



## Games technology in asset construction and management

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# Introduction



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# Games technology in construction?



1. Low-cost methods for modelling existing assets
2. Digital twins and the V-process
3. The value of semantic models for data integration

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# Digital Twins



Digital Twins are virtual copies of real world existing or planned assets or spaces.



# Models of the built environment – „Bestandsmodelle“



How do you want them to be?

For example..

... cheap?

... fit for purpose?

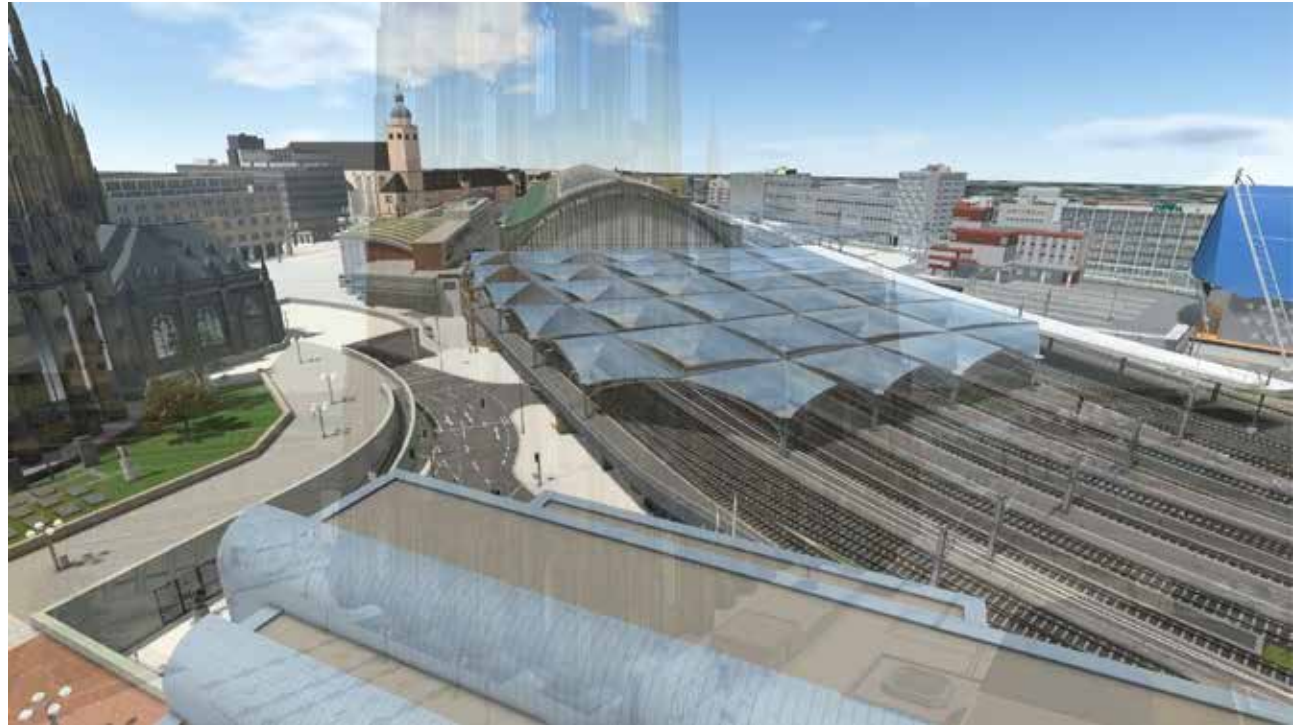
... available quickly?

... based on open standards?

... small file size?

... semantic?

**Use games technology!**



# More efficiency in data capturing

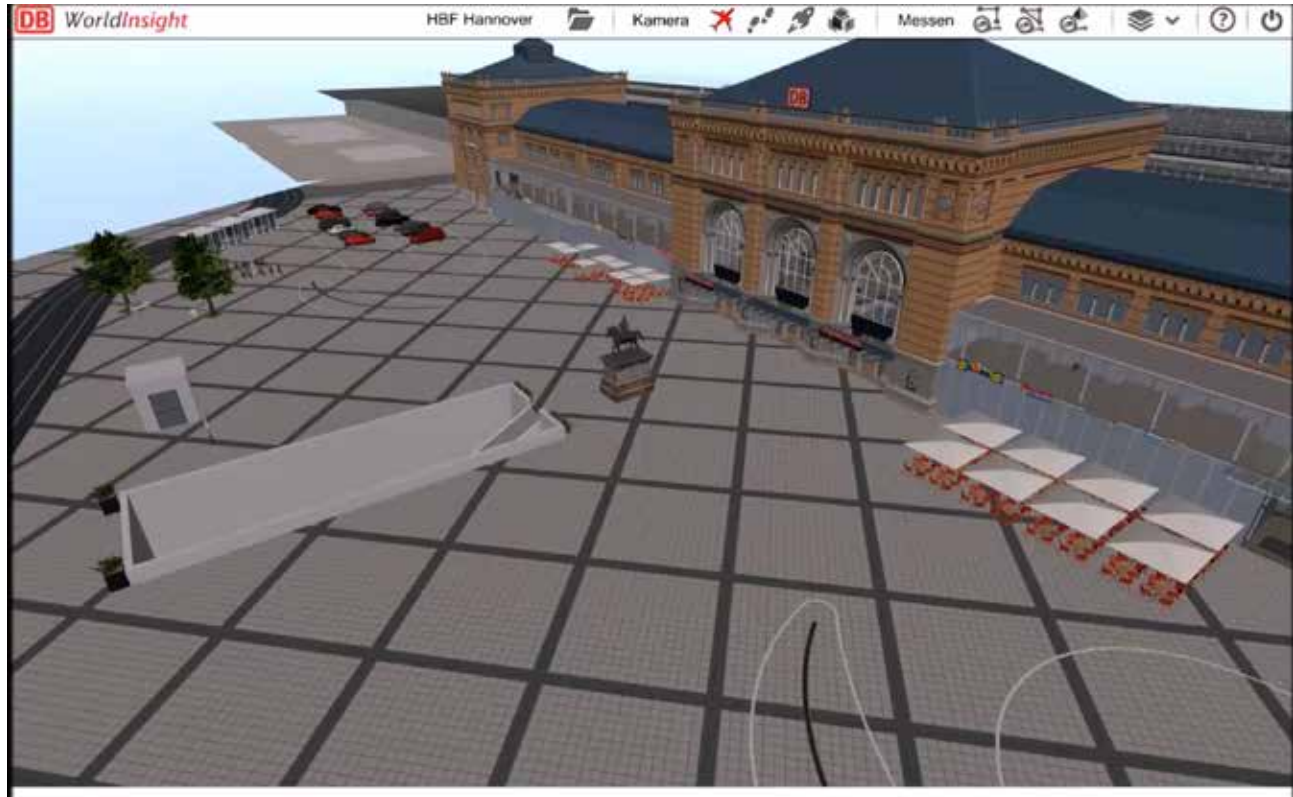


## Quiz time:

Data capturing of all public areas, including outdoor areas, station concourses, all platforms and pedestrian tunnels, at a city center station with around 60,000 passengers per day and 14 long-distance tracks.

How long do you think it took? How much did it cost?

3 man-hours  
100 EUR



# Reduce data volume



Quiz time:

Which one is real?

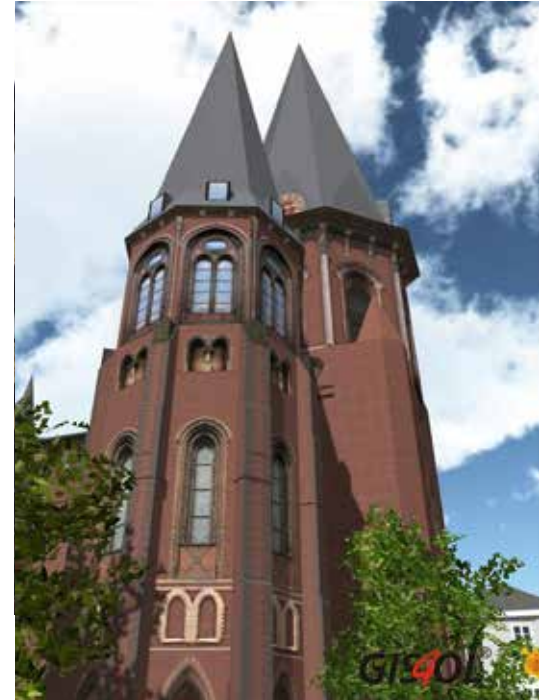
What is the file size of one of these buildings in the model?

What is the file size of a 3D city model with more than 1200 buildings?

Answers:

~ 80 kb

~250 MB



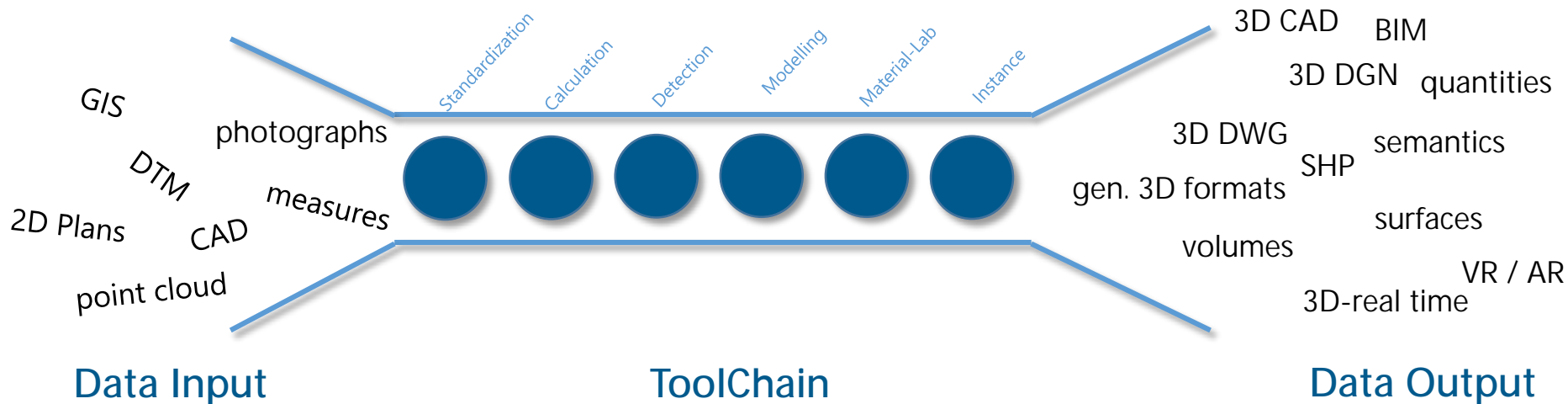




# Low-cost and automated 3D production

## 3D Production:

- § In-house developed ToolChain for semi-automated data processing and modelling
- § Data synchronizing and –standardization
- § Calculations based on terrestrial photogrammetry
- § Detection-software (pattern recognition)
- § Use of structured libraries

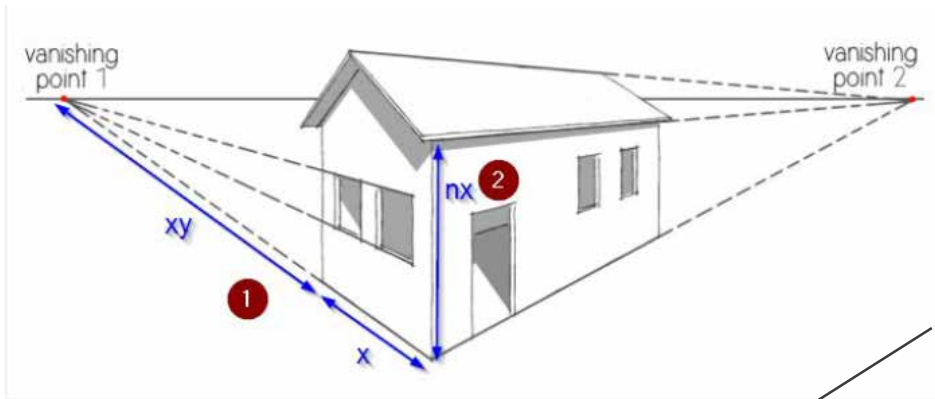


# Low-cost and automated 3D production



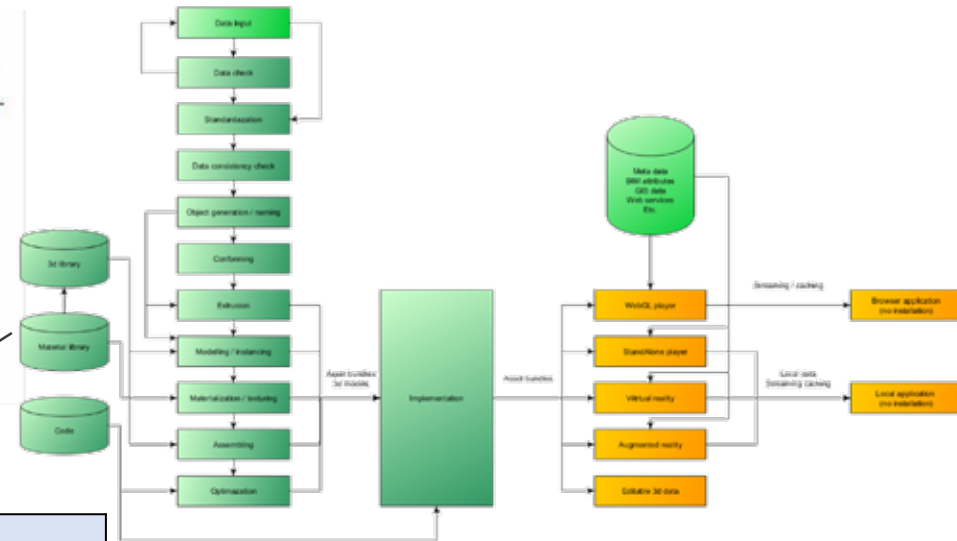
Step 1: creating the 3D geometry based on the principles of descriptive geometry

Step 2: Vector, material and object recognition and instancing

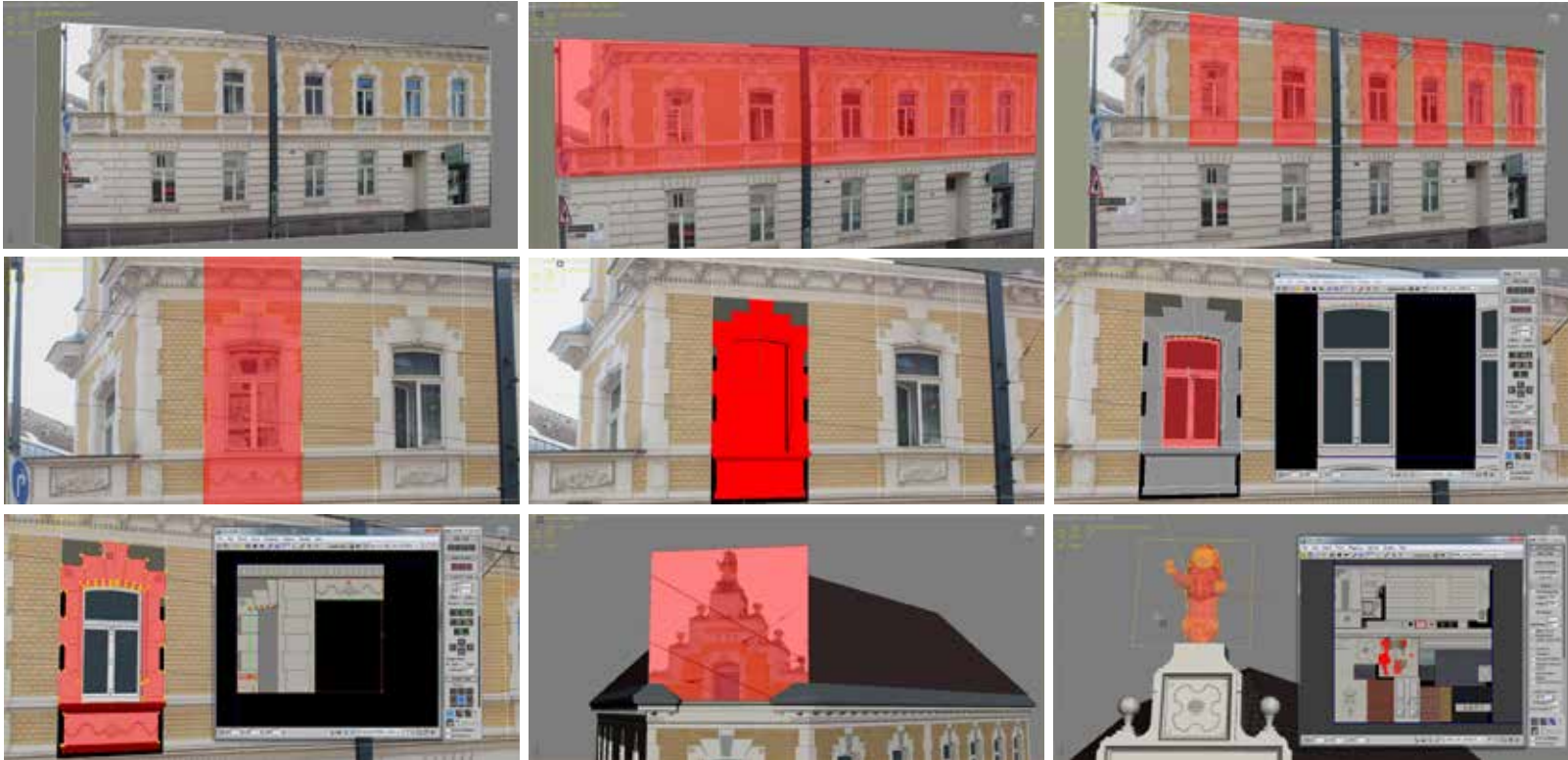


## Library structure

Type	Description
Global	Objects that are globally the same (i.e. concrete, a car etc.)
UK DE CH	Regional Objects that are specific to countries (i.e. traffic lights, road signs etc.)
Local	Objects that are unique (i.e. a house etc.)



# Efficient 3D production using learning algorithms



# Automation using games technology



What do you think was the processing time to produce this model of Milan Central Station?

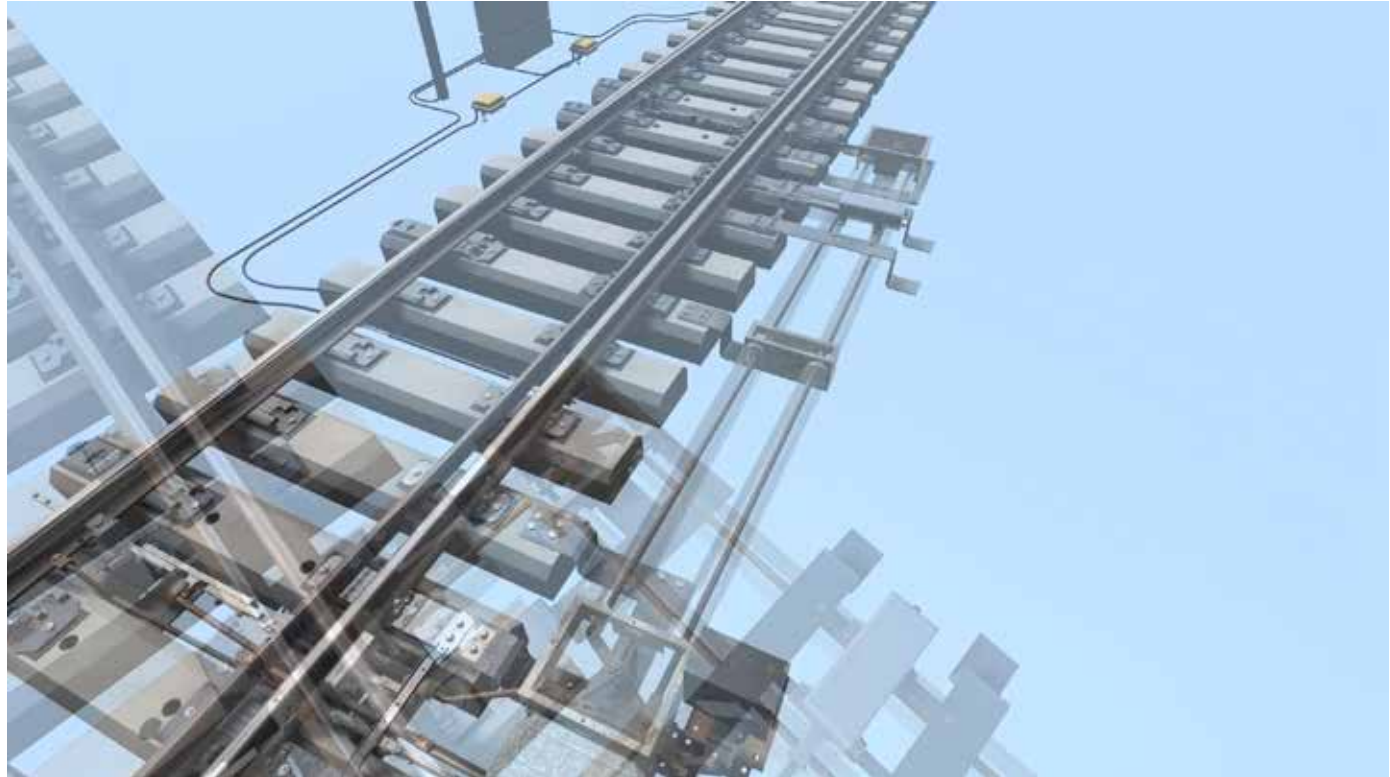
~ 1 week



# Object-based by default



A vast object library is at the heart of our technology, containing digital representations of real world objects. Started 15 years ago, it now contains a vast amount of street furniture, building components, rail equipment, technical objects, materials and textures from all over the world. The library enables the semantics in our digital twins.



# Games technology in construction?

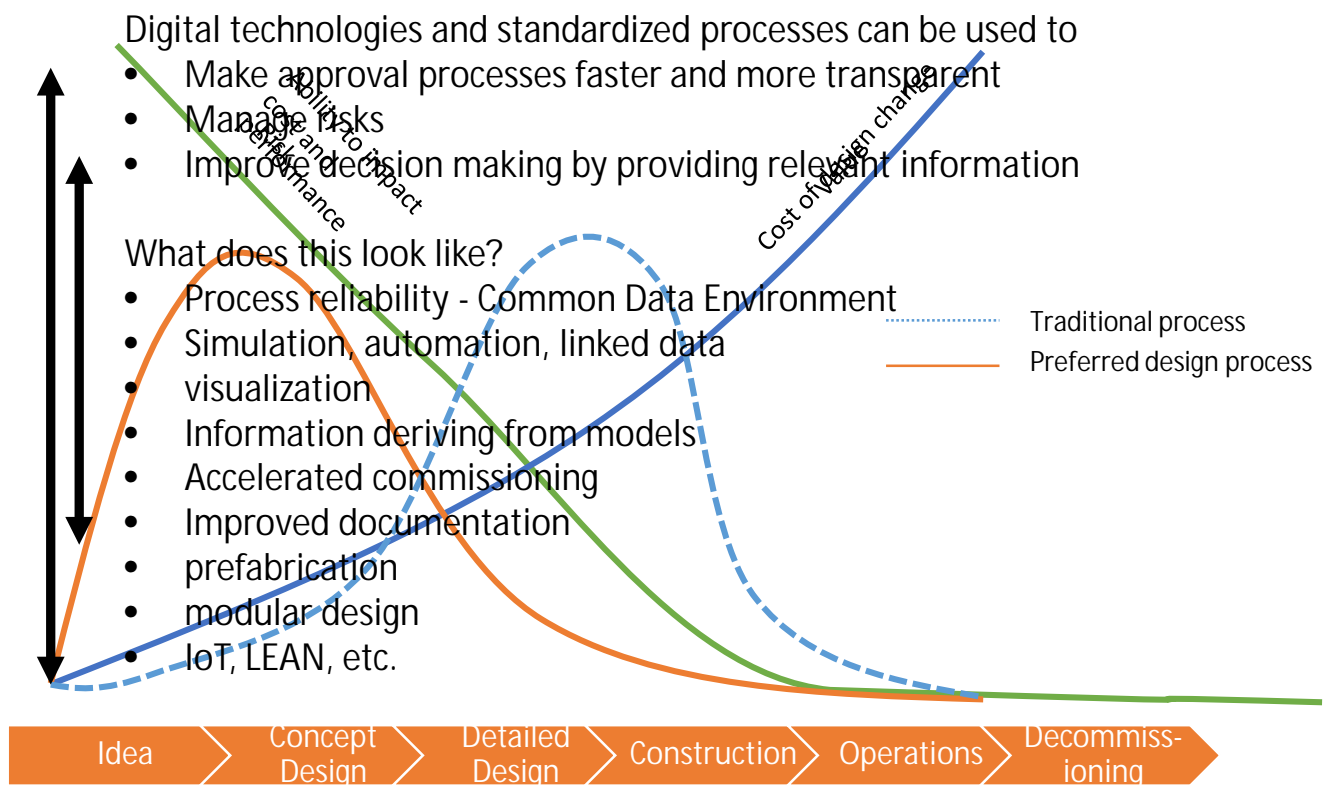


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# Does BIM cost or save money?

Higher investments for more clarity and better decisions are often avoided in early phases when risks for the project are high and the value of the project is still low





# The BIM Business Case




## CapEx



 £89bn  
 €1.9Bn  
 \$17.9Bn

## OpEx



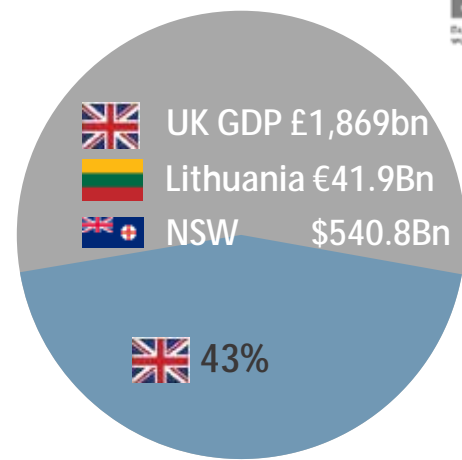
 £122bn  
 €6.6Bn  
 \$61.1Bn

## Service Provision



 £597bn  
 TBA  
 \$106.2Bn

1. Build things better
2. Build the right things



 £808bn

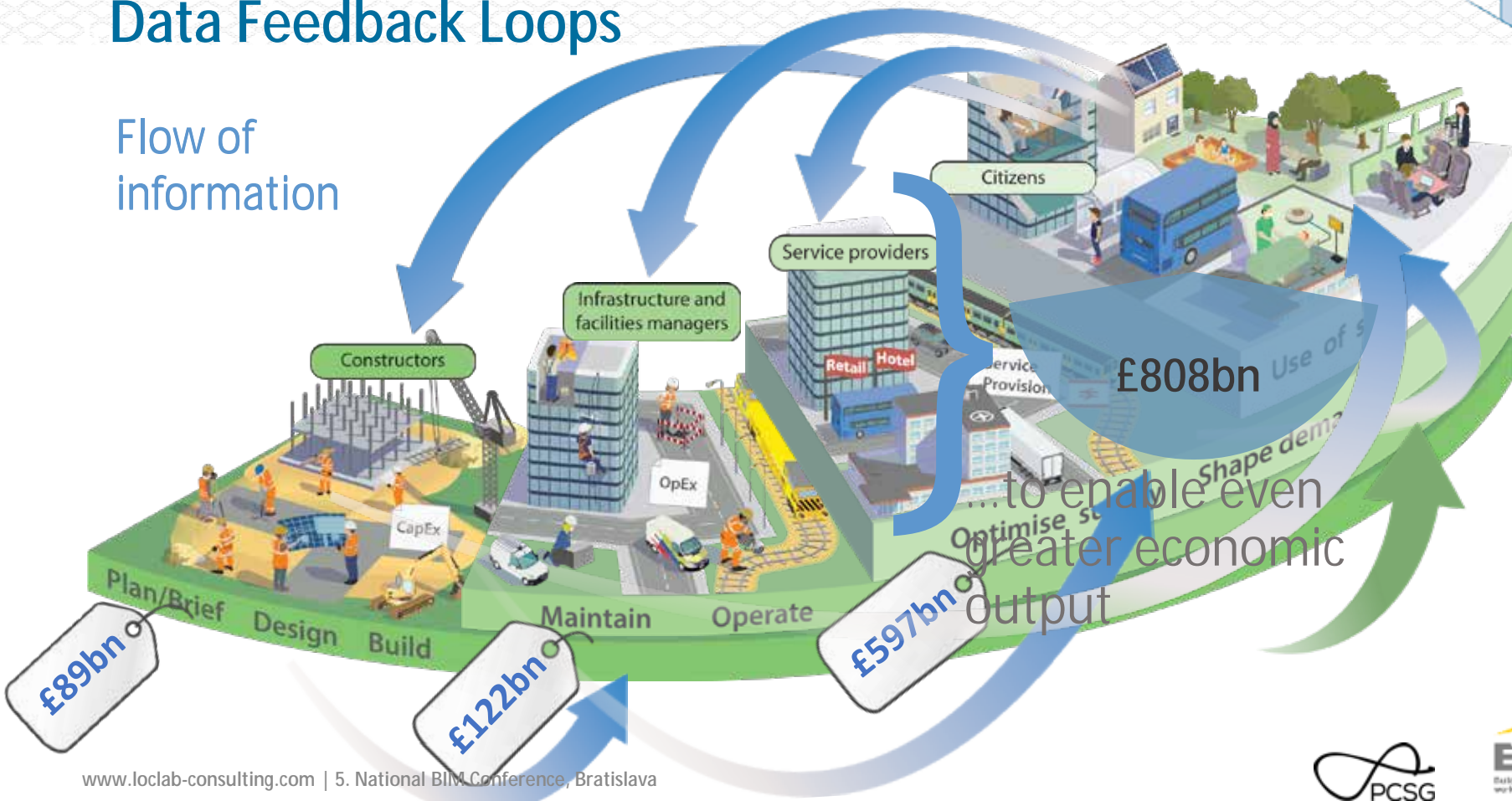






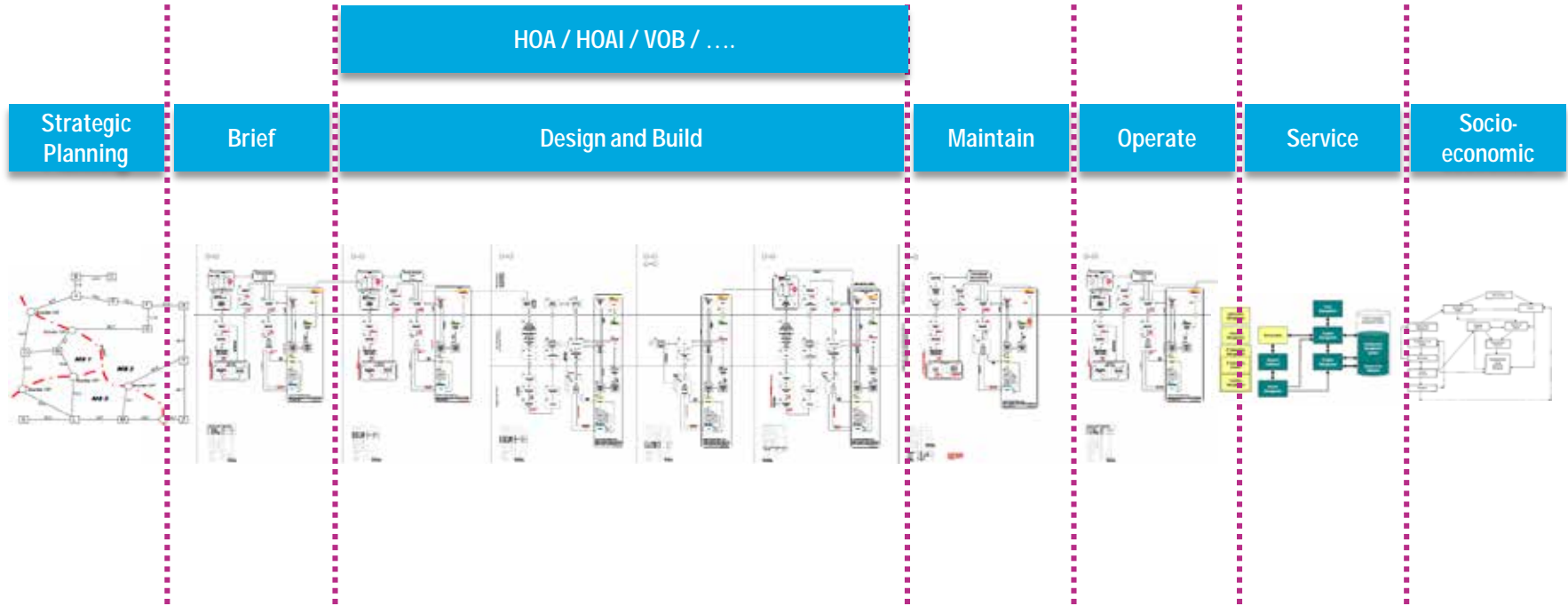
# Data Feedback Loops

Flow of information

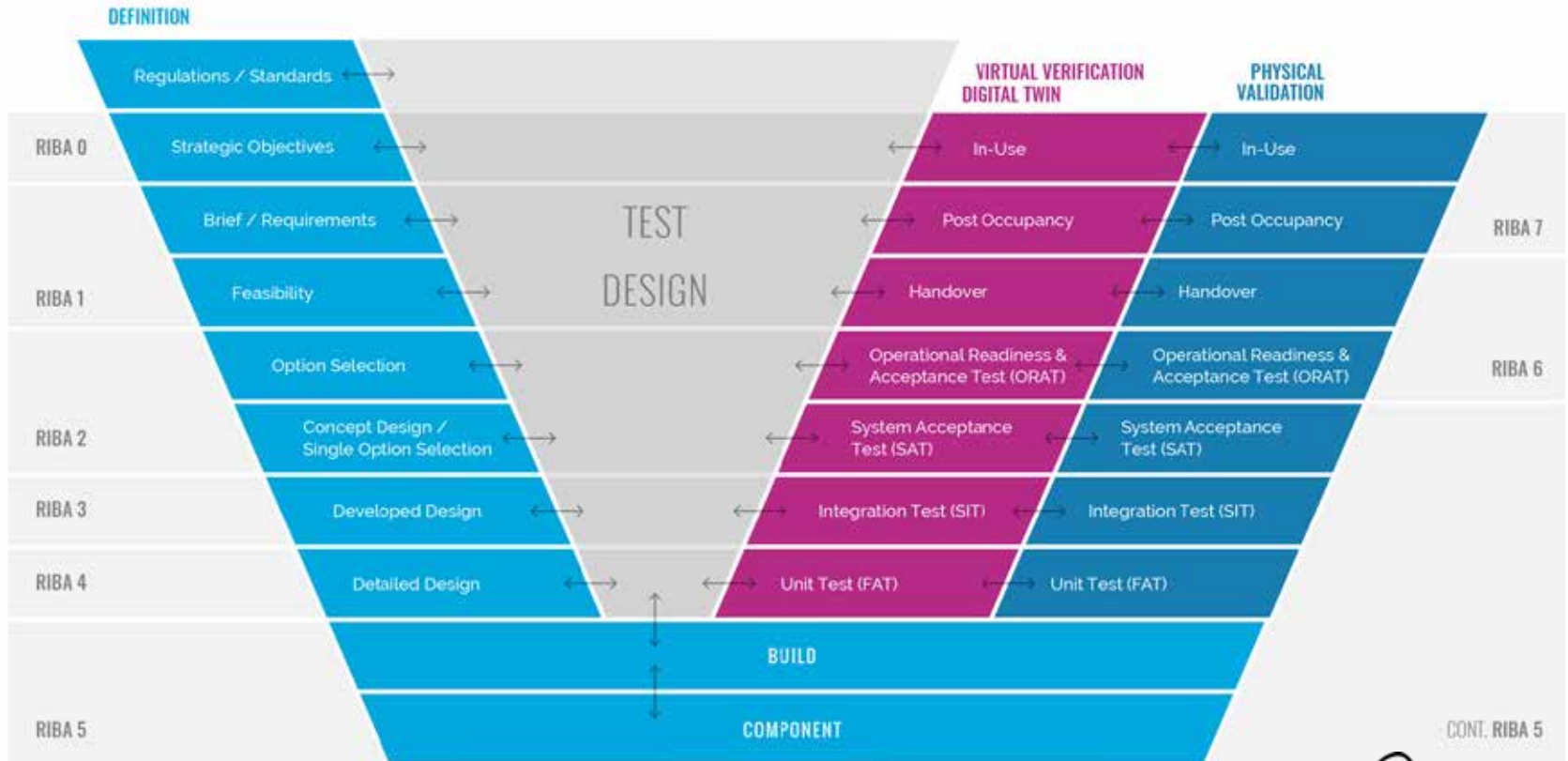




# Linear construction process



# The Systems Engineering "V-Process"





An example for a user acceptance test on a train configurator



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# The Challenge



- § Ability to find key information
- § Models, maps, drawings and data all in different places
- § No common open standards
- § Information is often poor or of unknown quality
- § Unknown security measures
- § Need to use complex unfamiliar systems to access information
- § Lack of integration limits good understanding
- § Information doesn't often get to those who need it



# 3D Models as the backbone for data integration



There is no better place to store information than a 3D model..





# Semantic Models – SAP Connection

The structure of the digital twins is mapped to the leading information system – in most cases SAP or any other commercial system





# Gamification – here comes the fun!



Gamification describes a way to simplify and optimize processes and procedures through playful and engaging applications.

The intuitive and real representations increase motivation and learning outcomes.



Vielen Dank für Ihre Aufmerksamkeit.

Bei Rückfragen stehen wir Ihnen  
gerne zur Verfügung:  
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