

# BIM

What comes to your office manager's mind?

# BIM

What comes to your office manager's mind?



# BIM

For building(as noun), not for landscape

For building (as verb) and we are building environment

# BIM

Information as the core is a new, unfamiliar concept

We doing this with GIS since ages



# BIM

Is BIM ready for landscape architects ?

Are landscape architects are ready or BIM?

# SMART BIM TREE PARTNERS

Andreas Luka



Prof. Peter Petschek

Eastern Switzerland University of Applied Science, Rapperswil (CH)  
Institute for Landscape and Open Space



Prof. Guo Yong

Tsinghua University Beijing (CN)  
Architecture School  
Landscape department

Jardin Suisse, Aargau (CH)

Association of  
Swiss Horticulture Enterprises

Researcher  
Growing trees  
virtually

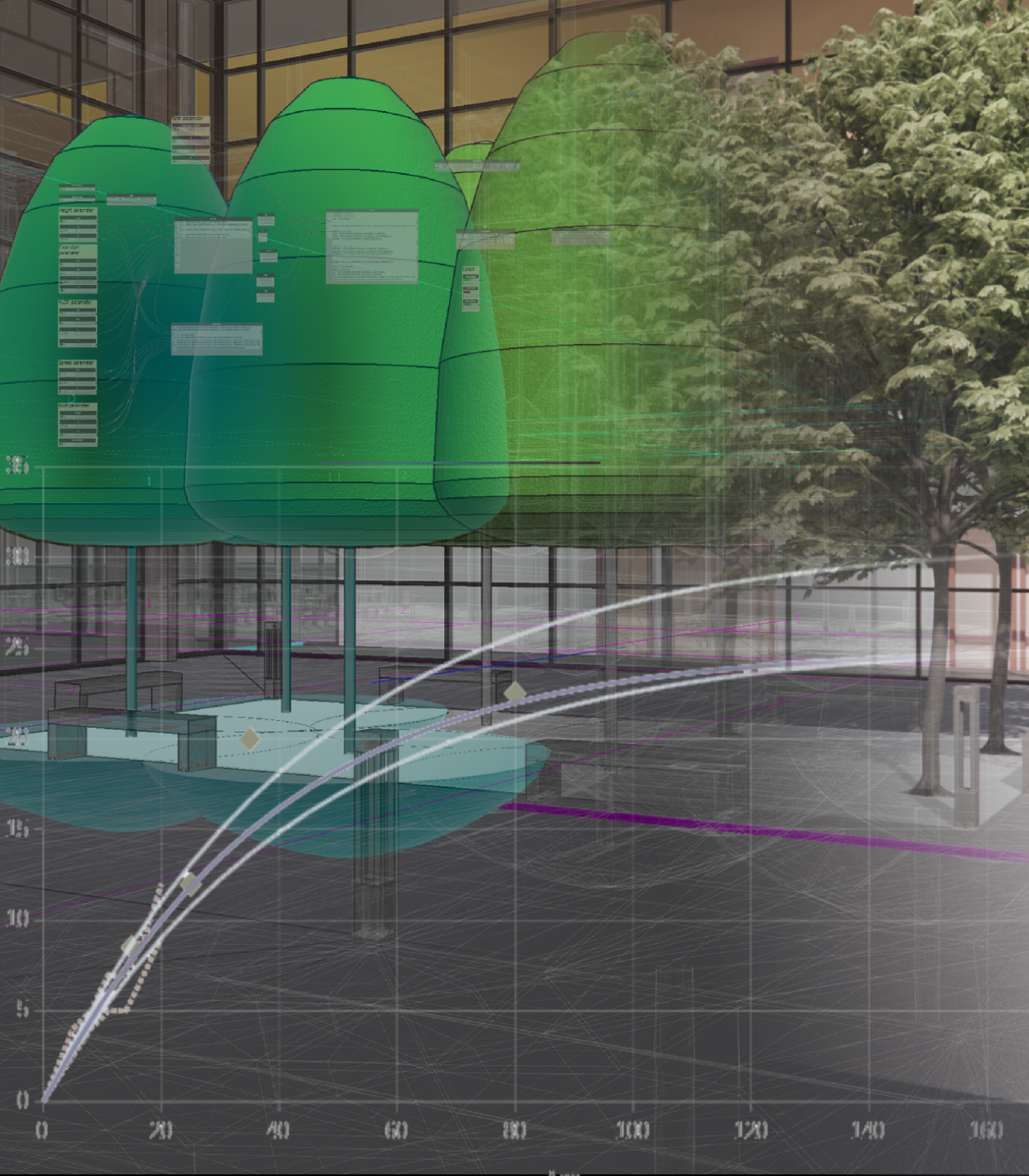
MSc Horticulture  
Growing trees  
In nursery

Designer  
Planting trees  
in Computer

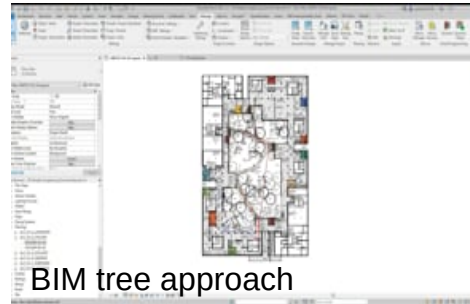


Site engineer  
Planting trees  
on site

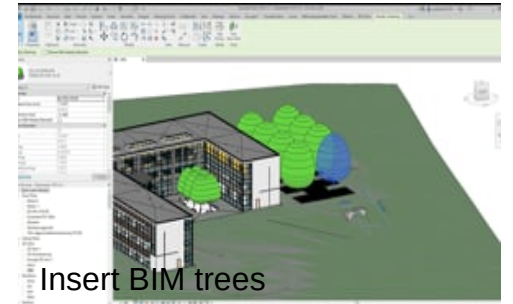
City Official  
Planting trees  
on paper



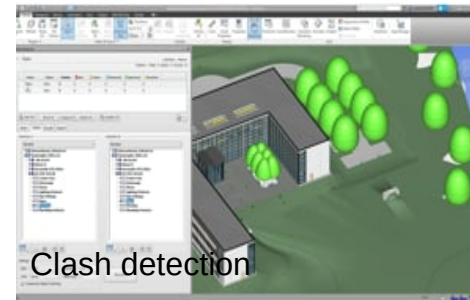
# DEMO I



BIM tree approach



Insert BIM trees



Clash detection

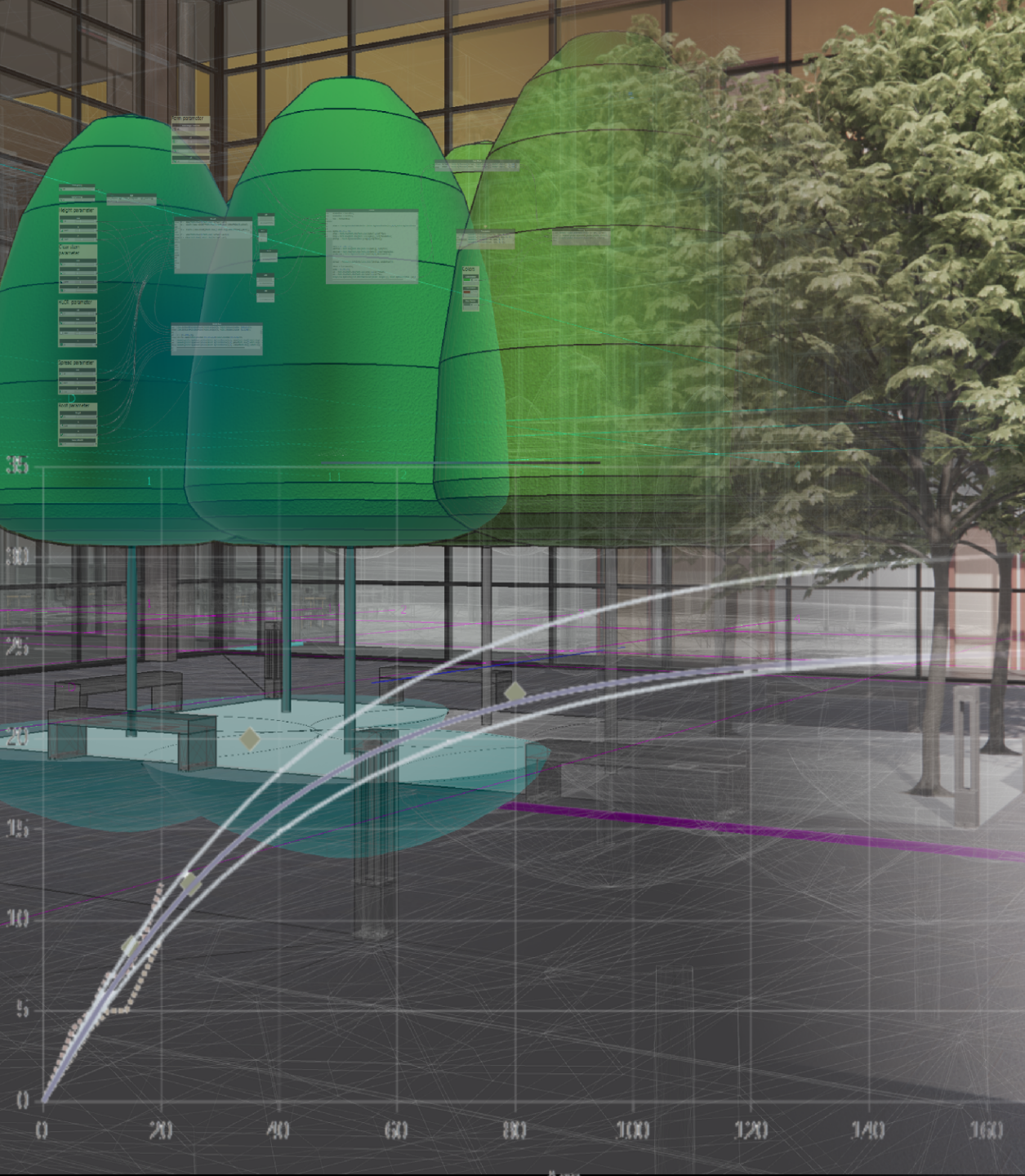


Linking Enscape assets for viz



Enscape





# SMART BIM TREES DATA



## Botanical parameters

Selection of suitable species,  
Based on existing botanical databases



## Nursery stock information

Provided by Jardin Suisse / Tree nurseries,  
Connecting BIM to specification / tendering  
and ERP

Defines the start parameter for growth  
simulation



## Form and growth parameter

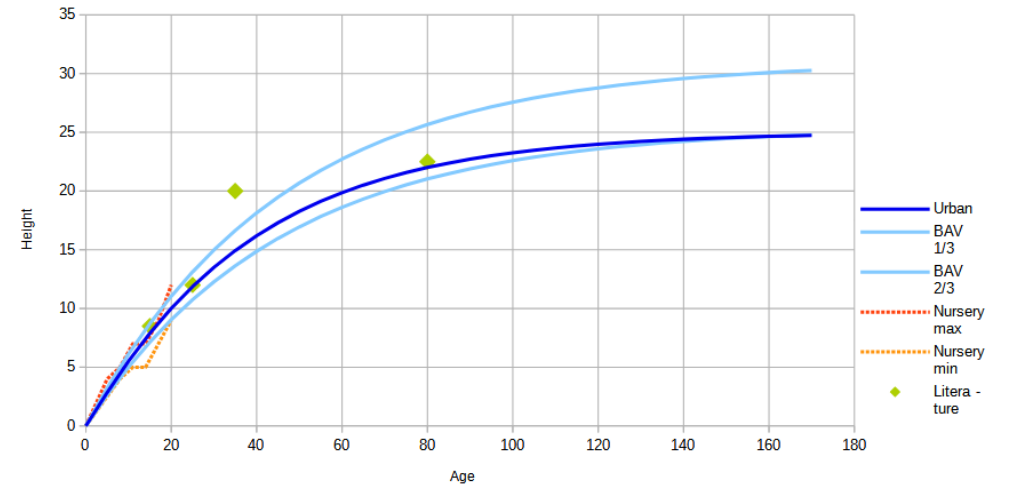
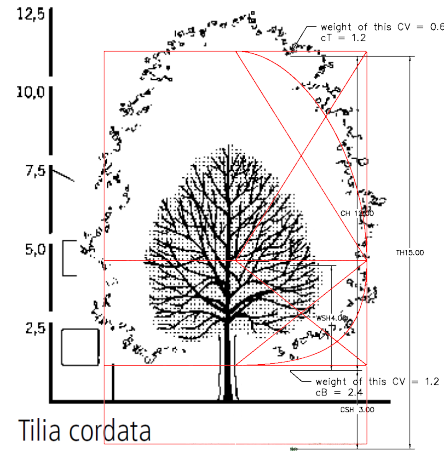
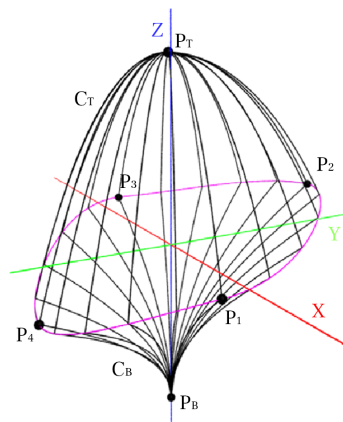
Defines the trees space requirement over time  
Basis for clash detection  
Basis for performance analysis



## Unique identifier & consistent parameters

Connects the tree with his digital twin across  
systems

# SMART BIM TREES FORM & GROWTH PARAMETERS



Growth (Height) curve for Tilia cordata Mill. compared with data from Bavaria [28]

## CESCATTI HULL MODEL AND SHAPE PARAMETER DERIVATION

- Crown represented by 6 points and two shape parameters suitable for existing trees
- Reduced to six parameters for symmetrical (new) trees
- Root (hull model similar to crown model) with 1 point and one shape parameter = two parameters
- Parameters based on analysis of botanical and forestry data

## GROWTH CURVE ESTIMATIONS

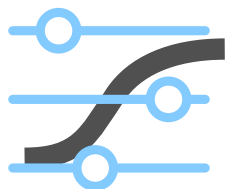
- Data from tree nursery article list
- Data from forest science and mensuration
- Other publications (accident reports), known ultimate size
- Chapman-Richard curve with interchangeable parameters  $k, p$  (simple form for statistical analysis)  $\leftrightarrow d, K$  (meaningful and interpretative)

# SMART BIM TREES FEATURES



## COMPLETE & CORRECT

- Crown, trunk and roots
- All elements described by parameters
- Parameters based on analysis of botanical data
- Parameters compatible with forest science and mensuration



## DYNAMIC

- Initial size based on tree nursery data
- Size and form as function of initial size, age and site index



## BIM READY

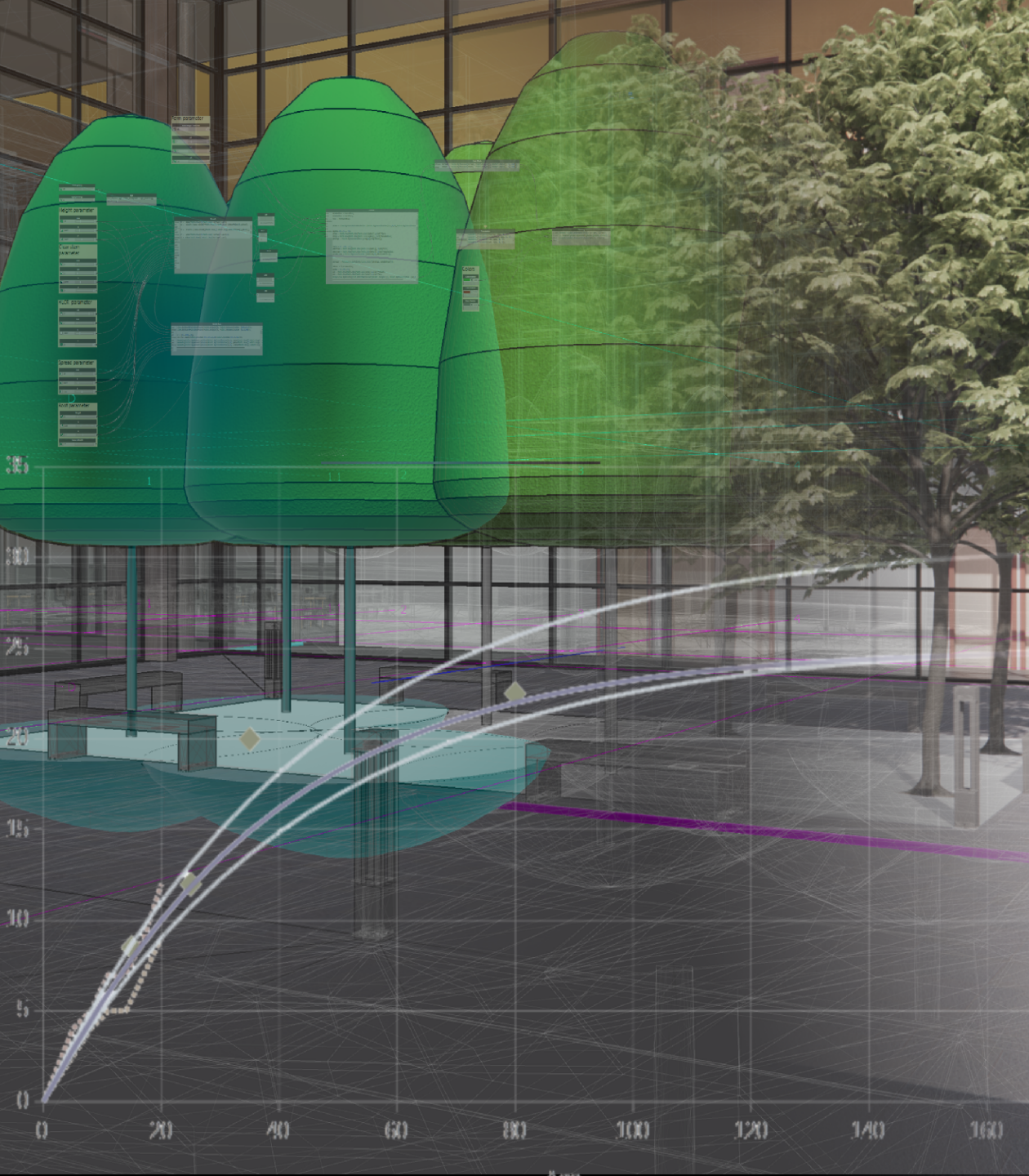
- Volume models for clash detection
- Specifications based on CoBIE standards
- Unique identifier and consistent data set
- Lightweight for fast processing of large models



## INTEROPERABLE

- OpenBIM and open GIS standard conform
- Central algorithm and data independent from modeling software and available as cloud service via API
- Atomic BIM principle: storing and exchanging of underlying information



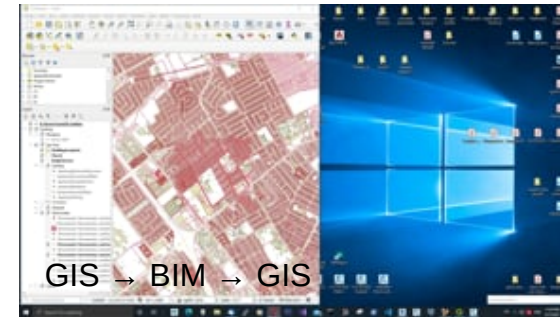


## DEMO II

### Performance analysis



Evaluating and optimizing landscape design based on predictable and accountable outcomes and impacts



### BIM to Field – Digital planting plan



Asset tracking from nursery / onsite stocks to FM handover with machine readable labels and RTK-GPS to guide forklift operator



### Virtual assets

Creating assets for virtual reality / visualization with space colonization algorithm in Blender  
BIM to tree cadastre (GIS based FM)