

SMART Infrastructure Facility

Faculty of Engineering & Information Sciences

2017-2019 STRATEGIC PLAN

smart
infrastructure facility



UNIVERSITY
OF WOLLONGONG
AUSTRALIA

OUR VISION

To be internationally recognised as a leading provider of research and learning for smart infrastructure solutions

OUR MISSION

Provide a creative environment for collaborative research and innovative analyses to deliver cutting-edge solutions for more liveable cities and productive infrastructure.

OUR OBJECTIVES

SMART will accomplish its Mission by:

- Developing digital innovations for people-centric and sustainable infrastructure solutions
- Contributing to cost-effective design and management of resilient infrastructure assets and networks
- Informing the integrated planning of urban and regional infrastructure for more productive and adaptive development
- Educating the next generation of infrastructure leaders, engineers and practitioners to foster innovation and progress

OUR VALUES

- EXCELLENCE – Innovative solutions driven by world-class interdisciplinary research
- PASSION – Creative minds and collaborative culture focussed on improving society and creating public benefit
- INDEPENDENCE – Respected partner providing evidence-based and impartial research
- FORESIGHT – Daring to question conventional thinking and develop new ideas achieving people-centric outcomes

OUR TOP PRIORITIES

#	Priorities	Impediments to achieving	Relevant UOW goal(s)	Relevant Core Strategy(s) (where relevant)	Completion (which quarter)
1	Securing SMART's sustainable growth through: <ul style="list-style-type: none"> Balanced portfolio of competitive grants and commissioned research Manageable mix of small exploratory projects and large applications Flexible, motivated and fit-for-purpose workforce Active collaboration with key partners within EIS, UOW and beyond 	*Decreased government and industry funding *Difficulty to attract relevant staff *Reluctance of colleagues to engage	3.1, 3.3, 3.4 & 3.5 5.1, 5.2 & 5.3	Research Staff Financial	On-going
2	Enhancing SMART's excellence in research within 4 capability domains: <ul style="list-style-type: none"> Smart Data Analytics Infrastructure Modelling & Simulation Infrastructure Economics & Governance Infrastructure Systems Engineering 	*Increased competition from other institutions *Incapacity to retain or promote key academics	1.4, 1.5 & 1.6 2.2 & 2.4	Research Info. Management Education	On-going
3	Consolidating SMART's advantage through 4 impact pathways: <ul style="list-style-type: none"> Assess – Infrastructure Value & Performance Adapt – Productive & Adaptive Infrastructure Protect – Safe & Resilient Infrastructure Learn – infrastructure Knowledge & Training 	*Increased competition from other institutions *Incapacity to respond to new types of demand	1.4, 1.5 & 1.6 6.4, 6.5 & 6.6	Research Marketing	On-going
4	Contributing to UOW's impact and international recognition by: <ul style="list-style-type: none"> Coordinating high impact regional initiatives (Wollongong Challenge) Contributing to National research programs (AURIN, CAUL) Organising high profile international events (ISNGI) Developing strong scientific networks & international exchanges (UGPN) 	*Incapacity to achieve priority 2 or 3 (above)	4.1, 4.2 & 4.4 5.4, 5.5 & 5.6	Marketing Brand Positioning International	On-going
5	Engaging with communities, governments and industries through: <ul style="list-style-type: none"> Key think tanks (UrbanGrowth NSW, Committee for Sydney) Market-driven professional development courses School-focused discovery programs (STEM) Traditional and social media 	*Increased competition from other institutions	2.2 & 2.4 6.1, 6.2 & 6.3	Research Education Marketing	On-going

OUR STRATEGY

Sustainable growth will be achieved through a balanced portfolio of public grant-funded and commissioned research projects. We intend to limit the number of concurrent projects in a given year to a maximum of 10 (5 public grant-funded and 5 commissioned ones) in order to keep an even balance between steady external income and scientific excellence. In order to achieve this target, SMART's executives aim at progressively decreasing the number of small projects (less than \$50k) which financial profitability and scientific value are often limited.

Another key focus of SMART's sustainable growth will be our capacity to manage our **scientific capability** in a flexible manner in order to better respond to new scientific challenges and market opportunities. This flexible management will first and foremost rely on adaptive career development plans and training opportunities for academic staff, as well as attracting new researchers with relevant skill sets.

Our four **Impact Pathways** (Assess, Adapt, Protect and Learn) will continue to define SMART's value added for our external partners and clients. The areas currently identified will be regularly reviewed with our stakeholders and validated by SMART's Scientific Advisory Committee and SMART Advisory Council in order to ascertain their contribution to (1) resilient and efficient infrastructure systems, (2) productive and adaptive regions, and (3) liveable and sustainable cities. Based on our current competitive advantage, key domains of scientific investment and market expansion for SMART include:

- **Infrastructure Systems Engineering**, in particular Model-based Systems Engineering (MBSE). Increasingly complex infrastructure project procurement and long-term management need more effective frameworks to ensure system integrity and cost-effectiveness. Our current projects with ACRI, Sydney Trains and Transport for NSW have provided SMART with an international reputation we can capitalise on.
- **Community-oriented Internet-of Things** (Community-IoT). As smart city and infrastructure concepts take the world by storm, there is a need to monitor and analyse these complex self-organising socio-technical systems through urban or regional 'living laboratories'. The launch of the SMART IoT Research Hub in September 2016 (affiliated with The Things Network) and our strategic collaboration with MESHED, alongside the arrival of NEC on Innovation Campus, have created the right conditions for an ambitious regional initiative supported by UOW.
- **Energy Efficiency Mapping & Benchmarking**. The State of NSW has engaged in a long-term and ambitious energy efficiency program that will require substantial research efforts. Over the last 3 years, SMART - in partnership with UOW's Sustainable Building research Centre (SBRC) - has engaged with NSW's Office of Environment & Heritage in foundational work to curate and map energy-related housing stock data in NSW.

Over the next five years, SMART will progressively develop its comprehensive **educational portfolio** of academic teaching and professional development courses (PDCs). First, we will focus on PDCs aimed at three types of audiences:

- Introductory courses: introducing concepts, methods or tools to relevant students or professionals
- Advanced courses: practical tutorials on specific methods or tools for already qualified students or professionals
- Master classes: high level and strategic description of the benefits of a new approach or technology to executives and other interested parties

Scientific excellence will draw upon foundational work undertaken during the initial 5-year period in terms of overall production and individual performance. However, the next 5-year period will focus on two key aspects:

- Increasing citation rates of our publications through a selective choice of targeted journals (high IF) and co-authorship with senior peers
- Exploring opportunities to establish a research Centre of Excellence in association with relevant research groups in key universities

OUR PARTNERS

Most of our critical Australian and international partnerships have been developed during the initial 5-year period. The next 5-year period will be used to strengthen these collaborations. For example, the International Symposium on Next Generation Infrastructure (**ISNGI**) will continue to foster exchange of ideas and personnel with the University College London (UK), Virginia Tech (USA), Oxford University (UK) and TU Delft (NL). ISNGI 2017 will be held in London in September.

SMART will continue to support the Australian Urban Research Infrastructure Network (**AURIN**) and contribute to the NESP-funded Clean Air & Urban Landscape (**CAUL**) research hub through close collaborations with the University of Melbourne, UNSW and RMIT. SMART will also proactively engage with the University of Surrey (UK), the University of North Carolina (USA) and the University of San Paolo (BR) as part of the University Global Partnership Network (**UGPN**).

Bilateral ties will be maintained and strengthened with the Argonne National Laboratory (ANL, USA) on agent-based modelling, the University of Newcastle (UK) on geosocial intelligence, the University of Namur (B) on transport modelling and the Chinese University of Hong Kong (HK) on organisational research. More recent links will be developed with the University of Moratuwa (Sri Lanka) on urban planning and modelling, Ho Chi Minh City's ICST centre (Vietnam) on crowd-sourced flood mapping and with IIT Kharagpur (India) on supply chain modelling.

OUR GOALS TO SUCCESS

#	GOALS & TARGETS	Completion
1	<ul style="list-style-type: none"> Securing SMART's sustainable growth Minimum of 5 Tier 1&2 and 5 Tier 3&4 projects Minimum of 5 small (< \$100k) and 5 large projects (>\$100k) Increasing the number of Associate Researchers from UOW 	2019
2	<ul style="list-style-type: none"> Enhancing SMART's excellence in research Minimum of 40 publications/year (including 25 journal articles) Minimum of 5 HDR students Minimum of 2 Tier 1 projects (ARC, NHMRC or else) 	2019
3	<ul style="list-style-type: none"> Consolidating SMART's advantage 2 key partnerships with private sector leaders in data analytics National academic leader in integrated regional modelling National academic leader in model-based system engineering (MBSE) First choice service provider for regional infrastructure assessment 	2019
4	<ul style="list-style-type: none"> Contributing to UOW's impact and international recognition International media coverage of the Wollongong IoT Challenge 3 memberships to key national research programs 1 international event organised in Wollongong 1 international project with UGPN partners 	2019
5	<ul style="list-style-type: none"> Engaging with communities, governments and industries 3 memberships to key infrastructure think tanks 6 leading professional development courses (PDCs) 3 school-oriented STEM courses Minimum of 20 media interactions (online, radio or social media) 	2019