



Real-time collaboration for
construction projects



Funded by the European Union –
NextGenerationEU

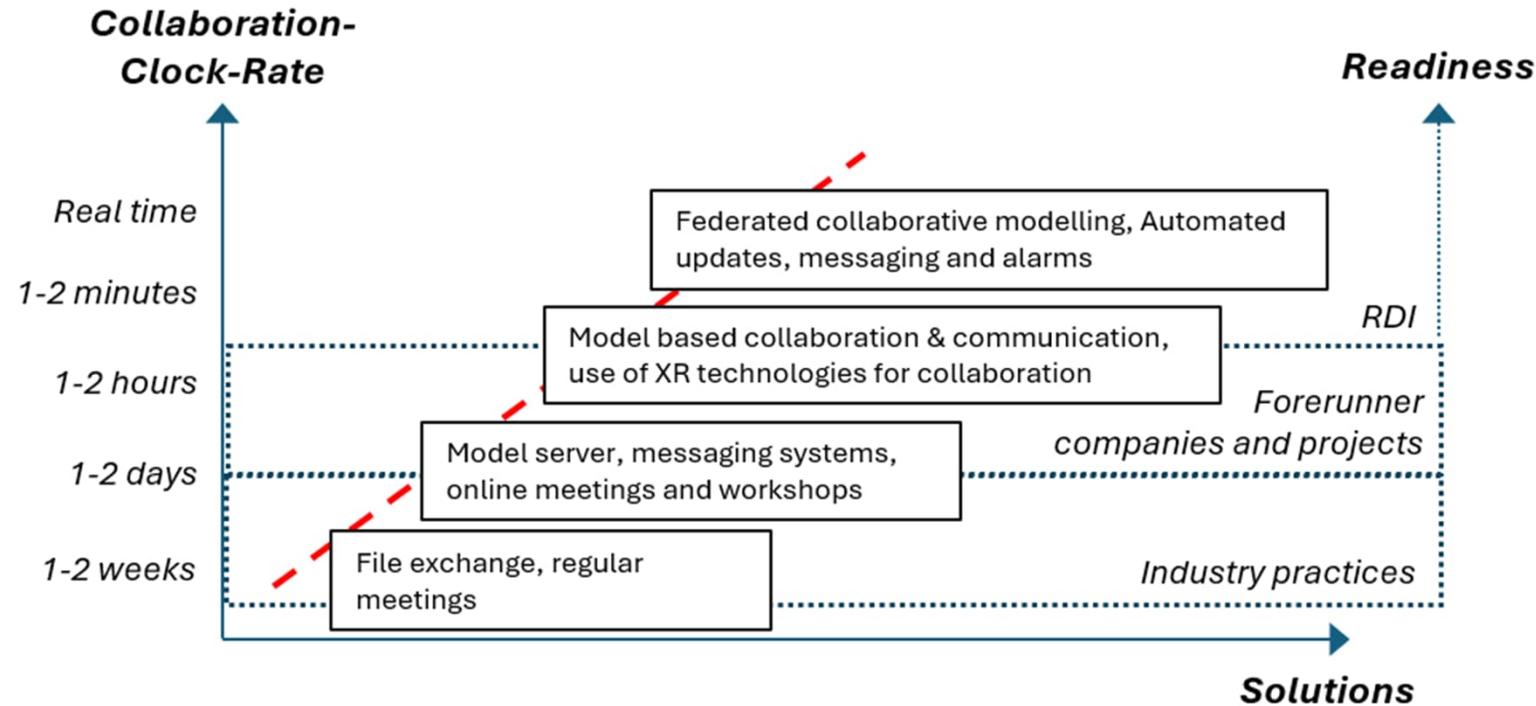
About LiveCol

- 2.5-year Business Finland funded project (NextGen EU funding)



- Researcher exchanges to Australia and Norway
- Collaboration with Trimble Tech Lab universities globally

The need for **Real-time** collaboration



Project **organization**

1. Finding pathways for new ways of working

How to deal with:

Changing operating environment, Technology acceptance,
Contracts, New business models

Project **organization**

1. Finding pathways for new ways of working

2. Real-Time Collaboration Technology Development

Project **organization**

1. Finding pathways for new ways of working

2. Real-Time Collaboration Technology Development

3. Experimental Use-Cases

Data sharing, Design Team Management & Collaboration, Sustainable Design

Project **organization**

1. Finding pathways for new ways of working

2. Real-Time Collaboration Technology Development

3. Experimental Use-Cases

4. Implications & Future of Real-Time Collaboration

Schedule

- 09.00 – 09.15: **Introduction** – Robert van den Brink (VTT)
- 09.15 – 09.30: **Live Collaboration Technology** – Thomas Bagge & Kim Nyberg (Trimble)
- 09.30 – 09.45: **Acceptance of Real-Time Collaboration Technologies** – Jaakko Huusko (TAU)
- 09.45 – 10.00: **BIM Contracting – an Information Package and Navigator** – Jutta Suksi (VTT)
- 10.00 – 10.15: **LiveCol Testbench results** – Kalle Kähkönen (TAU)

You can find our final report here:

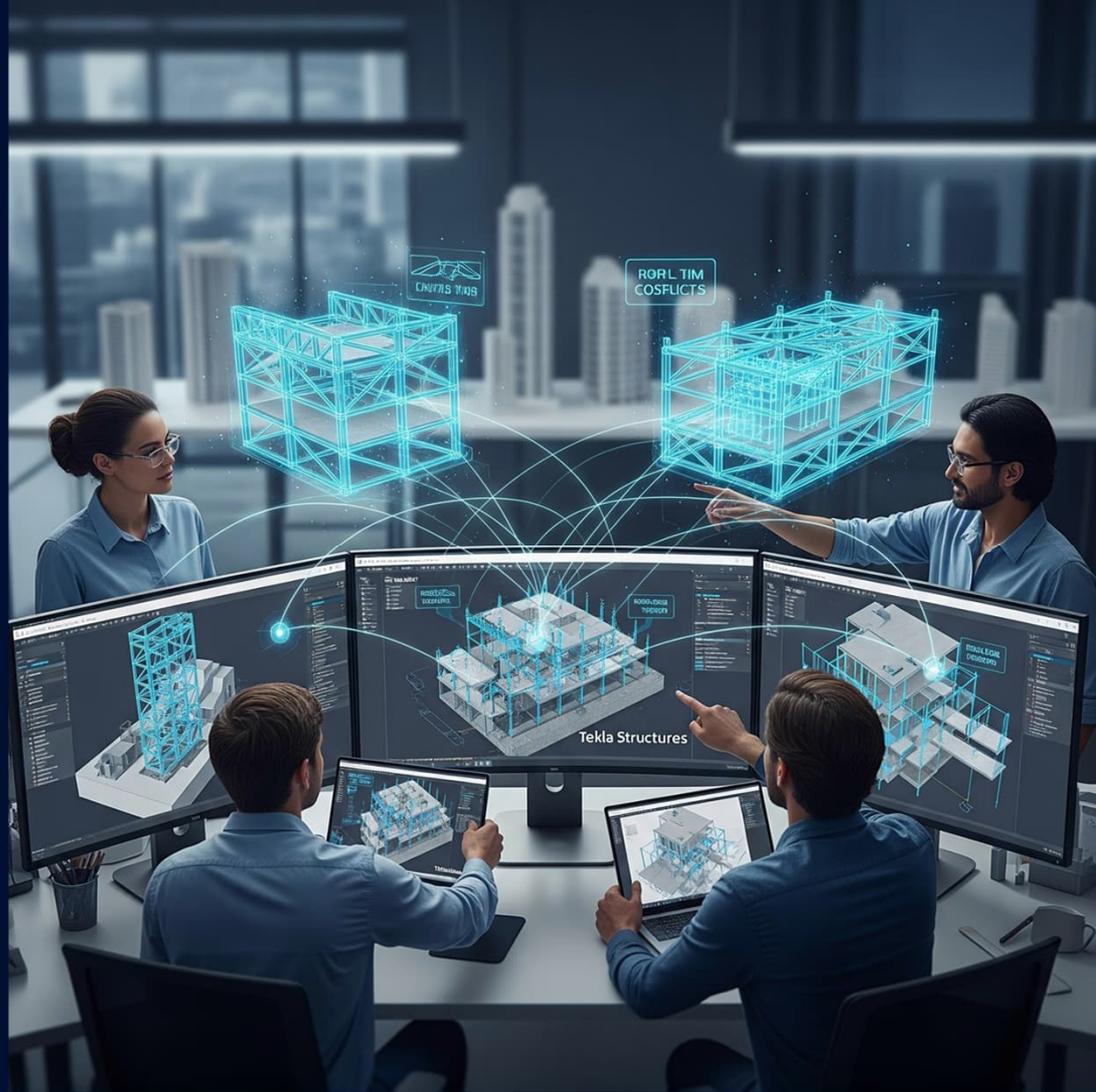


Live Collaboration technology

Thomas Bagge, Kim Nyberg, Trimble

2026-02-03

Real-time Collaboration





The **need** for Collaboration



We want better connected products



Collaboration in 3D needs to be dead simple



I want to collaborate across vendors and domains easily



Technology made for Collaboration

A platform technology to enable **interactive collaboration workflows.**

Allows Trimble's (and other's) products to communicate with each other in real time, sharing model changes *and* other data amongst participants, all anchored around a central session concept.

Live Sharing



Live Collaboration: **Tekla** Structures

**Version
2024**

Available by default from v2024 SP10

Has limited functionality, no support for sharing markups, clip planes, selection, ...

**Version
2025**

Available by default

Has full functionality,
also Model Sharing integration from SP4

Tekla Structures - C:\TeklaStructuresModels\Tekla2024Steel - Unofficial test release - Not for production or... Kim Nyberg

STEEEL CONCRETE REBAR EDIT VIEW DRAWINGS & REPORTS MANAGE ANAL > bcf

Move Move special Batch editor Grid Points Parametric modeling Construction object View list New view Clip Window

Live Collaboration (Preview) 2025 Live Collaboration Nyberg 20250909 Tekla2024Steel.trb Kim Nyberg Tekla2025Concrete.trb

0 Model origi Search in model standard Auto View plane Outline planes

0 0 Pan Current phase: 1, Phase 1 0 objects and 1 handles selected

Tekla Structures - C:\TeklaStructuresModels\Tekla2025Concrete - Unofficial test release - Not for production... Kim Nyberg

STEEEL CONCRETE REBAR EDIT VIEW DRAWINGS & REPORTS MANAGE ANAL > topics

Column Beam Panel Slab Footing Item Pour view Pour break Crossing Longitudinal Calculate pour units Cast unit

Live Collaboration (Preview) 2025 Live Collaboration Nyberg 20250909 Tekla2025Concrete.trb Presenting... Kim Nyberg Tekla2024Steel.trb

What is this?

0 Model origi Search in model standard Auto View plane Outline planes

0 0 Pan Current phase: 1, Phase 1 1 objects and 0 handles selected



Tekla Structures **Model Sharing** integration

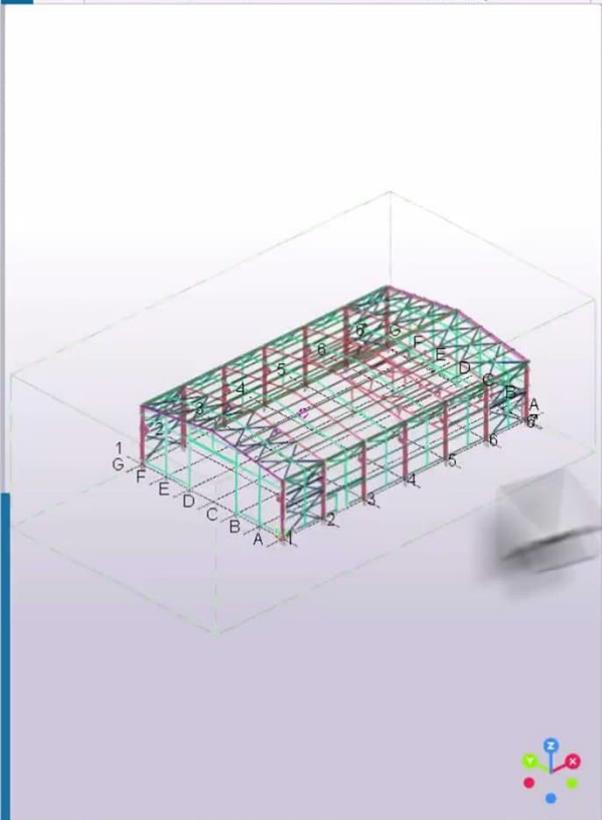
- Live Collaboration can now be used **together** with Model Sharing
- Allows for real-time visualization of changes done by multiple users in the **same** Tekla Model Shared model
- Tekla Model Sharing and Trimble Live Collaboration are **complementing** each other
- **Changes** (additions, modifications, and deletions) are shared and **visualized** in real-time
- This is **NOT** multi-user editing, read-in and a write-out is still needed

Tekla Structures - C:\Models\Model Sharing Live col - [View 1 - 3D]

STEEL CONCRETE REBAR EDIT VIEW DRAWINGS & REPORTS MANAC > Test Menu Quick Launch

Column Beam Plate Bolt Weld Bolted parts Assembly

Column Beam Panel Slab Window



Live Collaboration (Preview)

MS Live Sharing DEMO

Session name or link

No sessions available

v.1.1.4|About

Model origi Search in model

standard View plane Outline planes

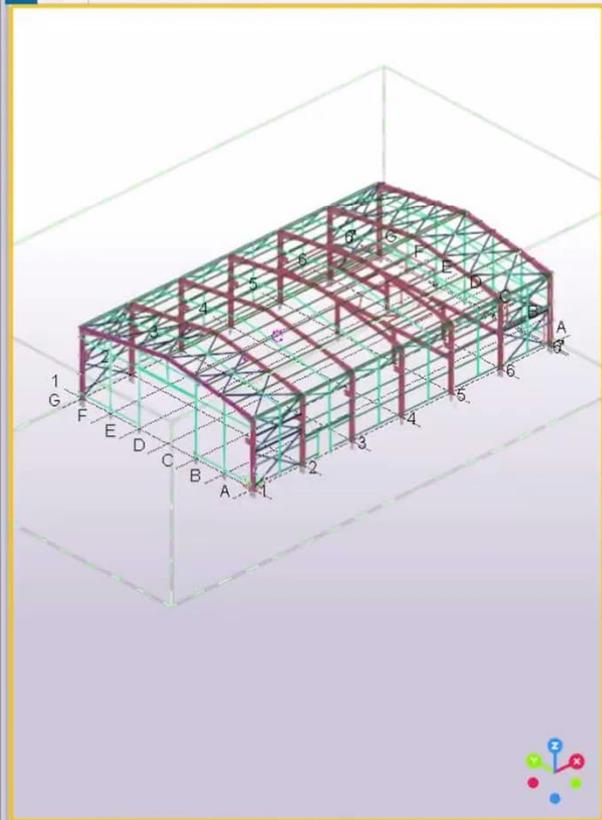
0 S 0 Pan Current phase: 1, Terrain et Res: 0 objects and 0 handles selected

Tekla Structures - C:\TeklaStructuresModels\Model Sharing Live col - [View 1 - 3D]

STEEL CONCRETE REBAR EDIT VIEW DRAWINGS & REPORTS MANAC > Test Menu Quick Launch

Column Beam Polybeam Curved beam Twin profile Orthogonal beam Spiral beam Plate Bolt Weld Bolted parts Assembly

Column Beam Panel Slab Window



Live Collaboration (Preview)

MS Live Sharing DEMO

Session name or link

No sessions available

v.1.1.4|About

Model origi Search in model

standard View plane Outline planes

Model was shared successfully 0 S 0 Pan Current phase: 1, Terrain et Res: 1 objects and 0 handles selected

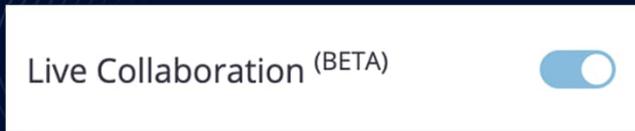


Trimble Connect

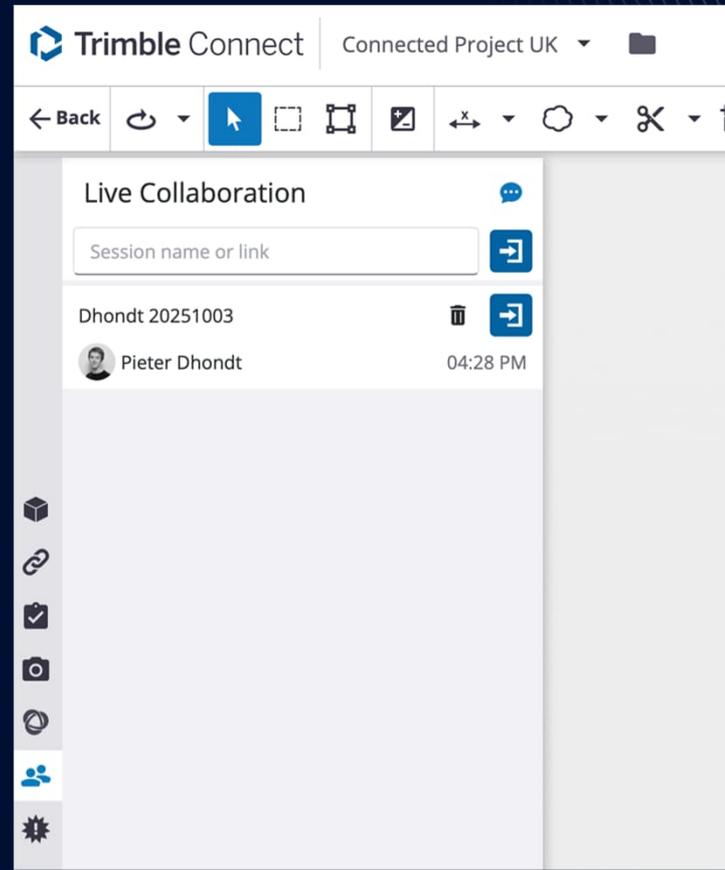
Automatically available in all Trimble Connect projects.

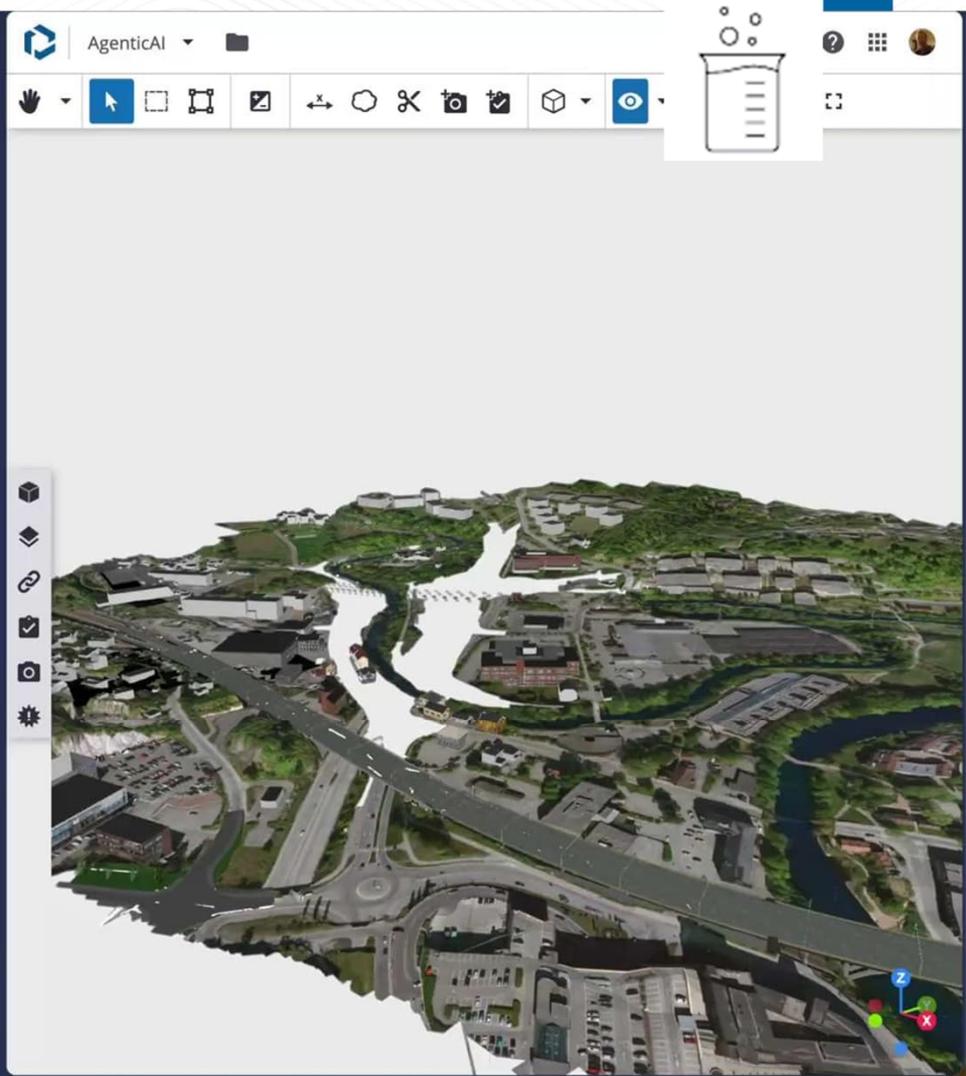
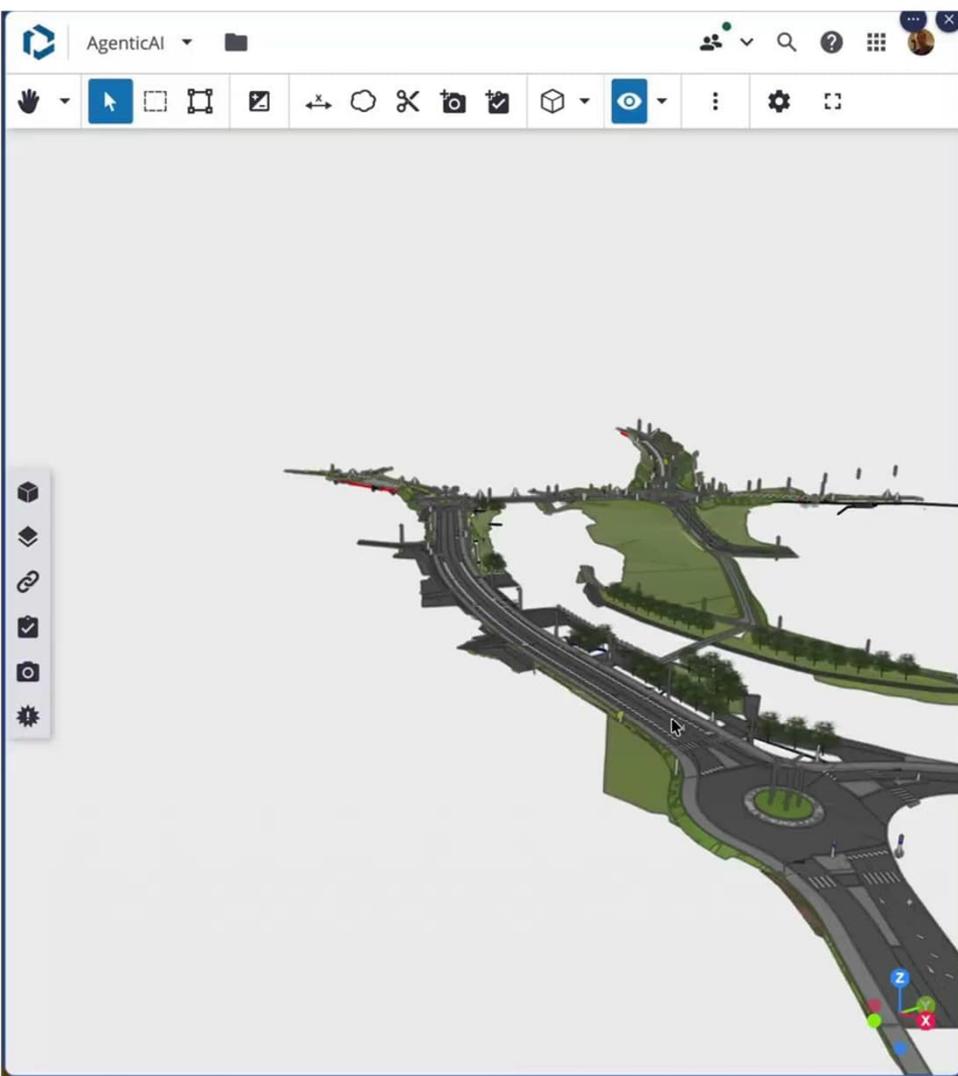
Has full functionality.

Enable it in your project in the Project Settings (only for Project Administrators):



Live Collaboration (BETA)







Live Collaboration: Revit



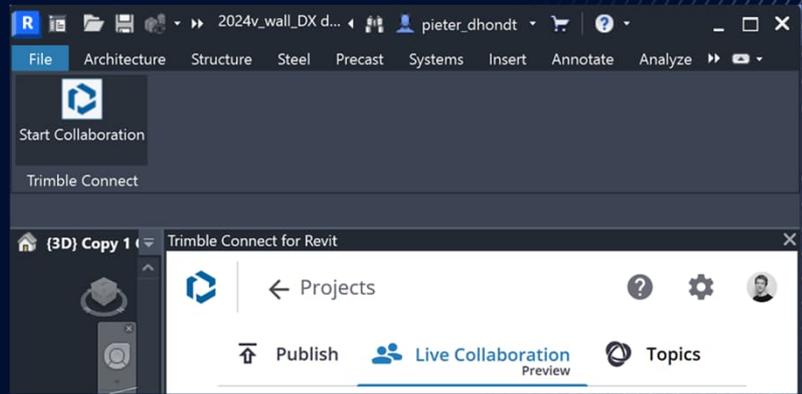
There is a Trimble Connect for Revit installer for all these versions

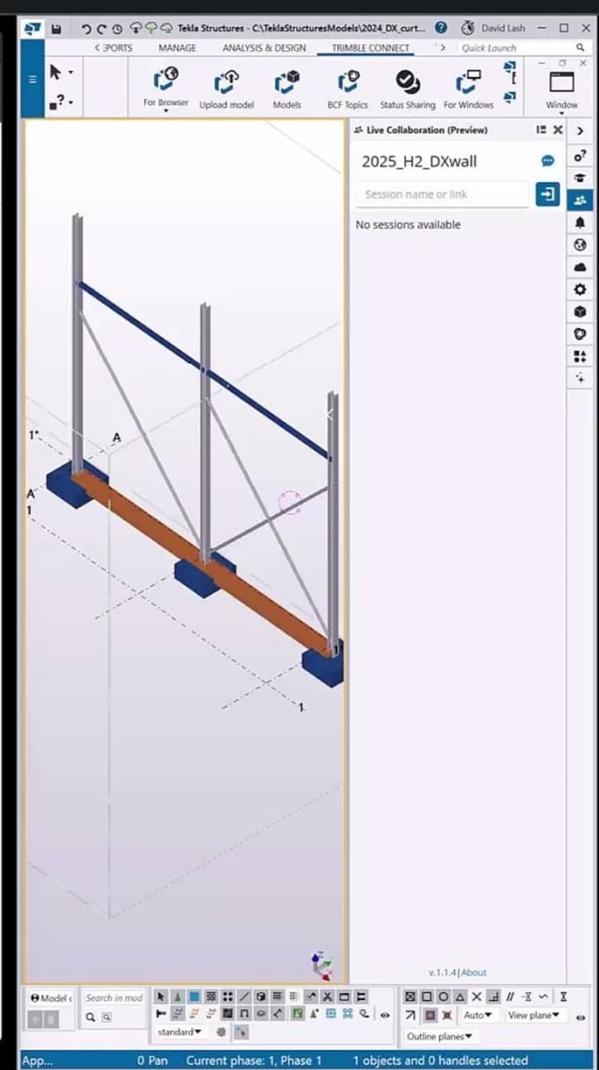
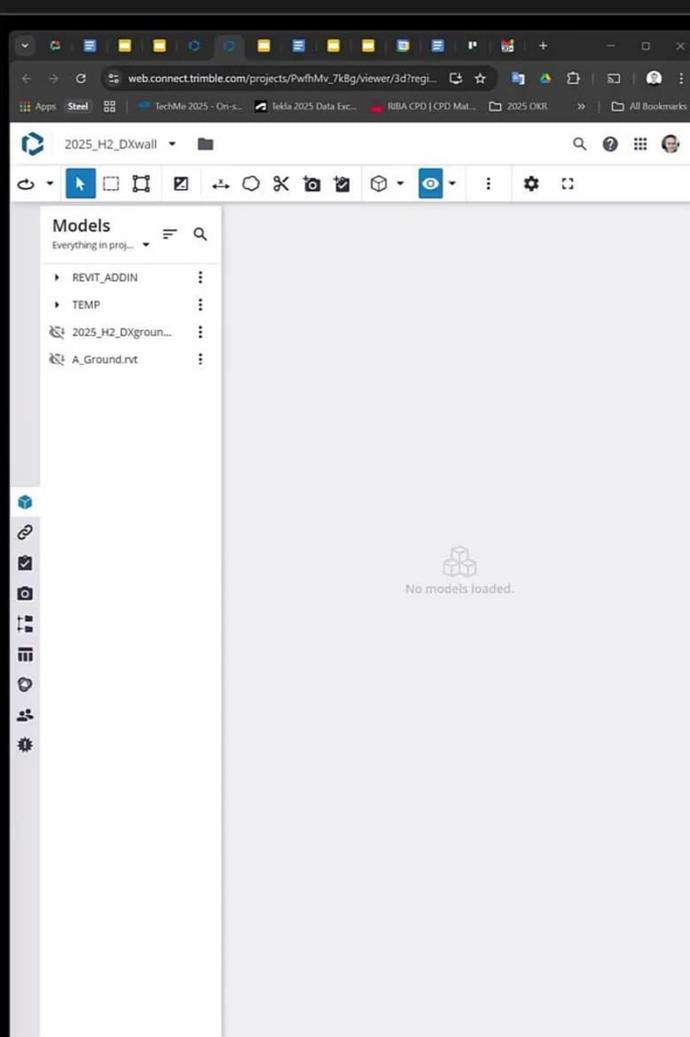
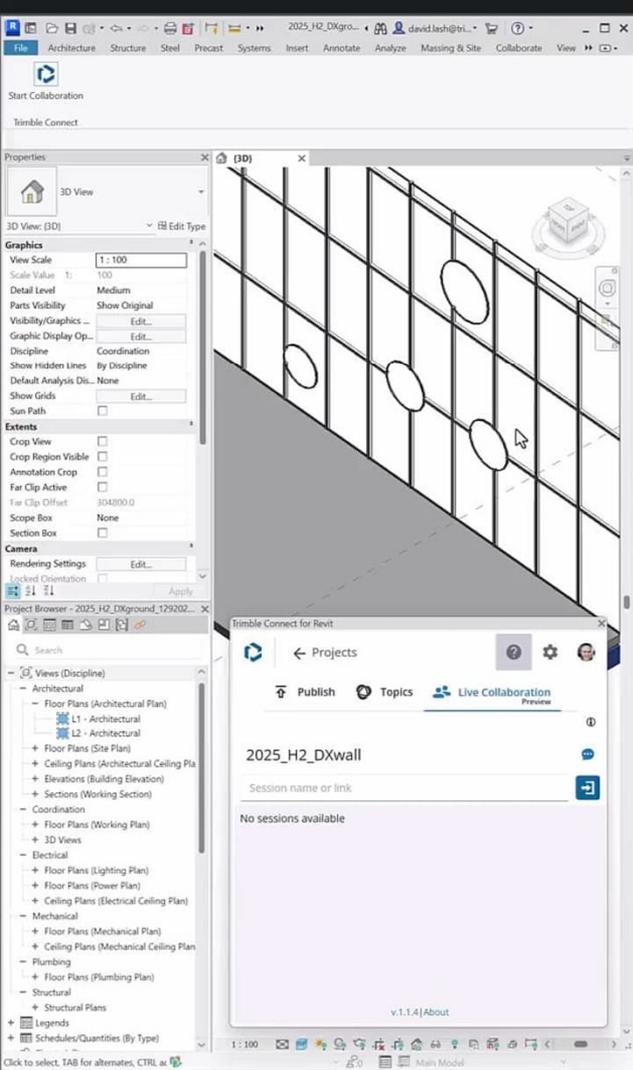
Limited functionality (similar as in Tekla Structures 2024)

Download it for free from the Connect App Store
<https://web.connect.trimble.com/store>



Live Collaboration (Preview)







Tekla Structures View Sharing



The screenshot displays the Tekla Structures software interface. The main window shows a 3D model of a building structure. A dialog box titled "Share your model with other participants" is open, listing several view files. A mouse cursor is pointing at "Test View-Arrivée escalier.trb". The dialog also includes a "No selection" option and a "Share" button. The background shows the software's ribbon and various toolbars.

Share your model with other participants.

- No selection
- Test View-Arrivée escalier.trb
- Test View-Axe crochet.trb
- Test View-Capture.trb
- Test View-Dessus Poutre Rouleme...
- Test View-File 1.trb
- Test View-File 2.trb
- Test View-File 5.trb
- Test View-File 6.trb
- Test View-File D.trb

Model origin Search in model standard Auto View plane Outline planes

Current phase: 1, Terrain et Resi 0 objects and 0 handles selected

The screenshot displays the Trimble Connect 3D Viewer web interface. The main window shows a 3D model of a building structure. A "Live Collaboration" session is active, with participants "Vlad 20251008" and "Blanca Vlad". The interface includes a toolbar with various collaboration tools and a 3D model view.

TechMe 2025

Vlad 20251008

Live Collaboration

Vlad 20251008

Blanca Vlad

v.1.1.5-dev.7546 | About



Unique Features



Share the models you want

Only share the models or views you want to in a live collaboration session. Using optimized result format.



Session invitation links

Create a session link and share it with others or create a calendar invite and attach the link.



Enforce presentations

Have everyone follow you as you move around the models and see where you click and select. Others can still move freely until they snap back to your movements.



Share markups, clip planes, measurements

Participants can add markups, clip planes, selections, measurements and change visibility for everyone to see.



See participant avatars

Easily see what other participants are looking at by watching their avatars move around.



Stay in your familiar tool

Use the capabilities of Live Collaboration in the tool you are familiar with, be it Tekla Structures, Trimble Connect or Revit.

Federated Modeling





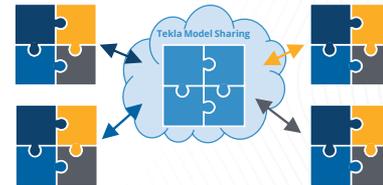
Tekla Model Sharing

Situation

- All information is saved into one model
- The central project model is hosted in the cloud on Trimble's servers.
- Distributed users have a local copy of the model.
- Users have different role-based permissions to make changes into the model.
- Changes made by users are shared with all other users as user-defined packages (Write out/Read in)
- The system takes care of the order of applying changes into the local copies of the model.
- Some communication methods are associated with the change packages.
- Some tools for sorting out the potential conflicts.
- Detailed object-level reports of change packages are available (version history)

Challenges

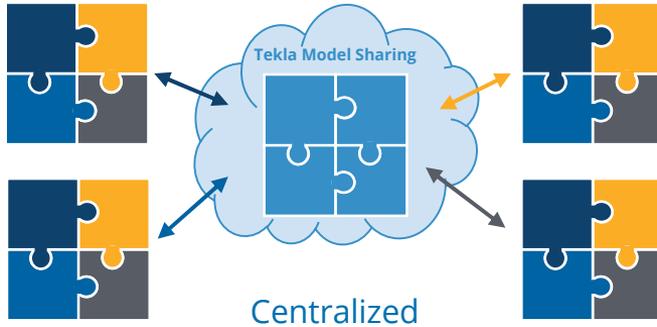
- Works only between Tekla models
- Companies' know-how leaks to competitors along with the shared native model
- Data is version dependent
- Demands a lot of control for modeling i.e. with numbering settings and with the environment files
- Leads to really huge models with a gigantic amount of history



Tekla Model Sharing vs Federated Modeling

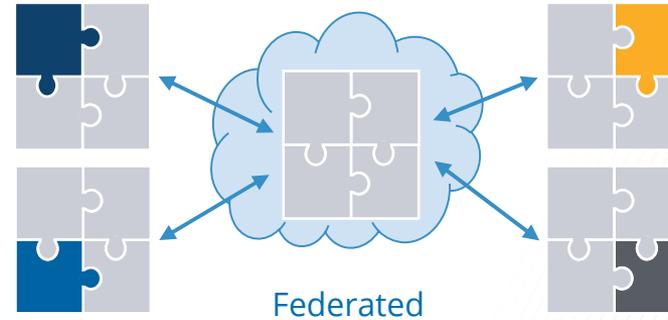


Tekla Model Sharing



- Existing solution
- Within the same organization
- Centralized native model
- Distributed users
- Full native model experience

Federated Modeling

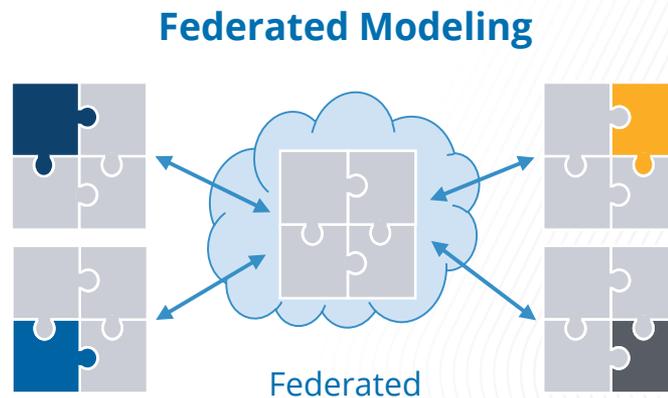


- Next generation solution for managing a whole project?
- Separate models created by different organizations
- Clear division of data ownership
- Each party creates needed output from their own model
- (IFC schema-based) intelligence for managing model changes



Federated Modeling - Benefits

- Enables publishing of partial models
 - Not required to share the entire model
 - Only share portions of the model when ready
- Is independent from software and versions
 - Users can use i.e. Tekla, Revit for modeling
 - No environment dependencies between models
- Each stakeholder in federated model environment will
 - Own their model and model environment
 - Create needed output (i.e. drawings, reports, NC files, IFC files) from their model





Federated Modeling Example

The image displays two side-by-side windows of the Tekla Structures software interface, illustrating federated modeling. The left window, titled 'Tekla Structures - C:\TeklaStructuresModels\Workflow\FederatedSteelModel - Unofficial test release - Not for pro...', shows a 3D model of steel components. The right window, titled 'Tekla Structures - C:\TeklaStructuresModels\Workflow\ConcreteModel - Unofficial test release - Not for production or res...', shows a 3D model of concrete components. Both windows feature a top toolbar with tabs for STEEL, CONCRETE, REBAR, EDIT, VIEW, DRAWINGS & REPORTS, MANAGE, ANALYSIS & DESIGN, and Quick Launch. The left window's toolbar includes icons for Column, Beam, Polybeam, Curved beam, Twin profile, Orthogonal beam, Spiral beam, Plate, Bolt, Weld, and Assembly. The right window's toolbar includes icons for Column, Beam, Panel, Slab, Footing, Item, Crossing, By face, By guidelines, More, Visibility, and Bar group. A central 'Applications & components' panel is visible, showing search results for 'basepla' and a list of components including 'BasePlateConnection'. Below this panel is a 'Federated Model' table with columns for Project Path, Read in Name, Write Out Name, Hide, and Transmission Name. The table contains the following data:

Project Path	Read in Name	Write Out Name	Hide	Transmission Name
..	steel	Read In		
..	concrete	Write Out		
..	transmission	Hide		

The bottom status bar of both windows indicates 'Database stored', '0 Pan', 'Current phase: 1, Phase 1', and '1 objects and 0 handles selected' (left) or '0 objects and 0 handles selected' (right).

Q&A

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kim.nyberg@trimble.com

תודה
 KIITOS
 BEDANKT
 Teşekkürler
 DANKIE
 Ευχαριστώ
 Спасибо
 GRACIAS
 SALAMAT
 VIELEN DANK
 KÖSZÖNJÜK
 NGĀ MIHI
 ວຽກຮ້າ ຢື່ນຮາຮ

GRAZIE
 TACK
 Dziękujemy
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THANK YOU
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 merci
 HVALA VAM
 DIOLCH
 MULŤUMIM
 Xin Cảm Ơn

DЯКУЕМО
 شكراً
 Obrigado
 शुक्रिया
 AČIŪ
 БЛАГОДАРИМ ВИ
 谢
 ありがとう
 謝
 감사합니다



Real-Time Collaboration - Hyväksyttävyys ja haasteet teknologiana

03.02.2026

**Jaakko Huusko, väitöskirjatutkija
Tampereen Yliopisto**



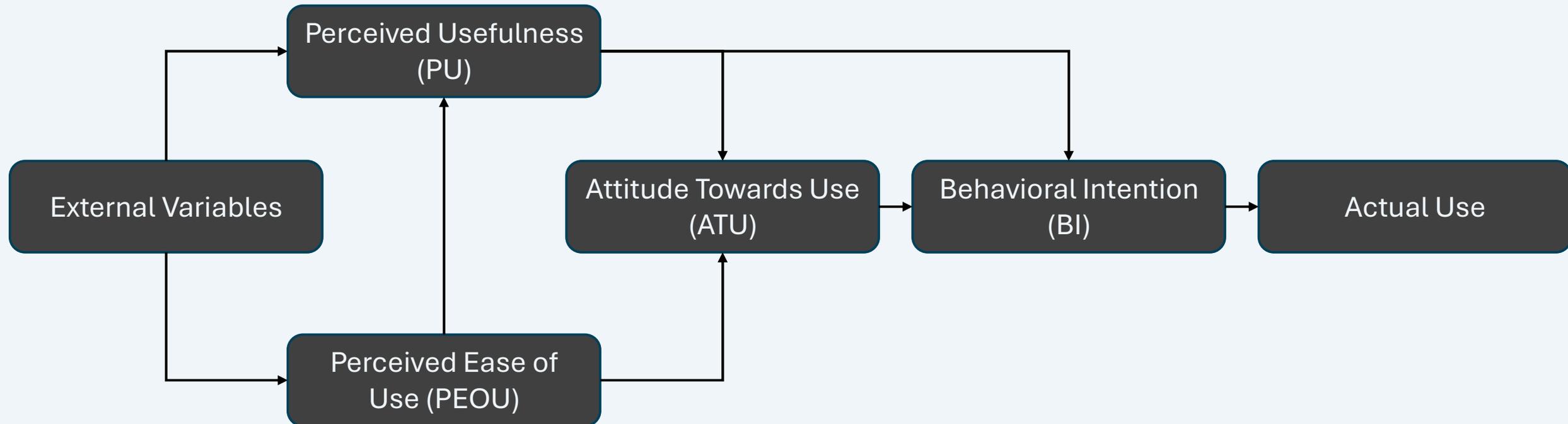
Funded by the European Union –
NextGenerationEU

Sisältö

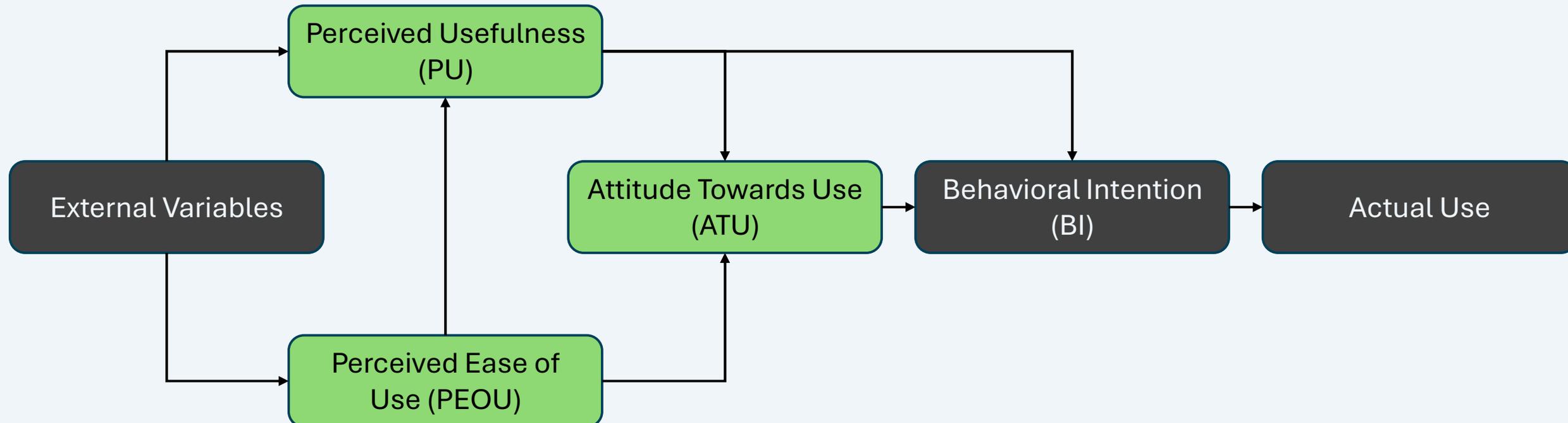
- Technology Acceptance Model (TAM)
- Miksi toimia reaaliajassa?
- Tietolähteet ja tiedonjaontaajuus
- Havaintoja LiveCol -projektin työpajoista ja haastatteluista
- 5 askelta teknologian käyttöönottoon



Technology Acceptance Model (TAM)



Reaaliaikaisen yhteistoimintateknologian hyväksyttävyyys



Miksi toimia reaaliajassa?

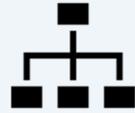
- *"Citius, altius, fortius"*
 - Nopeammin
 - Laadukkaammin
 - Edullisemmin
- Huipputiimien ominaisuuksia:
 - Selkeät tavoitteet
 - Jaettu ymmärrys
 - Luottamus
 - Psykologinen turvallisuus
- Yhteistyön (collaboration) 3C -malli:
 - Kommunikointi (communication)
 - Yhteistoiminta (cooperation)
 - Koordinointi (coordination)



Suunnitteluryhmien ominaispiirteitä



HETKELLINEN



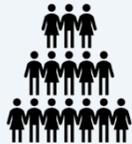
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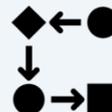
SOPIMUKSELLINEN



MONIA
ORGANISAATIOITA



“SELKEÄ TAVOITE”

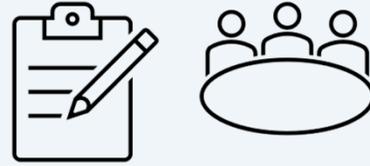
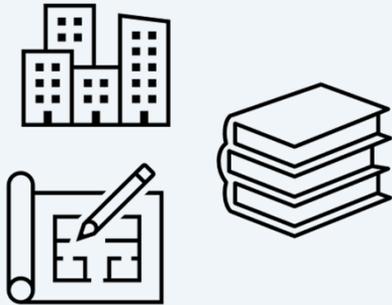
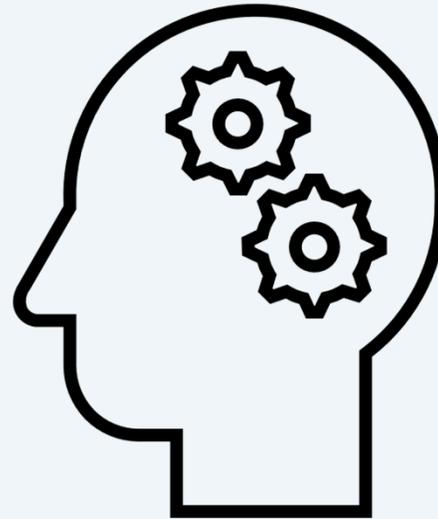
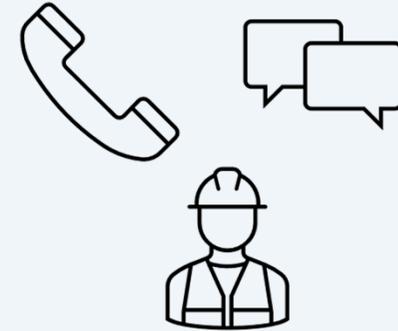


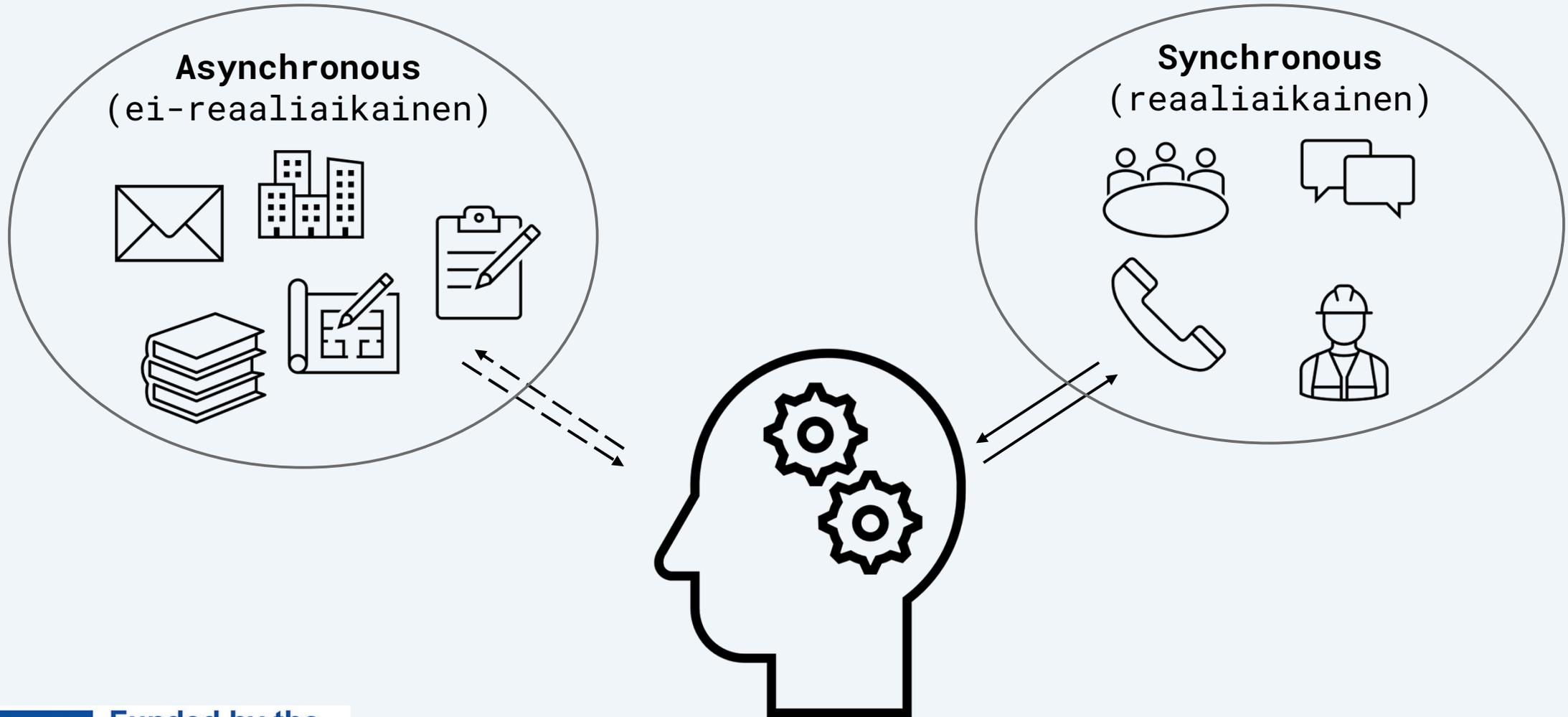
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OHJELMISTOT

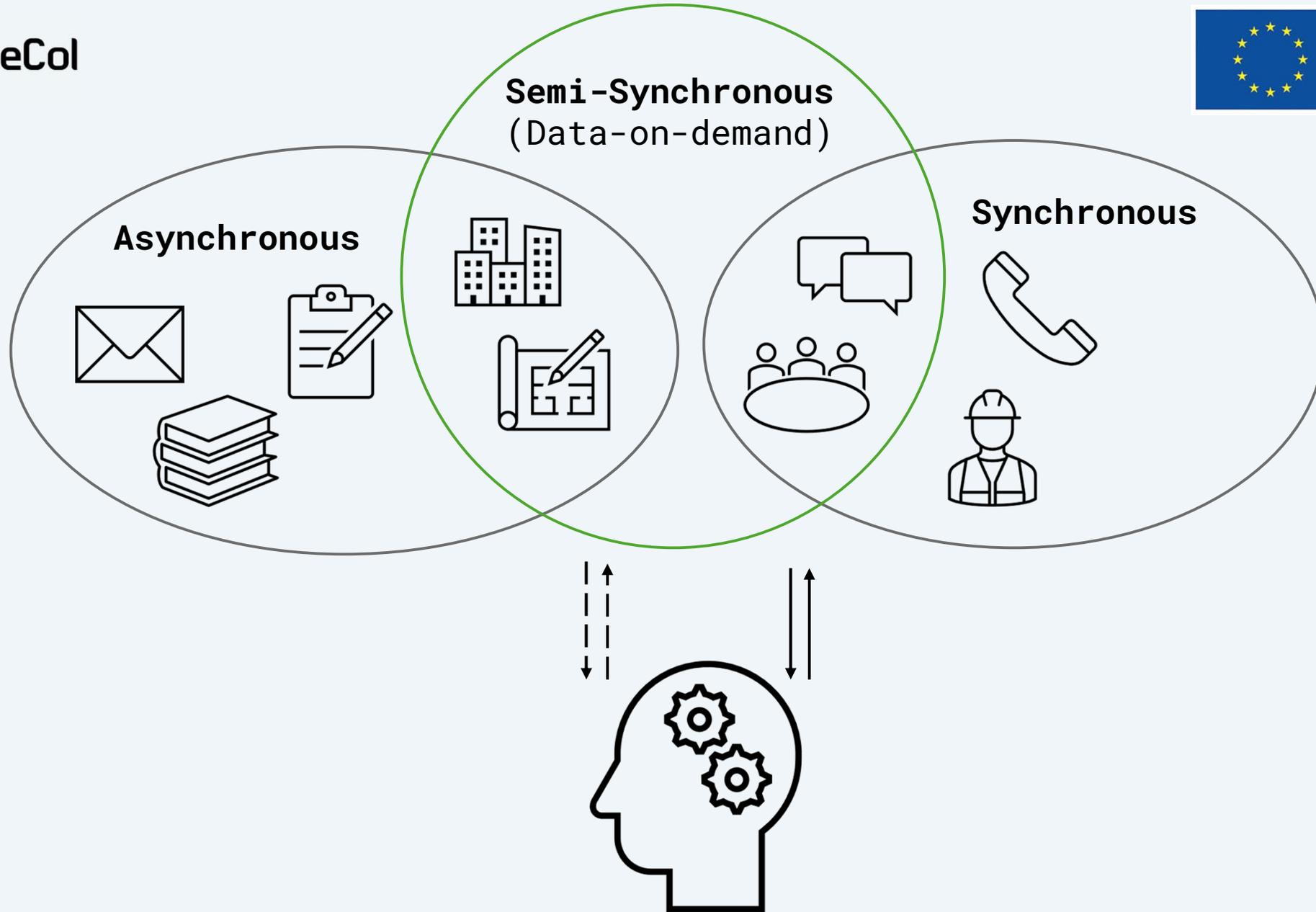


TIEDOSTOPOHJAINEN
TIEDONSIIRTO (CDE)

Suunnittelijan tietolähteet ja suunnitelman muodostaminen

**Puolivirallinen
(semi-formal)****Virallinen
(formal)****Epävirallinen
(informal)**





Havaintoja LiveCol –projektin työpajoista ja haastattelusta

Hyväksyttävyyttä lisäävät tekijät

- Suunnittelijat toimivat itselleen tutuissa BIM – ohjelmistoissa
- Muutokset näkyvät reaaliajassa, varmuus siitä että muutos on tapahtunut
- Kontekstisidonnainen kommunikointi



Haasteita teknologian hyväksyttävyydessä

Teknologisia haasteita:

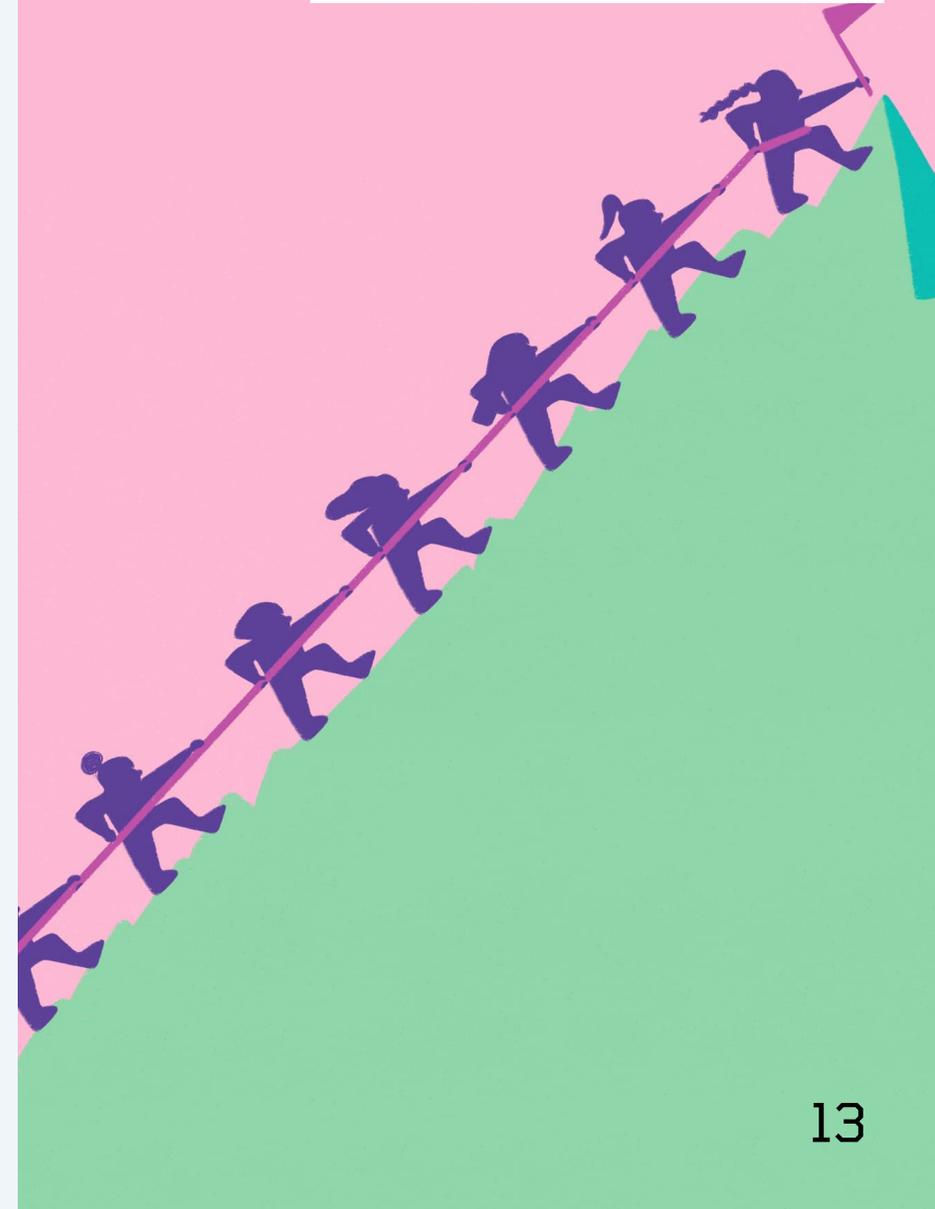
- Osien omistajuudesta sopiminen
- Muutosten dokumentointi/ versiohistoria

Sosiologisia haasteita:

- Yhteisten toimintatapojen puute
- Suunnitelmien avoin jakaminen
- Informaatiotulva (real-time vs on-demand)

Sopimuksellisia ja laillisia haasteita:

- Perinteiset sopimusmallit eivät kannusta suunnitteluryhmiä kokeiluihin
- Immateriaalioikeuksiin (IP) liittyvät ongelmat
- Keskenäisten suunnitelmien jakaminen



5 askelta reaaliaikaisen suunnitteluteknologian käyttöönottoon

1. **Tekninen toteutus:** reaaliaikaisen tiedonvaihdon mahdollistaminen ilman manuaalisia työvaiheita ja tiedon laadun heikkenemistä eri alojen ohjelmistotyökalujen välillä
2. **Käytettävyys:** teknologia tulee olla helppokäyttöistä suunnittelijoiden teknisestä osaamistasosta riippumatta
3. **Oikeudelliset ja sopimukselliset viitekehykset:** selkeä määrittely yhteistoiminnallisesti tuotetun suunnittelutyön immateriaalioikeuksien omistajuudelle ja vastuille
4. **Taloudelliset kannustimet:** palkitsemismenetelmät monialaiselle yhteistyölle (allianssimallin periaatteet)
5. **Organisaatiokulttuuri:** avoimen tiedonjaon kulttuuri, joka arvostaa avoimuutta ongelmanratkaisun voimavarana pikemminkin kuin ammatillisena riskinä





Kiitos!

Revolutionizing
Design Collaboration



Funded by the
European Union
NextGenerationEU



Navigator for BIM contracting



Funded by the European Union –
NextGenerationEU

From building information modelling (BIM) to information management (IM):

This focus on information management is illustrated by the international standards, which refer to 'Information management using building information modelling', with [the objective being information management, and Building Information Modelling \(BIM\) being the tool.](#)

UK BIM Framework

Sources and further information:
[From BIM to IM](#)

On the navigator

This navigator for BIM contracting collects the basics of building information modelling (BIM) and how to address it in contracts. It also highlights the focal points when developing BIM practices and contractual frameworks. The tool depicts a future of BIM as part of a [transition from file based information exchange in the construction projects to constant data sharing and data transaction based information management](#).

The navigator has been created in the LiveCol-project that explores the future of collaboration in construction projects and develops new methods and tools to enable design and construction teams to collaborate.

Target group – How to use

The navigator for BIM contracting is aimed to help when developing BIM related practices, information management, data sharing and contracting around BIM. By collecting the basics and links to further information in a single package, it can also be used in various decision making points involving multidisciplinary expertise from the areas of management, technology and legal.

The tool is an interactive pdf that can be navigated by using the interactive fields on the top and bottom of the pages.

BIM terminology in a nutshell:

Data models and Information models are connected, however separate:

- **Data model** focuses on data and can be transformed into machine-readable format
- **Information model** is structured in a way that can be interpreted by a human

BIM refers to information modeling of a construction entity as a tool, and can be used for example to produce:

- **Project information model (PIM)** for the design and building phases of a construction or
- **Asset information model (AIM)** for the use and maintenance phases of a construction

Digital twin is a digital representation aiming to manage, change and share data on for instance a construction for further purposes.

The core difference between a PIM, a AIM and a Digital twin is in their purpose of use. Each of them have a specific phase in which they are produced and used.

Sources and further information:

[Rakentamisen tieto- ja informaatiomallien sanasto \(luonnos\)](#)



The BIM process can be structured into four stages:

Stage 1: Initiation and planning

- Defining project goals to understand the client's requirements, project scope, and intended outcomes
- Assembling the project team consisting of architects, engineers, contractors, and other stakeholders
- Setting the BIM standards to govern how data is created, shared, and managed

Stage 2: Design and development

- Conceptual design covering the preliminary design
- Detailed design ensuring the fulfilment regulatory requirements and stakeholder expectations
- Collaboration and coordination aiming to detect and resolve design clashes and conflicts

Stage 3: Construction and implementation

- Procurement and material management to optimise them
- On-site construction and monitoring aiding in project monitoring, progress tracking, and issue identification
- Quality control and issue resolution ensuring the final product meets quality standards

Stage 4: Operation and maintenance

- As-built model reflecting the actual conditions of the structure
- Facility management with maintenance scheduling, asset tracking, and space management
- BIM for renovations and retrofits for understanding existing structures and planning changes

Sources and further information:
[BIM Wiki in Designing Buildings](#)



BIM maturity levels:

To describe the evolution of BIM, the previously used BIM maturity levels give an overview of the development of BIM:

Level 0 BIM: Unmanaged computer aided design (CAD) including 2D drawings, and text with paper-based or electronic exchange of information but without common standards and processes. Essentially this is a digital drawing board.

Level 1 BIM: Managed CAD, with the increasing introduction of spatial coordination, standardised structures and formats as it moves towards Level 2 BIM. This may include 2D information and 3D information such as visualisations or concept development models. Level 1 can be described as 'Lonely BIM' as models are not shared between project team members.

Level 2 BIM: Managed 3D environment with data attached but created in separate discipline-based models. These separate models are assembled to form a federated model but do not lose their identity or integrity. Data may include construction sequencing (4D) and cost (5D) information. This is sometimes referred to as 'pBIM' (proprietary BIM).

Level 3 BIM: A single collaborative, online, project model with construction sequencing (4D), cost (5D) and project lifecycle information (6D). This is sometimes referred to as 'iBIM' (integrated BIM) and is intended to deliver better business outcomes.

Level 4 BIM: Level 4 introduces the concepts of improved social outcomes and wellbeing.

Sources and further information:
[BIM Wiki in Designing Buildings](#)



BIM terminology

BIM process stages

BIM maturity levels

BIM in design stage

Finnish construction
project phasesFinnish construction
contracts

BIM as part of design stage contracts in Finland

Common BIM requirements YTV 2012 are often included in Finnish design contracts, however, they do not usually have a commercial role in the design phase.

YTV 2012 contains the following parts:

- Series 1: General part
- Series 2: Modeling of the starting situation
- Series 3: Architectural design
- Series 4: MEP design
- Series 5: Structural design
- Series 6: Quality assurance
- Series 7: Quantity take-off

- Series 8: Use of models for visualization
- Series 9: Use of models in MEP analyses
- Series 10: Energy analysis
- Series 11: Management of a BIM project
- Series 12: Use of models in facility management
- Series 13: Use of models in construction
- Series 14: Use of models in building control

Sources and further information:
[BuildingSMART](#) [Finland Wiki](#)
[RT YTV 2012](#)



Phases of a Finnish construction project Phases of a Finnish construction project are:

A. Design phases

1. Feasibility study (tarveselvitys)
2. Project planning (hankesuunnittelu)
3. Conceptual design (ehdotussuunnittelu)
4. Generic design (yleissuunnittelu)
5. Detailed design (toteutussuunnittelu)

B. Construction phases

6. Construction (rakentaminen)
7. Commissioning (käyttöönotto)
8. Warranty period (takuu aika)

Sources and further information:

[Terveet tilat 2028 Rakennustieto RT 10-11224](#)



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Finnish construction contracts

Consulting services often use General conditions for consulting **KSE 2013**:

- Takes often a structure of Main/Auxiliary/Sub-consultancy
- There are templates for different purposes (e.g. architectural, structural, HVAC, electrical design)
- Covers phases 1-5 of the above construction project phases

Construction uses often uses General conditions for building contracts **YSE 1998**:

- Often structured under Main/Nominated Sub-contractor/Sub-contractor
- Covers phases 6-8 of the above construction project phases
- Contract documents are multiple, consist of commercial and technical documents

In YSE 1998, the order of validity of the construction contracts is complex:

A. Commercial documents

- a) contract;
- b) minutes of the building contract negotiations;
- c) the General Conditions;
- d) invitation to tender and the additional written documents supplied prior to submission of the tender;
- e) building contract programme or other building contract conditions per contract;
- f) contract boundary annex;
- g) tender;
- h) bill of quantities and list of measurements;
- i) unit price list for modification work

B. Technical documents

- j) job-specific quality requirements and reports;
- k) contract drawings;
- l) general quality requirements and job reports

Sources and further information:

[Rakennustieto RT 13-11143](#)

[Rakennustieto RT 16-10660](#)



IMI Framework as an advanced way of contracting on BIM

One of the forerunners on promoting the use of BIM has been the British **IMI Framework** and the underlying **UK BIM Framework**. The UK BIM Framework established the **CIC BIM Protocol 2013**. It was developed further into the IMI Framework based on the international standards series **ISO 19650**.

According to the IMI Framework:

'Building information modelling (BIM) according to the ISO 19650 series' is about getting benefit through better specification and delivery of just the right amount of information concerning the design, construction, operation and maintenance of buildings and infrastructure, using appropriate technologies.

One way ISO 19650 series aims to achieve the delivery of just the right amount of information, is by introducing the terms **Project Information Model (PIM)** and **Asset Information Model (AIM)**. PIM covers the delivery phase of a building and AIM covers its operational phase.

To support the contracting on BIM, the UK BIM Framework provides **Information Protocols** for:

- a) the delivery phase of assets and building of the PIM (ISO 19650-2); and
- b) the operational phase of assets and building of AIM (ISO 19650-2).

These information protocols contain the contractual clauses proposed to be implemented in a construction project in its building and operational phases.

Sources and further information:

[IMI Framework](#)

[IMI Framework FAQ](#)

[BIM Framework guidance on information protocols](#)



Main contractual elements in the UK BIM Framework

The main contractual elements in the UK BIM Framework information protocols can be divided into:

a) Contractual responsibilities (Clauses 2-7 and 9)

These clauses identify what kind of responsibilities fall under different roles. The main roles are the Appointing Party, Appointor and Appointee. These roles cover the procurement made by the Appointing Party and the subcontracting structure between the Appointor and the Appointee. This division of contractual responsibilities also sets the frame for liability between the parties.

b) Use of information (Right to and scope of use) (Clause 8)

These clauses specify who possesses the rights to the Material produced (i.e. who "owns" the Material) and what kind of usage rights are granted to the other Parties. These identify who has the control of the information during the construction of a building and thereafter. Thereby, they also set the basis for finding the core actors needed for creation further value from the Material.

c) Limit of liability

(Clauses 5.1 and 5.2, Clauses 8.9 and 8.10, and Clause 10)

These clauses set out the contractual limits of liability of the Parties, without which the liability would be regarded to be limitless. The liability is based on the division of contractual responsibilities and granted usage rights to the Material. The clauses limiting liability usually carve out any other liability than that explicitly stated in the agreement.

Sources and further information:

[UK BIM Framework Information Protocol ISO 19650-2](#)

[UK BIM Framework Information Protocol ISO 19650-3](#)



Contractual responsibilities in the UK BIM Framework

Contractual responsibilities of the UK BIM Framework can be found in Clauses 2-7 and 9 of its information protocol.

The contractual responsibilities can be divided into the following main categories:

- Requirement to co-operate (Clause 2)
- Division of responsibilities between Appointing Party, Appointor and Appointee (Clauses 3 and 4)
- Common Data Environment (CDE) solution and workflow (Clauses 5.3-5.5)
- Management of information (Clause 6)
- Level of information need (Clause 7)
- Responsibility to deliver information based on Information Particulars (Clauses 9.1 and 9.2)
- Risks assessment, long term strategy, lessons learned (Clauses 9.3 and 9.4)

Sources and further information:

[UK BIM Framework Information Protocol ISO 19650-2](#)

[UK BIM Framework Information Protocol ISO 19650-3](#)



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Use of information in the UK BIM Framework

The right to use information and the scope of use is covered by the UK BIM Framework information protocols clause 8 regarding the use of information.

Clause 8 should be read in conjunction with the definition of Permitted purpose in clause 13.

The framework of usage rights and licenses can be structured as follows:

- Permitted purpose definition (Clause 13)
- GDPR (Clause 8.1)
- May agree otherwise (Clause 8.2)
- All rights in Material vest in the Appointee (Clause 8.3)
- Appointee grants a non-exclusive license for Permitted Purpose (Clause 8.4)
- Rights excluded from the Appointee's license (Clause 8.5)
- Appointor grants a non-exclusive sub-license to third-party material for Permitted Purpose (Clause 8.6)
- Appointor grants a non-exclusive license to own Material for Permitted Purpose (Clause 8.7)
- Rights excluded from the Appointor's license (Clause 8.8)

Sources and further information:

[UK BIM Framework Information Protocol ISO 19650-2](#)

[UK BIM Framework Information Protocol ISO 19650-3](#)



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Limit of liability in the UK BIM Framework

Limits of liability in the UK BIM Framework are scattered in several clauses: Clauses 5.1 and 5.2, Clauses 8.9 and 8.10, and Clause 10.

The core limitations address separately the liability for the Common Data Environment and for the provided Material. In addition, the UK BIM Framework information protocols contain general exclusion of liability.

Detailed clauses can be found in:

- Limits of liability - Common Data Environment (CDE) (Clause 5.1 and 5.2)
- Limits of liability - Material (Clause 8.9 and 8.10)
- Exclusion of liability (Clause 10)

Sources and further information:
[UK BIM Framework Information Protocol ISO 19650-2](#)
[UK BIM Framework Information Protocol ISO 19650-3](#)



Some recommendations for developing BIM contracting

The **EU BIM Taskforce** has proposed two recommendations specifically related to BIM contracting in their Handbook for the Introduction of Building Information Modelling by the European Public Sector:

1. Strategic level recommendation urges to develop the legal, procurement and regulatory framework that is consistent with EU policies and legislation.
2. Implementation level recommendation aims to drive contractual arrangements that enable the production of BIMs.

Even though these recommendations are directed towards the public sector, they can also be applied to private sector.

Finnish practices can be built based on the learnings of:

- From **UK**: IMI Framework and the Information Protocols of the UK BIM Framework
- From **Sweden**: Practices built by the Swedish Transport Administration based on the standard contract documents provided by the Construction Contracts Committee, BKK
- From **Finland**: Knowledge gained in implementing buildingSMART Finland Roadmap 2035

Finnish construction industry could gain especially from starting to use **BIM as a commercial document**. This would require for instance developing YTV 2012 towards binding contractual commitments. Special attention should be given for instance to **compensation models** that promote collaboration, clearly defined **collaboration processes**, and the role of the **BIM coordinator**.

Sources and further information:
[EU BIM Taskforce Handbook](#)
[buildingSMART Finland](#)

[Riku Riiheläinen: Yhteistoimintaa mahdollistavat suunnittelusopimukset talonrakentamisen tietomallihankkeissa](#)



Summary

1. Focal company

2. Balanced liability

3. Incentives

4. Flip to BIM first

5. Data product flows

Points of attention to promote consistent use of BIM in construction project contracts

1. Identify **focal companies** and their roles
2. Balance **liability** based on distinct responsibilities and business opportunities
3. Build active collaboration and **incentives** for all stakeholders
4. Flip the thinking towards **BIM first**
5. Understand **data product flows** and data sharing needs in each phase



Identify focal companies and their roles

Identifying the focal companies and their roles in the ecosystems, is the first step in building contractual frameworks that can serve the use of BIM and promote further uses of BIM data. The **building project owner** (e.g. Client or Appointing Party) purchasing the construction is one of the key players in the construction project. In a construction project, the counterpart for the building project owner is usually the **main consultant** in the design phase of the building, and the **main contractor** in the building phase. These main consultants and main contractors manage a **network of subconsultants or subcontractors**.

All actors identified above have a distinct role in BIM. When the scope of use of BIM is extended to the maintenance phase, several other focal companies emerge, for instance **companies leasing/renting the construction** and **maintenance service providers**. Widening the scope even further and looking at the whole lifecycle of a construction, novel type of actors, like **circular economy actors** or specific **data intermediaries** may appear.

Ecosystem studies give structure for assessing the role that each of these actors play in different stages of BIM. These actors operate in several, overlapping business networks and ecosystems. Some of these ecosystems focus specifically on the resource exploitation for customer value, as is the case for instance in the construction phase of a building, forming a clear **business ecosystem**. Other ecosystems may have different logic of action. Circular economy actors may for instance focus on knowledge exchange for the benefit of broader set of actors, forming **knowledge ecosystems**. For these ecosystems to achieve stable operation, a focal **keystone company** is often needed. In the building phase of a construction, this is often naturally the building project owner. In later stages, this keystone company may change depending on the phase of the building's lifecycle or the purpose for which data from the building is used. In addition to these keystone companies, **highly mobile actors** or **platform owners**, may be in a key position to enable interactions between different ecosystems. **Without identifying the changing roles of the focal companies, it is impossible to allocate business opportunities and relating liabilities to the contracting parties, build incentives for the actors, and define permitted purposes for BIM data.**

Sources and further information:

[Katri Valkokari: Business, Innovation, and Knowledge Ecosystems](#)



Balance liability based on distinct responsibilities and business opportunities

Once the focal companies and their roles have been identified, BIM related collaboration processes taking place between different actors can be specified and related responsibilities and liabilities built into contractual networks.

The most natural place to start, is to specify collaboration processes and allocate responsibilities in the design phase of a construction. One example of practices and tools emerging can be found in the **IMI Framework** and its **Information Management Assignment Matrices**. These include a clear allocation of responsibilities to the core actors of a construction project.

These kind of assignment matrices build the basis for collaboration on BIM. However, in case these assignments are not incorporated as contractual responsibilities and liabilities, the assignments may result in general, open-ended responsibilities. Therefore, the assignments should be clearly included in the **commercial documentation** and it should be ensured that payments follow the allocated tasks.

In addition to interlinking BIM as integral part of the design and construction phases, the **business opportunities** related to the later phases of BIM utilization should be considered.

In case rights and obligations related to BIM are allocated in a way that it reflects the commercial liability taken and further business opportunities opened, it may lead to clear and balanced liability allocation driving consistent use of BIM forward.

Sources and further information:

[IMI Framework Information Management Assignment Matrices](#)

[Riku Riiheläinen: Yhteistoimintaa mahdollistavat suunnittelusopimukset talonrakentamisen tietomallihankkeissa](#)



Build active collaboration and incentives for all stakeholders

After the roles and tasks related to BIM have been identified, incentives can be built into the contracts. These incentives should aim for high quality execution and reflect the business opportunities arising.

Alliance models used for large scale construction and IT-projects can be used as an example of incentive building that could be applied to BIM as well. Alliance models used for Finnish construction projects are based on the guidelines of RT 103239. There are several ways to implement an alliance contract. An alliance model in the construction industry is typically divided into the design and construction phases, the agreement is made jointly with the alliance team, responsibilities and tasks are allocated during the implementation of the project (not in advance) and it includes both bonuses and sanctions depending on the achievement of the key targets.

The use of the alliance model may lead to different kinds of collaboration between the stakeholders compared to a more traditional way of contracting with very distinct responsibilities and fixed payments.

The need for this kind of collaborative efforts is clearly present in BIM and the use of the resulting information models. Collaboration can also be fueled for instance with defining practices like Big Room operations collecting relevant stakeholders together, processes led by a BIM coordinator and establishing common data environments (CDEs).

Sources and further information:
[Alliance model guidelines RT 103239](#)

[Riku Riiheläinen: Yhteistoimintaa mahdollistavat suunnittelusopimukset talonrakentamisen tietomallihankkeissa](#)



Flip the thinking towards BIM first

What if the physical building would be considered primarily as merely the first use case for BIM?

This kind of thinking has been introduced for instance for driving the green transition and the climate targets. It changes the focus to utilizing smart infrastructure and data produced by it. However, transformation towards this kind of data-based business is challenging for established businesses and cannot be introduced by just adding a layer of data on top of the existing business. These kind of add-on layers may be sufficient for incremental development, but in the search for novel, disruptive business models, the mindset should be flipped. Once the smartness of the infrastructure is considered as the primary goal, the potential of data-based value creation in networks of networks appear.

BIM is fruitful soil for this kind of mindset flipping towards smartness. BIM is data intensive, dependent on collaboration and has already seeds for purpose-driven information management. Examples of this can be seen in in the PIMs and AIMs following the IMI framework and ISO standards.

Maybe flipping the thinking towards BIM first is what is needed to drive the use of BIM forward and generate disruption in the construction industry. In such cases, designing the physical building would be seen solely as the first use case for BIM, expressed as PIM. The next use case could be found around the AIM, enabling the maintenance of the building. And further use cases could be built on information models around transport, city services or sustainability.

Sources and further information:

[Vihreä siirtymä vaatii miljardi-investointeja – Siinä itää mahdollisuus pienelle maalle | Talouselämä](#)



Understand data product flows and data sharing needs in each phase

Flipping the thinking towards BIM first, would require a **transition from file-based data transfers to real-time data sharing and data transactions**. This highlights the need for **data productisation** and establishment of **data product flows** between the ecosystem actors. All of these should be purpose-driven, meaning they should be designed based on each specific purpose or use case.

Data sharing takes place between two or more organisations, often based on a contract. Data sharing may be subject to remuneration, bartered or free of charge. Data sharing may contain different levels of control over shared data. The European data spaces are one form of data sharing.

Data products are data sharing units, packaging data and metadata, and any associated license terms. The data product owner should produce data with reuse in mind as the same data can be delivered to multiple use cases.

Data product flows are formed by several data products that are shared or transacted between different organisations. Data product flows identify the actors and the value adding activities needed to provide the services to the end user.

A good starting points to develop the data sharing practices, data productisation and data product flows in BIM related industries are for instance the common BIM requirements YTV 2012 and buildingSMART Finland use case descriptions. These contain some elements needed for data productisation but should be developed further to interlink the production of BIM data to its purpose-driven data usage.

Sources and further information:

[Data Spaces Support Centre](#)

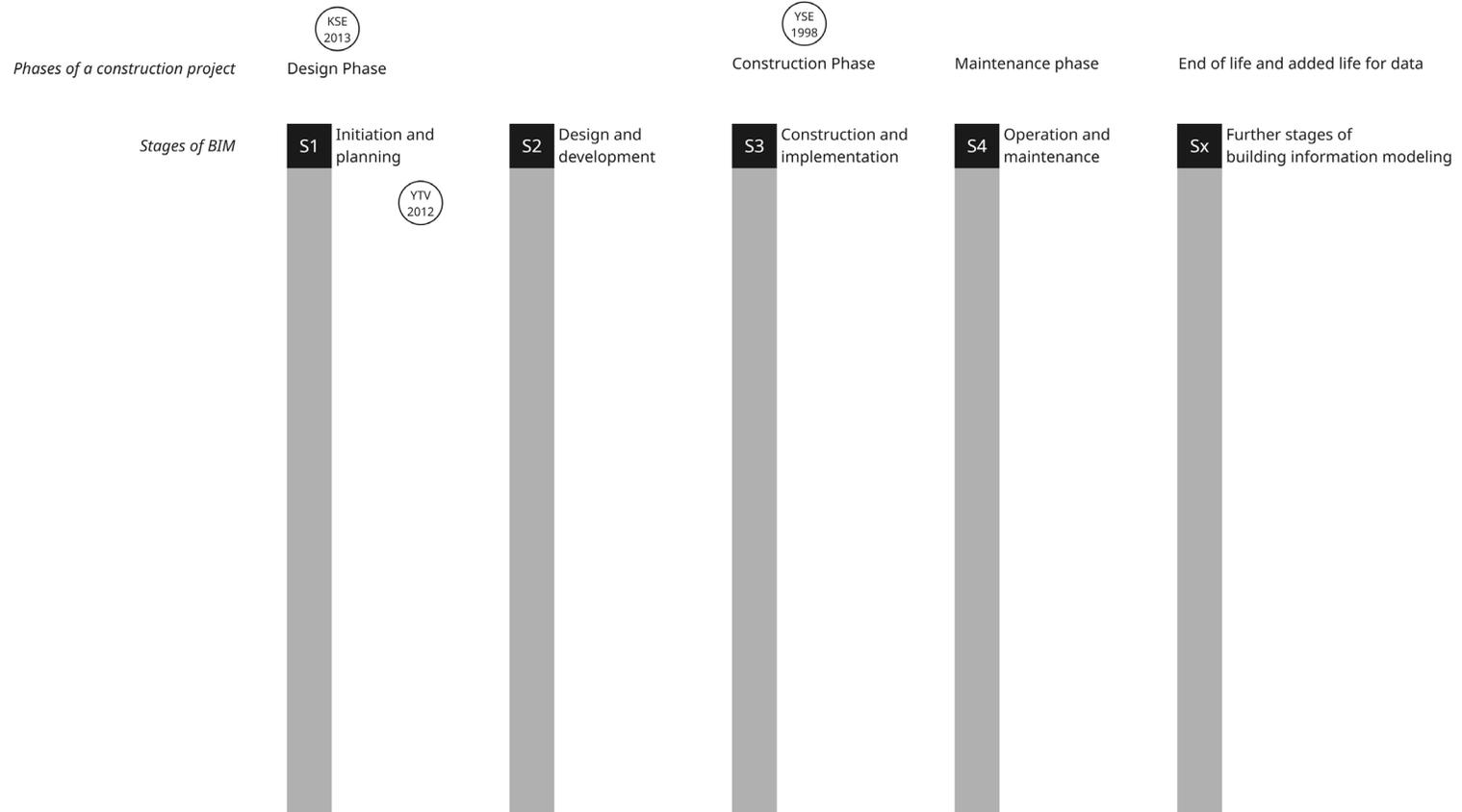
[DS2 Project](#)

[RT YTV 2012](#)

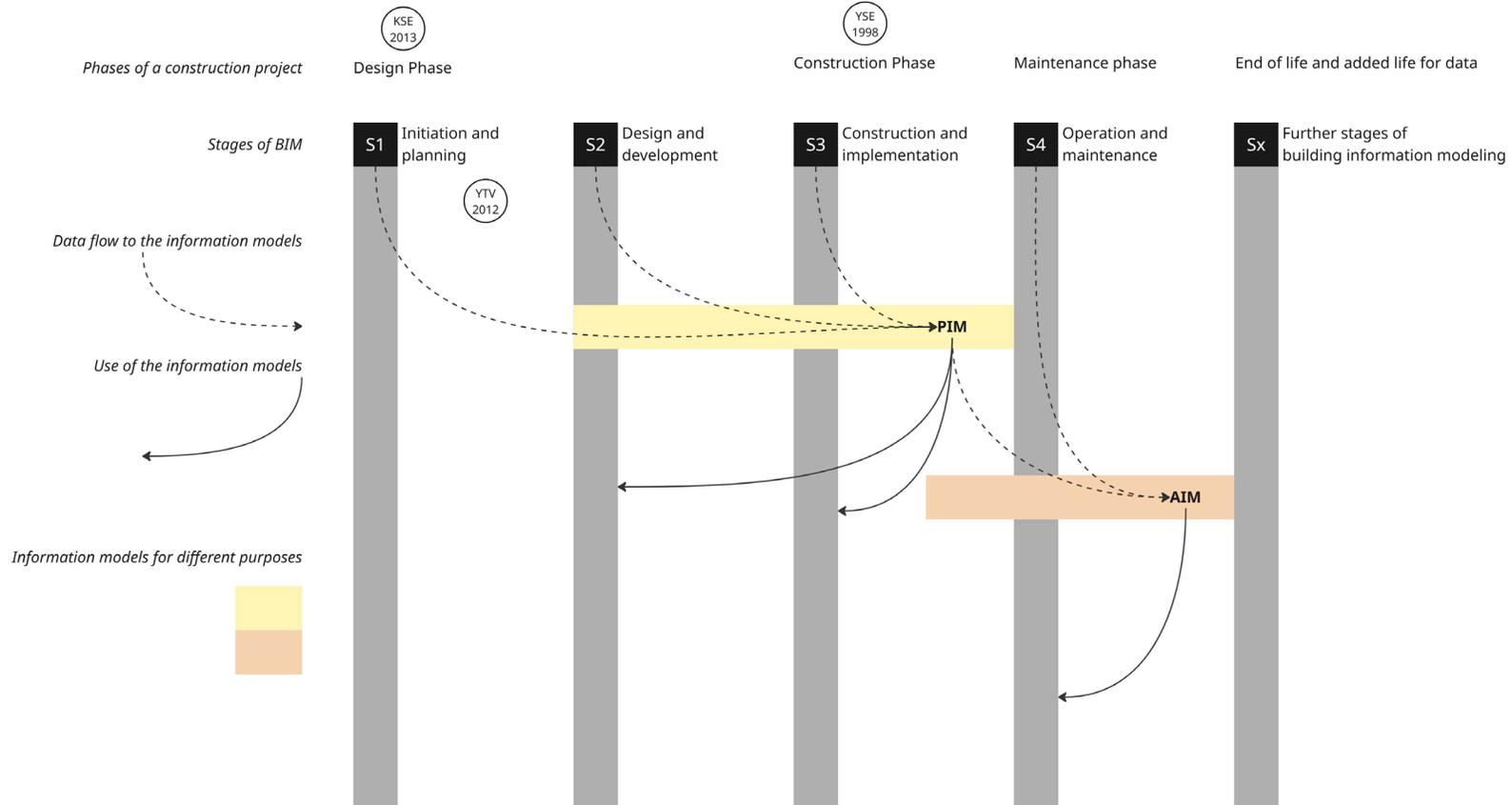
[BuildingSMART Finland use case descriptions](#)



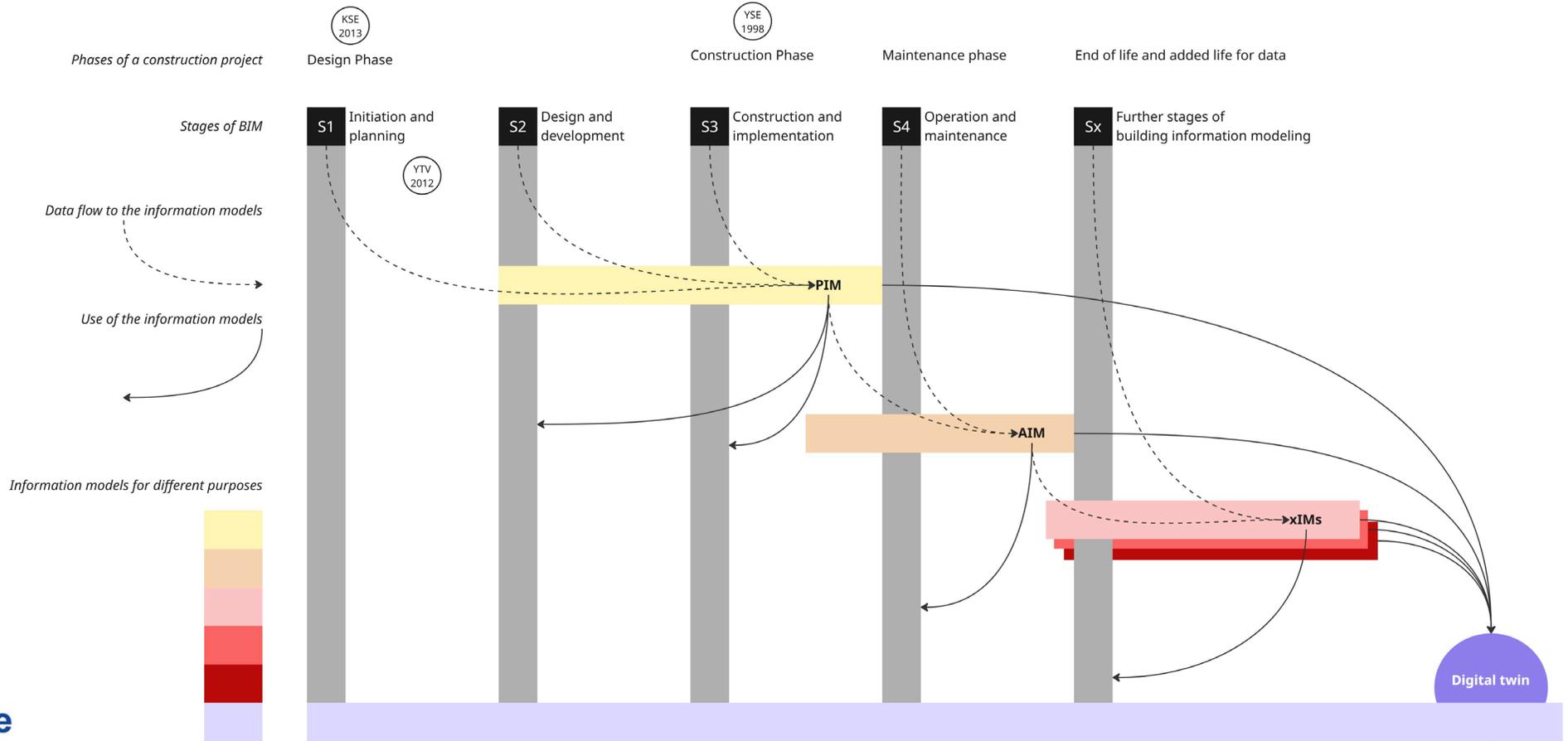
Current practices and contractual tools – like KSE 2013, YSE 1998 and YTV 2012 – are scattered and provide assistance to very specific parts of a construction project.



Tools like the IMI framework with project information models (PIMs) and asset information models (AIMs) help in driving towards purpose-driven use of data.



Purpose-driven use of data and information models does not stop at the construction or maintenance phase, instead several types of further use of construction related data can be envisioned. The concept of a digital twin aims to serve as the basis for all these purpose-driven ways of using data.



Better decision making with purpose driven data:

At the heart of the UK BIM Framework is a very simple premise – that we need to improve how we [use information to support better decision making across the whole life of the built and natural environment](#). Fundamentally, this requires us to know how to identify, develop and use [purpose-driven data](#) to support better outcomes for the environment, the economy and society at large.

Dr Anne Kemp OBE, Chair UK BIM Alliance and Co-Chair of the UK BIM Framework Strategy Board

Sources and further information:
[Where change matters](#)



About the author

Jutta Suksi

I work as Senior Specialist in VTT's Team Advanced Data Spaces.

With my research, I aim to help both private and public sector organisations to understand, operate and find new opportunities in the concurrent data intensive economy.

My specific focus areas are:

- Legal issues relating to data (e.g. regulations, data sharing, contracting)
- Design aspects (e.g. processes involved around data, systemic design tools, communication between different stakeholders)
- Data ecosystems and data-intensive business



LiveCol Testbench

Kalle Kähkönen
Gayan Kankanamge
Jaakko Huusko
Toni Teittinen

3.2.2026



Tekla Live Collaboration -ohjelmisto

- ❖ Live Collaboration for Tekla Structures -palvelun avulla voit tehdä reaaliajassa yhteistyötä 3D-mallien välillä ilman, että tarvitsee viedä tai jakaa tiedostoja.
- ❖ Live Collaboration toimii useiden Tekla Structures ja Trimble Connect instanssien välillä, mahdollistaen reaaliaikaisen mallipohjaisen yhteistyön laajan projektitiimin kanssa.
- ❖ Kaikki yhteistyökumppanit näkevät välittömästi muiden tekemät muutokset, mikä mahdollistaa projektitiimin jäsenten reaaliaikaiset suunnittelu- ja arviointisessiot.



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(<https://fi.linkedin.com/company/Tekla>)



Set-up

- Työasemat neljässä eri toimistotilassa (TAU Hervanta)
- Reaaliaikainen tietomallien jakaminen - Tekla Structures/Trimble Connect
- Teams-keskusteluyhteys
- Ennalta määritelty suunnittelutehtävä
- Kullakin osallistujalla oma rooli (terässuunnittelija, betonirakennesuunnittelija)

Testaus tapahtumat

- Aamupäivä
- Esittely (30 min), Live collaboration suunnittelua (120 min), palautekeskusutelu (30 min)
- Osallistujat rakennesuunnittelijoita
- Q1/2025

Tutkimusdata

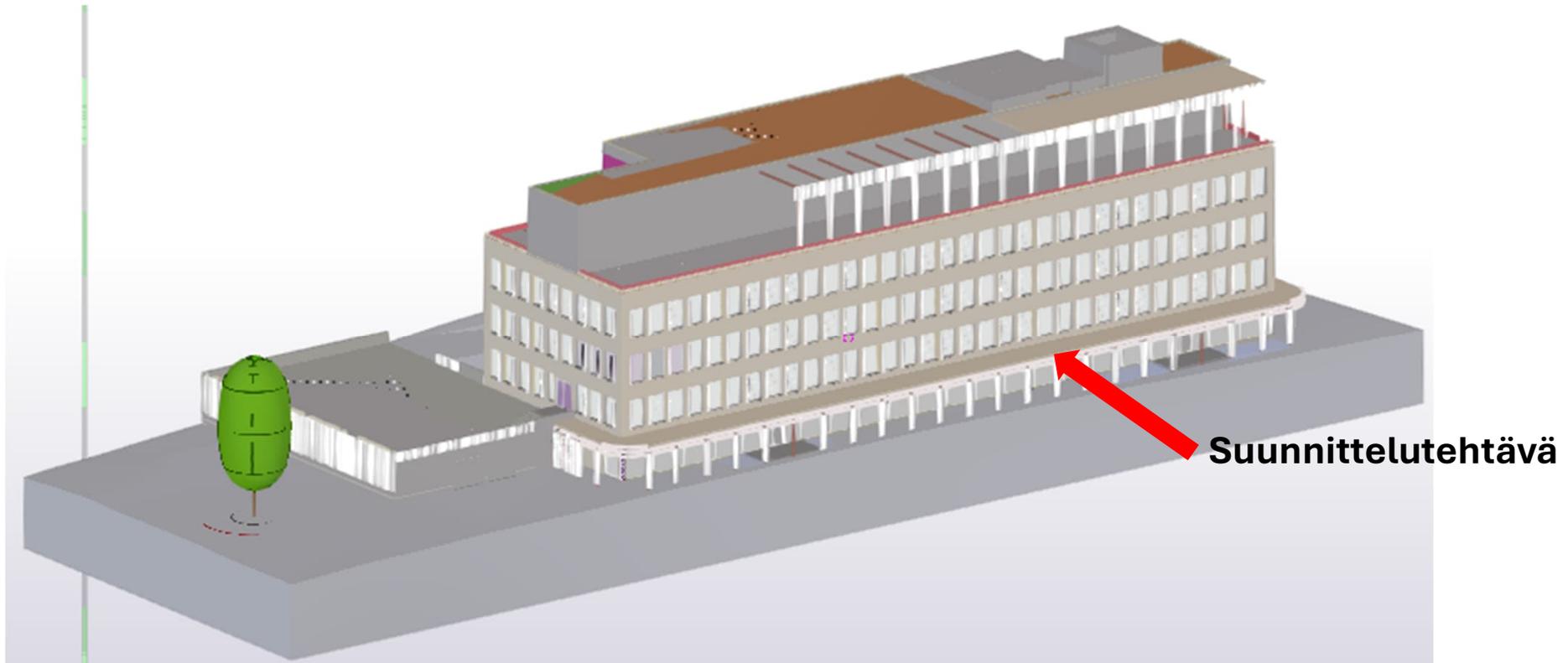
- Havainnointi
- Keskusteluiden tallenteet
- Ohjelmistojen log-data
- Palautehaastattelut



BIM4LCA tietomallit / VTT

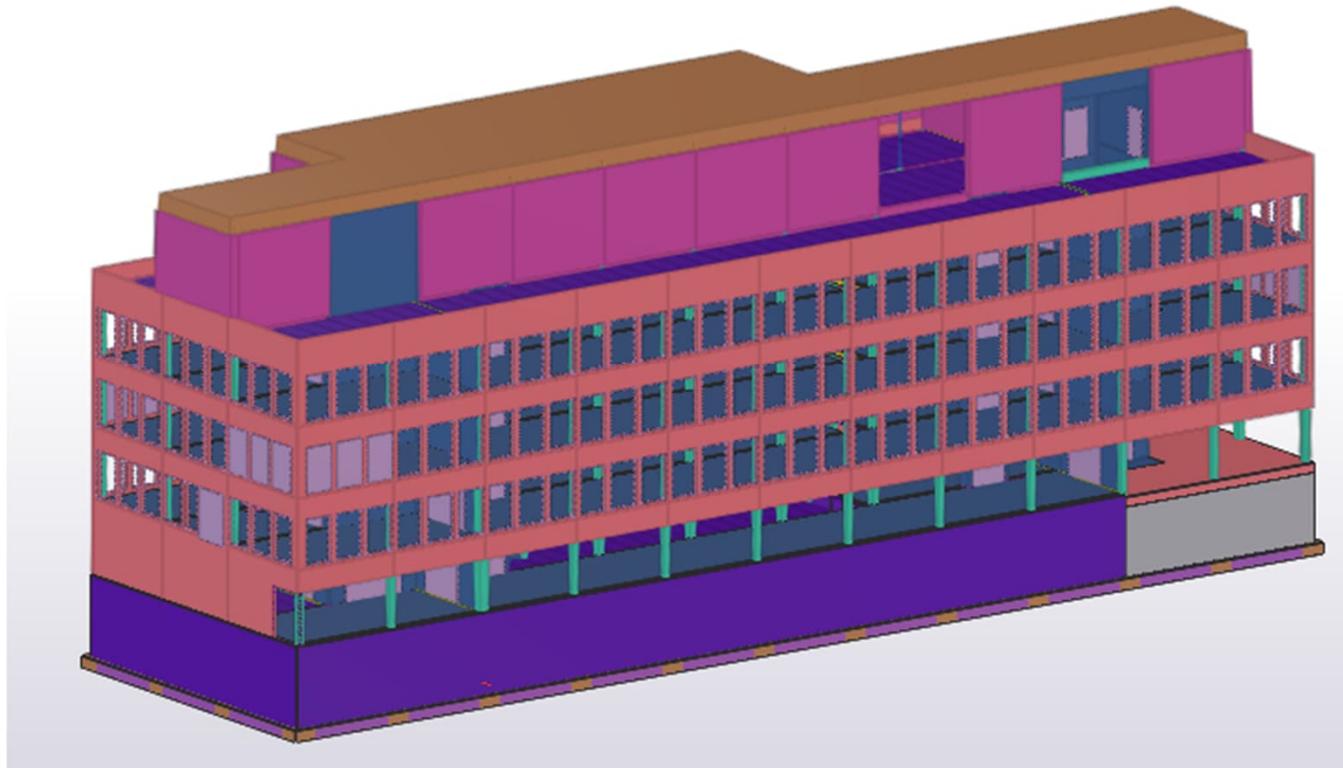
LiveCol testbench

Betonisen toimistorakennuksen katosrakenteen suunnittelu



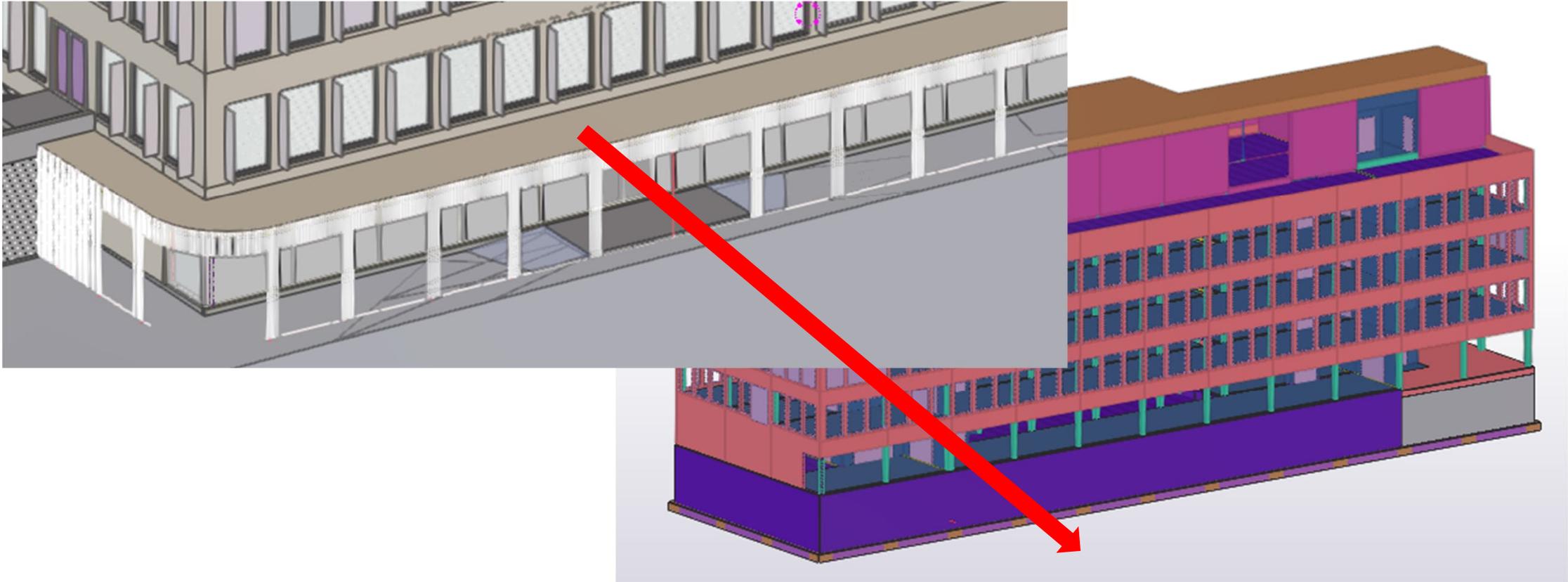
Lähtökohtainen rakennemalli

Toimistorakennuksen rakenteellinen mallinnus on valmis, lukuun ottamatta katoksen rakennetta

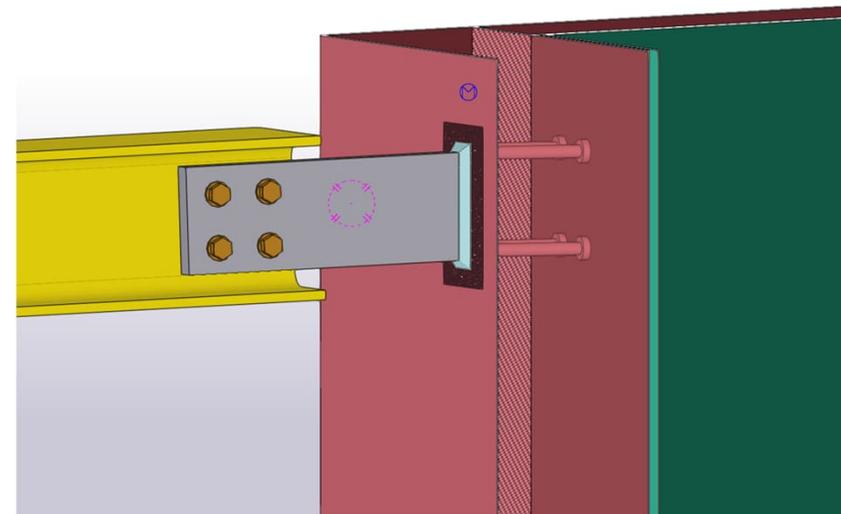
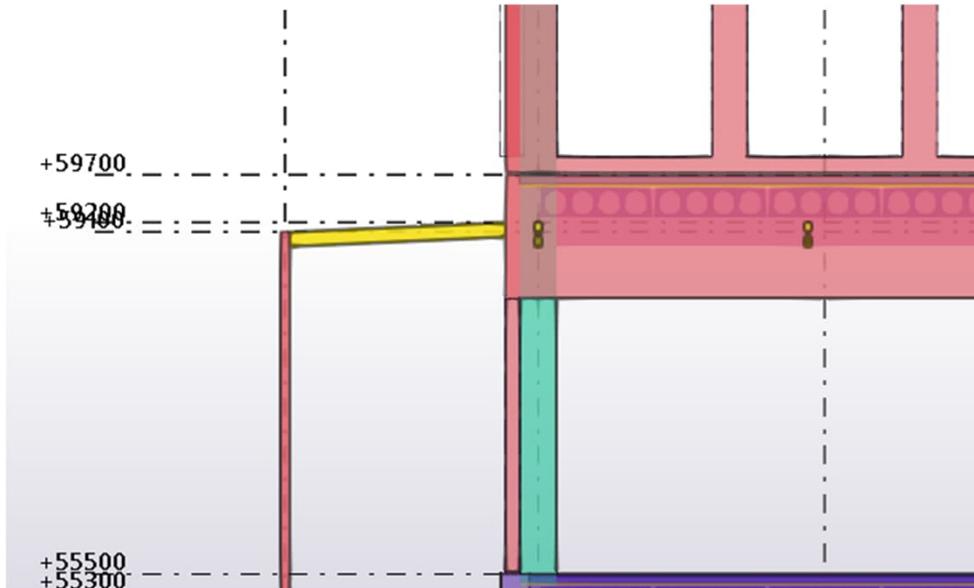
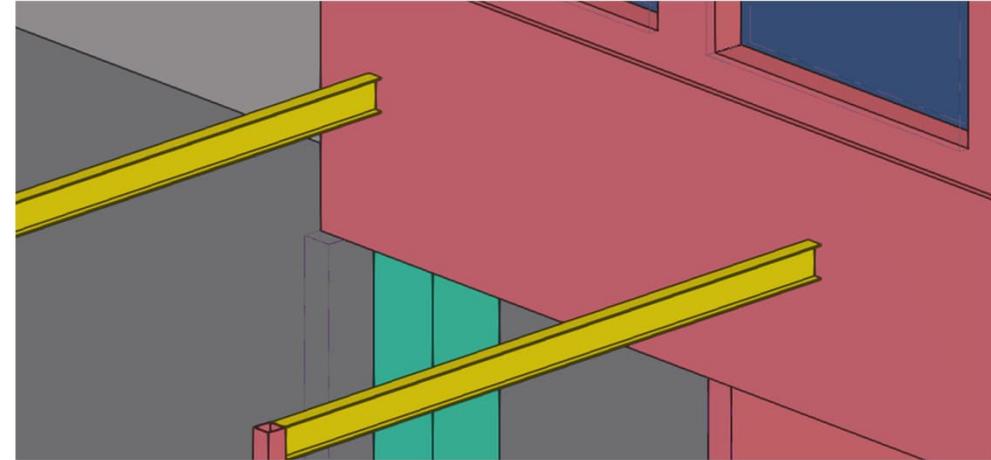
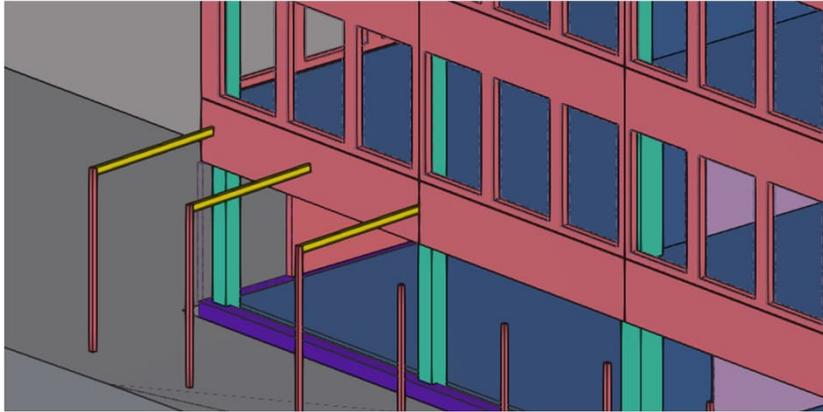


Suunnittelutehtävä?

Mallinna teräsrakenne katokselle!



Odotettu lopputulos – katospalkin ja betoniseinän yhdistäminen





Tekla Live Collaboration käyttäjän näkökulmasta

Hyödyt	Haasteet
<ul style="list-style-type: none">• Reaaliaikainen suunnitelmien synkronointi (ei tiedostojen siirtoja)• Kommunikointi uudelle tasolle visuaalisuuden kautta (muiden ratkaisujen näkeminen)• Vaihtoehtojen helpompi mallintaminen (nopeat suunnitteluiteraatiot)• Mahdollisuus nopeampaan ongelmanratkaisuun• Tukee etäyhteissuunnittelua (erityisen hyödyllistä suurissa, monimutkaisissa projekteissa)	<ul style="list-style-type: none">• Käytettävyydessä kehittämisen tarpeita• Ei sisäänrakennettua törmäystarkasteluita (törmäykset hallitaan manuaalisesti)• Ei voi muokata tai valita muiden suunnittelijoiden ratkaisuja (Tekla-rajoitus)• Status-tieto ja muutosten seuranta puuttuu• Useat ominaisuudet vielä kehitteillä

Tekla Live Collaboration käyttäjän näkökulmasta

- SUS Käyttäjäkokemus (System Usability Scale - SUS)

Arvioija	SUS score
Suunnittelija 1	67,5
Suunnittelija 2	55
Suunnittelija 3	55
Suunnittelija 4	60
Keskiarvo	54,9

- SUS-pisteet yli 68 katsotaan keskiarvoa paremmaksi



Lopuksi

- ❖ Reaaliaikainen suunnittelijoiden välinen yhteistyö tuo **uuden näkökulman** suunnitteluprosesseihin
- ❖ Reaaliaikainen yhteistyö voi **parantaa viestintää ja vähentää koordinoitaviiveitä.**
- ❖ **Vaativimpiin suunnittelutehtäviin** reaaliaikainen suunnittelijoiden välinen yhteistyö on erittäin hyödyllistä
- ❖ **Tulevien ohjelmistoversioiden** kehityksessä tulee keskittyä törmäystarkasteluiden, muutoshallinnan ja monipuolisen vuorovaikutuksen mahdollistamiseen
- ❖ Kun päivittäistä käyttöä koskevat käytännölliset haasteet ratkaistaan, reaaliaikaisesta yhteistyöstä voi tulla **merkittävä uudistaja perinteisille BIM-suunnittelukäytännöille**



Kiitos

Revolutionizing
Design Collaboration



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You can find our final report here:

