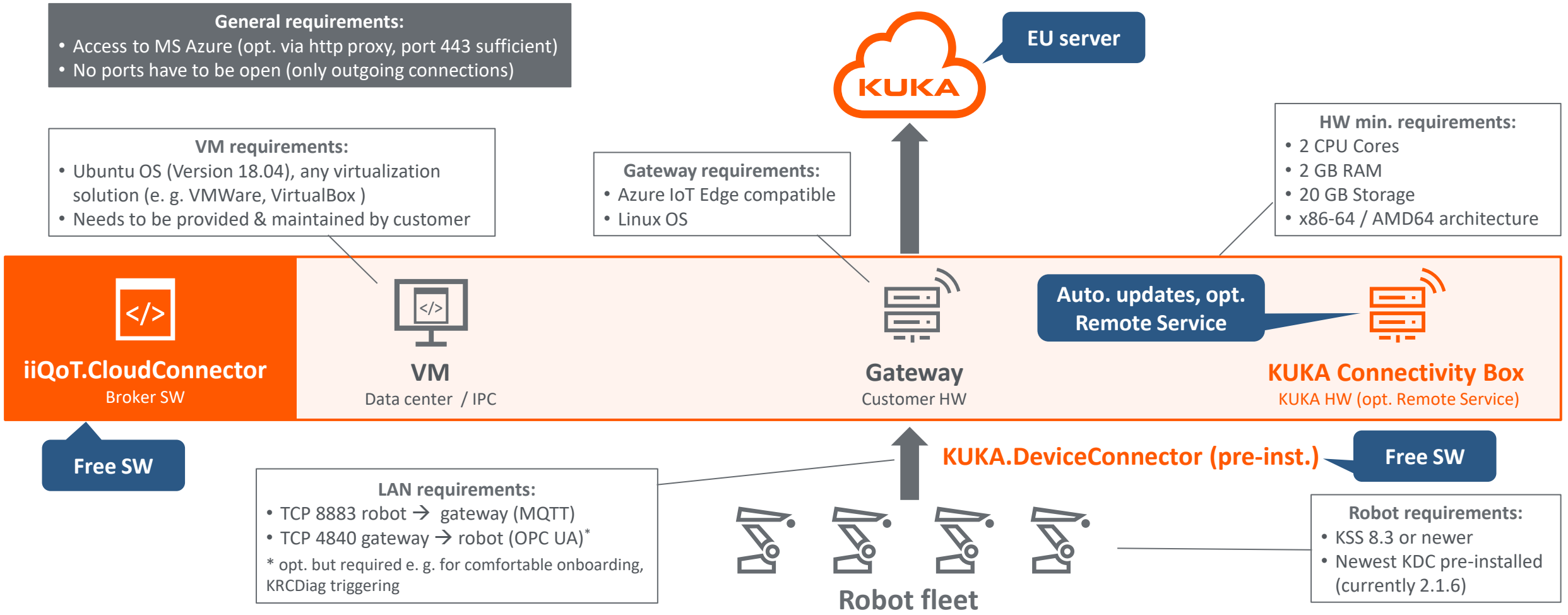
KUKA iiQoT product variants

	Infrastructure provided by KUKA	Infrastructure provided by customer
Cloud	**Public Cloud (KUKA cloud)** KUKA hosted platform, data publisher needed (First release)	**Private Cloud (customer cloud)** Customer hosted cloud (Specific)
On-Premises	**On-Premises (KUKA Edge)** Data stays on-premises, managed environment (Future release)	**On-Premises (customer hardware)** Data stays on-premises, non-managed environment (t. b. d)

Technical prerequisites (Cloud version)

- Cloud based product: free cloud connector/broker software will be provided (KUKA iiQoT.CloudConnector)
- For KUKA robots with (V)KSS and KUKA.DeviceConnector pre-installed
- (V)KSS 8.3 or newer
- Access to European Server

Technical prerequisites (Cloud version)



Data security

- KUKA do not share or sell data to 3rd parties
- Data will only be used of the purpose of the service (anonymous data will be used for general product improvements)
- GDPR compliant solution

- All services are only hosted in ISO27001 certified data centers in the European union (Microsoft Azure West Europe region)
- All customer data and data transfer is encrypted based on the current BSI recommendations ("Encryption at rest" & "Encryption in transit")
- Single Sign-On support with KUKA central customer identity (my.KUKA)

Performance & stability

- **Network performance:** < 1 MBit/s per robot for typical use-cases
- **Stability:** KUKA.DeviceConnector is proven for stable operation, uses minimal resources and has no impact on robot production (KRCDiag creation could lead to high resources usage, user is warned)