E-PLANNING AND E-APPROVALS PROJECT:

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ROADMAP

ACKNOWLEDGMENTS

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CONTENTS

Disclaimer

1. EXECUTIVE SUMMARY

1. EXECUTIVE SUMMARY

Building 4.0 CRC is an industry-led research initiative co-funded by the Australian Government. The CRC aims to develop an internationally competitive, dynamic and thriving Australian advanced manufacturing sector, delivering better buildings at lower cost and the human capacity to lead the future of industry.

1.1 ABOUT THE E-PLANNING AND E-APPROVALS PROJECT

Project 1 of the CRC is titled 'ePlanning and eApprovals – Scoping Study'. Its objective is to develop a roadmap for the phased design and implementation of an innovative digital platform to facilitate effective, efficient, and timely planning and building permits and approvals, thereby removing unnecessary delays and costs that impose substantial constraints on the building and construction sector.

This objective must be viewed in the context of what industry perceives to be a broader problem, and the project's longer-term objective that extends beyond the planning and building permit process to the whole of the building lifecycle. This broader perspective is brought to bear in this report's analysis of the planning and building technical and regulatory space (the mapping of which is a specific deliverable of the Project 1).

1.2 DELIVERABLES AND WORK PACKAGES

The project developed the Work Packages listed in Figure 1 and prepared two reports. The details of deliverables for each work package are provided as below.

(1) Technical and Legal Assessment Report:

WP-TL1: Technical Evaluation and Required Changes

a. A review of initiatives in Australia and key overseas jurisdictions to implement a digital approval and certification process for benchmarking and gap analysis;

b. A review of technologies that are available and may be used for aspects of approval and certification processes; and

c. Identification of the technologies and relevant standards that will need to be developed to achieve the longer-term objectives of the CRC in this area, including the development of a taxonomy for the standardised capture of digital information that can be used in setting up the platform.

WP-TL2: Stakeholder and risks analysis

a. Stakeholder analysis to identify direct users; and

b. Document the needs and requirements of stakeholders.

WP-TL3: Policy, legislative, and regulatory challenges and requirements

a. Identification of reform priorities – identification of areas where reform (policy, legislative and/or regulatory) may be required to achieve the project's objectives;

b. Identification of the legal principles/rules to ensure the validity and enforceability (and admissibility in a court of law) of AI made and/or supported decision-making, and the development of automated decision-making rules;

c. Identification of other required legal principles/rules to be taken into account, to ensure the validity and enforceability (and admissibility in a court of law) of decisions made regarding employing the platform-making; and

d. Regulatory space map – map of the regulatory space within which compliance, certification and approval decisions are made, with a focus on Victoria, New South Wales (NSW), and the Commonwealth, highlighting interconnections and interdependencies between them.

TECHNICAL AND LEGAL ASSESSMENT REPORT	STRATEGIC AND ROAD MAP REPORT	CAPACITY BUILDING
WP - TL1: Technical Evaluation and Required Changes	**WP – SR1:** The project scope of work, business and technical requirements	**WP – C1:** Capacity Building and Training Report
WP- TL2: Stakeholder and risks analysis	**WP – SR2:** Digital Transformation Strategic Plan (Projects List & Timeline)	
WP – TL3: Policy, legislative, and regulatory challenges and requirements	**WP – SR3:** Risk Management	

Figure 1: ePlanning and eApprovals project work packages

(2) Strategic and Roadmap Report:

WP-SR1: The project scope of work, business and technical requirements

a. Identification of the required changes in the technical environment;

b. Identification of a development project on which the development of the new platform will be trialled (pilot area); and

c. Articulation and high-level quantification of the benefits of introducing the digital platform, including reduced duplication of approval/certification processes.

WP-SR2: Digital transformation strategic plan (Projects List & Timeline)

a. Proposed projects, enablers and implementation timeline.

WP-SR3: Risk Management

a. Risk analysis to identify the possible risks in adopting this digital platform; and

b. Risk mitigation recommendations.

(3) Capacity Building:

WP-C1: Capacity Building and Training Report

a. Identification of ways to encourage industry and other stakeholders to transition to the new system.

The current document is the Strategic Roadmap report, which proposes 11 projects and enablers as discussed in Section 1.3.

1.3 PROJECTS, ENABLERS AND RECOMMENDATIONS

The ePlanning and eApprovals scoping project found that the limited adoption of technologies to Victoria's planning and building approval processes has led to avoidable delay, little predictability, and a lack of transparent monitoring in issuing building permits.

Digital and information technologies have been identified as core enablers to facilitate effective, efficient and timely planning and building permits and approvals.

Initiatives in various jurisdictions have demonstrated their opportunities and benefits.

In addition, having established that the planning and building regulatory spaces (and their constituent regulatory regimes) are crowded, complex, contested, costly and changeable, the roadmap has designed the following 11 projects

and enablers to address the causes of that complexity and the associated costs.

These projects and enablers will help to revolutionise our current systems to a modern planning and building approval system by 2027.

The projects, and the characteristics of the regulatory space/regimes they are designed to address, are shown in Figure 2.

The primary project is the development of the digital assessment platform that is directly supported by two legal projects.

It is designed to address the complexity, costs and variability of planning and building approval processes.

In addition, a series of other projects have been designed to address other

aspects of the regulatory space that contribute to the complexity and cost of the current regimes (also shown in Figure 2).

As explained below, each of these projects would also enhance and/or leverage the functionality provided by the digital assessment platform to maximise its value.

This roadmap suggests 11 projects in 3 categories of **Technical**, **Process Improvement**, and **Legal and Regulatory**, to enable the move to a modernised planning and building approval system in 2027. Training and capacity building is suggested as an enabler across all stages of roadmap implementation.

The projects have been proposed according to the challenges and issues identified and explained in the scoping study (Report 1).

The list of projects is as follows.

Technical

1. Business Process Assessment
2. Framework (e-Lodgement, 3D Map–base, Assessment Engine)
3. Data Model & Exchange Format for Building & Planning
4. System Design
5. System Implementation and Pilot

Process Improvement

1. Reform of Quantitative/Qualitative Assessment Modes for ePlanning and eApprovals system
2. Aggregating Digital Application Data for Better Decision-making

Legal & Regulatory

1. Reform of the Planning Objection and Appeals Process
2. Regulatory Harmonisation
3. Legal Implementation Strategy
4. Legislative Framework Requirements to Support ePlanning and eApprovals

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This roadmap suggests 11 projects in 3 categories of Technical, Process Improvement, and Legal and Regulatory, to enable the move to a modernised planning and building approval system in 2027.

LEGISLATIVE FRAMEWORKS
REQUIREMENTS

DIGITALISED ASSESSMENT
PLATFORM

LEGAL IMPLEMENTATION
STRATEGY

Scoping Study: Regulatory Space is

| CROWDED | COMPLEX | CONTESTED | COSTLY | CHANGEABLE |

Aggregating digital application data for better decision making

Reform of Quantitative / Qualitative assessment modes for digital e-approvals

Regulatory Harmonisation
(Regulatory Space Reconfiguration)

Reform of Planning Objections & Appeals Process
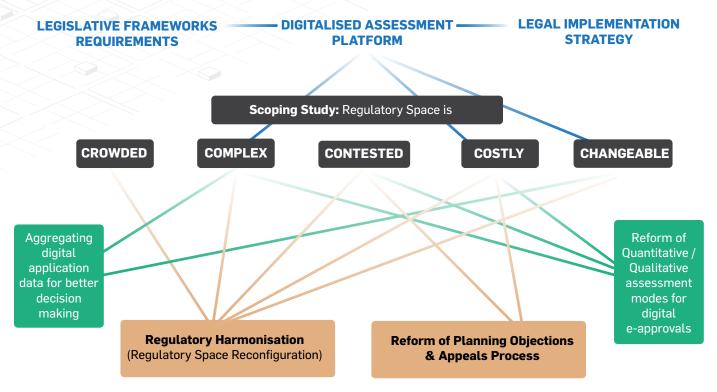
Figure 2: Addressing 5 challenges of current regulatory space through the ePlanning and eApprovals Roadmap.

TECHNOLOGICAL RECOMMENDATIONS:

The following recommendations will help with verifying efficient planning:

- **Phased Development:** In developing the platform, it would be best to prioritise the development of components to ensure that they are interoperable. This will address what has previously been identified as a problematic and challenging exercise – developing a 'one-stop' digital platform covering the whole-of-building lifecycle. Decisions on the phasing of components will need to consider government implementation level, building type, and level of digitisation in assessment.

- **Adaptability:** Ensuring the platform can expand to cover all construction types and other jurisdictions.

- **Aim:** In developing digital planning systems, outcomes should be citizen-centric and improve the places, and the efficiency, of approval processes.

- **Transparency:** The platform should be able to provide a clear explanation of how it made a decision. This will be easy to do with deterministic systems; harder with probabilistic systems. In

addition, the platform should provide an audit trail for each decision made, which shows each step in the process, the principles applied and considerations taken into account at each of those steps, and (where relevant) the dataset used for training purposes.

- **Cooperation:** The development of digital planning infrastructure should be a priority.

ENABLING RECOMMENDATIONS:

The recommendations for a digital modernisation process, from the qualitative stakeholder research and legal advice, are as follows:

- **Future-proofing the platform:** Ensuring the platform can evolve with the industry, technology, and government policy changes and developments.

- **Future-proofing regulation:** Ensuring the regulation is sufficiently agile to adapt to rapid and transformative changes in both industry and technology.

- **Mindful integration with the existing system:** The digital modernisation process should be cognisant of the purpose and values of each existing component of the building, and planning permit application system. The process should seek to integrate with and improve these purposes and values, including those separate to the process (such as qualitative assessment in planning). If required, safeguards should be provided to ensure all purposes and values are not put at risk by the process.

- **Extensive Stakeholder Analysis:** A fine-grain and wide-ranging understanding of all industry and stakeholder needs and barriers is important to identifying the most effective and promising avenues to commence the digital modernisation process. Further investigation should capture distinctions in the different typologies, delivery approaches of development, and stakeholder roles in the process. The platform should be developed in close partnership with industry to ensure its needs are properly understood and reflected in the final design.

- **Ownership:** The government should own, or be licensed to use, the intellectual property in the platform, to be able to disclose the platform's logic to judicial and other legal authorities, and to evolve the platform with changes in industry practice, technological developments, government policy, and the law.

- **Respect and protect third-party rights:** An approach to ensure that the commercial, privacy, and data rights of developers and users of the platform are protected.

- **Phased development:** A transition plan to support the roll-out of the platform. This approach leverages the drivers for change and overcomes (or at least mitigates) the barriers to change. While the digital transformation process should focus initially on key development sectors that will benefit from large-scale change in the development industry, smaller opportunities for change exist, such as creating an as-built model library in established areas. Concurrently implementing some of these smaller changes would be more inclusive of a greater range of actors in the overall process, therefore encouraging greater buy-in.

- **Broader value exploration:** In addition to the time and cost benefits for development, other broader benefits, like the potential to aggregate data to improve government decision-making, should also be explored to fully evaluate this initiative's value.

- **(Algorithmic) Bias prevention:** When designing a machine learning system, the training data will need to be scrutinised for existing biases. Machine learning training should also be initially overseen, allowing for a thorough trial of the process to detect errors. A gradual roll-out will then enable checking for unforeseen errors.

- **Communication:** The purpose of introducing each component's system change and significance should be clearly communicated in training to all industry and other stakeholders involved in the process. This will assist with maintaining high-quality applications and assessments, and avoiding regression into only meeting the process requirements.

- **Data and leadership:** To encourage industry uptake of a digital transformation process, as identified in the literature, there should be a focus on facilitating valuable and convenient data collection and technical platforms that are highly targeted in purpose, and interfaced to specific applications. In addition, the need for organisational leadership and change was noted in all professions, as was adequately supported education and training.

2. VISION AND GOALS

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2.1 VISION

By the next 5 years, we will be able to submit and assess development proposals against planning and building rules on a common, interactive, and digitally-advanced platform that can be used by practitioners and authorities.

2.2 GOALS

By 2027, Digital Planning and Approvals Systems aims to:

1 Provide a digital representation of the real world that is multi-dimension (2D, 3D, 4D.

4 Be based on common standards, interoperable with other platforms, and capable of applying across jurisdictions in the life of building.

2 Facilitate the digital lodgement and assessment of planning and building applications and communicate progress of these applications.

5 Be informed by, and grounded in, user needs and barriers, and be accessible to all stakeholders, easily functioned, and readily understood and used.

3 Facilitate better government decision-making at the micro-, meso- and macro-levels.

6 Be a modular architecture, adaptable with emerging and evolving technologies.

3. EXISTING GAP AND CHALLENGES

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Following a current status assessment, benchmarking, and gap analysis, the existing gap and challenges associated with the Planning and Approvals have been identified under three distinct aspects: technical, process, and legal and regulatory.

Table 1: Gaps and challenges (Technical, Process Improvement, Legal and Regulatory)

Aspect	Major Gaps and Challenges
Technical	• There is a lack of single point of access to data and information, which has increased the complexity and delay in planning and building approvals. Despite overlapping activities, building and planning approvals use fragmented digital systems. • Current planning and building approval processes rely on systems with limited useful functionalities, such as workflow capabilities, template management, access to council data, and document management with council Data Management System (DMS). • Planning applications in both the statutory and strategic domain lack a standard data model. The strategic planning data cannot be used for statutory planning. • There are compatibility challenges associated with the existing local government online platforms with the proposed assessment engine. • Despite developing guidelines such as the Victorian Digital Asset Strategy (VDAS), there is a lack of building data standard, which increases the complexity and delays the approvals process. • There is a delay, little predictability, and a lack of transparent monitoring in issuing planning and building permits due to a limited adoption of technologies. • There is a lack of standard information frameworks for managing, publishing, and disseminating geometric and semantic information for planning and building approvals data. It hinders the process of digital transformation.
Process	• Inconsistency in quality of information: in some cases, more time is required for decision-making due to the insufficient quality of provided information. • Decision complexity: complexity of planning and building approval processes that manifest in requirements for complex information and forms. • Decentralised management: issued permits and all relevant records are collected by different authorities but not integrated with monitoring or reporting at other stages of the process causes decision delays, and insufficiently supports the establishment of strategic plans for individual states, and nation-wide. • Multiple authorities but lack of network: there are significant costs and delays resulting from diverse decision-making authorities who navigate systems in the assessment of various decision stages, in addition to poor connection with the network, which would allow an efficient report and consent procedure. • Multi-layer legislations: various planning and building legislation is added to the approvals system, which contains many layers of state and local government policies, standards, and requirements. • Considerable time and effort of decision-makers in reviewing, assessing, and determining whether applications meet planning and building approval requirements within the error-prone manual procedure. • Absence of a channel or system enabling applicants to monitor the progress status 24/7 and communicate with permit issuers. • Ineffective data management during construction stages in updating and synchronising required documents for planning and building permits in line with design changes. • Difficulties in the management of building records in inconsistent data formats resulting from different lodgement platforms and procedures of local councils (i.e., online form, email, post). • Discretionary aspect in planning schemes that refers to the quality of space is subjective decision-making, which is difficult to address via digital technologies.

Aspect	Major Gaps and Challenges
Legal and Regulatory	• The regulatory space is crowded (there are many rules, actors and instruments). • The regulatory space is complex (there are many (subjective) variables, interactions and contingencies). • The regulatory space is contested (rules and actors with different purposes and objectives). • The regulatory space is costly (the result of the complexity). • The regulatory space is changeable (in response to new circumstances and changing norms). • The factors contributing to the complexity and cost of the space (and its regimes) were examined and discussed in the scoping study. Important factors identified (in addition to the manual, paper-based process) included: (1) third party objection and appeal rights (and the inherent risk of design change they introduce); (2) the presence and prominent role played by qualitative (subjective) assessment criteria; (3) multiple, overlapping regulatory frameworks at the national, state and local (council/municipal) levels; and (4) at the local level, a lack of standardisation and consistency of approach. Developing a 'one-stop' digital platform that covers the whole-of-building lifecycle is a difficult and challenging exercise.

4. RECOMMENDATIONS

To address the identified gaps and challenges, the following recommendations are proposed under the three pathways: Technical, Process Improvement, and Legal and Regulatory.

Table 2: Recommendations (Technical, Process Improvement, Legal and Regulatory)

Aspect	Recommendations
Technical	• A centralised digital approval system for reporting, monitoring, communication, data sharing, and tracking progress for connecting state and local governments with other stakeholders. • To develop a digital platform to submit and approve planning and building permit applications aligned with the existing systems, standards (state, national, international), and relevant government initiatives and strategies. • A step-wised automation for the compliance checking process, to facilitate efficiency and accuracy of approvals according to the maturity model. • To establish a digital data environment to capture, exchange, and deliver required information for planning and building approvals in a consistent format. • To move towards digital submissions by accepting 3D models and geospatial data in accordance with an approved data model to shift from 2D document-based information for applying and assessing planning and building permits, to an integrated 3D digital information. • Developing a Planning Application Domain Model (PADM). • Developing a Building Application Domain Model (BADM). • Developing an automated compliance checking system in parallel with establishing digital regulation representation that runs regulation compliance checking in planning and building approvals. • Use of cloud computing as an essential component for the centralised system, to provide online services for applying, tracking, assessing, and managing planning and building permits, and an integrated network and database with relevant authorities. • Digital decision-making systems to be interoperable and consider accountability, transparency, and trustworthiness. • Adoption of a design-thinking approach with user experience to co-design, develop, and testbed digital planning and building approval infrastructure. • Investments in developing Digital Twins and smart platforms by the states and local governments to be integrated with electronic lodgment of planning and building proposals.
Process	• Bridge the gap in planning and building approval processes over the building project lifecycle. • Local governments are at the forefront of providing services and interacting with both service providers and users (citizens). Digital planning and building should start at the local level, in accordance with the existing contextual and local differences, considering the needs as well as local standards. • In the development of digital planning and building systems, outcomes to be citizen–centric and improve the places and the efficiency of approval processes. • Digital decision-making systems to be held accountable and be transparent. • Cooperation in the development of digital planning and building infrastructure to be a priority.

Aspect	Major Gaps and Challenges
Legal and Regulatory	• Develop the platform in close partnership with industry to ensure its needs are properly understood and reflected in the final design. • Ensure the platform can expand to cover all construction types, and other jurisdictions. • Future-proof the platform - ensuring the platform is capable of evolving with changes and developments within industry, technology and government policy. • Future-proof regulation – ensuring the regulation is sufficiently agile to adapt to rapid and transformative changes in both industry and technology. • Ensure the platform is accessible to all who may have a need to use it – not just those directly involved with the preparation and assessment of planning and building permit applications, but also the public (and potential objectors) and those charged with resolving disputes that might arise (e.g. VCAT). • Support the roll-out of the platform with a transition plan that leverages the drivers for change and overcomes (or at least mitigates) the barriers to change. • Identify legislative decisions made based on objective criteria, compared to those reliant on subjective or polycentric considerations, and make recommendations that are more amenable to automation. • Develop an implementation strategy to support the development of the digital assessment platform, including identifying any legislative, regulatory or process amendments required to facilitate it. • Progress the edvelopment of the platform by prioritising the development of components and ensuring those components are interoperable. • Perform a comprehensive legislative stock-take to determine the extent to which legislative frameworks might facilitate or hinder the establishment of ePlanning and building approvals.

5. BENEFITS AND OPPORTUNITIES

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The ePlanning and eApprovals system provides several significant benefits through switching from a mostly manual system to a digital service delivery. To follow are some of the high-level benefits for the main stakeholders.

Aside from the general benefits of the ePlanning and eApprovals system, the projects can create new opportunities in many areas of the planning and building permit process at both national and local levels across a range of sectors.

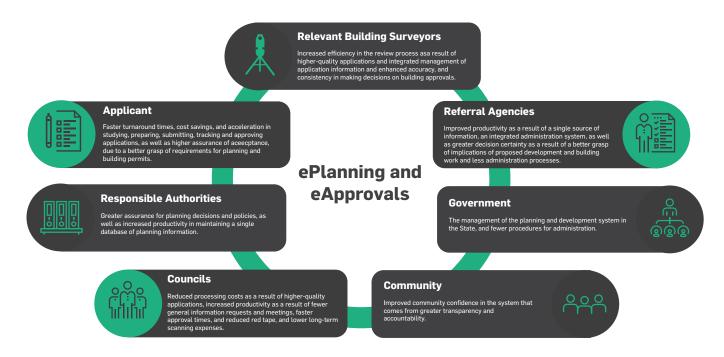These opportunities are listed in Figure 4.

Relevant Building Surveyors

Increased efficiency in the review process asa result of higher-quality applications and integrated management of application information and enhanced accuracy, and consistency in making decisions on building approvals.

Applicant

Faster turnaround times, cost savings, and acceleration in studying, preparing, submitting, tracking and approving applications, as well as higher assurance of aceecptance, due to a better grasp of requirements for planning and building permits.

Referral Agencies

Improved productivity as a result of a single source of information, an integrated administration system, as well as greater decision certainty as a result of a better grasp of implications of proposed development and building work and less administration processes.

ePlanning and eApprovals

Responsible Authorities

Greater assurance for planning decisions and policies, as well as increased productivity in maintaining a single database of planning information.

Government

The management of the planning and development system in the State, and fewer procedures for administration.

Councils

Reduced processing costs as a result of higher-quality applications, increased productivity as a result of fewer general information requests and meetings, faster approval times, and reduced red tape, and lower long-term scanning expenses.

Community

Improved community confidence in the system that comes from greater transparency and accountability.

Figure 3: ePlanning and eApprovals high-level benefits of main stakeholders

Greater value return to community (e.g. Faster turnaround times, Cost savings, Increased transparency, and Convenience)

Greater assurance for planning decisions and policies, Integrated management of application information, ,Increased productivity, and Better performance monitoring and reporting.

Easier integration with broader stakeholders including Applicants, Responsible authorities, Relevant building surveyors, Councils, Referral agencies, and Government.

Significant reduction in operation and maintenance costs, Increased accountability, and Efficiency.

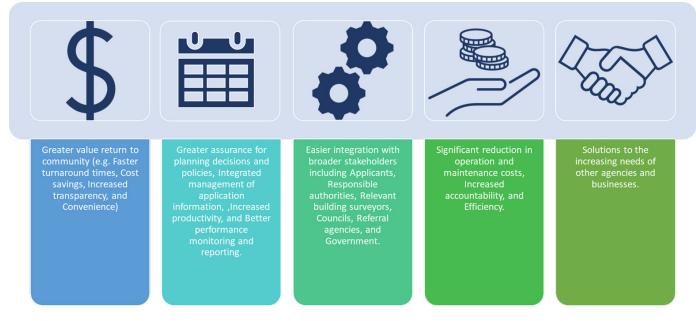Solutions to the increasing needs of other agencies and businesses.

Figure 4: Opportunities created by ePlanning and eApprovals

6. MATURITY LEVELS

Three components for the ePlanning and eApprovals system have been defined as E-lodgement, 3D-Mapbase, and Digital Assessment Engine (refer Figure 5).

- **E-lodgement:** Electronic lodgement is part of electronic conveyancing. It is the use of an Electronic Lodgement Network (ELN) to lodge the planning and building permit applications. This component can be used by all parties involved in the planning and building permit and certification processes.

- **3D-Mapbase:** This is a spatially enabled infrastructure that can integrate different and multi-dimensional data about buildings, infrastructures, population, environment, and socio-economic aspects of an area. The infrastructure provides facility for visualisation, data management, and spatial modelling and analysis. This

can be considered as a Digital Twin of a state to provide an infrastructure for representing the current status.

- **Digital Assessment Engine:** This engine enables the system to assess the planning and building applications against planning and building rules.

E-LODGEMENT

Business Process Management System

Administration

3D - MAPBASE

Visualisation & Spatial Data Management, Spatial Analytics

DIGITAL ASSESSMENT ENGINE

E-Lodgement

Figure 5: Three components of the ePlanning and eApprovals system

Based on the three components defined in Figure 5, and considering the findings of stakeholder analysis, four significant steps for potential digitisation of the planning and building approval processes have been identified, each with different focus and level of maturity:

a. purely administration system, which is a simple file lodgement and processing system that begins the application pipeline and enables applicants to check the progress of applications;

b. a deterministic system that employs rules as code and is able

to provide yes/no responses to objective criteria;

c. a deterministic system that, besides objective decision-making, facilitates further analytics and provides visualisation methods to understand broader impacts of building on neighbouring properties (amenity impact); and

d. a deterministic and probabilistic system that uses machine learning techniques and is able to make predictions based on pre-programmed algorithms that can adapt to an ongoing stream of data.

Figure 6 shows the relation of three digital infrastructure components (column) with four system deliverables (row), which constructs the maturity matrix of ePlanning and eApprovals system.
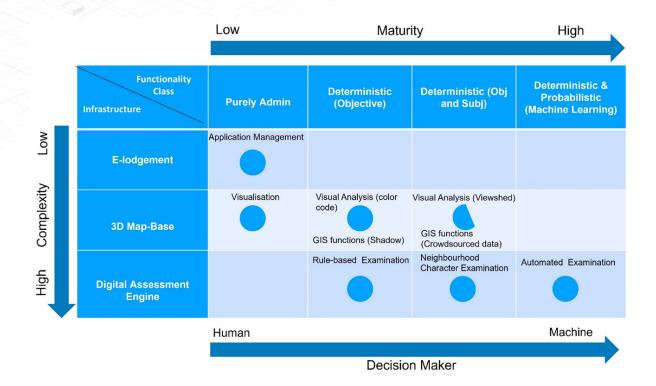
Figure 6: ePlanning and eApprovals system maturity matrix

7. HIGH-LEVEL ARCHITECTURE

The ePlanning and eApprovals conceptual high-level system architecture is designed to support the ePlanning and eApprovals system. It is aligned with the latest available technologies and the world's best practices, and customised to consider the planning and building approval process requirements. The architecture is designed based on cloud computing technologies and services to provide advantages such as efficiency, flexibility and scalability.

In this system, the applicant refers to a property owner or owner's agent who lodges applications for planning and building permits in a standard format developed for planning and building applications.

By having access to the E-Lodgement portal, the applicant can create, submit and track applications.

Some initial examinations are conducted to test the completeness of the application before signing and lodging applications.

The Business Process Management Service (BPMS) manages all user application activities.

The service is designed based on the business processes, and is used to create, control, modify, monitor, and generate reports regarding the status of the application. The service can also be responsible for activities such as payments, notifications, and document management.

In the next level, 3D Map-base converts uploaded data from applications to the Planning Application Domains Data Model (PADM) and Building Application Domains Data Model (BADM), based on standard data exchange formats, and prepares them for storage in the PADM/BADM database for integration and visualisation on the Digital Twin environment, which will digitally represent the real world and performs selected GIS functions to provide various analyses according to required business processes.

The Digital Assessment Engine is responsible for assessing applications using a validation service to check applications against the regulations.

The Digital Repository stores applications and permit information in the cloud infrastructure, and provides required data to the whole system. Applicants can also have access to the Data Repository to download a 3D model of neighbouring properties to design future developments.
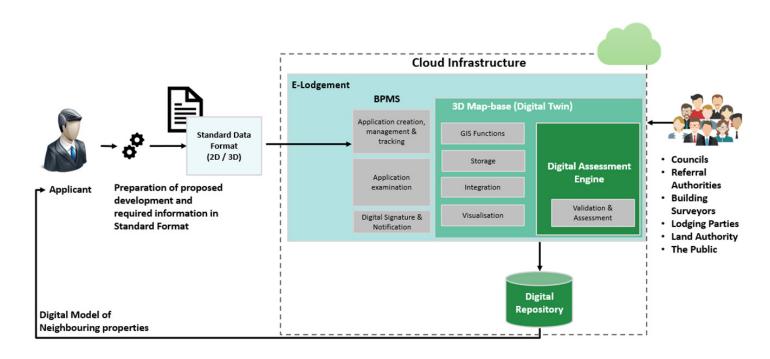

Figure 7: ePlanning and eApprovals High-Level Architecture

8. RISK MANAGEMENT

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This section provides an overview of the risk management framework to identify the risks associated with the proposed ePlanning and eApprovals projects. The framework is developed in compliance with the ISO 31000 standard[1] that provides principles, a framework, and a process for managing risks.

The risk management framework is adapted from "Public-Private Partnerships in Land Administration: Analytical and Operational Frameworks"[2], which was developed by the World Bank to address knowledge gaps, and advance the thinking in land administration with appropriate risk mitigation.

The report presents a Risk Reference Matrix (RRM) with a focus on ePlanning and eApprovals.

The RRM has been slightly modified to reduce ambiguity and improve its fitness to the scope of the proposed projects.

The proposed framework includes 12 high-level risk indicators in planning and building approval processes across six categories, as shown in Figure 8.

The identified risk indicators falling under each risk category are listed in Table 3 in Appendix II.

The table also provides some brief examples of the associated impacts along with the corresponding mitigation recommendations for each risk indicator.

Figure 8: High-Level Risk categories. Modified from (World Bank, 2020)[3]

[1]https://www.iso.org/iso-31000-risk-management.html
[2]https://openknowledge.worldbank.org/handle/10986/34072
[3]https://www.worldbank.org/en/topic/urbandevelopment/publication/ppps-in-land-administration

9. PROPOSED PROJECTS, ENABLERS AND IMPLEMENTATION TIMELINE

This section provides the implementation timeline and description of the proposed enabler and projects along with their alignment to the ePlanning and eApprovals, scope, duration, commencement date, key inputs and requirements, and outputs.

The identified enabler and projects are the outcome of the status assessment, benchmarking studies, and recommendations made in accordance with the findings of the gap analysis. Figure 9 provides a timeline of projects and enabler in the context of this roadmap.
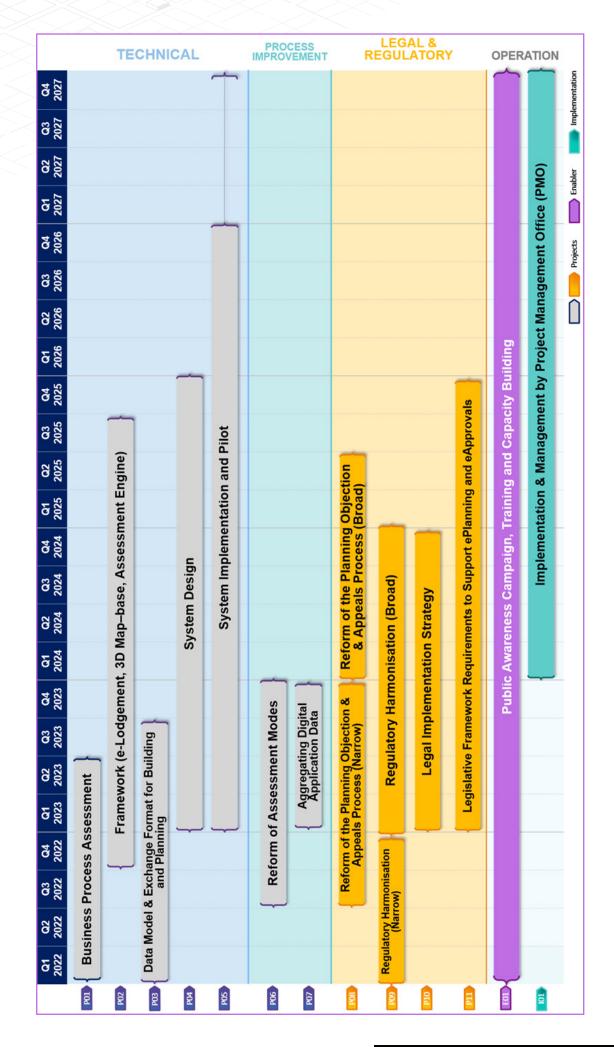
Figure 9: Proposed ePlanning and eApprovals projects and enabler implementation timeline

E1 | Public Awareness Campaign, Training and Capacity Building

ENABLER SCOPE

The "Public Awareness Campaign, Training and Capacity Building" enabler aims to communicate the ePlanning and eApprovals journey with key stakeholders and the general public. It will also ensure that stakeholders are well educated to adopt the ePlanning and eApprovals institutional, legal, and technical changes. Recommended activities under this enabler are:

- Training and capacity-building activities including staff training and executive coaching, accredited multi-module courses, and online forums where practitioners can learn, share, and expand their knowledge.
- Public awareness campaign activities including dissemination of ePlanning and eApprovals output, periodic publication, cultural events, display, and audio-visual ads across national and local media channels.
- R&D activities including applied research, market research, experimental development, creativity, and talent management.

DURATION

Entire lifetime of the ePlanning and eApprovals project

COMMENCEMENT

Q1 – 2022

KEY INPUTS & REQUIREMENTS

Creation of special organisational taskforces with members from various specialties (such as scientific researchers, public relations, and social media experts, etc.), to facilitate and oversee the development of the required plans and establishment of the associated teams

OUTPUTS

- Greater public awareness of the ePlanning and eApprovals services.
- Improved collaboration among internal and external stakeholders.
- Enhanced creation of organisational knowledge and experts.
- Faster and better adaptation to new technologies.

P1 | Business Process Assessment

ePlanning and eApprovals Roadmap

GOALS

G2, G3, G5

PROJECT SCOPE

This project aims to review and document the end-to-end land development process including planning, subdivision, construction, and registration steps to realise the existing inefficiencies and challenges in details. In addition, this project aims to assess the feasibility of automating the end-to-end land development process within the ePlanning and eApprovals system, to increase the economic return of the land and property industry for the whole society.

DURATION

18 Months

COMMENCEMENT

Q1 – 2022

KEY INPUTS & REQUIREMENTS

- Engagement with all stakeholders to confirm business land development processes.
- All business flow diagrams to be developed based on Business Process Modelling Notation (BPMN) standard

OUTPUTS

- The planning and building business processes review document.
- A list of business processes/steps that can be improved in the ePlanning and eApprovals system

P2 | Framework (e-Lodgement, 3D Map–base, Assessment Engine)

GOALS

G1, G2, G3, G4, G5, G6

PROJECT SCOPE

This project aims to provide a conceptual framework for a) e-Lodgement, b) 3D map-base, and c) assessment engine.

DURATION

36 Months

COMMENCEMENT

Q4 – 2022

KEY INPUTS & REQUIREMENTS

- Access to existing systems and platforms for the planning and building approvals

OUTPUTS

- Digital planning and building approvals modernisation conceptual framework

P3 | Data Model & Exchange Format for Building & Planning

GOALS

G1, G2, G3, G4, G5

PROJECT SCOPE

This project develops a Planning Application Domain Model (PADM) and Building Application Domain Model (BADM), and provides recommendations on data exchange format.

DURATION

21 Months

COMMENCEMENT

Q1 – 2022

KEY INPUTS & REQUIREMENTS

- Access to existing strategic and statutory planning spatial and textual data
- Review the relevant data models and exchange formats

OUTCOMES/KPI

- Develop the PADM
- Develop the BADM
- Develop a data exchange format

P4 | System Design

GOALS

G1, G2, G3, G4, G5, G6

PROJECT SCOPE

This project aims to design the ePlanning and eApprovals system architecture components including detailed business and technical requirements (which incorporates the technologies selection)in consultation with relevant stakeholders. The main components are as follows:

- Cloud infrastructure
- Portal
- Business Process Management System (BPMS)
- Data storage infrastructure
- User management service

DURATION

36 Months

COMMENCEMENT

Q1 – 2023

KEY INPUTS & REQUIREMENTS
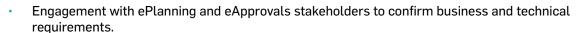
- Engagement with ePlanning and eApprovals stakeholders to confirm business and technical requirements.
- High-level ePlanning and eApprovals conceptual architecture.
- Existing and future anticipated data size and processing requirements.

OUTCOMES/KPI

- ePlanning and eApprovals detail design documentation.

P5 | System Implementation and Pilot

GOALS

G1, G2, G3, G4, G5, G6

PROJECT SCOPE

This project aims to develop all services required to acquire, create, exchange, validate, edit, visualise, analyse and process applications for the planning and building approvals provided by users/stakeholders. Through developing this system and related services, users will be able to submit their applications and assess their applications (based on their access level) in a digital environment

DURATION

48 Months

COMMENCEMENT

Q1 – 2023

KEY INPUTS & REQUIREMENTS

- System Design (Project 4) is a prerequisite for this project.
- Engagement with government and industry stakeholders to identify issues relating to implementation of ePlanning and eApprovals.

OUTCOMES/KPI

- System implementation.
- Running Pilots (Appendix III discusses the scope of the pilot projects).
- Identification of any legislative, regulatory, or process amendments required to facilitate ePlanning and eApprovals.

P6 | Reform of Quantitative/Qualitative Assessment Modes for ePlanning and eApprovals System

GOALS

G1, G2, G3, G4, G5, G6

PROJECT SCOPE

Stakeholder interviews, conducted in the scoping study, revealed industry tension towards qualitative and quantitative assessment modes in planning regulation. Participants highlighted the lack of clarity and understanding regarding the purpose behind having two different modes for development practitioners and assessors, and the best utilisation of each mode within the current system. While those interviewed all agreed that reform in this area was required, perspectives differed on the best approach, the value, and the potential risks presented from each approach.

This project aims to outline the options for reforming qualitative assessment for digital transformation purposes. It will analyse the benefits and risks presented by each option from a technical and design perspective, and evaluate the identified options with this further knowledge in mind against an agreed criteria.

This project will provide recommendations for:

- Specifically, the most suitable application option for qualitative and quantitative assessment in a digital transformation process as per the agreed criteria. It will also include suggestions of safeguards and parallel actions that may be required to accompany this option, to ensure the best outcome is achieved in the process.
- More broadly, a further understanding of the purpose of each mode of assessment, the current opportunities for reform, and the risks from a design and technical perspective for the different existing options.

DURATION

18 Months

COMMENCEMENT

Q3 – 2022

KEY INPUTS & REQUIREMENTS

1. **Desktop review** of assessment measurement methods for quantitative elements of design, including surrogate quantitative measurement methods for qualitative elements and instances where qualitative measurement is only suitable. This will review policy, scholar and grey literature.

2. **Visual design assessment**, via application to a series of building plans currently under assessment, of the potential options for any existing qualitative measurements to be altered to quantitative, either through surrogate measurement methods or as part of a regulations review. This will evaluate the efficacy and implications to design quality and lived experience of each option.

3. **Case study review** of a series of different existing options for reforming qualitative assessment for the digital transformation process. This will include both local and international cases, and examine in further detail their technical method of implementation, the benefits experienced for the development sector and design, and the issues/risks presented. If available, it will also outline the recommended actions for offsetting any risks identified.

4. **Stakeholder analysis of a broad spectrum of industry stakeholder**s on the specific issues/opportunities for assessment efficiency/certainty and ensuring a satisfactory design quality with either the current Victorian amalgamated qualitative/quantitative assessment system or a more separate and designated approach.

5. **Evaluation Workshops with project partners and key industry stakeholders**. Two workshops will be conducted as part of this research project. After the desktop review (stage 1), an initial workshop will be held to discuss the research outcomes and form an agreed criterion against which to evaluate the different options for reform. A second workshop will be held at the completion of the remaining stages of research to discuss the evaluation outcomes of the options from stages 2-4. This workshop will discuss recommendations on the most suitable application and the parallel actions required for qualitative assessment reform via a digital transformation process.

OUTCOMES/KPI

*   Interim stage reports and presentations to project partners.
*   Two workshops with project partners and select industry stakeholders.
*   Final report that outlines:
    *   » An overview of the international and academic context of reforming qualitative assessment for digital transformation and specific case study examples, with further detail and assessment of their suitability in application in the Australian context.
    *   » Visual design testing of case study options to pragmatically understand the efficacy and implications of each option.
    *   » An evaluation criterion for qualitative assessment reform and assessment of each option against these criteria.
    *   » Recommendation of the most applicable option for the Australian context and any further requirements for parallel actions to accompany this option, to ensure that the reform positively contributes to the digital transformation process.

P7 | Aggregating Digital Application Data for Better Decision-making

GOALS

G3, G5

PROJECT DESCRIPTION

The stakeholder interviews highlighted the opportunity for the digital assessment process to capture aggregate urban level, smart data for better decision-making. The quantification necessary to assess applications can be scrapped to provide state government, local planners, and developers greater understanding of how potential developments contribute to and impact the immediate urban area, as well as the compounded effect of all future development on a larger scale. For planners and governments, this aggregate understanding can demonstrate how an individual proposal fits into city-wide policies and strategies overall, and assists the management of sufficient infrastructure provision specifically for that area. For developers, feasibility studies can gain greater accuracy and complexity with the scale of information. Interview participants noted instances where data was already manually collected, and the benefits observed for nimble, evidence-informed decision-making. They noted the significant opportunity to improve decision-making by expanding the ease of collecting and reporting this data.

This project proposes to scope the potential opportunities, best use and barriers for capturing smart data from the ePlanning and eApprovals processes and analysing this data at the aggregate level to benefit both policy and developer decision-making. It will make recommendations on both application data scraping and utilisation in decision-making within an Australian development context, with the aim of improving decision-making through evidence in policy and development.

DURATION

12 Months

COMMENCEMENT

Q1 – 2023

KEY INPUTS & REQUIREMENTS

This project is composed of three consecutive but overlapping phases, with each phase informing the following. At the completion of each phase, an interim report and presentation will be made to project partners on the phase outcomes. All research phases will inform a series of recommendations and report for review by the project partners before completion of the project.

1. **Desktop review** of the literature and international policies for smart data collection, focusing on systems for broader scale policy and developer feasibility data collection.
2. **Case studies** examining in further detail potential examples of application to Australia's systems and development industry, with potential cases including London's planning data dashboard and Fink's urban development financial modelling. The case studies will focus on scoping the opportunities, barriers and risks presented by the different systems.
3. **Stakeholder analysis** of a broad array of industry stakeholders and project partners, including interviews with developers, permit assessors, strategic planners and policy makers, to establish the benefits, opportunities and barriers for scrapping and aggregating application data for decision-making purposes.

⚜ OUTCOMES/KPI

- Interim reports and presentations to project partners at the completion of each research phase.
- A final report outlining:
  - » The international context of smart data collection for policy and development feasibility purposes.
  - » An overview of potential benefits and barriers that this digital transformation could bring from scholarly research and grey literature.
  - » An in-depth and extensive review of a series of case study projects and the lessons to be learnt from the experience of these projects when applying a similar system to Australia.
  - » A detailed examination of applying a smart application data system to an Australian context, including the opportunities, benefits and barriers identified by industry.
  - » Recommendations for the effective implementation of such a system as informed by all phases of the research, specifically focusing on the strengths and weaknesses for implementation in policy making and development feasibility.
  - » An overview of the international and academic context of reforming qualitative assessment for digital transformation and specific case study examples, with further detail and assessment of their suitability for application in the Australian context.

P8 | Reform of the Planning Objection and Appeals Process

GOALS

G3, G4, G5

PROJECT DESCRIPTION

The scoping study revealed that, for a range of participants, third party objection and appeal rights (and the inherent risk of design change they introduce) is the greatest source of delay and uncertainty in the process. Much of this was attributed to the presence of qualitative (subjective) assessment criteria. The literature also identifies problems associated with third party objection and appeal rights in addition to delay and uncertainty, including issues of gaming, corruption and perceived bias, democratic accountability and legitimacy, and cost and community access.

This project would:

1. (narrow scope) ensure the digital assessment platform is designed and developed to fully realise its potential to eliminate unnecessary grounds of challenge and institutional bias by providing a more accessible and common narrative of proposed developments.

2. (broad scope) conduct a holistic review of existing third party objection and appeals processes to:

   (1) ensure they properly align with the overall objectives of the planning process; and

   (2) deliver those objectives effectively (increase consistency and speed of decision-making; minimise unnecessary disputation and conflict); efficiently (increase speed; reduce delays and costs); and legitimately (improve system credibility; increase community acceptability and trust; improve perceptions of fairness among those engaged with the processes).

DURATION

- Narrow scope – 18 months (aligns with P6 - Reform of Assessment Modes Project)
- Broad scope – 18 months

COMMENCEMENT

Q3 – 2022 (aligns with P6 – Reform of Assessment Modes Project)

KEY INPUTS & REQUIREMENTS

- Engagement with government and industry stakeholders to identify harmonisation options and assessment criteria, and to participate in assessing options against those criteria.
- Links to the Reform of Assessment Modes Project (given subjective criteria are a major source of objections).

OUTCOMES/KPI

The outcomes of both the narrow and broad projects are to improve the process's effectiveness, efficiency and legitimacy (as per the Project Description).

The project's key deliverables would consist of a report (with accompanying presentation and support materials for industry partners and interested stakeholders) setting out for each jurisdiction examined:

- the objection and appeals process (in particular, its policy objectives, and the processes, institutions and mechanisms to achieve those objectives);
- the strengths and weaknesses of those processes, institutions and mechanisms;
- reform recommendations to leverage opportunities for improving the effectiveness, efficiency and legitimacy of those processes presented by:
  » (narrow scope) the development of the digital assessment platform.
  » (broad scope) a holistic review to ensure third party objection and appeal processes, institutions and mechanisms align with the objectives of the planning process and deliver those objectives effectively, efficiently and legitimately.

P9 | Regulatory Harmonisation (Regulatory Space Reconfiguration)

GOALS

G3, G4, G5

PROJECT DESCRIPTION

The scoping study revealed the complexity of the planning and building regulatory spaces. Numerous factors contribute to this complexity. Two of the more frequently cited factors are: (1) they operate at multiple, overlapping levels: national, state and local (council/municipal); and (2) at the local level, there is a lack of standardisation and consistency of approach. A number of industry partners called for the system to be consolidated or harmonised, albeit they had different perspectives concerning at what level it should be harmonised. Some called for harmonisation at the national level; some at the state level; and some still for harmonisation at the local (council) level. Some also called for harmonisation between planning and building (and other related) regulatory schemes. However, none were specific as to what harmonisation meant or involved (e.g., of policy, process, institutions and/or mechanisms) and how it might be achieved (e.g., full legal centralisation, common national standards, template legislation etc.). Some also alluded to the answer to the harmonisation question being different for different projects (e.g., large vs small; commercial vs residential vs infrastructure). This leaves the goal and scope of 'harmonisation', its benefits, and how to realise them, ill-defined. A review of the literature reveals that while a degree of harmonisation exists in the building regulatory space with the National Construction Code, calls remain for greater consistency in its application and enforcement. In the planning space, however, there has been less progress and a lack of consensus that harmonisation would produce net benefits.

This project would build upon the work of the scoping study by moving beyond acknowledging the complexity of the regulatory space and focussing on solutions:

• (narrow scope) developing a strategy to achieve standardisation and scale of use of the platform at the local government level (starting with Victoria).

• (broad scope) examining how the regulatory space might be better configured to achieve its policy objectives:

   o provide detail and specificity to the 'harmonisation' aspirations expressed during the scoping study;

   o assess the harmonisation options against a suit of effectiveness, efficiency and legitimacy criteria developed in conjunction with stakeholders (cost- benefit analysis); and

   o develop recommendations for a more harmonised regulatory framework and model for planning and building decision-making.

DURATION

- Narrow scope – 12 months
- Broad scope – 24 months

COMMENCEMENT

Q1 – 2022

KEY INPUTS & REQUIREMENTS

- Engagement with government and industry stakeholders to identify harmonisation options, assessment criteria, and to participate in assessing options against those criteria.

OUTCOMES/KPI

Recommendations on how best to reconfigure the regulatory space to develop a more harmonised regulatory framework and model for planning and building decision-making.

- These recommendations would be supported by:
  » a report detailing and assessing a range of harmonisation options, identifying the preferred option(s), and establishing the business and community case for change; and
  » a strategic plan for implementing the recommendations.

P10 | Legal Implementation Strategy

GOALS

G3, G4, G5

PROJECT DESCRIPTION

- This project aims to develop an implementation strategy for the automation of ePlanning and eApprovals. It will consult with relevant stakeholders and identify any legislative, regulatory or process amendments required to facilitate ePlanning and building approvals

DURATION

24 Months

COMMENCEMENT

Q1 – 2023

KEY INPUTS & REQUIREMENTS

- Engagement with government and industry stakeholders to identify issues relating to legal implementation of ePlanning and eApprovals.
- Identification of any legislative, regulatory or process amendments required to facilitate ePlanning and eApprovals.
- Development of a step-by-step implementation strategy for ePlanning and eApprovals.

OUTCOMES/KPI

A report that sets out an implementation strategy for the automation of ePlanning and eApprovals.

P11 | Legislative Framework Requirements to Support ePlanning and eApprovals

GOALS

G3, G4, G5

PROJECT DESCRIPTION

This project aims to perform a comprehensive legislative stock-take for Victoria, to determine the extent to which legislative frameworks might facilitate or hinder the establishment of ePlanning and eApprovals.

The project will also identify legislative decisions made based on objective criteria compared to those reliant on subjective or polycentric considerations, and will make recommendations on which are more amenable to automation.

DURATION

36 Months

COMMENCEMENT

Q1 – 2023

KEY INPUTS & REQUIREMENTS

- Identification of all legislation and regulations that impact on ePlanning and eApprovals.
- Identification of key decision points, and whether it relates to objective criteria or subjective/polycentric considerations.
- Recommendations on which legislative decisions are amenable to automation.

OUTCOMES/KPI

Report setting out the legislative instruments that could directly or indirectly affect the establishment of ePlanning and eApprovals, i.e., facilitating or hindering ePlanning and eApprovals.

APPENDICES

APPENDIX I: ALIGNMENTS AND FOUNDATIONS

The ePlanning and eApprovals roadmap is aligned with the relevant strategies and standards at the state level and in line with national directions and global trends as discussed in this section.

GLOBAL TRENDS, STANDARDS AND FRAMEWORKS

Several international forums and agreements have recognised the relevance of digital transformation and its application to ePlanning and eApprovals, including the following:

UN'S SUSTAINABLE DEVELOPMENT GOALS

The achievement of United Nations Sustainability Development Goals (SDGs) for all communities requires the encompassing of all dimensions of data infrastructure, and social, economic, environmental and governance ecosystems. Although all the SDGs are indirectly related to ePlanning and eApprovals process, the main SDGs that are associated with the processes are goals 9 and 11, which are "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation" and "Make cities and human settlements inclusive, safe, resilient and sustainable".

THE NEW URBAN AGENDA

The New Urban Agenda has three main guiding principles: leave no one behind, achieve sustainable and inclusive prosperity, and ensure environmental sustainability, which refers to a smart city approach that makes use of opportunities from digitalisation, clean energy, and technologies.

FAIR DATA PRINCIPLES

FAIR stands for Findable, Accessible, Interoperable, Re-usable principles. The FAIR Data Principles were drafted at a Lorentz Centre workshop in the Netherlands in 2015. The principles have been globally recognised as a valuable framework for thinking about sharing data in a way that will enable maximum use and reuse. The principles help data and metadata to be 'machine-readable' and support knowledge discovery and innovation, and facilitate the sharing and reuse of data. Figure 12 provides a brief description of the FAIR principles.

FINDABLE	ACCESSIBLE	INTEROPERABLE	REUSABLE
F1. (meta)data are assigned a globally unique and persistent identifier	A1. (meta)data are retrievable by their identifier using a standardized communications protocol	I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.	R1. meta(data) are richly described with a plurality of accurate and relevant attributes
F2. data are described with rich metadata (defined by R1 below)	A1.1 the protocol is open, free, and universally implementable	I2. (meta)data use vocabularies that follow FAIR principles	R1.1. (meta)data are released with a clear and accessible data usage license
F3. metadata clearly and explicitly include the identifier of the data it describes	A1.2 the protocol allows for an authentication and authorization procedure, where necessary	I3. (meta)data include qualified references to other (meta)data	R1.2. (meta)data are associated with detailed provenance
F4. (meta)data are registered or indexed in a searchable resource	A2. metadata are accessible, even when the data are no longer available		R1.3. (meta)data meet domain-relevant community standards

Figure 12: FAIR Data Principles[4]

UNGGIM INTEGRATED GEOSPATIAL INFORMATION FRAMEWORK (IGIF)

The Integrated Geospatial Information Framework is an UN-endorsed Framework that was developed in collaboration between the UN and the World Bank. The Framework provides a basis and guide for developing, integrating, strengthening and maximising geospatial information management and related resources in all countries. It seeks to assist countries in bridging the geospatial digital divide, secure socio-economic prosperity, and to leave no one behind. However, as the Framework has evolved, and will continue to evolve as a living document in the years ahead, it has become apparent that many developed countries will also significantly benefit from the integrative and inclusive strategic nature of the Framework. The Framework is anchored by 9 Strategic Pathways in 3 main areas of influence: Governance, Technology, and People, as shown in Figure 13.
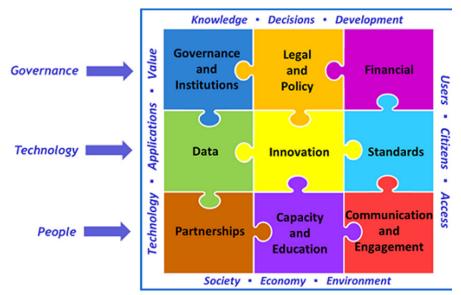

Figure 13: IGIF Pathways (UN-GGIM, 2021)

[4]Wilkinson, M., Dumontier, M., Aalbersberg, I. et al. The FAIR Guiding Principles for scientific data management and stewardship. Sci Data 3, 160018 (2016) https://doi.org/10.1038/sdata.2016.18

INTERNATIONAL ORGANISATION FOR STANDARDISATION (ISO)

Various standards can be adopted as the basis for designing the ePlanning and eApprovals processes and framework. When preparing and issuing permits, the ISO 19650 series can be considered for information management. It provides a framework for managing digitised information on buildings and civil engineering works (including BIM) within an organisation or across different organisations. For digital representation of permit applications, the ISO 19100 series of geographic information standards can be used along with the ISO 27001 on information and data security and the ISO 31000 on risk management.

OPEN GEOSPATIAL CONSORTIUM (OGC)

The Open Geospatial Consortium (OGC) is an international not-for-profit organisation committed to making quality open standards for the global geospatial community. These standards are made through a consensus process and are freely available for anyone to use to improve sharing of the world's geospatial data. OGC standards will be used to support the geospatial aspects of various web services offered by the ePlanning and eApprovals system.

BUILDINGSMART INTERNATIONAL (BSI)

buildingSMART is an international not-for-profit organisation committed to creating and developing open digital ways of working for the built asset industry. Its standards help the building supply chain work more efficiently and collaboratively through the entire project and asset lifecycle. These include industry-specific data model schema (IFC, ISO 16739), a methodology for defining and documenting business processes and data requirements (IDM, ISO 29481), and data model exchange specifications (MVD, ISO 29481). These standards have been widely used to improve the sharing of information throughout the lifecycle of projects or assets. By breaking down the silos of information, these standards enable end-users to better collaborate and cooperate, regardless of which software application they are using.

E-SUBMISSION COMMON GUIDELINES FOR INTRODUCING BIM TO THE BUILDING PROCESS

'Regulatory Room', a committee in buildingSMART International (bSI), works to support automated regulatory by benefiting from the use of BIM. It has been formed to deliver BIM solutions and standards to drive a gradual change in building approval workflow from manual to automated. This room recently developed e-Submission Common Guidelines for Introducing BIM to the Building Process. It is based on the experience of building authorities and government agencies in countries with early adopted e-submission, such as Singapore. This guideline provides commonality in the process of applying BIM to building administrative procedures, as well as the Level of Maturity of BIM e-Submission and the Level of Development for BIM e-Submission.

FRAMING THE BUSINESS CASE FOR AUTOMATED RULE CHECKING

'Regulatory Room' of buildingSMART International also established a framework of main components that an assessment of ROI (return on investment) for BIM-based automated rule checking should include. The framework has five dimensions – methods, boundary conditions, stakeholders, costs, and benefits. At the core are the networks of costs and benefits, which are linked to three other networks. This framework encourages developers of business cases to clearly consider the values and costs from the perspective of each stakeholder.

NATIONAL POLICIES AND STRATEGIC PLANS

NATIONAL STRATEGY FOR CADASTRE - CADASTRE 2034

Cadastre 2034 developed a unified ideology for Australia, laying out what citizens can anticipate and what the government must deliver in the future. Cadastre 2034 will direct the evolution of jurisdictional systems, ensuring a coordinated and consistent approach to future policies, laws, standards, models, and research, as well as providing clear guidance for the whole sector. There are five goals in the strategy. These are aimed at creating a cadastre that meets the criteria, as illustrated in Figure 14.

Fundamental to land and property ownership and is sustainably managed;

Truly accessible, easily visualised, and readily understood and used;

Fully integrated with broader legal and social interests on land;

Provides a digital representation of the real world that is survey accurate, 3-dimensional and dynamic

Federated cadastral system based on common standards.

Figure 14: Five goals in the strategy of Cadastre 2034 (ICSM, 2014)

DIGITAL TRANSFORMATION STRATEGY 2018-2025

The Australian Government published the Digital Transformation Strategy in 2018, with the goal of becoming one of the top three digital governments in the world by 2025. Figure 15 shows the componenets of the strategy.

Strong foundations

Be adaptive and accelerate change

Inspire innovation and imagination

Harness the future

Invest in people

Be collaborative

Figure 15: Components of Digital Transformation Strategy 2018-2025[5]

NATIONAL DIGITAL ENGINEERING POLICY PRINCIPLES

In 2016, the Council of Australian Governments (COAG) Transport Infrastructure Council endorsed the National Digital Engineering Policy Principles as a step toward a national adoption and integration of digital engineering to building and infrastructure development and management, and its interaction with industry. These principles clarify governments' role and a consistent approach in building and infrastructure development, and in its interaction with industry.

NATIONAL EPLANNING STRATEGY

To move the electronic development assessment (eDA) initiative forwards, the COAG's Local Government and Planning Ministers' Council Ministerial Sub-Group on Development Assessment Reform created a National eDA Steering Committee in 2011. The National ePlanning Strategy's goal is to develop a strategy for electronic planning (ePlanning) services in Australia, including a common vision and implementation roadmap. To accomplish the objective of Australia as a leader in electronic planning services, it will rely on collaboration and innovation across government, industry, and the community. The National ePlanning Strategy, as a result, separates goals and strategies into five components: Plan, Know, Decide, Confirm and Improve (refer Figure 16).

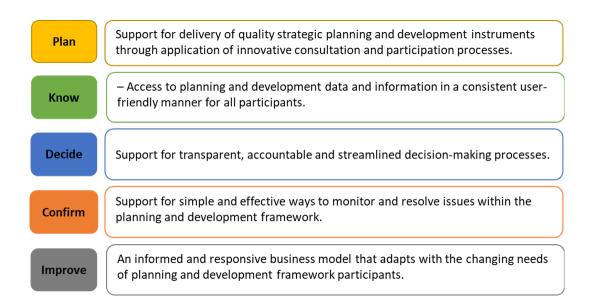|	
Plan	Support for delivery of quality strategic planning and development instruments through application of innovative consultation and participation processes.
Know	– Access to planning and development data and information in a consistent user-friendly manner for all participants.
Decide	Support for transparent, accountable and streamlined decision-making processes.
Confirm	Support for simple and effective ways to monitor and resolve issues within the planning and development framework.
Improve	An informed and responsive business model that adapts with the changing needs of planning and development framework participants.

Figure 16: ePlanning Components (National eDA Steering Committee, 2011)

SPATIALLY ENABLED DIGITAL TWINS FOR NATURAL AND BUILT ENVIRONMENT

The Principles of Spatially Enabled Digital Twins for Natural and Built Environment, developed by ANZLIC (2019), provides insights on building blocks and maturity levels of Digital Infrastructures (refer Figure 17). These principles inform the ePlanning and eApprovals roadmap. Digital Twin use cases for the built and natural environment can include:

- Transformation of building and construction by improving approval processes, enabling automated progress monitoring, assessing as-built to as-designed, improving resource planning and logistics, monitoring safety and quality assurance and compliance.

- Assessment of the effectiveness of development and infrastructure approval processes, to ensure alignment with strategic development objectives.
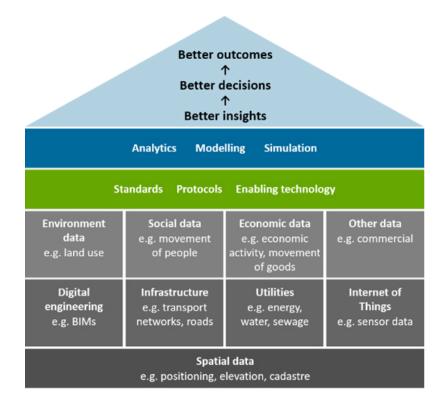
Figure 17: Spatially enabled digital twins integrate multiple data types and sources to allow for advanced analytics and better insight[6]

DIGITAL PLANNING PRINCIPLES

The Digital Planning Principles were developed by the NSW and National PlanTech working group at Planning Institute of Australia (PIA), and provide important insights on innovation for an open digital public infrastructure. Digital Planning Principles suggest a platform for a future digital planning system. This platform is a prerequisite for further innovation, and it must be provided as open digital public infrastructure in order to reap the full benefits of a digital planning system. With a fully open platform in place, the possibilities for new application development by anyone inside or outside government are limitless5 (refer Figure 18)
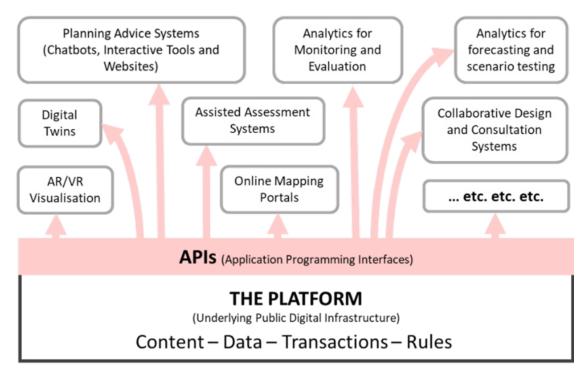
Figure 18: Digital planning platform (Victoria State Government, 2016)

The ePlanning and eApprovals Roadmap project is designed to directly address the digital planning principles, which are:

1. Planners must be prepared for wide-reaching change to their day-to-day work
2. Digital planning infrastructure should be public infrastructure built with open technology
3. Digital planning applications should be developed in a human-centric way
4. Collaboration should be prioritised in the development of underlying digital planning infrastructure
5. Planners must be central to the design of digital planning infrastructure
6. Accountability and transparency must be built into digital decision systems
7. Communication of planning content and processes to non-planners should be reimagined
8. Outcomes for communities and places must be considered alongside efficiency of approval processes in the development of digital planning systems
9. Ambitious programs can be implemented to improve social and environmental outcomes
10. A culture of innovation and sharing should be promoted

[5]Digital Planning Principles, 2020, Available online: https://www.planning.org.au/policy/pia-digital-planning-principles

STATE POLICIES, STANDARDS, AND GUIDELINES

VICTORIA'S INFRASTRUCTURE STRATEGY 2021-2051

In 2021, Victoria's infrastructure strategy 2021-2051 was presented to the Victorian Parliament for consideration. The strategy encourages the application of digital technologies with a focus on the following topics: (1) Confronting long-term challenges; (2) Managing urban change; (3) Harnessing infrastructure for productivity and growth; and (4) Developing regional Victoria.

VICTORIAN DIGITAL ASSET STRATEGY (VDAS)

This strategy represents a paradigm shift in the way Victorian Government departments and agencies plan, deliver, operate, and maintain assets on behalf of the people of Victoria. Figure 19 provides VDAS priorities (Victorian Digital Asset Strategy Guidance, 2016).

Effective creation and management of digital engineering (DE) data and information for efficient and sustainable physical asset delivery and whole-life management across Victoria

Enable and maximize the use of DE data and information

Inform and support Victorian Government departments, industry and practitioners on key aspects of DE, including the value of digital data and the creation and management of information

Innovate approaches and provide insights to ensure the efficient and effective implementation of DE

Embrace the sustainability of DE through the effective and efficient delivery and management of major assets across Victoria.

Figure 19: VDAS priorities[7]

NSW INFRASTRUCTURE STRATEGY 2018-2038

The NSW Government's State Infrastructure Strategy (SIS) is a 20-year infrastructure investment plan that prioritises strategic fit and economic merit. The Strategy establishes six cross-sectoral strategic directions, each with the goal of achieving "more with less" and embedding best practises across the infrastructure lifecycle (refer Figure 20).

Integrated strategic land use and infrastructure planning

Infrastructure planning, prioritization, and delivery

Asset management, assurance and utilization

Resilience

Digital connectivity and technology

Innovative service model

Figure 20: NSW Infrastructure Strategic Directions[8]

[7] https://www.infrastructure.nsw.gov.au/sis-2018
[8] https://www.infrastructure.nsw.gov.au/sis-2018

THE NSW DIGITAL TWIN

The NSW Digital Twin Minimum Viable Product (MVP) platform intends to establish a 4D (3D+time) Foundation Spatial Data Framework in response to the NSW State Infrastructure Strategy. This includes the capacity to present data models in 3D and 4D, as well as visualising and interrogating them. The purpose is to assist the NSW Government with infrastructure asset planning and management, data collaboration and sharing, and integration with land use planning. Figure 21 shows the guiding concepts for the development of the NSW Digital Twin.
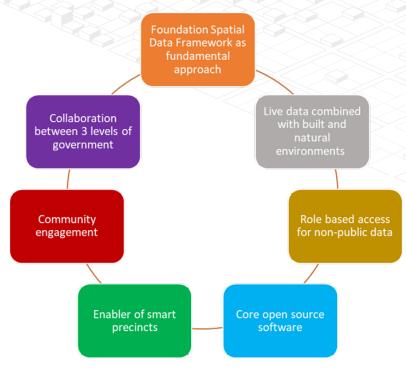
Figure 21: the guiding concepts for the development of the NSW Digital Twin[9]

NSW'S DIGITAL STRATEGY

The NSW government's digital vision is to improve people's lives by creating smart, easy, and seamless policies and services. NSW will create a data-driven and resilient government. NSW's plan is to simplify government services, reduce complexity, and streamline procedures. The strategy respects the community's wish to maintain privacy, and personal and health information protection for themselves and their families. This strategy defines the next steps to realise this vision. It outlines three priorities – customer experience, data, and digital on the inside. It sets out four enablers that will support digital innovation across government – technology, cyber security, legislation and delivery capability.

[9] https://nsw.digitaltwin.terria.io/about.html

APPENDIX II: RISK INDICATORS, IMPACTS, AND MITIGATION RECOMMENDATIONS

As referenced in Section 8, the identified risk indicators falling under each risk category are listed in Table 3 (below). The table also provides brief examples of the associated impacts along with the corresponding mitigation recommendations for each risk indicator.

Table 3: Risk indicators, their impacts, and mitigation recommendations. Modified from World Bank (2020)

Risk Indicator	Impacts/consequences	Mitigation Recommendations
A - Governance		
Weak governance	Poor oversight or regulatory measures can threaten safeguards, leading to a loss of citizens'/users' land rights through corruption or poor oversight.	A1 – Strengthen public oversight arrangements, such as Government Auditor. A2 – Establish new entities or a special taskforce with clear goals on time, cost, and quality for service delivery.
Strong resistance to change	Project delays due to poor staff cooperation, owing to fear of change/job loss, resistance from professionals that can delay or prevent the project's implementation.	A3 – Introduce training or change management for affected staff. A4 – Foster relationships and engage with professional associations.
B - Macroeconomic and Fiscal		
Fiscal risk and budget deficits	Direct and provisional liabilities related to the budget commitment resulting in fiscal shortfalls or imbalances.	B1 – Forecast effects of project cash flow using accurate data and realistic assumptions.
Financial crises	Insufficient funds to complete the project leading to project delays/failure and contributing to a lack of trust between the stakeholders	B2 – Include degree of flexibility in agreement to address such crises.
C- Legal and Institutional		
Insufficient or complicated legal framework in place/ legal inconsistencies	Regulatory uncertainty that can either cause or intensify project disputes, and can result in long delays and/or compromise of proposed solutions.	C1 – Ensure supportive Regulations, Guidelines, and/or Policy is in place to facilitate project. C2 – Ensure that laws in the land sector do not constrain the commercial viability of the project
Laws change during project implementation	Retroactive amendments to existing contracts leading to lengthy disruptions and impacting the overall viability.	C3 – Include a clear dispute resolution procedure in the implementation contract. C4 – Inclusion of penalty clauses in the contract for violations of responsibilities
No clear definition of roles and responsibilities across sectors and levels of government	Project delays and/or failure resulting from limited cooperation/coordination, poor data standards and data integration, increased project complexity.	C5 – Coordinated activities across agencies or different levels of government, and reaching documented clear agreements on roles and responsibilities.
No previous experience with project in the country	Insufficient project management, legal reforms etc. leading to poor project oversight and regulation, leading to project delays, poor outcomes or project failure.	C6 – Hire technical consultants and policy advisors to support the project and advise ministries. C7 – Establish a guiding policy statement to which the stakeholders and contractors may refer to understand government priorities and strategy.

Risk Indicator	Impacts/consequences	Mitigation Recommendations
D - Commercial		
Unclear or non-forecastable revenue generation	Lack of investor appetite and/or risk that project is ultimately underfunded.	D1 – Undertake pre-feasibility/ feasibility study and financial analysis to establish a revenue model.
E- Contractual and Technical		
Protection of Intellectual Property	Where the private sector develops software to support the planning and building permit system, the issue of intellectual property must be addressed, as private businesses will not transfer trade secrets without proper compensation / protection	E1 – Contracts need to address commercial, intellectual property rights such as for source code ownership, and/or royalty-free use rights etc.
Data privacy and cyber security	Possible public loss of services, loss of public trust, and possible loss of revenue.	E2 – Set standards on data collection and meta-data use and/or sale. E3 – Outline clear data privacy requirements in the contract with appropriate safeguards, such as regular externally conducted audits.
F- Social		
Vulnerable groups (e.g. women, elderly, indigenous peoples, and disabled) are marginalised or adversely impacted by the service (complexity of use or costs).inconsistencies	Project fails to meet the public coverage goals.	F1 – Use methods like targeted subsidies, incentives, or penalties to meeting performance levels for providing services to vulnerable groups and addressing pro-poor concerns.

APPENDIX III: SCOPING THE LIGHTHOUSE PROJECTS FOR PILOT

Lighthouse projects (pilots) will increase the success level in implementing ePlanning and eApprovals across the state and local governments.

As demonstrated in Figure 22, the complexity of development (Asset) classes increases in the vertical direction.

For example, a greenfield residential development is low complexity, and a brownfield high-rise residential is highly complex. The maturity level of decision-making follows the explanation provided in Section 6 of this report.

In terms of pilot projects implementation, it is suggested that the process starts from top to bottom (low to high complexity) in each maturity level (e.g., purely admin, deterministic, etc.).

Therefore, the first pilot project (P1) will start from a simple file lodgement and processing system of greenfield residential development, and cover all four residential types listed in the left column of Figure 22.

The final pilot project (P4) is a system enriched with a deterministic and probabilistic decision-making engine. It utilises machine learning techniques for planning and building approvals of four development classes, as listed in Figure 22.
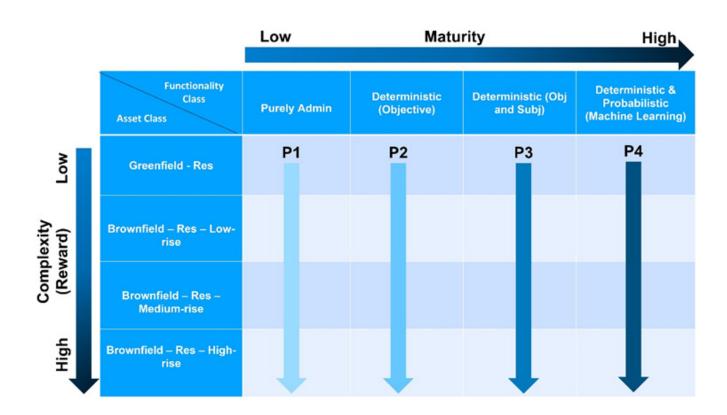

Figure 22: Scoping of lighthouse projects (Pilots)