

# Do new urban densities provide urban landscape identity?

A concept for operationalizing qualitative factors  
combining sophisticated visualization workflows



REAL CORP 2012

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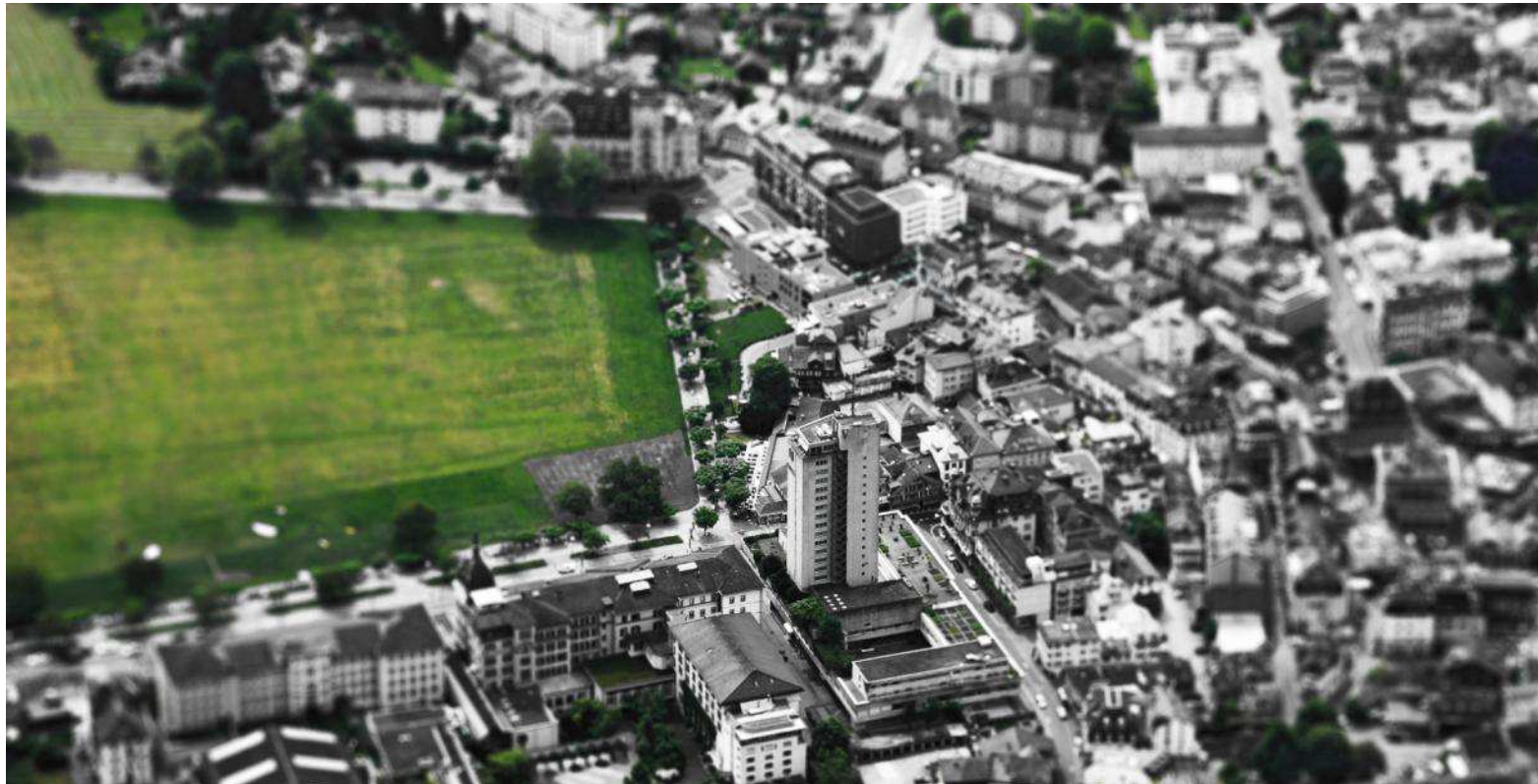


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# Continuing Pressure on Urban Areas

- growing population
- further urbanization → affects urban quality



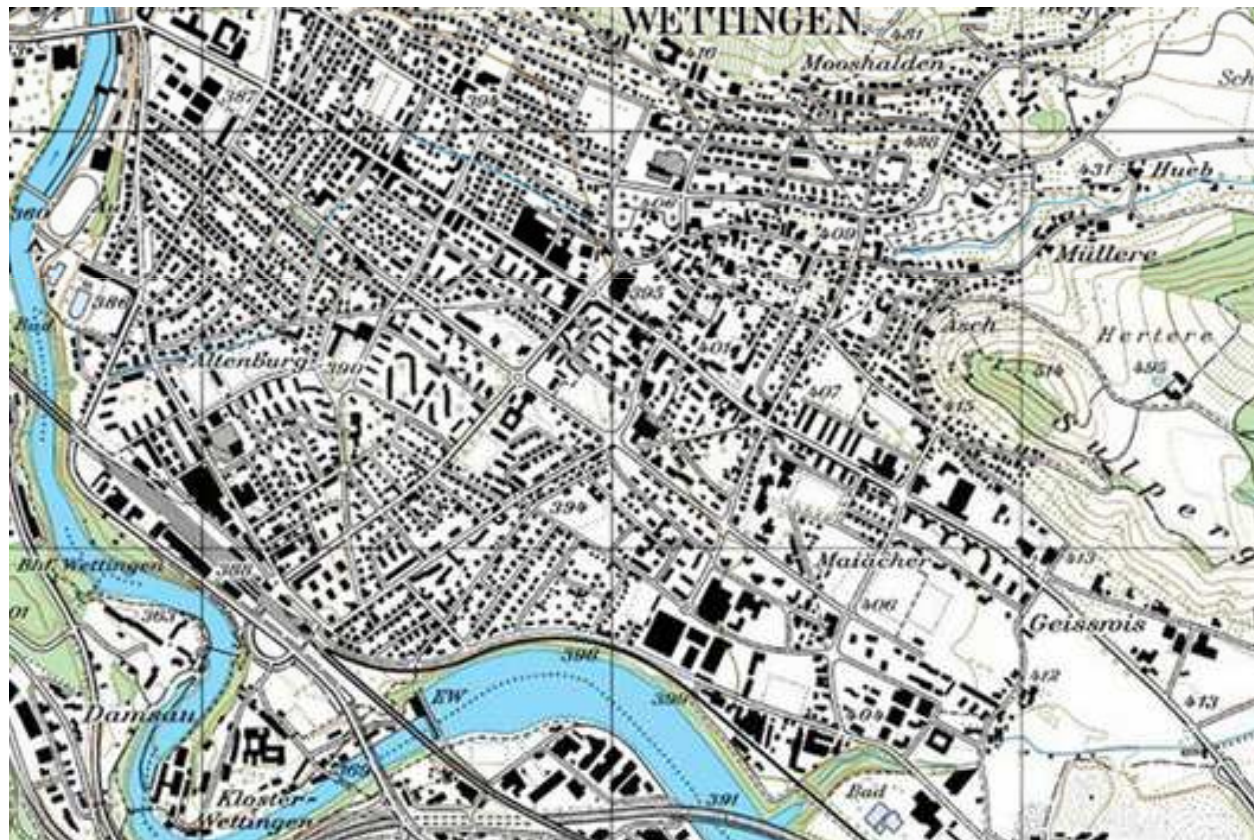
Source: Thomas M. Klein



# Continuing Pressure on Urban Areas

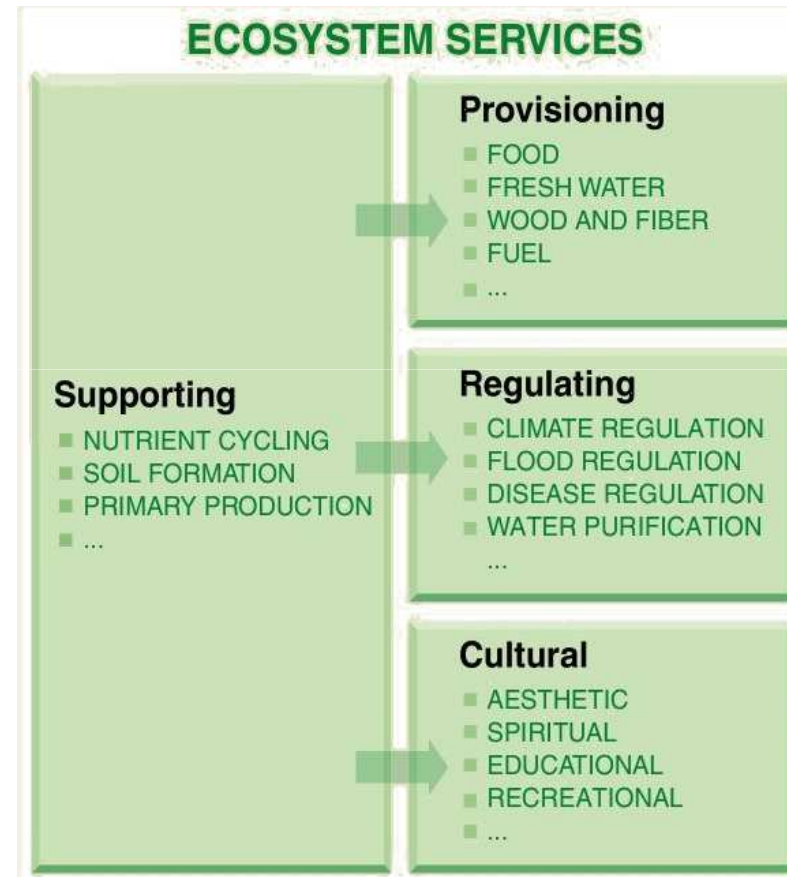
- growing population
- further urbanization → affects urban quality

2000



# Concept of Ecosystem Services

- Offers a vast systematic framework for goods and services to humanity
- The principal of valuing ecological landscape components allows new approaches
- → quantify and bring landscape in comprehensible indicators
- → enables also trade-offs of socio-economic values
- The number or area of culturally important landscape features or species support the service of providing signs of cultural heritage and identity



Source: ecologyandsociety.org

# Assessing the urban landscape's identification function

- objective and subjective approaches required
- objective approaches are well established
  - rather applicable on rural than on urban landscape
- subjective approaches still lack of suitable tools
  - Integration of individual perceptions of stakeholders into the evaluation process not given.

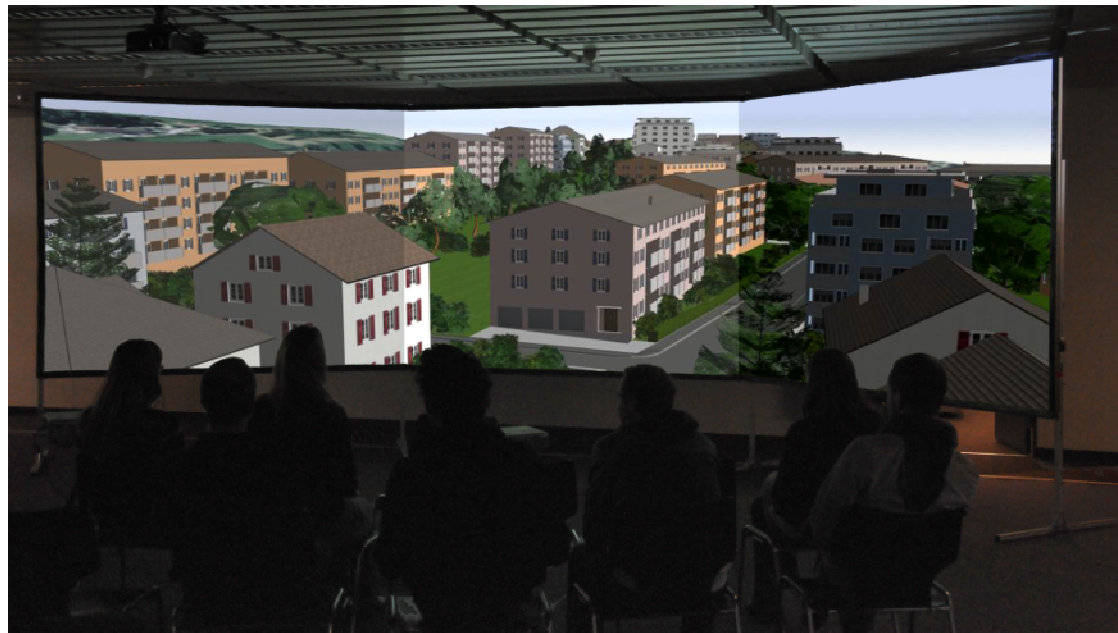


Source: Google StreetView



# New Approach in Participatory Planning Processes

- GIS- and rule-based
  - interactive modeling
  - visualization tools
- objective and subjective assessment of landscape's provision of identification functions



Source: Thomas M. Klein

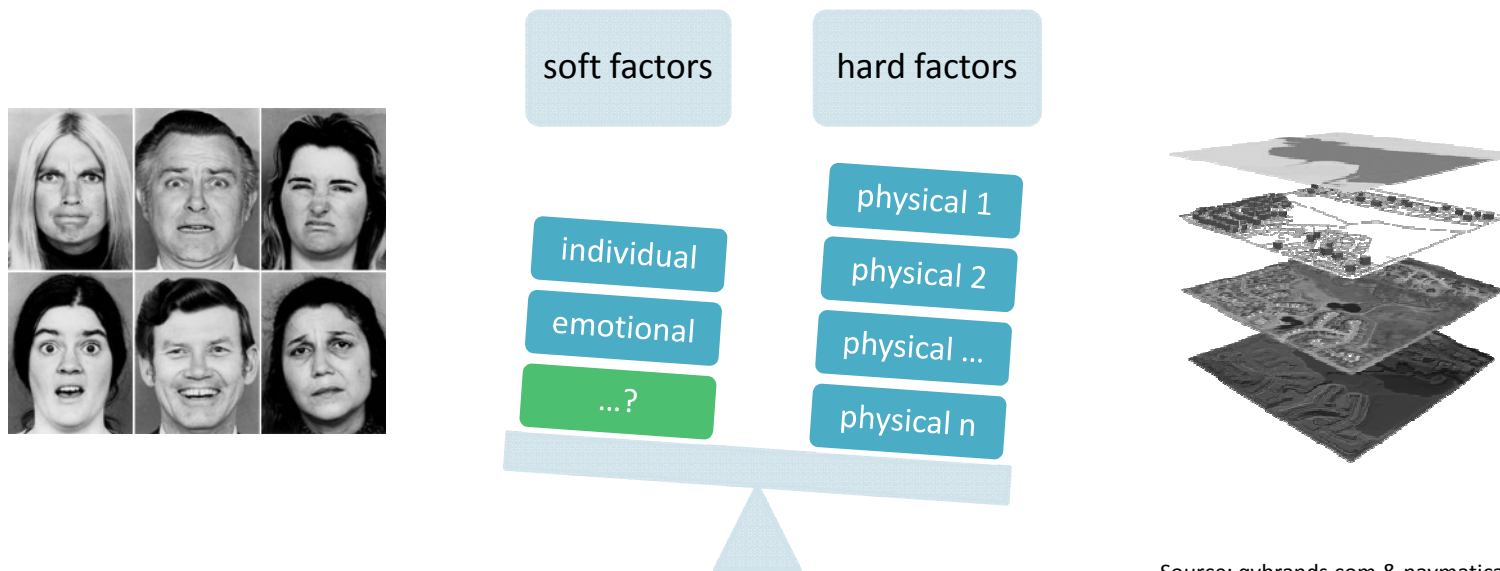
# Important Factors

- Urban quality
  - sense of place
  - people's place attachment

→ “the positive emotional bonds that develop between individuals and their environment”, (Brown & Raymond 2007: 89)
- Impact factors on urban quality
  - Increasing floor area ratios in land use plans
  - Amount of recreation offers (green spaces)
  - Connectivity of foot and bike paths
  - Relationship between social aspects

# Significance of Relationship

- Significance of relationships between soft and hard factors are important
- Emphases of individual and emotional indicators (soft factors) unknown
- Subjective perception contributes to individual place identity



Source: qvbrands.com & navmatica.com



# Perceiving Landscapes: Three-component View



Source: Thomas M. Klein

# Requirements for new tools

- Visual impacts indicated by observers' expressions  
→ observers preference or judgments/ratings of visual aesthetic quality

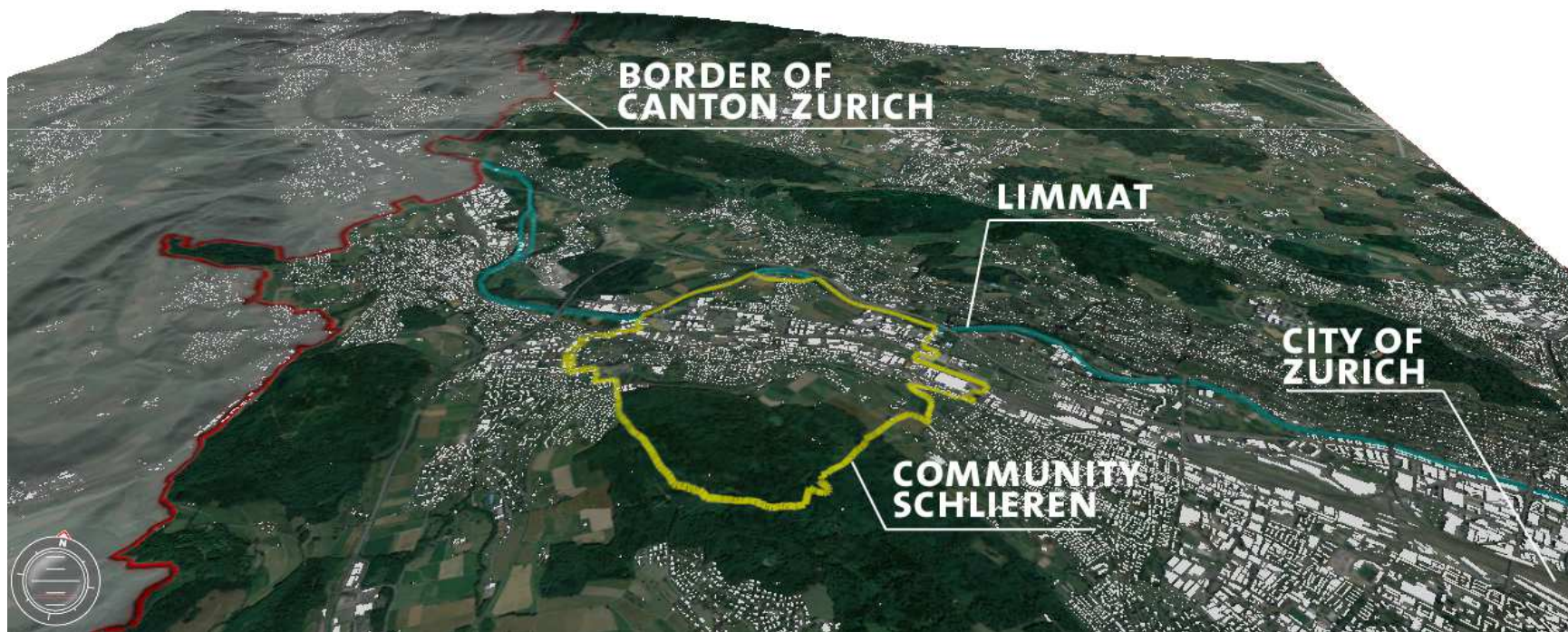


Source: Thomas M. Klein



# Case Study Area

- Community of Schlieren
  - 6,38 sqkm, population of 16.100 → 2.462 inhabitants/sqkm
  - Since 1960s population increased up to 10.000 (2010)
  - Annual growth of 800 people (4.000 last seven years)
  - living space for 2.500 inhabitants is planned



Source: Thomas M. Klein



# Case Study Area

- Schlieren: living space for only 2.500 people is planned

→ Area is ideal for analyzing different possible future situations and development strategies in order to cope with the development pressure.



Source: Thomas M. Klein



# Methods



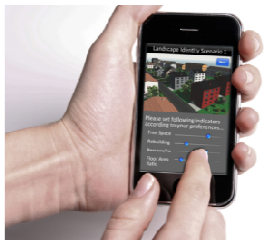
- Participatory approach



- 3D visualizations



- New and innovative data acquisition



- An interactive approach

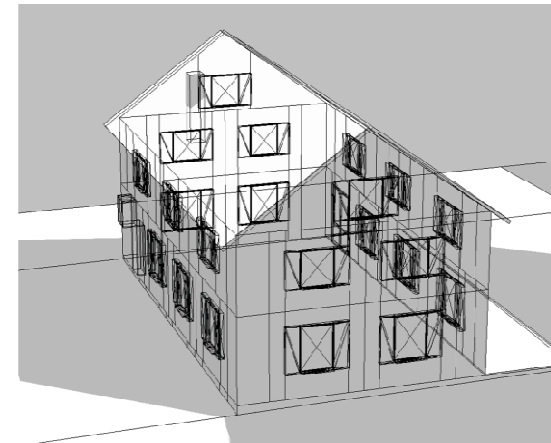
# Implementing TLS and UAV

- → highly accurate models
- → up to date elevation/surface models and aerial images



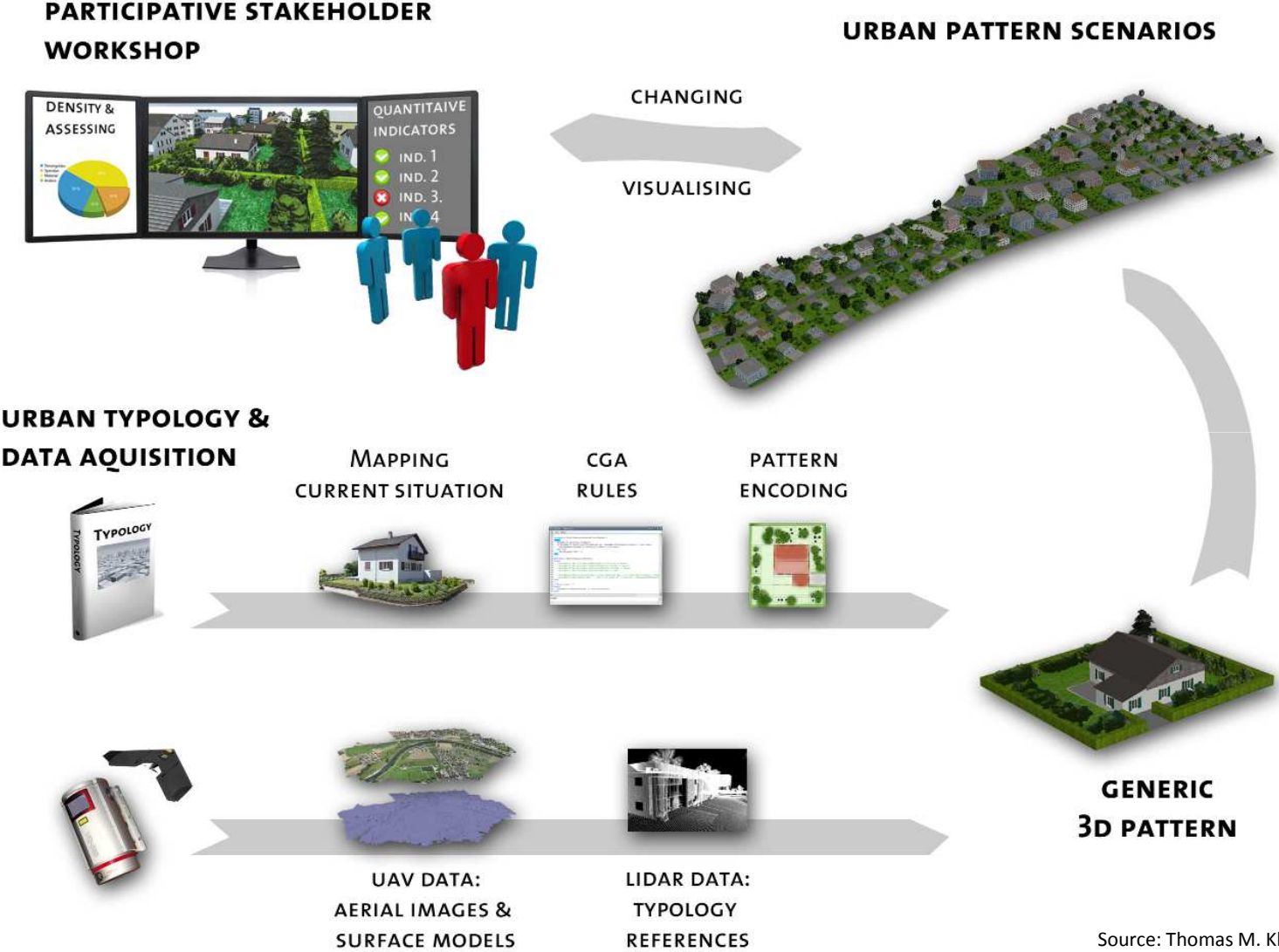
# Procedural, rule-based visualization

- Automatic CGA rule processing
- → reconstruction of buildings by detection tools
- → new flexibility in generating larger CGA sets
- → more detailed scenarios



Source: Thomas M. Klein

# Framework for assessing urban density and identity



Source: Thomas M. Klein



# Pre-Test Results

- Scenarios Schlieren 2030 – “Character City”



▼ Rule Parameters			
Name	Source	Value	
<i>Detailgrad</i>	User	0	0 <input type="range"/> 1
<i>Gebaeude_Grund_Flaeche</i>	?	?	
<i>Gebaeude_Hoehe_mit_Dach</i>	?	?	
Gebaeudetyp	Rule	7	0 <input type="range"/> 10
Infrastrukturkosten_Freihaltezone	Rule	0	0 <input type="range"/> 1
Infrastrukturkosten_pro_Einwohner_EFH	Rule	2084	0 <input type="range"/> 1000
Infrastrukturkosten_pro_Einwohner_MFH	Rule	1248	0 <input type="range"/> 1000
Infrastrukturkosten_Tankstelle	Rule	2084	0 <input type="range"/> 1000
Unterhaltskosten_Baum	Rule	5.560000	0 <input type="range"/> 10
Unterhaltskosten_Baum_Freihaltezone	Rule	5.560000	0 <input type="range"/> 10
Unterhaltskosten_Hecke	Rule	1.480000	0 <input type="range"/> 10
Unterhaltskosten_Rasen	Rule	1.480000	0 <input type="range"/> 10
Unterhaltskosten_Strauch	Rule	3.710000	0 <input type="range"/> 10
Unterhaltskosten_Strauch_Freihaltezone	Rule	3.710000	0 <input type="range"/> 10
Wohnflaeche_pro_Person_EFH	Rule	53	0 <input type="range"/> 100
<i>Wohnflaeche_pro_Person_M</i>	?	?	
<i>Zuweisung_Typologie_Blau</i>	Gebäudetyp	?	
<i>Zuweisung_Typologie_Gruen</i>	Gebäudetyp	?	
<i>Zuweisung_Typologie_Rot</i>	Gebäudetyp	?	

▼ Reports		
Report		Sum
1) Mass der Verdichtung:	Anzahl Einwohner im Quartier [Personen]	1190.98
1) Mass der Verdichtung:	Siedlungsdichte [Personen/ha]	81.09
2) Naherholung und Versickerung:	Grünflächen im Quartier [m2]	71869.03
2) Naherholung und Versickerung:	Grünflächenanteil (am Gesamtgebiet) [%]	47.50
3) Kosten:	Infrastrukturkosten [CHF/Jahr]	1580389.39
3) Kosten:	Unterhaltskosten Grünraum [CHF]	124171.17
4) Biodiversität (Vogelvielfalt):	Baumbestand [Anzahl Bäume]	260.00

Source: Thomas M. Klein

# Pre-Test Results

- Scenarios Schlieren 2030 – “Smart City”




▼ Rule Parameters			
Name	Source	Value	
Betrachtungsjahr	Rule	2030	0 [Slider] 1000
<b>Detailgrad</b>	<b>User</b>	<b>0</b>	0 [Slider] 1
Erneuerungswahrscheinlichkeit_bis_2030	Rule	0	0 [Slider] 1
<b>Gebaeude_Grund_Flaeche</b>	<b>Gebäudegrun...</b>	<b>?</b>	
<b>Gebaeude_Hoehe_mit_Dach</b>	<b>Gebäudehöhe</b>	<b>?</b>	
Gebauedetyp	Rule	4	0 [Slider] 10
Hochhaus	Rule	100	0 [Slider] 100
Infrastrukturkosten_Freihaltezone	Rule	0	0 [Slider] 1
Infrastrukturkosten_pro_Einwohner_EFH	Rule	2084	0 [Slider] 1000
Infrastrukturkosten_pro_Einwohner_HH	Rule	798	0 [Slider] 1000
Infrastrukturkosten_pro_Einwohner_MFH	Rule	1248	0 [Slider] 1000
Infrastrukturkosten_Tankstelle	Rule	2084	0 [Slider] 1000
Neubaurate	Rule	1.500000	0 [Slider] 10
Parzellenflaeche	Rule	2013.820000	0 [Slider] 1000
Unterhaltskosten_Baum	Rule	5.650000	0 [Slider] 10
Unterhaltskosten_Baum_Freihaltezone	Rule	5.650000	0 [Slider] 10
Wohnflaeche_pro_Person_EFH	Rule	53	0 [Slider] 100
Wohnflaeche_pro_Person_M	Rule	45	0 [Slider] 100
<b>Zuweisung_Hochhaus</b>	<b>Hochhausvork...</b>	<b>?</b>	
▼ Reports			
Report			Sum
1) Mass der Verdichtung:	Anzahl Einwohner im Quartier [Personen]		1448.55
1) Mass der Verdichtung:	Siedlungsdichte [Personen/ha]		96.92
2) Naherholung und Versickerung:	Grünflächen im Quartier [m2]		79390.88
2) Naherholung und Versickerung:	Grünflächenanteil (am Gesamtgebiet) [%]		52.47
3) Kosten:	Infrastrukturkosten [CHF/Jahr]		1781659.76
3) Kosten:	Unterhaltskosten Grünraum [CHF]		128425.71
4) Biodiversität (Vogelvielfalt):	Baumbestand [Anzahl Bäume]		313.00

Source: Thomas M. Klein



# Pre-Test Results

- Scenarios Schlieren 2030 – “Pure Dynamic”



▼ Rule Parameters			
Name	Source	Value	
Betrachtungsjahr	Rule	2030	0 <input type="range"/> 1000
<b>Detailgrad</b>	<b>User</b>	<b>0</b>	0 <input type="range"/> 1
Erneuerungswahrscheinlichkeit_bis_2030	Rule	1	0 <input type="range"/> 1
<b>Gebaeude_Grund_Flaeche</b>	<b>Gebäudegrun...</b>	<b>?</b>	
<b>Gebaeude_Hoeh_e_mit_Dach</b>	<b>Gebäudehöhe</b>	<b>?</b>	
Gebaeudetyp	Rule	7	0 <input type="range"/> 10
Infrastrukturkosten_Freihaltezone	Rule	0	0 <input type="range"/> 1
Infrastrukturkosten_pro_Einwohner_EFH	Rule	2084	0 <input type="range"/> 1000
Infrastrukturkosten_pro_Einwohner_MFH	Rule	1248	0 <input type="range"/> 1000
Infrastrukturkosten_Tankstelle	Rule	2084	0 <input type="range"/> 1000
Neubaurate	Rule	10	0 <input type="range"/> 10
Parzellenflaeche	Rule	6	0 <input type="range"/> 10
Unterhaltskosten_Baum	Rule	5.650000	0 <input type="range"/> 10
Unterhaltskosten_Baum_Freihaltezone	Rule	5.650000	0 <input type="range"/> 10
Unterhaltskosten_Hecke	Rule	1.480000	0 <input type="range"/> 10
Unterhaltskosten_Rasen	Rule	1.480000	0 <input type="range"/> 10
Unterhaltskosten_Strauch	Rule	3.710000	0 <input type="range"/> 10
Unterhaltskosten_Strauch_Freihaltezone	Rule	3.710000	0 <input type="range"/> 10
<b>Zweisung_Ausnutzungsziffer_Alt_Lokal</b>	<b>Dichte Ist-Zus...</b>	<b>?</b>	
▼ Reports			
Report			Sum
1) Mass der Verdichtung:	Anzahl Einwohner im Quartier [Personen]		1346.99
1) Mass der Verdichtung:	Siedlungsdichte [Personen/ha]		91.98
2) Naherholung und Versickerung:	Grünflächen im Quartier [m2]		67710.91
2) Naherholung und Versickerung:	Grünflächenanteil (am Gesamtgebiet) [%]		44.75
3) Kosten:	Infrastrukturkosten [CHF/Jahr]		1774304.87
3) Kosten:	Unterhaltskosten Grünraum [CHF]		118261.78
4) Biodiversität (Vogelvielfalt):	Baumbestand [Anzahl Bäume]		219.00

Source: Thomas M. Klein

# Pre-Test Results

- Scenarios Schlieren 2030 – “Charming Valley”



▼ Rule Parameters			
Name	Source	Value	
Ausnutzungsziffer	Rule	0.600000	0 <input type="range"/> 1
Ausnutzungsziffer_Differenz_alt	Rule	0.500000	0 <input type="range"/> 1
Ausnutzungsziffer_Alt	Rule	0.500000	0 <input type="range"/> 1
Ausnutzungsziffer_Lokal	Rule	0.100000	0.0 <input type="range"/> 0.1
Betrachtungsjahr	Rule	2030	0 <input type="range"/> 1000
<b>Detailgrad</b>	<b>User</b>	<b>0</b>	0 <input type="range"/> 1
Erneuerungswahrscheinlichkeit_bis_2030	Rule	0	0 <input type="range"/> 1
<b>Gebäude_Grund_Flaeche</b>	<b>Gebäudegrun...</b>	<b>?</b>	
<b>Gebäude_Hoehe_mit_Dach</b>	<b>Gebäudehöhe</b>	<b>?</b>	
Gebaedetyp	Rule	7	0 <input type="range"/> 10
Infrastrukturkosten_Freihaltezone	Rule	0	0 <input type="range"/> 1
Infrastrukturkosten_pro_Einwohner_EFH	Rule	2084	0 <input type="range"/> 1000
Infrastrukturkosten_pro_Einwohner_MFH	Rule	1248	0 <input type="range"/> 1000
Infrastrukturkosten_Tankstelle	Rule	2084	0 <input type="range"/> 1000
Neubaurate	Rule	1.500000	0 <input type="range"/> 10
Parzellenflaeche	Rule	6	0 <input type="range"/> 10
Unterhaltskosten_Baum	Rule	5.650000	0 <input type="range"/> 10
Unterhaltskosten_Baum_Freihaltezone	Rule	5.650000	0 <input type="range"/> 10
Unterhaltskosten_Hecke	Rule	1.480000	0 <input type="range"/> 10

▼ Reports		
Report		Sum
1) Mass der Verdichtung:	Anzahl Einwohner im Quartier [Personen]	1279.56
1) Mass der Verdichtung:	Siedlungsdichte [Personen/ha]	86.55
2) Naherholung und Versickerung:	Grünflächen im Quartier [m2]	73841.16
2) Naherholung und Versickerung:	Grünflächenanteil (am Gesamtgebiet) [%]	48.80
3) Kosten:	Infrastrukturkosten [CHF/Jahr]	1653420.47
3) Kosten:	Unterhaltskosten Grünraum [CHF]	130744.24
4) Biodiversität (Vogelvielfalt):	Baumbestand [Anzahl Bäume]	259.00

Source: Thomas M. Klein



# Pre-Test Results

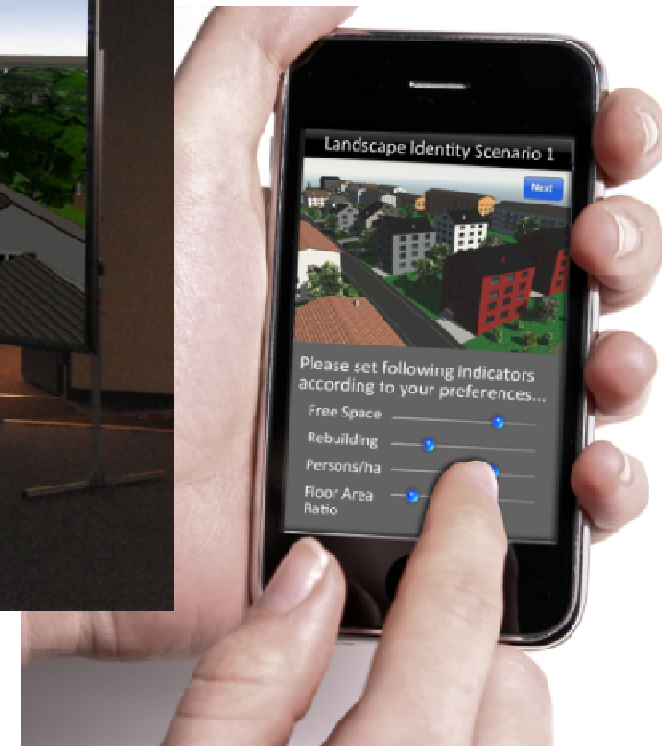
- Quite good acceptance of interactive modeling
- → interactive modeling helps to understand presented scenarios
- → understand coherence with indicators
- → flexible camera position

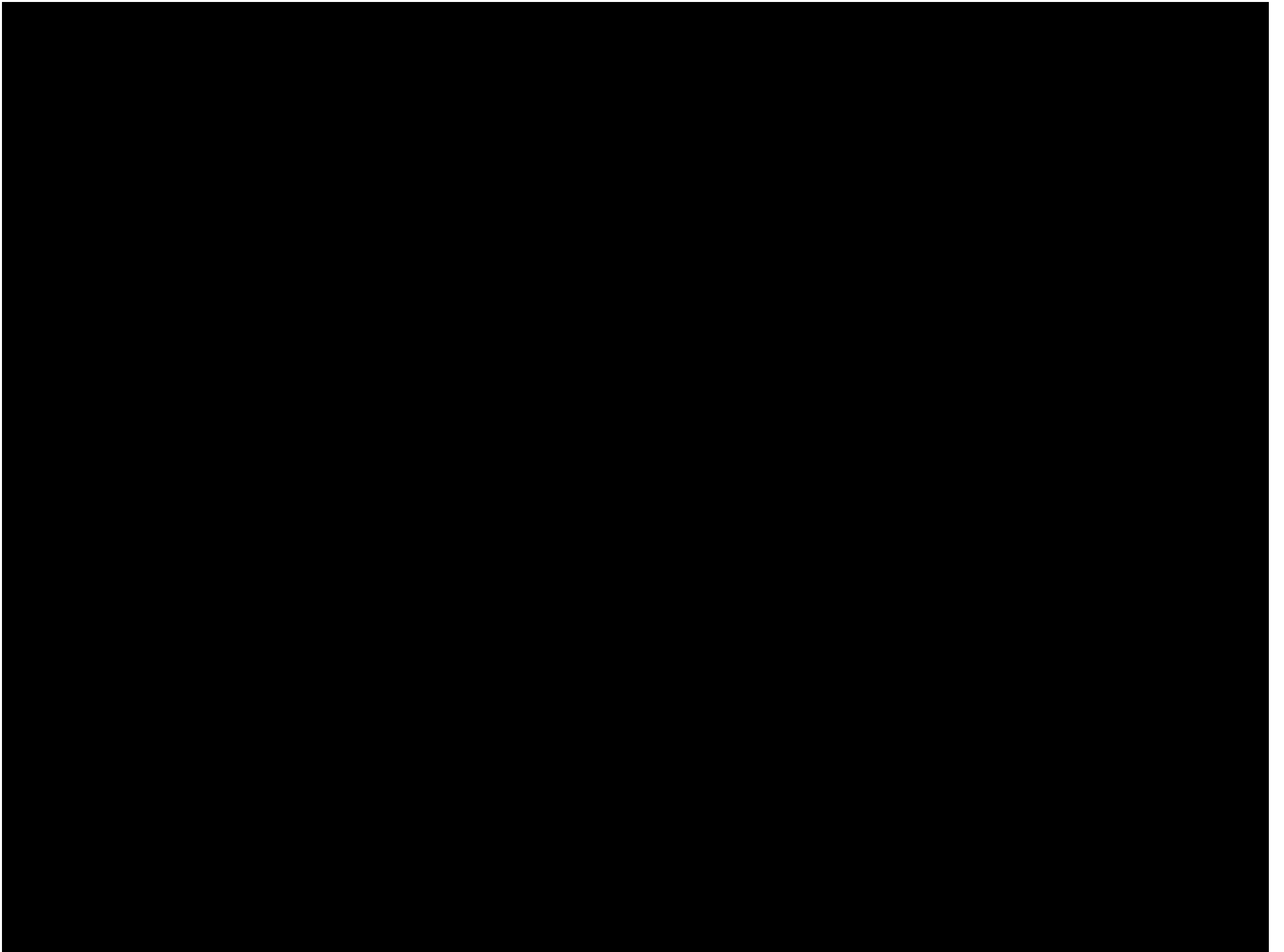


Source: Thomas M. Klein

# Conclusion & Outlook

→ Current technical possibilities offer multiple options for an operationalization of qualitative factors like landscape aesthetics and identity







# CGA-Rule & Patterns



Attributes  
& Objects



Parcel  
Structure



Object  
Distribution

```
attr treedist = rand (6,10)
soil = "#CCFF99"
[more attributes...]
```

```
# Tilia cordata (Lime) --- popular street tree
tilia = "tilia.obj"
tilia_height = rand(20,35) # height
tilia_width = rand(6,15) # crown width
tilia_crown = tilia_width*tilia_width
[more objects...]
```

Lot -->

```
alignScopeToAxes()
split (z) {dist : garden(ext)
          ~0.5 : part|
          dist : garden(ext)}
```

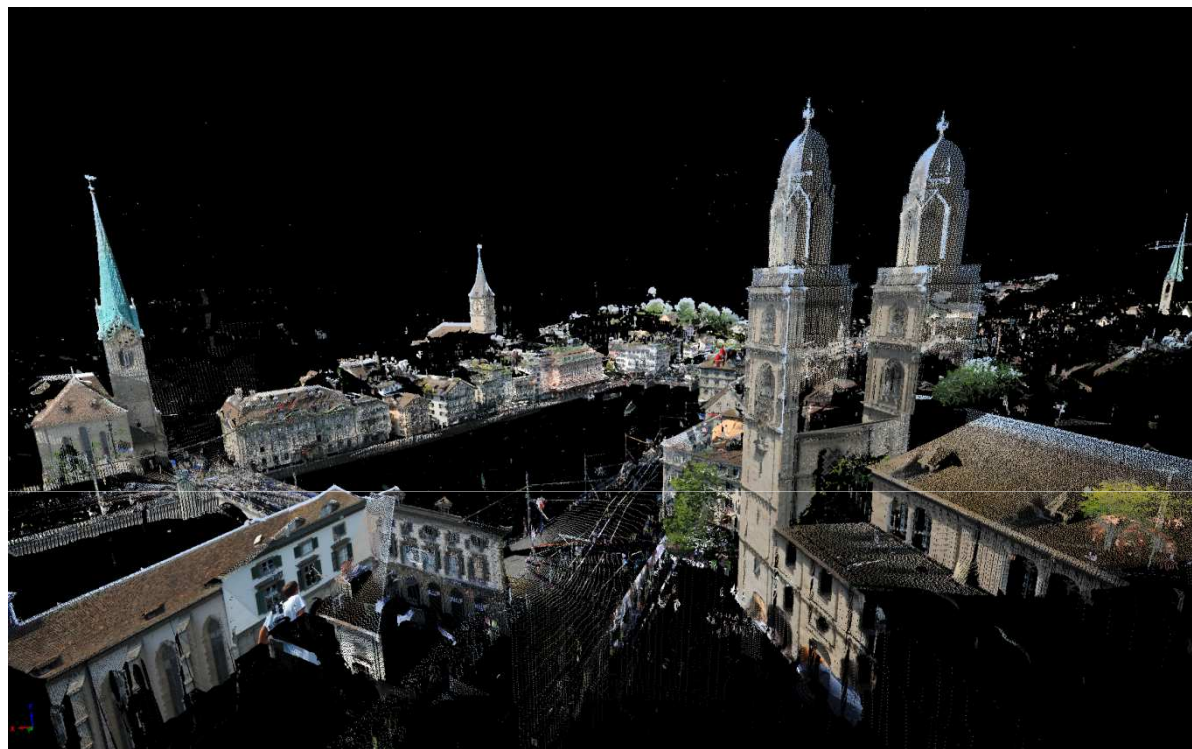
[...]

Tree(tr) -->

```
30%: [other species -> Syringa -- Lilac, scrub]
30%: t(tr*rand(tilia_height/4,
tilia_height/3),0, treedist/2+rand(-1,1))
s(0, tilia_height,0)
r(0,rand(0,90),0)
i(tilia)
report("Lime Tree", 1)
report("Shadow", tilia_crown)
```

else: NIL

# Data Acquisition: TLS





# Data Acquisition: UAV

