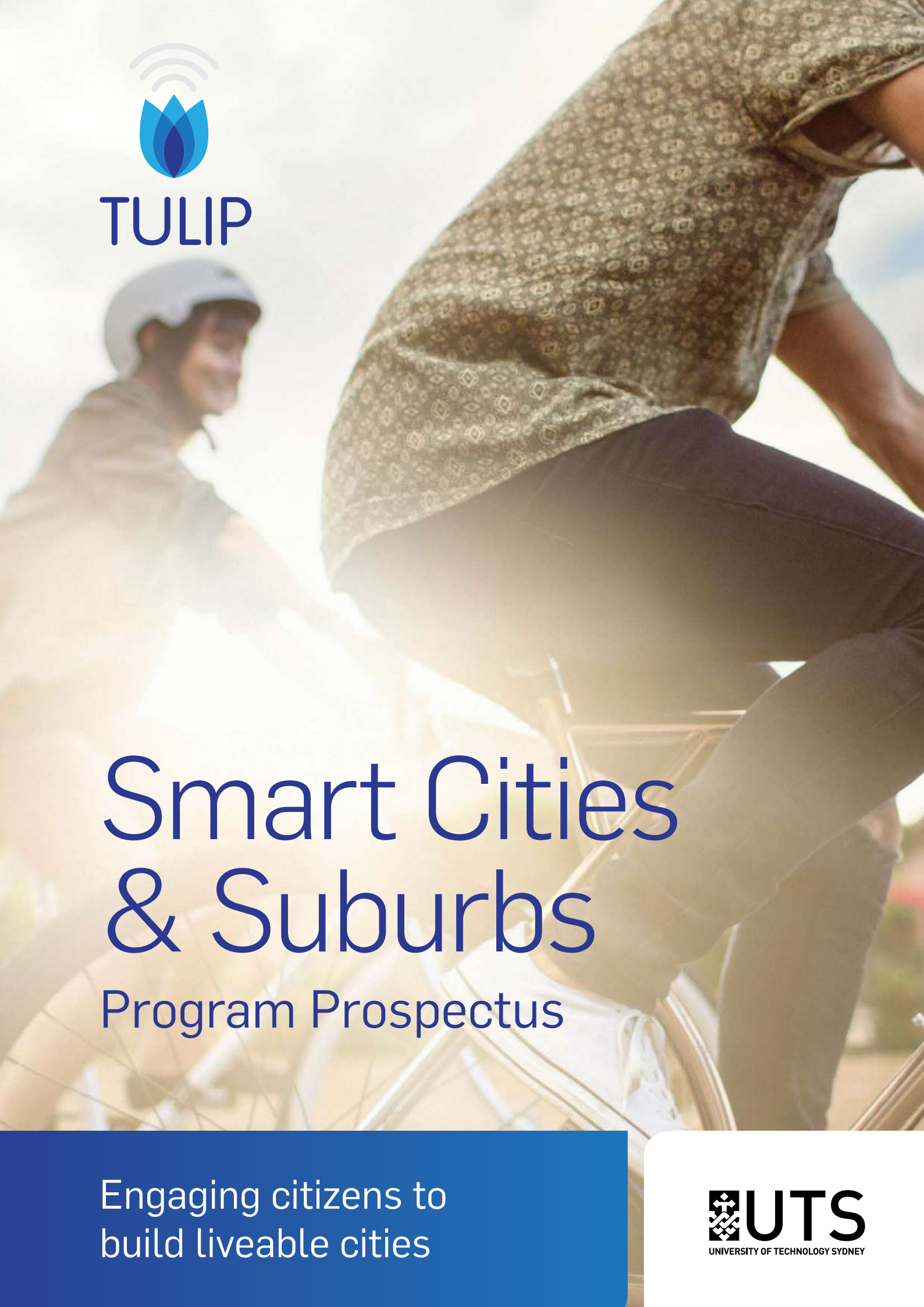


TULIP

Smart Cities & Suburbs

Program Prospectus

Engaging citizens to build liveable cities

UTS
UNIVERSITY OF TECHNOLOGY SYDNEY

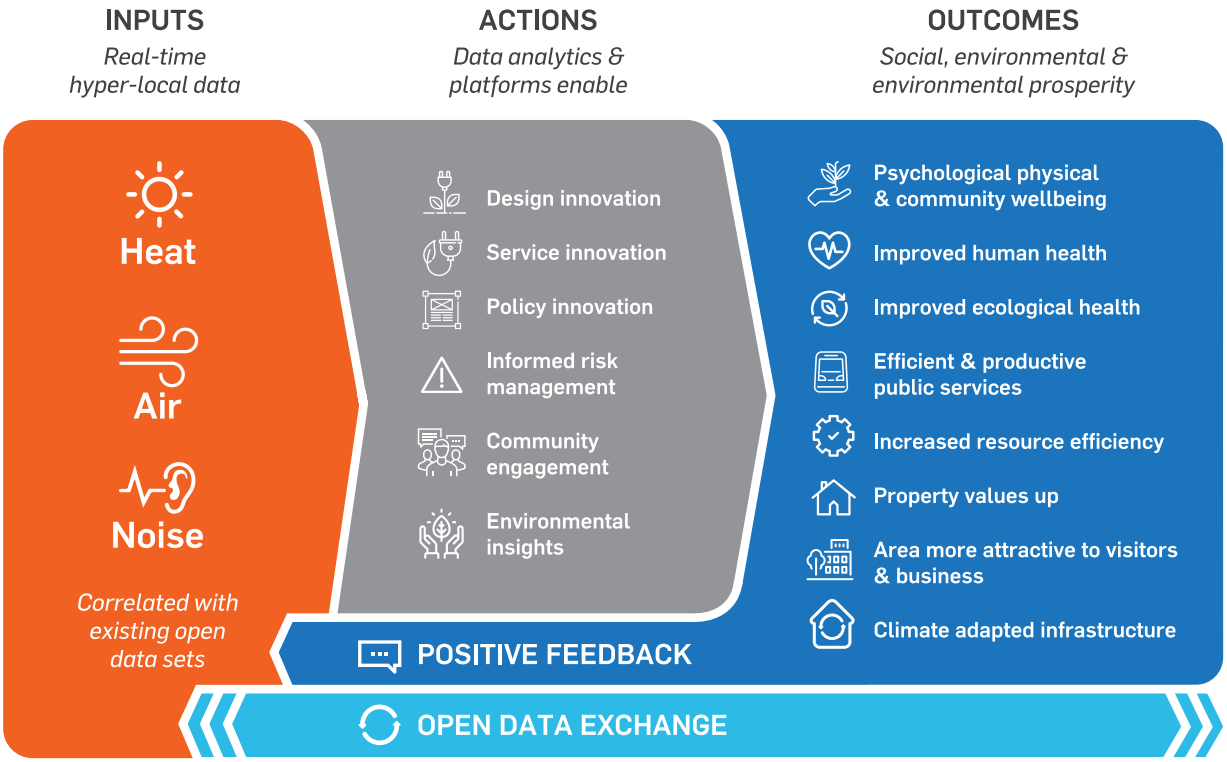
What TULIP means for cities

TULIP (Technology for Urban Liveability Project) applies smart city technologies and engages citizens to build more liveable urban communities that are clean, cool and quiet.

The TULIP Smart Cities and Suburbs program is a UTS-led collaboration between government, industry, research institutions, civil society, communities and citizens to build better, more liveable cities. TULIP fills the environmental data "void" by collecting real-time, hyper-local data on heat, air quality and noise at city-scale and enables innovation and insights by making it available through a scalable open data exchange to cities and citizens.

By applying environmental data science, TULIP will enable new and detailed understandings of how significant environmental variables interact in a complex urban system that will inform and improve urban design, planning and policy.

TULIP INCREASES SOCIAL, ECONOMIC AND ENVIRONMENTAL PROSPERITY



TULIP enables cities to engage with researchers, policymakers, businesses and citizens to work together and take specific actions that support the development of cooler, cleaner, more efficient and more liveable cities with increased climate resilience. The program will enable more efficient management of urban systems and realize cost savings by anticipating and proactively addressing specific challenges related to trends such as climate change, increased traffic density, urban population density and an ageing population.

1 Better City Living

Better city living is enabled through analysis of hitherto unavailable hyper-local temperature, air quality and noise pollution data that drives research and urban environmental design improvements.

Monitoring & mitigating urban Heat

Urban heat is a serious risk to the health and wellbeing of communities and compromises liveability, especially for vulnerable populations. The hazard posed by heat is due to two distinct causes; an increase in the number and/or intensity of heat waves, and the urban heat island effect (UHI) in which urban landscapes have increased temperatures due to buildings and paving, dark surfaces and lack of vegetation.

In Australia heat waves cause more deaths than other natural disasters (Steffen et al. 2015). With the number of days above 35°C projected to increase (Adapt NSW, 2015) and projected increases in the density and population of cities, the number of heat wave-related deaths is projected to grow.

UTS studies in Penrith have revealed considerable spatial heterogeneity in the distribution of observed heat within each suburb with surface temperatures ranging from around 30°C through to almost 55°C.

Hyperlocalised environmental data and applied data science will inform strategies for UHI mitigation, “cool route” wayfinding, urban design and citizen awareness and warnings.

Monitoring & improving urban Air Quality

There is a strong variation in air quality between suburbs and even specific locations in cities and suburbs, impacted by local wind and temperature patterns, as well as point or line sources such as major roads. Poor air quality has been linked to a range of health impacts, respiratory and also cardiovascular, in Australian cities.

The network of air quality measurement stations in Australian cities, is sparsely located, particularly those that measure the full range of parameters including the particulates, PM10 and PM2.5. The more widespread deployment of sensors proposed by this project will enable a greater level of awareness and better datasets of air quality conditions.

This data, combined with noise data, available traffic count data, opt-in data from road users and public transport users will support councils, planning authorities and citizens in data driven urban design and governance for improved liveability.

Monitoring & mitigating urban Noise Pollution

Urban noise pollution in Australian cities comes from many sources, including road traffic, aircraft, rail corridors, construction and various commercial and industrial activities.

Persistent and pervasive noise pollution has a direct negative impact on human health, resulting in increased levels of stress and reduced amenity, including sleep disturbance and even cardiovascular impacts. Some studies show that chronic exposure to levels above 60 dBA increase the risk of cardiovascular disease.

Currently, urban noise pollution is not extensively measured. TULIP will provide better noise measurement which will help improved transport planning and mitigation strategies.

It will also enable baseline measurements prior to new developments and to monitor the impact of trends such as electric vehicle uptake, and to test the impact of measures to mitigate urban noise such as sound barriers, new road surfaces and improved urban design.

INFORMING AND IMPROVING URBAN DESIGN, PLANNING AND POLICY

Creating liveable and thriving urban places requires high-quality urban design, planning and policy. Cities must mitigate urban heat, improve air quality, and minimise noise pollution. These outcomes can be achieved through improved land use and transport planning, vegetation of the urban environment and use of water in the landscape, with world-leading sustainable urban design, planning and policy informed by strong community input. This work will be lead by UTS faculty of Design, Architecture and Building, in collaboration with other research partners.

2 Citizen Innovation & Engagement

Citizens are keenly interested in their city liveability.

TULIP is designed to provide opportunities and incentives for citizens to participate in building a more liveable city:

DATA COLLECTION

Citizens install their own sensors in TULIP's open access network, supported by new low-cost options developed and distributed by TULIP, as well as open source solutions in the maker community.

DATA SHARING

Citizens provide their environmental data for sharing in their community and across the city they participate in, building a deep and localised data set for analysis.

LOCAL INNOVATION

Civil society, start-ups and citizens can do their own research and create their own applications and services through open access to shared data.

COMMUNITY CONSULTATION

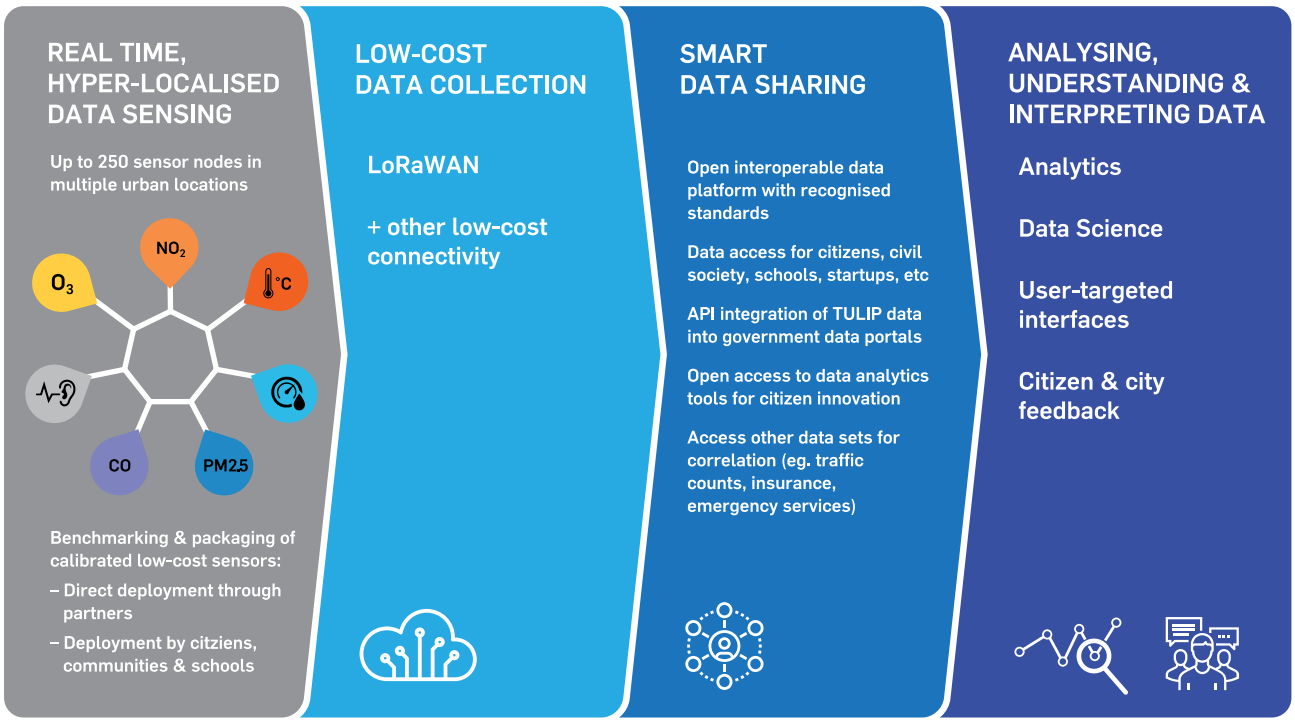
Digital platforms as well as more traditional processes can be used to engage the community in decisions on local design and planning, including determining citizen preferences.

3 Smart Platform

TULIP will build a low-cost platform that can collect environmental data and share it with data scientists and other researchers, designers, policy-makers and citizens.

Analysis of hyper-local temperature, air quality and sound pollution data will reveal new system-level understandings about the urban environment, informing better city design, policy and community responsiveness.

TULIP SMART PLATFORM ARCHITECTURE



TULIP Pilot already underway

COMMENCED 2016, COMPLETION TARGET DECEMBER 2017

The TULIP Smart Cities and Suburbs Program builds upon the TULIP Pilot, which is currently using LoRaWAN wireless technology to deploy approximately 30 sensor nodes across central Sydney (Chippendale, Redfern, Surry Hills, Ultimo, Pyrmont).

KEY AREAS OF FOCUS FOR THE TULIP PILOT:

- Set benchmarks for sensor calibration, accuracy, precision and installation, laying the groundwork for provision of data for research, policy, business, design and citizen engagement.
- Establish early data science and open access data sharing principles, including an API for integration to third party data platforms.
- Develop an early public data portal with visualisation and citizen feedback.

Following the Pilot, TULIP will establish city-scale sensor deployment, urban liveability research, diverse data applications, citizen engagement and education initiatives between March 2018 and June 2019.

THE FOLLOWING TULIP PILOT PARTNERS ARE ALREADY IDENTIFIED AND ENGAGED:

INDUSTRY	IOT STARTUPS	COMMUNITY	RESEARCH	GOVERNMENT
iag	MESHED	Smart Locale	UTS UNIVERSITY OF TECHNOLOGY SYDNEY	CITY OF SYDNEY
FRASERS PROPERTY	SKYGRID	TOTAL ENVIRONMENT CENTRE	KEi	
BOSCH	wattwatchers DIGITAL ENERGY		UTS:ISF INSTITUTE FOR SUSTAINABLE FUTURES	
REEKOH				

Our Partners

Delivering a sustainable model for designing and building liveable cities with engaged communities requires collaboration between cities, industry, government and citizens, leveraging diverse capabilities and expertise. This collaborative approach is a fundamental aspect of the TULIP program.

TULIP's Smart Cities and Suburbs program will commence in January 2018 and conclude in June 2019.

It builds upon a 2017 TULIP Pilot project that is currently benchmarking sensors and developing associated data infrastructure.

UTS IS NOW SEEKING PRIVATE SECTOR AND GOVERNMENT PARTICIPATION AND INVESTMENT IN THE PROGRAM →

To be matched by an application for funding from the Commonwealth Smart Cities and Suburbs Program, which has a total funding pool of $50 million and supports projects that apply innovative technology-based solutions to urban challenges. Significant grants of up to $5 million are available.

OUR PARTNERS WILL EACH BRING IMPORTANT CONTRIBUTIONS AND CAPABILITY TO THE TULIP PROGRAM:

CITIES

- Local knowledge
- Defining Locations
- Co-design in Citizen engagement
- Platform Integration

TECHNOLOGY

- Smart platform building blocks
- Deployment & integration
- Sensors
- Platform Co-design

CITIZENS

- Sensor deployment
- Innovation
- Support

INDUSTRY/GOV

- Environmental co-design
- Planning alignment
- Location provision
- Environmental guidelines

RESEARCH

- Data Science in UHI, Air Quality and Urban Design
- Smart Platform architecture
- Sensor Benchmarking

TULIP Management

Frank Zeichner
Knowledge Economy Institute; and CEO, IoT Alliance Australia

Stuart White
Director, Institute for Sustainable Futures

Jay Guo
Distinguished Professor and Founding Director of Global Big Data Technologies Centre

TULIP

Please direct all enquiries to info@tulipnetwork.org

tulipnetwork.org

Or contact:
Andrew Tovey

TULIP Program Manager
Senior Researcher, Institute for Sustainable Futures
Director of Public Programs, Total Environment Centre
andrew.tovey@uts.edu.au