MAJANDUS- JA KOMMUNIKATSIOONI-MINISTEERIUM

Consultative stakeholder meeting

October 23, 2019
Tallinn, Estonia

see it. get it. do it.

Introducing a Building Information Model (BIM)-based process for building permits in Estonia

Funded by the Structural Reform Support Programme of the European Union and implemented by Future Insight Group B.V. in cooperation with the European Commission's Structural Reform Support Service (SRSS).
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Introductions

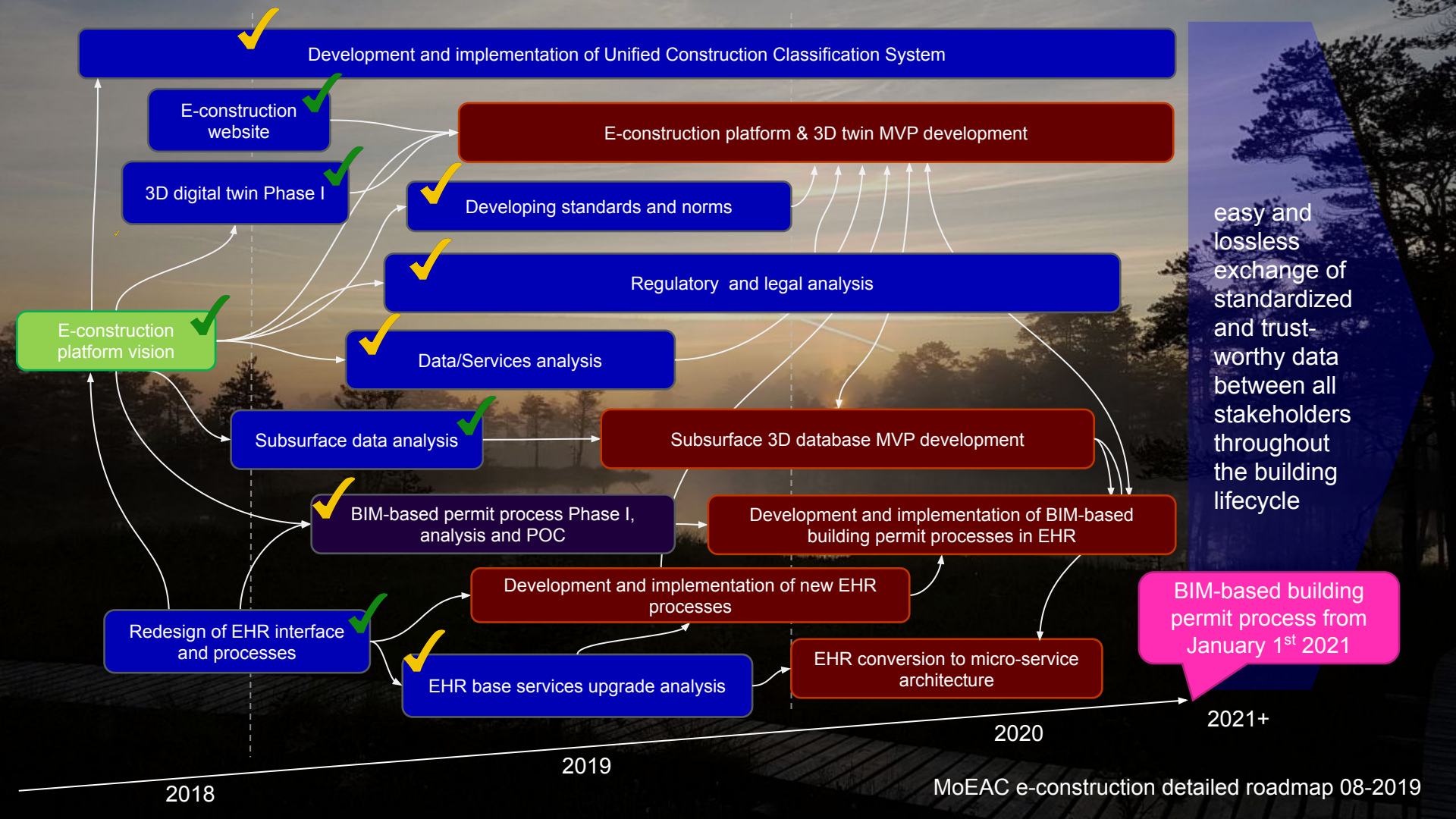
Ministry of Economic Affairs and Communications	- Jaan Saar - Taavi Jakobson
SRSS	- Michela Foresti
Future Insight	- Rick Klooster - Judith van Deth - Léon van Berlo - Stephan Meijer
Meet other attendees	

Program

- Project so far
- Proof of concept
- Recommendations
- Mockups UX
- Next steps/implementation
- Questions

Project so far

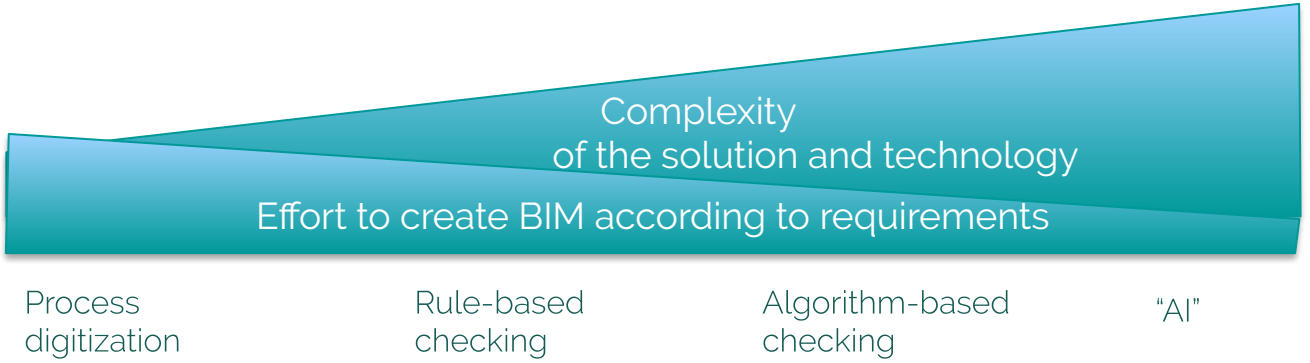
This project is part of the **e-construction platform** vision with interdependent links to other ongoing and planned developments.


Development and implementation of Unified Construction Classification System
E-construction website
E-construction platform & 3D twin MVP development
3D digital twin Phase I
Developing standards and norms
Regulatory and legal analysis
E-construction platform vision
Data/Services analysis
Subsurface data analysis
Subsurface 3D database MVP development
BIM-based permit process Phase I, analysis and POC
Development and implementation of BIM-based building permit processes in EHR
Development and implementation of new EHR processes
Redesign of EHR interface and processes
EHR base services upgrade analysis
EHR conversion to micro-service architecture
easy and lossless exchange of standardized and trust-worthy data between all stakeholders throughout the building lifecycle
BIM-based building permit process from January 1st 2021
2018
2019
2020
2021+
MoEAC e-construction detailed roadmap 08-2019

Project so far

1st Consultative stakeholder meeting 11-07-19

- Highlights technical report & meeting
  - High level BIM expertise in Estonia
  - Increase transparency
  - Include area checks (eg. detailed plans)
  - Speed up permit process
  - Minimize extra requirements
  - Rule-based vs Algorithm-based



Proof of Concept

- The starting points
- The interface
- The checks
- Recommendations

The starting points

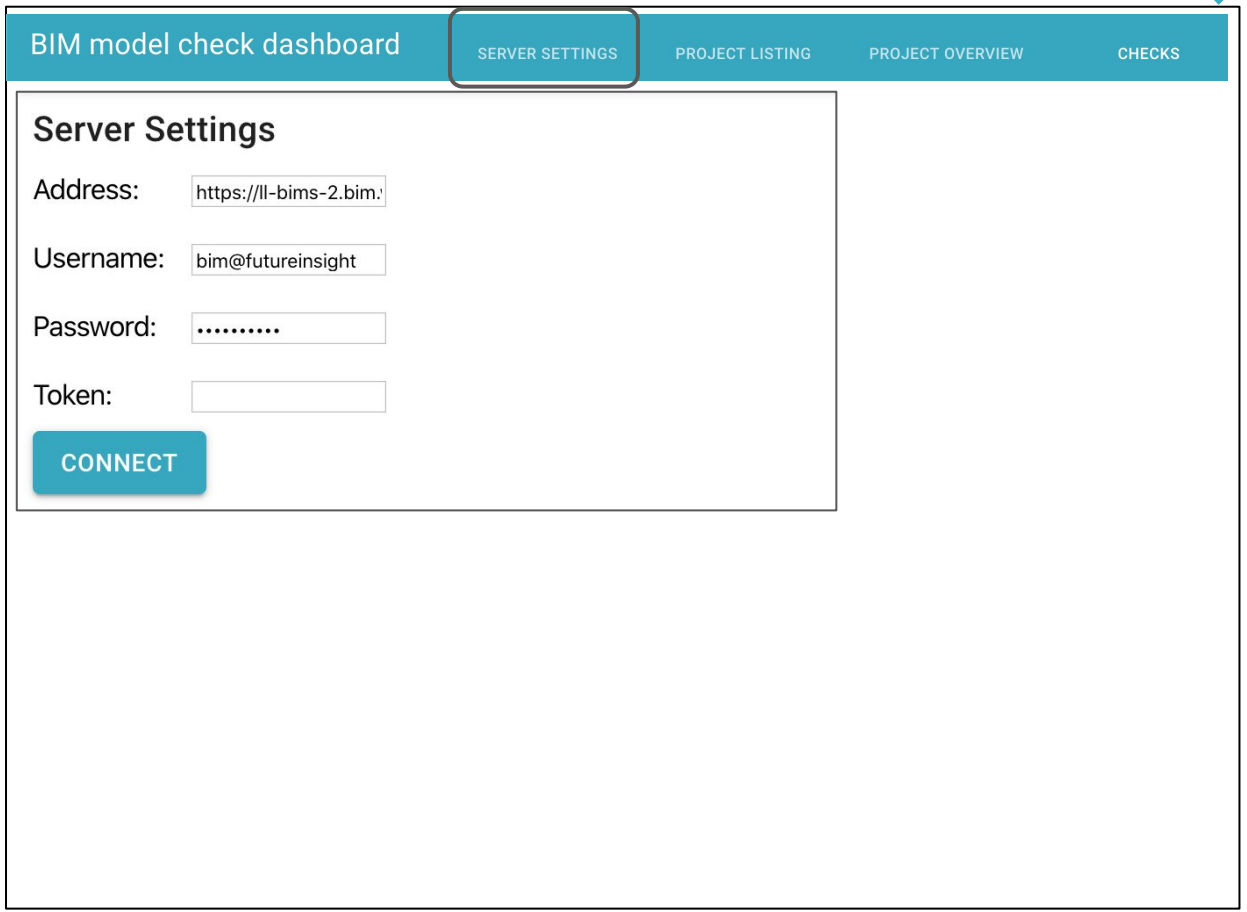
- IFC for building
- Upcoming “IFC infra extensions”
- CityGML for 3D city models
- ADE’s for extensions of city models

The starting points

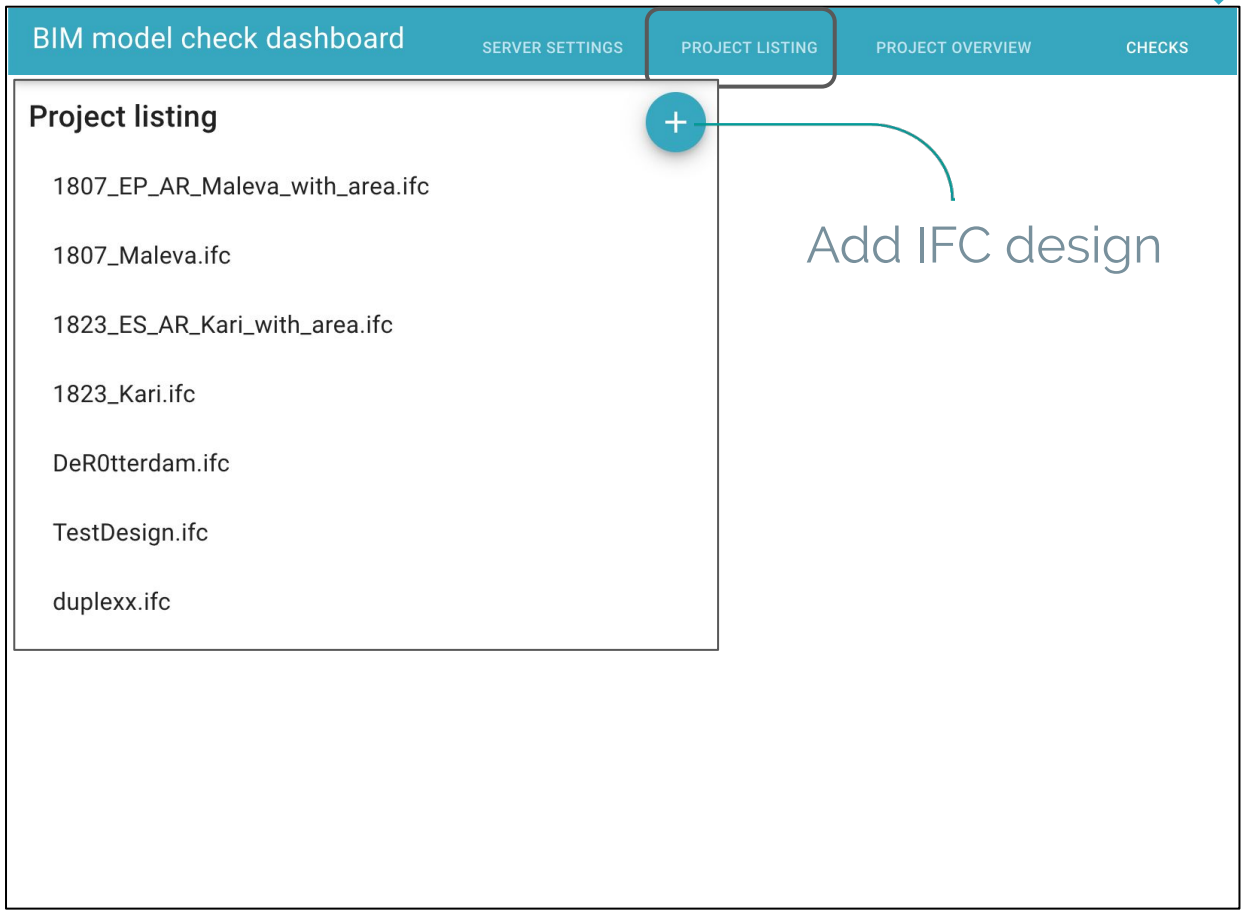
- Check both building and usage permit
- Web-based
- Easy interface
- Rule-based & algorithm-based
- Open standards
- Works based on the Estonian BIM standard

The interface

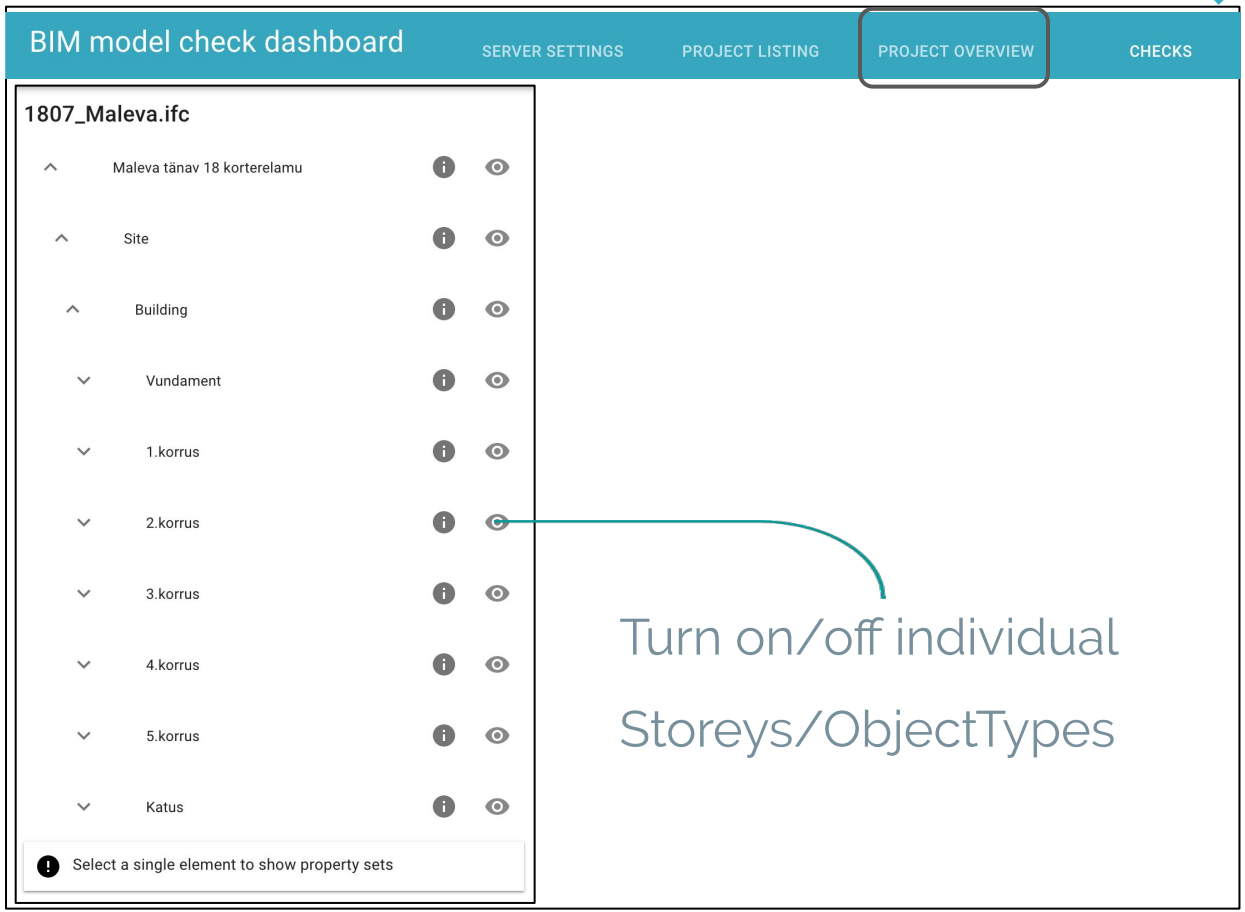
The interface



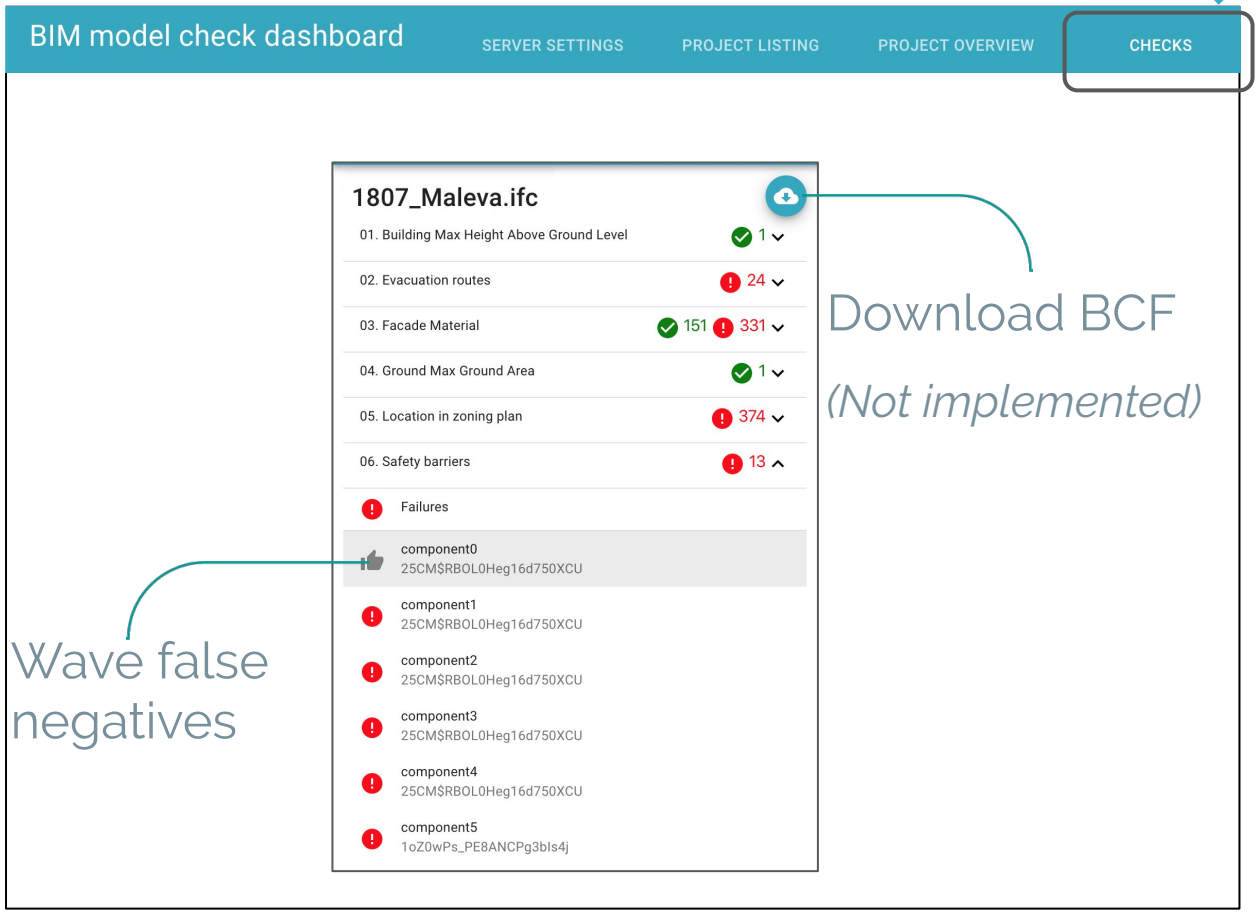
The interface



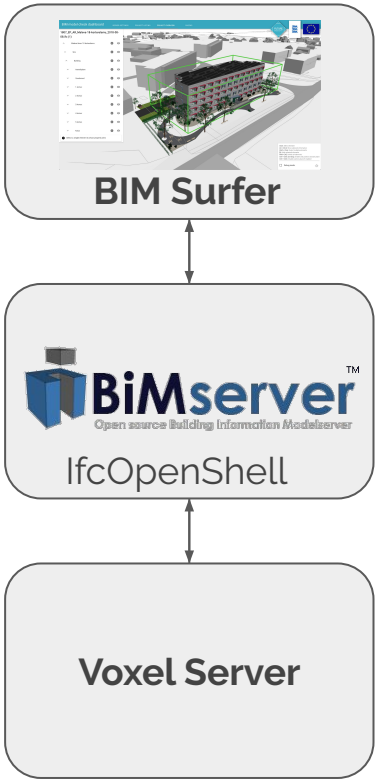
The interface



The interface



The infrastructure



The checks

01. Building maximum height
02. Evacuation routes
03. Facade materials
04. Maximum ground area
05. Location in bounding box
06. Safety barriers / fall protection
07. Spacing minimum door width
08. Maximum storeys above ground

01. Building maximum height

The checks

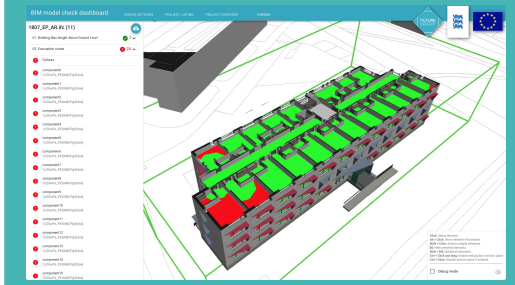
☐ Rule based	☒ Building permit
☒ Algorithm based	☒ Usage permit

Calculates the height from the geometry from the origin (0,0,0) and compares it with a given value.
(fixed at 18 m for POC)

False negative when the origin is not set right

02. Evacuation routes

The checks



☒ Rule based	☒ Building permit
☒ Algorithm based	☒ Usage permit

Calculates the length of the route (voxel based) and checks for the maximum distance (30m in POC) from fire doors (wider than 1,2 m in POC)

False negative when doors aren't classified right

03. Facade Material

The checks

☒ Rule based	☒ Building permit
☐ Algorithm based	☒ Usage permit

Checks whether the outside walls (isExternal) consists of a certain material (Raudbetoon for POC)

False negatives when the isExternal property is not set right and if material names are (spelled) wrong

04. Maximum ground area

The checks

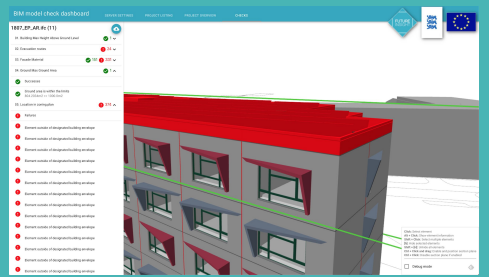
☐ Rule based	☒ Building permit
☒ Algorithm based	☒ Usage permit

Recalculates the total 2D perimeter (including balconies and overhangs) and checks whether the building fits within a certain value (1000m2 for the POC)

No false negatives

05. Location in bounding box (zoning plan)

The checks



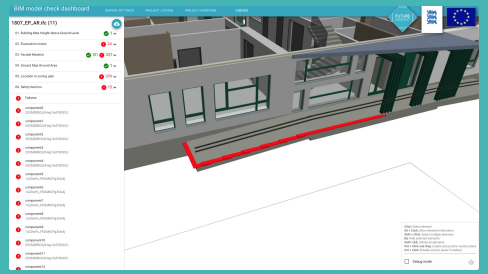
☐ Rule based	☒ Building permit
☒ Algorithm based	☒ Usage permit

Checks for all geometries if they fit within a given bounding box (zoning plan). For the POC one fixed volume is used

No false negatives

06. Safety barriers/fall protection

The checks



☐ Rule based	☒ Building permit
☒ Algorithm based	☒ Usage permit

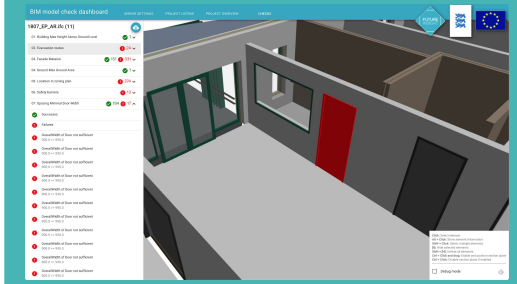
A voxel based check which ‘walks’ through the building, opens doors and checks if you can fall more than 1m.

In the POC, elevator shafts and the ground level give false negatives

07. Spacing minimum door width

The checks

☒ Rule based	☒ Building permit
☐ Algorithm based	☒ Usage permit



Checks if the ‘width’ property of IfcDoor is 990 mm or wider. Although a rule based check, this property is quite reliable since the property is usually automatically generated by the authoring tool.

If the ‘width’ property of IfcDoor is manually changed the check will not give the right results

08. Maximum storeys above ground

The checks

☒ Rule based	☒ Building permit
☐ Algorithm based	☒ Usage permit

Checks the maximum amount of stories against a given value (6 stories in the POC). It uses the IfcBuildingStorey element which is automatically generated. Only stories above the origin (0,0,0) will be taken into account.

If the origin is set wrong or the roof is also modeled as a storey it will give false negative.

Recommendations

- Scale up to a final infrastructure
- Add the link with 3D Digital Twin
- Specify checks per permit type
- Make a list of the top 10 checks
- Design these checks
- Digitize the necessary regulations (eg. detailed plans)
- Configure the checks
- Improve the checks
- Expand with new checks


coffee
break

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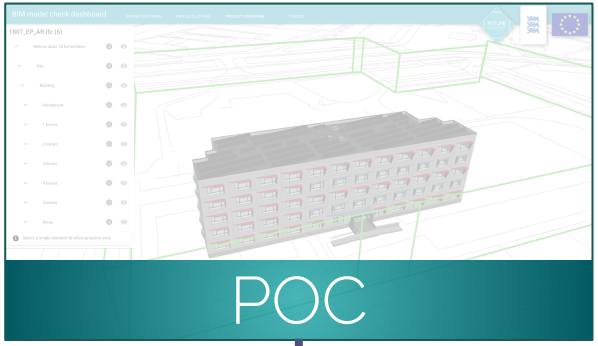
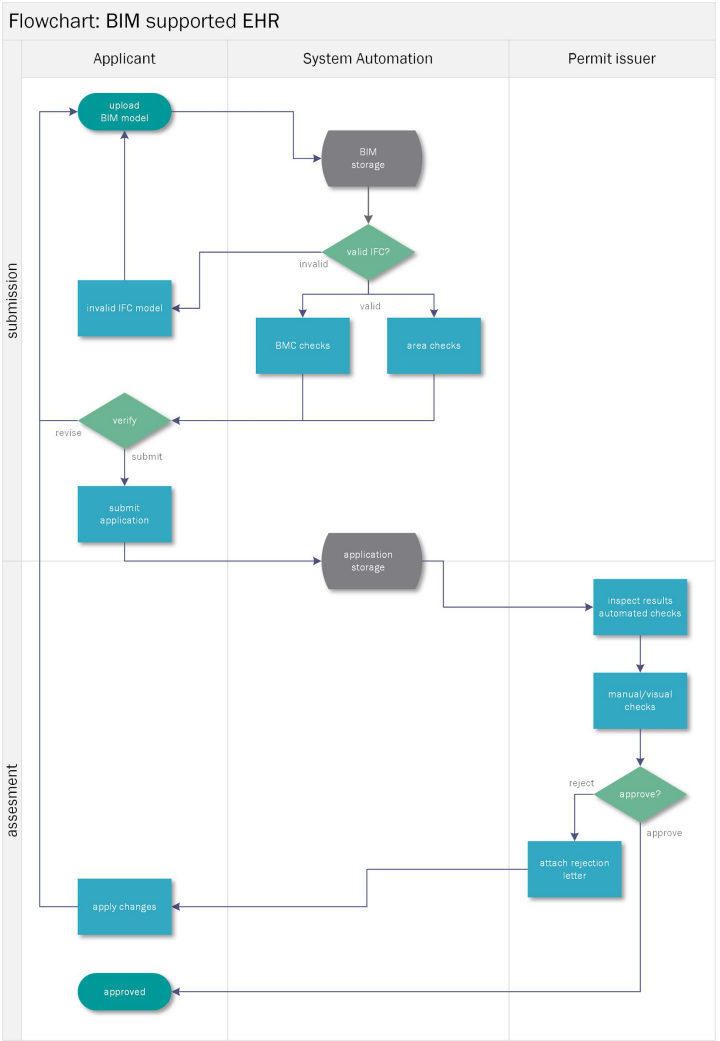
The connection



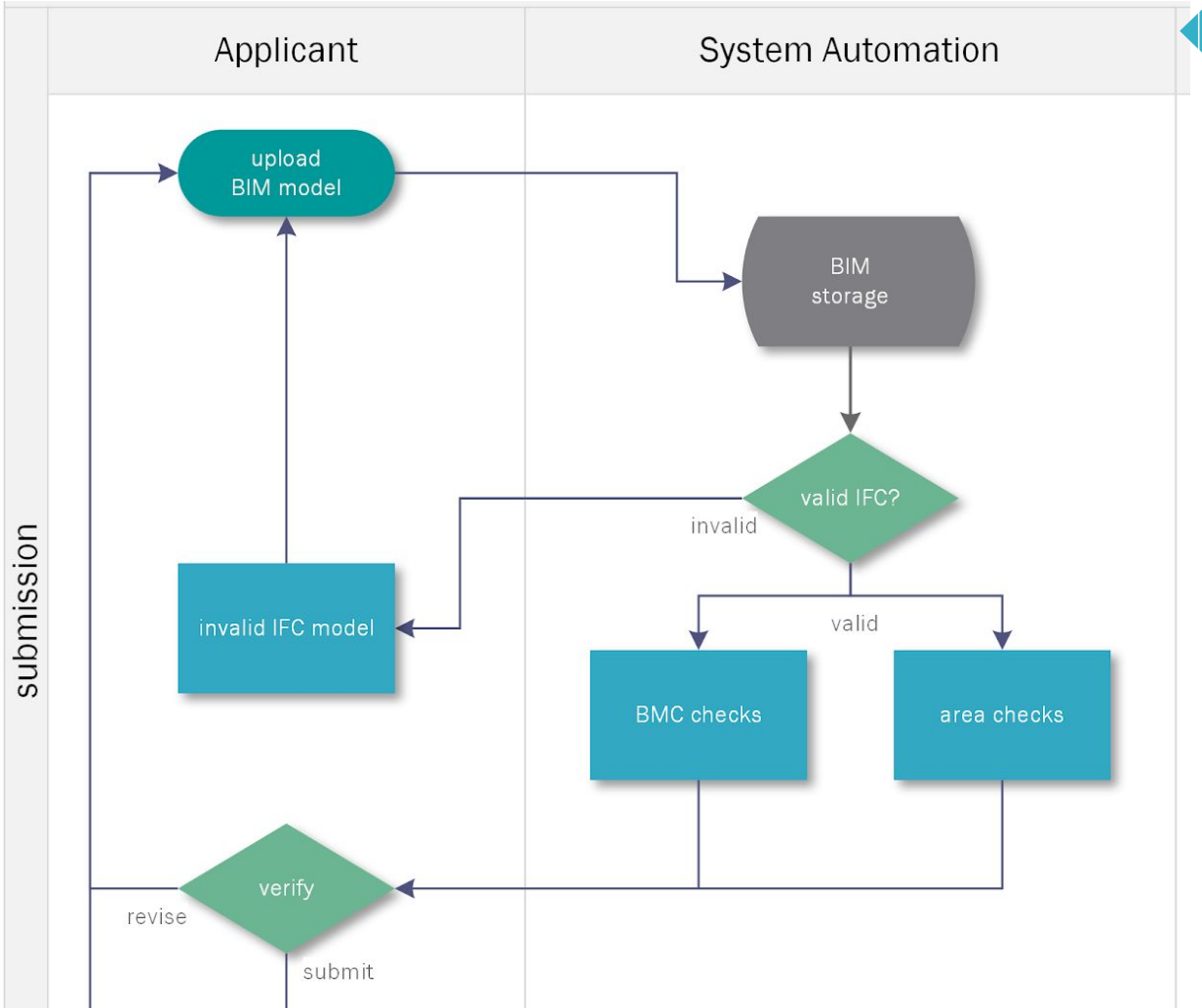
UX design

- One checking solution serving several BIM processes in EHR (eg. building & usage permit)
- Two types of users (applicant & permit issuer)

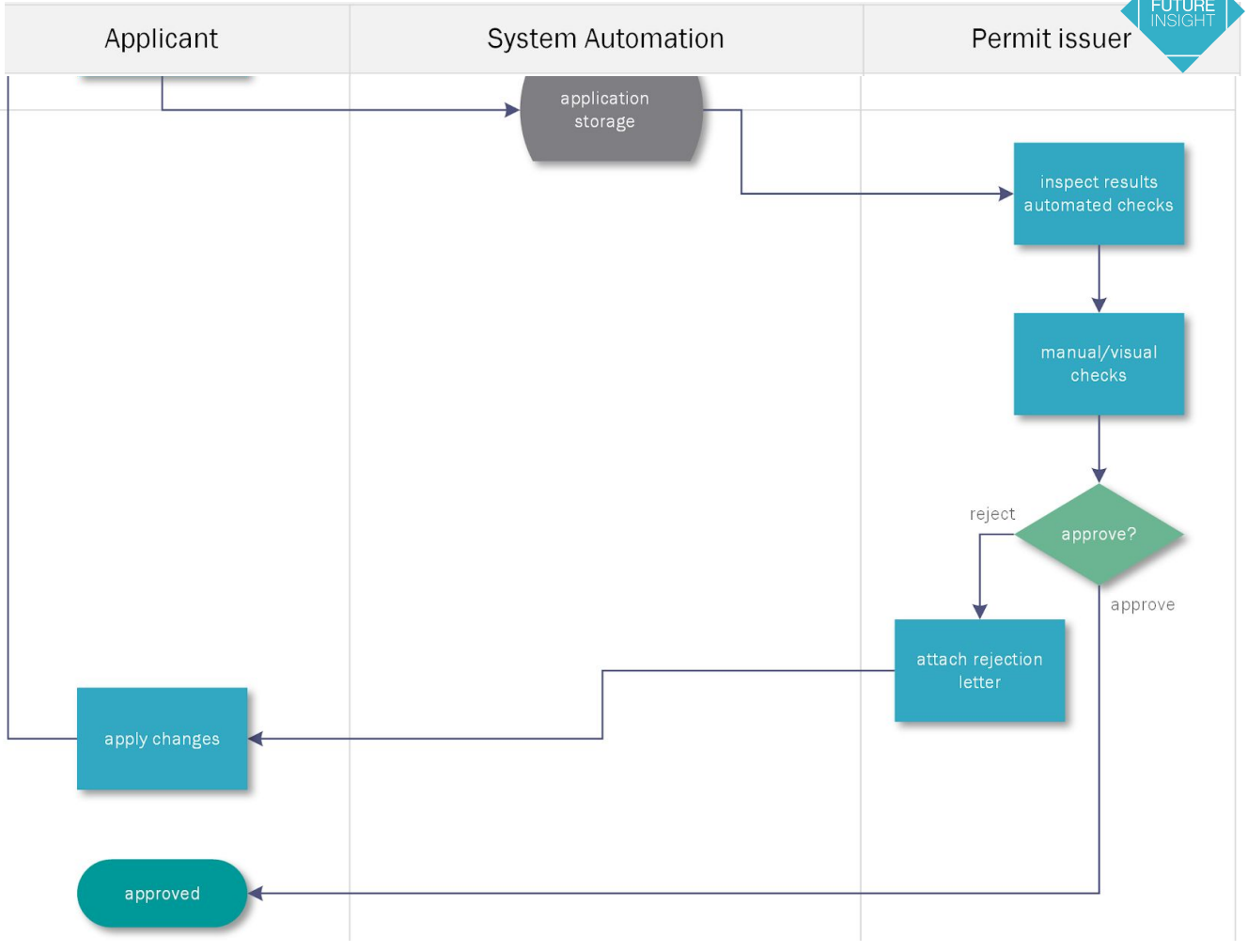
Flowchart


Flowchart: BIM supported EHR
Applicant
System Automation
Permit issuer
submission
assesment
upload BIM model
BIM storage
valid IFC?
invalid
valid
invalid IFC model
BMC checks
area checks
verify
revise
submit
submit application
application storage
inspect results automated checks
manual/visual checks
reject
approve?
approve
attach rejection letter
apply changes
approved

Flowchart submission



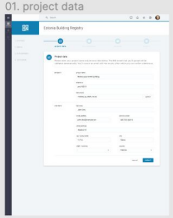
Flowchart assessment



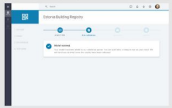
Presentation of the mockups

Applicant Screens

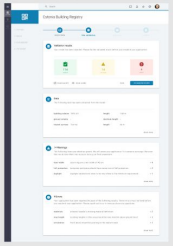
01. project data



02.0 bim validation - received

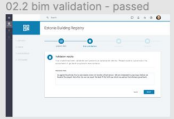


02.0 bim validation - errors

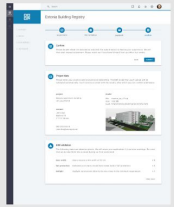


0.2.1 bim validation - model

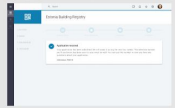
02.2 bim validation - passed



03. confirm submission

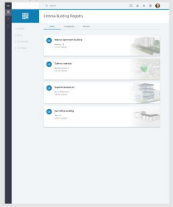


04. submission received

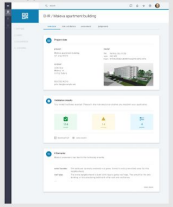


Assesment Screens

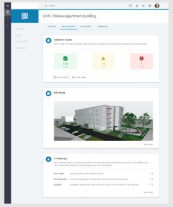
10. applications list



11. application details



12. bim details

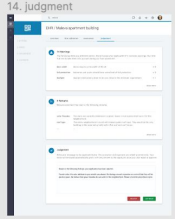


13.1 manual checks - marked ...

13.2 manual checks - default

13.3 manual checks

14. judgment



https://www.figma.com/file/ZUo3HJeYt01IVXRuOiXmT9/estonia?node-id=0%3A1

Next steps

- Take into account feedback **from you**
- Prepare development funding applications (SF)
- Define detailed requirements **with you**
  - Compile the list of checks (incl legal validity)
  - Prioritize (complexity vs time saving)
  - Formalize the checks (can input be formalized?)
  - Build automatic checks
  - Refine the checks
- Finalize BIM requirements standard
- Goal for go-LIVE **01.01.2021**

Questions

Link to POC

Link: http://bimchecks.futureinsight.nl

Username: bim@futureinsight.nl

Password: BIMEstonia

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27.11.2019

Eesti Ehitusettevõtjate Liit

EESTI ARHITEKTIDE LIIT
ESTONIAN ASSOCIATION OF ARCHITECTS

MAJANDUS- JA KOMMUNIKATSIOONI-MINISTEERIUM

EESTI EHITUSINSENERIDE LIIT

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EHITUS 2020+

https://eehitus.ee/timeline-post/ehitus-2020-sild-tulevikku/