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# UAV solutions

BENJAMIN FEDERMANN, JANUARY 2018

# Application areas



## Warehouses

Inventory management, process monitoring



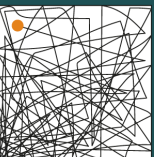
## Production facilities

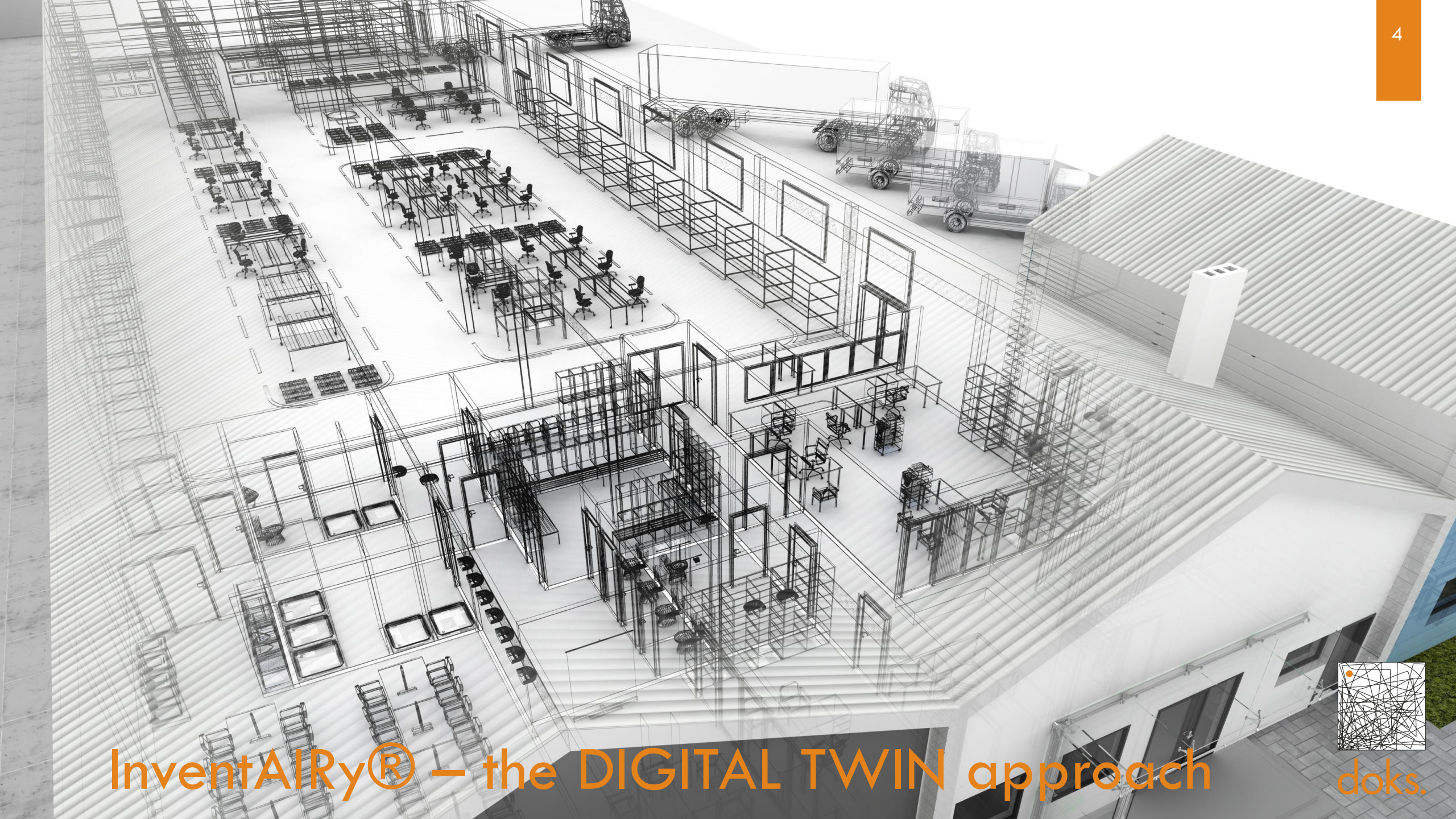
Asset monitoring, delivery of time-critical parts (short distance)



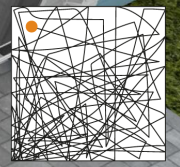
## Urban environment

Last mile delivery, emergency support



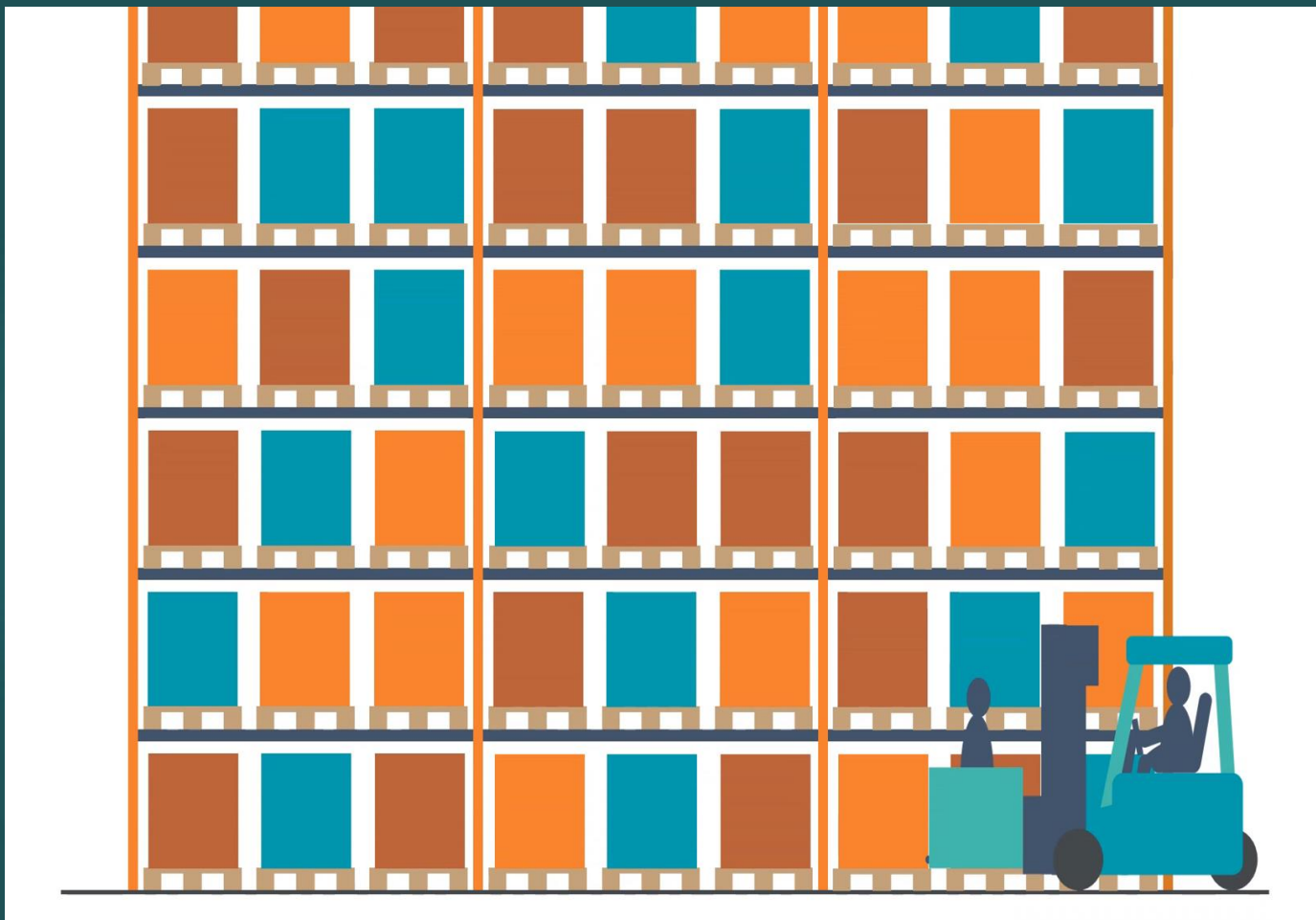


InventARy® – the DIGITAL TWIN approach



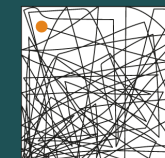
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# Digital Twin – the way to capture data

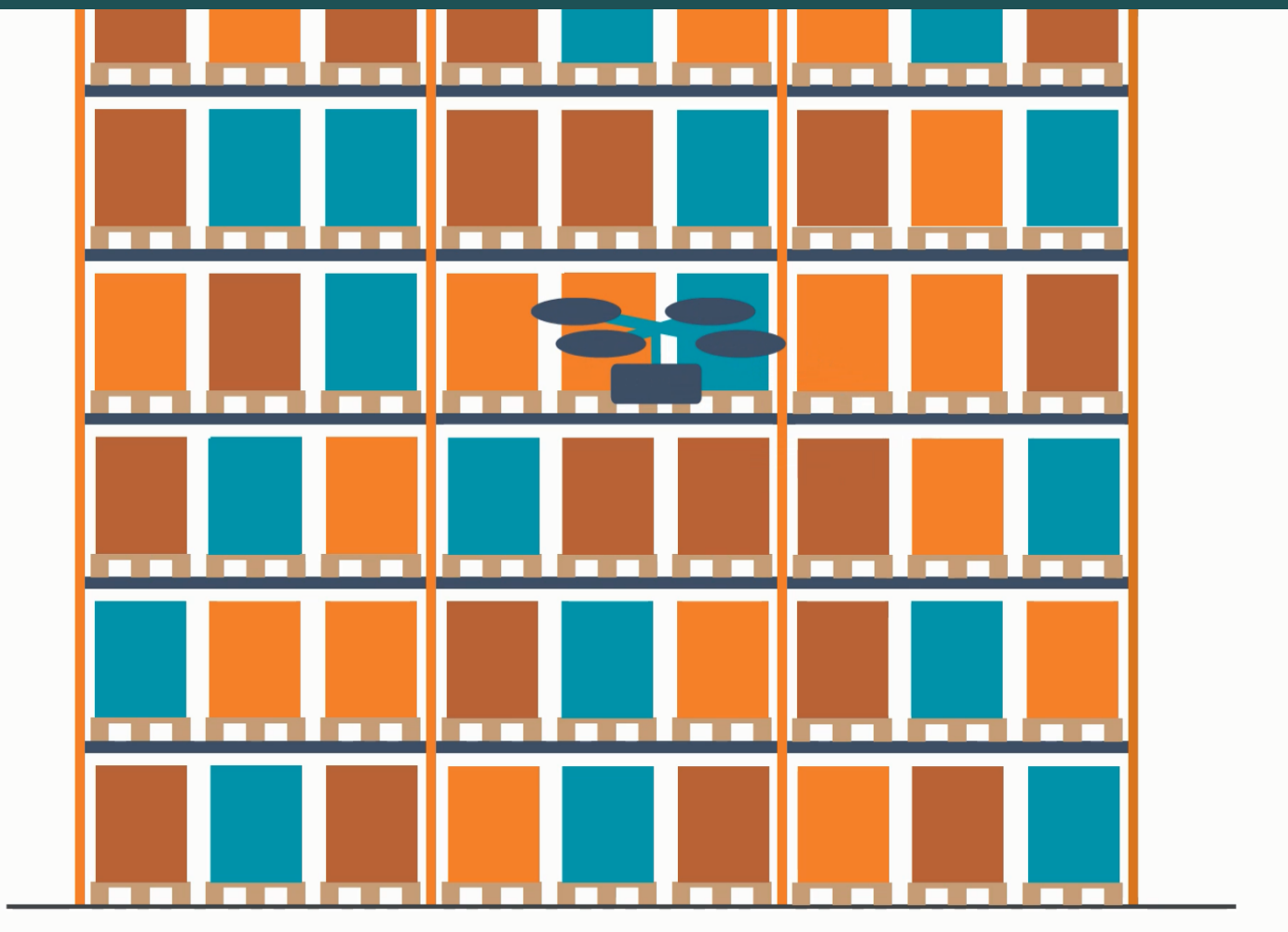


## Time consuming and manual

- One fork lift
- Three employees (four-eye-principle)
- Handheld scanner only

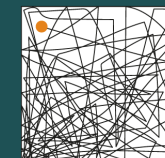


# Digital Twin – the way to capture data



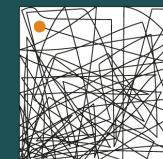
## Fast and automated

- Multiple drones
- Automated flights indoors
- Multisensory data acquisition

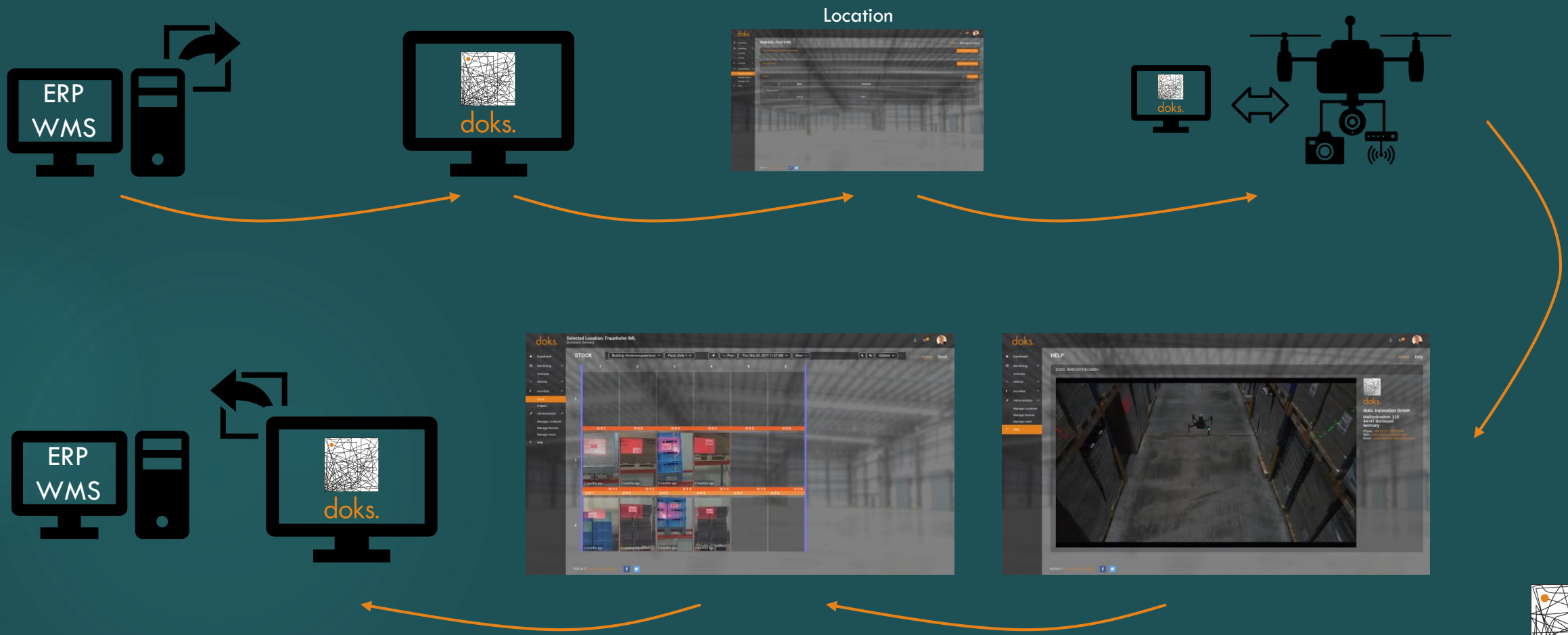


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# Digital Twin – all about information



# InventAIRy® workflow



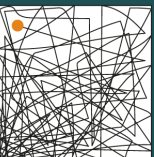


# Automated flights indoors – InventAIRy®



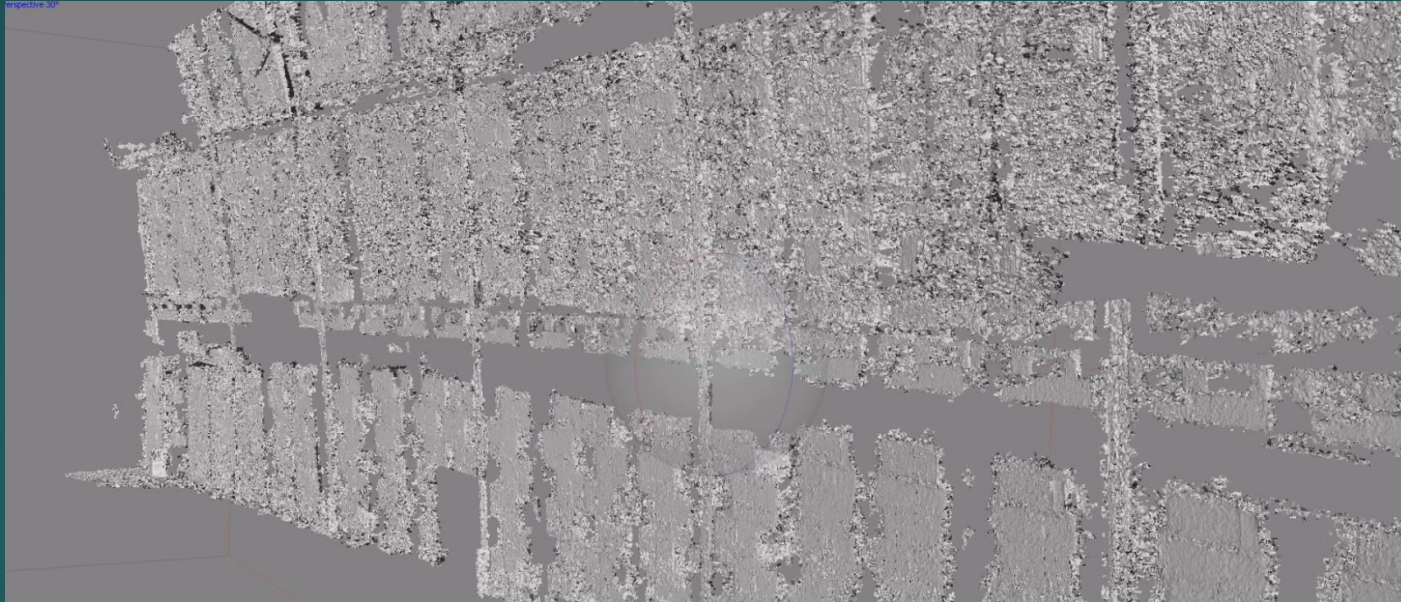
## Navigation without additional infrastructure

- No WiFi based navigation
- Vision based, SLAM
- Additional sensors for distance control (spheric)



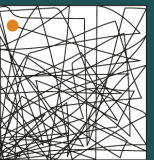
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# Automated flights indoors – InventAIRy®



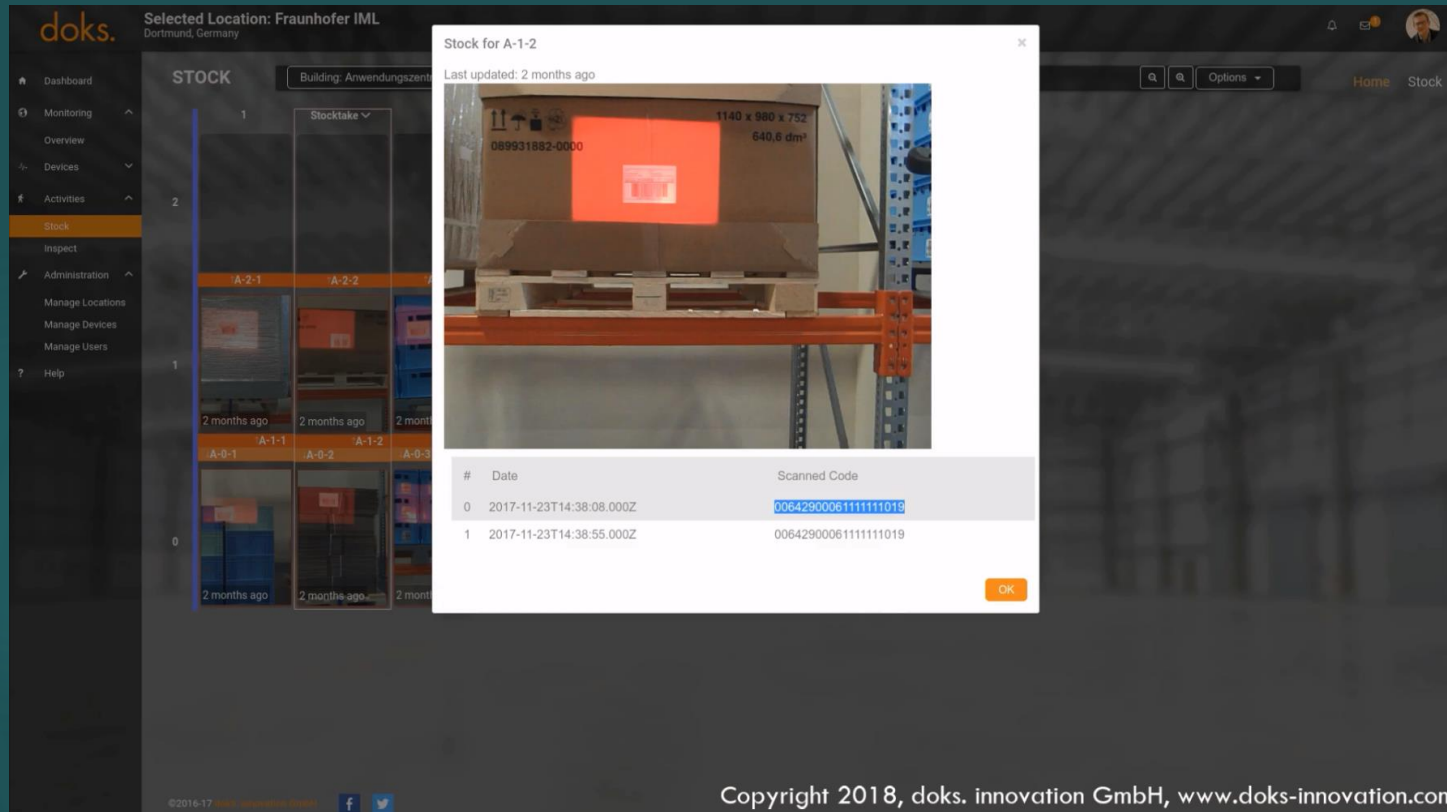
## The UAV's view

- Results of the stereo image sensors



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# Automated flights indoors – InventAIRy®



Selected Location: Fraunhofer IML  
Dortmund, Germany

STOCK Building: Anwendungszentrum

Stocktake

Last updated: 2 months ago

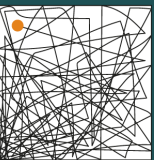
1140 x 980 x 752  
640,6 dm³  
089931882-0000

#	Date	Scanned Code
0	2017-11-23T14:38:08.000Z	00642900061111111019
1	2017-11-23T14:38:55.000Z	00642900061111111019

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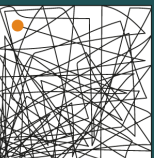
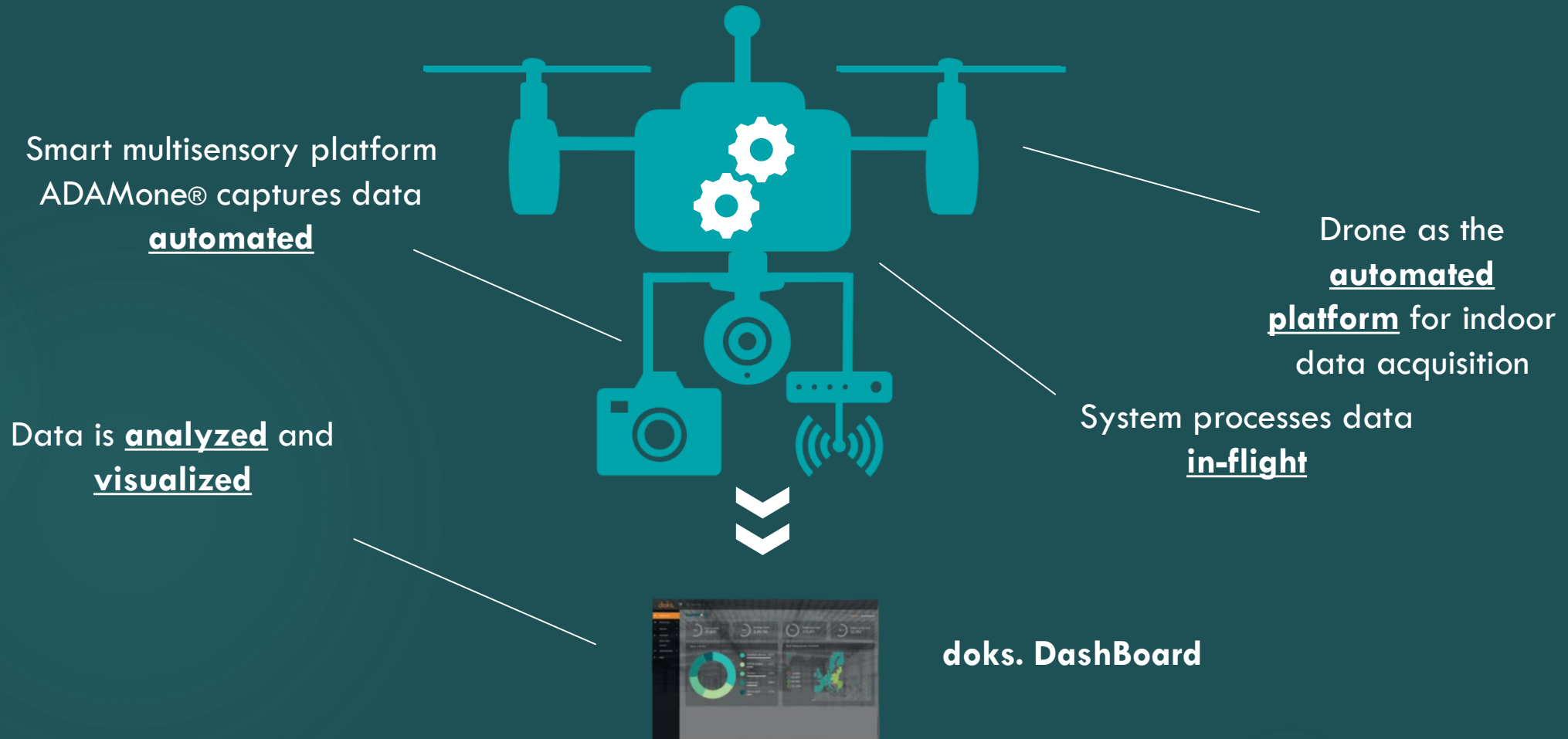
## Visualisation in doks. DashBoard

- Connected to the UAV during flight
- User interface for mission control



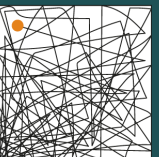
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# UAV and sensor technology



# InventAIRy® - other scenarios

- High rack warehouse
- Block storage warehouse
- Block storage outdoor
- Fleet management outdoor
- Volume calculation outdoor
  - Inventory management for stock piles
  - Inventory management for any industrial bulk material

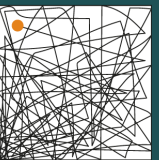


# InventAIRy® - outdoor scenario



## Stock-taking of empties

- Without any additional identifier

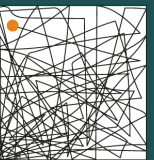


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# InventAIRy® - outdoor scenario



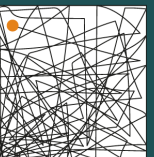
## Results and visualisation



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# InventAIRy® - rich information

- Temperature
- Object quality
- Identifier
  - Barcode
  - QR code
  - RFID
  - NFC
  - Bluetooth
- ...

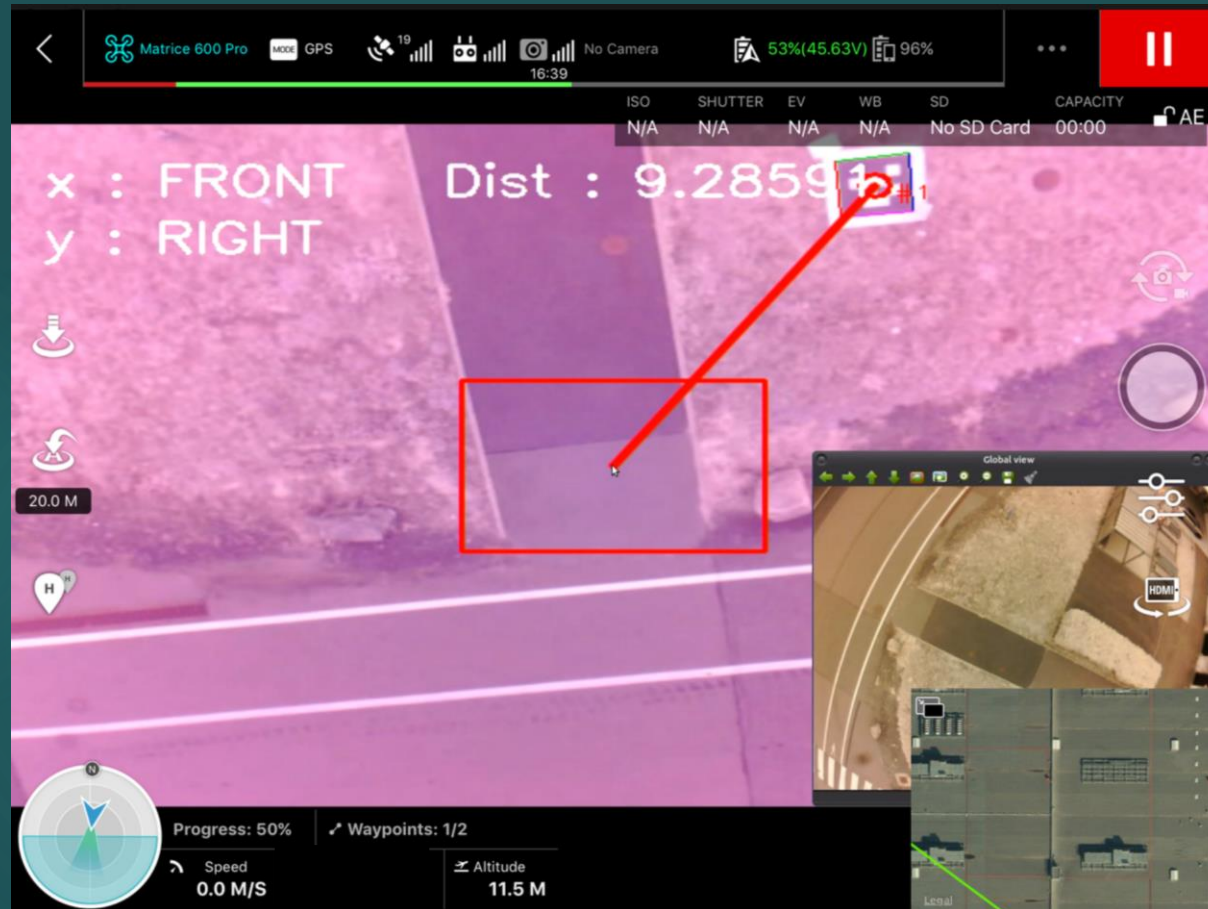




# DelivAIRy® - cooperation with Fraunhofer IML

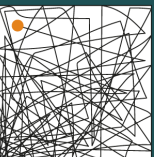
DRONE BASED TRANSPORTATION AND DELIVERY

# DelivAIRy® - time-critical delivery



## Beyond existing infrastructure

- Time reduction up to 80%
- Delivery directly to the production line
- Smart and agile order management via drone logistics hub



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# DelivAIRy® - time-critical delivery



Order via phone or app



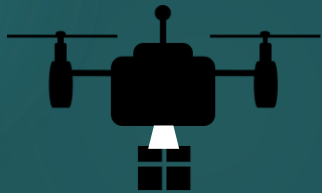
Order management  
in backend



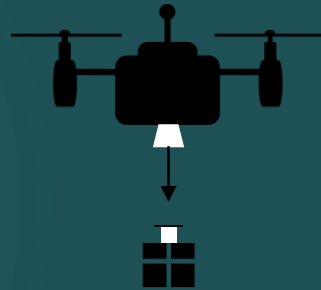
Doublecheck of  
weight



Flight plan activation  
via app



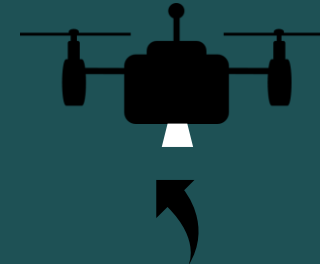
Object is detected by drone,  
automated pick-up process



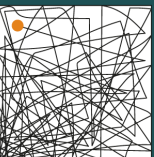
Drone detects landing  
area, automated  
drop



Employee gets  
access to object



Drone flies  
back to drone hub,  
ready for new order

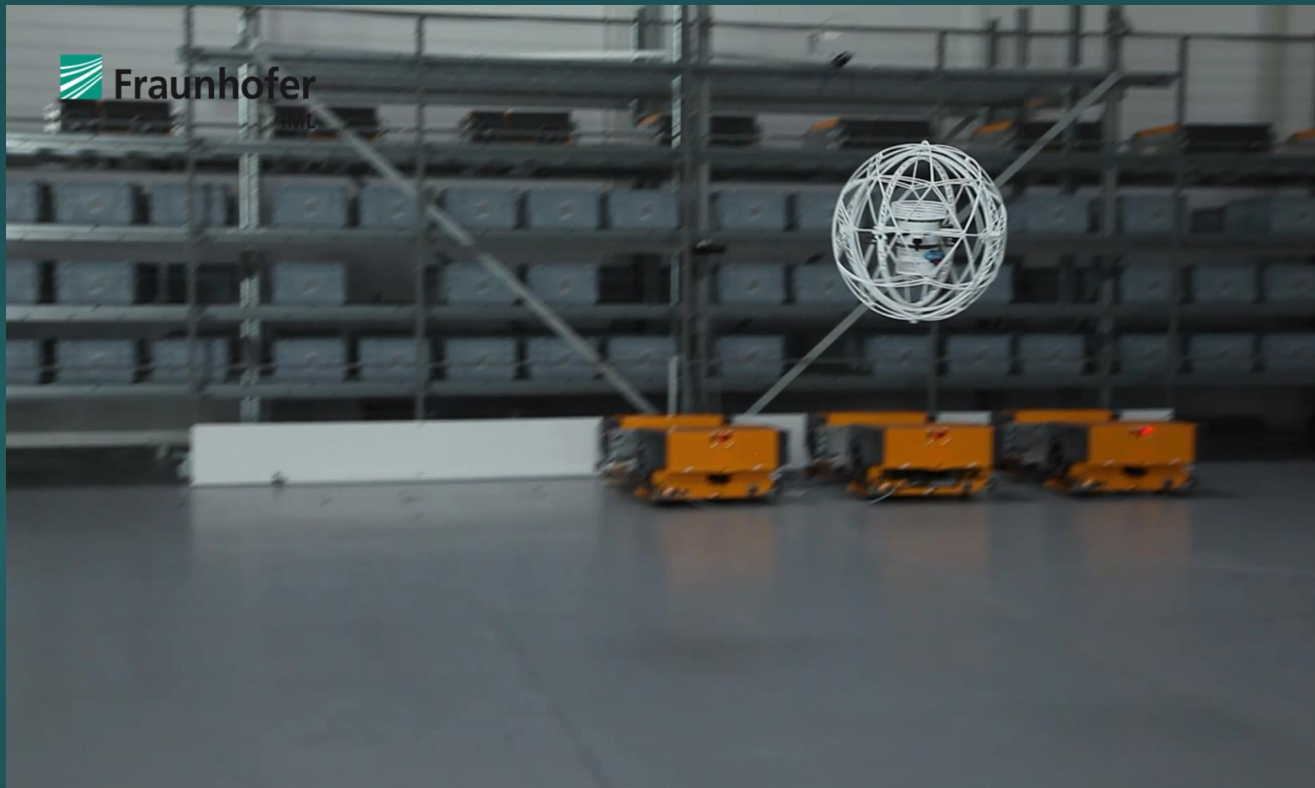


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# Research cooperation – Bin:Go®

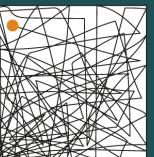
FRAUNHOFER IML, DORTMUND, GERMANY

# Bin:Go® - future of logistics robotics



## Combined mobility, Fraunhofer IML

- Flying
- Rolling
- Delivery, data acquisition

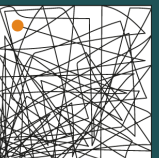
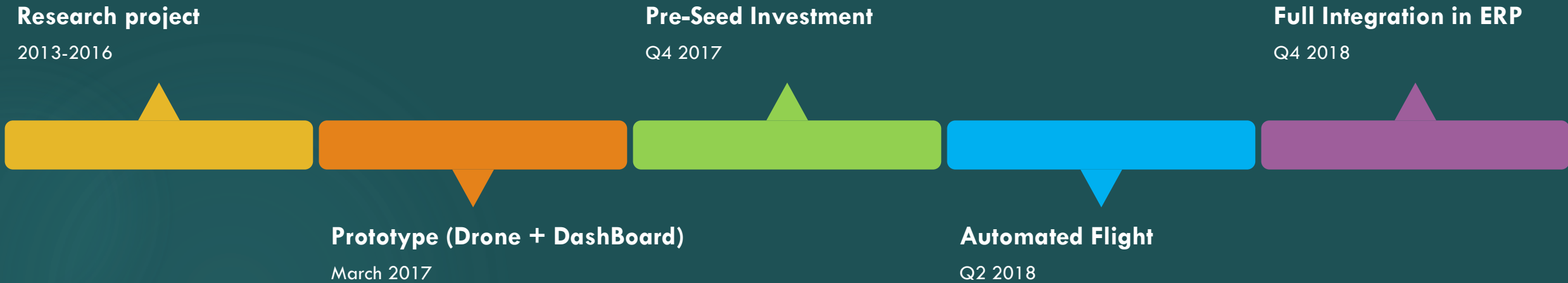


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# The way to go

ROADMAP

# Roadmap for InventAIRy® and doks.



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## doks. innovation GmbH

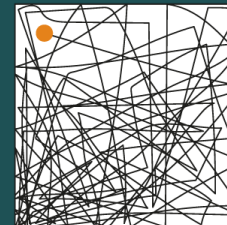
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