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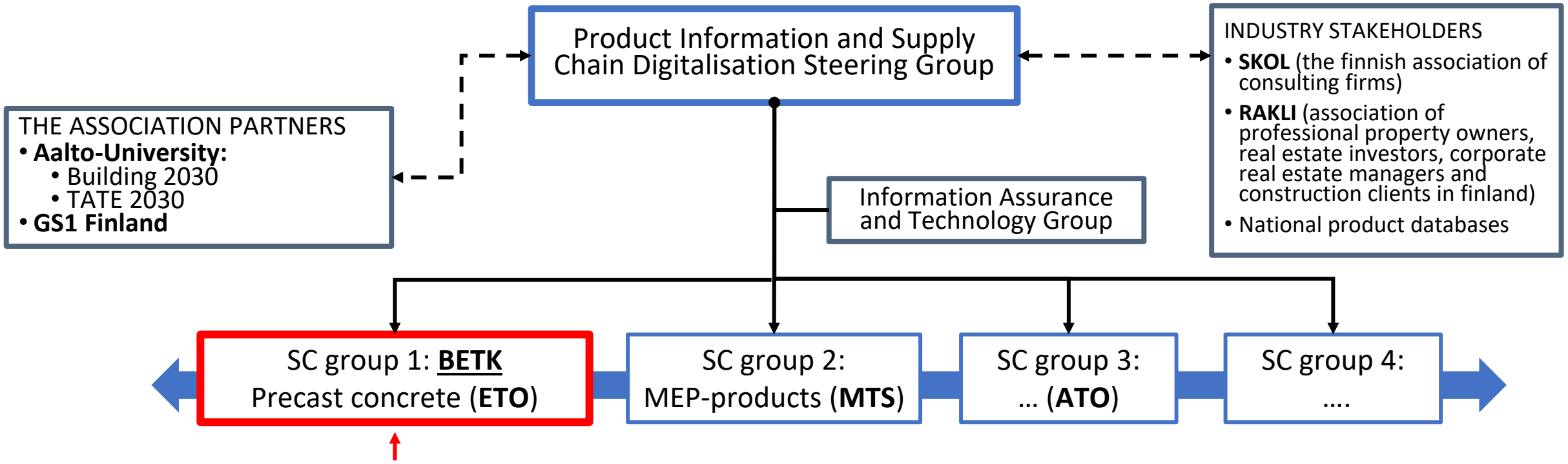
# Precast concrete supply chain, (Betonielementtitoimitusketju, BETK)

The Confederation of Finnish Construction Industries RT, Product information and supply chain digitalization development project

Event XX / 4.6.2024

# Organising the development of supply chain management

The Confederation of Finnish Construction Industries RT owns and coordinates the national project for the development of digitalisation of product information and the supply chain.



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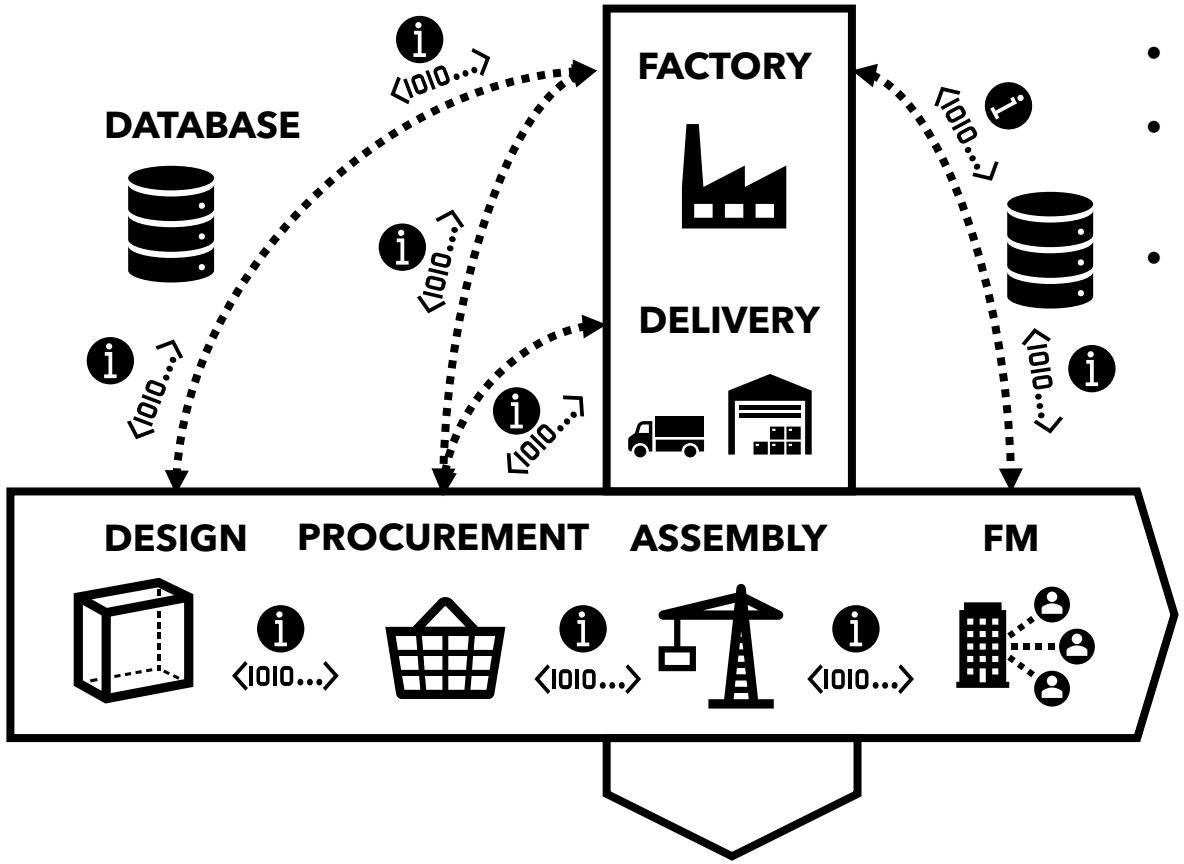
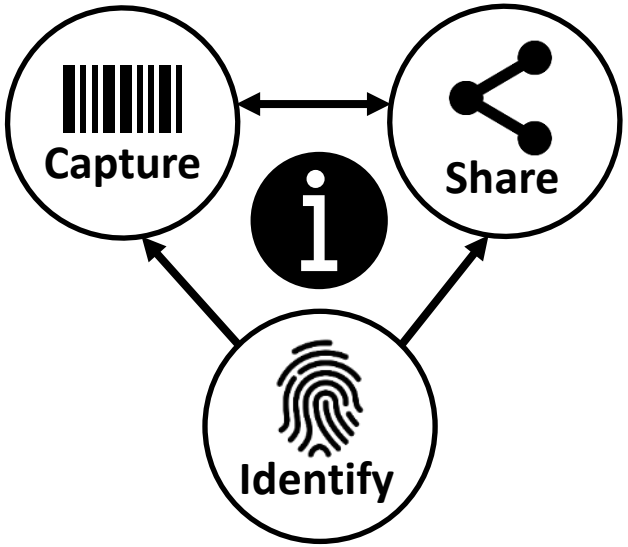
# BETK-digitalization workgroup

# Visio

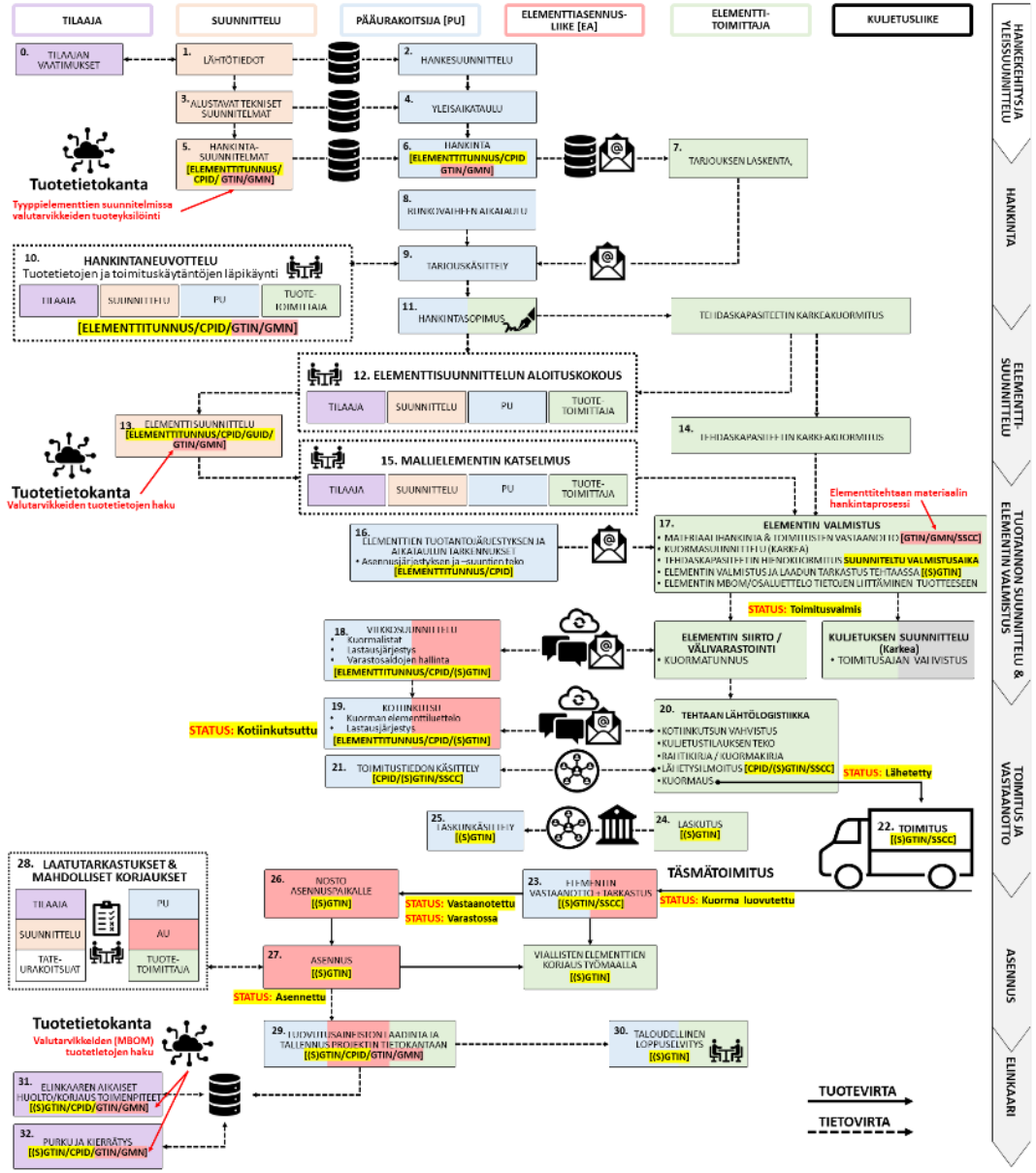



## DIGITAL SUPPLY CHAIN MANAGEMEN

- Machine-readable data exchange
- Standardised data content
- Consistent methods for the processes of identifying, capturing and sharing information
- Availability of product information and recording of process information in the supply chain



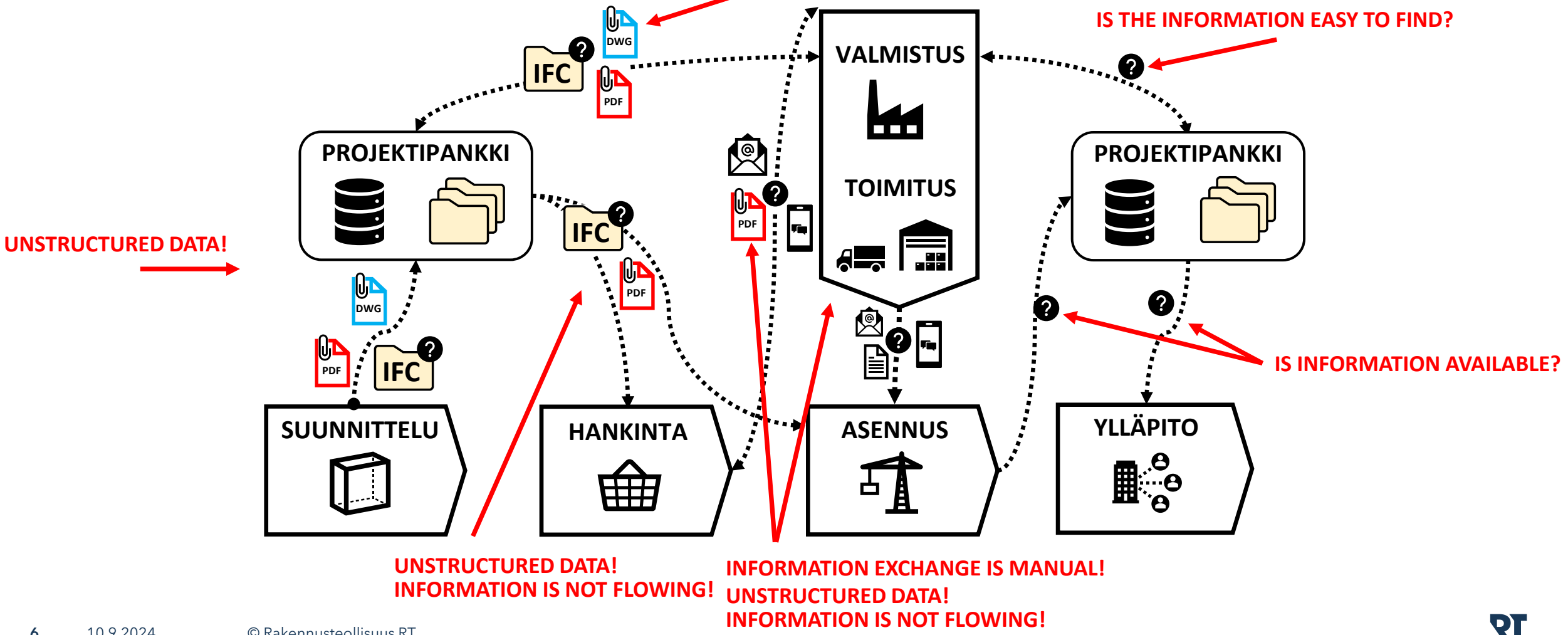
# Study on precast concrete supply chain management

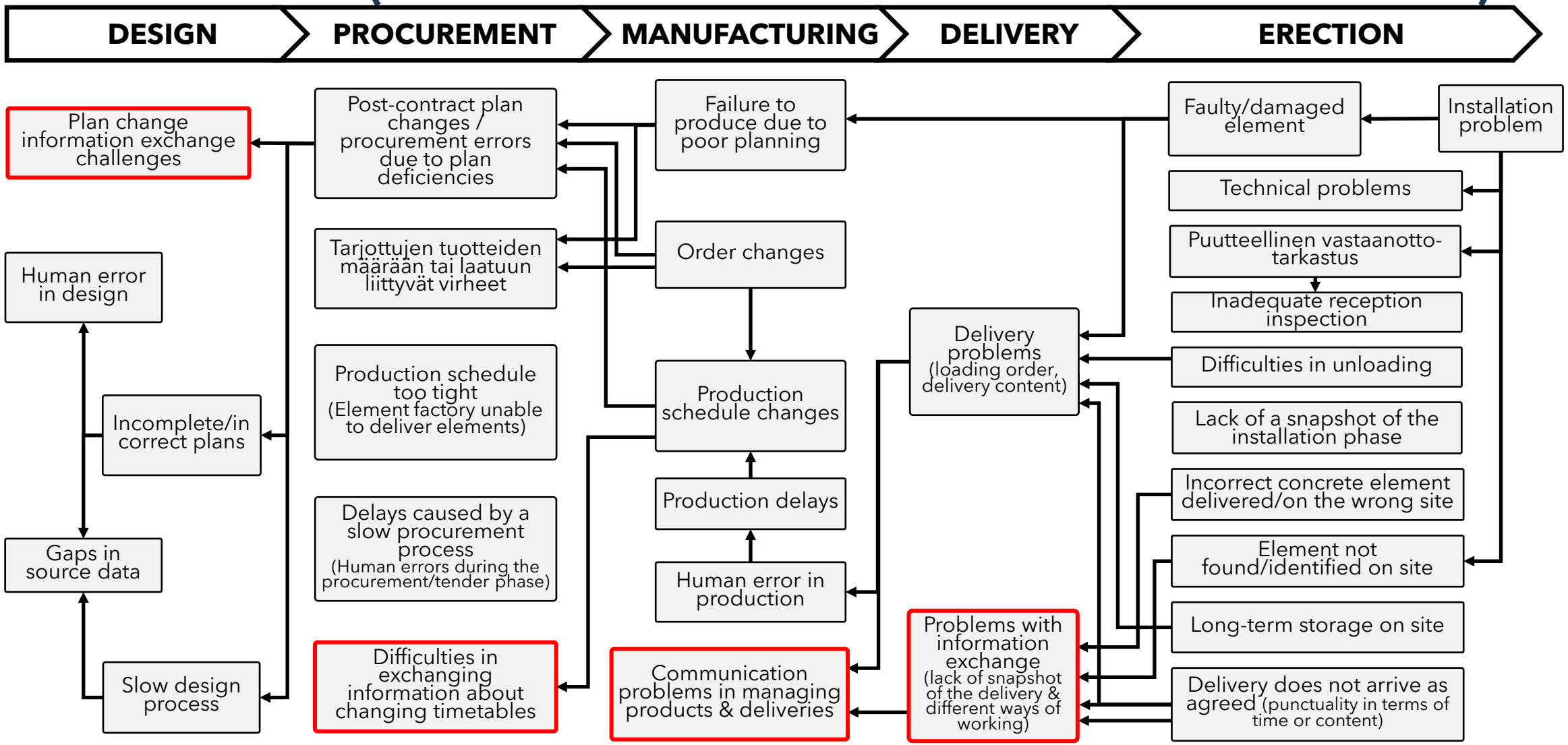

 

# Current situation/Industry challenge

**THE SUPPLY CHAIN IS NOT DIGITALLY MANAGEABLE!**



# Outcome (CAUSE MAP BASED ON WORKSHOP RCA)



# Outcome

## DESIGN

**MALLIPUU**

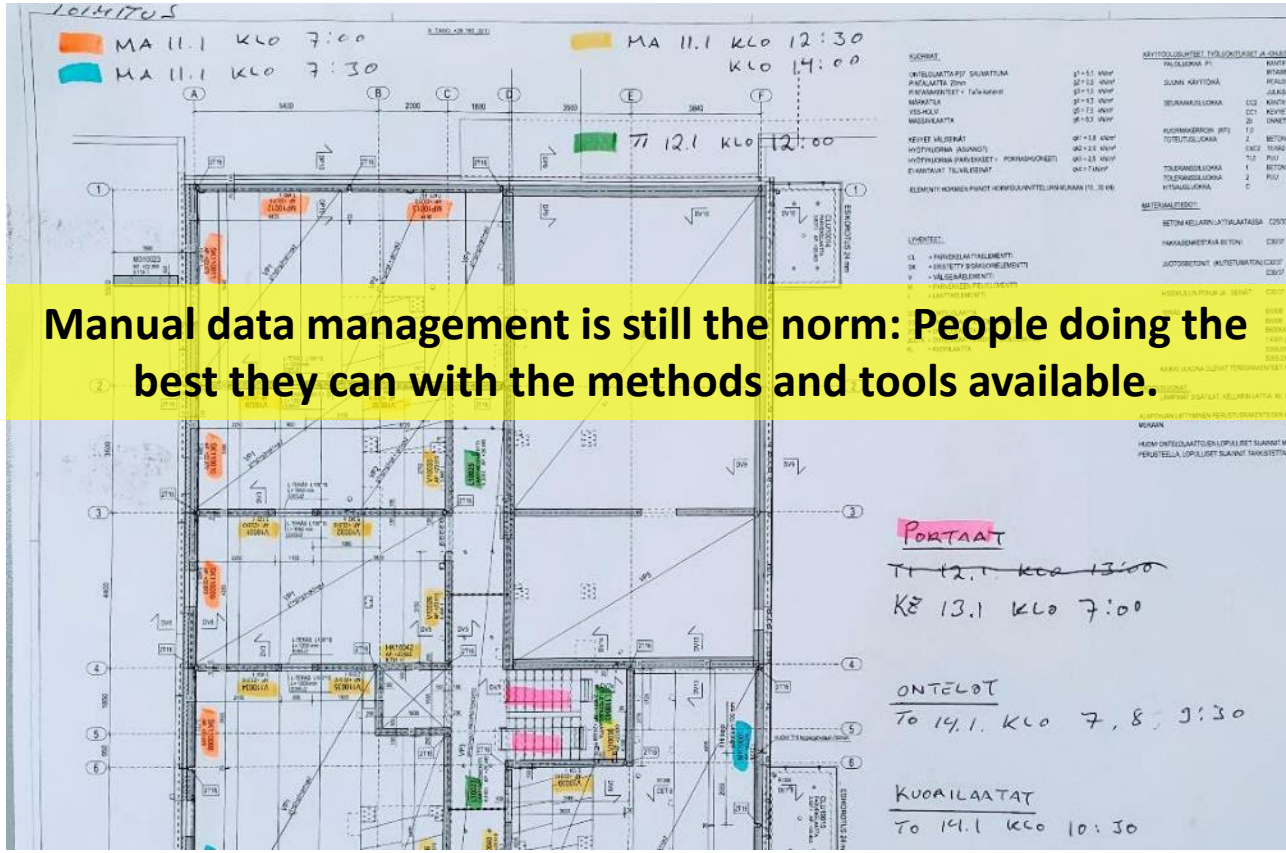
- (B) LVI KOHDE X
  - (B) Tontti.1
    - (B) mc-building
      - (B) Ryomintatila
      - (B) 1. kerros
      - (B) 2. kerros
      - (B) 3. kerros
- (C) RAK KOHDE X
  - (C) KOHDE X
    - (C) Rakennus.r.1
      - (C) 0
      - (C) 1
      - (C) 2
      - (C) Kerros. 3

Same building, different designers use different naming conventions to identify the floors:

[Floor number]. Kerros (means floor)
[Floor number]
Kerros. [Floor number]

This is human readable form not machine-readable form. Machine-to-machine data transfer is not possible with this kind of information.

## ERECTION




**Manual data management is still the norm: People doing the best they can with the methods and tools available.**

# BETK-digitalization workgroup

## The work will be carried out in stages in small groups:

**1** Solving the identity problem of an element in the design phase

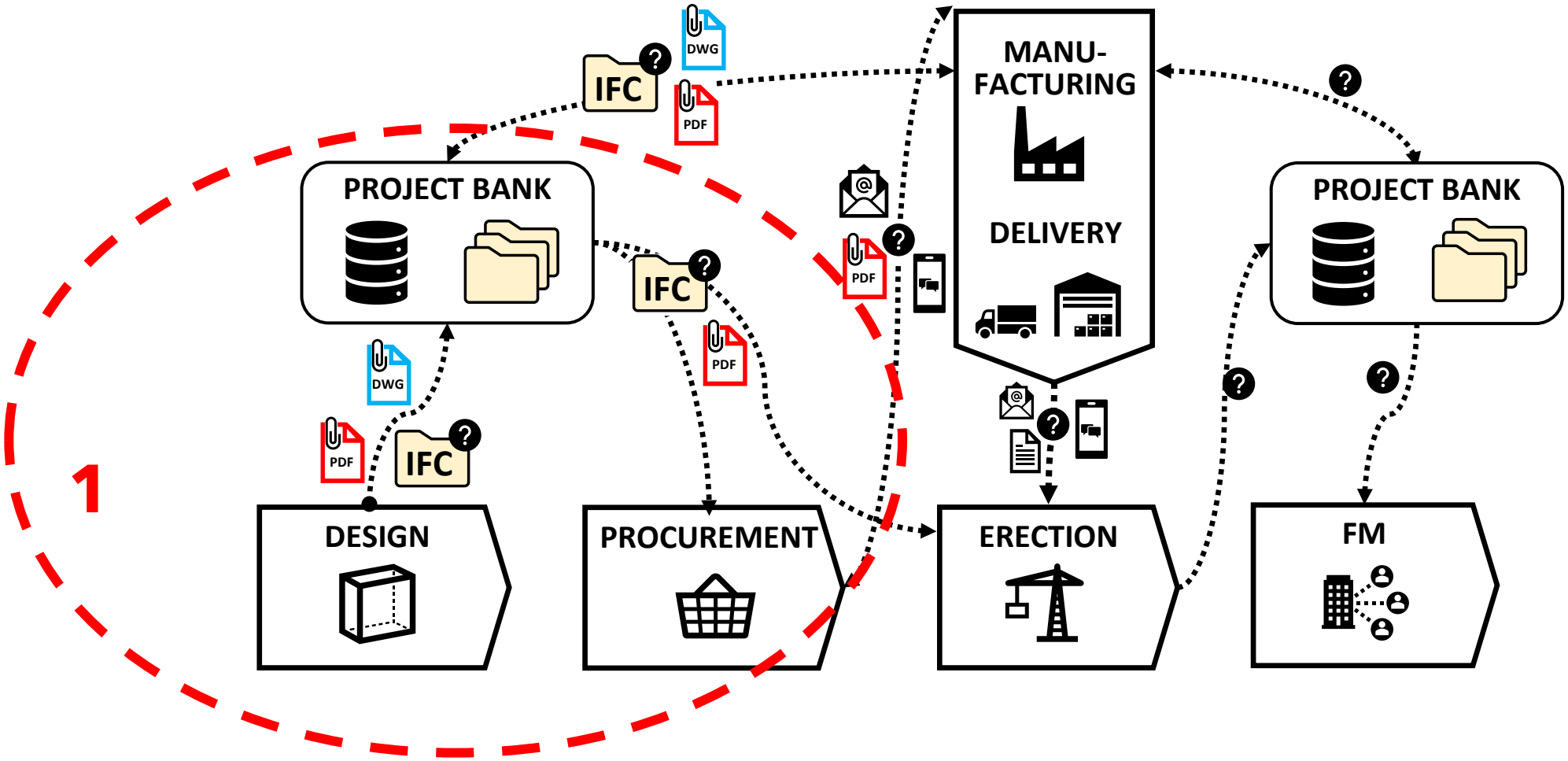
**2** Identification of the precast concrete element: implementation of the physical element identification code

**3** Precast concrete element identification capture: unique identification code in barcode and RFID tag

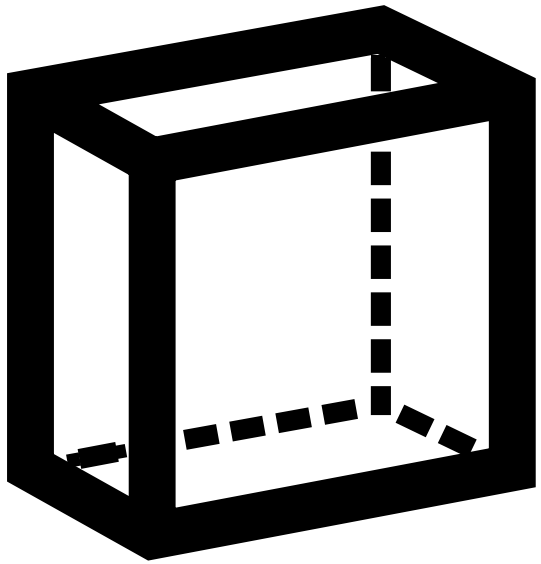
**4** Product and process knowledge of precast concrete products

**5** Application programming interface & information architecture

# BETK-digitalization workgroup



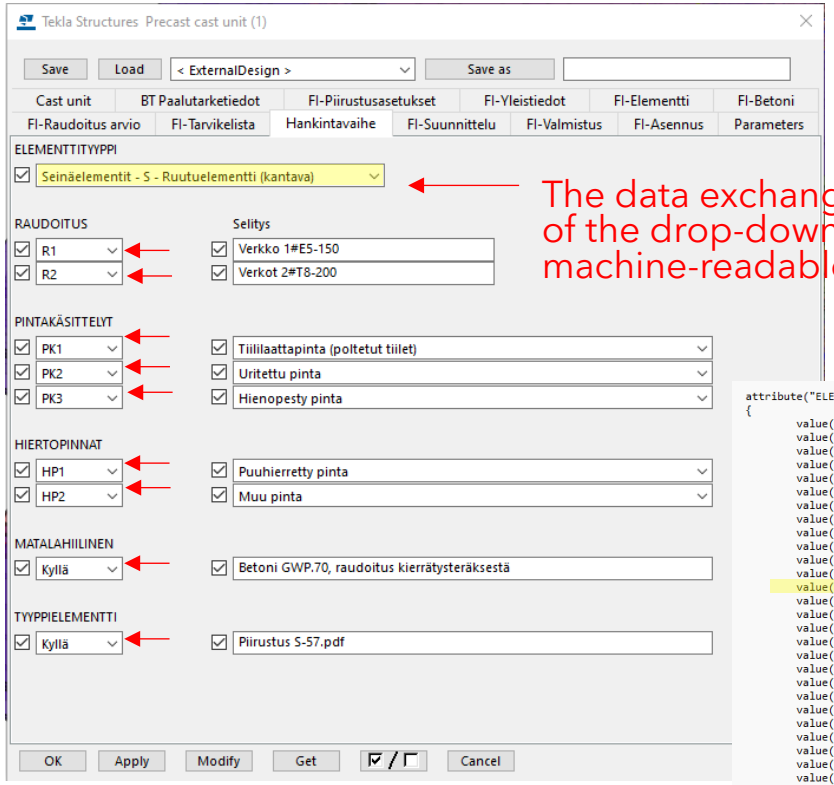
# BETK-Team 1



## Solving the identity problem of an element in the design phase

### The aim is:

- Find a software-independent solution that would allow the automatic generation of standardised machine-readable identification data in the design software. This would enable the design phase to produce standardised machine-readable information for downstream parties in the supply chain.

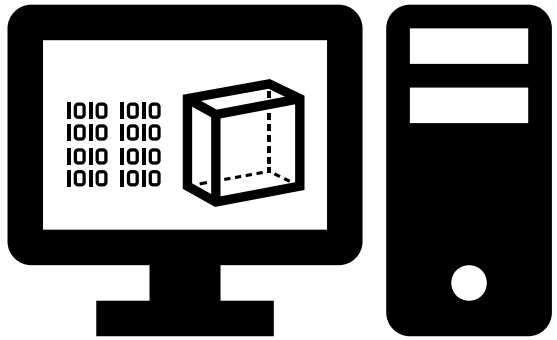



The data exchange pilot will test the suitability of the drop-down lists for the creation of machine-readable standardised metadata.

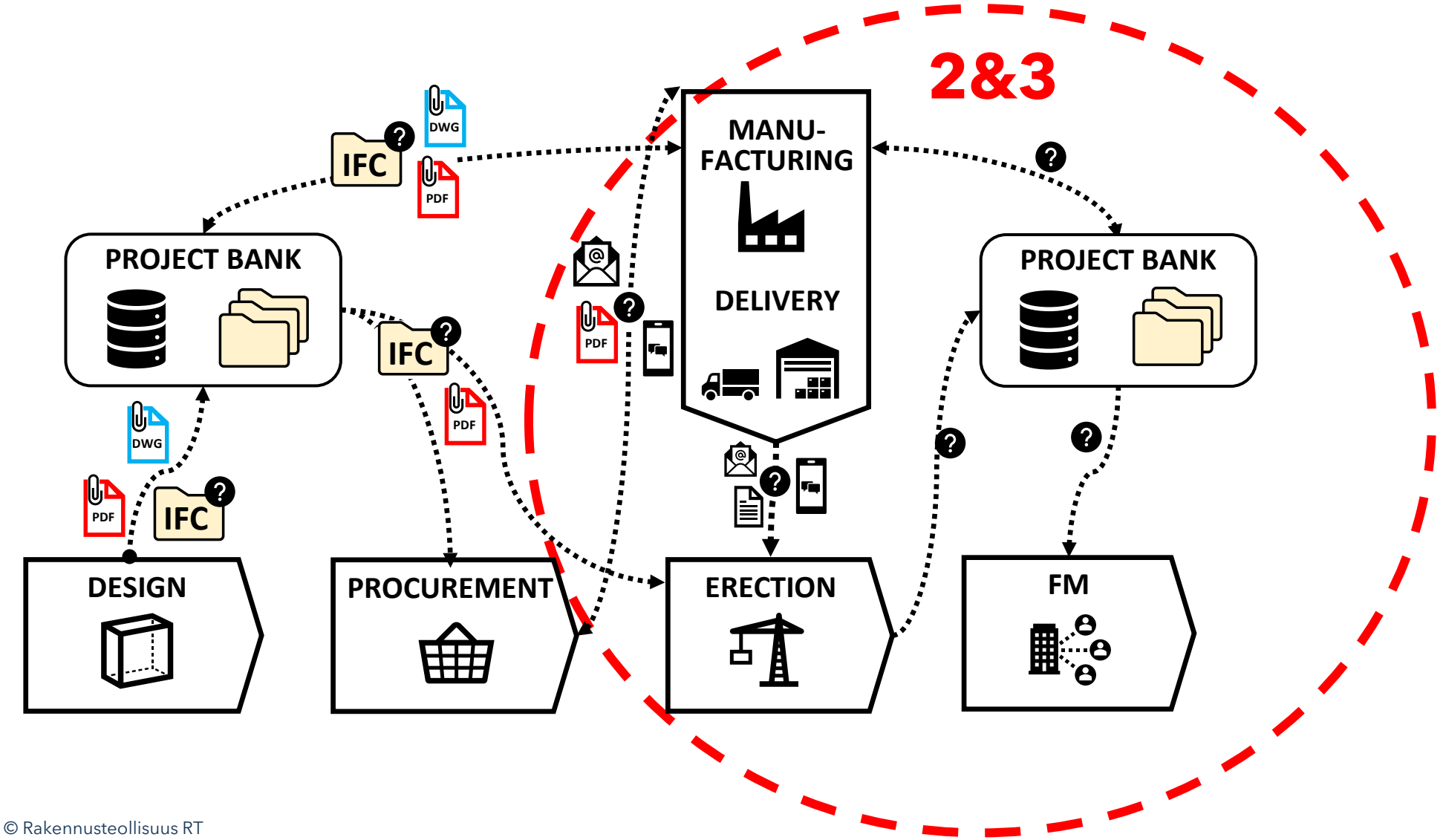
```
attribute("ELEMENT_TYPE", "", option,"%s", no, none, "0.0", "0.0",25,75,400)
{
        value("Elementtityyppiä ei ole asetettu", 1)
        value("Perustuselementit - A - Anturaelementti", 0)
        value("Perustuselementit - PH - Pilariholkkielementti", 0)
        value("Perustuselementit - AN - Sokkelielementti  (ei kantava)", 0)
        value("Perustuselementit - AS - Sokkelielementti (kantava)", 0)
        value("Perustuselementit - AK - Sokkelipalkki", 0)
        value("Perustuselementit - AR - Sokkeliruutuelementti (maanpaine)", 0)
        value("Perustuselementit - AV - Sokkelielementti (maanpaine, yksi kuori)", 0)
        value("Perustuselementit - TKE - Tukimuurielementti", 0)
        value("Pilarielementit - P - Pilari", 0)
        value("Seinäelementit - V - Väliseinä", 0)
        value("Seinäelementit - VSP - Väliseinä (seinämäinen palkki)", 0)
        value("Seinäelementit - S - Ruutuelementti (kantava)", 0)
        value("Seinäelementit - R - Ruutuelementti (ei kantava)", 0)
        value("Seinäelementit - SK - Sisäkuorielementti (kantava)", 0)
        value("Seinäelementit - RK - Sisäkuorielementti (ei kantava)", 0)
        value("Seinäelementit - SKR - Sisäkuorielementti (kantava, eriste + rappaus)", 0)
        value("Seinäelementit - RKR - Sisäkuorielementti (ei kantava, eriste + rappaus)", 0)
        value("Seinäelementit - NK - Nauhaelementti (kantava)", 0)
        value("Seinäelementit - N - Nauhaelementti (ei kantava)", 0)
        value("Seinäelementit - KE- Kuorielementti", 0)
        value("Palkkielementit - K - Palkkielementti (teräsbetoni)", 0)
        value("Palkkielementit - I - Jännebetonipalkki (I-profiili)", 0)
        value("Palkkielementit - HI - Jännebetonipalkki (HI-profiili)", 0)
        value("Palkkielementit - JK - Jännebetonipalkki (muut profiilit)", 0)
        value("Laattaelementit - L - Laattaelementti (massiivilaatta, välipohja)", 0)
        value("Laattaelementit - EL - Alapohjalaatta (massivilaatta, eristetty)", 0)
        value("Laattaelementit - JL - Jännitetty laattaelementti", 0)
        value("Laattaelementit - O - Laattaelementit, Ontelolaatta", 0)
        value("Laattaelementit - KL - Laattaelementit, Kuorilaatta", 0)
        value("Laattaelementit - TT - Laattaelementit, TT-laatta", 0)
        value("Laattaelementit - HTT - Laattaelementit, HTT-laatta", 0)
        value("Parveke-elementit - C - Parveke-elementti", 0)
        value("Parveke-elementit - CL - Parvekelaatta-elementti", 0)
        value("Parveke-elementit - JCL - Jännitetty parvekelaattaelementti", 0)
        value("Parveke-elementit - UCL - Ulokeparvekelaatta", 0)
        value("Parveke-elementit - M - Parvekepieli-elementti", 0)
        value("Parveke-elementit - Z - Parvekekaide-elementti", 0)
        value("Parveke-elementit - CX - Parvekekattoelementti", 0)
        value("Parveke-elementit - JCX - Jännitetty parvekkeen kattoelementti", 0)
        value("Porraselementit - T - Porraselementti", 0)
        value("Hissikuilun elementit - HKA - Hissikuilun pohjaelememtti", 0)
        value("Hissikuilun elementit - HK - Hissikuiluelementti", 0)
        value("Hissikuilun elementit - HKL - Hissikuiluelementti (L-muoto)", 0)
        value("Hissikuilun elementit - HKU - Hissikuiluelementti (U-muoto)", 0)
        value("Hissikuilun elementit - HKY - Hissikuilun yläpään elementti", 0)
        value("Erikoiselementit - H - Hormielementti", 0)
        value("Erikoiselementit - MUU - Muu erikoiselementti", 0)
}
```

# Draft output

The draft to be piloted is to supplement the basic data of the standard BEC modelling guideline elements with the necessary additional fields with standard values.The data transfer pilot will test the incorporation of BETK defined metadata into the building information model and export to an ifc file.



# BETK-digitalization workgroup



# BETK-Team 2

## Pilot

| LEVELS OF PRODUCT IDENTIFICATIONS | |
|---|---|
| **Level 1:**<br>**Product category (MTS)** | GTIN |
| **Level 2:**<br>**Product category (ATO/MTO)** | GTIN + MTO Variation number |
| **Level 3:**<br>**Product category (ETO/DTO)** | GTIN + MTO Variation number +<br>Sarjanumero (SGTIN) |

(01) 06400001000247 **GTIN-14**
(21) 12345678910 **Serial**

**User Memory Bank Contest**
(242) 123456 **MTO Variation number**
(91) V1001 **Finnish element classification**
(92) ba34cf17-0c4b-4c6f-9295-cae05aa74ad4 **GUID**

**INFORMATION CARRIERS**

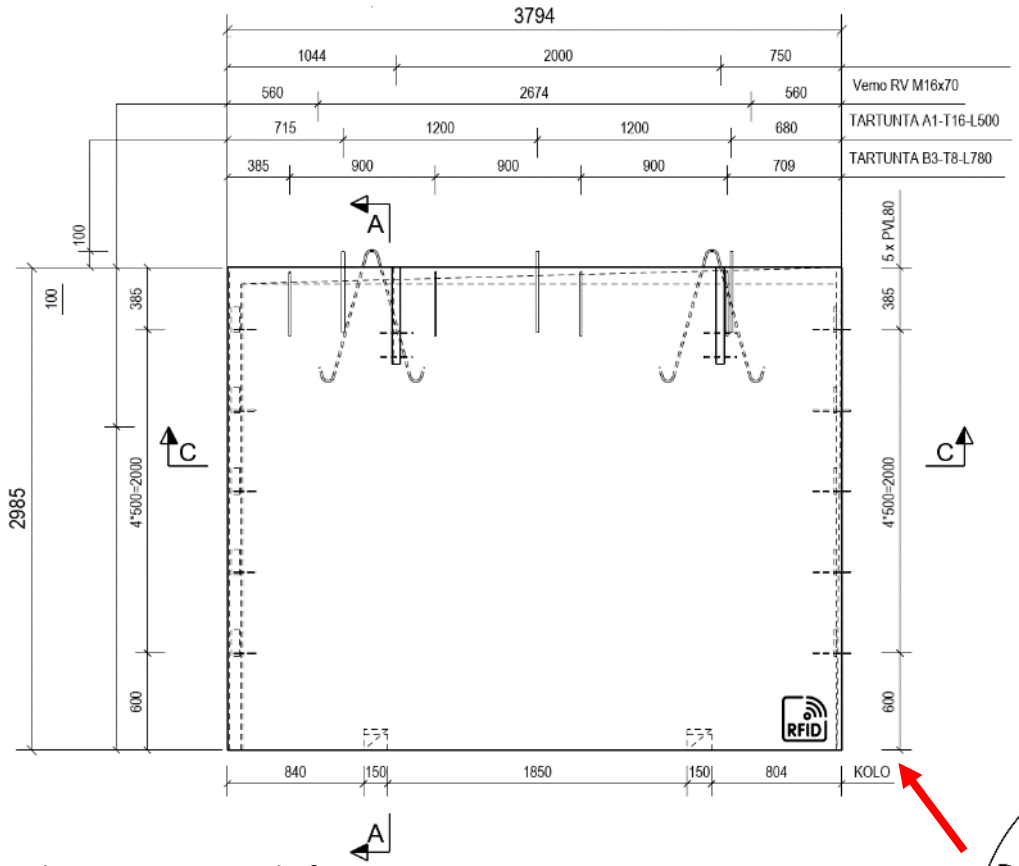

**GS1 Digital Link** (2D Barcode)
**GS1 DataMatrix** (2D Barcode)
**EPC/RFID** (radio frequency remote sensing method)

## Identification of physical objects

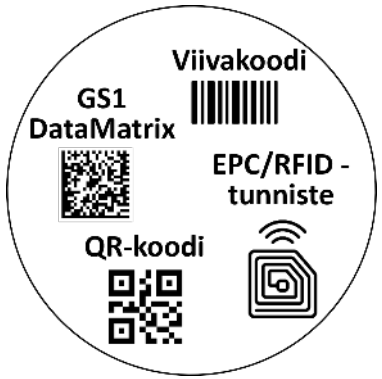
### The aim is:

- Selecting the unique identification code for a physical element
- Adoption of applicable standards of the GS1 family of standards and national level definitions in the supply chain of precast concrete elements

# BETK-Team 3




Kuva: Elementtisuunnittelu.fi




## Capturing information

### The aim is:

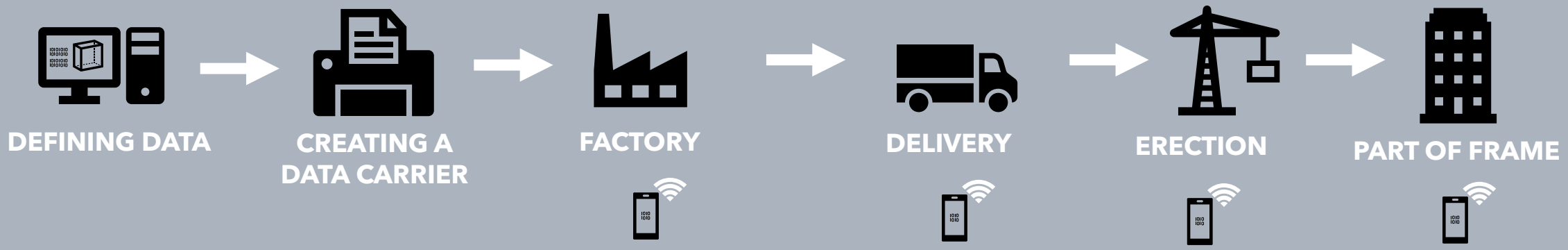
- Conversion of the identification code into a machine-readable format (1D & 2D barcode, RFID) and attach of data carriers into elements
- Creation and testing of use cases to implement machine reading.

**Collaboration:**
RFID Lab Finland Ry

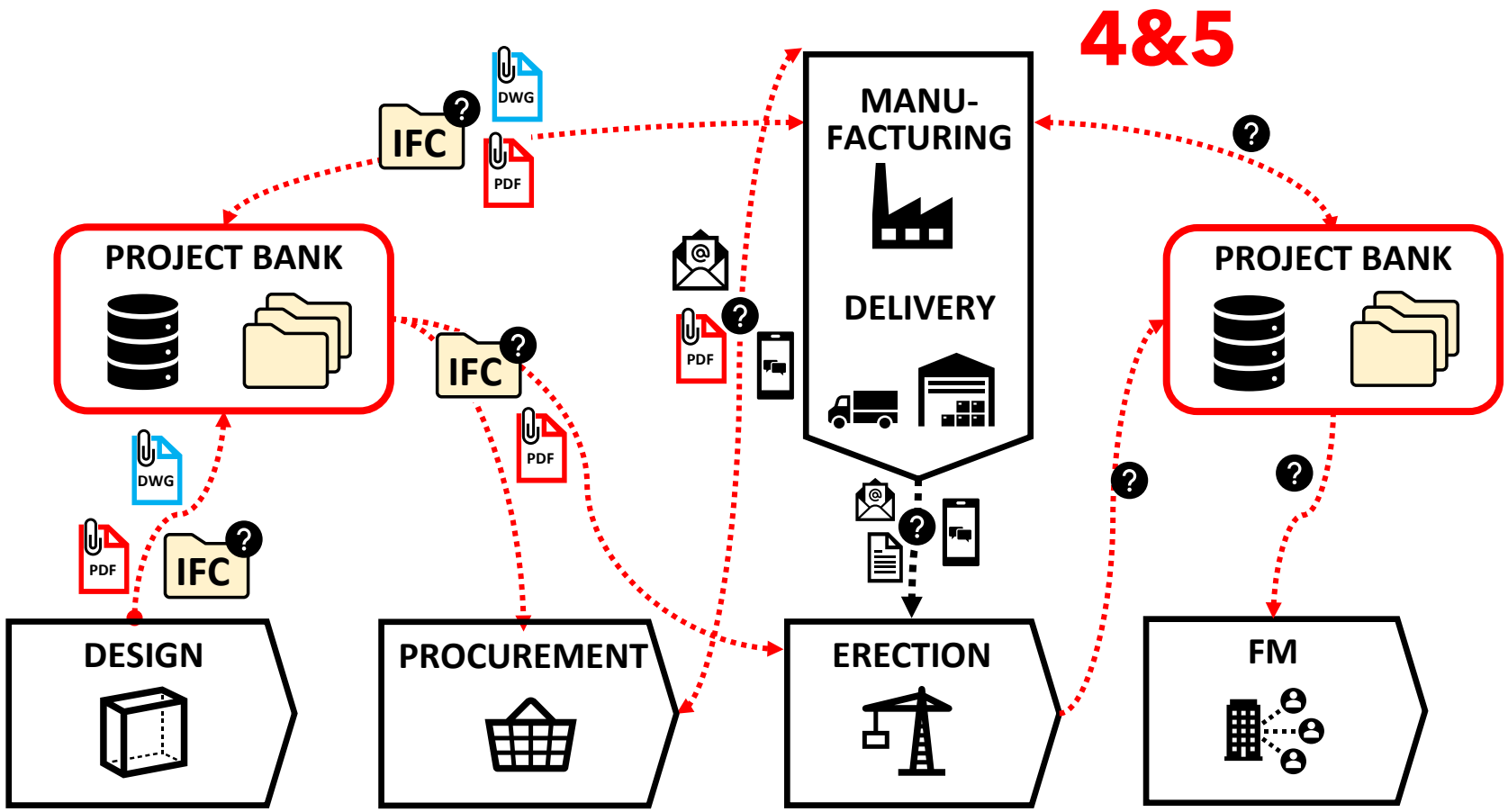
# BETK-Team 2&3 Pilot

## PHYSICAL IDENTIFICATION OF THE SUPPLY CHAIN AND PILOTING OF THE EXCHANGE OF INFORMATION

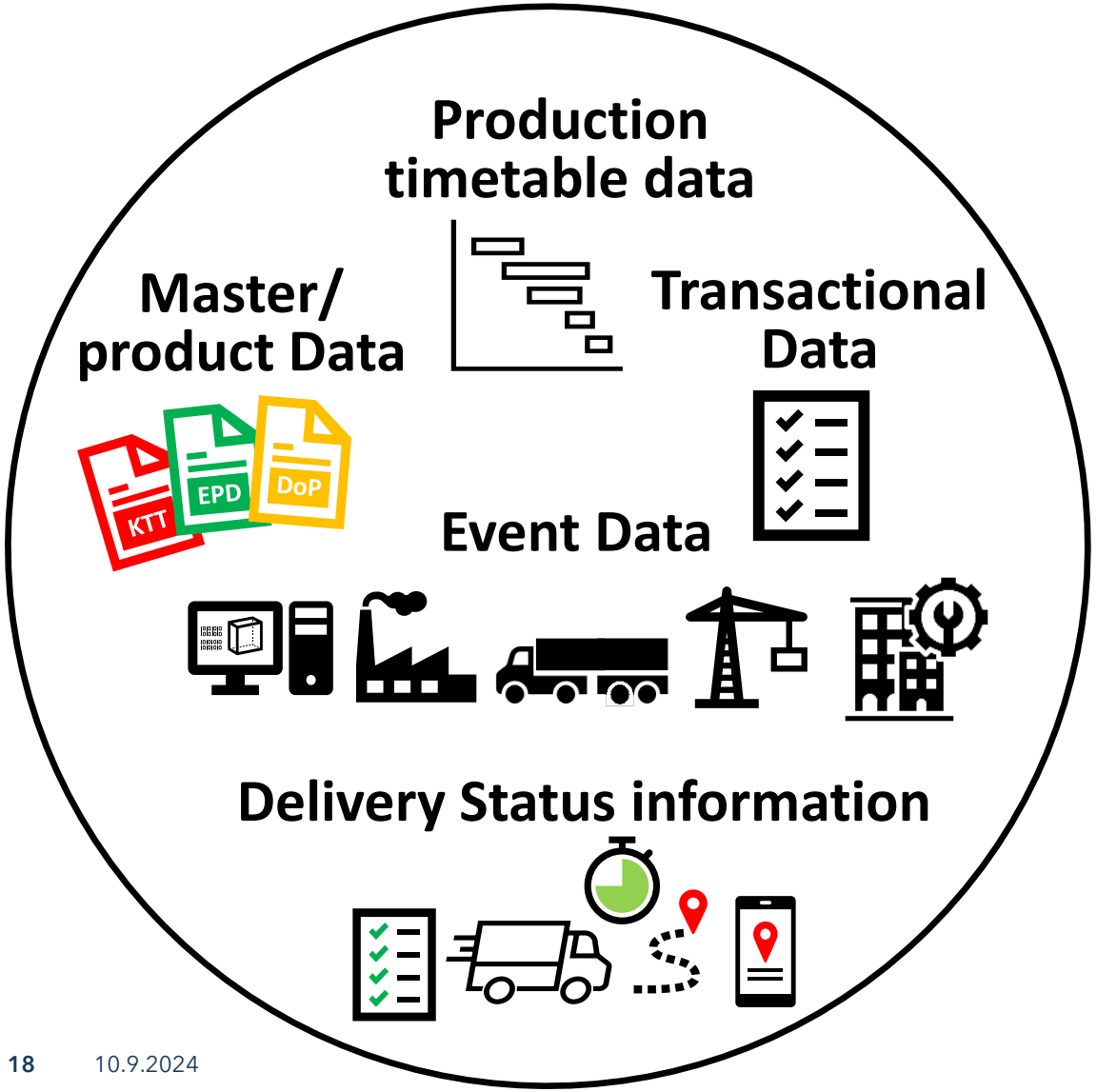
## The journey of the RFID tag from factory to site



# BETK-digitalization workgroup



# BETK-Team 4




## Product and process information on precast concrete elements

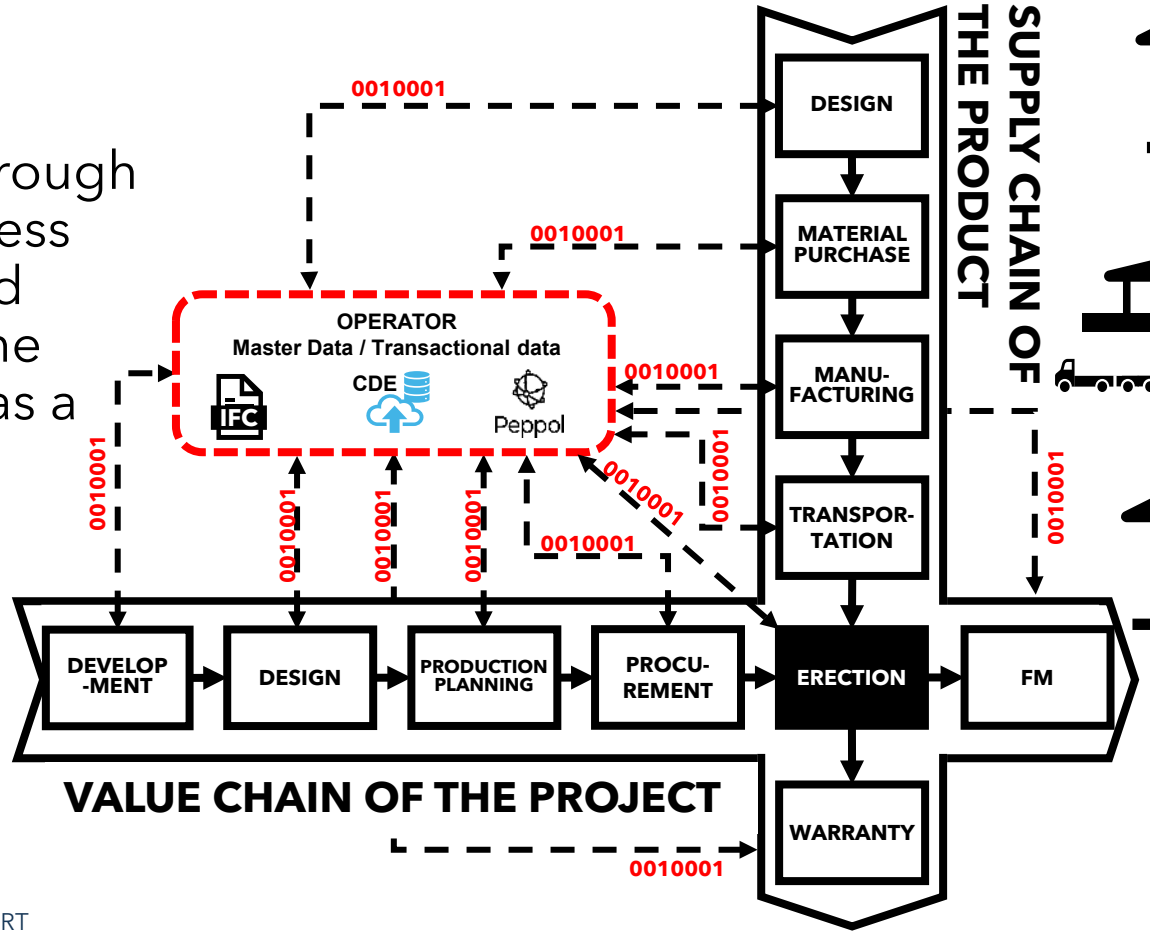
**The aim is:**
Definition of information needs and definition of the actual element product information using BEC (so that information can be transferred by means of a unique identifier code, targeting the information to a specific element).

# BETK-Team 5

## Application programming interface & information architecture

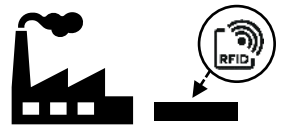
### The aim is:

Interface description (through which product and process information is transferred between parties using the element's unique code as a key), taking security into account, describing an exemplary architecture for different parties



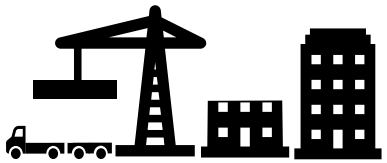

**Event Data share between Supplier and customer**

EPC Information Services (EPCIS)



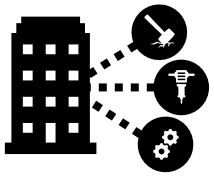

**Who: (GLN) Supplier**
**What: (SGTIN) Precast element**
**Where: (GLN) Factory**
**When: YYYY-MM-DDThh:mm:ssZ**
**Why: Produced**
**Status: Active**

**Who: (GLN) Supplier**
**What: (SSCC) Logistics unit**
**What: (SGTIN1, ..2, ..3) Precast elements**
**Where: (GLN) Factory**
**When: YYYY-MM-DDThh:mm:ssZ**
**Why: Delivery**
**Status: Delivery**



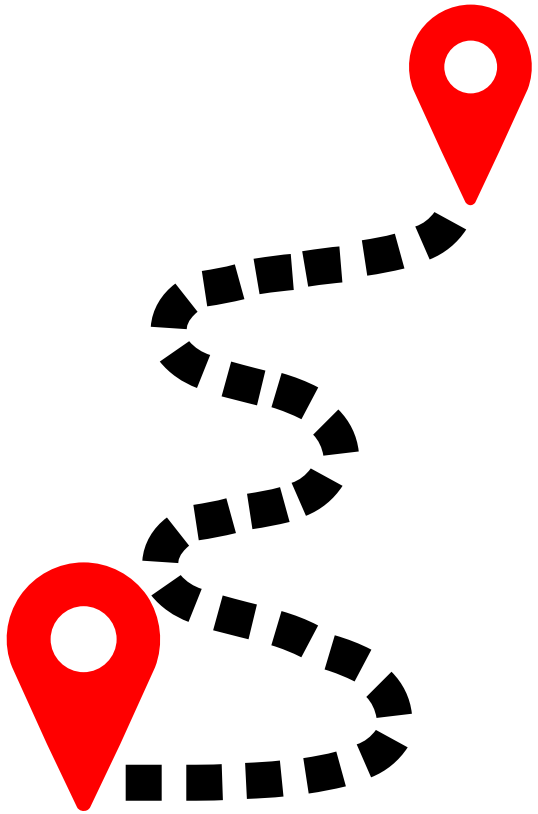
**Who: (GLN) Supplier**
**What: (SSCC) Logistics unit**
**What: (SGTIN1, ..2, ..3) Precast elements**
**Where: (GLN) Construction site**
**When: YYYY-MM-DDThh:mm:ssZ**
**Why: Receiving**
**Status: Received**

**Who : (GLN) General contractor**
**What: (SGTIN) Precast element**
**Where: (GLN) Construction site + exact location (apartment, etc.)**
**When: YYYY-MM-DDThh:mm:ssZ**
**Why: Erection**
**Status: Erected**



**Who : (GLN) Facility manager**
**What: (SGTIN) Precast element**
**Where: (GLN) Building + exact location (apartment, etc.)**
**When: YYYY-MM-DDThh:mm:ssZ**
**Why: Life-cycle event X**
**Status: Event X**

# Schedule



| Project plan | Q1/2024 | ✓ Done |
|---|---|---|
| **TR1 Suunnitteluvaiheen elementin identiteettiongelman ratkaisu** | | |
| Draft | Q1/2024 | ✓ Done |
| Pilot | Q2/2024 | WIP |
| Development | Q2-3/2024 | |
| **TR2&3 Elementin yksilöinti ja tunnistaminen** | | |
| Draft | Q1-2/2024 | ✓ Done |
| Pilot | Q2-3/2024 | WIP |
| Development | Q3/2024 | |
| **TR4 Elementtien tuote- ja prosessitieto** | | |
| Draft | Q2/2024 | WIP |
| Pilot | Q2-3/2024 | |
| Development | Q3-4/2024 | |
| **TR5 Rajapinta (API) ja arkkitehtuuri** | | |
| Draft | Q2/2024 | WIP |
| Pilot | Q2-3/2024 | |
| Development | Q3-4/2024 | |
| **Specification document** | **Q4/2024 – QX/2025** | |

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# Thank you

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