Digital Twins – Games Technology in Asset Design and Management
Dr. Ilka May, LocLab & Dr. Mario Caputi, in2it
CRESME provides the private sector and public institutions with information and know-how to describe and predict the development of the construction economy and market at the local, national and international levels.

HARPACEAS is the technological partner for the whole process of conception and construction: design, construction, maintenance and management.

In2it’s mission is to maximize the impact that new technologies bring to business processes, primary and support, to extract the maximum possible value and increase the performance of our customers.

LocLab Consulting GmbH is a team of experts specializing in the digitization of the construction sector, who create semantic and volumetric 3D models of buildings, infrastructure and technical equipment that are interactive, software-independent.

“We accompany the world of design, construction, real estate, facility management and public services towards new production and management performances”
We create "Digital Twins" - virtual copies of existing or planned assets and spaces, three-dimensional, technically perfect and amazingly real.

Digital Twins are increasingly used across many industries, mostly in transport, energy, nuclear, telecoms, maritime, aviation and security. The market is global and growing.

Our digital twins are different from most others. Have a look.
Our technology

We have the technology for the needs of a digitalised industry:

• A vast object library, containing a vast amount of street furniture, building components, rail equipment, technical objects, materials and textures from all over the world.

• Our vendor-neutral ToolChain, enabling an outstanding degree of automation in the digital production process.
Our clients want their digital twins to be...

... 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?

3 man-hours
Automation using games technology

More quiz time: Data processing

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

~ 1 week
Even more quiz time:
Data load
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?

~ 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

Data Input
- photographs
- measures
- point cloud
- CAD
- DTM
- GIS

ToolChain
- Standardization
- Calculation
- Detection
- Modelling
- Material-Lab
- Instance

Data Output
- 3D DWG
- 3D DGN
- SHP
- gen. 3D formats
- volumes
- semantics
- quantities
- VR / AR
- 3D-real time

Low-cost and automated 3D production  

3D CAD

BIM
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>Objects that are specific to countries (i.e. traffic lights, road signs etc.)</td>
</tr>
<tr>
<td>DE</td>
<td></td>
</tr>
<tr>
<td>CH</td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>Objects that are unique (i.e. a house etc.)</td>
</tr>
</tbody>
</table>
Efficient 3D production using AI
From Input to Output

Video captured with GoPro Hero 5

Digital Model for two use cases
1) Train Driver Simulator
2) Upgrading technical equipment
From Input to Output

Photographs  
Digital Twin  
BIM Model
LOA – Level of Accuracy

We can be as accurate as the input data, to the millimetre if needed..

However, most use cases for digital twins don’t require that level of accuracy.
Object-based by default

This switch consists of 7000 individual parts.

Every nut and bolt is linked to its technical place in SAP.

Orders for spare parts can be placed directly through the model.
Managing Data: 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..
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.
A 3D model is the most intuitive place for finding information!

GeoConnect+ provides web-based integration of asset data, BIM and IFC viewers, digital twins and real-time sensor data.
Vielen Dank für Ihre Aufmerksamkeit.

Bei Rückfragen stehen wir Ihnen gerne zur Verfügung:
info@loclab-consulting.de