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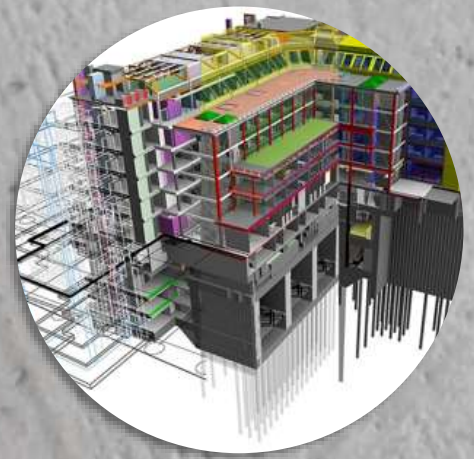
AI for the construction sector

Future trends and perspectives



Outline

Current BBRI AI activities

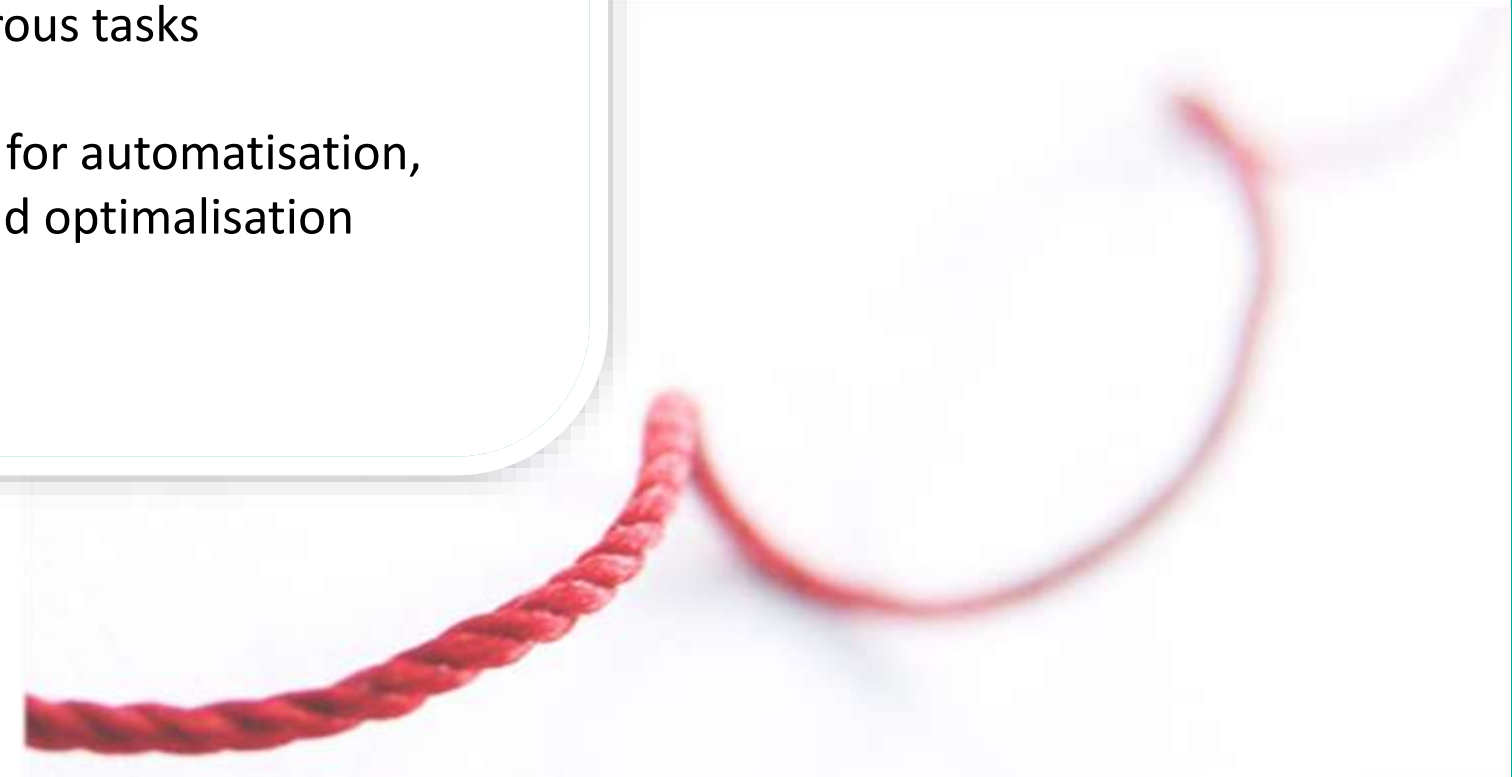
Upcoming trends

Future developments

Take-home message

- AI-techniques will increasingly assist with repetitive, time consuming and/or dangerous tasks

- New possibilities for automatisation, monitoring and optimalisation



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Outline

Current BBRI AI activities

Upcoming trends

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Computer vision applications

Demystifying computer vison

Labeled images

Training
vision system

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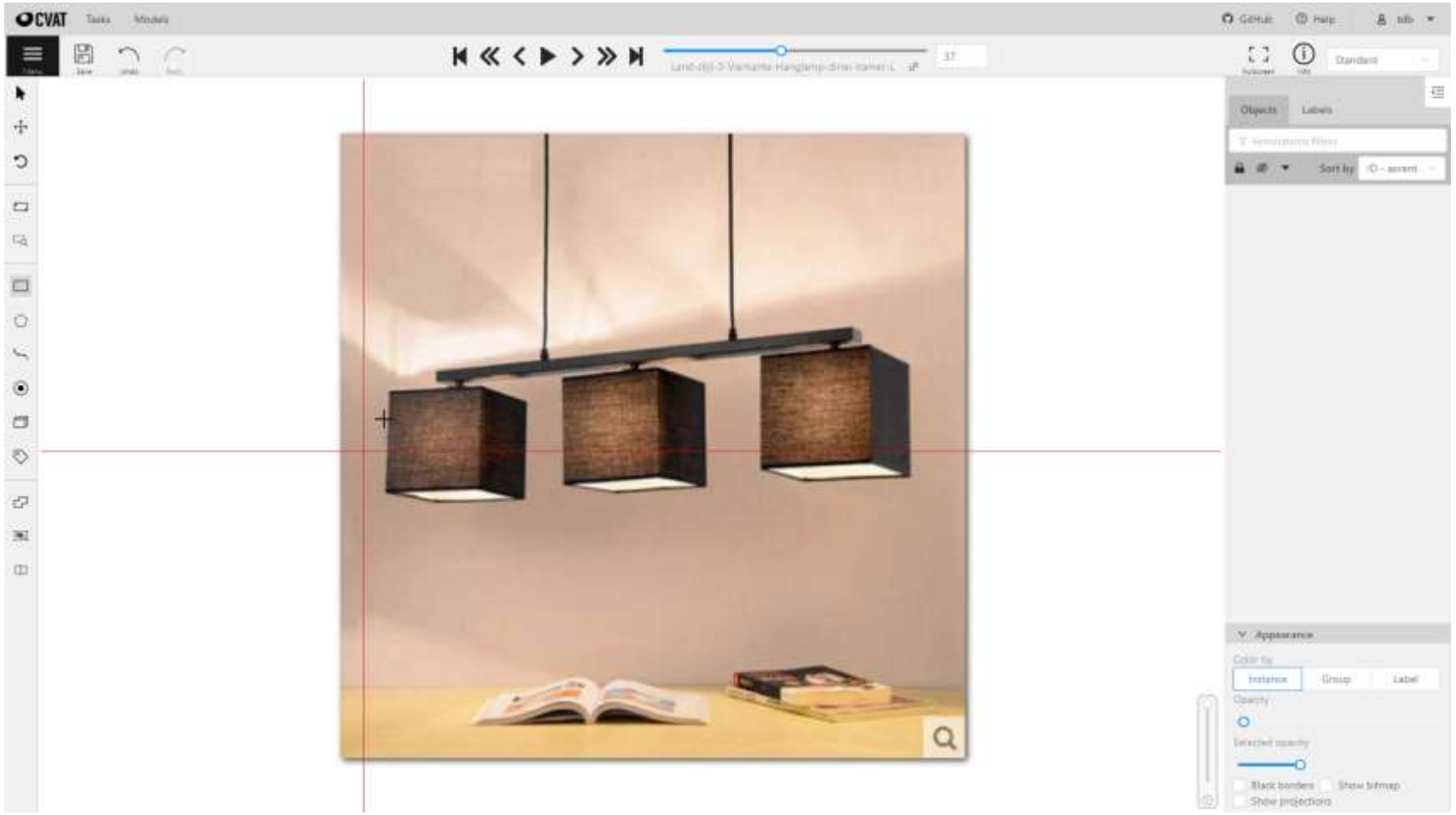
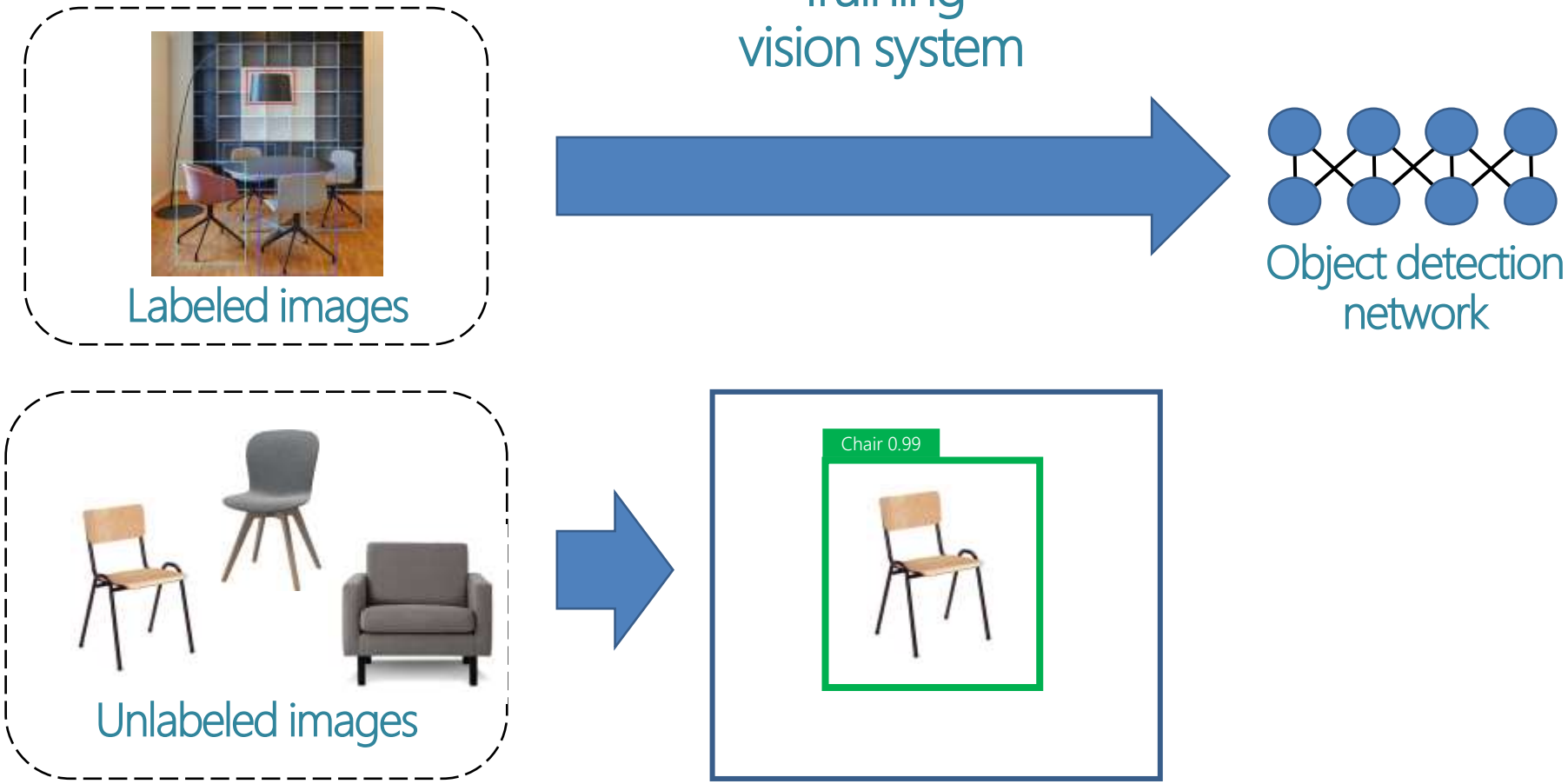
Image labeling



Computer vison



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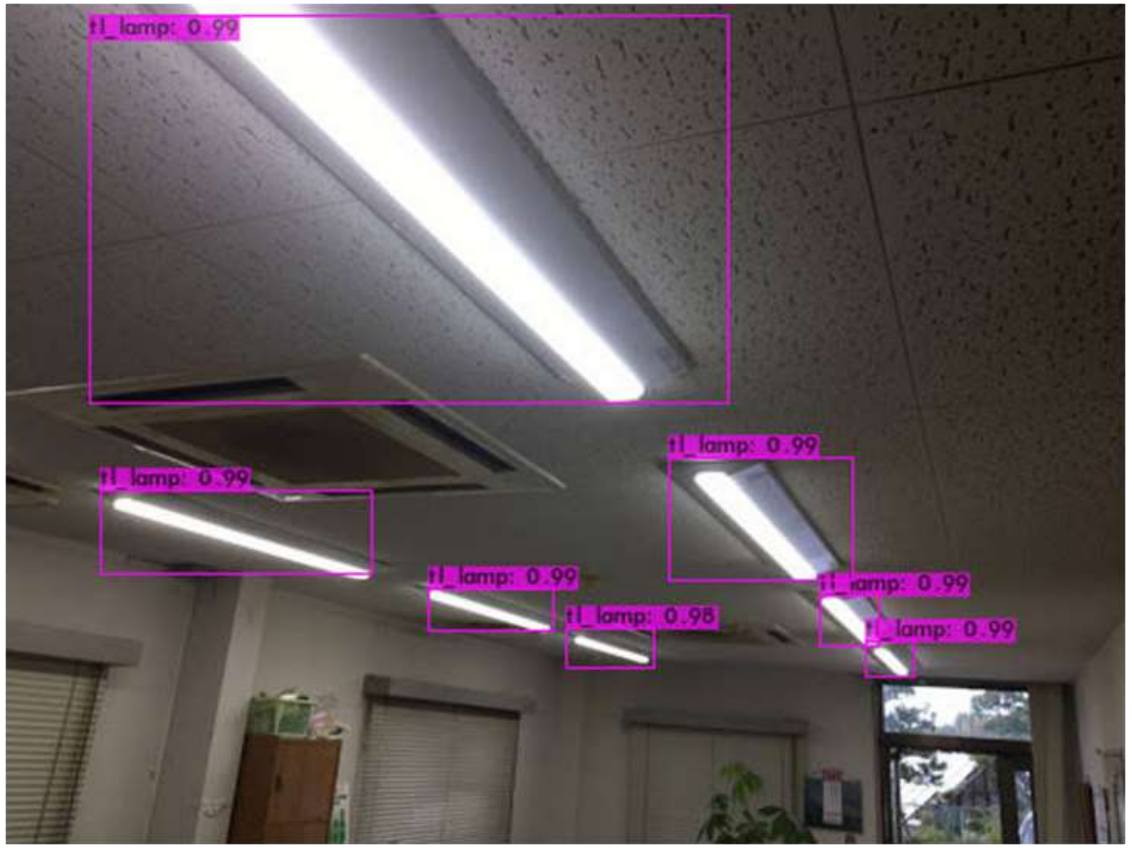
Automatic recognition and quantification

Counting by type, surface area calculation, tracking over time..

BBRI computer vision examples

Automated inventory



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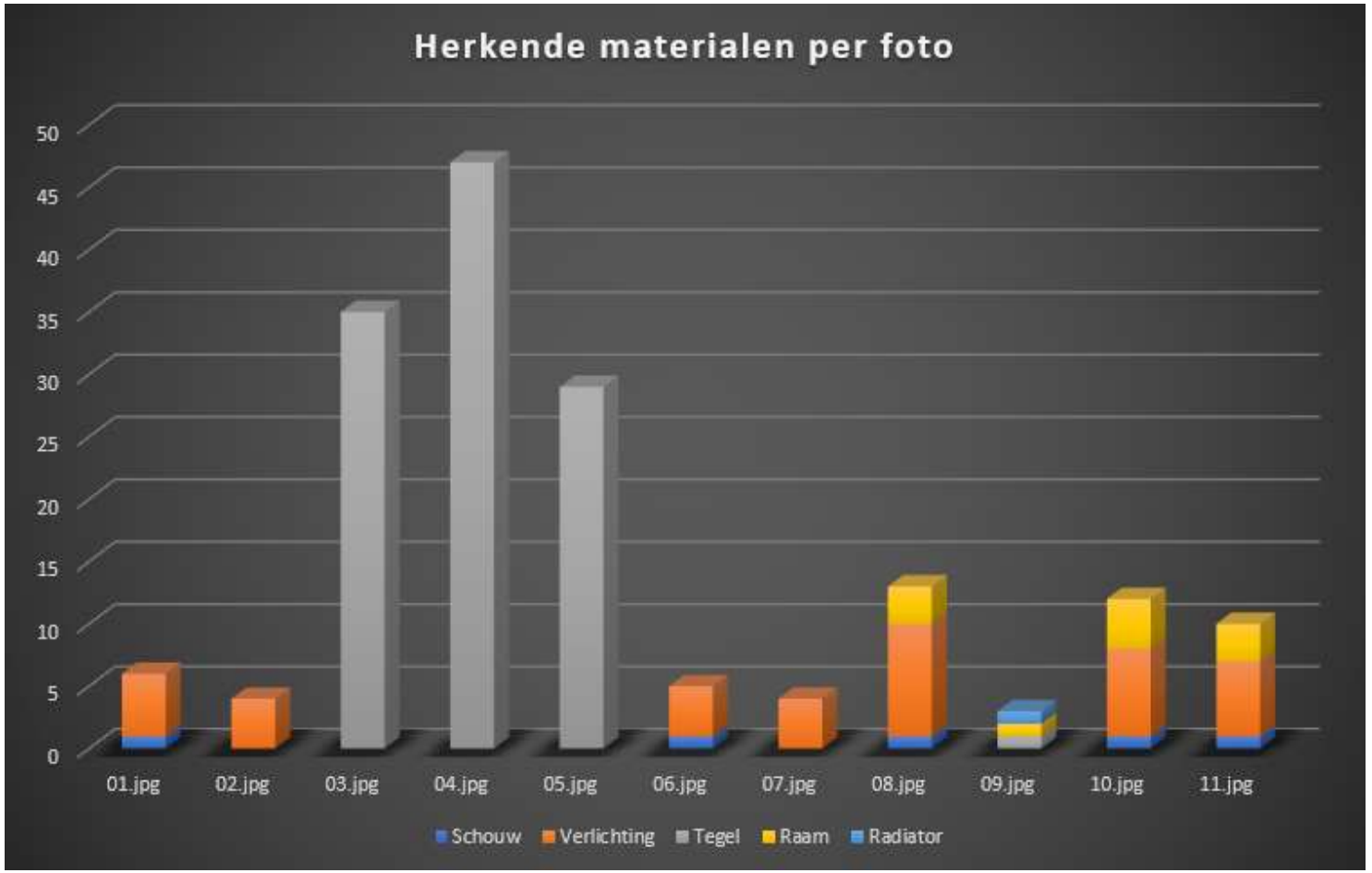
Using 360° images

Inventory output example



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Support for repetitive, time consuming tasks

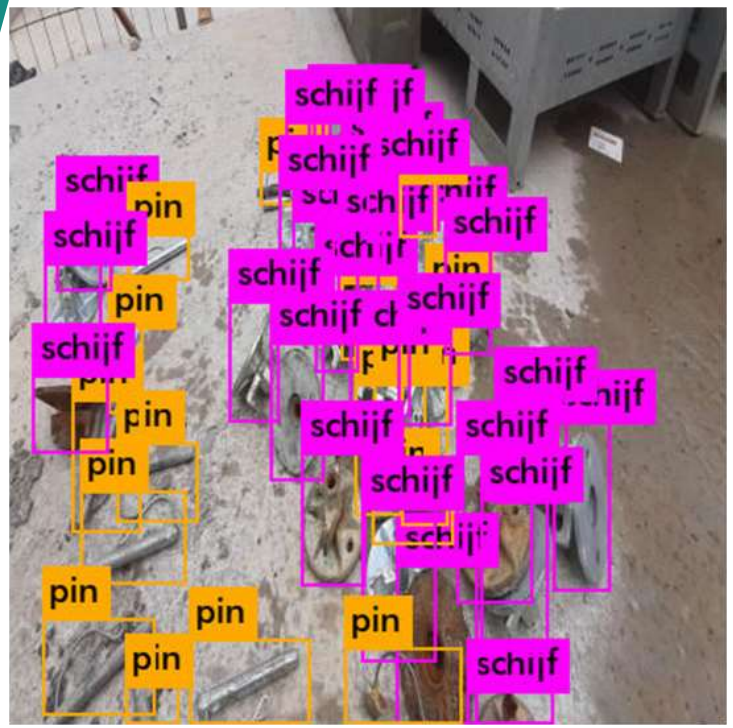
Regona, M., Yigitcanlar, T., Xia, B., & Li, R. Y. M. (2022). Opportunities and Adoption Challenges of AI in the Construction Industry: A PRISMA Review. *Journal of Open Innovation: Technology, Market, and Complexity, 8*(1), 45. Retrieved from https://www.mdpi.com/2199-8531/8/1/45

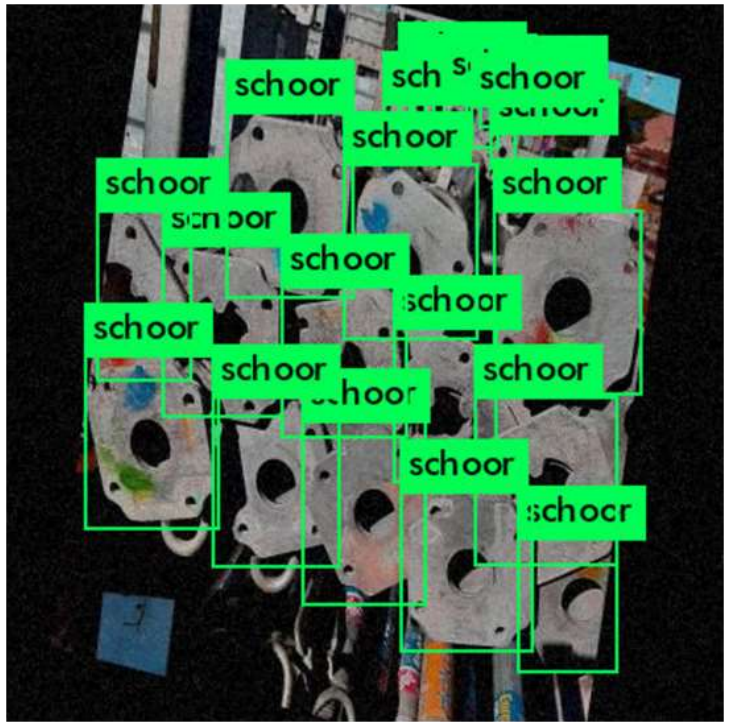
"the major opportunity in adopting AI is to reduce the time spent on repetitive tasks by using big data analytics and improving the work processes"

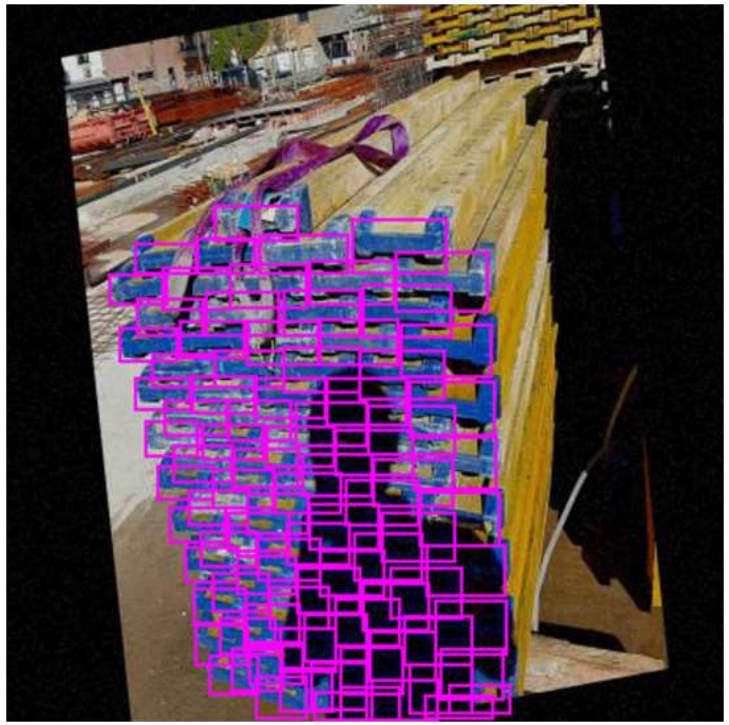
Support for repetitive, time consuming tasks

Challenging conditions

Materials counted by type





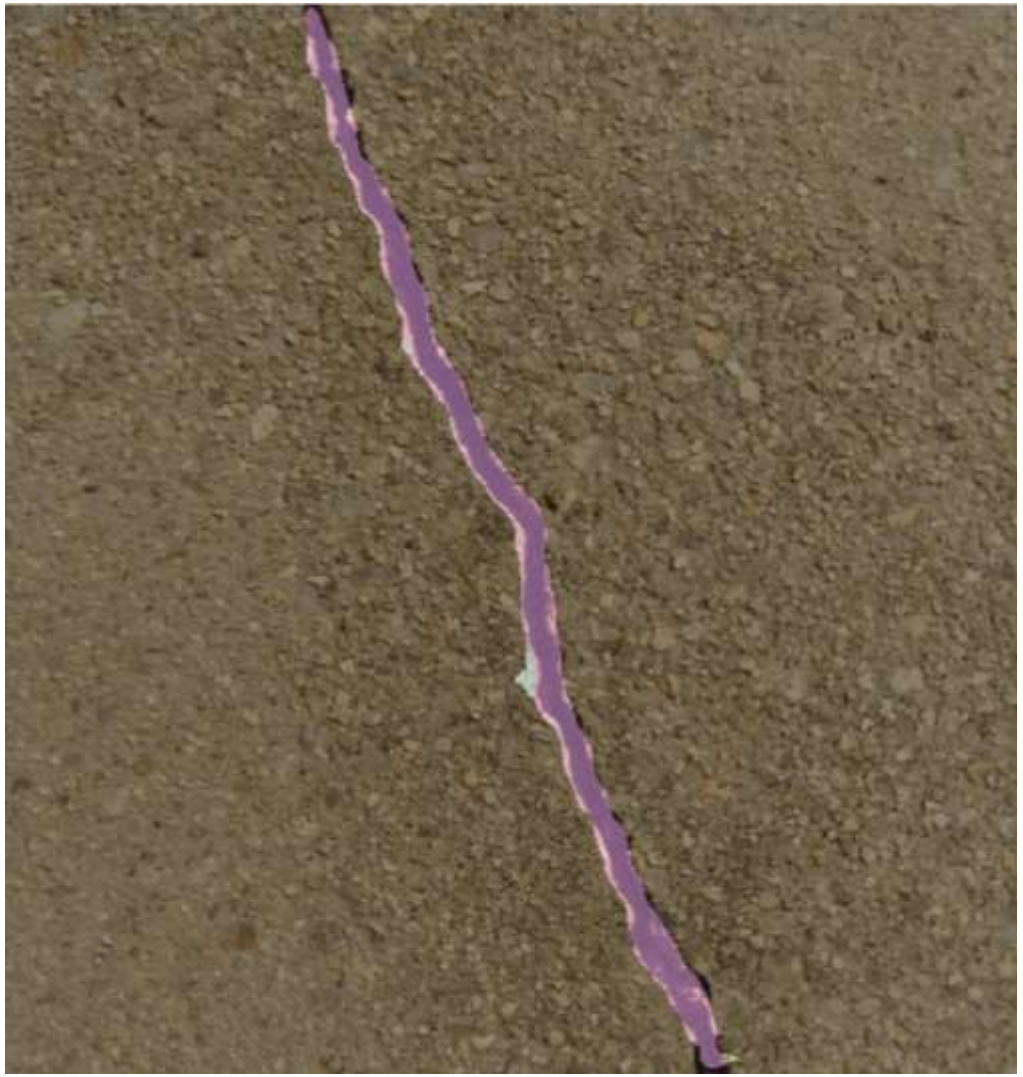


Real-time counting

COVID-19 social distance demo
Nombre de personnes qui courent un risque: 3

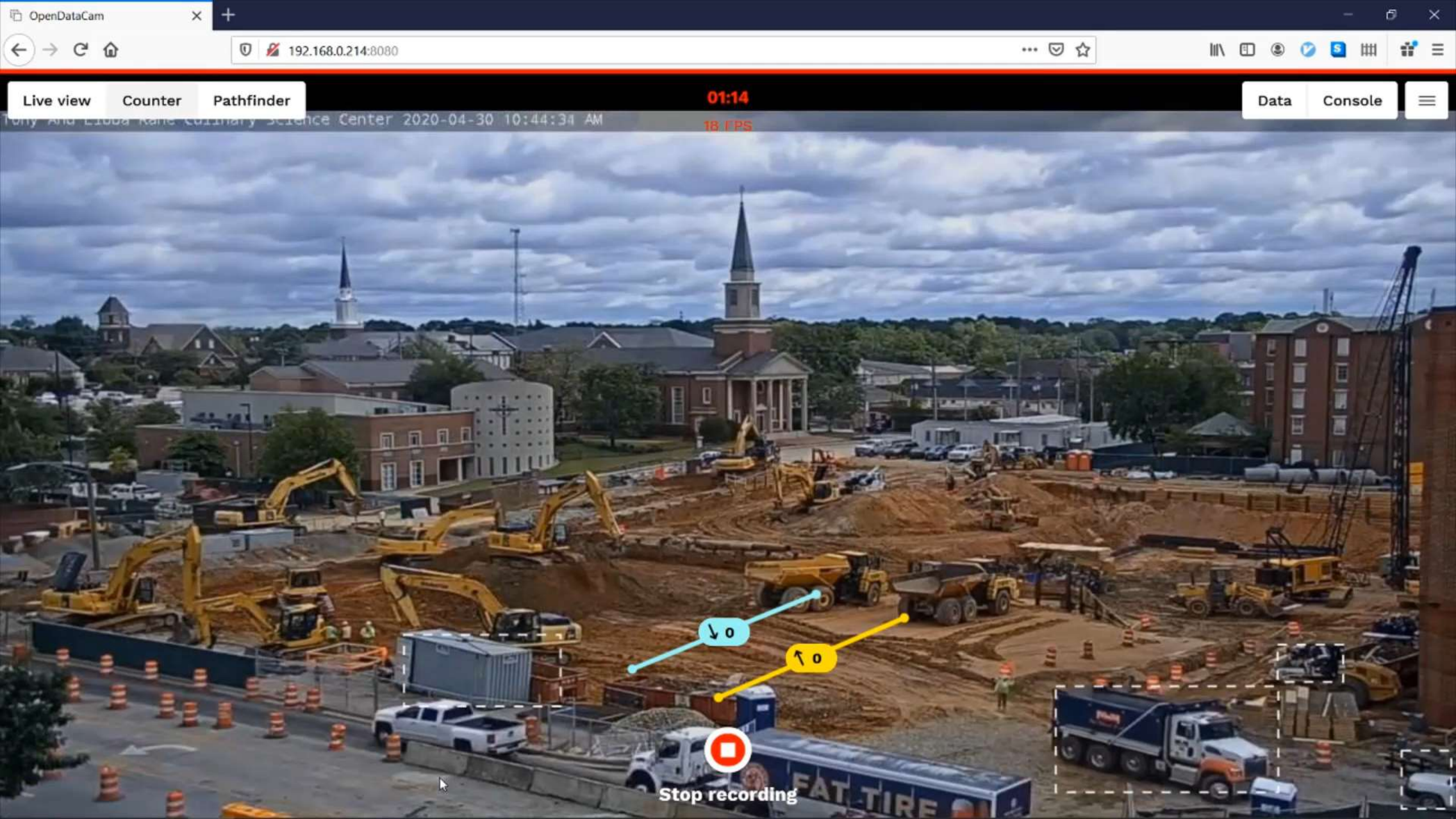
Level A

Pathology recognition



Facade: counting, surface area

Logistics tracking


OpenDataCam
192.168.0.214:8080
Live view
Counter
Pathfinder
01:14
18 FPS
Data
Console
Tony And Libba Rane Culinary Science Center 2020-04-30 10:44:34 AM
0
0
Stop recording

Outline

Current BBRI AI activities

Upcoming trends

Future developments

AI: Increased benefits, higher accessibility

Construction site supervision support

Dashboard: alerts, progress monitoring..

wtcb.be Global supervision of the jobsite

[matrix]

AI analytics

T-storage

ThingsBoard

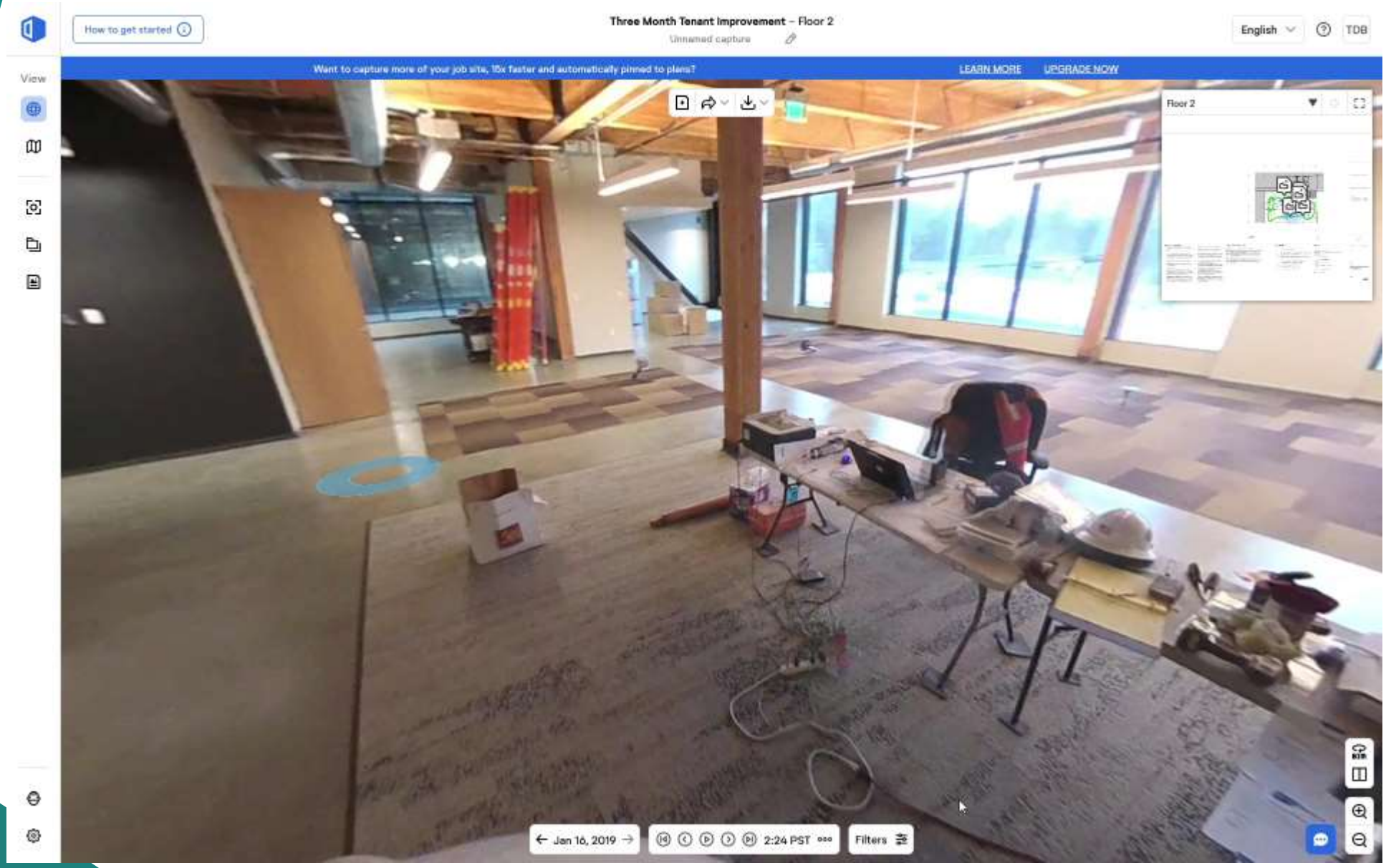
OpenDataCam

OpenDroneMap

Video, image

Reality capture

Automated progress monitoring


How to get started
Three Month Tenant Improvement – Floor 2
Unnamed capture
English
TDB
View
Want to capture more of your job site, 10x faster and automatically pinned to plans?
LEARN MORE
UPGRADE NOW
Floor 2
Jan 16, 2019
2:24 PST
Filters

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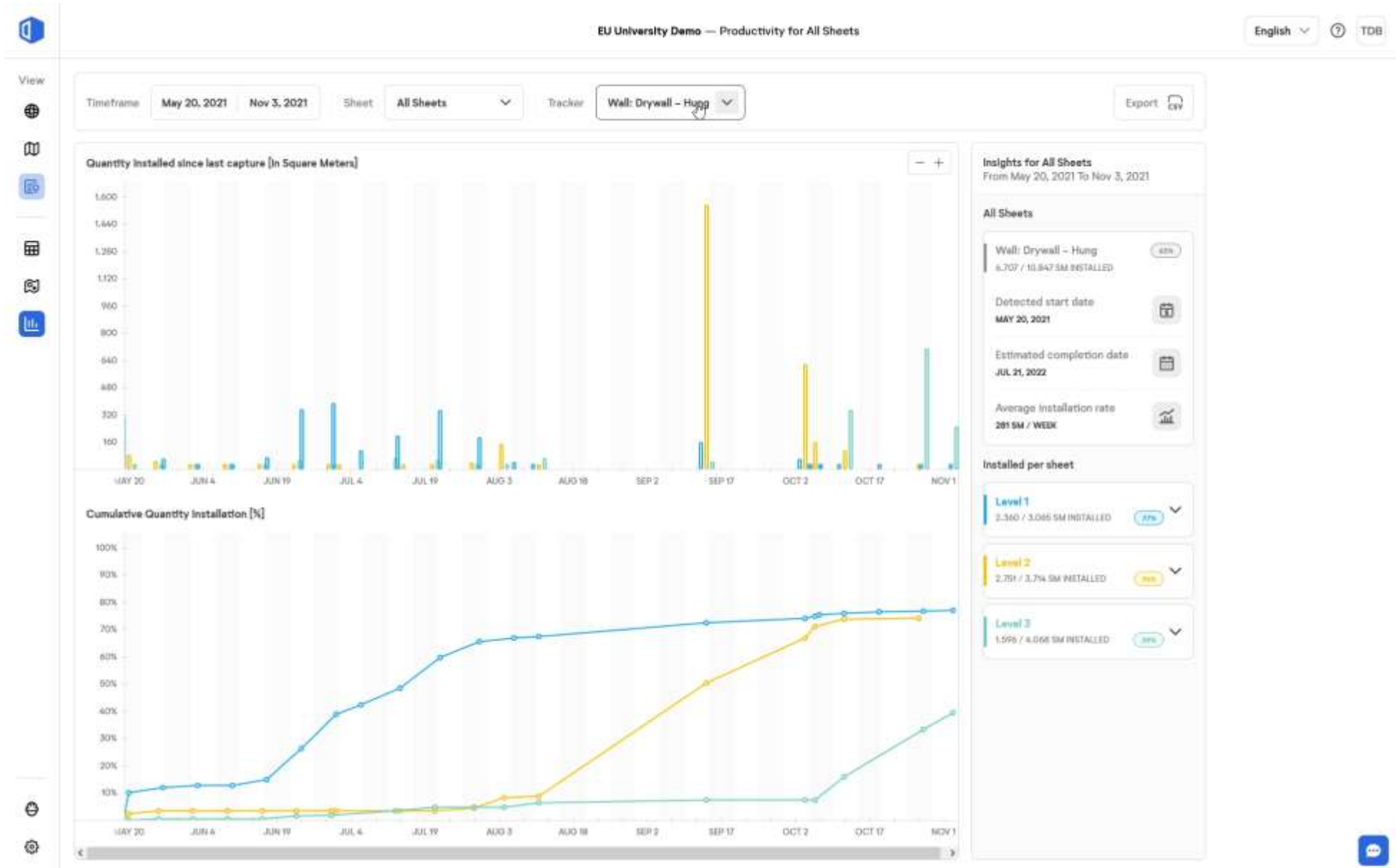
EU University Demo — Productivity for All Sheets
English
TDB
View
Timeframe
May 20, 2021
Nov 3, 2021
Sheet
All Sheets
Tracker
Wall: Drywall – Hung
Export
CSV
Quantity installed since last capture [In Square Meters]
1,600
1,440
1,280
1,120
960
800
640
480
320
160
MAY 20
JUN 4
JUN 19
JUL 4
JUL 19
AUG 3
AUG 18
SEP 2
SEP 17
OCT 2
OCT 17
NOV 1
Cumulative Quantity Installation [%]
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
Insights for All Sheets
From May 20, 2021 To Nov 3, 2021
All Sheets
Wall: Drywall – Hung
Detected start date
MAY 20, 2021
Estimated completion date
JUL 21, 2022
Average installation rate
201 SM / WEEK
Installed per sheet
Level 1
2,360 / 3,085 SM INSTALLED
Level 2
2,751 / 3,714 SM INSTALLED
Level 3
1,596 / 4,068 SM INSTALLED

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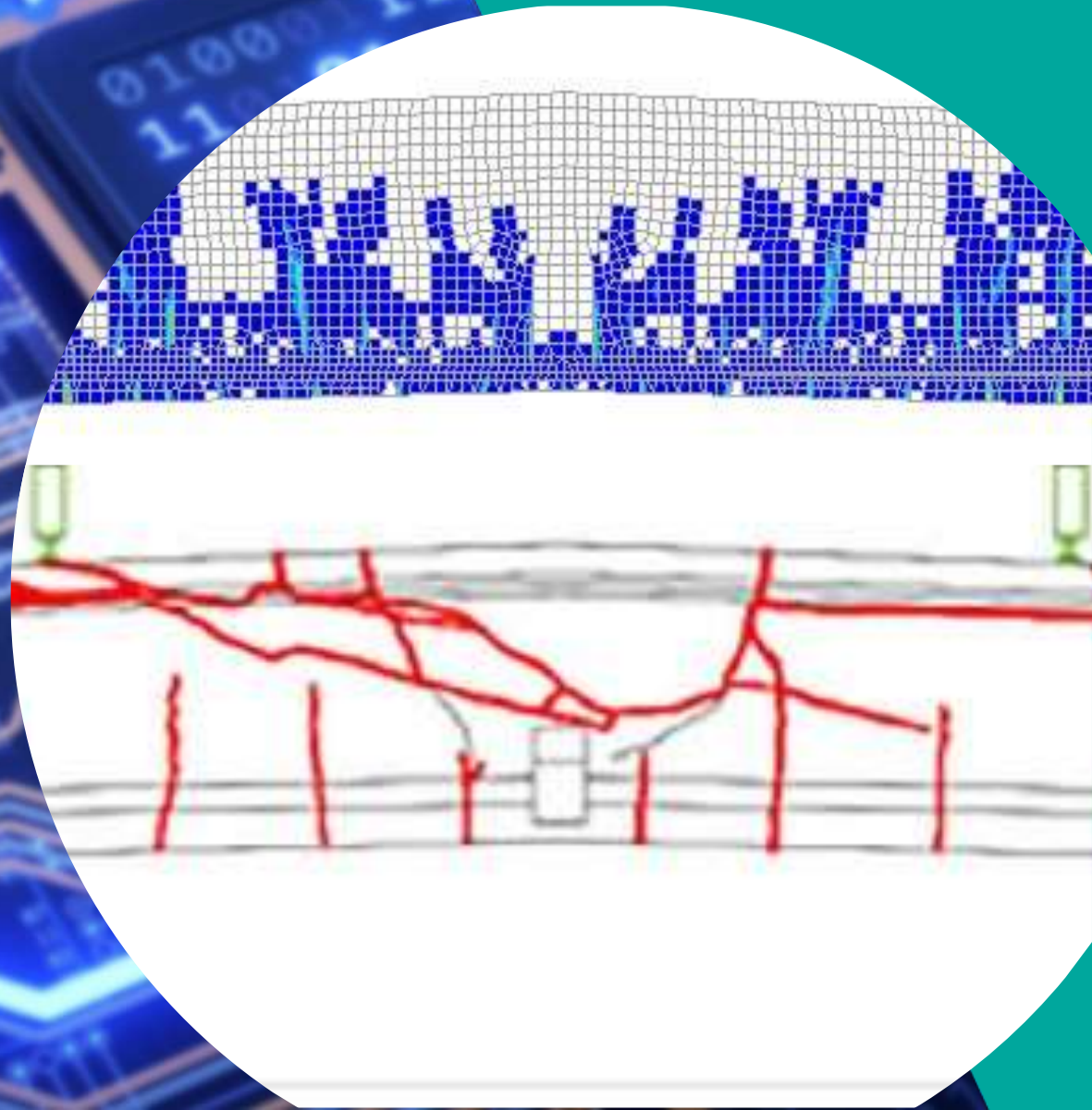
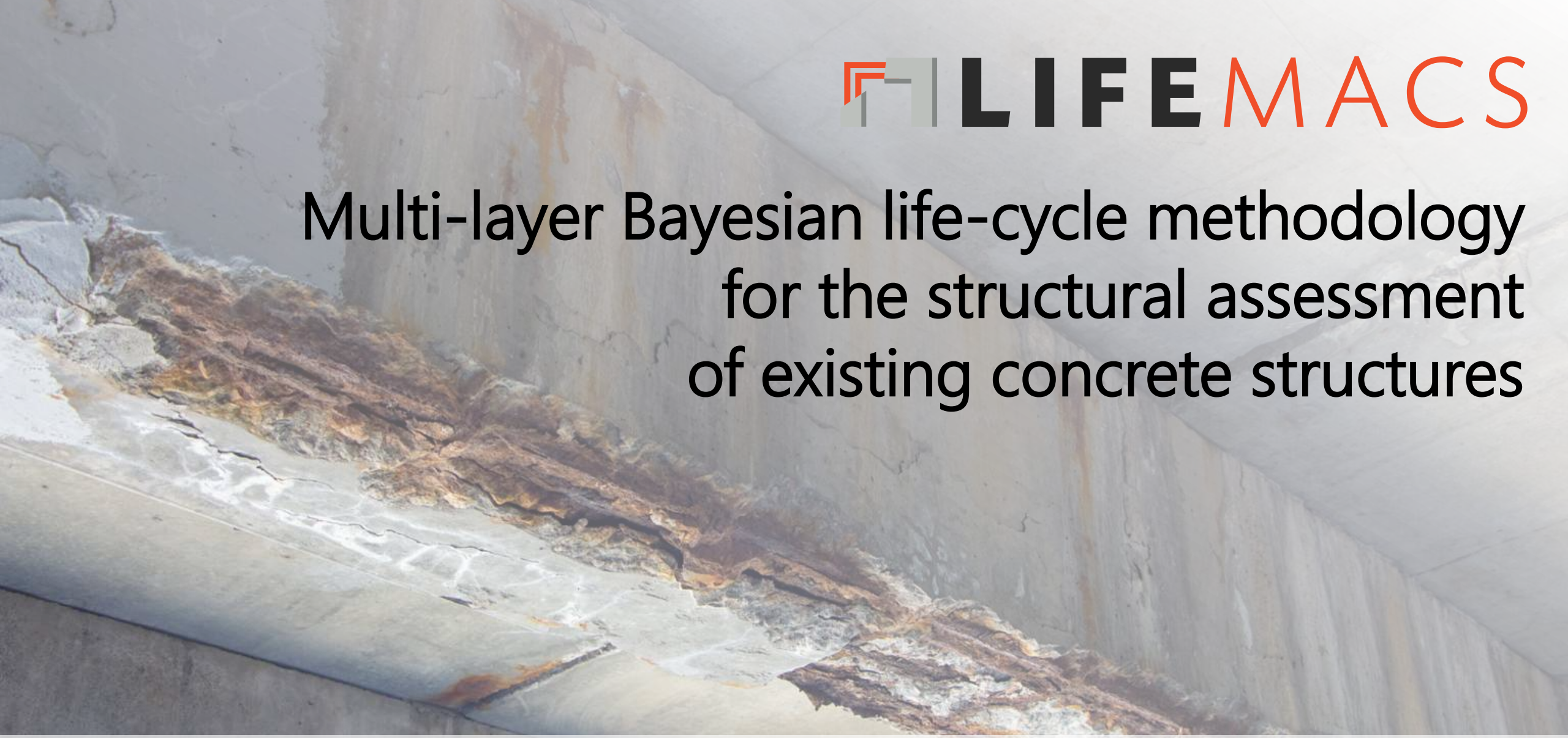
Data-driven predictions





LIFEMACS

Multi-layer Bayesian life-cycle methodology for the structural assessment of existing concrete structures

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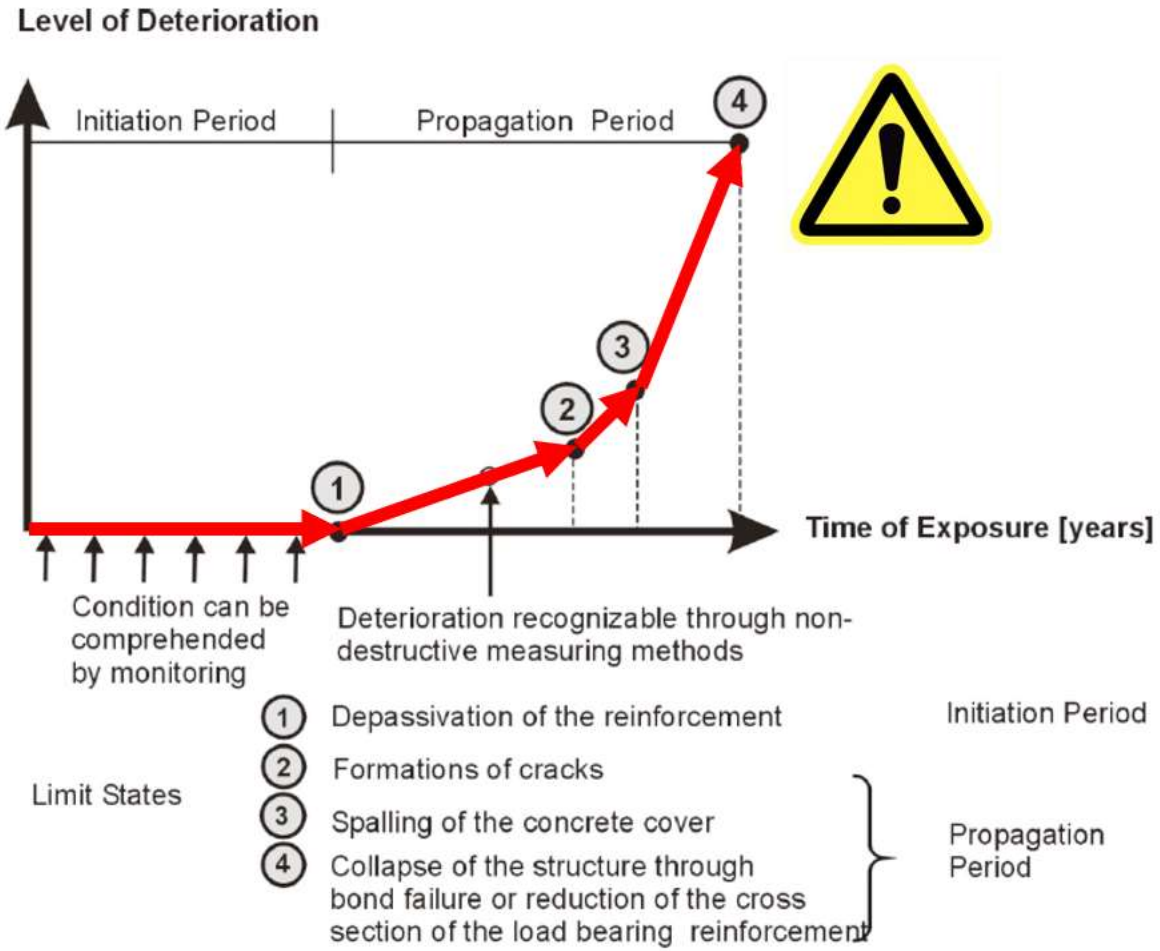
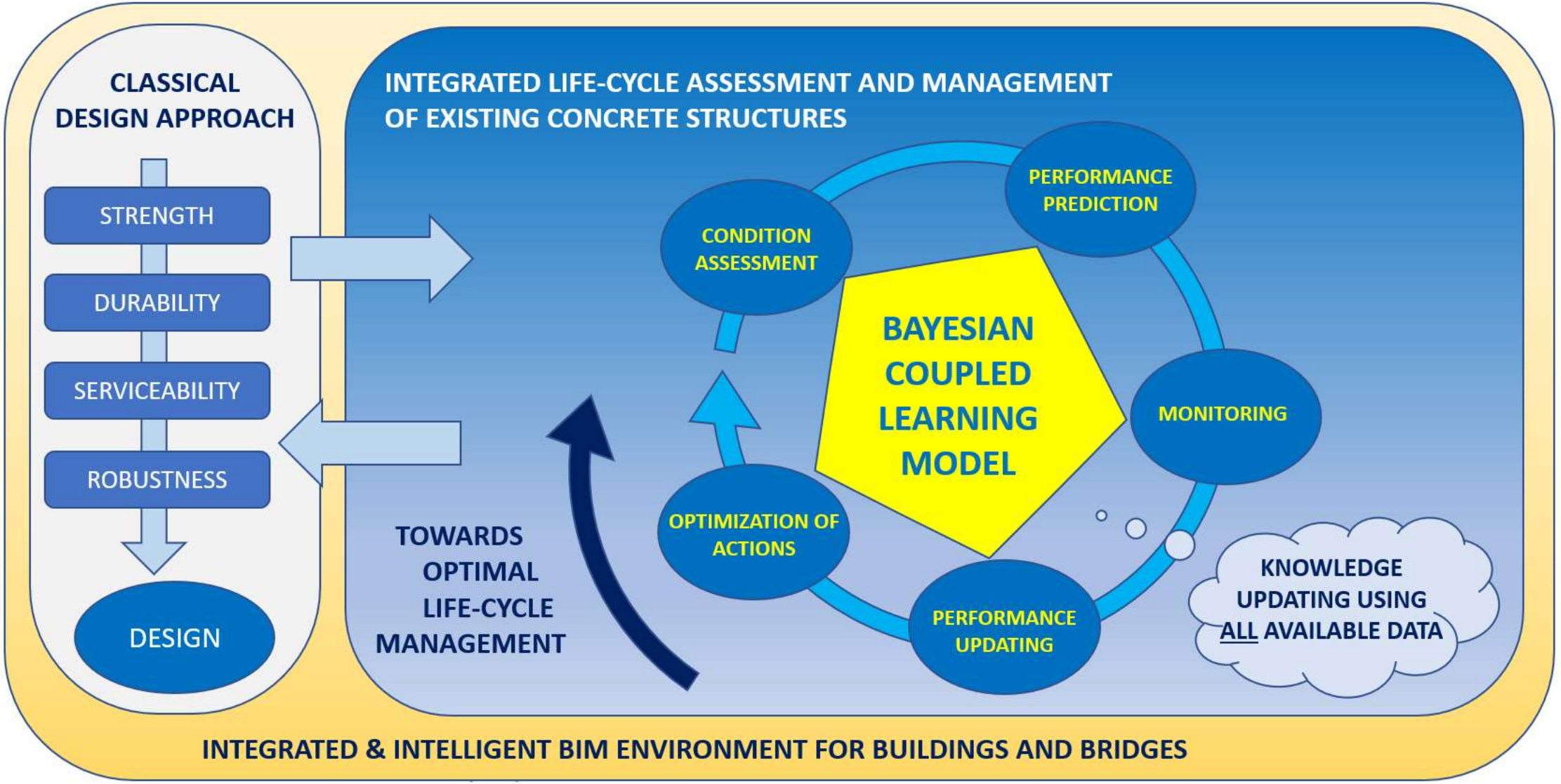
fwo

Deterioration of concrete structures



Overview



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FROM INNOVATION TO BUSINESS

DEEP CONSTRUCT

AI powered collaborative platform to optimize usage of shared resources in the construction industry

TRAXXEO – SAGACIFY – UCLouvain – Multitel - CSTC

KICK-OFF 22/10/2021

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INNOVATIVE NATURE OF THE PROJECT - VISUAL

SKWIZ V1

Automate the extraction of information from invoices and receipts using artificial intelligence

- Invoices
- Expenses
- New document type (30 work days)

DEEP CONSTRUCT

SKWIZ V2

Platform for the implementation of document processing automation systems

- All document types

INPUT
Send docs by emails, API, Skwiz app, ...

PRE-PROCESSING
Image cleaning, OCR, word bounding boxes detection

DOCUMENT SPLIT
Split files with many documents

DOCUMENT CLASSIFICATION
Into invoice, payslip, contract, ...

ENTITY EXTRACTION
Amounts, dates, numbers, names, ...

LINE ITEM EXTRACTION
From table structures

BUSINESS RULES
Classification & entity prediction validation

HUMAN REVIEW
Optional review and quality control for uncertain predictions

OUTPUT
Automated metadata encoding in system, support RPA, ...

SKWIZ PLATFORM

Competitive advantages:

- Cutting-edge performance
- User in control of the process
- Data privacy by design
- Focus on European languages
- Reduced learning time with Active Learning

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Increased safety, semi-automated scanning

Versatile, expandable platform

digital wallonia .be

Wallonie

BUILD4WAL

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All-terrain

Safe

DRIVE
SPOT CAM 360
Tablet:
STOP
1.0x
MED
HT
Stand
Stairs

BostonDynamics

Outline

Current BBRI AI activities

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Looking ahead

Research-based predictions

Consulted external sources:

Akinosho, T. D., Oyedele, L. O., Bilal, M., Ajayi, A. O., Delgado, M. D., Akinade, O. O., & Ahmed, A. A. (2020). Deep learning in the construction industry: A review of present status and future innovations. *Journal of Building Engineering, 32*, 101827. doi:https://doi.org/10.1016/j.jobe.2020.101827

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Boje, C., Guerriero, A., Kubicki, S., & Rezgui, Y. (2020). Towards a semantic Construction Digital Twin: Directions for future research. *Automation in Construction, 114*, 103179. doi:https://doi.org/10.1016/j.autcon.2020.103179

Darko, A., Chan, A. P. C., Adabre, M. A., Edwards, D. J., Hosseini, M. R., & Ameyaw, E. E. (2020). Artificial intelligence in the AEC industry: Scientometric analysis and visualization of research activities. *Automation in Construction, 112*, 103081. doi:https://doi.org/10.1016/j.autcon.2020.103081

Pan, Y., & Zhang, L. (2021). Roles of artificial intelligence in construction engineering and management: A critical review and future trends. *Automation in Construction, 122*, 103517. doi:https://doi.org/10.1016/j.autcon.2020.103517

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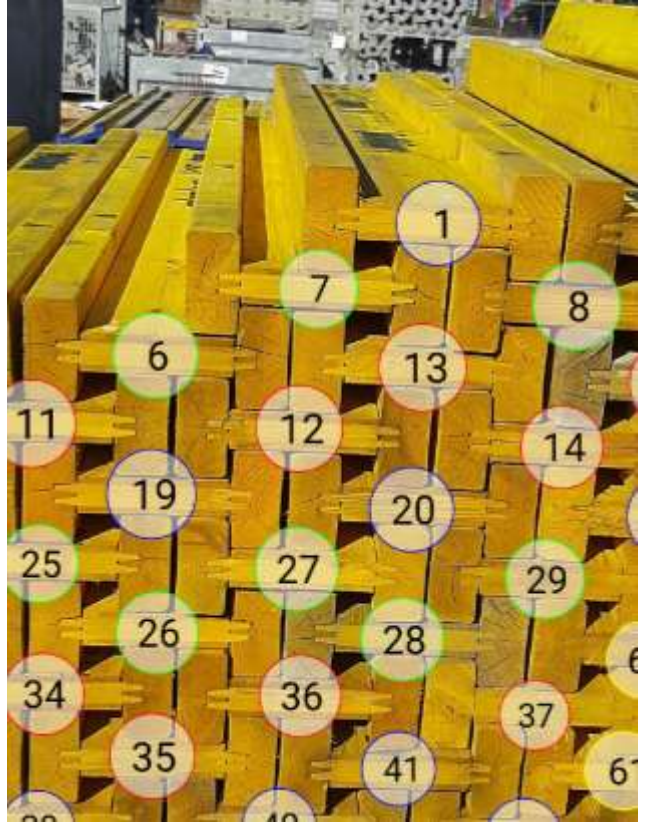
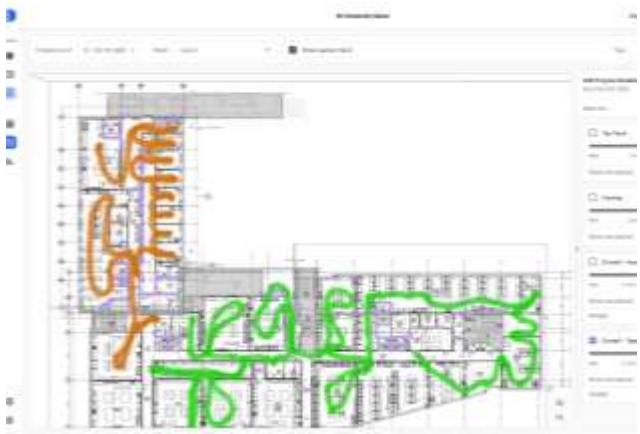
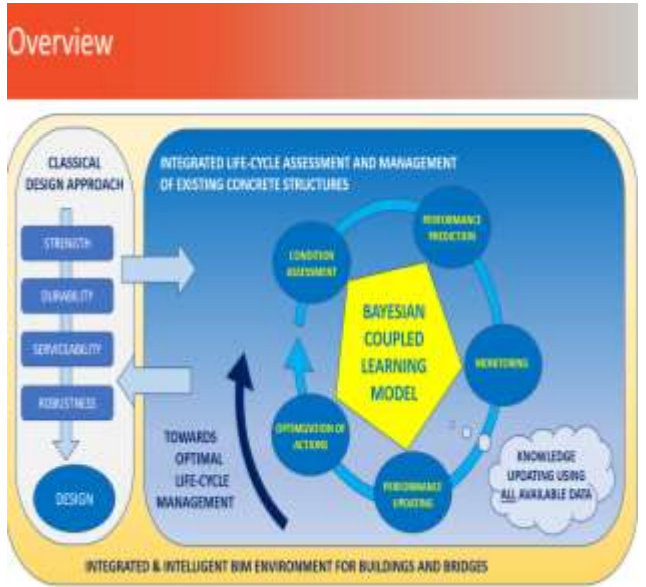
Take-home message

- AI-techniques will increasingly assist with repetitive, time consuming and/or dangerous tasks
- New possibilities for automatisation, monitoring and optimalisation







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Get the new hand-outs about AI quick-wins for construction!

Praktische problemen oplossen met AI tools

Quick-wins van 360° camera's

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