

Factsheet: Land & Liveability National Innovation Challenge

Background

One of the key goals for Singapore's long term development is to support sustainable growth and a good quality of life for our people. The Land and Liveability National Innovation Challenge (L2 NIC) is a long-term, multi-agency effort that recognises land as a precious resource to Singapore, and seeks to leverage on R&D to provide sustained capacity and options for future generations.

Vision and Research Focus

The vision of the L2 NIC is to support an economically vibrant, highly-liveable and resilient city of the future with land capacity for sustained growth. This will be achieved through the integrated development of R&D in (i) Creating new space cost-effectively and (ii) Optimising the use of our existing land, while maintaining liveability. These areas will be supported by R&D in enabling Information and Communications Technologies (ICT) and platforms.

Funding

A total of \$135 mil has been approved for the L2 NIC for the first 6 years (FY2013-2018). The funding will cover basic research, applied research and small-scale demonstration projects for both technical research and relevant social and behavioural studies.

Focus on Applied Outcomes and Capability Building

The L2 NIC aims to fund promising R&D projects that have high potential for practical implementation in the areas of land creation, land savings and enhancing liveability and environmental quality.

To ensure the effective translation of research into practical solutions, the L2 NIC will involve close collaboration across Singapore's planning and development agencies and industry. As Singapore continues to develop new towns and growth areas, solutions developed through the L2 NIC can be potentially test-bedded and deployed.

Through the L2 NIC, we hope to attract and anchor talent and research manpower in Singapore with capabilities in both applied research and basic sciences.

Roadmapping Exercise to Direct R&D Funding

A series of R&D roadmaps to guide and prioritise L2 NIC funding are being developed by public agencies in consultation with academic experts and industry. The roadmapping process involves three broad steps (Figure 1). To facilitate gathering of inputs from the research community, three roadmapping workshops involving some 200 researchers were organised in May 2013. The roadmaps will be completed in September 2013 with the aim to launch a first grant call at the end of the year.



Fig 1. Stages and Timeline of L2 NIC Roadmapping Process

Examples of some promising R&D areas that were drawn from the consultation thus far are as follows:

(a) Creating New Underground Spaces

As part of our effort to expand Singapore's land capacity and free up surface land for important uses such as housing, we are exploring the creation of useable underground space for an expanded range of uses. Possible uses include an estate goods mover system (2 West), warehousing and logistics facilities (Tanjong Kling), and biomedical research and industry (Underground Science City at Kent Ridge).

The objective is to create highly-efficient, safe, smart and resilient spaces by:

- i. Constructing and operating underground developments cost-effectively, e.g.
 - Improving engineering materials, construction methods and technologies that are suited for Singapore's geological context;
 - Improving soil and rock conditions.
- ii. Creating safe, conducive and comfortable environments, e.g.
 - Developing safe, efficient and cost-effective mechanical & electrical (M&E) and ventilation systems;
 - Developing effective fire protection and evacuation management systems;
 - Creating comfortable environments for people working underground;
 - Developing efficient and cost-effective sewer and waste management systems.

(b) Optimising and Intensifying Land Use

To make more productive use of our economic spaces, the L2 NIC will explore ways of co-locating and integrating industrial infrastructure. Our aims are to achieve greater supply chain and production efficiencies, as well as cost savings, through shared infrastructure and amenities.

The objective is to support innovative methods of co-locating and integrating industrial facilities that are safe and cost-effective through:

- i. Developing innovative technologies, materials and construction methods for horizontal and vertical lifting of heavy goods/ equipment, corrosion resistance and vibration sensitive requirements.
- ii. Increasing the efficiency of industrial processes, such as through:
 - Value chain management (i.e. where by-products of companies can be utilised as raw materials for other companies);
 - Information portals that link up companies' production lines and supply chains, thus minimising inventory and increasing productivity.

Another objective is to reduce the space needed for industry through reducing the land needed for health and safety buffers. This could be achieved through the development of technical and engineering mitigation measures that could be adopted to remove or minimise the building height constraints imposed by chimneys.

Air rights developments are also being explored in selected areas where there will be meaningful connections and land optimisation opportunities, and where seamless integration across major infrastructure would be beneficial to the surrounding developments. One potential area is an eco-deck with developments that could link one-north to Science Park across the AYE. For the air rights developments, R&D efforts in long-span structures are needed to 'bridge' that gap between vision and reality.

(c) Creating Liveable, Sustainable and Community-Centric Towns of the Future

An important outcome of the L2 NIC is to achieve high standards of liveability in our housing towns, even as they are built to higher densities. Liveability would be measured by improved environmental quality (e.g. improved ventilation, wind flow, sky-exposure, day-lighting, thermal comfort, etc.) and increased connectivity and accessibility to services, employment locations, facilities and amenities.

One objective is to achieve highly-liveable, high-density environments that meet the psychological needs of people through:

- i. Enhancing environmental quality and liveability, e.g.
 - Developing designs and typologies to reduce ambient temperatures, improve wind flow and ventilation;
 - Developing technologies to isolate and mitigate transportation noise, community noise and inter-floor noise;
 - Developing solutions to enhance greenery in high-density contexts to provide relief and improve air quality;
 - Increasing human adaptability to higher densities and achieve greater acceptance, e.g. exploring new housing typologies and urban space designs to enhance the comfort and acceptability of high-rise, high-density living by overcoming barriers to accessibility, navigation and movement (for both daily living and during emergencies).

Another objective is to improve connectivity and accessibility to employment, and essential facilities, services and amenities through:

- ii. Improving intra- and inter-town mobility and accessibility, e.g.
 - New town-level transport systems to improve connectivity around transport nodes;
 - Infrastructure and urban designs to encourage public transport, cycling and walking.
- iii. Co-locating and integrating facilities and amenities with complementary uses to meet rising demand and maintain service quality within higher densities.

(d) Leveraging on ICT for Enhancing Services and Enabling Intelligent Decision-Making

There is potential for enabling ICT to increase the ease of convenience of accessing community, social, healthcare, retail and other urban services, thereby reducing residents' need to travel and reducing the physical space needed for essential services. These could include:

- Systems and technologies to enhance data collection, analytics, with the aim to enhance services for residents;
- Enabling technologies, systems to enhance accessibility and connectivity to services within residential developments (e.g. remote healthcare and medical assistance, virtual schools, smart work centres);
- Modelling and simulation technologies to construct and provide insights to different foreseeable scenarios to aid decision-making.

Governance

An Executive Committee has been formed to guide the development of the L2 NIC and maintain oversight of the relevant urban solutions R&D programmes. The Executive Committee will be led by PS(National R&D) Ms Yong Ying-I and PS(National Development) Mr Benny Lim.

Members of the Executive Committee include Deputy Secretary-level representatives from the Ministry of National Development (MND), Ministry of Finance (MOF), Ministry of Trade and Industry (MTI), Ministry of Transport (MOT) and Ministry of Environment and Water Resources (MEWR) and CEO-level representatives from the National Research Foundation (NRF), Urban Redevelopment Authority (URA), JTC Corporation (JTC), Housing Development Board (HDB), Agency for Science, Technology and Research (A*STAR), Infocomm Development Agency (IDA), Economic Development Board (EDB), Land Transport Authority (LTA) and Centre for Liveable Cities (CLC).