Games technology in asset construction and management
Dr. Ilka May
Introduction

Dr Ilka May
CEO
LocLab Consulting GmbH

Stufenplan Digitales Planen und Bauen
EU BIM Task Group

ilka.may@loclab-consulting.de
+49 (0) 6151 30865-35
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
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
Digital Twins

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>Objects that are globally the same (i.e. concrete, a car etc.)</td>
</tr>
<tr>
<td>UK</td>
<td>Regional Objects that are specific to countries (i.e. traffic lights, road signs etc.)</td>
</tr>
<tr>
<td>DE</td>
<td>CH</td>
</tr>
</tbody>
</table>
Efficient 3D production using learning algorithms
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?

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

Digital technologies and standardized processes can be used to:
- Make approval processes faster and more transparent
- Manage risks
- Improve decision making by providing relevant information

What does this look like?
- Process reliability - Common Data Environment
- Simulation, automation, linked data
- Visualization
- Information deriving from models
- Accelerated commissioning
- Improved documentation
- Prefabrication
- Modular design
- IoT, LEAN, etc.

Patrick McLeamy, 2004
The BIM Business Case

1. Build things better
2. Build the right things

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>£1,869bn</td>
</tr>
<tr>
<td>Lithuania</td>
<td>€41.9Bn</td>
</tr>
<tr>
<td>NSW</td>
<td>$540.8Bn</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region</th>
<th>CapEx</th>
<th>OpEx</th>
<th>Service Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>£89bn</td>
<td>£122bn</td>
<td>£597bn</td>
</tr>
<tr>
<td>Lithuania</td>
<td>€1.9Bn</td>
<td>€6.6Bn</td>
<td>TBA</td>
</tr>
<tr>
<td>NSW</td>
<td>$17.9Bn</td>
<td>$61.1Bn</td>
<td>$106.2Bn</td>
</tr>
</tbody>
</table>

Sources: ONS, gov.uk, Gazprom, Facilities Management Journal, Arcadis
Flow of information

Data Feedback Loops

...to enable even greater economic output

£808bn

£89bn

£122bn

£597bn
Linear construction process

- Strategic Planning
- Brief
- Design and Build
- Maintain
- Operate
- Service
- HOA / HOAI / VOB / ....
- Socio-economic

The Systems Engineering “V-Process”
An example for a user acceptance test on a train configurator
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
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

The is no better place to store information than a 3D model.
The structure of the digital twins is mapped to the leading information system – in most cases SAP or any other commercial system.
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:
info@loclab-consulting.de