

EFFEKTIVISERING?

Nathalie Labonnote, SINTEF Byggforsk

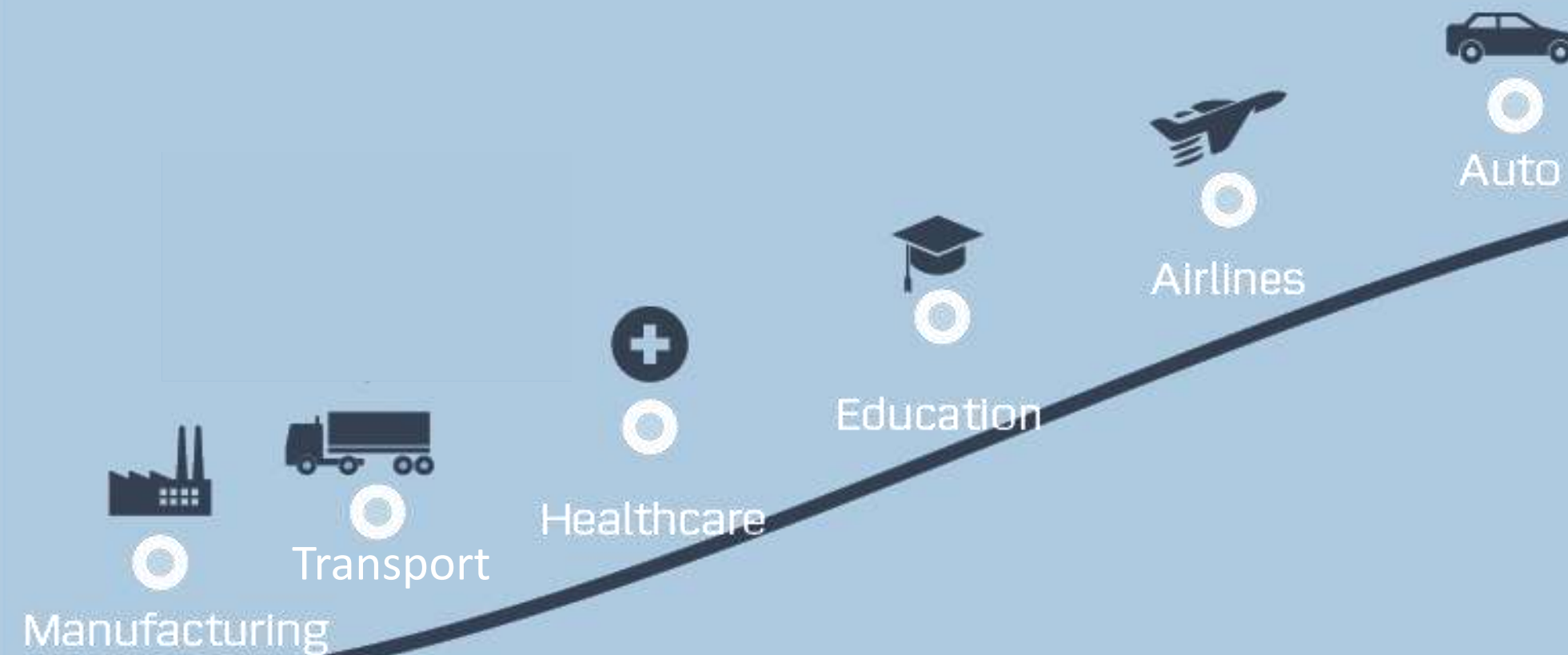
STAGE 01

- Digital impact primarily in **operations** and **cost reductions**
- Limited digital disruption in the industry



STAGE 02

- **Digital engagement with customers** increasingly important
- **Increasing personalisation** of the customer experience using advanced data analytics



STAGE 03

- **Advanced technologies** and **data analytics** constantly deployed to find competitive advantages



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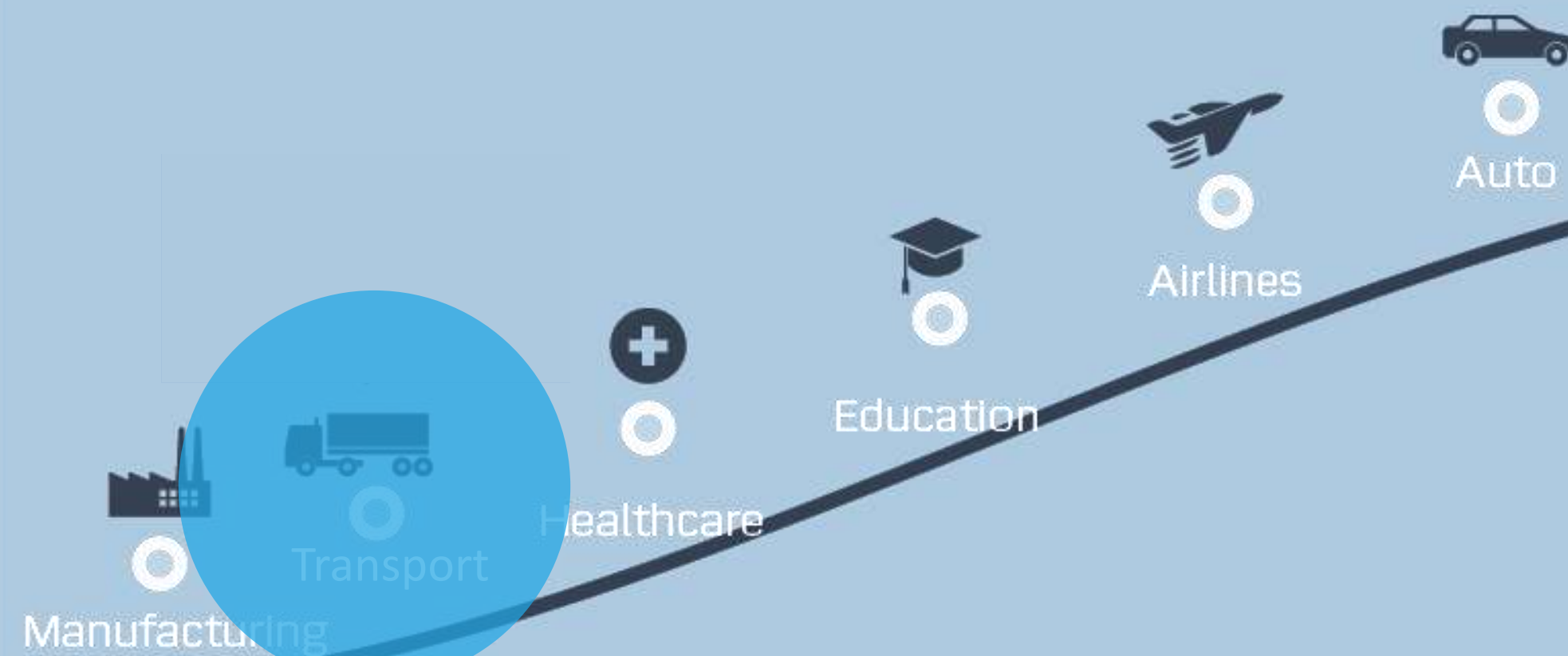
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STAGE 01

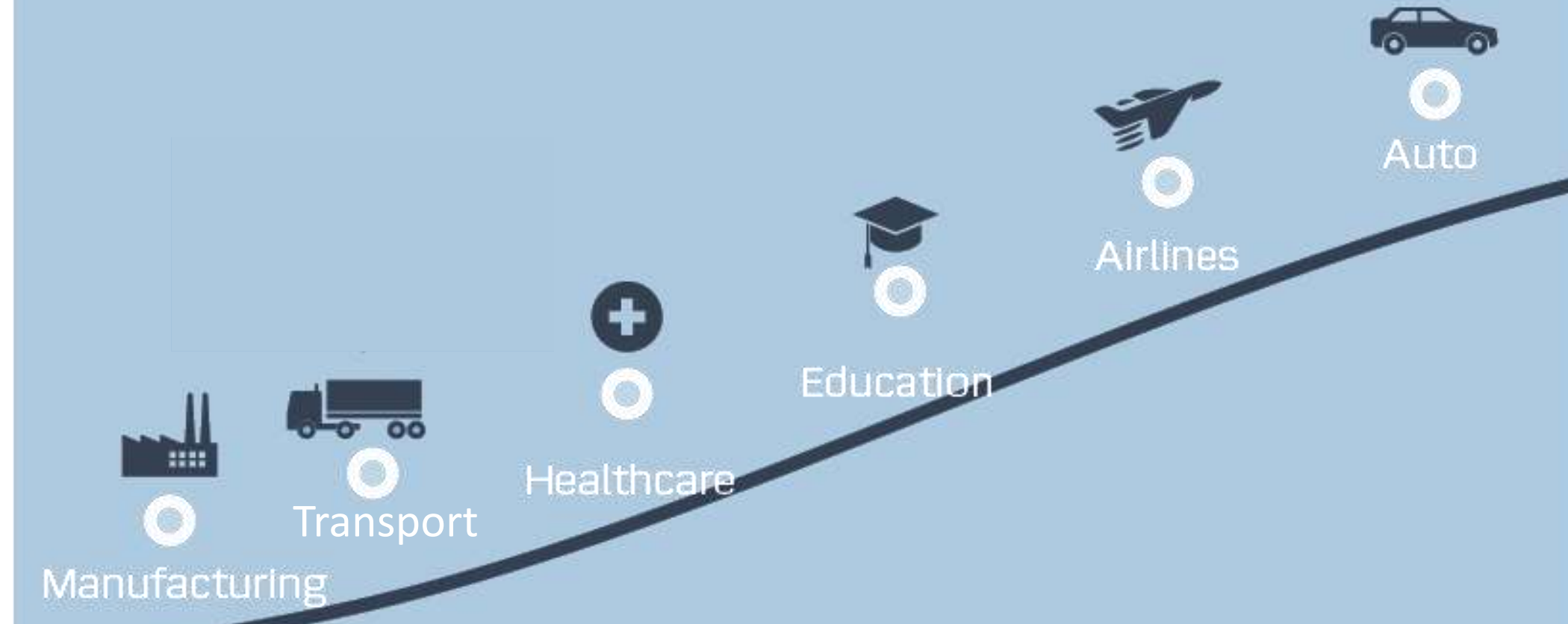
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"Bygg- og anleggsbransjen er verst
av alle bransjer i Norge,
når det gjelder digitalisering
og er dårligst på effektivitet."

Kimberly Lein-Mathisen
General manager i Microsoft Norge
02.10.2018



©Pål Engeseth

STAGE 01

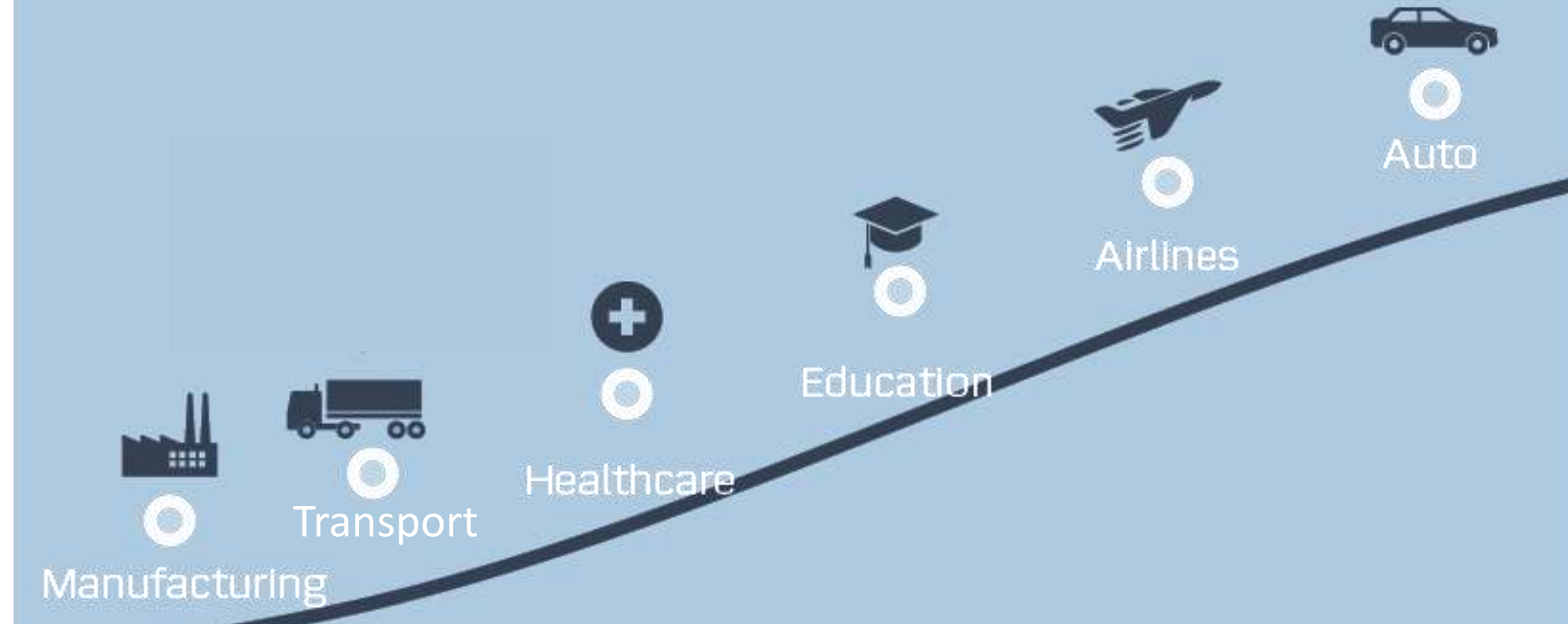
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STAGE 01

Digital operations
Cost reduction

Digital design

STAGE 02

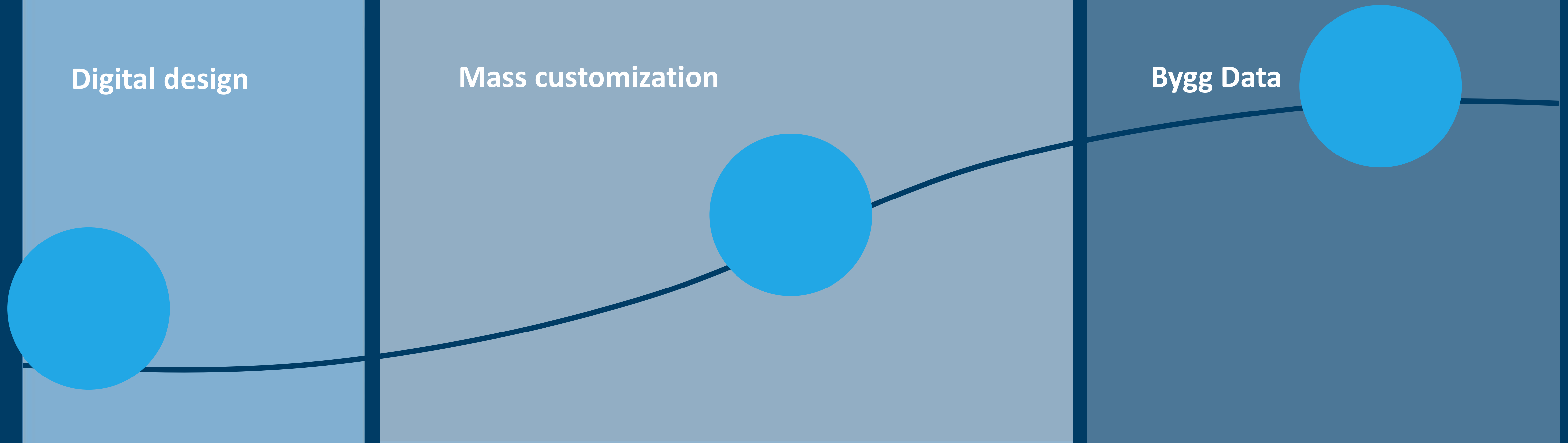
Digital customers
Personalization

Mass customization

STAGE 03

Data analytics

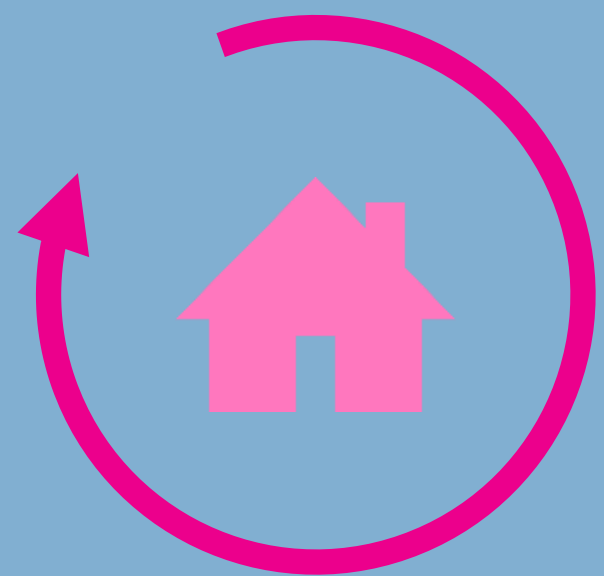
Bygg Data



STAGE 01

Digital operations
Cost reduction

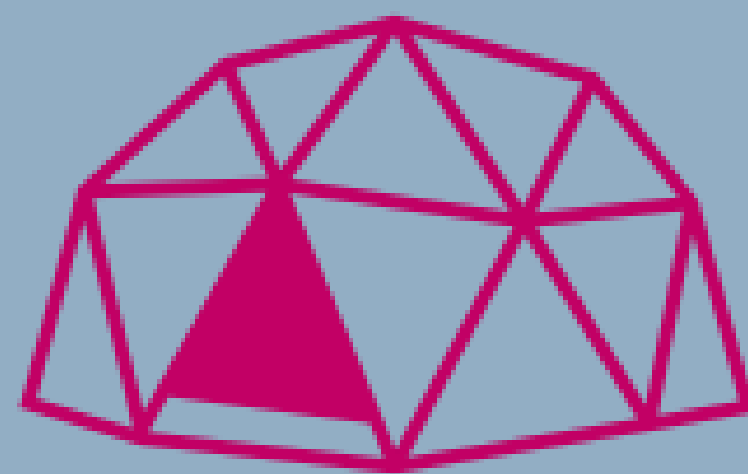
Digital design



STAGE 02

Digital customers
Personalization

Mass customization

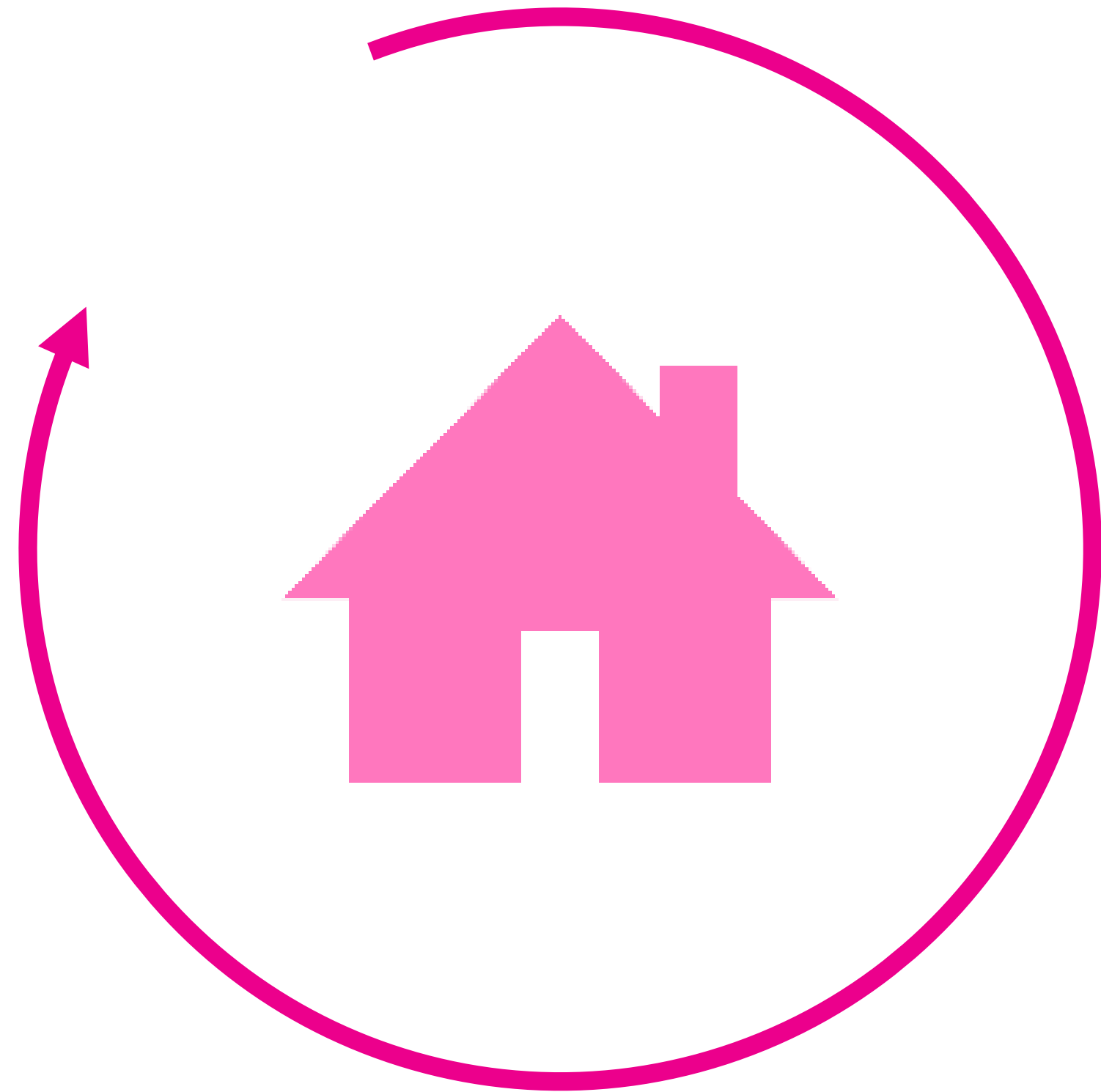


STAGE 03

Data analytics

Bygg Data





~~(analog)~~ **Digital design**

Ar
Architect

Ma
Manufacturer

En
Structural
Engineer

Ar
Architect

Bui
Builder

Ma
Manufacturer



Ma
Manufacturer

En
Structural
Engineer

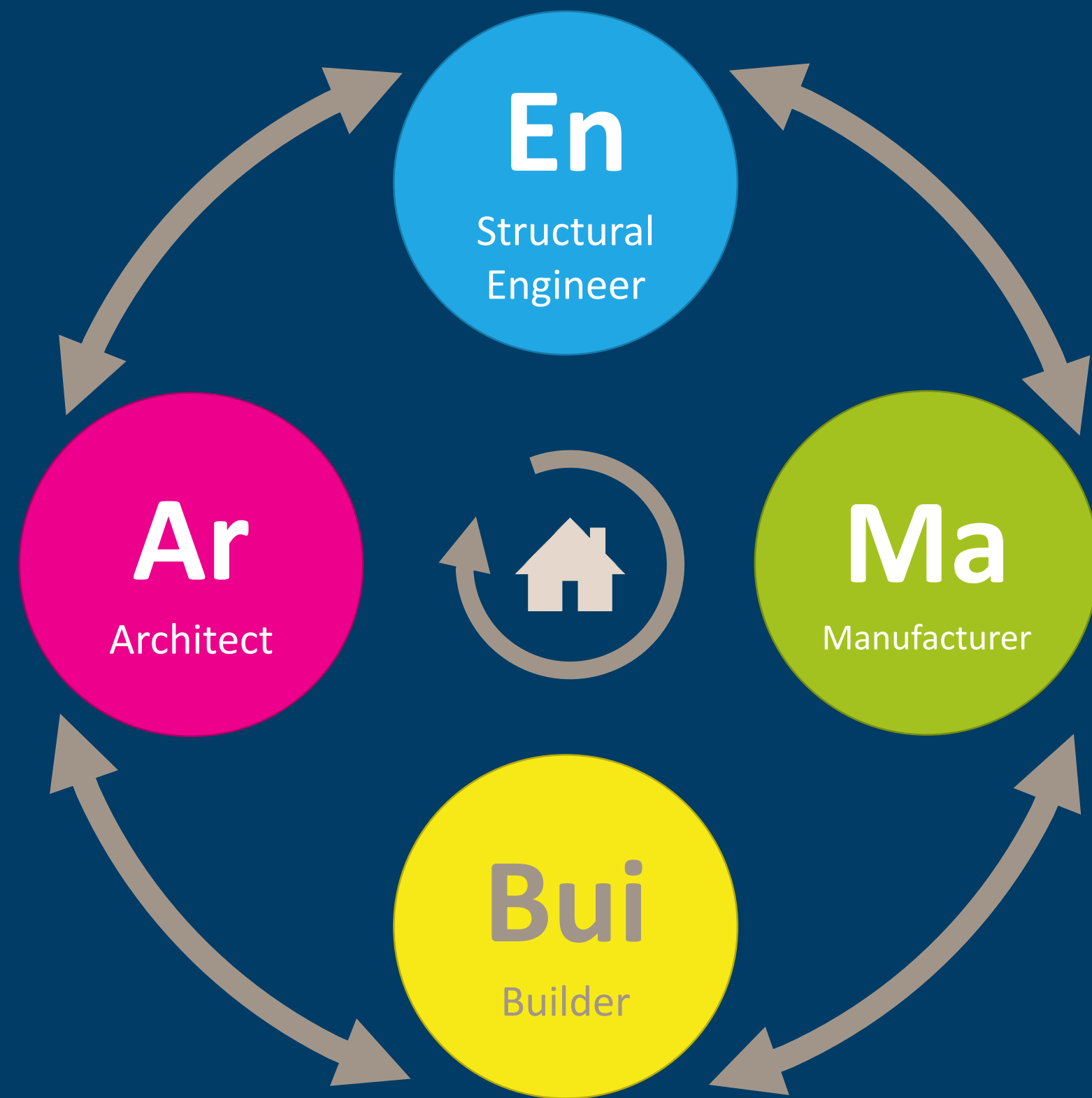
En
Structural
Engineer

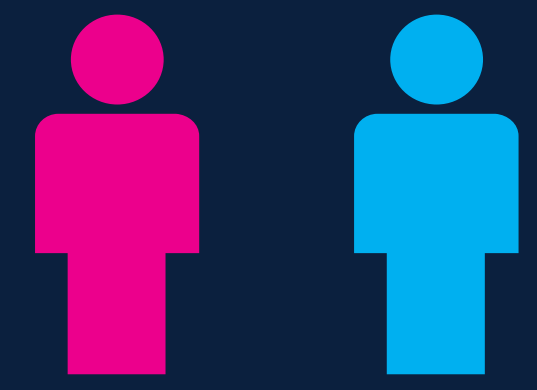
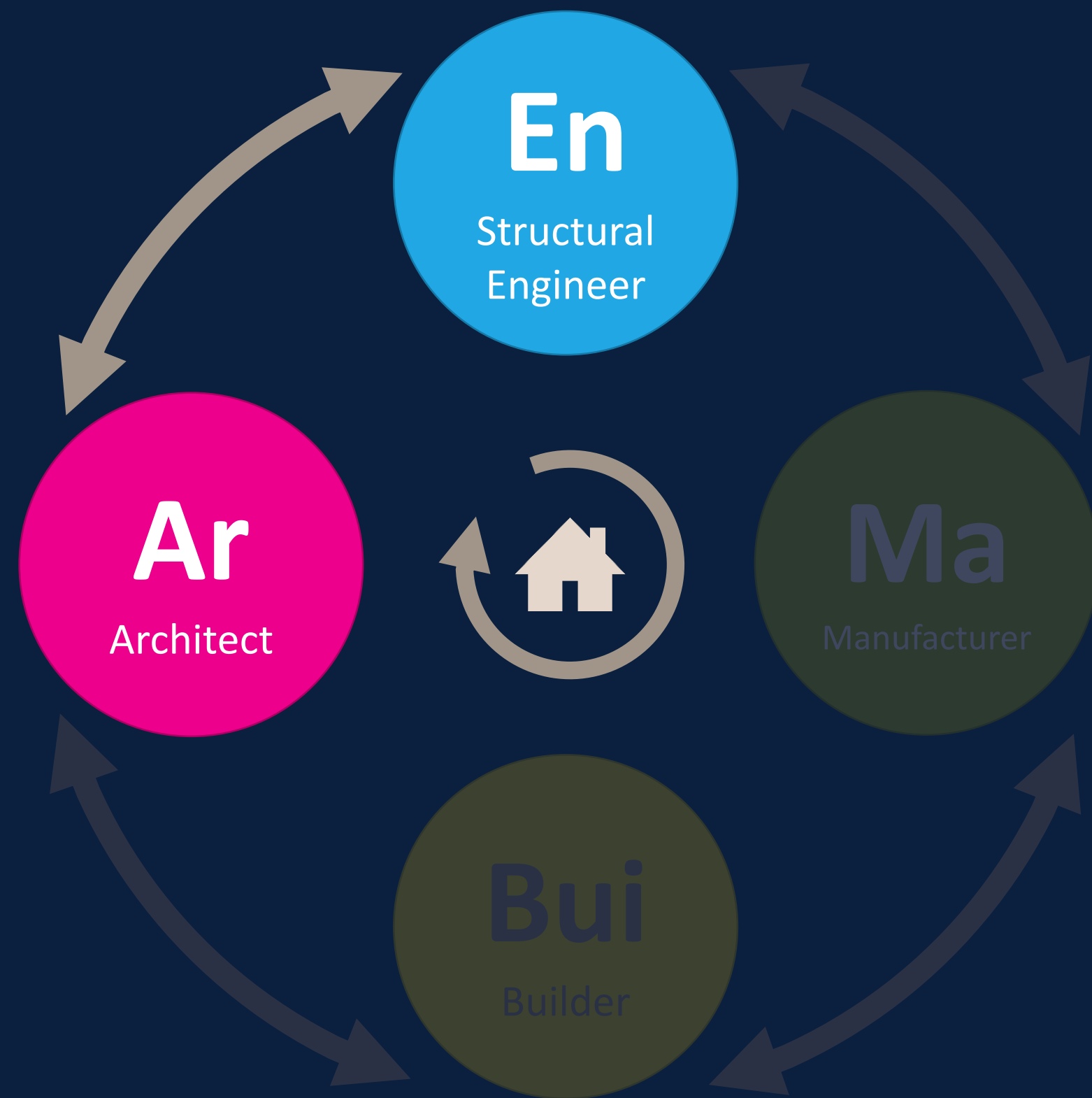
Bui
Builder

Bui
Builder

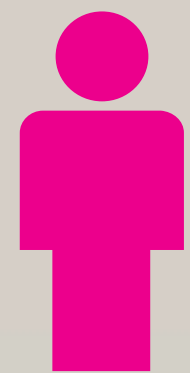
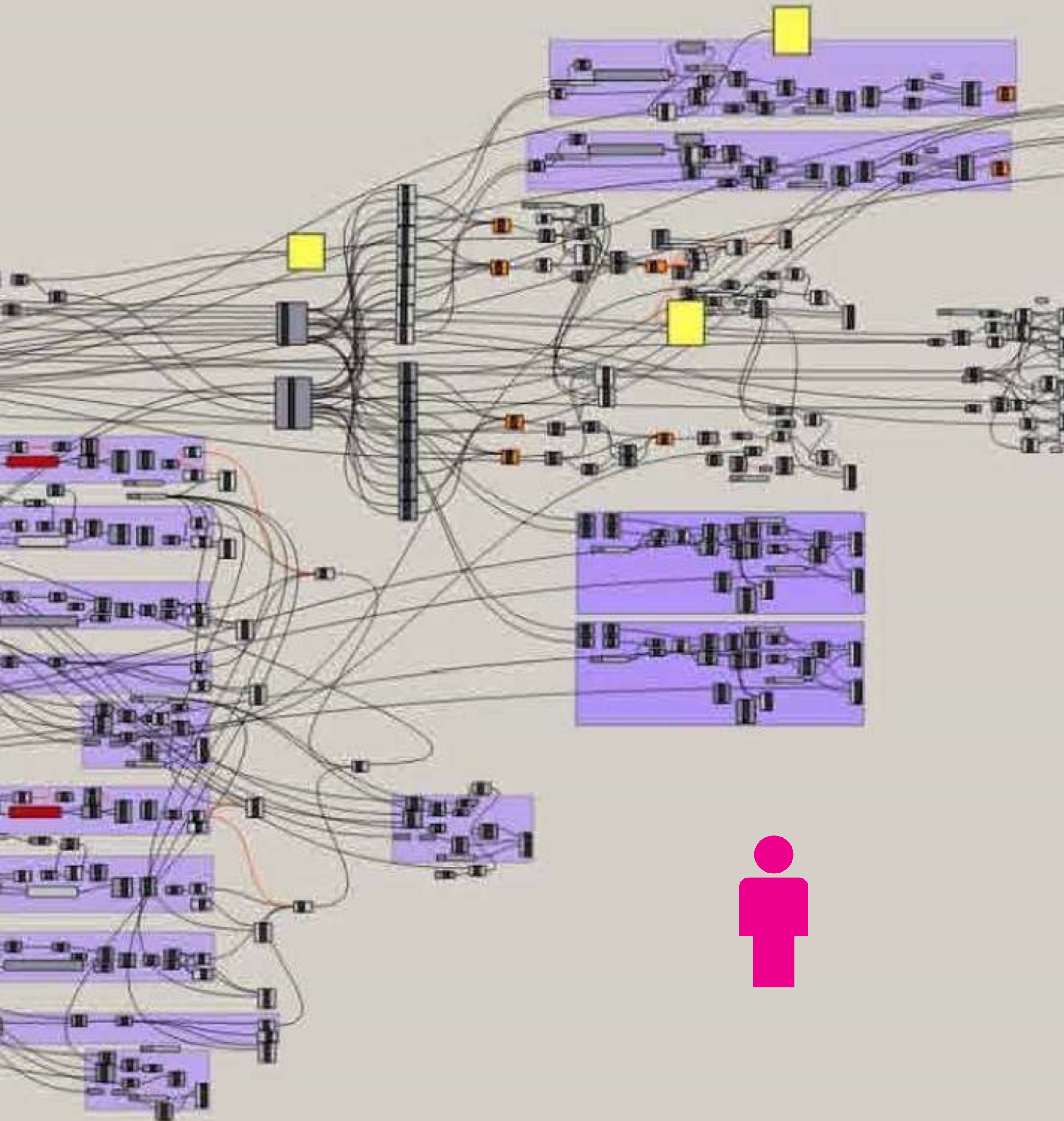
Ar
Architect











```

def CreateJoist(length,width,height,angle,z_offset,x_BC_fundament_1,x_BC_fundament_2, x_BC_fundament_3,
x_BC_column,c_c):

    mesh_size = 0.1 # global mesh size
    j_mat = 'Glulam' # material Joist

    rad = angle * math.pi / 180.
    b_length = height / math.cos(rad)
    profile_joist_a = 0.180
    profile_joist_b = 0.3
    param_0 = x_BC_fundament_1 / x_BC_fundament_2
    param_1 = x_BC_fundament_2 / x_BC_fundament_3
    param_2 = x_BC_fundament_3 / x_BC_column
    param_3 = x_BC_column / length

    m = mdb.models['Bru']
    a = mdb.models['Bru'].rootAssembly

    # Create the parts

    myJoist = m.Part(name='Joist', dimensionality=THREE_D,type=DEFORMABLE_BODY)
    p = m.parts['Joist']

    # Create the sketches + draw onto them + use them.
    mySketch = m.ConstrainedSketch(name='Joist sketch',sheetSize=250.)
    mySketch.Line(point1=(0,0), point2=(length,0))
    p.BaseWire(sketch=mySketch)

    # Create the sets

    begin = (0,0,0)
    end = (length,0,0)
    vertex_begin = p.vertices.findAt((begin,))
    vertex_end = p.vertices.findAt((end,))
    set=p.Set(name='J_Both',vertices=(vertex_begin,vertex_end))
    set=p.Set(name='J_begin',vertices=(vertex_begin))
    set=p.Set(name='J_end',vertices=(vertex_end))
    set=p.Set(name='all',edges=p.edges)

    # Assign beam orientations

    p.assignBeamSectionOrientation(region=(p.edges,),method=N1_COSINES,n1=(0,1,0))

    # Assign material orientation

```

Contexts

Architectural intention

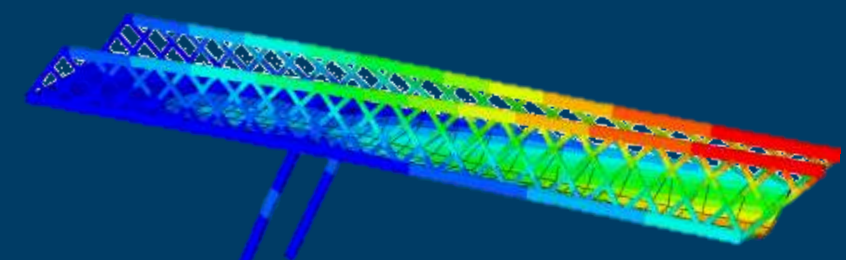
Ar
Architect



Architectural decisions

Structural requirements

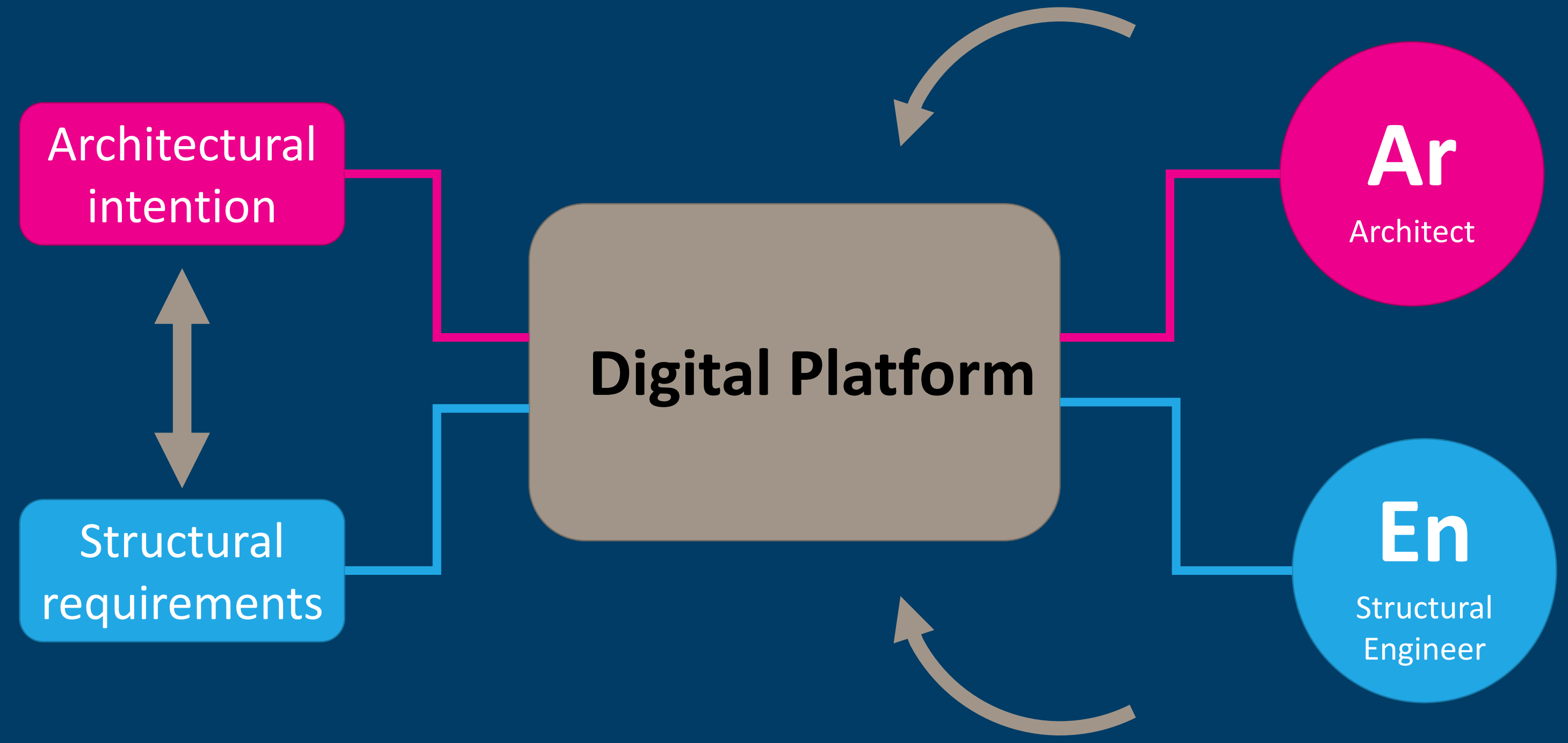
En
Structural Engineer



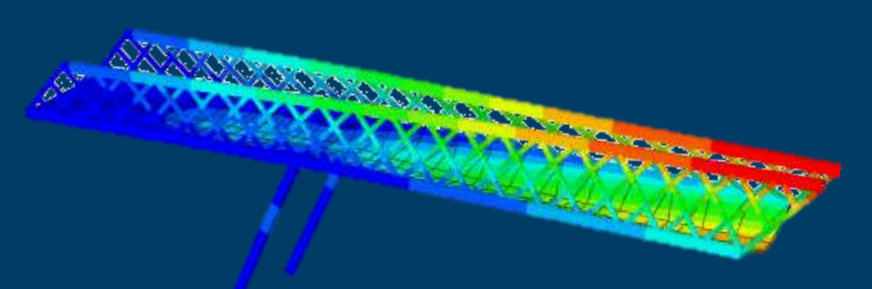
Structural algorithm



Contexts



Architectural decisions

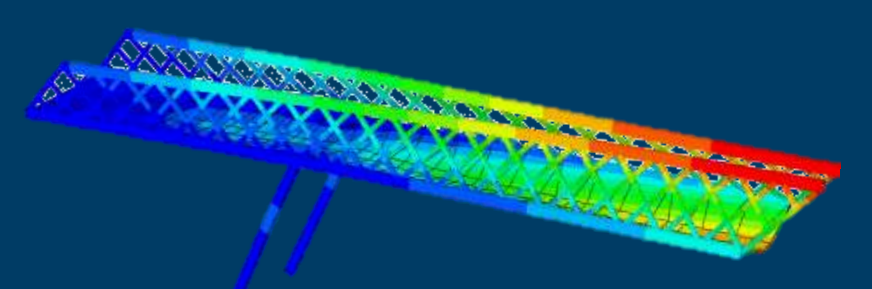


Structural algorithm

Contexts



Architectural decisions



Structural algorithm



CNC commands

CC-avstand 700 ◊

CCiModul ◊ 3

Antal Modular 6 ◊

Høgde ◊ 1050

Joints
(0;0;0)
0 42

Boltar
{0}
0 61

SluttStav ◊ 225

Starts ◊ 297

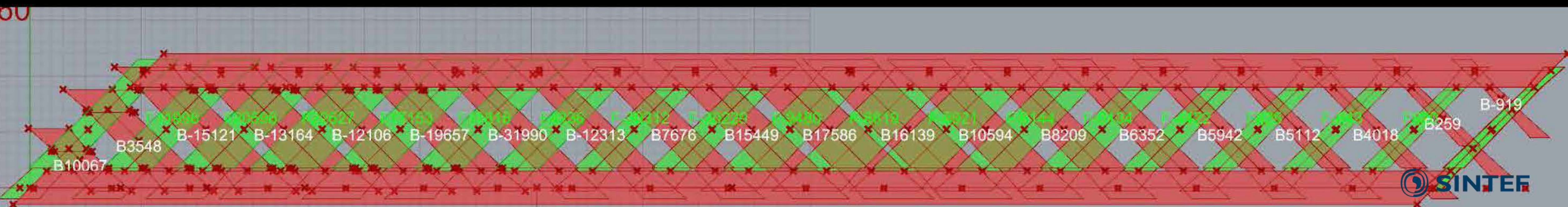
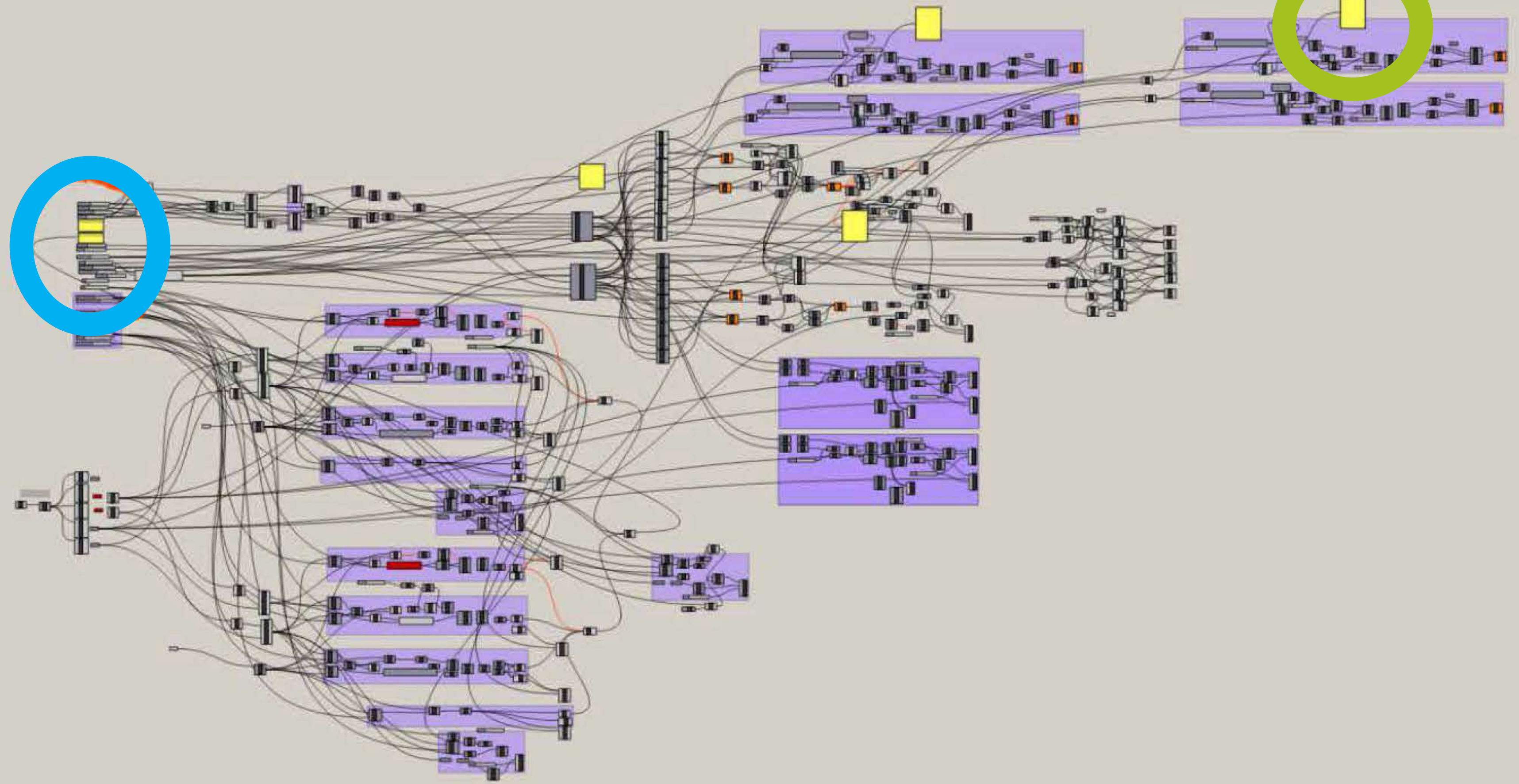
Stavrunding ◊ 41

Rest ◊ 30

Bjelkehøgde ◊ 300

Centerplassering 0.5 ◊

Variable z 80 ◊

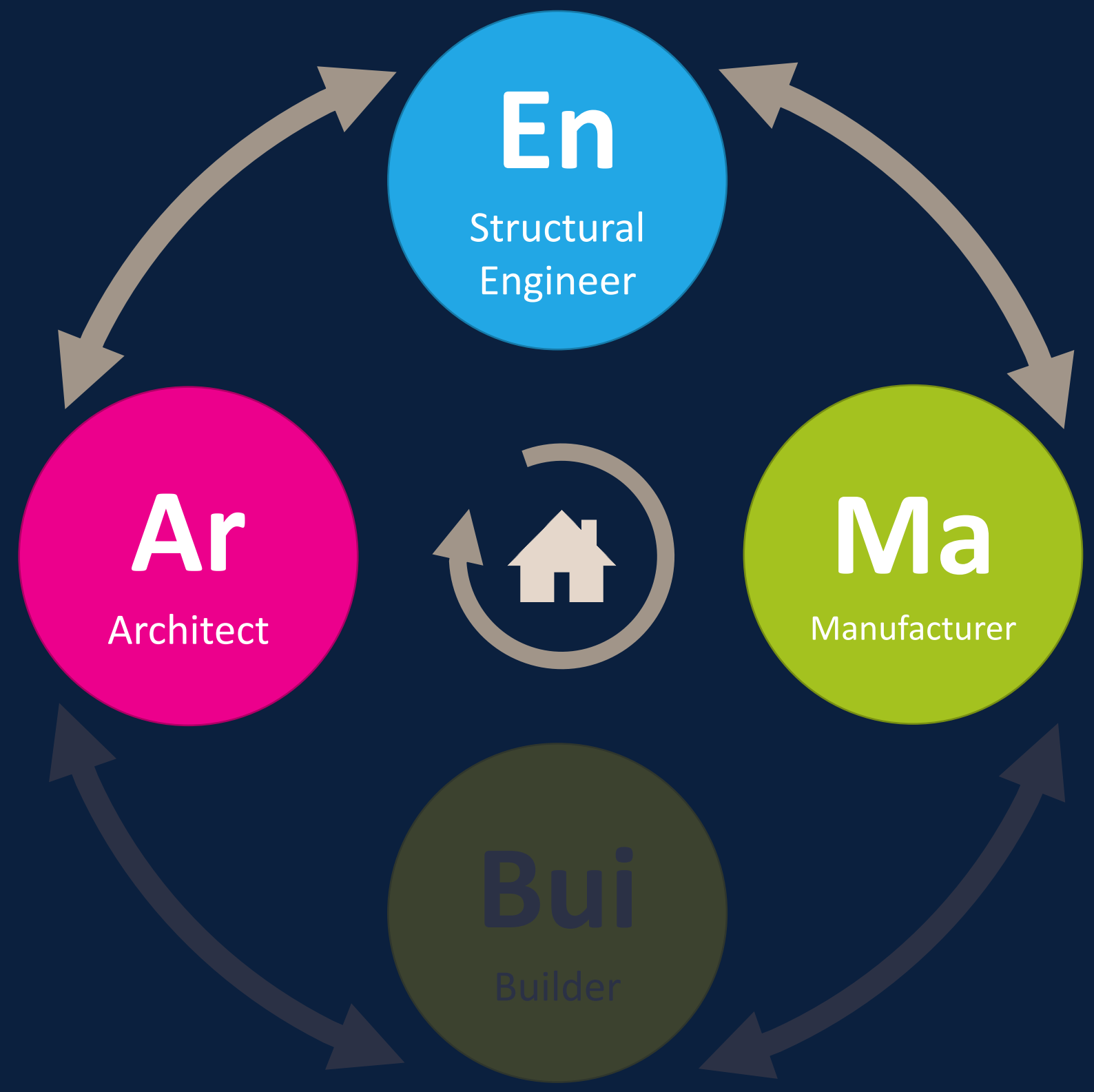


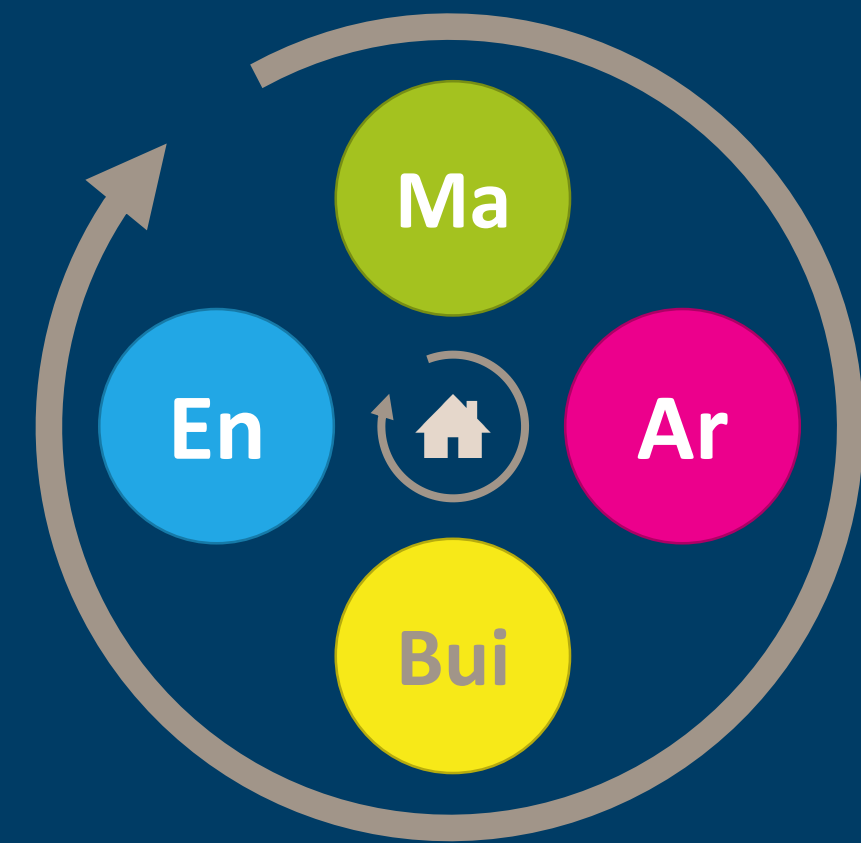
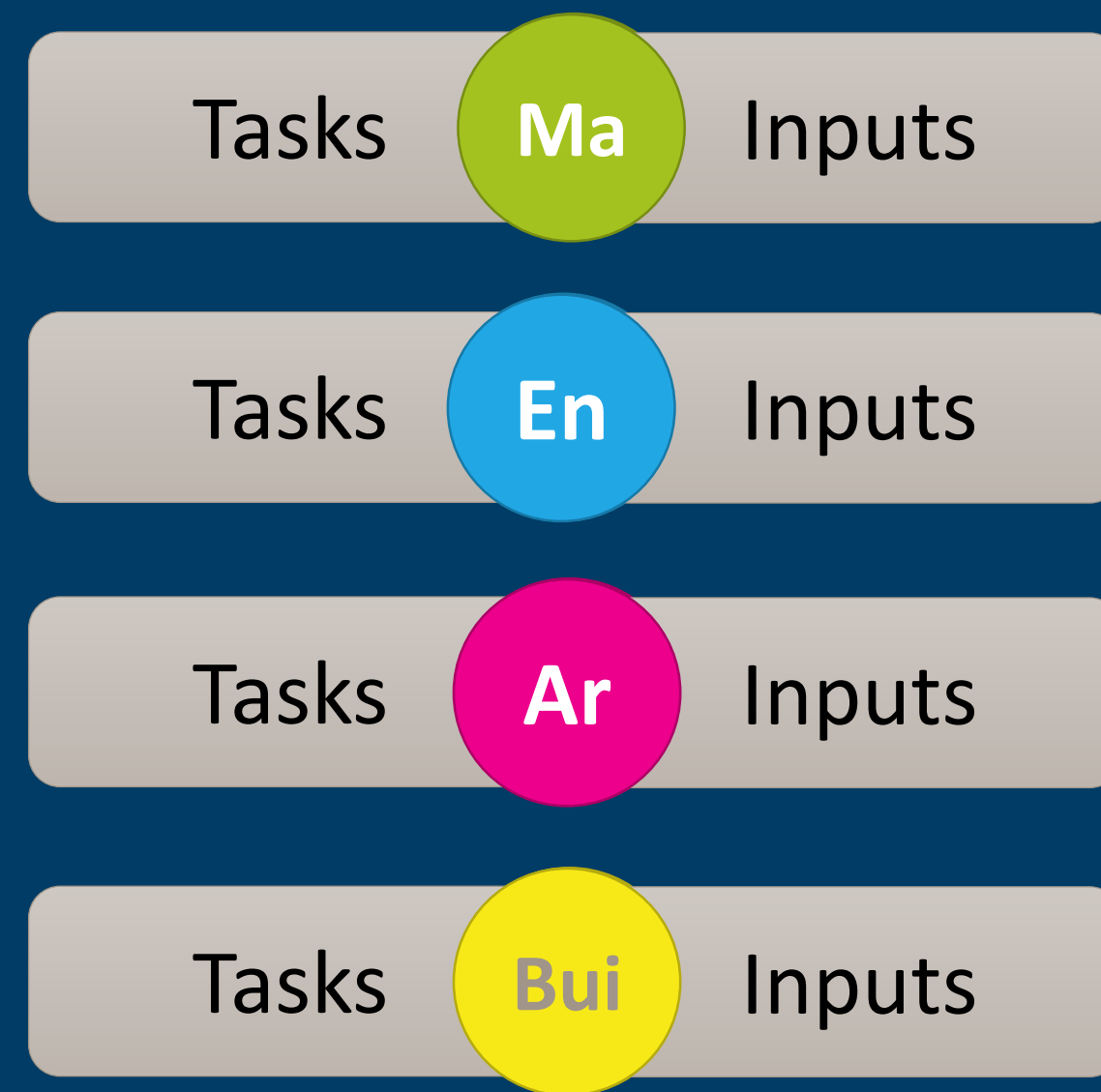
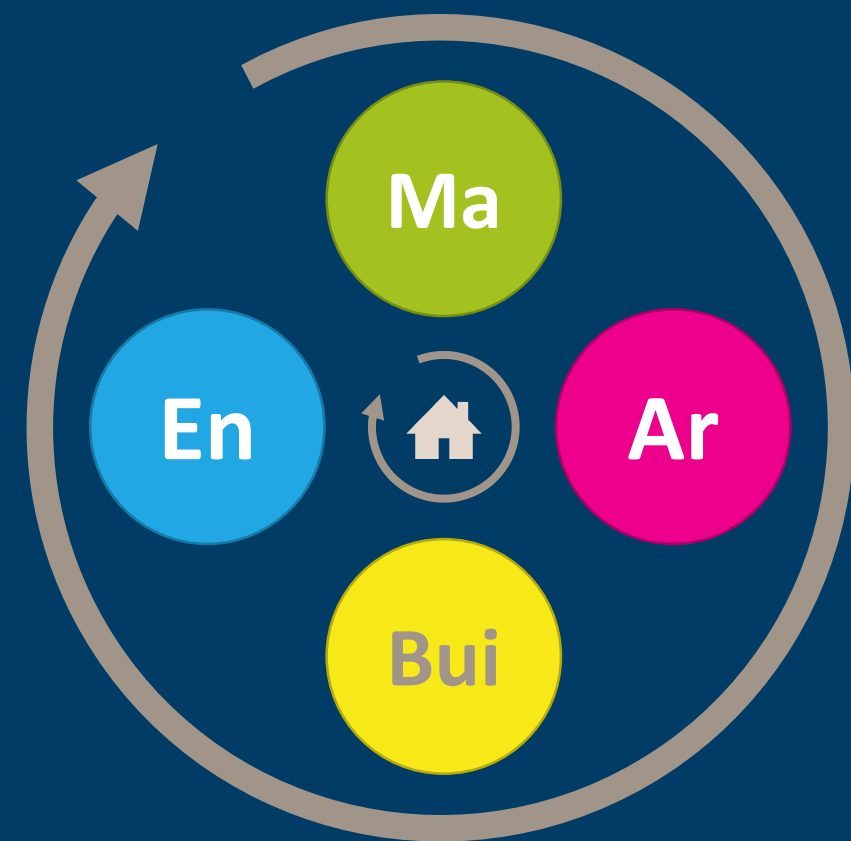
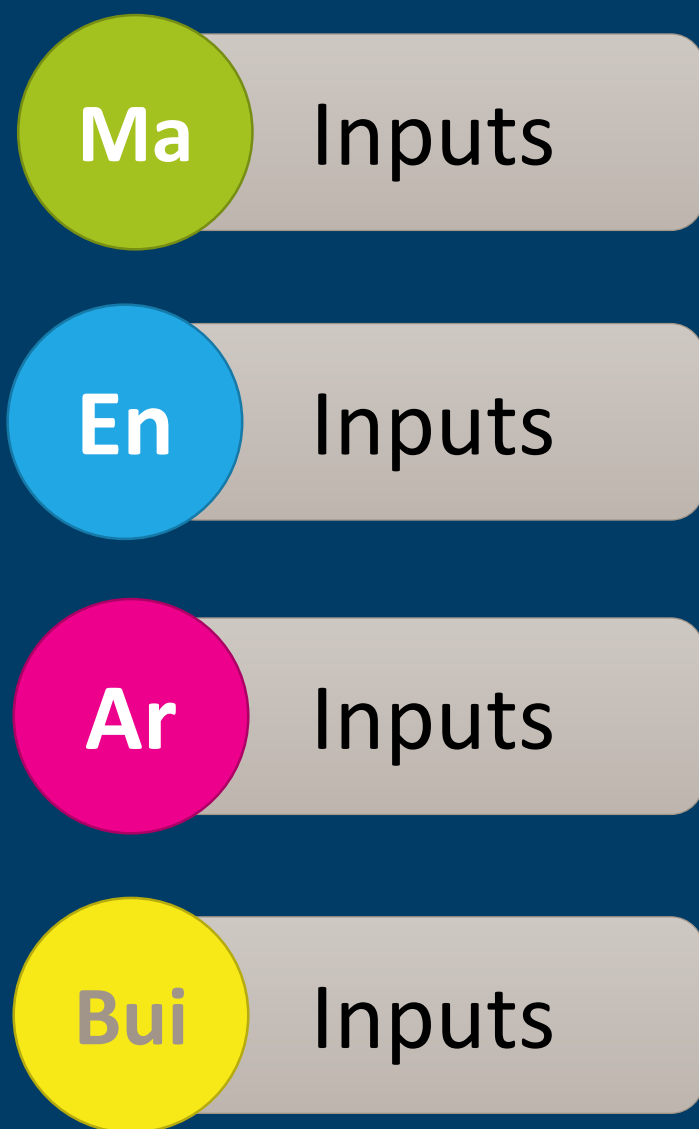


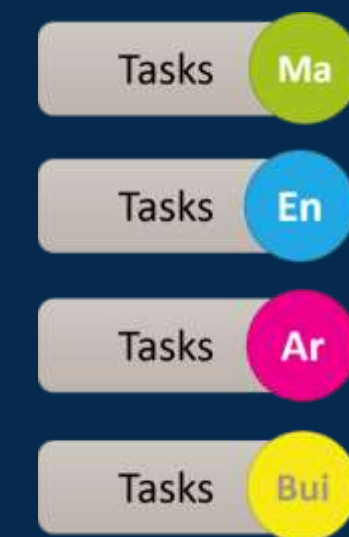
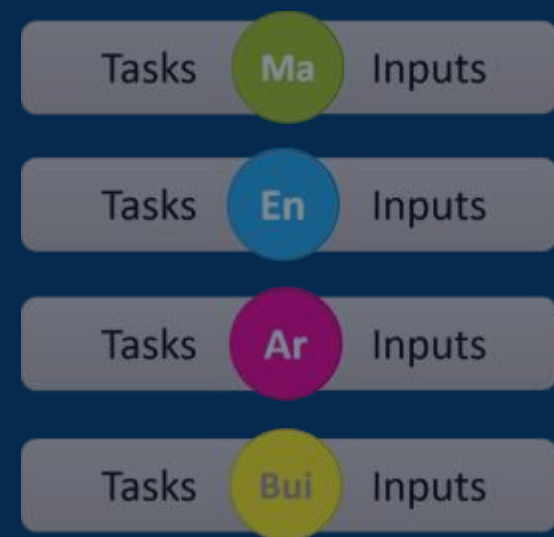
20.6 kN

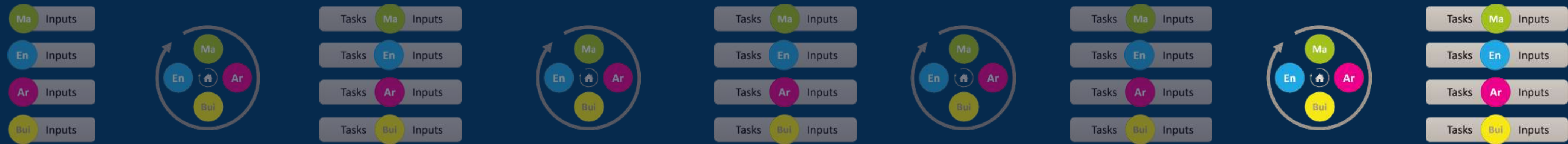


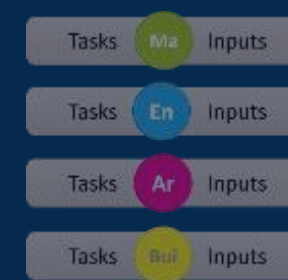
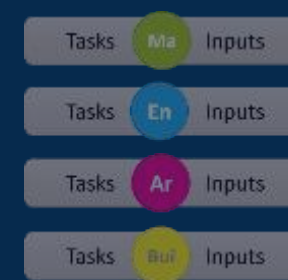
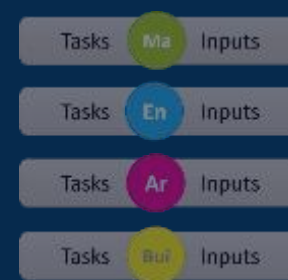
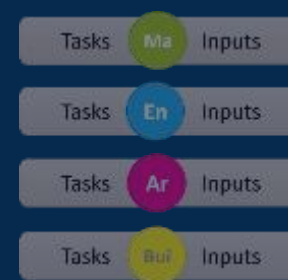
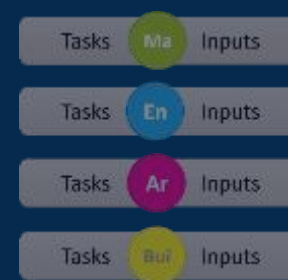
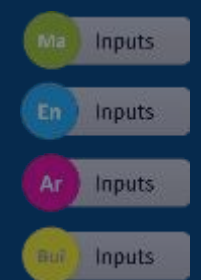




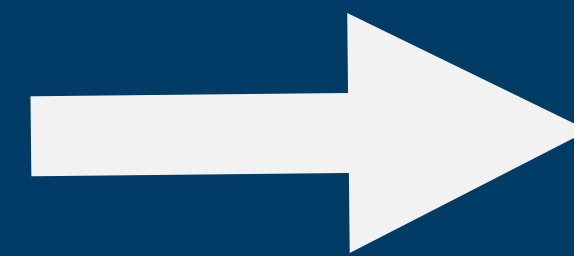
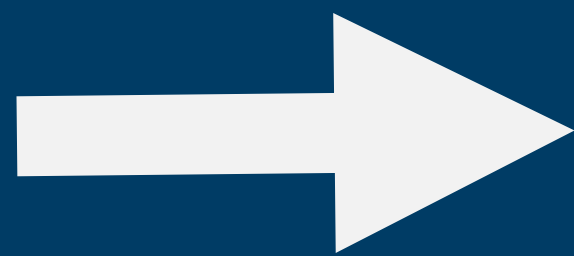






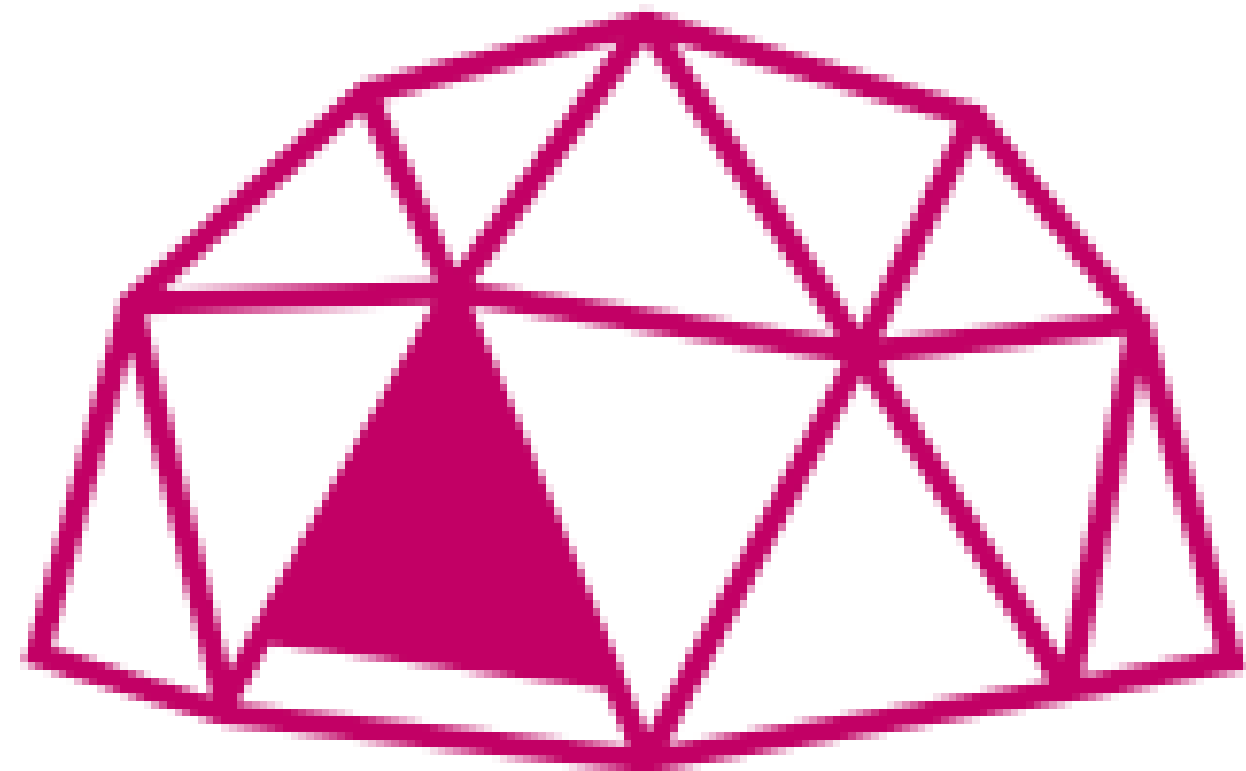


- Ma Inputs
- En Inputs
- Ar Inputs
- Bui Inputs

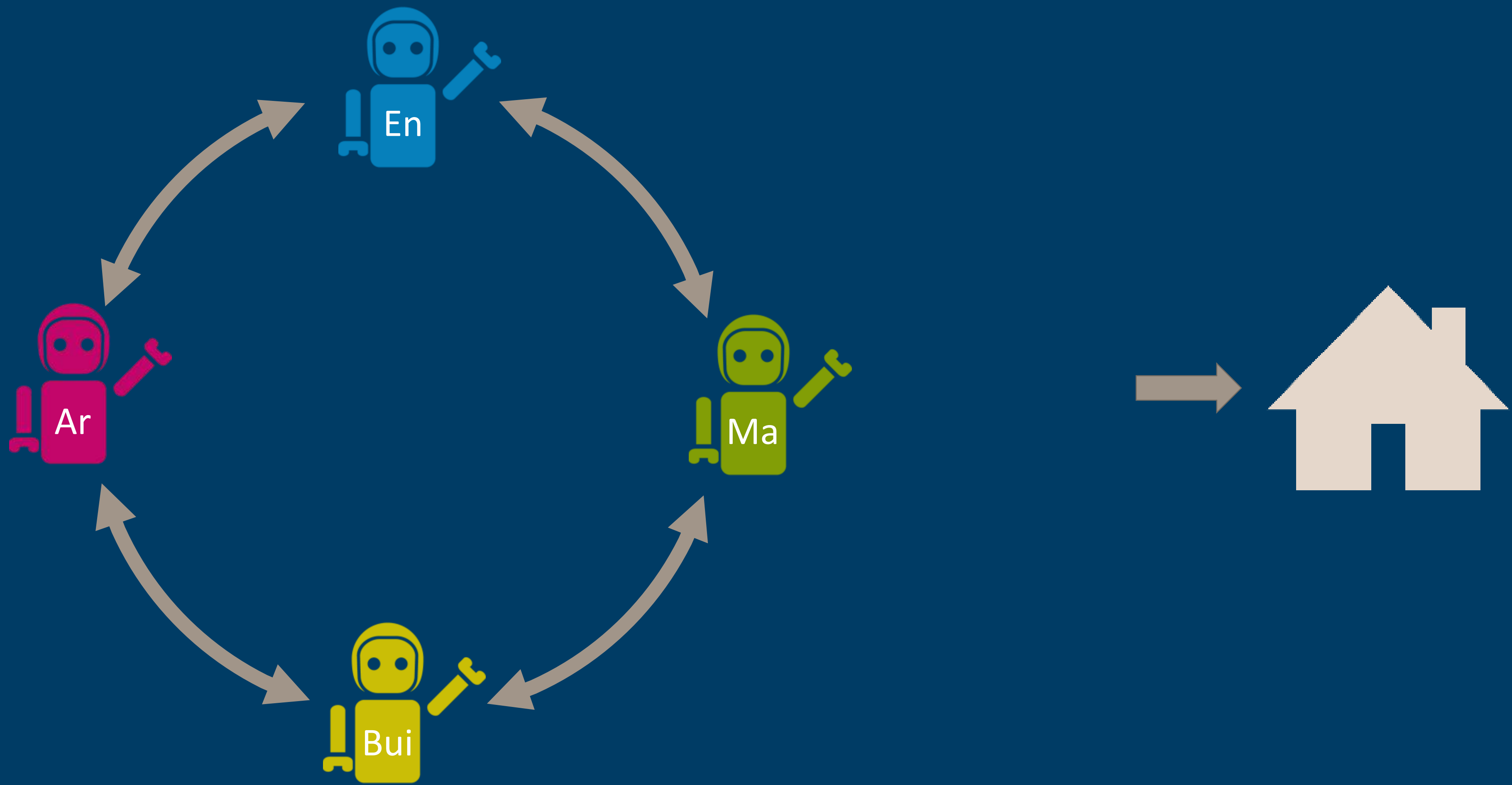


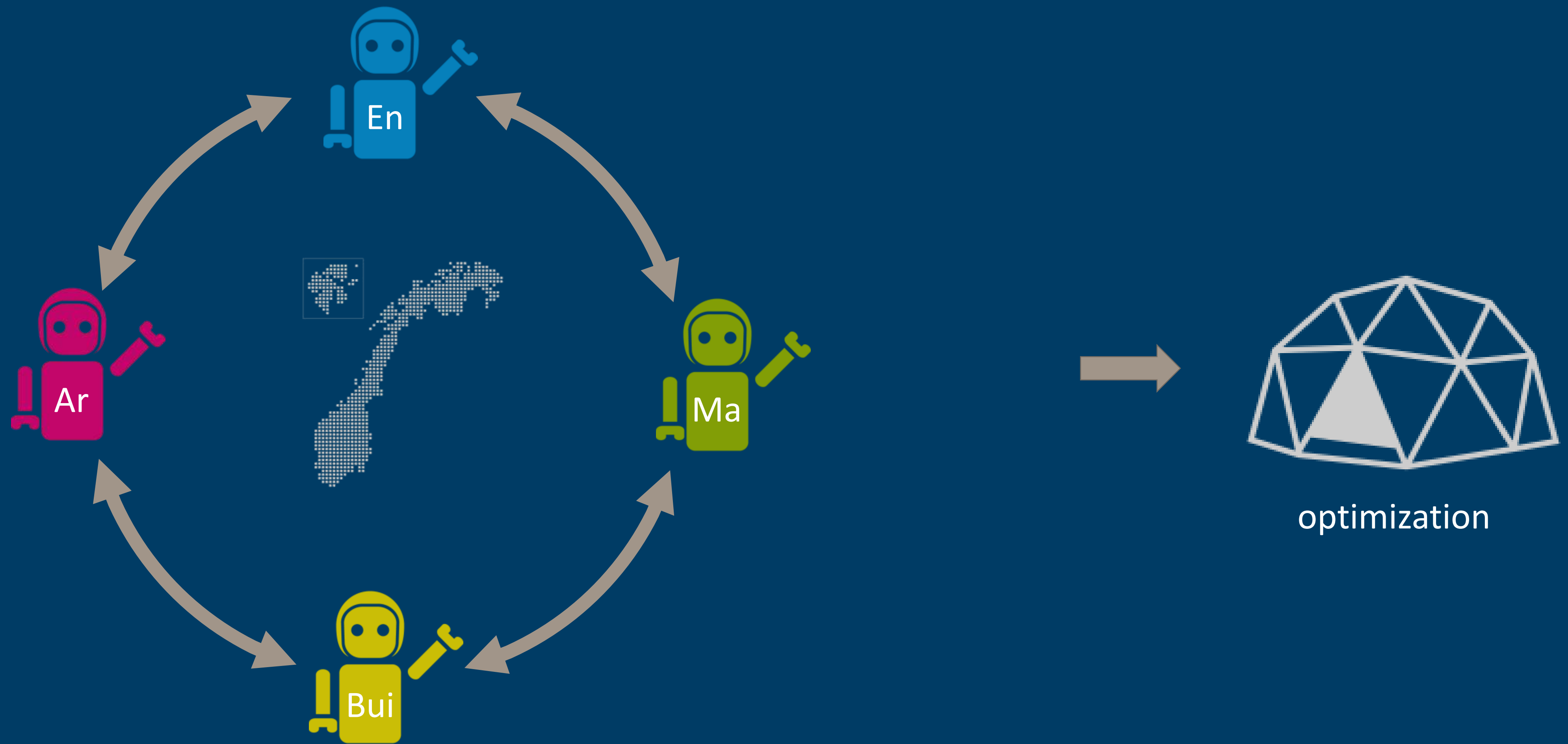


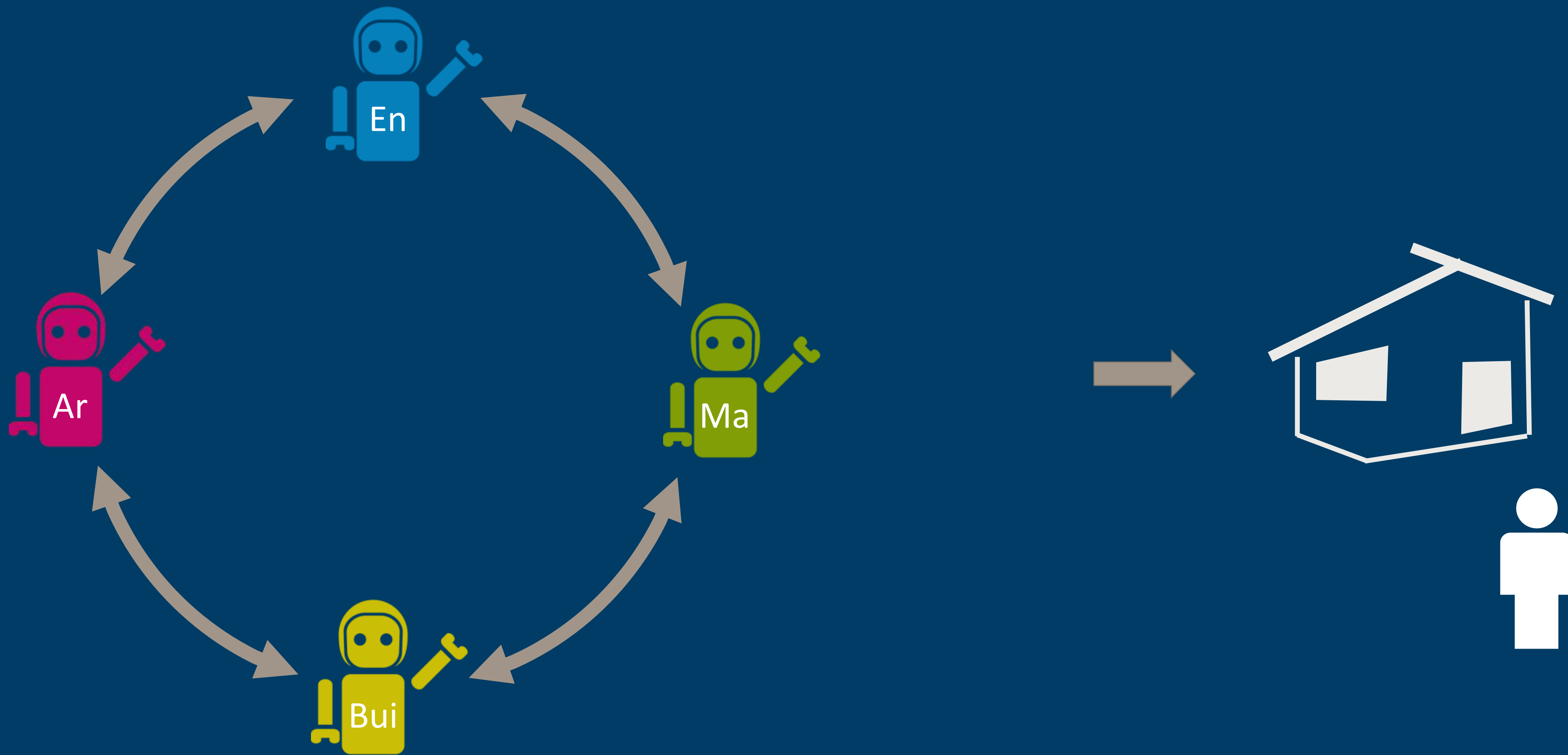


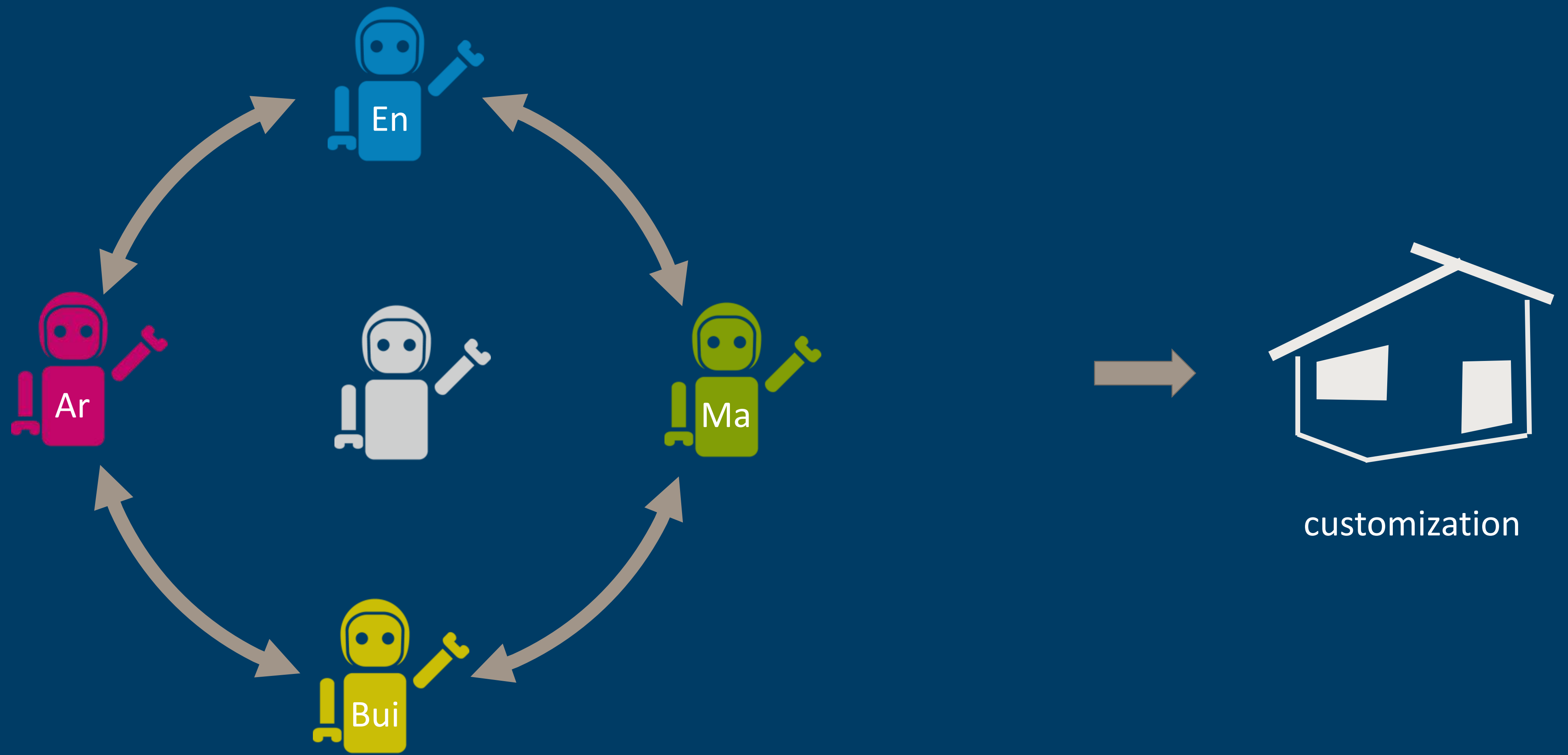


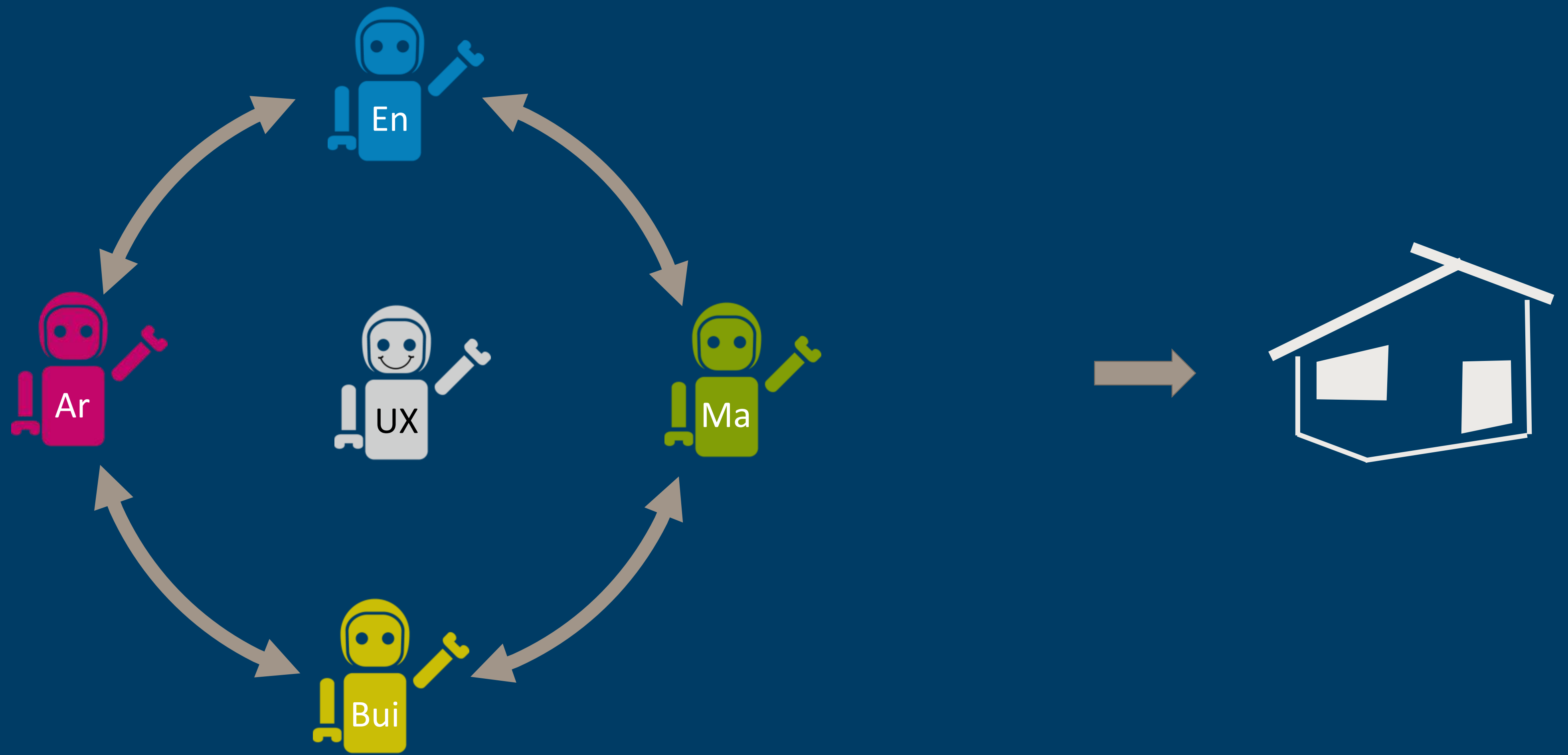
Mass customisation



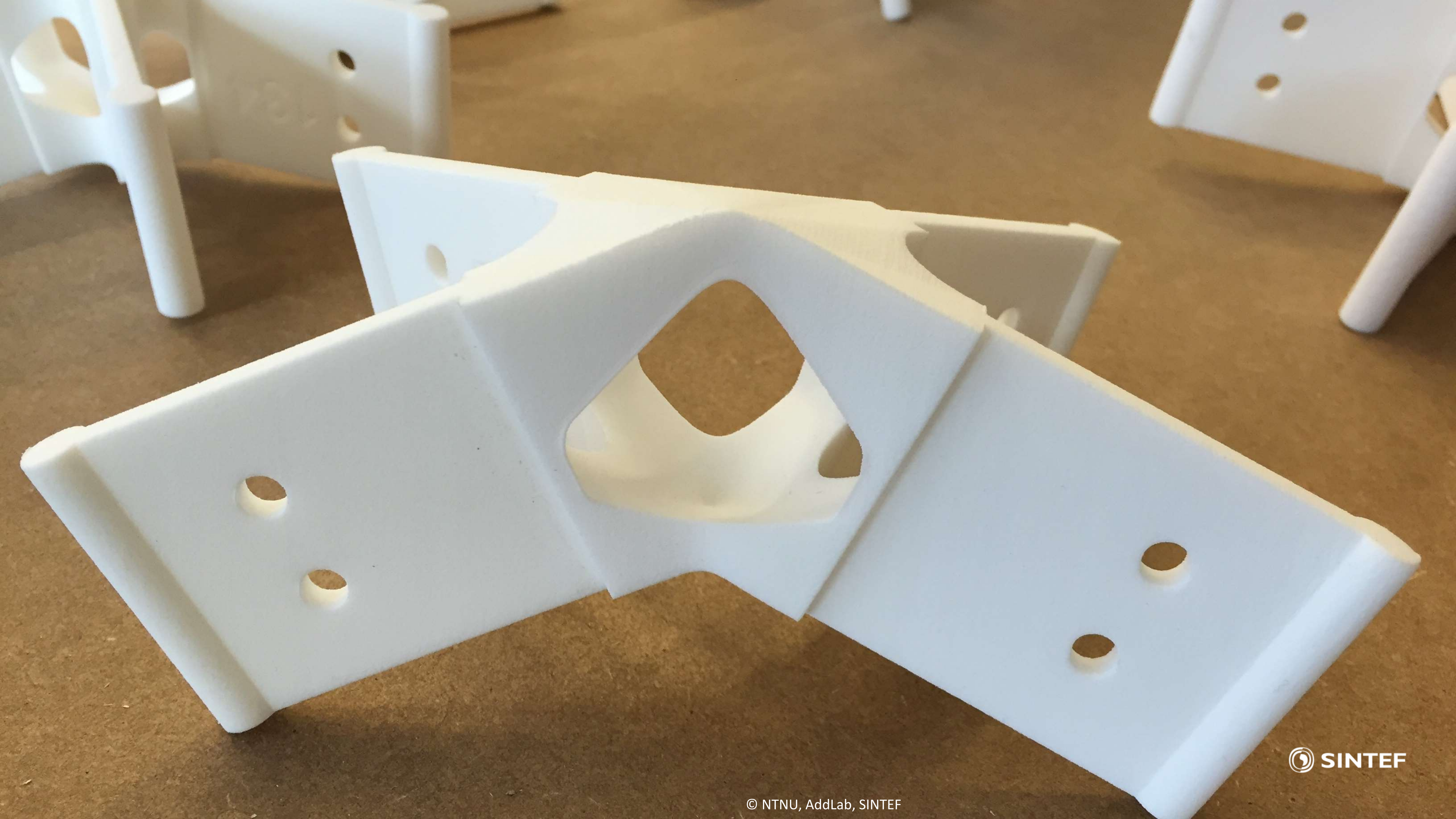
















19
52



(Big Data for) **Bygg Data**



[bygg]



[byggskade]



[IoT]



[forsikring]



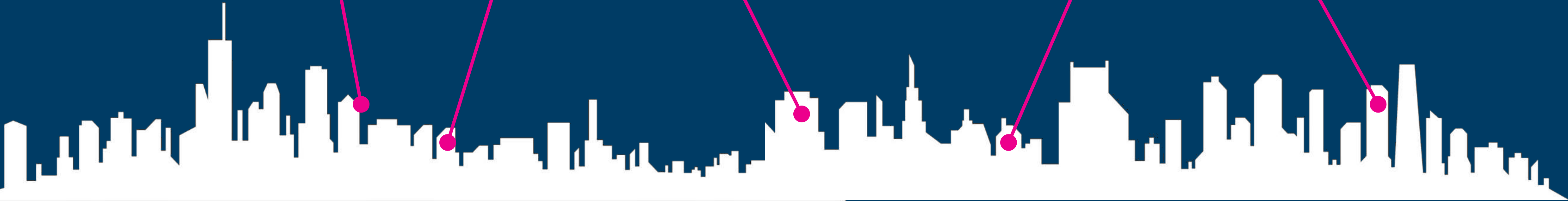
[vær]



[takst]



[strøm]



[bygg data]



[byggskade]



[IoT]



[forsikring]



[vær]



[takst]



[strøm]



[bygg data]



[big data]





[byggskade]



[IoT]



[forsikring]



[vær]



[takst]



[strøm]



[big data for bygg data]





[byggskade]



[IoT]



[forsikring]



[vær]



[takst]



[strøm]



[big data for bygg data]



[prosess]



[folk]



[teknologi]





[big data for bygg data]



data



kunnskap



innovasjon

STAGE 01

Digital operations
Cost reduction

Digital design



STAGE 02

Digital customers
Personalization

Mass customization



STAGE 03

Data analytics

Bygg Data



Effektivisering



Technology for a better society