

NP3006 URBAN OBJECTS AND PRECINCTS AND THEIR PERFORMANCE UNDER URBAN HEAT SCENARIOS

RESEARCH QUESTIONS

The research supports the transition to adaptive greener precincts and an improved design methodology; it will enable the transfer of scientific findings to policy-makers by collecting the data on how urban objects are responding and adapting to the increases temperatures and urban heat island effect and their combined effects on precinct microclimate.

METHODOLOGY

The research follows a quantitative approach which manifests itself in four main modules:

- international and national framework, literature explaining phenomena and evolving theories;
- local literature exploring the effect of UHI in Australian cities mitigation and adaptation measures;
- tabulation and synthesis that condenses the mitigation and adaptation measures into a heat island object-based framework;
- The last section aim to compare the effectiveness of each precinct object versus in the urban heat scenarios

RESULTS

The research is about to start: The first section will be dedicated to the definition of UHI and the national and international polices and setted targets. The aim is to identify all existing researches on heat amplification and mitigation undertaken in Australian cities and generate a library of precinct objects and their attributes relevant to the urban heat island phenomena. The scope of work will include:

- A scoping study on existing micro-climate research;
- A precinct object library that amplify and mitigate heat based on empirical data from research. The elements will be organised in

Biotic network and Urban fabric in both a suburban and urban context. Each precinct element will be parametric, and be described by:

OBJECT ATTRIBUTES
1 Geographical location
2 Orientation
3 Location within the city morphology
4 Typology
5 Indicative dimensions
6 Components/material (as per typology)
7 Decay period
8 Mitigation potential or amplification value
9 Capital costs
10 Maintenance costs

The third phase it will structure the findings of the second section and populate spread-sheet with adaptive and mitigation potential for urban design scenarios in Australian cities as well as guidelines that will focus on smart city principles.

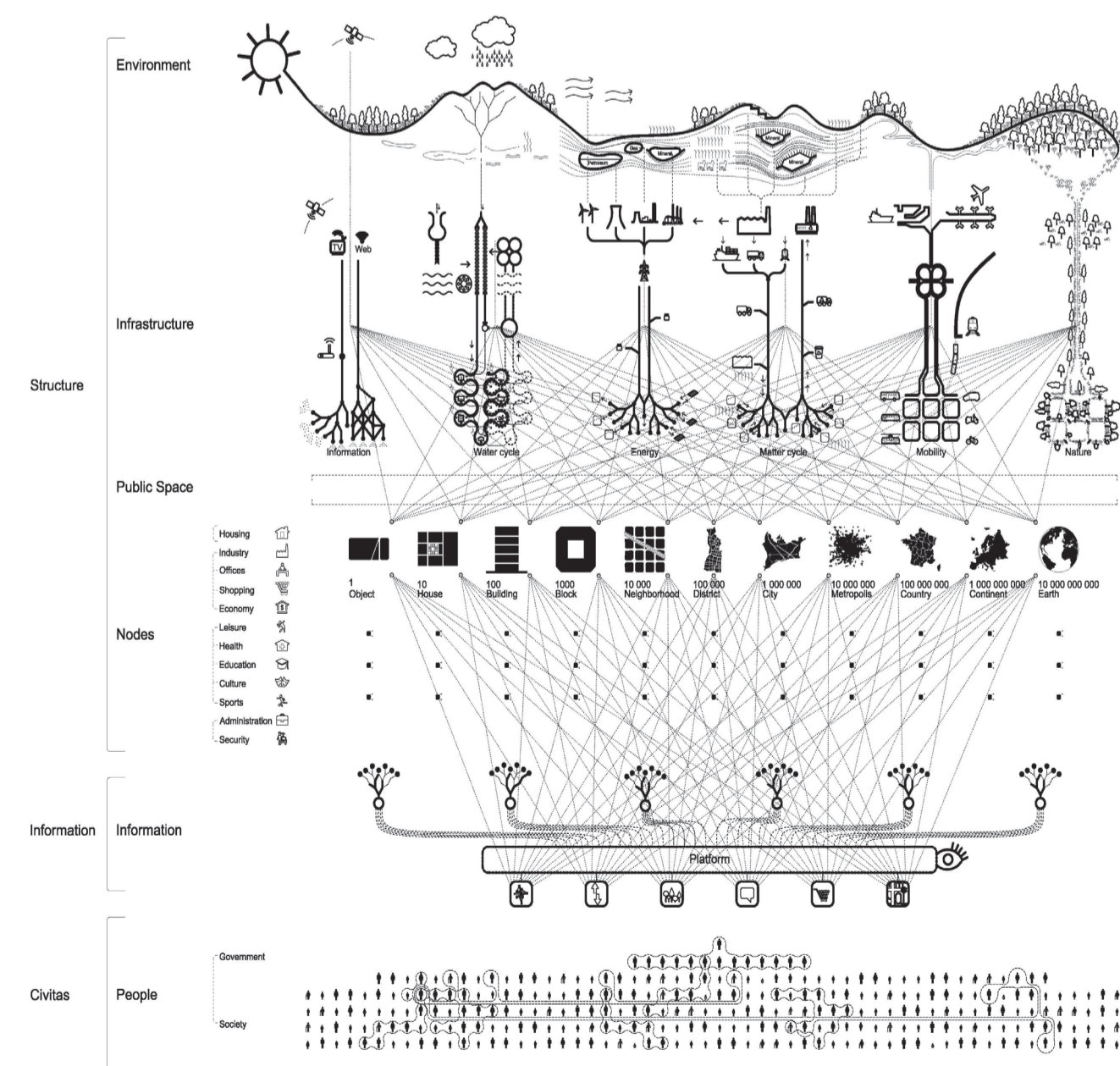


Fig. 1 - Smart city anatomy, imagine from City Protocol, in <http://www.cityprotocol.org/framework.html>

Fig. 2 - Proposed strategy framework, comparing the effectiveness of each precinct object versus in the urban heat scenarios.

	EDGE ZONE The least dense, most purely residential sector of the neighbourhood.	GENERAL ZONE The sector that is mixed in function, but principally residential and industrial.	URBAN CENTRE ZONE The dense multi-functional social condenser of a neighbourhood.	URBAN CORE ZONE The most dense business, service and institutional centre. It is usually shared by several
REDUCING URBAN HEAT ISLAND	Reduce Anthropogenic Heat	<ul style="list-style-type: none"> Promote green building design to reduce the need of heating and cooling systems. Decreasing CO2 emissions, by supporting alternative transport. Protect native vegetation responsible to absorb CO2 and trap particle pollutants that can damage humans. 	<ul style="list-style-type: none"> Promote green building design to reduce the need of heating and cooling systems. Decreasing CO2 emissions, by supporting alternative transport. Protect native vegetation responsible to absorb CO2 and trap particle pollutants that can damage humans. 	<ul style="list-style-type: none"> Promote green building design to reduce the need of heating and cooling systems. Decreasing CO2 emissions, by supporting alternative transport. Protect native vegetation responsible to absorb CO2 and trap particle pollutants that can damage humans.
	Reduce Heat Absorption	<ul style="list-style-type: none"> High reflective materials used for roof and building materials. 	<ul style="list-style-type: none"> High reflective materials used for roof and building materials. Trees shading as key element. 	<ul style="list-style-type: none"> High reflective materials used for roof and building materials. Trees shading as key element.
REDUCING URBAN HEAT ISLAND	Increase Radiation Reflection	<ul style="list-style-type: none"> High reflective materials used for roof and building materials. 	<ul style="list-style-type: none"> High reflective materials used for roof and building materials. Permeable surfaces used for hardscaping of public spaces. 	<ul style="list-style-type: none"> High reflective materials used for roof and building materials. Permeable surfaces used for hardscaping of public spaces and car park areas.
	Soil and water conservation	<ul style="list-style-type: none"> Maximise green verge along streets and private properties greens areas. 	<ul style="list-style-type: none"> Direct run-off into dry ponds in dedicated landscaped features. 	<ul style="list-style-type: none"> Direct run-off into dry ponds in dedicated landscaped features.
		EFFECTIVENESS AFFORDABILITY	EFFECTIVENESS AFFORDABILITY	EFFECTIVENESS AFFORDABILITY

The last section aim to compare the effectiveness, the eco-efficiency of each precinct object versus its short and long term affordability and a brief overview of the secondary effects on biodiversity, water consumption, energy consumption, soil protection, waste, local amenities, housing affordability/gentrification, community identity. Case studies will also form part of the research.

CONCLUSIONS

The aim is to provide an organised and up-to-date selection of precinct objects tables to implement the Precinct Object Library (PIM) and a set of design guidelines for the heat island scenario planning framework.

ANTICIPATED IMPACTS

The design guidelines will be designed to operate as a tool in which several promising design solutions can be compared. The aim is to integrate the guidelines with the available microclimate information; thus the decision-maker will identify and explore from adaptation options and mitigation options within a set of climate scenarios and socio-economic scenarios.

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