ADDRESSING 2035

ADDRESSING REFORM AND INNOVATION
FOR AUSTRALIA AND NEW ZEALAND

ICSM
ANZLIC COMMITTEE ON SURVEYING & MAPPING

ANZLIC
the Spatial Information Council

CONTENTS

FOREWORD

BRINGING ADDRESSING INTO THE FUTURE AND ENHANCING THE DELIVERY OF SERVICES FOR ALL COMMUNITIES ACROSS AUSTRALIA AND NEW ZEALAND.

The overarching goal of the Addressing 2035 strategy is to support all Australian and New Zealand government jurisdictions and the wider stakeholder ecosystem in remediating, and future-proofing, the addressing supply chain.

The Intergovernmental Committee on Surveying and Mapping (ICSM) and ANZLIC have developed this strategy to establish a common vision, mission and aspirational goals for addressing. Our common intent is for jurisdictions and all stakeholders involved in addressing across both countries, to converge on agreed courses of action that will improve addressing capability.

A major element of this strategy is to ensure that the addressing policy environment supports standards that are fit for the future. This will enable interoperability and innovation across the addressing supply chain to deliver great outcomes to the citizens and communities of both Australia and New Zealand.

This requires a strong commitment to overcome challenges with legacy addressing data, improve the management and sharing of addressing information across the supply chain, and the will to both remediate and enhance this valuable resource.

The strategy articulates 5 guiding principles, which we believe will keep us aligned to our goals:

1. **User-centred:** Addressing solutions are co-designed with users across the addressing supply chain to ensure they are desirable and fit-for-purpose.
2. **Coordinated:** Addressing solutions have appropriate coordination, leadership, governance, and oversight to ensure expected benefits are realised. Impacted stakeholders across all regions and jurisdictions are consulted and taken on the change journey.
3. **Data Driven:** Our standards, models, information and data sets are appropriately linked, contextualised and accessible to the right users. They can be relied upon to inform addressing outcomes. Interoperability, scalability and security factors are considered during solution design to enable the seamless flow of data and information wherever possible.
4. **Future ready:** We make investment decisions based on our strategic objectives, capitalising on best of breed and emerging technologies, reusing or optimising existing solution patterns wherever possible to reduce technical debt.
5. **Sustainable:** Addressing solutions can be reliably operated, sustained and supported. Implementation always considers the training, enablement and digital literacy needs of users.

We would like to thank all the stakeholders across government and industry who participated in the supply chain workshops to provide us with their experiences, their challenges and their ideas for the future. Contributions came from more than 50 workshop attendees from 35 organisations, including Local councils, State and Federal government agencies, the emergency services community, utility providers and other industry representatives. Over 160 responses to the Addressing 2035 strategy research survey were submitted, a testament to the enthusiasm and appetite for change.

Over the coming years we intend to make the most of the relationships we have built, and we are keen to keep the engagement and momentum going to achieve our goals for Addressing. This strategy can only succeed through the collective efforts of all stakeholders across the addressing supply chain.

Craig Sandy

Craig Sandy
Surveyor-General of Victoria |
Chair of ICSM

Melissa Harris

Melissa Harris
Chief Executive Land Use
Victoria I Registrar of Titles I
Chair ANZLIC

ADDRESSING 2035

The ICSM Addressing Working Group are represented by addressing agencies from both Australia and New Zealand. Our role is to provide leadership, coordination and standards for assembling, delivering and maintaining address datasets, providing sustainable benefits for Australians and New Zealanders.

Since 2018 the Addressing Working Group have focussed on analysing current issues with addressing systems, processes and standards. Over 40 issues of differing complexity - both operational and strategic, have been identified and documented.

The Addressing 2035 Strategy has been produced as an outwards communication piece that dedicates space to outlining the need for a modern and integrated approach across jurisdictions for address creation, discovery and use.

The consultation undertaken with stakeholders has allowed the Addressing Working Group to both test and endorse the issues raised since 2018. The pillars described in the strategy consolidate the pain points described by workshop participants during the consultation and the issues that arise because of these pain points. It also provides high-level approaches to guide the addressing community's actions in the short term - before a national approach to implementation is taken.

This strategy also recognises that whilst parts of Australian and New Zealand addressing systems are similar, each jurisdiction will have variations in legislation, practices and localised requirements. Alignment with Addressing 2035 is aspirational however the strategy allows for jurisdictions to work within their local requirements.

Where the strategy provides the high level approaches, there is an addendum provided that highlights the technical directions that can be taken that won't lead away from any final whole of governments regime implemented by the community as a whole.

A VISION FOR ADDRESSING 2035

"TO PROVIDE AUSTRALIA AND NEW ZEALAND WITH A MODERN, WORLD LEADING ADDRESSING ECOSYSTEM THAT DELIVERS A TRUSTED SINGLE POINT OF REFERENCE FOR ALL AUSTRALIAN AND NEW ZEALAND LOCATION-BASED ADDRESSES."

A MISSION FOR ADDRESSING 2035

"RECOGNISE AND PROMOTE THE IMPORTANCE OF STANDARDISED ADDRESSES AND DELIVER A DYNAMIC AND INTEGRATED WHOLE OF GOVERNMENT ADDRESSING ECOSYSTEM ENABLING A 3D/4D DIGITAL ECONOMY."

ADDRESSING 2035 STRATEGY EXECUTIVE SUMMARY

The addressing strategy provides a common view of our needs, goals, and business context. All stakeholders in the Addressing supply chain can use this strategy to better understand the requirements of the community, the benefits that will result for our citizens and the strategic and technical effort required to meet future goals.

VISION

To provide Australia and New Zealand with a modern, world leading addressing ecosystem that delivers a trusted single point of reference for all Australian and New Zealand location-based addresses.

MISSION

Recognise and promote the importance of standardised addresses and deliver a dynamic and integrated whole of government addressing ecosystem enabling a 3D/4D digital economy.

WHERE WE WANT TO BE

- Addressing governance framework applies across jurisdictions; with roles and responsibilities communicated, understood, and adhered to.
- Addressing standards and guidance are applied consistently across jurisdictions.
- Addressing data in Australia and New Zealand are interoperable with an agreed common addressing model on which they have implemented jurisdictional specifications.
- Interoperability, governance, and good practice across the addressing supply chain supports unified data management and innovation, resulting in faster and enhanced services to citizens.
- All stakeholders in the addressing supply chain, including citizens and service providers, use authoritative addresses, leading to an improved citizen experience.

ADDRESSING 2035 STRATEGY EXECUTIVE SUMMARY (CONT.)

HOW WE GET THERE

STRATEGIC PILLAR 1

Harmonised addressing policy

Deliver an addressing policy framework that can be harmonised across supply chains to support a standardised addressing model.

STRATEGIC PILLAR 2

Future ready

Review the addressing model against the future 3D/4D needs.

STRATEGIC PILLAR 3

Jurisdictional flexibility

Enable customised pathways for jurisdictions to adopt a common addressing model and retain their specific data requirements.

STRATEGIC PILLAR 4

Interoperability and linkages

Achieve addressing data linkages to other valuable datasets

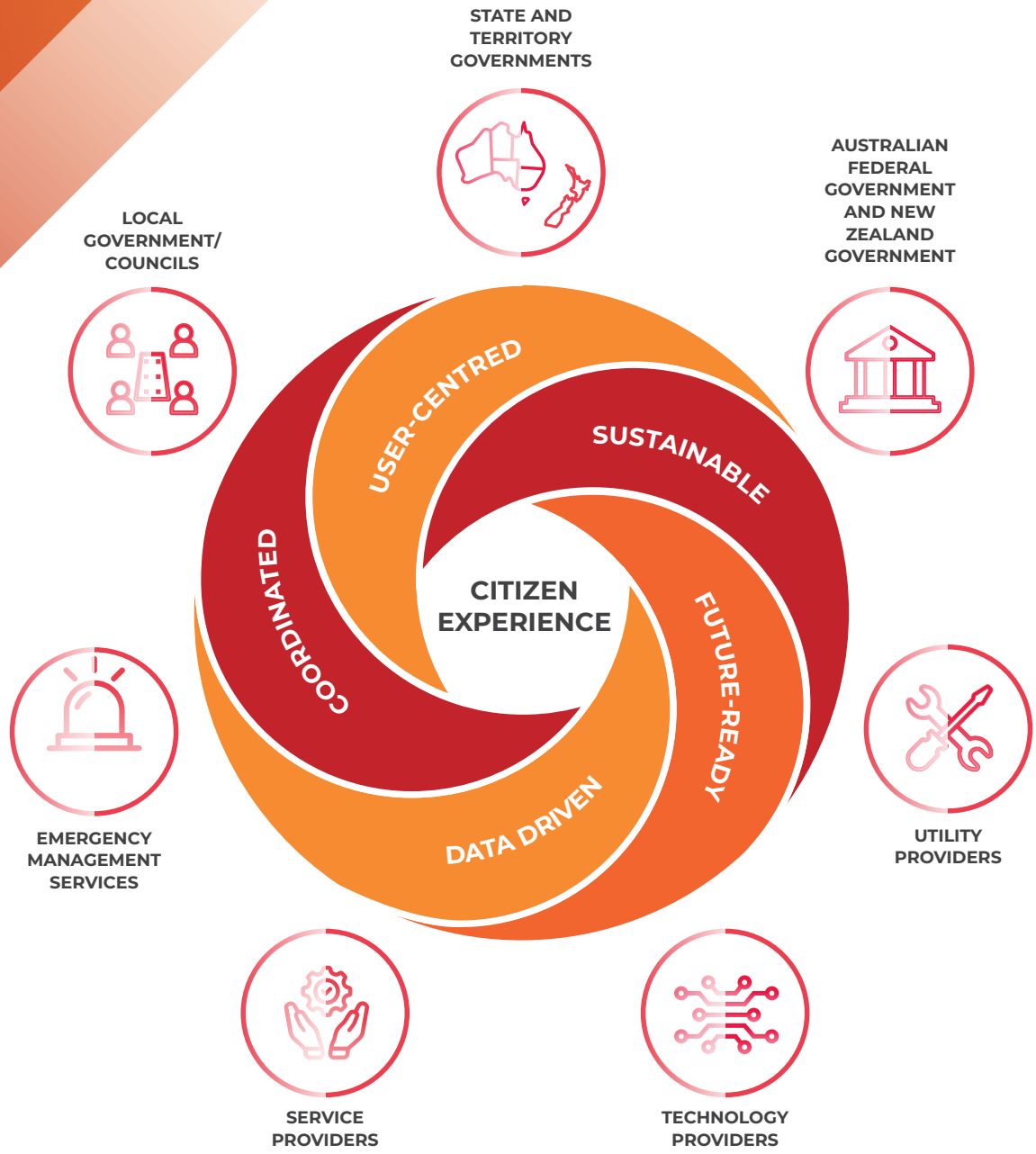
STRATEGIC PILLAR 5

Education and communication

Drive an increased understanding of the importance of accurate and authoritative addressing.

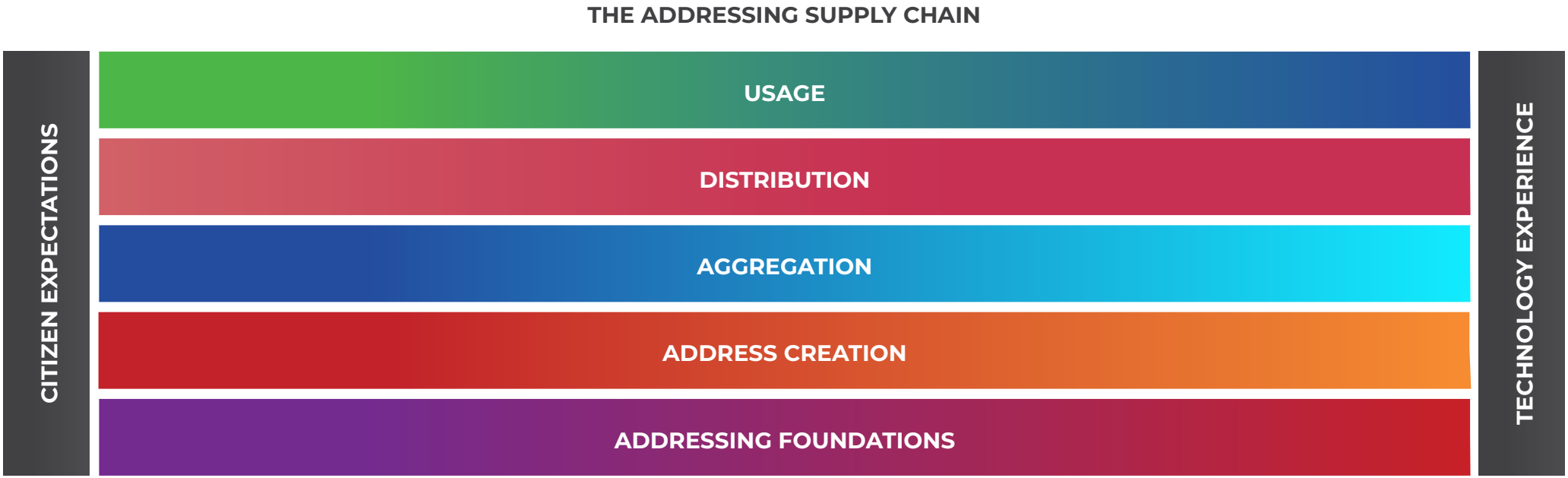
ALIGNING INCENTIVES WITHIN A COMPLEX ADDRESSING SUPPLY CHAIN

Various stakeholder perspectives and considerations have informed our research approach and strategy development



THE ADDRESSING SUPPLY CHAIN MUST ULTIMATELY SUPPORT COMMUNITY NEEDS AND THE LIVES OF CITIZENS

Investing in addressing's foundations will support government stakeholders, utility, and service providers to deliver modern, integrated experiences expected by Australian and New Zealand citizens as they travel through their lives.



GUIDING PRINCIPLES

Navigate a new era in citizen expectations, societal change and exponential technological advancements that will occur on the road to 2035. This will require a set of principles to guide the development of addressing solutions.

WHAT ARE THEY?

The Guiding Principles steer solution design, and delivery activities back to the Addressing 2035 Strategy. Each principle aligns directly to one or more of the strategic pillars.

WHY GUIDING PRINCIPLES?

Applying these Guiding Principles to solution requirements gathering, design and delivery ensures that there is adequate coverage and traceability back to measurable goals and objectives.

WHO MIGHT USE THEM?

- Delivery teams in designing technology and other addressing solutions.
- Project sponsors in ensuring addressing solutions have adequate coverage and traceability back to the strategy.
- Strategy, portfolio and quality assurance teams needing to evaluate and prioritise solutions.

GUIDING PRINCIPLES (CONT.)

USER-CENTRED

Addressing solutions are co-designed with users across the addressing supply chain to ensure they are desirable and fit-for-purpose.

COORDINATED

Addressing solutions have appropriate coordination, leadership, governance, and oversight to ensure expected benefits are realised. Impacted stakeholders across all regions and jurisdictions are consulted and taken on the change journey.

DATA DRIVEN

Our data sets and information are appropriately linked and accessible to the right users and can be relied upon to inform addressing outcomes. Interoperability and security factors are considered during solution design to enable the seamless flow of data and information wherever possible.

FUTURE-READY

We make investment decisions based on our strategic objectives, capitalising on best of breed and emerging technologies, reusing or optimising existing solution patterns wherever possible to reduce technical debt.

SUSTAINABLE

Addressing solutions can be reliably operated, sustained and supported. Implementation always considers the training, enablement and digital literacy needs of users.

ADDRESSING TODAY

Addressing is foundational and has an important role in the lives of every citizen. The impact of inconsistent or incorrect addressing data can be profound. The COVID-19 pandemic has found governments needing to know the location of its citizens and then their address if there was a need to quarantine. Those quarantining may then be reliant on food delivery and medical services – also requiring an accurate address.

Addresses form a tangible connection between where people live and how they are located; and represent the most used spatial reference system today. When addressing is accurate, commerce and government services flow smoothly and the citizen is unaware of the extent addressing underpins everyday life. Identity management – name, address, date of birth, location information and other data points are often underpinned by a reliable, accurate and authoritative addressing system.

Australia and New Zealand have separate addressing ecosystems. However, the fundamental principles that govern each system are the same; to ensure accurate, current, and consistent location information is delivered to facilitate an efficient public sector to deliver services to its citizens.

The private sector is also heavily reliant on these systems and services. The community bears the cost of incorrect or absent addressing through lost business or delays in government services such as postal delivery or emergency response. Governments are committed to improving addressing quality so that it can be accessed and reused efficiently across agencies.

The current AS/NZS 4819:2011 Rural and urban addressing standard is required for those tasked with assigning addresses, road names, geocodes, signage, and defining localities. It enables the consistent creation of addresses suitable for inclusion in aggregated jurisdictional addressing datasets. However, when the standard was created, the model was to service property-based street addresses; it does not allow for non-property-based locations or locations that don't have a complete street address.

With an increasing demand for address and location information at all levels of the public sector that is complete, timely, verified, accessible, secure, authoritative, interoperable, and cost-effective, the current supply chain is structurally unable to provide the quality and latency expected for some jurisdictions.

At present, address data is likely stored and defined differently from one government agency, or level of government, to another. For example, Cadastre, land registry, business register, and the utilities sector would all hold address information and personal information that may have useful additional information only available to that database holder rather than across the public sector as a whole.

To meet future addressing requirements there is a need for an extensible model which aligns with the AS/NZS 19160.1:2018 Addressing Conceptual model standard. This is the backdrop for Addressing 2035, and the work of the Addressing Working Group in setting forth a vision that is comprehensive and ensures the quality and integrity of 'addressing', now and into the future.

The future of addressing will not just be the modern technical delivery of the information but that it is unified for discovery, access and use across government organisations as well as service providers for the benefit of citizens.

THE CURRENT STATE OF ADDRESSING

The research team surveyed 161 stakeholders across the addressing supply chain to explore and capture the major issues and challenges with addressing today.

Respondents represented a range of important stakeholder groups, from local government councils, state and federal government, to emergency management, utilities and other service providers. The majority of respondents surveyed are involved in multiple aspects of the addressing supply chain.

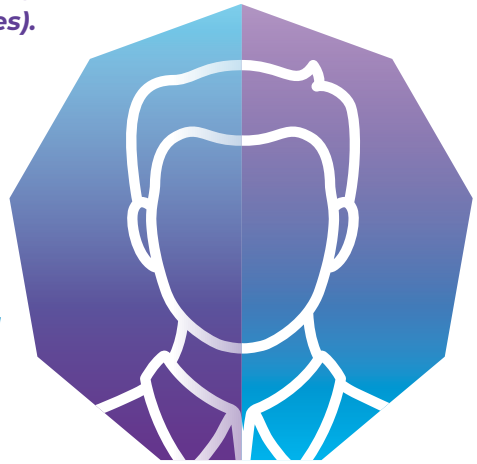
In the workshops, 67% of respondents are address creators, 35% of respondents are address collators & aggregators and 45% of respondents are address users.

KEY STAKEHOLDER INSIGHTS INTO THE CURRENT STATE OF ADDRESSING

49% *of respondents experience difficulties in addressing complex scenarios, including when there are multiple addresses on a site. (e.g. retirement villages and shopping centres).*

37% *of respondents experience difficulties with address matching between government agencies and/or commercial service providers.*

21% *of respondents experience delays in the address lifecycle (e.g. visibility of new addresses).*



14% *of respondents experience addressing legislation, policy, and standards issues or constraints.*

13% *of respondents noted limitations and issues with systems, interoperability, and addressing data models.*

47% *of respondents experience difficulties with a lack of understanding of addressing (e.g. property occupiers not using the valid address).*

18% *of respondents noted that address location information doesn't provide enough accuracy (e.g. entry or access point to the property required to deliver a service).*

12% *of respondents noted that current addressing does not easily support future requirements (e.g. 3D property modelling, BIM, spatial digital twins, and multi- floor buildings).*

A HUMAN CENTRED, FUTURE THINKING STRATEGY FOR ADDRESSING

To understand the perspectives and needs of the various stakeholders that play important roles in addressing, the research team conducted primary and secondary research, and engaged with stakeholders to surface their goals, challenges and opportunities for the future.

INPUTS

Our discovery research leveraged both **qualitative** and **quantitative** data.

QUALITATIVE

- 1 Multijurisdictional contextual session
- 50 Stakeholders participated in 3 co-design workshops
- Macro-environmental analysis activities with key stakeholders
- 35 Organisations participated in co-design workshops
- Interviews with addressing subject matter experts

DESKTOP RESEARCH

- Problem root cause and solution analysis
- Technology reports and whitepapers

QUANTITATIVE

- 161 Addressing Survey responses received

SYNTHESIS PROCESS

We engaged with the stakeholder ecosystem to gather data, synthesise insights, and build a picture of what must change to deliver on a future state vision for addressing.

- Supply chain visualisation, user journey and persona mapping
- Business architecture, strategy and capability mapping
- External research insights consolidation
- 14 Common pain points

ADDRESSING STRATEGY OUTPUTS

- Insights and perspectives are consumed into the Addressing Strategy 2035
- 5 Guiding Principles
- 3 Addressing 2035 vignettes
- 5 Strategic Pillars
- 1 Strategy Implementation Roadmap

OVERARCHING PAIN POINTS

14 common pain points were synthesized from data gathered through desktop research, workshops, interviews and the survey.

- **A** Address supply chain issues are caused by lack of guidance for applying current legislation and policy.
- **B** Address assignment errors are caused by a misunderstanding of the address assignment process and lack of stakeholder engagement.
- **C** There is confusion in roles and responsibilities across the supply chain.
- **D** The role of property developers in address creation is not clearly understood or consistently managed.
- **E** There is a lack of adherence to, and inconsistent application of, existing addressing standards.
- **F** The current spatial definitions of address sites do not match the real-world nature of these objects and are not suitable for future spatial digital twin models.
- **G** Addresses are assigned late in the development cycle and after survey plan lodgment. This leads to a reliance on lot numbers for the delivery of goods and services.
- **H** There is no consistent method for representing addresses and sites within complex scenarios (e.g., private facilities such as universities) leading to inconsistent address allocation and no possible validation.
- **I** Validation services only confirm address validity using point-in-time data and not versions over time.
- **J** Uptake and adoption of non-authoritative addresses (such as search engines and other technology providers) can conflict with the authoritative address.
- **K** Citizens' use of incorrect addresses when dealing with the public sector impacts service delivery and trust in the integrity of the underlying addressing system.
- **L** There is no feedback mechanism to address points of truth for Government Agencies who encounter incorrect addresses.

PILLAR 1: HARMONISED ADDRESSING POLICY

Deliver a harmonised addressing policy framework to create a standardised addressing supply chain.

OUR GOAL

Addressing policy operates together in harmony within jurisdictions, with roles and responsibilities communicated, understood and adhered to.

HOW WE WILL GET THERE

- Communicate the addressing strategy and its rollout with all stakeholders in the addressing supply chain.
- Document and publish a standardised supply chain on the ICSM website.
- Each jurisdiction to undertake an audit of their relevant addressing legislation to map opportunities for amendment and improvement.
- Develop a harmonised policy framework to provide governance for addressing across the jurisdictions.
- Define guiding principles for a consistent approach to whole of Government address management for Australia and New Zealand.
- Prioritise identified opportunities for amendment and improvement and communicate timeliness across the addressing supply chain.

PILLAR 1: HARMONISED ADDRESSING POLICY

Deliver a harmonised addressing policy framework to create a standardised addressing supply chain.

WHAT SUCCESS LOOKS LIKE

- ✓ The addressing supply chain is clear, transparent and well understood.
- ✓ Clear, timely and complete communication occurs between address creators and all custodians of addressing datasets.
- ✓ An addressing policy framework supports quality and authoritative addressing, incentivising adherence to a clear and coordinated addressing supply chain.
- ✓ All instances of addresses exchanged across Australia and New Zealand conform to the common addressing model.
- ✓ The performance of the addressing supply chain is baselined and measured by all jurisdictions, with data and insights driving continuous improvement.

ALLEVIATES GLOBAL PAIN POINTS

A B C D E

THE USER EXPERIENCE WILL BE

"WE GOT THE BASICS RIGHT. NOW WE CAN TALK ABOUT MODERNISATION AND THE FUTURE"

- Address user

"OUR ADDRESSING ECOSYSTEM CONTAINS A FEDERATED GOVERNANCE PROCESS WHEREBY ALL ADDRESSING IS REGULATED"

- Address creator

"THERE IS SHARED UNDERSTANDING OF THE IMPORTANCE OF ACCURATE ADDRESSING AND WE HAVE AUTOMATED AND MODERNISED THE SUPPLY CHAIN TO SUPPORT IT"

- Citizen

PILLAR 2: FUTURE READY

Review the addressing model against future 3D/4D needs.

OUR GOAL

Review addressing standards and model driven implementation to deliver a future-enabled addressing capability.

HOW WE WILL GET THERE

- Identify and adopt baseline data models to modernise the addressing data model.
- Review the addressing model against future 3D/4D needs to ensure the elements of all jurisdictions are all catered for.
- Pilot new addressing model and systems.
- Implement address data model in multiple jurisdictions.
- Publish and promote the standards so that they are freely accessible.
- Create demonstration address validation for addresses.
- Operate address validation services for data coming in to jurisdictions (new address) and for shared address data.

PILLAR 2: FUTURE READY

Review the addressing model against future 3D/4D needs.

WHAT SUCCESS LOOKS LIKE

- ✓ Addressing standards meet future needs, and cater to complex addressing, 3D and 4D data models, and spatial digital twins.
- ✓ A common addressing data model is testable, requirements-driven, and supports a compartmentalised modelling process.
- ✓ The addressing data model supports specialised model extensions on top of a common core, scalable to all jurisdictions' requirements.
- ✓ The addressing data model achieves general extensibility to other standards, features, and many possible relations.
- ✓ The addressing data model interoperates with ICSM and independent data models.
- ✓ Addressing standards are freely accessible, known and adhered to by surveyors, developers, and local government.
- ✓ Stakeholders critical to the addressing supply chain are equipped with relevant training and guidance to adhere to the standards, and perform their important roles.
- ✓ The standard articulates not just the presentation of address information, but the required timeliness of supply.
- ✓ Validation services can accommodate all address classes; e.g. retirement villages or other complex addresses.

ALLEVIATES GLOBAL PAIN POINTS

E F H

THE USER EXPERIENCE WILL BE

"WITH 3D AND 4D, I CAN GET GOODS DELIVERED ANYWHERE"

- Address user

"I HAVE ACCURATE, USER FRIENDLY, OPTIONAL LAYER MODELLING FOR 3D ELEMENTS AND TERRAIN"

- Address creator

"WE HAVE A CLEAR SET OF GUIDELINES AND STANDARDS"

- Address creator

PILLAR 3: JURISDICTIONAL FLEXIBILITY

Enable customised pathways for jurisdictions to adopt a common addressing model and retain their specific data requirements.

OUR GOAL

Addressing datasets in Australia and New Zealand align to the addressing model, and implement jurisdictional customisations.

HOW WE WILL GET THERE

- Plan and develop customised pathways for adoption of the standardised addressing data model.
- Deliver translation tooling for existing jurisdictional addressing data to the new model.
- ICSM to develop governance of, and guidance where possible, on extensions to the address model and whole of government address verification and linkages.

PILLAR 3: JURISDICTIONAL FLEXIBILITY

Enable customised pathways for jurisdictions to adopt a common addressing model and retain their specific data requirements.

WHAT SUCCESS LOOKS LIKE

- ✓ Status of alternate addresses is visible.
- ✓ Model enables address lifecycle stage management.
- ✓ Jurisdictions notified of informal addressing use.
- ✓ Addressing model allows flexibility for addresses to be represented.
- ✓ Historical and nonconforming addresses have been transitioned to a standardised addressing model.
- ✓ The addressing data model allows for flexibility to accommodate future 3D/4D needs.
- ✓ All citizens are able to enter their address and its alternate names into any government service portal (local, state or federal) and have it validated in real time.
- ✓ The model can cater for all classes of addresses used in Australia and New Zealand.
- ✓ There is demonstrable consistency and synchronicity between jurisdictional and aggregated address datasets.
- ✓ Addressing data exchange is integrated and automated, resulting in increased efficiency and accuracy across the supply chain.

ALLEVIATES GLOBAL PAIN POINTS

C G I

THE USER EXPERIENCE WILL BE

"A CENTRAL FEDERATED ADDRESS REPOSITORY WOULD ALLOW ADDRESS DATA TO BE AVAILABLE TO CUSTOMERS IN NEXT TO REAL TIME"

- Address user

"FEEDBACK LOOPS ARE OPTIMISED SO INTELLIGENCE ABOUT INCORRECT ADDRESSES MAKES ITS WAY BACK TO DATA CUSTODIANS"

- Address user

"MY ADDRESS IS IMMEDIATELY VALIDATED WHEN I APPLY ONLINE FOR A GOVERNMENT SERVICE"

- Citizen

PILLAR 4: INTEROPERABILITY AND LINKAGES

Achieve addressing data linkages to other valuable datasets.

OUR GOAL

Interoperability and innovation across the addressing supply chain supports developers, and results in faster and enhanced services to citizens.

HOW WE WILL GET THERE

- Demonstrate interoperability of new addressing model data with other core location-based data.
- Highlight and demonstrate datasets that are linked with address datasets.
- Assess the impact of operational services in existence that leverage address data and other data interoperability.

PILLAR 4: INTEROPERABILITY AND LINKAGES

Achieve addressing data linkages to other valuable datasets.

WHAT SUCCESS LOOKS LIKE

- ✓ Address data is interoperable with other location-based datasets.
- ✓ Address data is interoperable with other datasets.
- ✓ Where addressing data is used in relation to other data, citizens across all locations and jurisdictions experience faster transactions and improved provision of government services.
- ✓ Overseas Australia and New Zealand address users are better served.

ALLEVIATES GLOBAL PAIN POINTS

F G H K

THE USER EXPERIENCE WILL BE

"WE CAN MEASURE SOCIAL TRENDS THROUGH INTEGRATED LOCATION-BASED REPORTING"

- Address user

"ONE OVERARCHING ADDRESS SERVICE CAN UNDERPIN PUBLIC AND PRIVATE SECTORS"

- Address aggregator

"DEMOGRAPHIC INFO AND ADDRESS UNDERPINS THE ACCURACY OF SERVICE DELIVERY"

- Government service provider

PILLAR 5: EDUCATION AND COMMUNICATION

Drive an increased understanding of the importance of accurate and authoritative addressing.

OUR GOAL

All stakeholders in the addressing supply chain, including citizens and service providers, use authoritative addresses, leading to an improved citizen experience.

HOW WE WILL GET THERE

- Deliver mapping of current addresses to the future modernised data model for each jurisdiction.
- Deliver comprehensive, near real-time open address data enabling industry to enhance the customer experience.
- Implement feedback mechanisms for large-scale systemic address anomalies.
- Track and report on the rate of addressing problems.

STRATEGIC PILLAR 5 - EDUCATION AND COMMUNICATION

Drive an increased understanding of the importance of accurate and authoritative addressing.

WHAT SUCCESS LOOKS LIKE

- ✓ Informal addresses and alternate address components are related to formal addresses.
- ✓ Government and industry is able to deliver better services using address data.
- ✓ Citizen awareness, and public trust of address sources is increased.
- ✓ Emergency services are able to deliver better services using address data.
- ✓ Differences between jurisdictional address databases are visible and explained.

ALLEVIATES GLOBAL PAIN POINTS

J K L

THE USER EXPERIENCE WILL BE

"UTILISING AND LEVERAGING NEW TECHNOLOGIES LIKE AUGMENTED & VIRTUAL REALITY, CAN GIVE REAL TIME FEEDBACK TO THE USER TO GUIDE THEM TO ADDRESSING "POINTS" THAT CAN BE TRACKED IN REAL TIME EVEN INSIDE BUILDINGS"

- Emergency services user

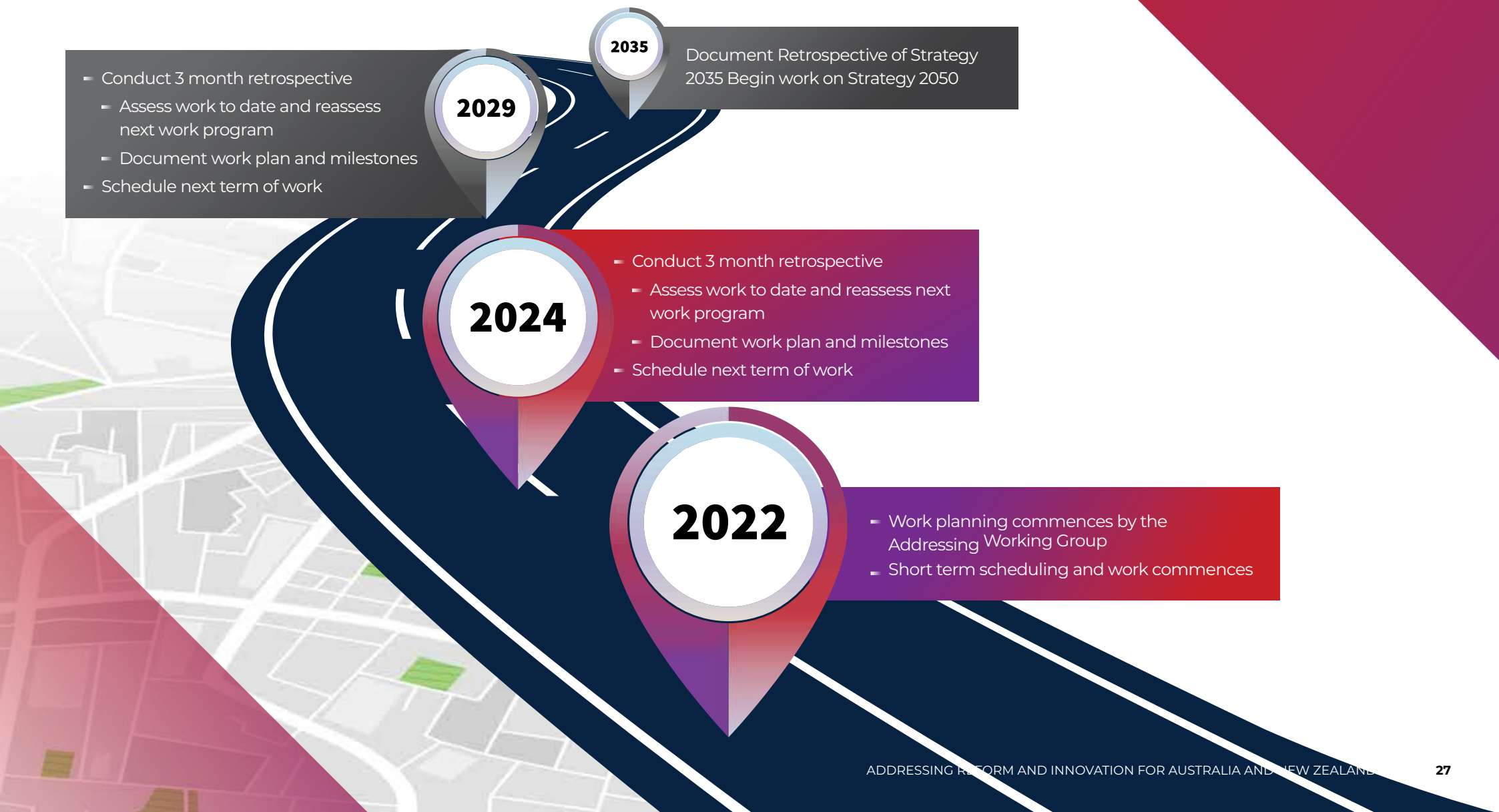
"A COURIER DELIVERING A PACKAGE IN A MULTI LEVEL APARTMENT CAN SEE THE DESTINATION IN AUGMENTED REALITY REGARDLESS OF WHERE THEY ARE IN THE BUILDING"

- Address user

"ADDRESS IS VALUED BY EMERGENCY RESPONDERS AS ONE OF THE HIGHEST QUALITY AND USEFUL DATA INPUTS TO QUICK DISPATCH"

- Address creator

ROADMAP OVERVIEW



ROADMAP - SHORT TERM 2022-2024

This Roadmap is divided into general work items supporting the Strategic Pillars.
Each general work item requires planning and resourcing which would influence the sequence of activities.

PILLAR 1

1a) Communicate the addressing strategy and its rollout with all stakeholders in the addressing supply chain.

1b) Document and publish a standardised supply chain on the ICSM website.

1c) Each jurisdiction to undertake an audit of their relevant addressing legislation to map opportunities for amendment and improvement.

1d) Develop a harmonised policy framework to provide governance for addressing across the jurisdictions.

1e) Define guiding principles for a consistent approach to whole of Government address management for Australia and New Zealand.

1f) Prioritise identified opportunities for amendment and improvement and communicate timeliness across the addressing supply chain.

PILLAR 2

2a) Identify and adopt baseline data models in line with a review of future 3D/4D needs.

2b) Review the addressing model against future 3D/4D needs to ensure the elements of all jurisdictions are all catered for.

2c) Pilot the developed addressing model and systems.

2f) Create demonstration address validation for addresses.

PILLAR 3

3a) Plan and develop customised pathways for adoption of a standardised addressing data model.

PILLAR 4

4a) Demonstrate interoperability of addressing model data with other core location-based data.

ROADMAP - MEDIUM TERM 2025-2030

Roadmap work items 1f, 3a and 4a continue into the Medium Term.

PILLAR 2

2d) Implement address data model in multiple jurisdictions.

2e) Publish and promote the standards so that they are freely accessible.

2g) Operate address validation services for data coming in to jurisdictions (new address) and for shared address data.

PILLAR 3

3b) Deliver translation tooling for existing jurisdictional addressing data to the developed model.

3c) ICSM to develop governance of, and guidance where possible, on extensions to the address model and whole of government address verification and linkages.

PILLAR 4

4b) Highlight and demonstrate datasets that are linked with address datasets.

4c) Assess the impact of operational services in existence that leverage address data and other data interoperability.

PILLAR 5

5a) Deliver mapping of current addresses to the future modernised data model for each jurisdiction.

5c) Implement feedback mechanisms for large-scale systemic address anomalies.

ROADMAP - LONG TERM 2031-2035

Roadmap work items 1f, 3b and 3c continue into the Long Term.

PILLAR 5

5b) Deliver comprehensive, near real-time open address data for industry to develop better products and services.

5d) Track and report on the rate of addressing problems.

ADDRESSING THE FUTURE

Implementing the Addressing Strategy 2035 will achieve a high level of digital maturity and enhanced addressing capabilities in the supply chain that can be leveraged to serve communities and citizens.

At present, address data is likely stored and defined differently from one government agency, or level of government, to another. For identity management in government, having this siloed approach creates duplication of information with variable currency depending on when the citizen last interacted with that agency.

To enable an efficient public sector, the future of addressing will not just be the modern technical delivery of the information. It will also be unified for discovery, access and use across the whole of government and service providers, for the benefit of citizens. This will result in less reporting and registration by the business sector, faster digitisation, and fewer errors in dealing with government. Common data repositories will enable new opportunities to develop data-based services.

Address is also a semantic touchpoint between different types of geometric layers and geographic knowledge. It is currently thought of as a two-dimensional physical link between a property and a street address but in the future, semantic layers of "address" will allow unique identification of multiple features at a location. For example, indoor addressing: shop fronts within a mall, emergency exits, stairwells, fire hoses, apartments within a complex, delivery dock, front door, car park etc. As well, infrastructure and public spaces can be "addressed".

The future model for addressing, to enable these semantic touchpoints, is by enabling "address" to be an index into a range of sources of detailed information. The machine readability of the semantic address model will allow that information to be immediately discovered and accessed. This will require both a social and technical approach.

To succeed across the ICSM addressing community now, it must be a "co-designed, testable, requirements-driven, and contextualised" model creation process. It needs to identify and cater for stakeholders' needs, demonstrate that model elements match those needs. Further, it must also be demonstrated that the model works with other related models and is in line with longer-term modelling interoperability needs.

As described in the roadmap, the short-term future of addressing will need:

- To ensure the re-use of authoritative address data and prevent silos of address information held across many organisations, a common address model will be implemented with jurisdictional specialisations.
- To improve the quality of address data, the common address model will be interoperable with other ICSM models such as the Cadastre, so that quality information can be re-used from the point of truth source.
- The ICSM Addressing Working Group to enable all members to adopt or map to the common address model to link data. This may require seeking funding and/or allowing knowledge sharing between members.
- To improve the federation of the address data, thought will be given to establishing a common (WoG) infrastructure for stable and efficient distribution of data, held by a designated data distributor.
- The ICSM Addressing Working Group will be the committee managing the future work program of Strategy 2035 to ensure efficient, effective, and coordinated development and use of the data through:
  - Documenting common approaches and guidance where necessary; and
  - Providing a governance framework to raise and action issues as they arise.

ADDRESSING THE FUTURE (CONT.)

The model directions required, and the Strategy 2035 Pillars (p.17-26) to which they are relevant, are in the table that follows. A detailed technical description of the model direction is given in the Strategy 2035 Addendum paper – *The Future of Address Information in Australia and New Zealand*.

DIRECTION	PILLAR
Better complex / multi address representation	2
Shared addressable object / address conception	2, 4
Model interoperability	1, 2, 4
Model profiling and mapping	3
International model uptake	2
New address dimensions	5
Enhanced address life cycle management	1, 3, 5
Address validation at creation point	1, 5
Verifiable model conformance	2, 5
Multi-lingual and alternate name addressing	3

OPPORTUNITIES

IMPROVED ADDRESS DATA PROVIDES ADMINISTRATIVE SAVINGS

Property development not providing adequate address information for complex sites in real time can result in confusion for citizens who are trying to register for Government services or even just have a pizza delivered.

CORRECT ADDRESS DATA CAN SAVE LIVES

Emergency Response being directed to a wrong or incomplete address can have life-or-death consequences.

SIMPLIFIED ADDRESS ASSIGNMENT PROCEDURES FOR DEVELOPERS

Less red tape, early registration, and linkages to place names, cadastre, and land tax registers through a single business registration process. This could also be linked to environmental or historical buildings registers and raise digital flags automatically for both the developer and the public sector managing the process should a site have caveats attached to its future development.

BUYING A HOME

Buying a home will trigger a flow of data between the estate agent, bank, utilities, government (change of address) and so on. Having a central, accessible register of public sector data - where only the required minimum information about the citizen is provided for the purposes of the sale, can reduce the paperwork and fees applied to the citizen for the purchase.

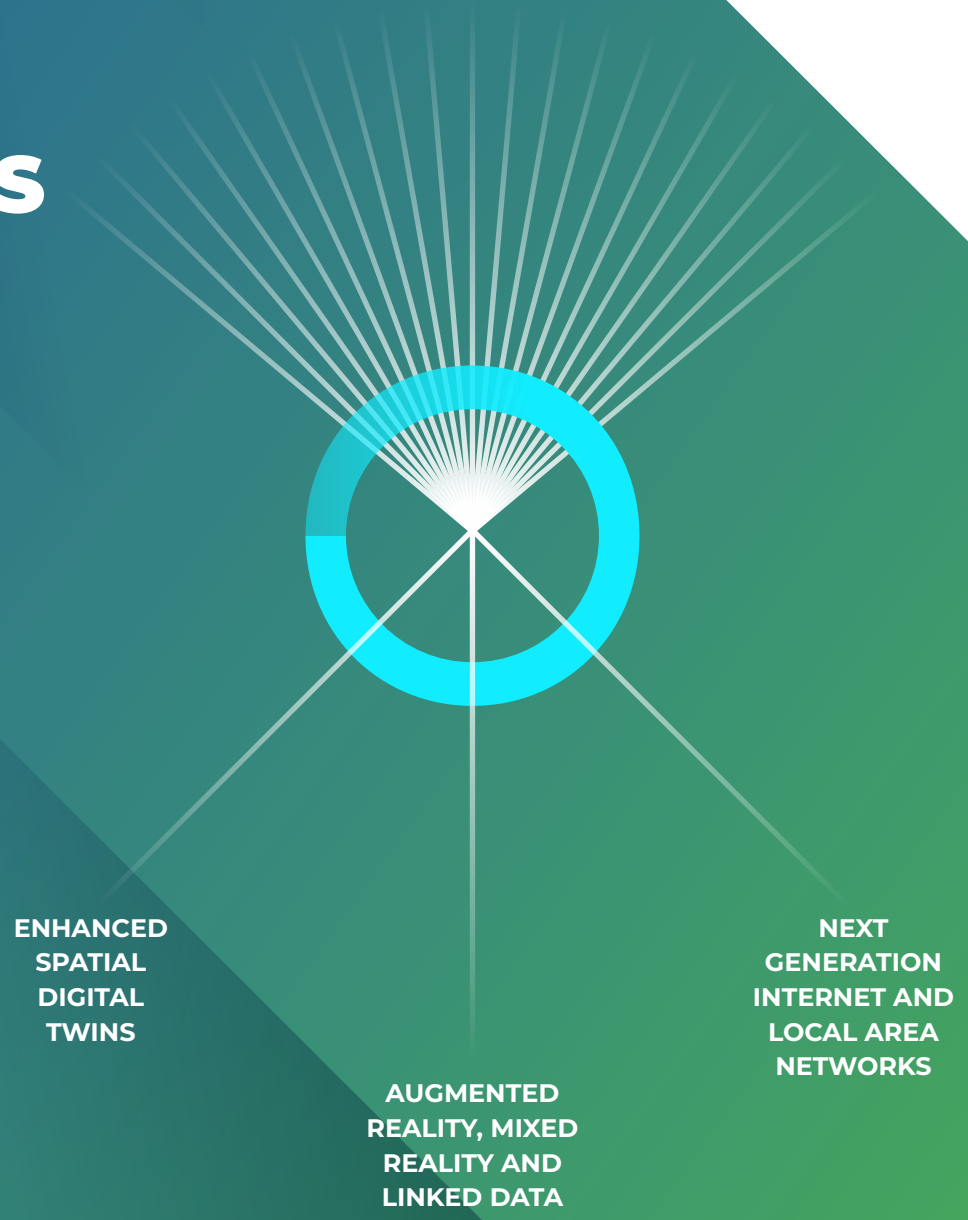
UPDATING YOUR ADDRESS FOR GOVERNMENT PAYMENTS AND SERVICES

Customer address data can be entered once and by default it will be shared safely, as needed, across other services. It will result in faster digitisation and fewer errors in dealing with government and less reporting and registration by the business sector providing those services.

ADDRESSING THE FUTURE – VIGNETTES

Whilst there are tangible gains to be made by completing the roadmap outlined in the Addressing Strategy 2035, there are also future gains to be made when address is enabled as a semantic touchpoint within a precision location reference system and used as a foundation for other linked datasets.

The following three vignettes illustrate key emerging technology trends where addressing will play a major role. Each vignette contains a technology-centric description, the potential application in an addressing context and the anticipated opportunity and future benefits.



1. ADDRESSING THE FUTURE – ENHANCED SPATIAL DIGITAL TWINS

WHAT IS A SPATIAL DIGITAL TWIN?

A digital twin is a virtual representation of a real-world entity such as an organisation, a building or physical infrastructure. Having a virtual, visual representation of millions of data from hundreds of sources helps us understand and react to situations in the real world. They act as portals into the world of linked data that enhance human decision making in real-time. A spatial digital twin further extends this concept into complex human ecosystems (towns, cities, regions) providing 3D and 4D simulation capability of these ecosystems to government, industry, and the community.

Ultimately, spatial digital twins enable better planning, design and utilisation of infrastructure, assets, and services. The ability to overlay historical and forecast data sets, adds the dimension of time to these simulations, enabling 4D visualisations. Historical and future scenarios can then be modelled. Data security and privacy controls can also be instantiated. Data custodians can determine authentication and authorisation levels to government, industry and citizens, making addressing, 3D and 4D data available for use in their own digital twins, or allow direct connections using APIs.

APPLICATION

By enhancing the addressing data model and linking more data and information sources (for example, 3D Cadastre data), emerging spatial digital twins across Australia and New Zealand can achieve the following:

- visualise current and future infrastructure using data from telecommunications, utilities providers
- visualise things that affect the interaction between society and the built infrastructure, such as administrative boundaries, planning zones, and titles and easements or access rights
- visualise information such as air quality and energy production in real time.

This virtual model of a city, region, or nation (underpinned by addressing and location data) can also connect to sensors through Internet-of-Things (IoT) technology to raise insights in the virtual environment, based on real-time data to improve evidence-based decision-making. This presents an exciting opportunity to accurately simulate real-world problems and identify scenarios that address them, in real-time.

Real-time data inputs from machines and systems offer the ability to gain new insights to improve tactical decision making on the fly with data security and privacy controls instantiated. Data from IoT system sensors can indicate likely failures if action is not taken, triggering risk assessment and impact analysis, with the ability to trigger preventative maintenance before operations are disrupted.

1. ADDRESSING THE FUTURE – ENHANCED SPATIAL DIGITAL TWINS (CONT.)

OPPORTUNITIES FOR THE FUTURE

Enhanced digital twins will perform a critical role in improving emergency and disaster management response by providing linkages between different sources of information at different levels of detail. In the future, being called to a medical emergency at an 'address' will mean that other valuable information will be made available for the first responders. If the system has a common concept of address, then the following example of humans moving from knowing information in advance, to the machine being able to enhance the known information by linking to common information around the address, can be achieved.

In the case of an apartment complex, the 'address' will include appropriate logistical and physical information for the responders.

- What is the best route to take given the time of day and any roadworks underway? Can the intersections have their lights adjusted to allow the responder right of way?
- What vehicle should be taken – an ambulance or car? What vehicle is closest at that time?
- Where is the actual access point from the road network to the complex for that address?
- The best point of access – is the service lift recommended for a paramedic for this complex? Where is it?
- Indoor route to take you to the door of the address
- Are there any police or medical flags on the address that require a cautious approach?
- Once with the patient, what is the nearest hospital that has capacity in the health specialisation required (e.g. burns)? What is the quickest way to get there?

When addressing is incorporated into modelling the behaviour of people moving around a built environment, planning for safe movement within that environment is enhanced. For example, if you live in an inner city dwelling, you may be more likely to stay within that area and walk to shops, pubs, cinema etc. Where address (business and home), topology, streetlights, traffic, and line of sight are all linked points of data, the safety of the citizens moving around the area can be planned.

Integration with real-time data sources is a new frontier for service design and delivery, strategy, and scenario testing that will further improve outcomes for citizens nationwide. Further enhancements will be enabled by complementary technologies as next generation internet and remote internet connectivity and sensors become foundational capabilities for true smart city and regional infrastructure. In particular traditional integration via assimilation into a bespoke system is being augmented by hybrid approaches using graph databases, sensor hubs, network accessible sources and dynamic identification of connections through machine learning and AI. All this is enabled through a user-centric semantic framework.

2. ADDRESSING THE FUTURE – AUGMENTED REALITY, MIXED REALITY AND LINKED DATA

WHAT IS MIXED REALITY AND LINKED DATA?

Mixed reality provides an immersive experience that blends digital and real-world settings. While virtual reality immerses the end user in a completely digital environment, Augmented Reality layers digital content on top of a physical environment. Mixed reality on the other hand blends digital and real world settings.

Linked data is machine-readable interlinked data on the Web and is one of the core pillars of Semantic Web. For the last several decades it's been possible to deliver data via the web, but the ability to identify where that data may be and how it relates to a current context (address) is only now emerging with the gradual adoption of standardised semantic models. The Network Economy, where the usage, creation, distribution, manipulation and integration of information is a significant activity, is fast reaching the stage where the reward for making more data available is demonstrating economic benefit to society - e.g. Digital Twins

Mixed and augmented reality is powered by a combination of sensors, cameras, infrared detectors, gaze trackers, accelerometers, and microphones, working harmoniously to provide an immersive experience. These experiences are enabled by wearable or handheld devices and can occur in the real world, or in a fully virtual world.

APPLICATION

Mixed reality enhanced by linked information represents a new frontier and application for spatial digital twins, providing an immersive experience that brings conceptual ideas to life without people having to be physically present at a location.

Government and industry can leverage augmented or mixed reality technologies to foster better collaboration amongst its own distributed workforce. This concept naturally extends to engaging with its diverse range of stakeholders, across locations.

These technologies deliver opportunities for stakeholders to engage differently, build empathy and shared understanding of rural and regional experiences, and provide different stakeholder groups with opportunities to collaborate and exchange ideas and information.

2. ADDRESSING THE FUTURE – AUGMENTED REALITY, MIXED REALITY AND LINKED DATA (CONT.)

OPPORTUNITIES FOR THE FUTURE

Augmented and mixed reality are enabling technologies. At their simplest they provide the ability to exploit the context of the user experience to find the data. In the field, they can enhance safety and operational activities by providing real-time mission critical information.

These technologies can be used to operationalise address and geospatial data in new and highly effective ways. Combined with linked data and next generation Internet connectivity, mixed and augmented reality can be leveraged for remote guidance to support emergency services and first responders “in the field”, through handheld devices and heads-up displays.

Linked data will provide the unambiguous identification of objects in your screen and the interactions between those objects. The interaction between addresses and semantic descriptions of that space could be used to drive the discovery of information in an augmented discovery world. For example, combined with a precision location system, the responder will know what to expect when entering a smoke-filled building – “I expect there to be a door or a passage in front of me” or “This is how I get to the closest exit”.

This opportunity is made available by enabling “address” to be an index into a range of sources of detailed information. The machine readability of the semantic address model will allow that information to be immediately discovered and accessed.

3. ADDRESSING THE FUTURE – NEXT GENERATION INTERNET AND LOCAL AREA NETWORKS

INTERNET CONNECTIVITY CHALLENGES AND LOCATION – A THING OF THE PAST?

The previous two vignettes have had a physical touchpoint via the address. In a connected world, our ability to remain connected as we move from our home network to indoor spaces or even across the sparsely populated rural areas that are Australia, can be an impediment to supporting the flow of data and information required to make decisions about location.

Connectivity is an issue mainly faced in rural and remote locations and presents a major challenge when responding to emergencies and natural disasters, or in the aftermath when infrastructure has been destroyed. In the urban centres, particularly densely populated cities, the delivery of products and services to “an address” can present issues when connectivity is lost due to indoor blackspots or where complex addressing does not give directions to a ‘front door’. As the technology to remediate connectivity issues matures, it also provides opportunities to capitalise on enriched data, and interoperable geospatial and addressing data.

Several businesses (e.g. SpaceX) are actively building low-latency satellite networks. Currently, rural and regional Australians are generally limited to using satellite services for everyday Internet usage. As low-latency satellite internet, and sensor technology, becomes low cost and mobile, readily accessible internet connectivity will be available no matter the location.

APPLICATION

Low power wide area networks (such as LoRaWAN) with sensors to indicate geographic ‘boundaries’ can ensure that Internet connectivity and bandwidth is everywhere it is required. Secure, reliable internet connectivity provides new channels for data exchange, communication and collaboration. It also provides a new means of economic empowerment for both individuals and communities. It’s become an essential part of the global economy.

Reliable connectivity is also creating opportunities for employers to leverage skills from the global workforce. Low-latency satellite internet is also improving occupational health and safety outcomes, allowing field workers to contact their employers regularly and easily in remote locations. The addition of enriched geospatial data will provide even more benefits that were otherwise only available in areas with significant telecommunications infrastructure.

3. ADDRESSING THE FUTURE – NEXT GENERATION INTERNET AND LOCAL AREA NETWORKS (CONT.)

OPPORTUNITIES FOR THE FUTURE

Leveraging this new connectivity fabric, enriched geospatial data and Internet of Things (IoT), local, state and federal government agencies could create, combine and leverage richer data streams to better understand and serve citizens, better deliver new and innovative services, and improve performance.

The low power local network with sensors will enable the connectivity to change as you move between different levels of geographic scale, such as from outdoor to indoor or remote to rural to urban. In much the same way that mobile phone towers are able to triangulate your phone location, sensor networks will work within layers of authorisation to give you access to information within that location.

The natural relationship between your address and your rights to access information at that address will allow the automatic intermediation of access to information through the local network. This is much in the same way that routing software used to determine how to drive from point A to point B, currently takes a broad view of the route to be taken and then the 'last mile' detail uses local navigation which requires a larger (finer detailed) model of the different routes that can be taken to determine the lock-step directions given.

Semantic web data exchange will be sensor enabled and navigation to a location will consist of multiple models: address, road network, indoor navigation, aerial navigation etc. Before a courier delivers a package, the IoT solutions will enable the best navigation "to the door" for delivery regardless if the location is a house, a park, a shop front or an apartment within a complex. Delivery of services to an address will be determined by the most efficient method given the data available; e.g. autonomous delivery vehicles such as drones for apartments with balconies. Indoor navigation assisted by sensors will ensure that the closest car park is used and then direction details will be updated as you move through the space to the delivery point.

In the regional and agricultural context, technology ecosystems like the (IoT) promise to help revolutionise the way we produce food and track its location (from "paddock to plate") through the global supply chain. Having supplies delivered to a rural homestead (address) will be equally efficient – even if the delivery location is tens of kilometres from the "front gate" off a main road.

ADDRESSING 2035

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ANZLIC COMMITTEE ON SURVEYING & MAPPING

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