Glossary of terms re. digital planning infrastructure (Figure 1)

APPLICATIONS: It is possible to build a myriad of applications to assist with planning tasks from collaborative design to automated assessment. Although by no means an exhaustive list, some of the key applications include:

- **Digital Twins[1]:** "Digital twins are dynamic, data driven, multi-dimensional digital replicas of a physical entity"[2]. Although a digital twin is still a model, it is differentiated within the draft Australia New Zealand Land Information Council (ANZLIC), and in other guidelines, from traditional digital models by the ability to connect it directly to the real world using sensors, with one able to affect the other (e.g. shades on a building). The excitement around the concept in the built and natural environment sectors is that technology now makes it feasible to create "spatially enabled digital twins", highly detailed 4D (inclusion of the temporal dimension) of entire metropolitan and regional areas.
- **Collaborative Design Platforms:** Interactive programs that provide highly detailed visualisation and assessment of potential planning scenarios based on user input.[3]
- **Digital Public Consultation:** Digital applications that allow for widespread and targeted feedback on planning policy and proposals, including the identification of issues and consensus building.[4]
- **Assisted Assessment Systems[5]:** Through the representation of planning rules as computer code (known as "Rules as Code", "Legislation as Code" or other variants) these systems will assist planners in the assessment of development applications, automating the boring checks and flagging where issues need to be addressed.
- **Planning Advice Systems[6]:** Also utilising planning rules written in computer code, these applications will provide community members with accessible and accurate planning advice based on their location.
- **Analytics for Monitoring and Evaluation[7]:** Development and other data are combined to provide necessary insight into how a city is changing and growing, useful for everything from small business location decisions right through to the ability to protect land for critical infrastructure.

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[1] For example Melbourne's Fishermen's Bend Project djpr.vic.gov.au/about-us/news/fishermans-bend-gets-victorias-first-digital-twin, Western Sydney City Deal www.digital.nsw.gov.au/article/twinning-spatial-services-has-created-digital-twin-nsw and more.

[2] ANZLIC 2019, Draft Principles for Spatially Enabled Digital Twins of the Built and Natural Environment in Australia

[3] For example MIT's City Scope https://www.media.mit.edu/projects/cityscope/overview/ and 'Giraffe' a collaboration between UNSW, UDIA and Cox Architecture https://www.giraffe.build/post/urban-ai and also the Geodesign method developed by Ian McHard and Karl Steinitz and applied worldwide https://en.wikipedia.org/wiki/Geodesign

[4] For example info.vtaiwan.tw/ demonstrates successful digital consultations in practice

[5] Elements of this are included in the Archistar platform archistar.ai/

[6] For example the PlanX System developed by Southwark Council and Open Systems Lab www.planx.uk/ and the prototype rules as code application by Wellington City Council youtu.be/0OBb29aoOx

[7] For example the Pulse of Greater Sydney https://www.greater.sydney/pulse-of-greater-sydney

APPLICATION PROGRAMMING INTERFACES: APIs are comprised of code that provides a direct connection between different software applications, allowing the automated exchange of data and instructions linked to a single verified source, making services and information easily available within and across organisations[8].

PLATFORM: The platform can be conceptualised as four elements, each of which can be provided in digital, interoperable and machine-readable formats for direct use in software applications[9]:

- **Content:** Broad contextual information including strategies, policy documents, web articles, images, videos.
- **Data:** Data generated by planners necessary for this platform includes zoning information and spatial layers, development approvals data including digital building models and infrastructure contributions information. Data generated elsewhere but nevertheless consumed by planners includes a wide range of demographic, economic, sensor and environmental data.
- **Transactions:** Transactions include payment of application fees and issuance of development permits.
- **Rules:** Rules include regulations and planning codes. Planning rules can be represented in computer code, enabling automated or streamlined assessment of a large range of planning matters, a concept known more broadly as 'rules as code'.

[8] NZ Digital Government 2019, *Application Programming Interfaces,* www.digital.govt.nz/standards-and-guidance/technology-and-architecture/application-programming-interfaces-apis/

[9] Adapted from Pia Andrews, 2019, "Government as a Platform: the foundation for Digital Government and Gov 2.0", The Mandarin. www.themandarin.com.au/118672-government-as-a-platform-the-foundation-for-digital-government-and-gov-2-0/. Pia Andrews is an internationally renowned GovTech leader based in Canberra. Planning as a regulatory profession and PlanTech has much in common with the general GovTech field.