

Anpassung von Entwässerungssystemen an Urbanisierung und Klimawandel

C. Urich , R. Sitzenfrei, M. Kleidorfer, W. Rauch



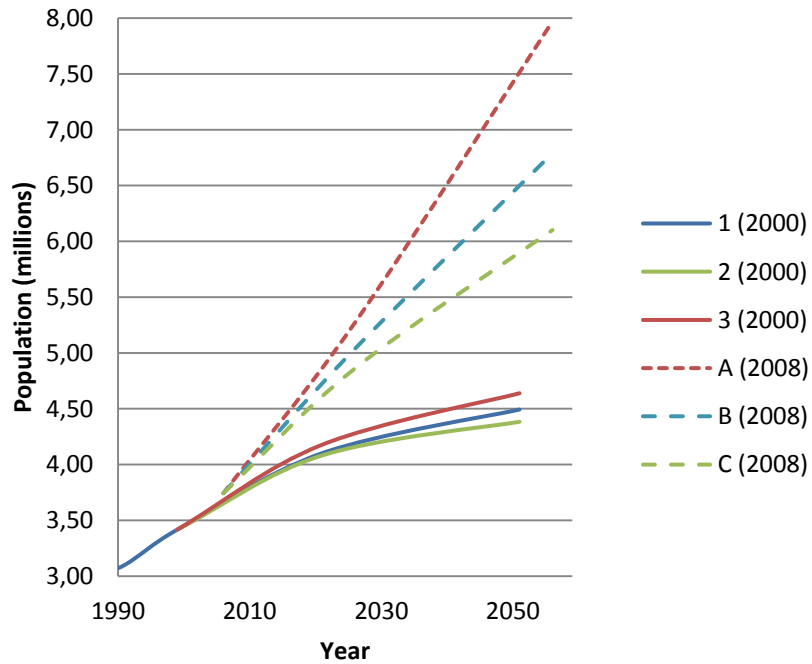
Melbourne 2010



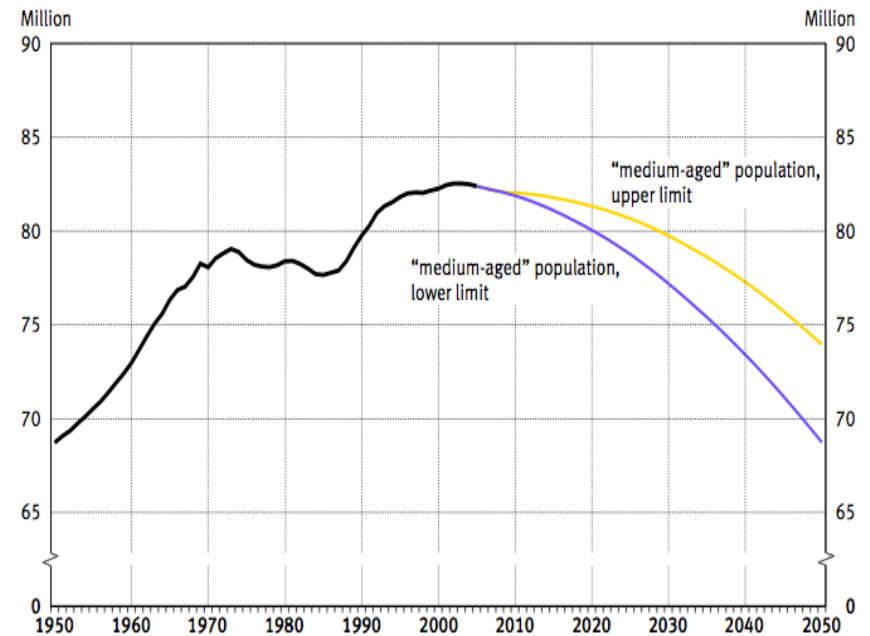
Melbourne 2010

Bevölkerungsentwicklung

Melbourne



Deutschland

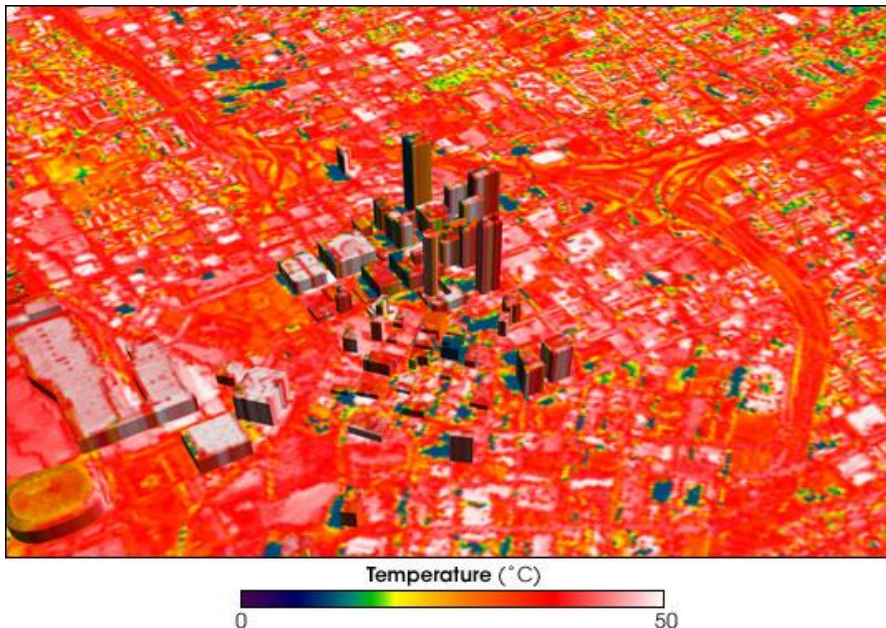


Soziale Veränderungen

Städte werden zu Ökosystemdienstleistern

- Gesteigerte Lebensqualität
- intakte Umwelt und Erholungsräume innerhalb der Stadt
- ...

Wärmeinseln



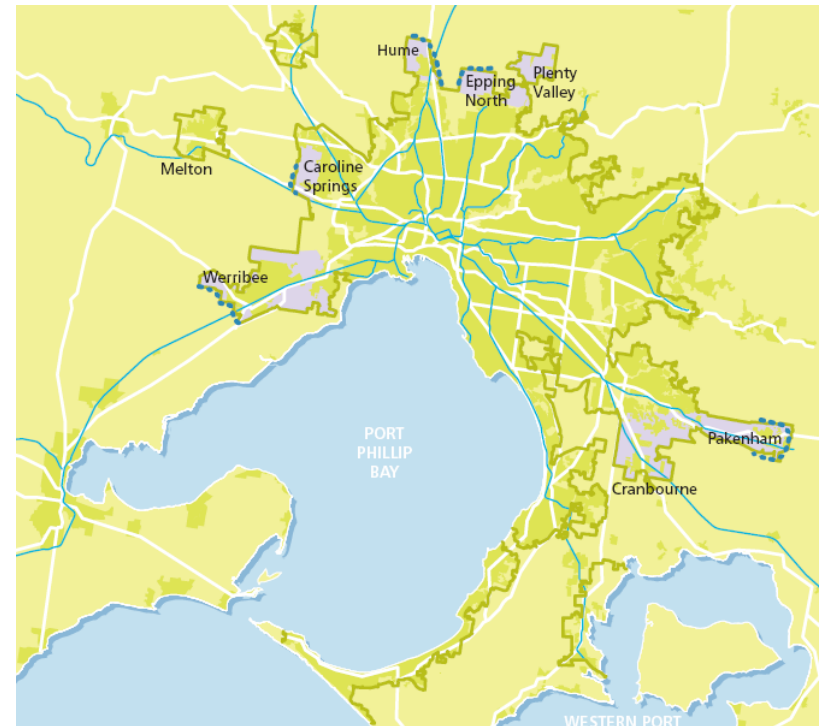
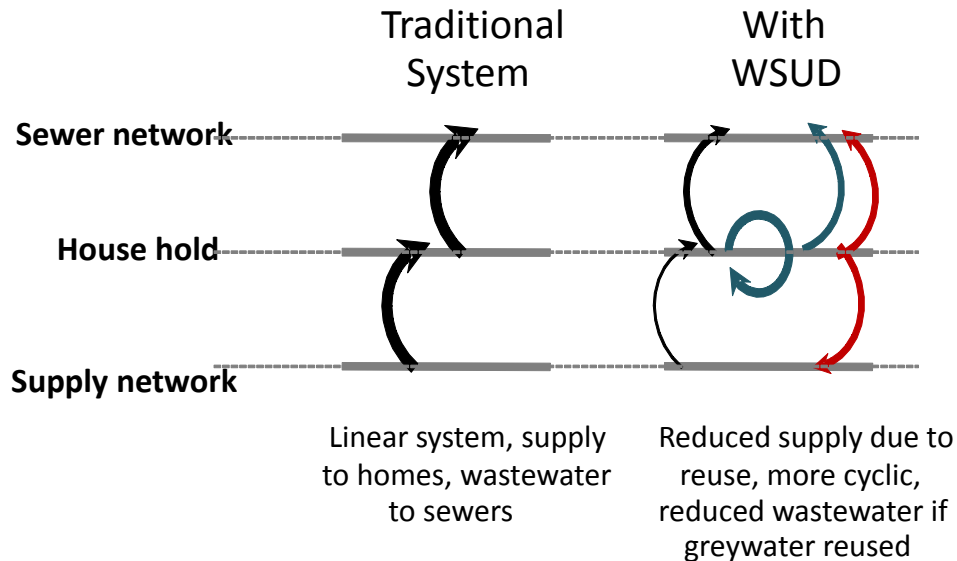
Source: <http://earthobservatory.nasa.gov/Features/GreenRoof/>



Source: <http://www.cityofsydney.nsw.gov.au>

Dezentrale Technologien

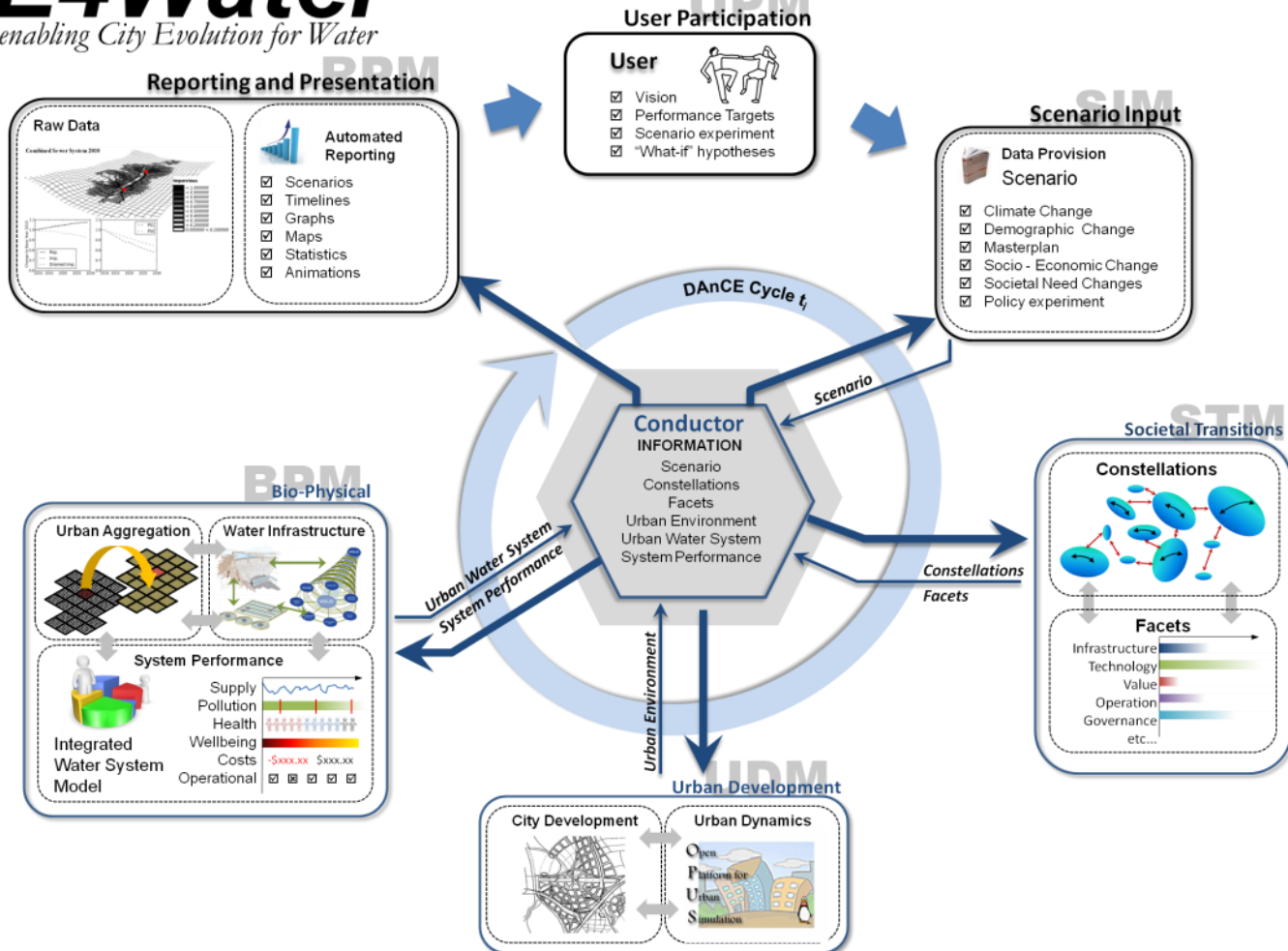
Komplexe Interaktionen auf Stadtebene



- Conventional flow
- Reuse flow
- Negative feedback

DAnCE4Water

Dynamic Adaptation for enabling City Evolution for Water



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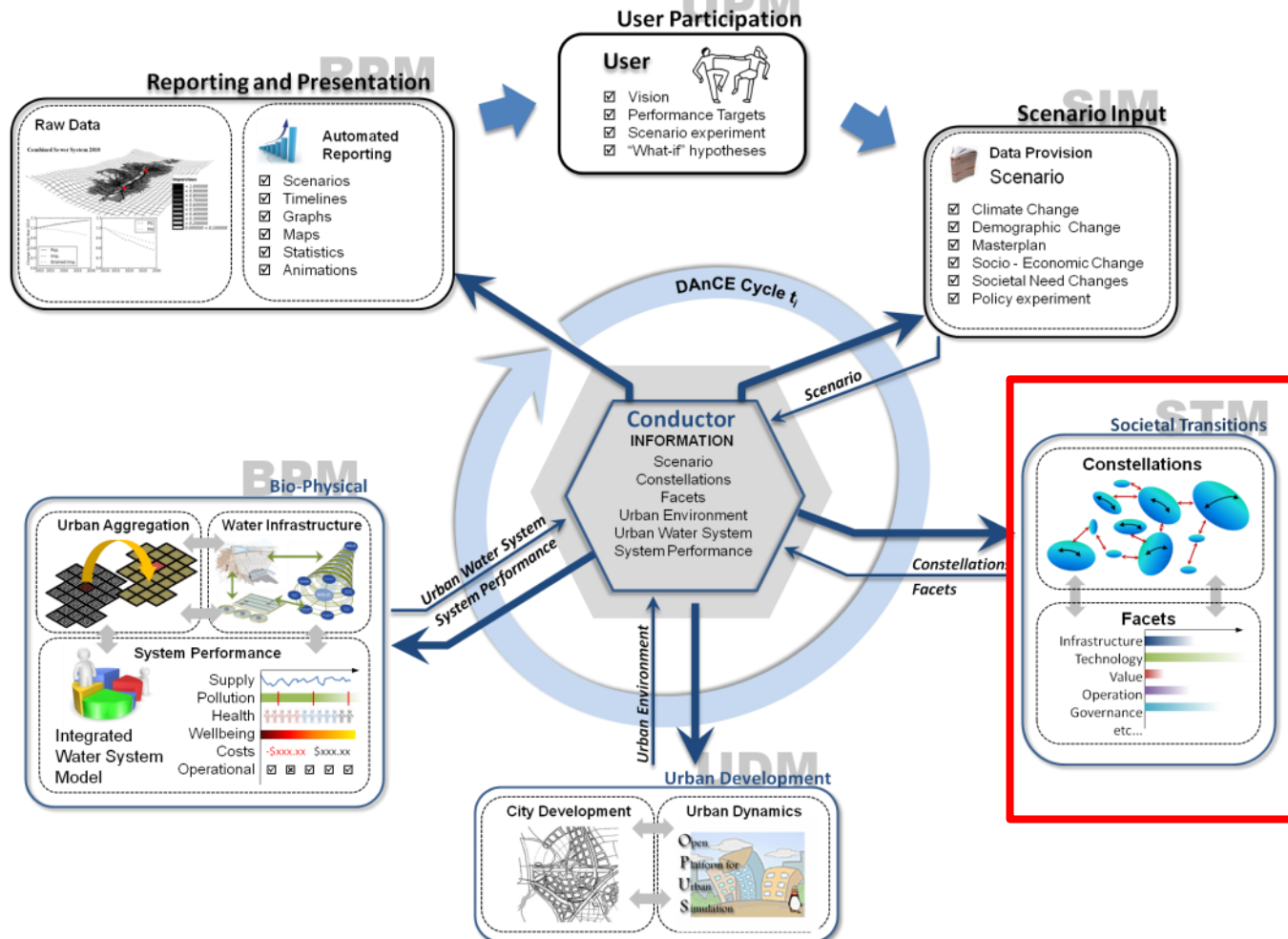
2050

Melbourne ~~2010~~

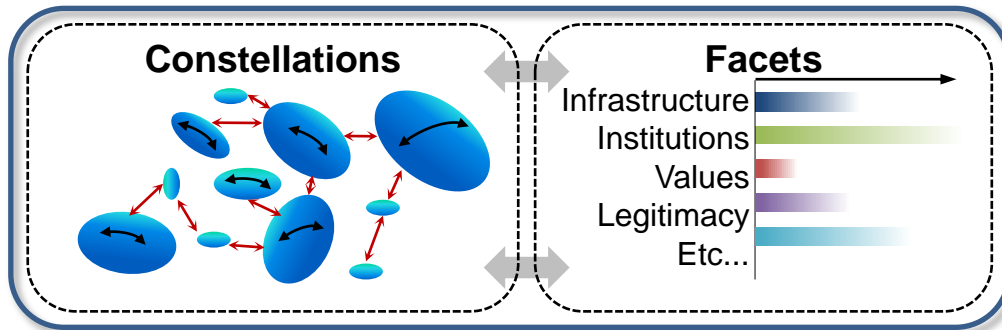


Melbourne 2010

1. Societal Transitions Module



1. Societal Transitions Module



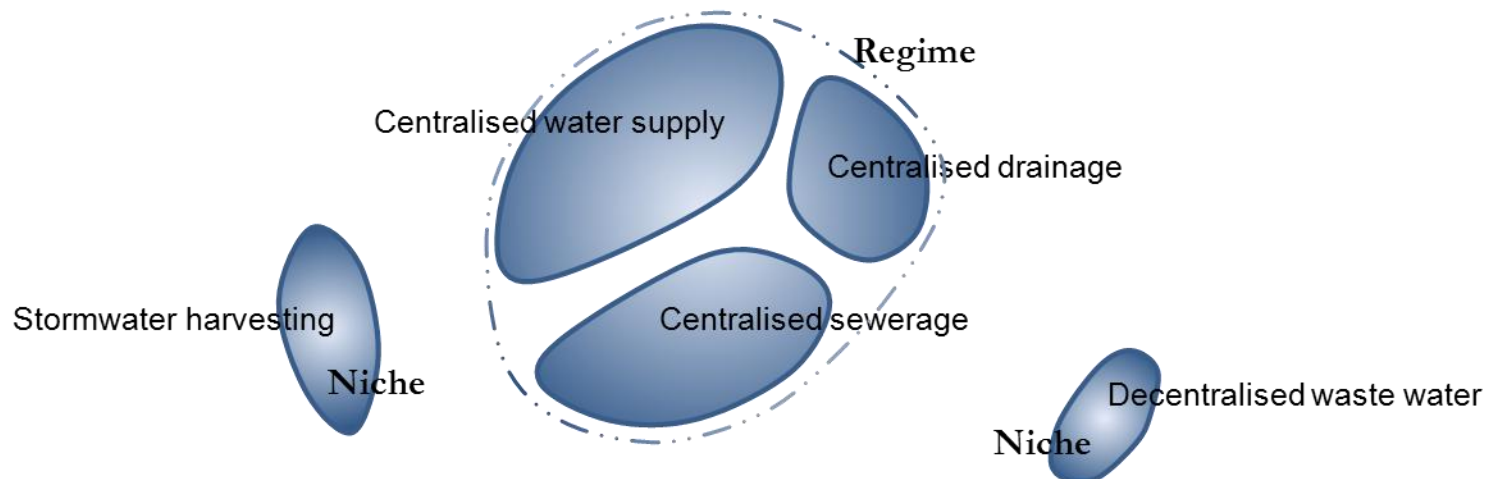
Modellierung der sozio-technischen Zusammenhänge unterschiedlicher Dienstleister und Technologieanbieter im Bereich Siedlungswasserwirtschaft

1. Societal Transitions Module



Societal Landscape

- Political climate
- e.g. • Economic constraints
- Environmental influences

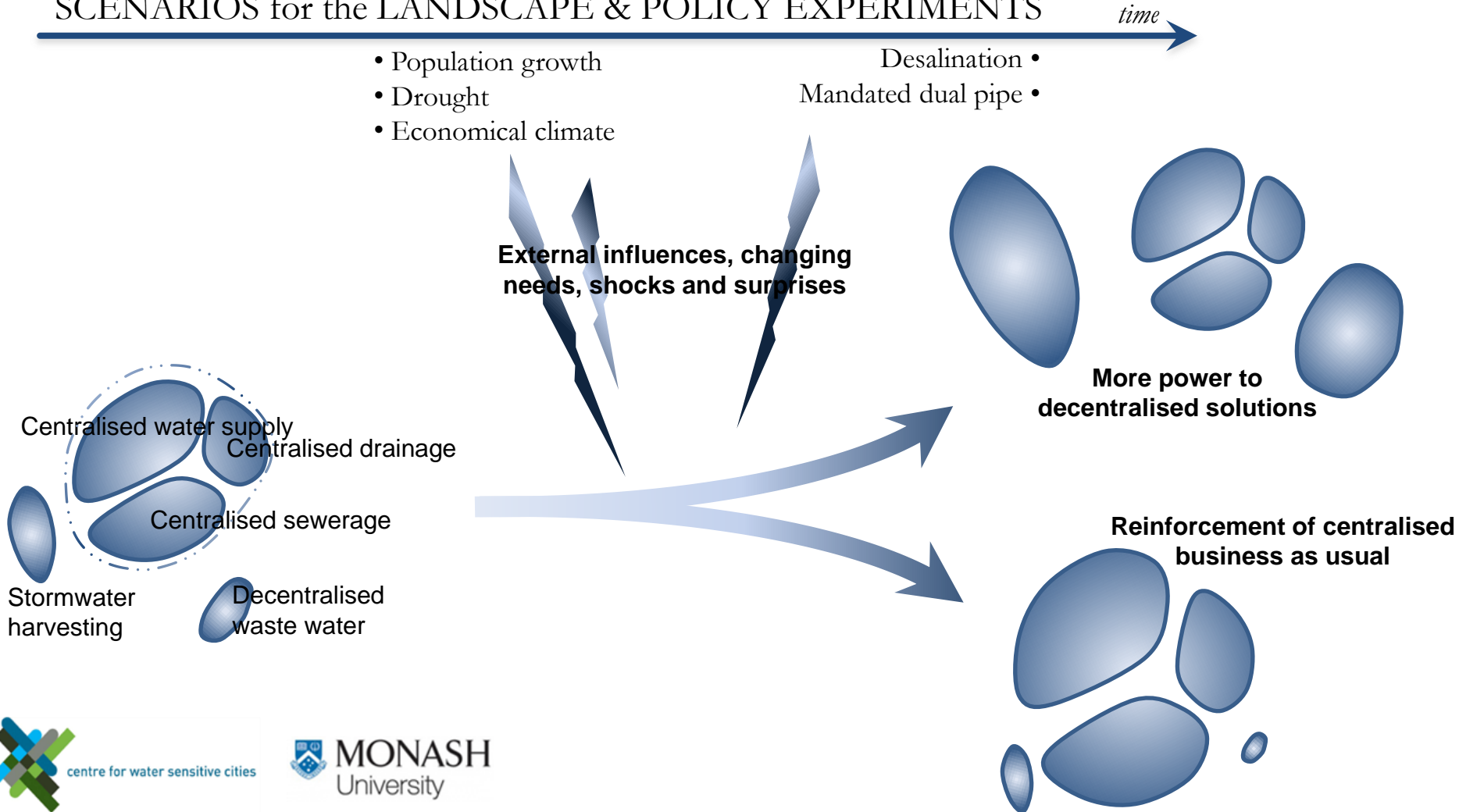


- Drinking water
- e.g. • Ecological health
- Intergenerational equity

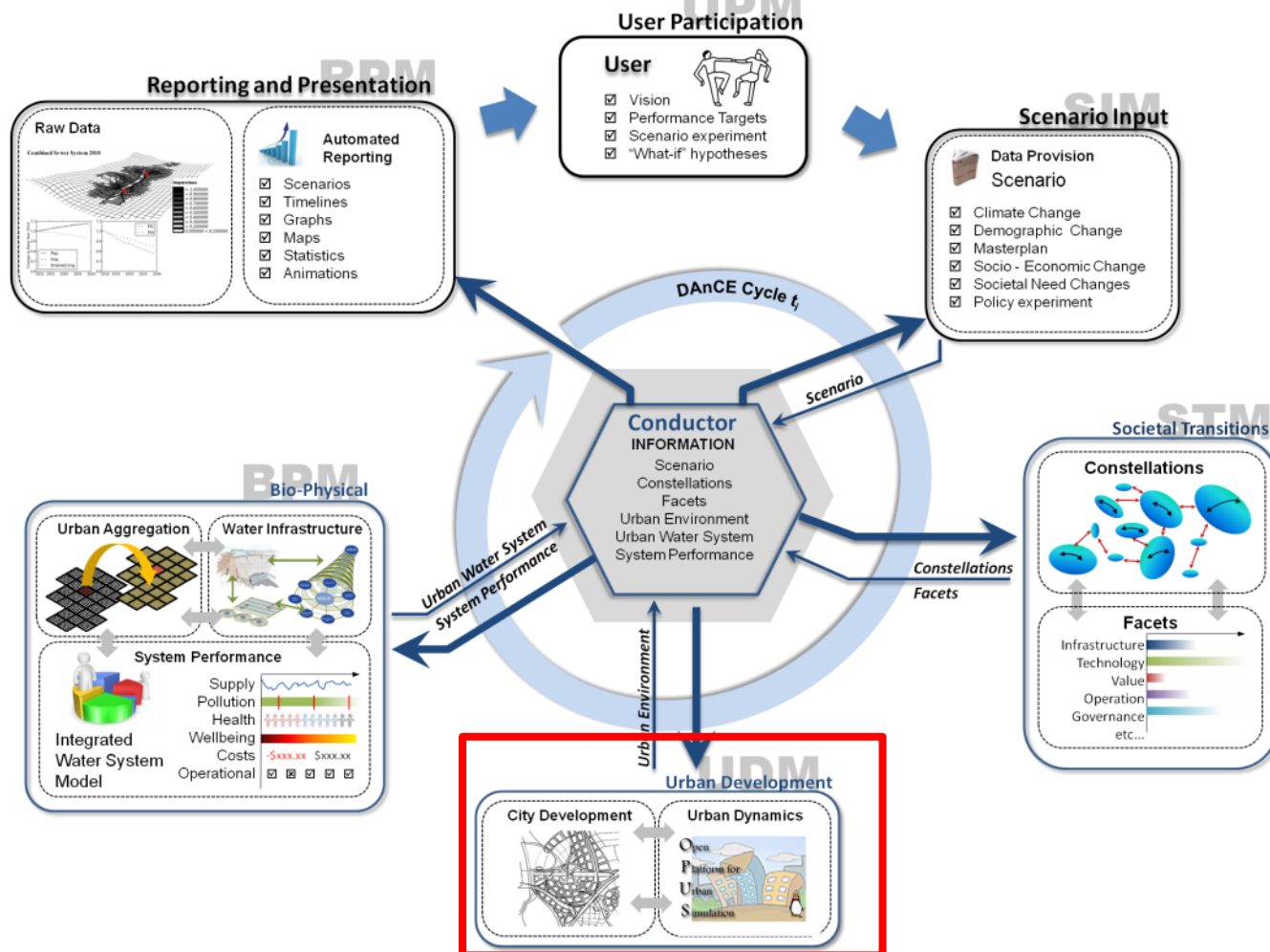
Societal Needs

1. Societal Transitions Module

SCENARIOS for the LANDSCAPE & POLICY EXPERIMENTS



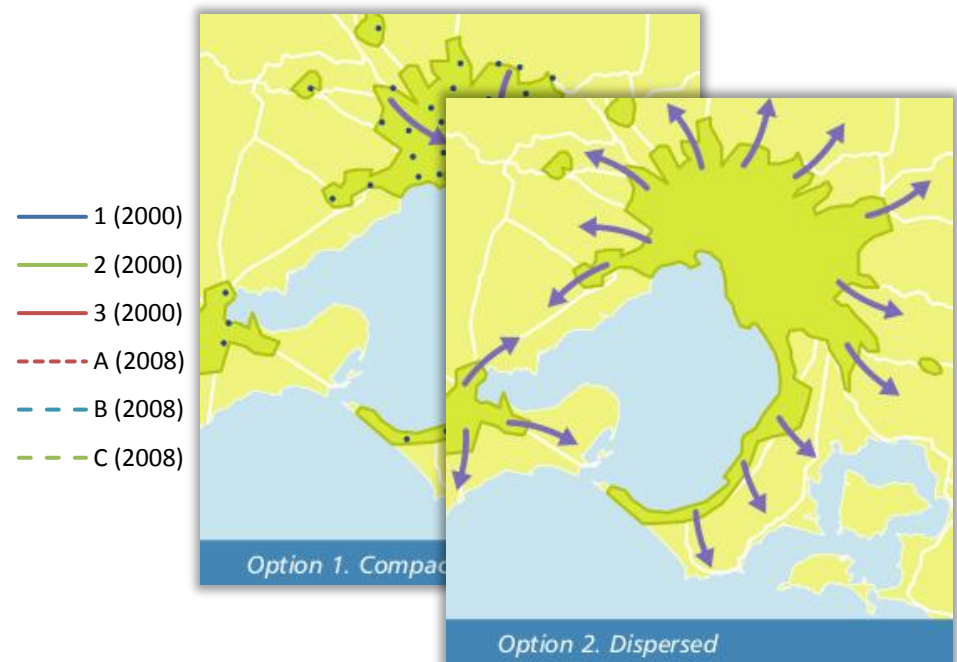
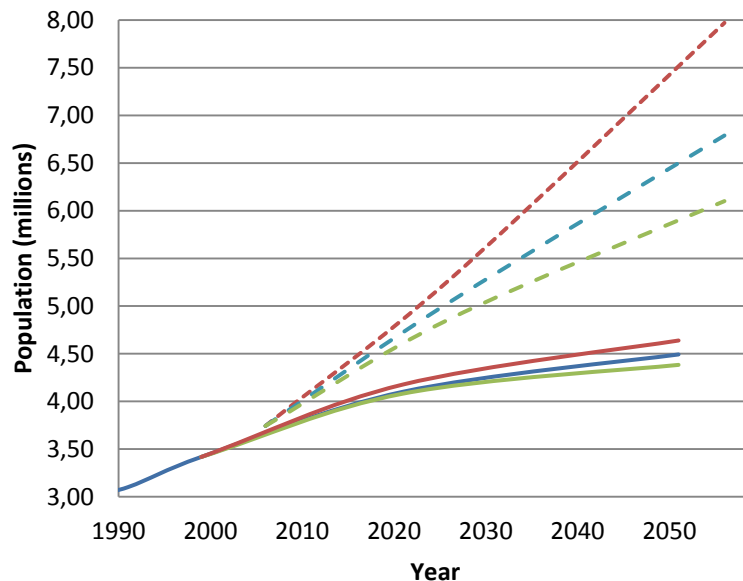
2. Urban Development Module



2. Urban Development Module

Aufgabe:

- Räumliche Entwicklung der Stadt in einem jährlichen Zeitschritt

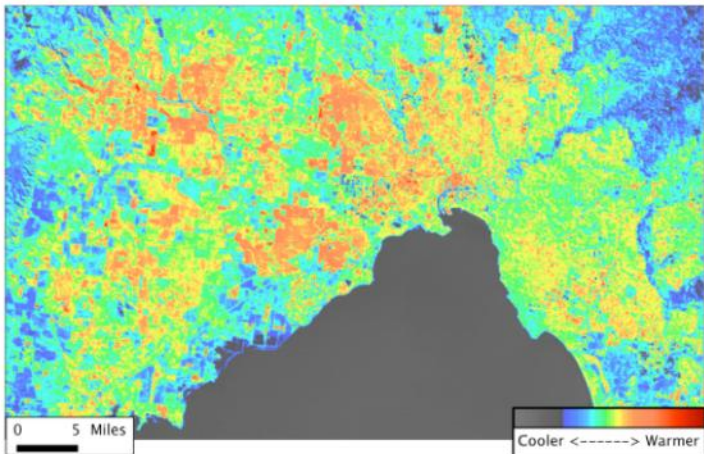


2. Urban Development Module

- Räumliche Entwicklung der Stadt in einem jährlichen Zeitschritt
- Interaktion Wasserinfrastruktur - Stadt

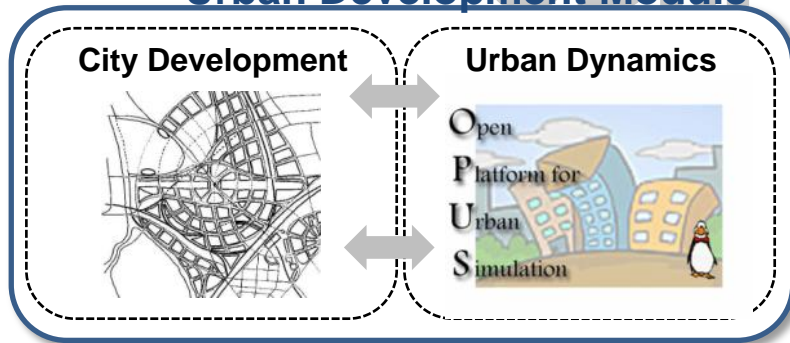


Landsat of Melbourne, Australia on October 24, 2010 : Thermal Band-6



2. Urban Development Module

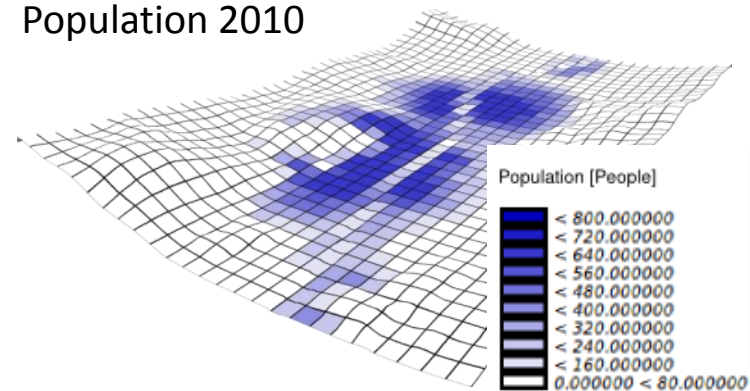
Urban Development Module



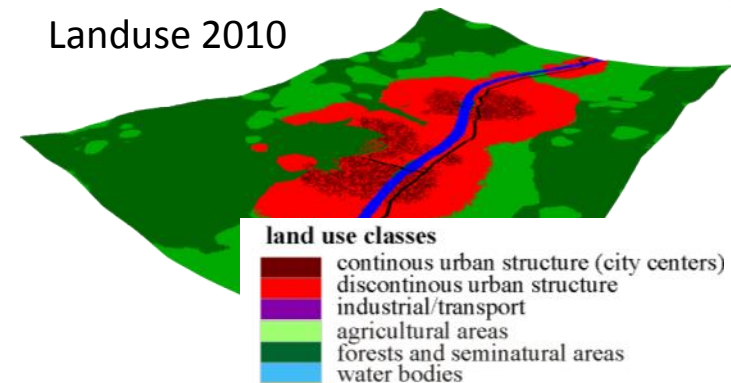
UrbanSim:

- Modelliert die Interaktion von Schlüsselakteure (Haushalte, Gewerbe, Bauträger ...) in einer Stadt.
- Die Modellierung erfolgt mithilfe unterschiedlicher Komponenten die das Verhalten der einzelnen Akteure (Agenten) abbilden
- Weit verbreitetes und getestetes Modell

Population 2010



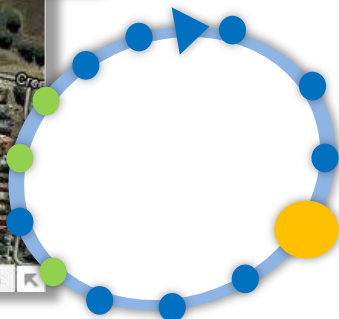
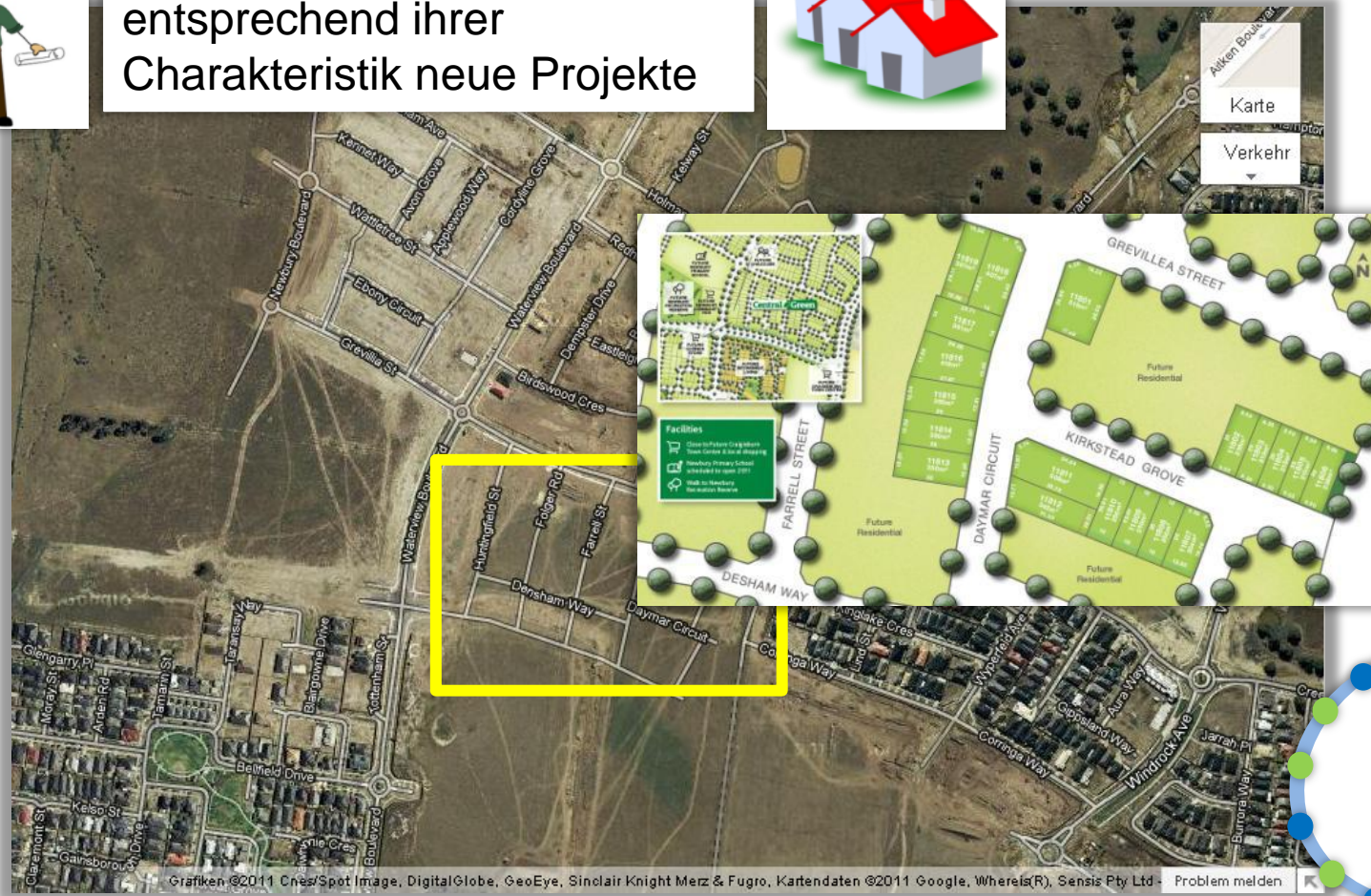
Landuse 2010



2. Urban Development Module



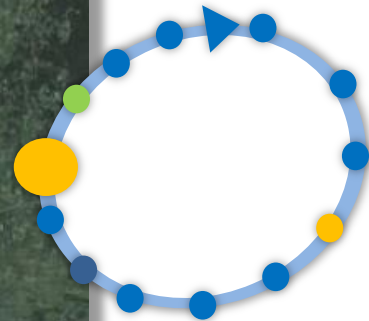
Bauträger entwickeln
entsprechend ihrer
Charakteristik neue Projekte



2. Urban Development Module



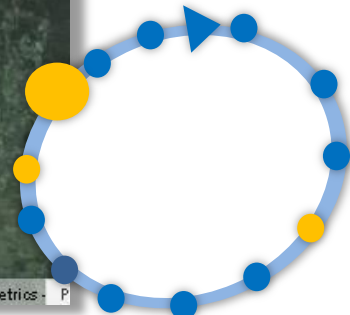
Entspricht die derzeitige Wohnsituation des Haushalts nicht mehr den Anforderungen verlassen sie die Umgebung



2. Urban Development Module

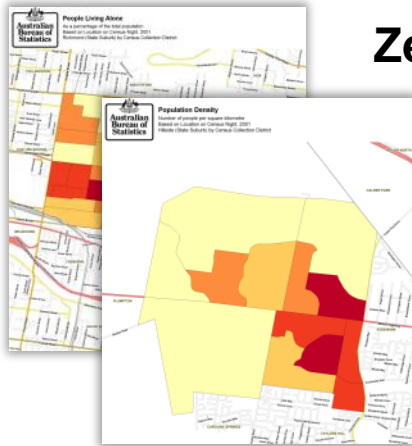


Entsprechend ihrer Charakteristik
beziehen Haushalte ein neues
Gebäude

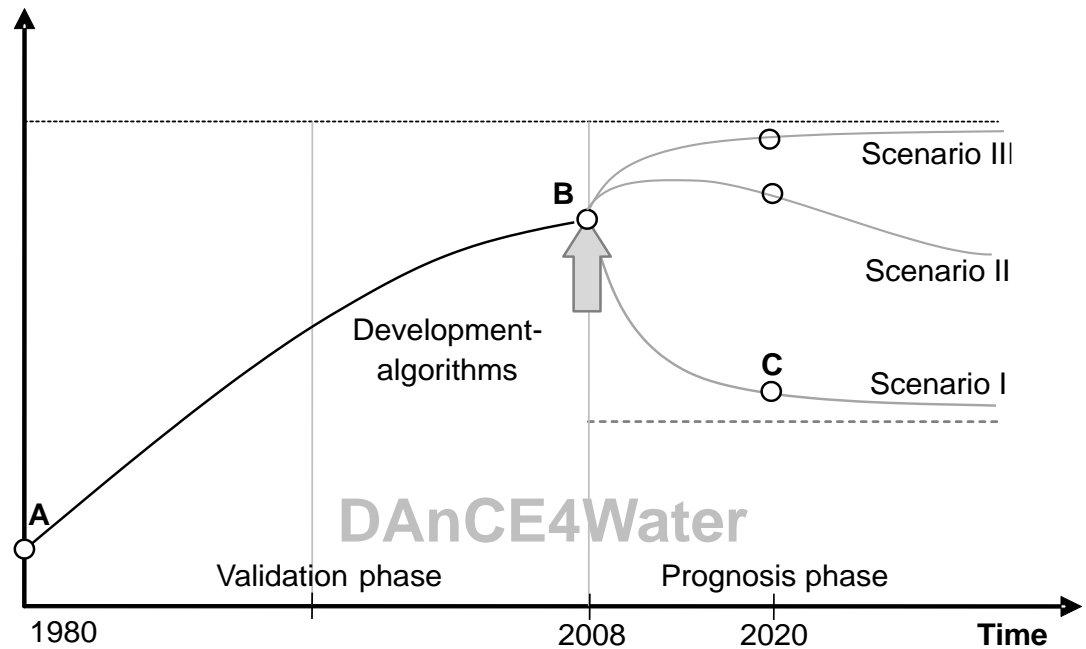


2. Urban Development Module

Zensusdaten



Szenarios



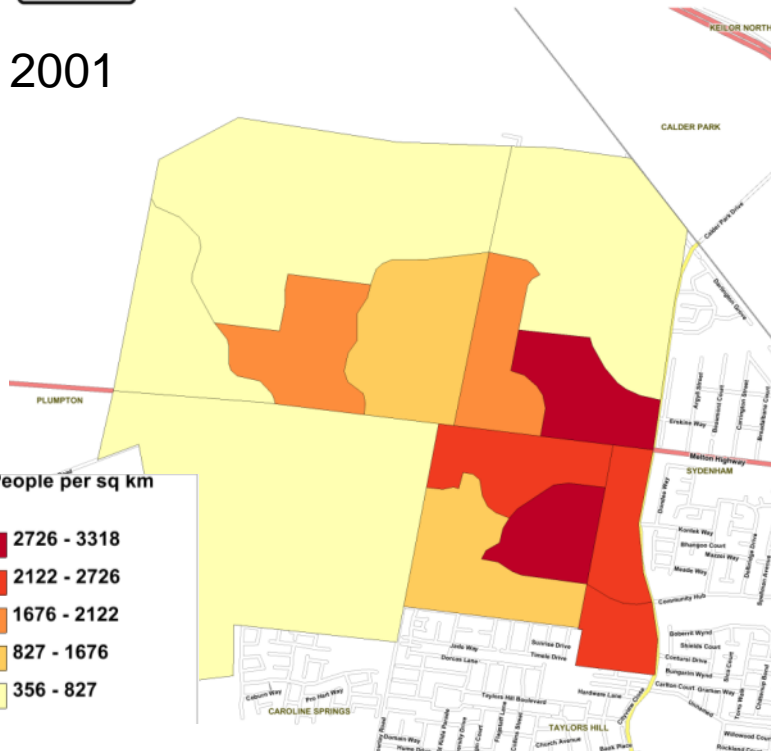
2. Urban Development Module



Population Density

Number of people per square kilometre
Based on Location on Census Night, 2001
Hillside (State Suburb) by Census Collection District

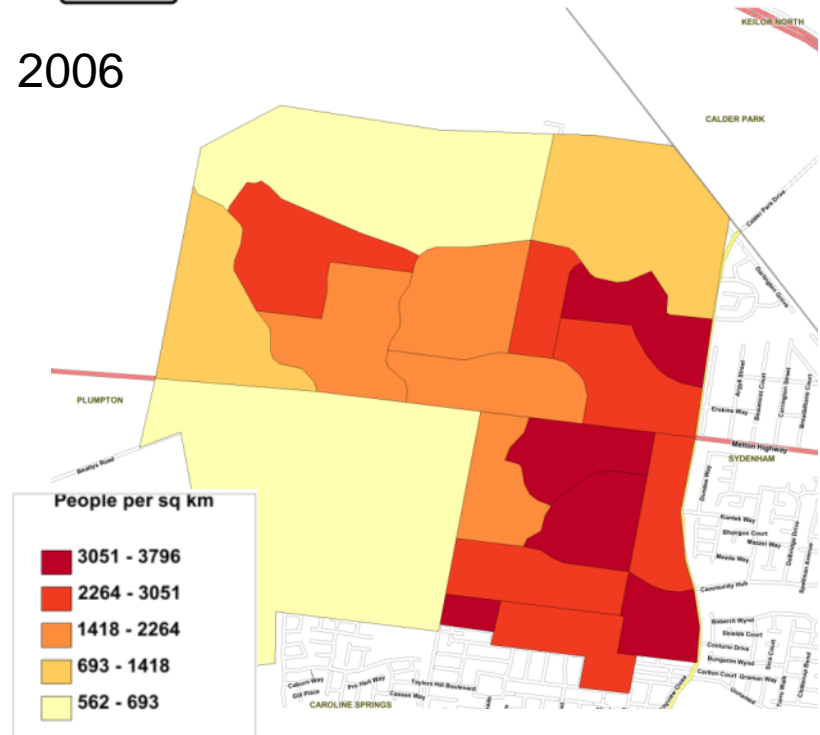
2001



Population Density

Number of people per square kilometre
Based on Place of Usual Residence, 2006
Hillside (Melton) (State Suburb) by Census Collection District

2006



Bevölkerungsentwicklung

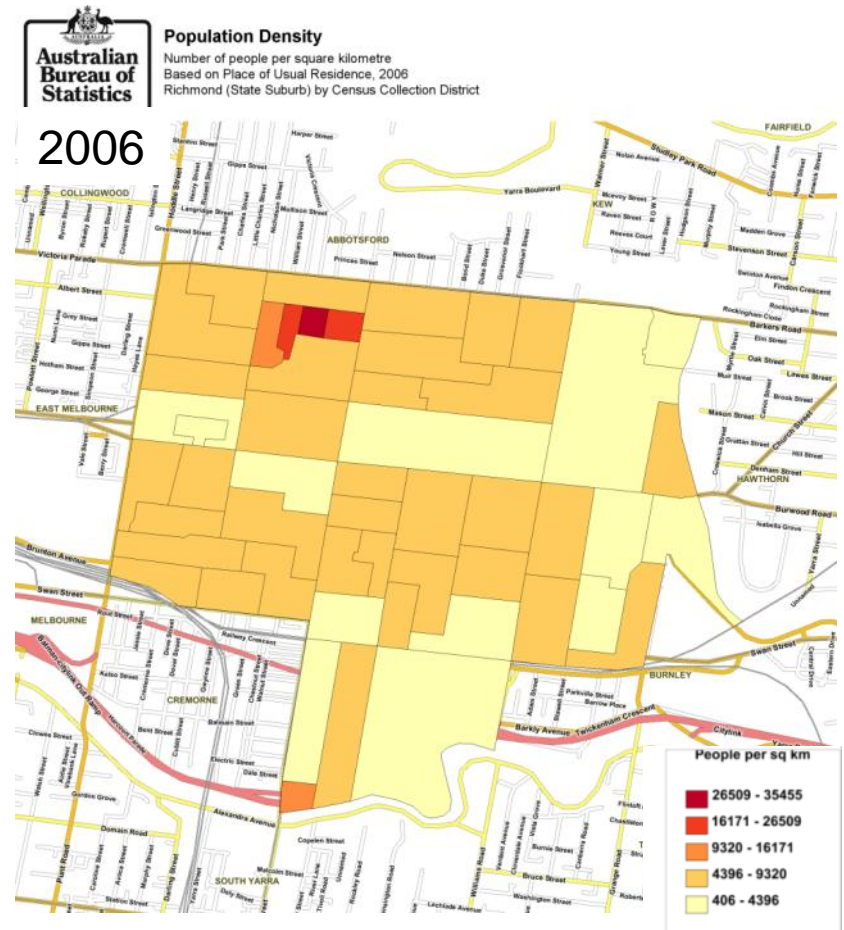
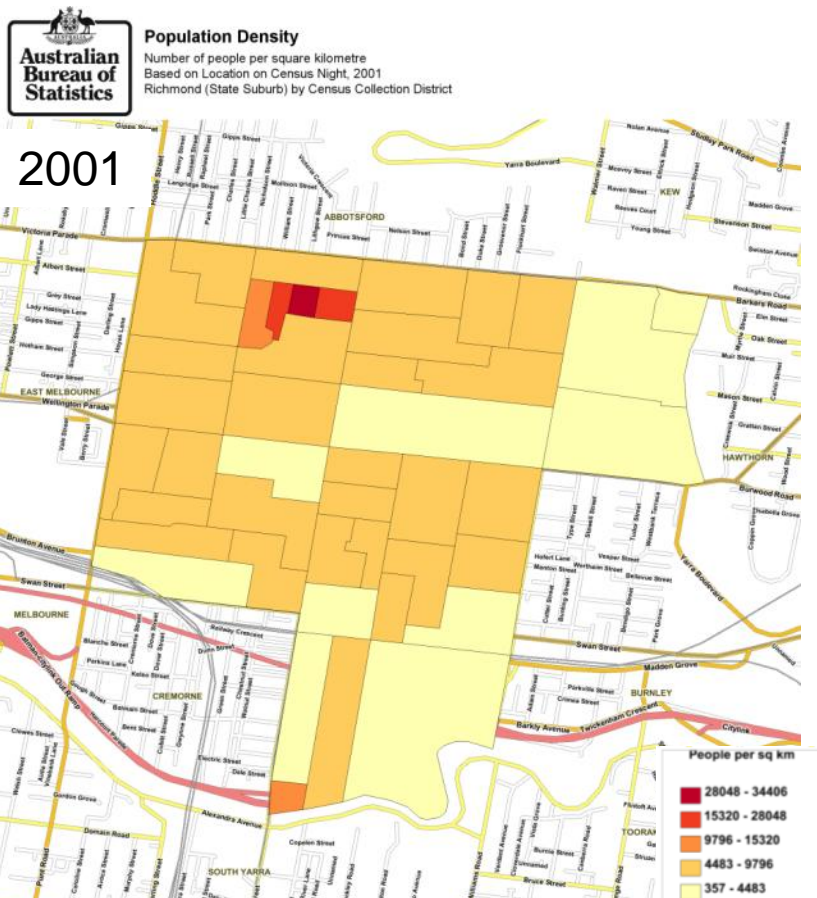
2. Urban Development Module



80 Apartments

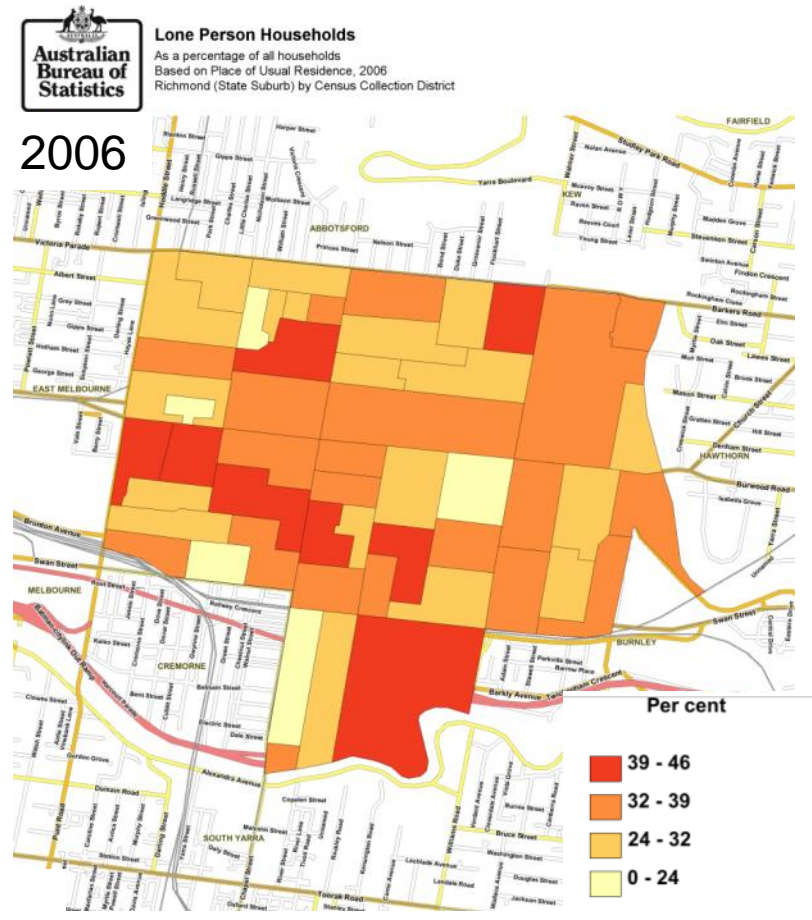
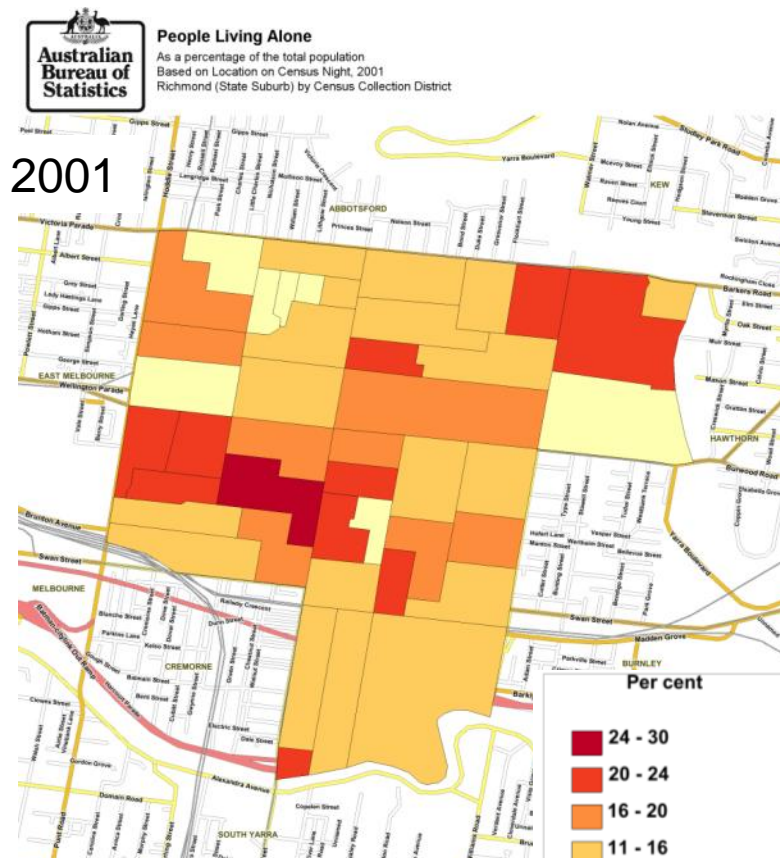
Demographische Entwicklung

2. Urban Development Module



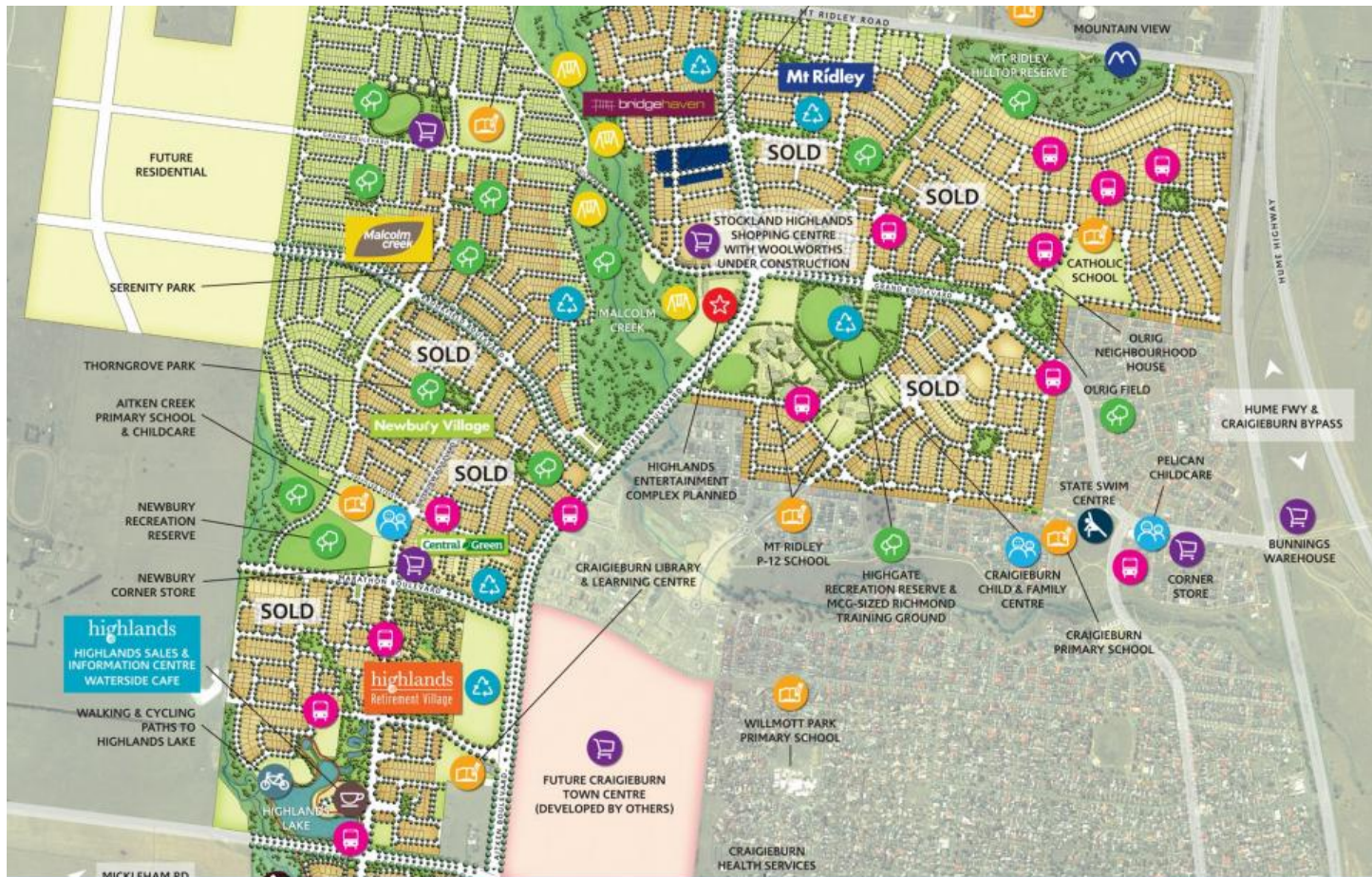
Bevölkerungsentwicklung

2. Urban Development Module

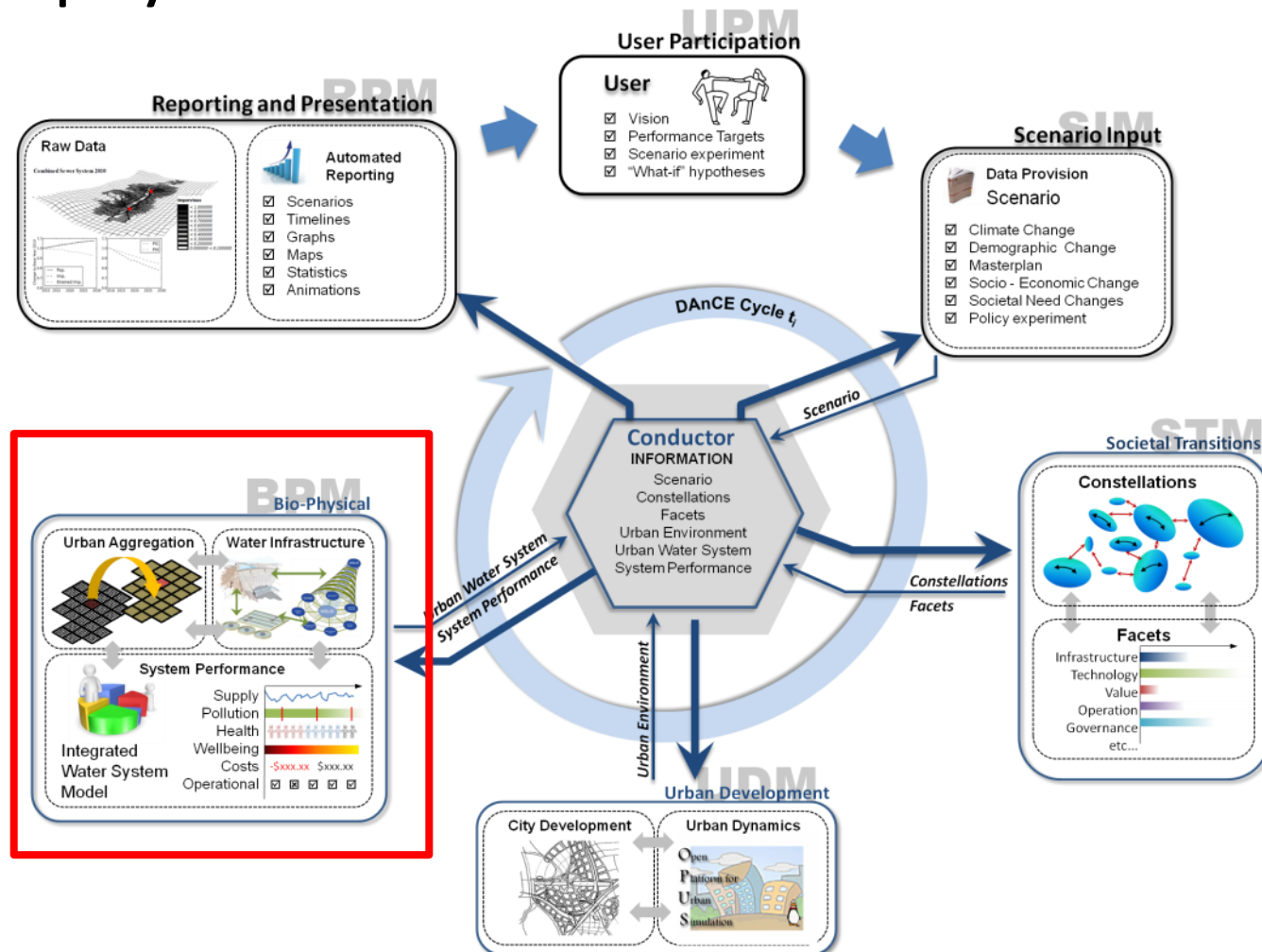


Demographische Entwicklung

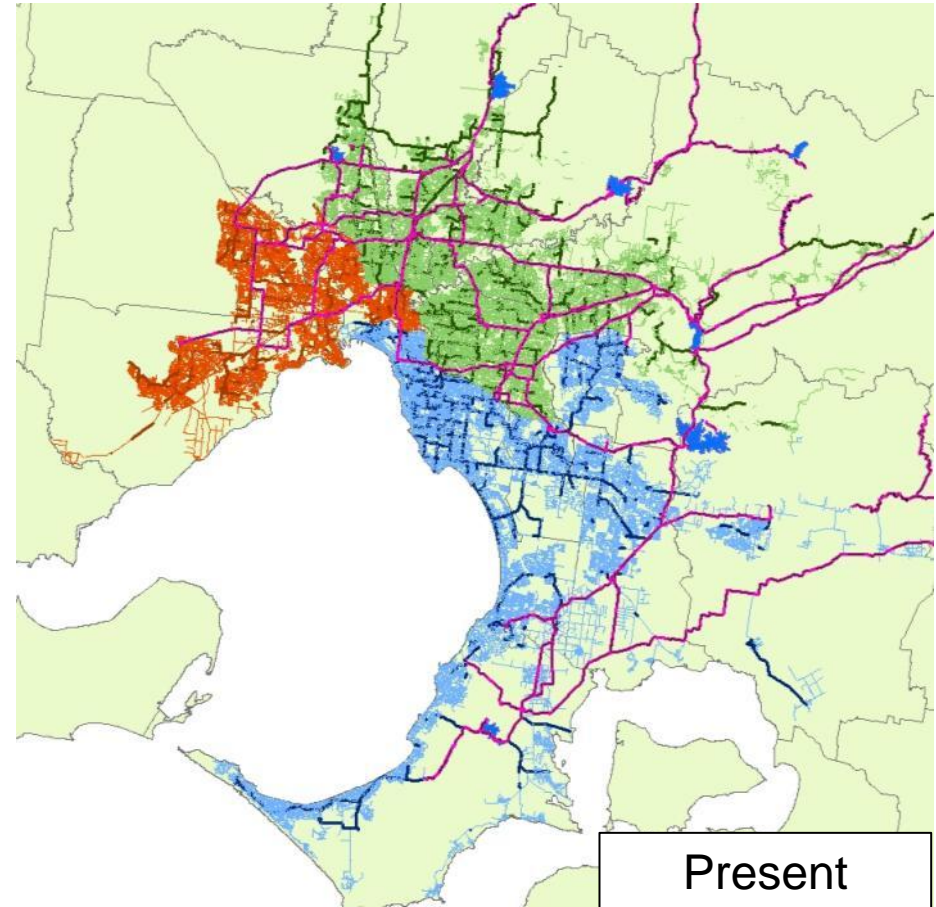
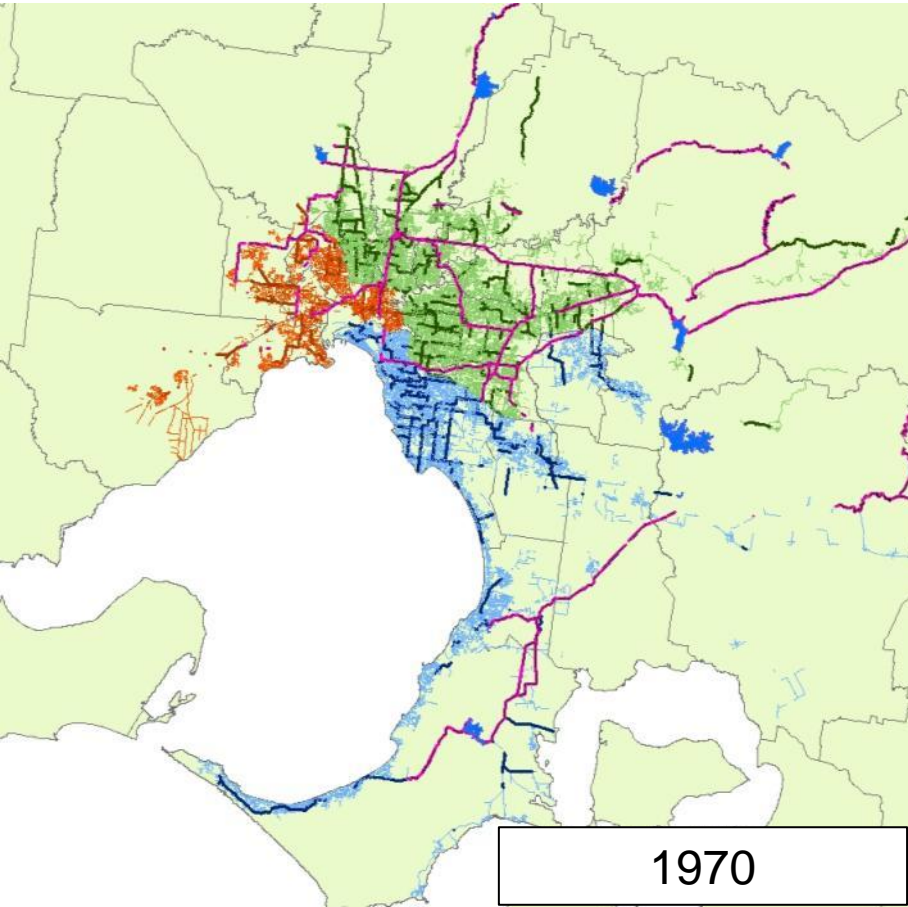
Infrastruktur?



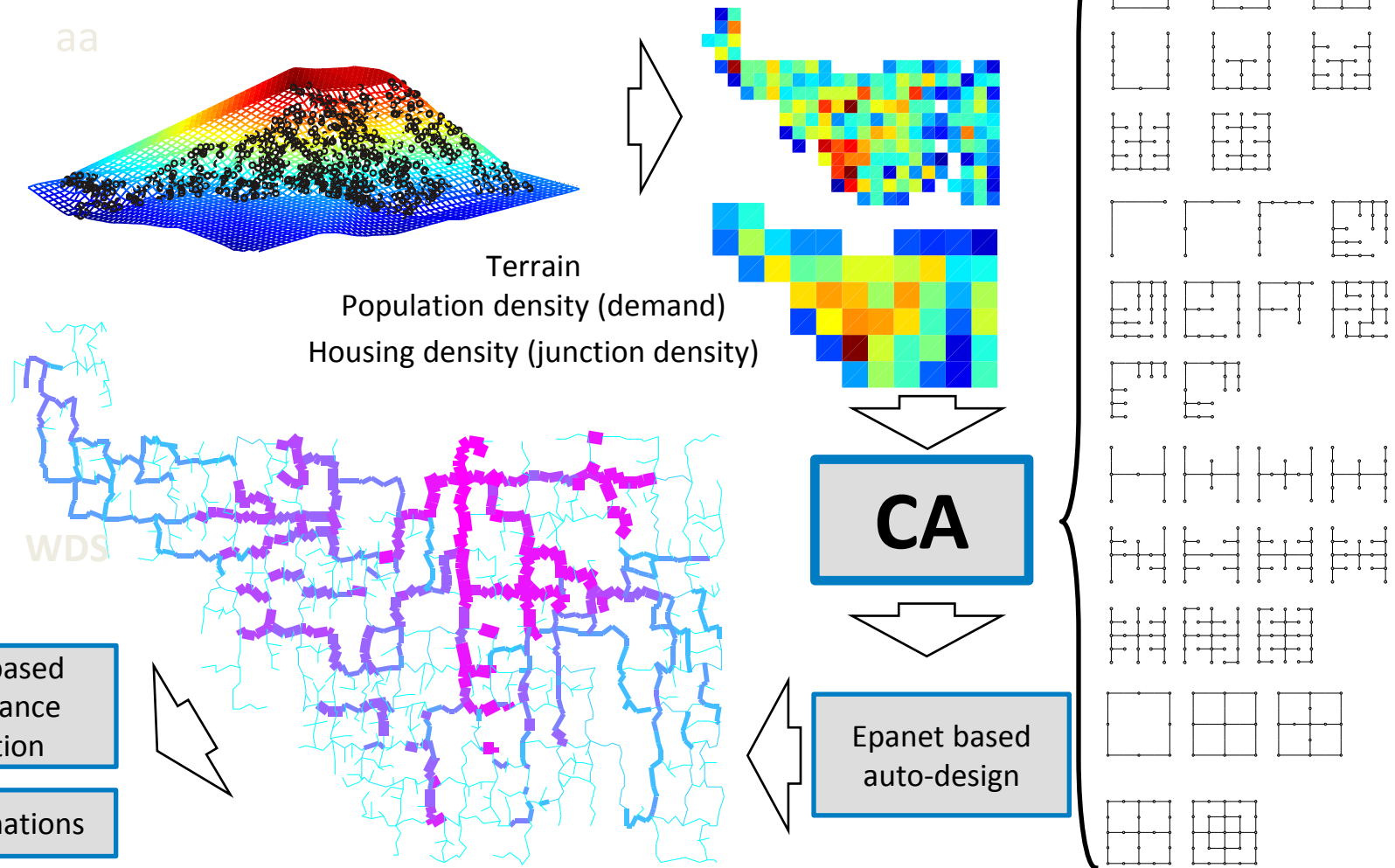
3. Bio-physical Module



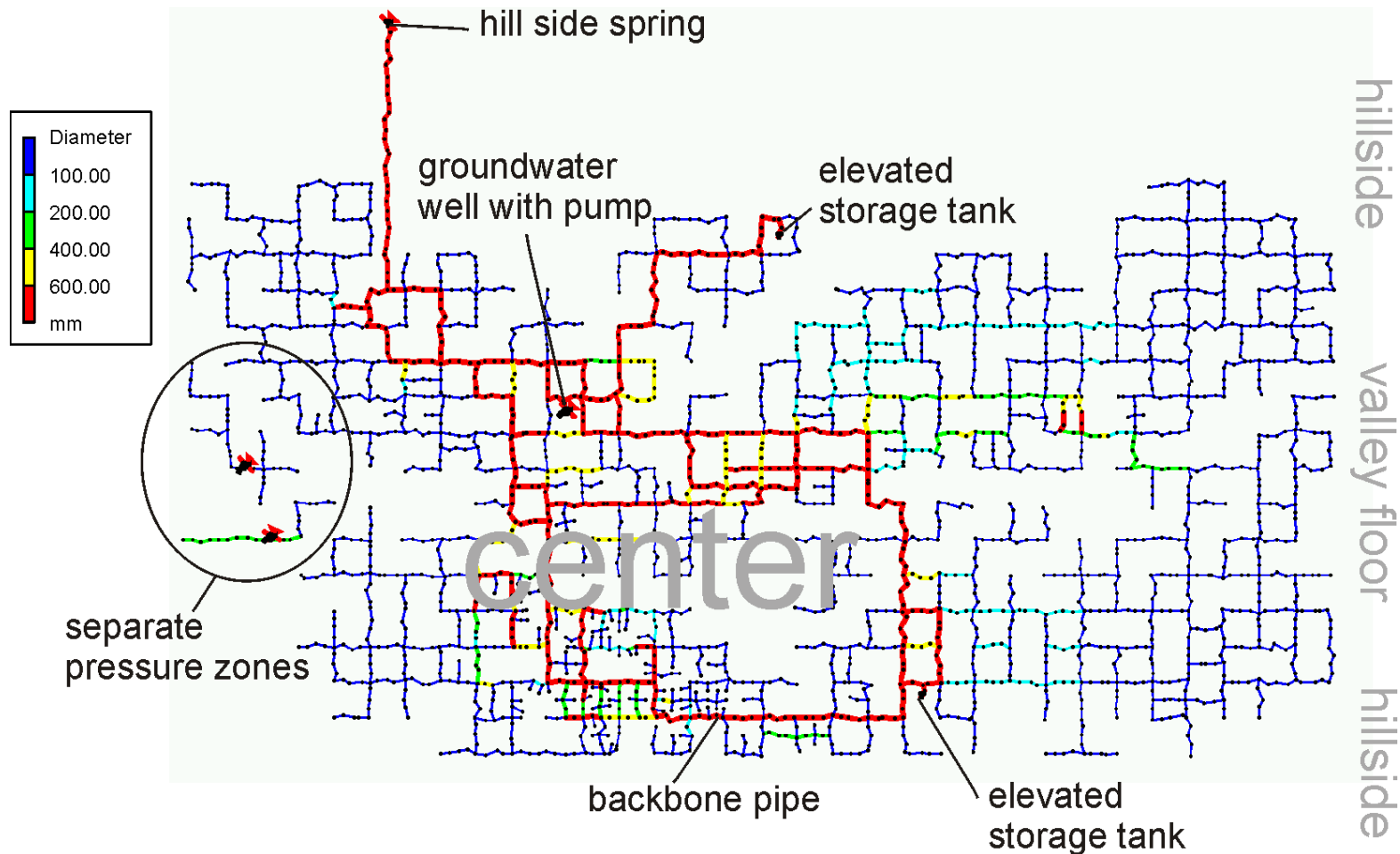
3. Bio-physical Module



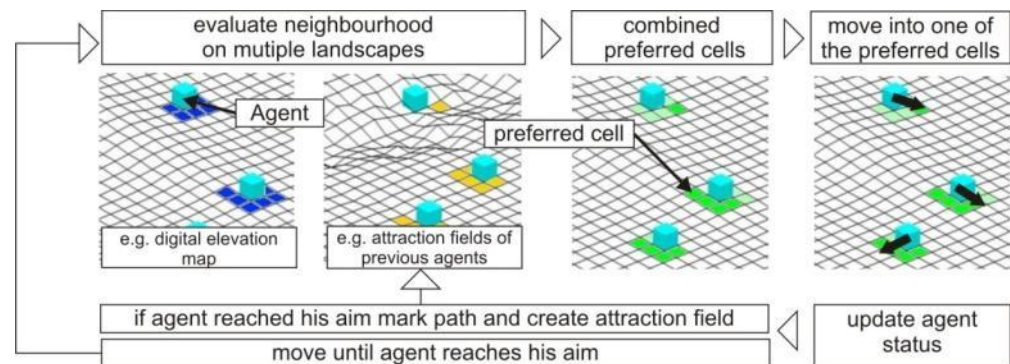
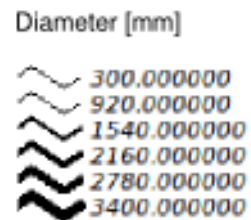
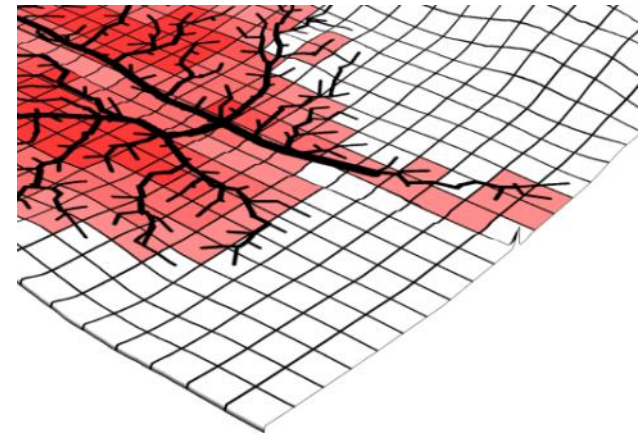
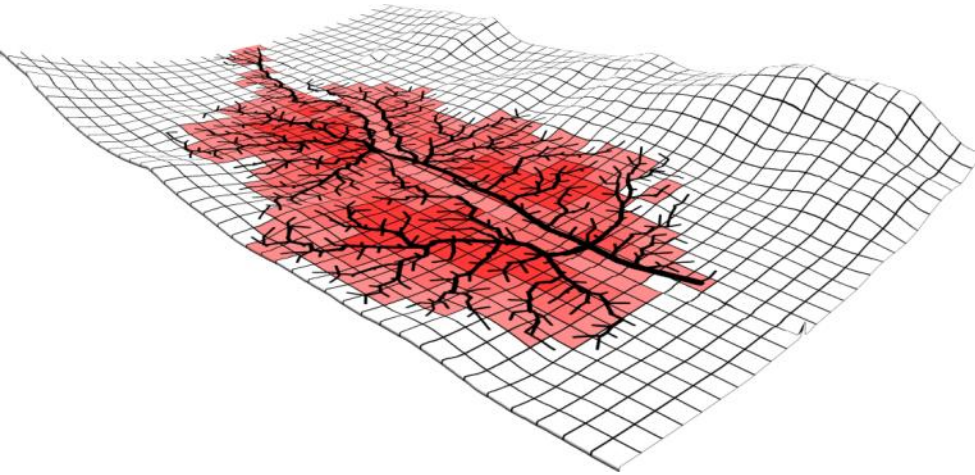
3. Bio-physical Module



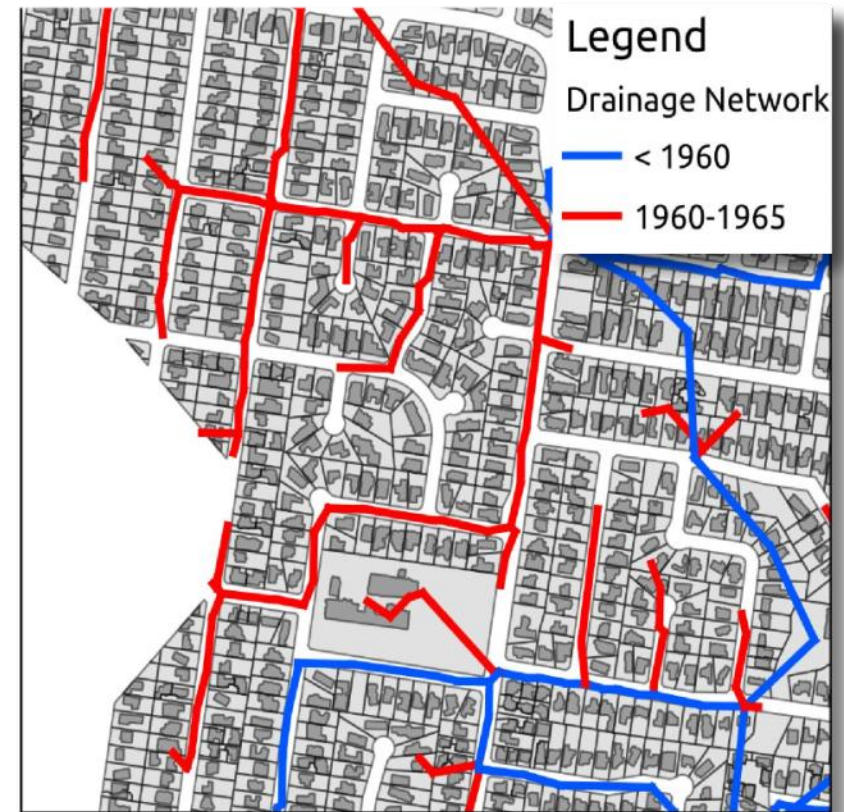
3. Bio-physical Module



3. Bio-physical Module



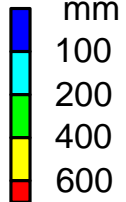
3. Bio-physical Module



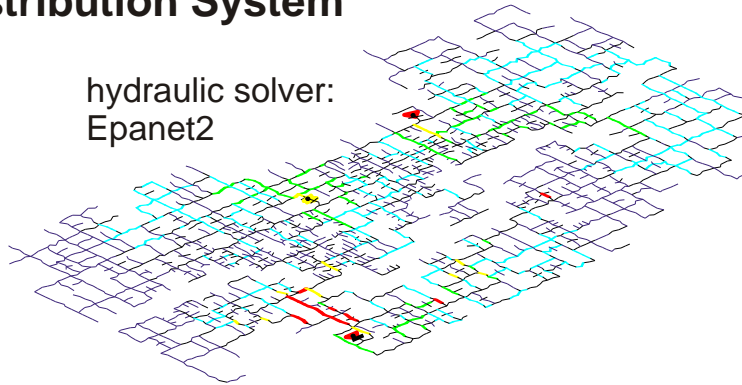
3. Bio-physical Module

Water Distribution System

Diameter

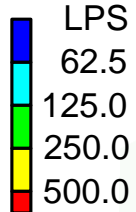


hydraulic solver:
Epanet2

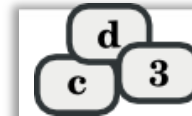
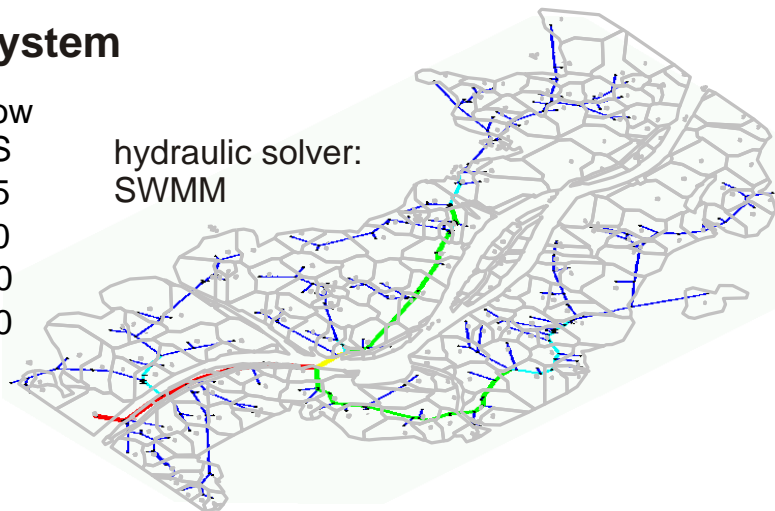


Sewer System

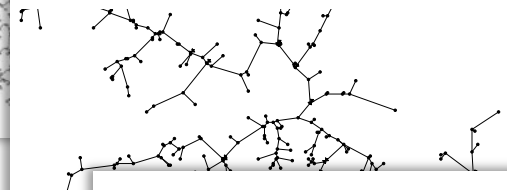
Link Flow



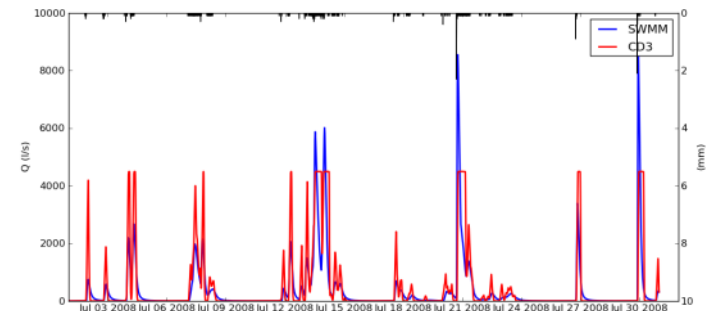
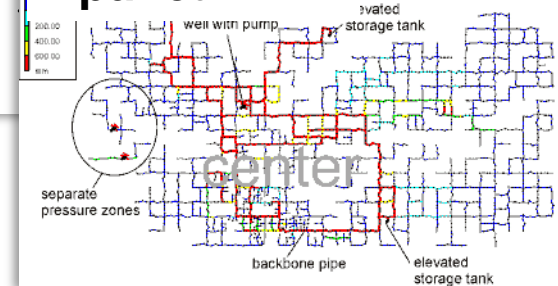
hydraulic solver:
SWMM



SWMM 5.0



Epanet2

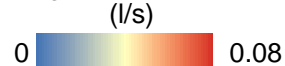


3. Bio-physical Module

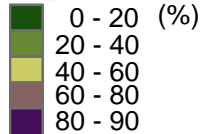
Population Density



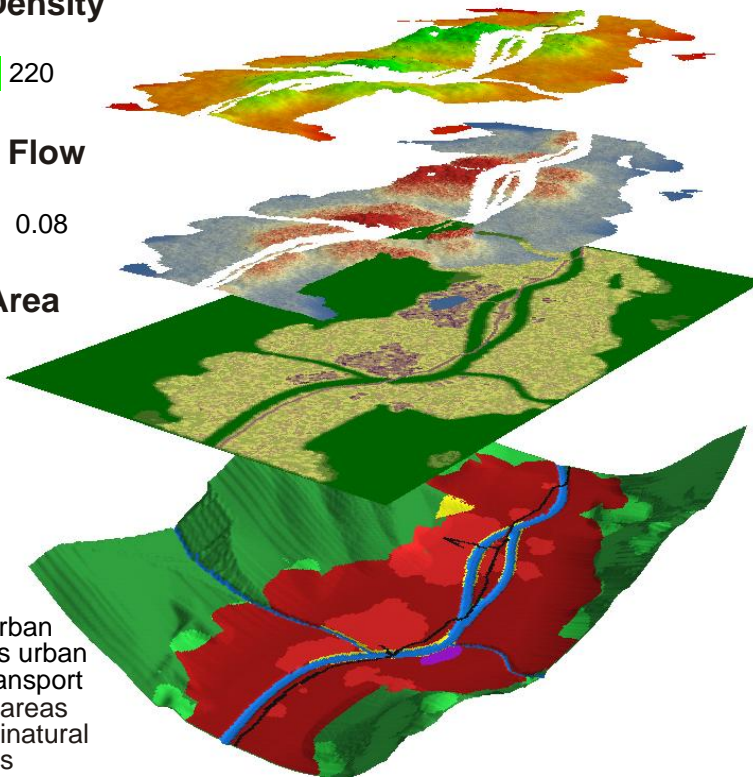
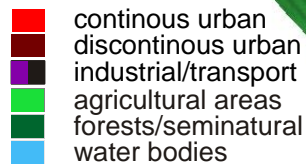
Dry Weather Flow



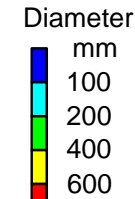
Impervious Area



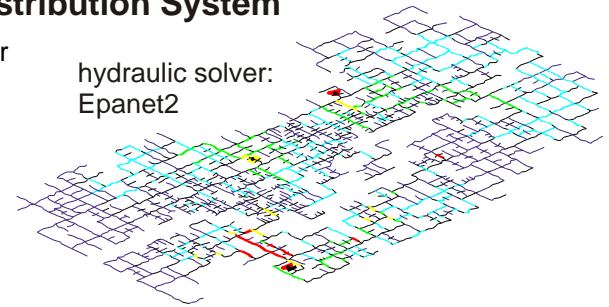
Land-use



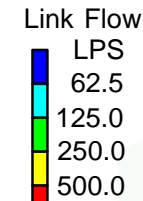
Water Distribution System



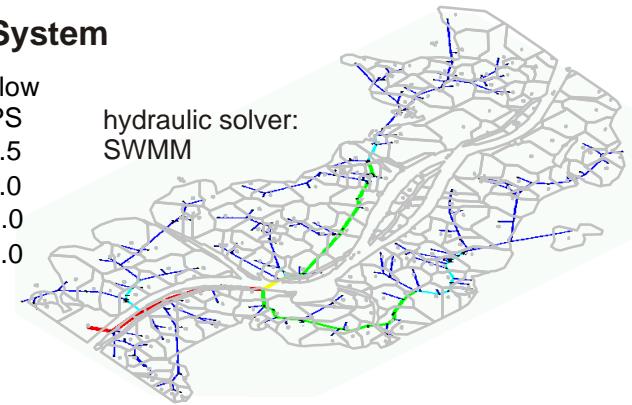
hydraulic solver:
Epanet2



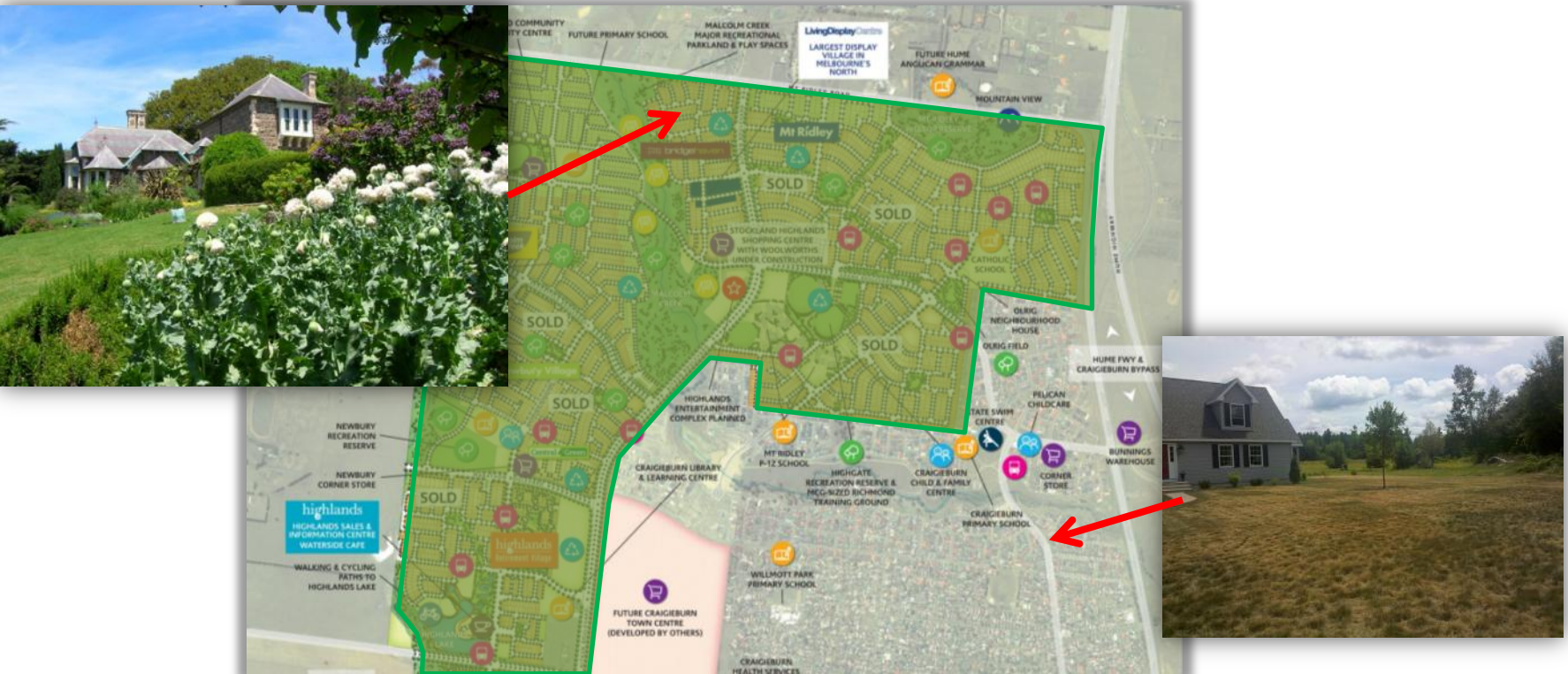
Sewer System



hydraulic solver:
SWMM

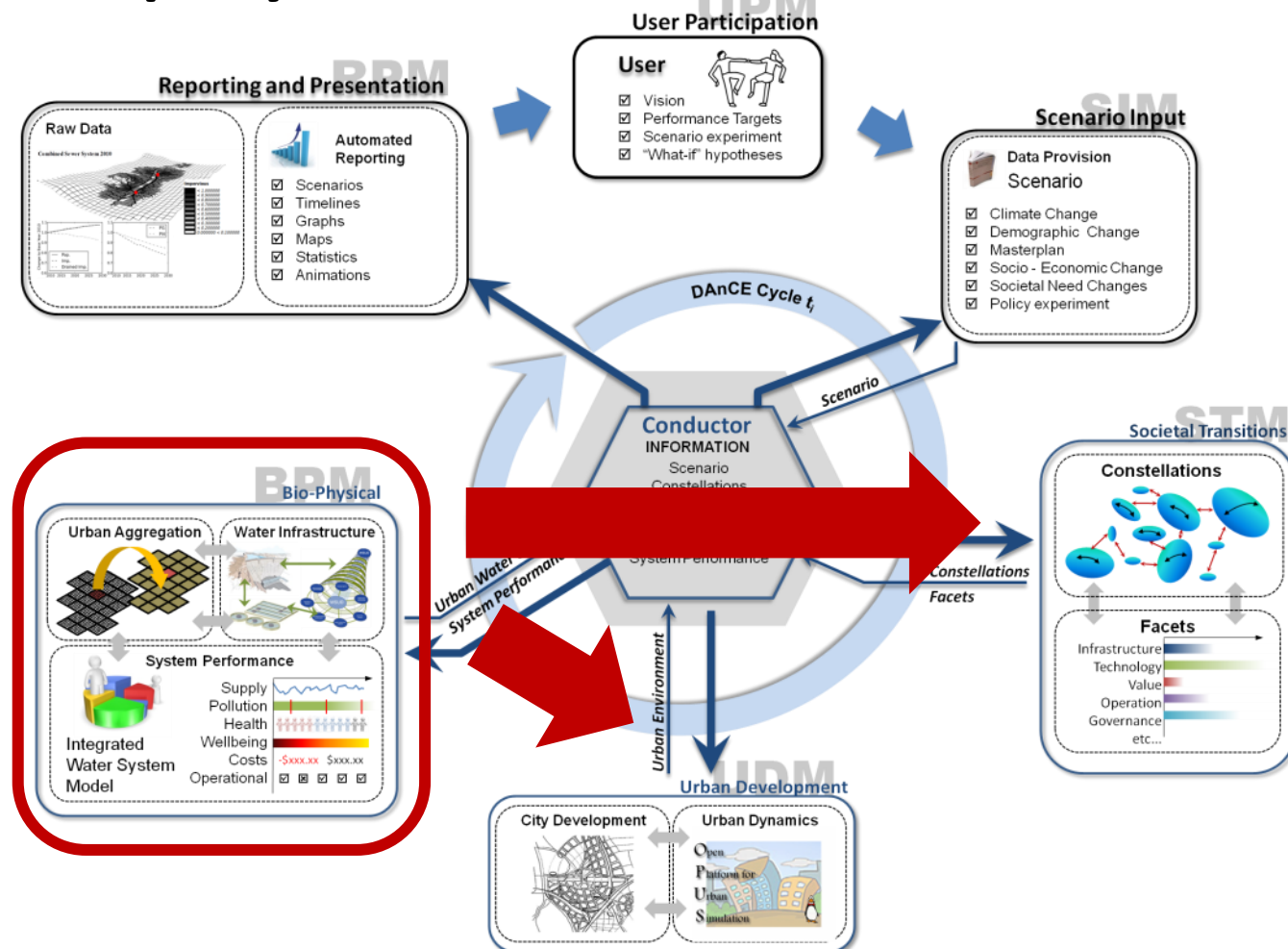


3. Bio-physical Module



 Dual pipe system

3. Bio-physical Module



Zusammenfassung

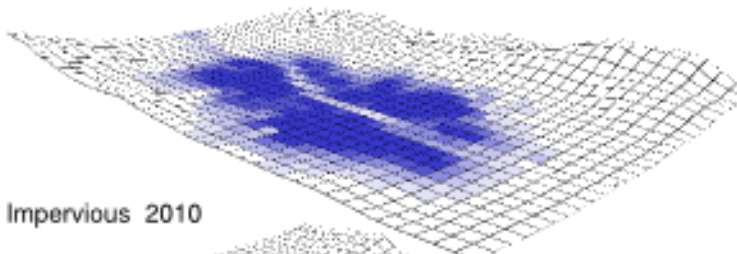
1. Integriertes Modell der Siedlungswasserwirtschaft

2. DAnCE4Water

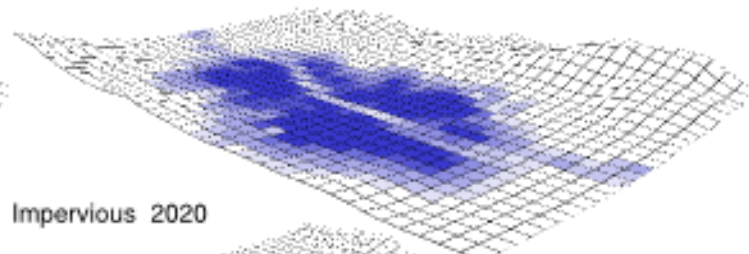
- **Räumliche und zeitliche Entwicklung der Stadt, Wasserinfrastruktur und des sozio-technischen Systems**
- **Neue Erkenntnisse über die komplexen Zusammenhänge urbaner Systeme**
- **Untersuchung unterschiedlichster Anpassungsstrategien in einer integrierten Umgebung**

Zusammenfassung

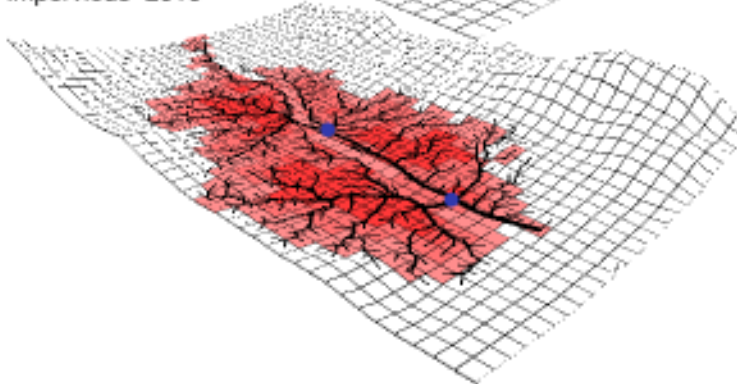
Population 2010



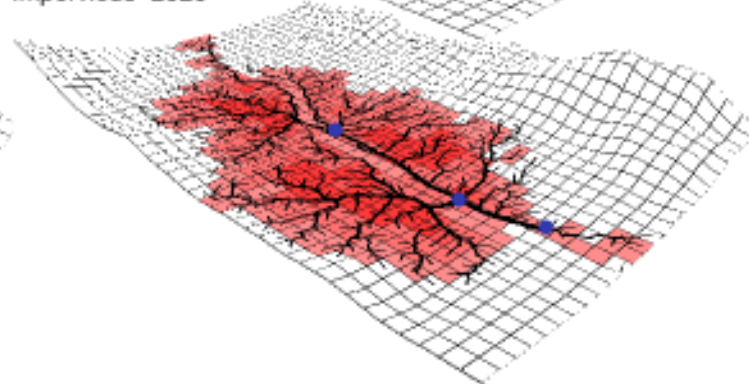
Population 2020



Impervious 2010



Impervious 2020

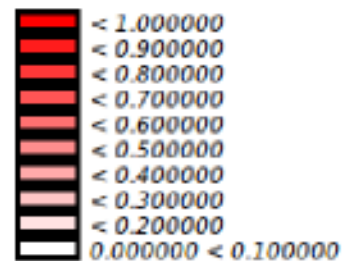


● Flooding

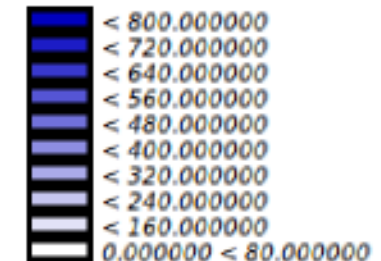
Diameter [mm]



Impervious [-]

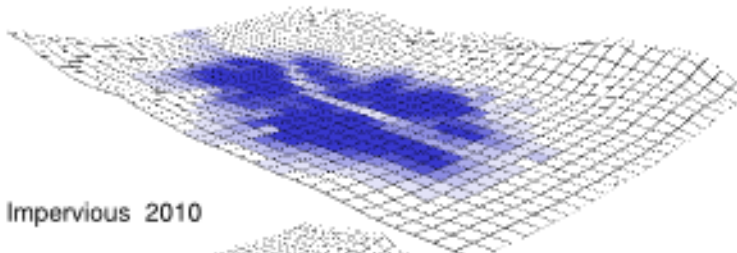


Population [People]

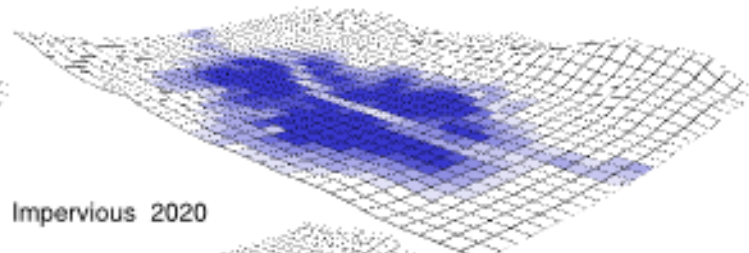


Zusammenfassung

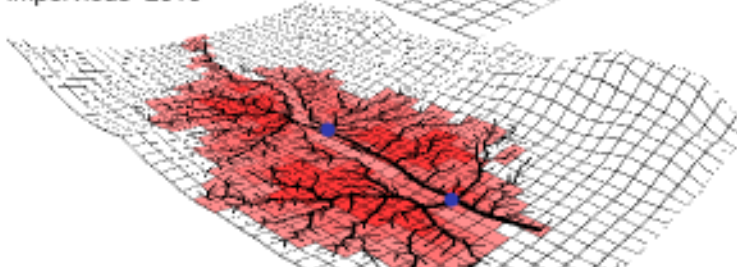
Population 2010



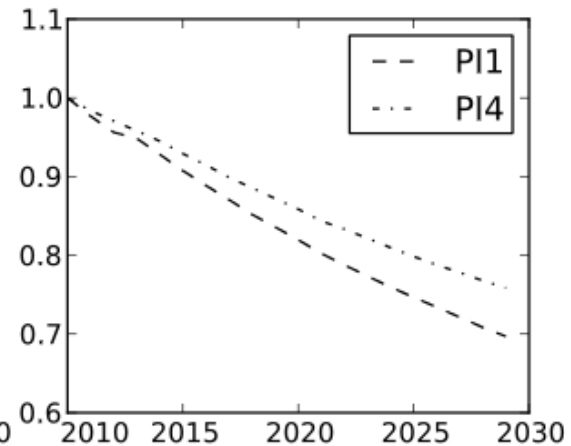
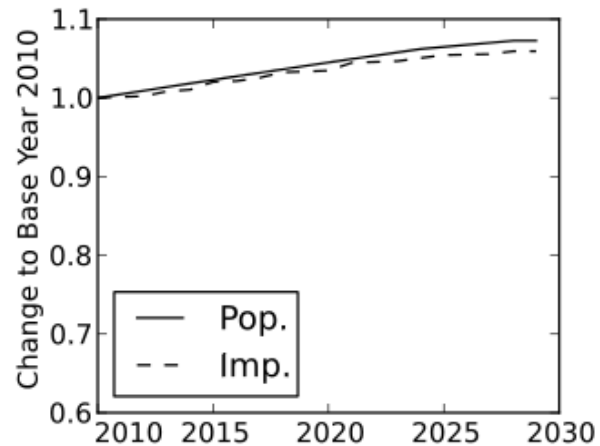
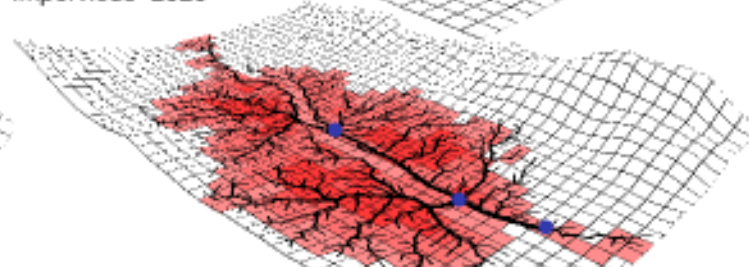
Population 2020



Impervious 2010



Impervious 2020



DAnCE4Water

Dynamic Adaptation for enabling City Evolution for Water



Melbourne ~~2010~~



Melbourne 2010