CRC for
Water Sensitive Cities

Facilitating water sensitive urban development through planning integration — A discussion paper

Sylvia Tawfik and Chris Chesterfield

November 2020

Australian Government
Department of Industry, Science, Energy and Resources

Business Cooperative Research Centres Program

Facilitating water sensitive urban development through planning integration
A discussion paper
Guiding Integrated Urban and Water Planning (IRP3)
IRP3-4-2020

Authors

Sylvia Tawfik[1,2,3], Chris Chesterfield[3]

[1]School of Social Sciences, Monash University
[2]Monash Art, Design and Architecture, Monash University
[3]Cooperative Research Centre for Water Sensitive Cities

Publisher

Cooperative Research Centre for Water Sensitive Cities

PO Box 8000
Monash University LPO
Clayton, VIC 3800

e. admin@crcwsc.org.au
w. www.watersensitivecities.org.au

Date of publication: November 2020

An appropriate citation for this document is:

Tawfik, S. and Chesterfield, C. (2020). *Facilitating water sensitive urban development through planning integration — A discussion paper*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

Contents

Executive summary **4**
About the research project 5
1. Introduction **6**
1.1. About this document 6
1.2. Why integration? 6
2. Substantive integration through coherence **8**
2.1. Typology of planning instruments 8
2.2. Planning instruments that facilitate integration 12
2.3. Designing coherent instruments 14
The four Cs 14
Common pitfalls to avoid 17
3. Procedural integration through coordination **18**
3.1. Actor involvement 18
3.2. Information sharing and decision support tools 20
3.3. Approaches to coordination 21
4. Bringing it all together: degrees of integration **24**
Glossary **27**
References **28**

Executive summary

'Integration' is often touted in policy and planning circles as fundamental to realising holistic city shaping aspirations, like water sensitive cities which demand strong linkages between urban and water planning activities. But what does integration mean? And more importantly, how can it be operationalised in practice? This discussion paper takes a step towards answering these questions in the context of facilitating water sensitive urban development. We see integration as a useful *means* for advancing better outcomes, rather than an end result itself. And like the aspirations it seeks to facilitate, integration is multifaceted. We contend that integration is both *substantive* (output-oriented) and *procedural* (process-oriented), and practitioners who seek to advance water sensitive outcomes by improving cross-sectoral integration need to consider both aspects simultaneously.

Substantively speaking, integration is more likely where instruments of planning (e.g. policies, strategies) exhibit a level of *coherence*. That is, they are free of major contradictions and able to work together to support a greater, common goal. The integration potential of existing urban planning and water planning instrument hierarchies is constrained both vertically (from higher to lower levels of governance) and horizontally (across sectoral and organisational divides). Vertically, translating strategic directions into spatially explicit plans and implementation requirements is hampered by practices that favour reactive planning and gaps in planning scales. Horizontally, sectoral differences in spatial and temporal planning scales can make it difficult for water considerations to proactively drive urban planning outcomes.

While some instrument types may be characterised as more integrative than others, the degree of integration among planning instruments can generally be improved through a considered approach to instrument design.

We emphasise the importance of four key design attributes for coherent instruments (what we call 'the four Cs'):

- *Choice*, which relates to the selection of instruments available to address a problem or effect an outcome in different ways
- *Comprehensiveness*, which concerns the scope (breadth and depth) of an instrument or instrument mix
- *Clarity*, which recognises the importance of language and communication in supporting interpretation certainty
- *Consistency*, which describes the degree of alignment between different instruments (vertically, horizontally and concurrently), as well as the components of an individual instrument.

Ultimately, *coherence* only determines the potential of instruments. Whether that potential is realised in the outcomes we see on the ground depends on how actors work together to make decisions and implement planning instruments. This is where *coordination*, the procedural aspect of integration, becomes important. Coordination is broadly concerned with aligning the tasks and efforts of different actors in pursuit of a shared goal or agenda. Actor considerations like who is involved and how they interact are important, as are information sharing and access to integrative decision support tools.

The degree of coordination achieved through procedural changes can vary. At a minimum, decision making processes within and across fragmented sectors, organisations and levels of government can be altered or replaced to indirectly promote synergistic outcomes, such as by establishing joint decision making protocols. More advanced forms of coordination are likely to require structural changes that affect how organisations operate, such as amalgamating portfolios, additional or different mandates, or creating a new decision making body. While these changes may enhance the capacity of organisations to coordinate, in the end, the extent to which political, cultural, financial and personal factors provide an enabling context will determine the quality of implementation.

About the research project

This discussion paper is an output of the CRC for Water Sensitive Cities' Integrated Research Project 3, *IRP3: Guiding Integrated Urban and Water Planning*. The project asserts an integrated approach to urban and water planning is required to facilitate water sensitive outcomes in Australian cities and towns. It proposes a principles-based framework to guide practitioners design and carry out a fit-for-purpose planning pathway for advancing desired outcomes through the urban development process. The materials produced by this project aim to help practitioners negotiate complexity and find ways to strengthen linkages between water and urban planning. It targets three areas, in recognition that practitioners are more likely to achieve success when they can:

- Diagnose how their context may influence (constrain, enable or otherwise) the pursuit of desired outcomes
- Design and implement context-appropriate collaborative planning processes and structures that engage relevant actors in defining a place-based vision, and developing and analysing different development scenarios and servicing options
- Identify planning and governance interventions to facilitate the implementation of desired development and servicing outcomes.

The outputs of this project will take different forms to address the needs and interests of different audiences:

- *Concepts and discussion papers*, including *academic articles,* that articulate foundational aspects of our framework (which includes this document) and seek to contribute to policy debates
- A *Practitioner Manual* that provides process guidance for practitioners seeking to undertake water-centred urban planning
- *Case study reports* that provide a detailed exploration of the issues and opportunities affecting planning, water servicing and urban development in different Australian contexts (Perth, Townsville, Adelaide and Melbourne).

1 Introduction

1.1 About this document

The CRC for Water Sensitive Cities' Integrated Research Project 3 (IRP3), *Guiding Integrated Urban and Water Planning*, contends we need an integrated approach to urban and water planning to facilitate water sensitive outcomes in Australian cities and towns. It was borne out of a need for practical guidance on ways to systematically improve integration across disconnected actors, governance structures and processes involved in delivering urban development and urban water services. The project is developing an integrated planning framework that can support practitioners to advance water sensitive outcomes through urban growth and renewal processes.

This discussion paper reflects on a core theme of the project—integration. We draw on international academic literature in the fields of policy design and integration, integrated planning and governance, as well as practitioner insights and case study research across Australia, to describe concepts and considerations that we believe are fundamental to integrating urban and water planning.

Figure 1 summarises the document's overarching logic. That is, *water sensitive outcomes* depend on *integrated activity* across the urban planning and water services sectors, and the degree of integration is determined by the *coherence* of planning instruments (which relates to the 'substantive' aspect of integration), and the extent of *coordination* in their formulation and implementation (which relates to the 'procedural' aspect of integration).

The paper begins by briefly explaining the need for integration. It then describes and comments on a generic typology of urban and water planning instruments that influence urban development practices in Australia, before defining four design attributes that can enhance the coherence of instrument mixes (i.e. their substantive aspects). It then explores different dimensions of coordination (i.e. procedural aspects). Finally, the report combines both these aspects of integration to describe different degrees of integration in the context of delivering water sensitive urban development.

1.2 Why integration?

The need for an integrated approach reflects the multifaceted and interconnected nature of contemporary societal challenges, and the widely recognised failings of existing governance arrangements to effectively manage this complexity (Kidd and Shaw, 2007; Kotzebue, 2016; Hurlimann and Wilson, 2018; Productivity Commission, 2020). Climate change, population growth, environmental degradation and other cross-cutting issues demand a collective, rather than fragmented, approach to planning. Yet despite evident connections between urban development and water management (e.g. the presence or absence of water affects the location and type of development, highly impervious urban environments contribute to flooding, and different land uses produce sources of water pollution), critical linkages are often overlooked (Woltjer and Al, 2007). This result reflects sectoral divisions and the dispersal of strategic and operational responsibilities across different instruments, organisations and levels of governance (Carter et al., 2005). This in turn has contributed to governance approaches that are inefficient—by pursuing competing or contradictory objectives and duplicating effort—and ineffective—by disregarding or oversimplifying complexity (Kidd and Shaw, 2007).

If the urban water sector is to achieve its own objectives for integration (i.e. integrated urban water management)

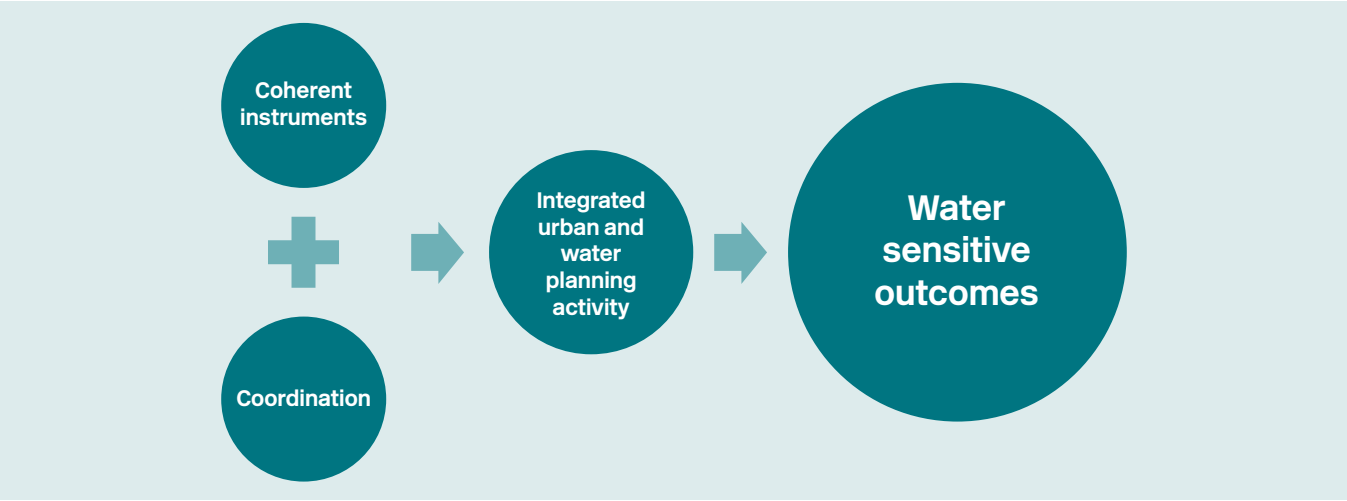


Figure 1. Logic of this document, highlighting the relationship between aspects of integration and the delivery of water sensitive outcomes.

and contribute to developing sustainable, liveable, resilient and productive cities, it needs to proactively integrate its strategic and operational activities with its counterparts in the planning system. Indeed, integrated urban water management—which seeks to optimise the community outcomes achieved by the urban water system through an integrated, total water cycle approach to the planning and management of all water services (i.e. water supply, wastewater, drainage, waterway health, etc.)—cannot be delivered by the water sector alone (Mitchell, 2006). Ongoing collaboration with other sectors, particularly local government and state planning policy, is key to advancing greater integration (e.g. Productivity Commission, 2020; Department of Environment, Land, Water and Planning, 2017). While not an easy task, the potential of integration to advance synergies between sectors, support the achievement of cross-cutting goals and promote a holistic (as opposed to sector-oriented) focus for action (see Box 1) is reflected in increasing efforts to operationalise integration (e.g. Stead, 2008; Candel, 2017).

The integration concept encompasses a range of activities, which can make it difficult to define and implement (Potter and Skinner, 2000). In its broadest characterisation, two forms of integration can be distinguished: physical integration, which is concerned with integrating physical structures such as built form, natural water systems and infrastructure networks; and institutional integration, which is concerned with 'joining up' the governance structures and processes involved in planning and delivering urban development and water services (Kidd and Shaw, 2007; Rode, 2019). This paper focuses on institutional integration as a means of advancing water sensitive urban development outcomes. In this sense, (institutional) integration is seen as a way of achieving practical, on-ground outcomes rather than an end result itself (Stead, 2008; Cejudo and Michel, 2017).

If integration is the means, then urban planning is the pathway for achieving greater integration (Stead and Meijers, 2009). Like integrated urban water management, integration is an essential feature of urban planning (Kidd and Shaw, 2007). Its spatial perspective of societal activity provides a unifying focus, capable of bringing together different sectoral actors to resolve the allocation and organisation of different urban functions (Kidd, 2007; Eggenberger and Partidario, 2000; Vigar, 2009).

In addition to managing potentially conflicting interests and facilitating cooperation, urban planning can implement a range of instruments, backed with varying degrees of statutory force, to guide urban change in pursuit of water sensitive outcomes (Hurlimann and March, 2012). These include long-term spatial visions or strategies, policy frameworks, regulations and codes (Hurlimann and Wilson, 2018). Overall, harnessing the broad powers, political support and democratic accountability of the planning system offers the 'only sensible and cost-effective' means for delivering integrated outcomes, particularly as they relate to water (Kidd and Shaw, 2007, p. 324).

The preceding discussion implies integration can be conceptualised and operationalised in many different ways. For example, integration can be tackled through *processes* (e.g. policy formulation, master planning and decision making) or *outputs* (e.g. plans, strategies and other planning instruments), and assessed by the resultant *impacts* (e.g. changes in behaviour, on-ground outcomes) (Nilsson and Persson, 2003; Persson, 2007). Scale and sector considerations add further dimensions. For example, integration can be *vertical* (between different levels of governance) or *horizontal* (between different sectors, organisations or departments within the same organisation), and manifest differently across a planning instrument's life cycle (from formulation through to implementation) (Cowell and Martin, 2003; Geerlings and Stead, 2003). While it is useful to break down integration in this way, these components are interrelated and should be considered together (Kidd, 2007; Ran and Nedovic-Budic, 2016). The next two sections focus particularly on the output-oriented (a 'substantive' perspective) and process-oriented (a 'procedural' perspective) aspects of integration respectively. However, we acknowledge that integration is more than the sum of its parts (Eggenberger and Partidario, 2000), and that the greatest influence will be achieved when a multifaceted approach to intervention is employed (Stead and Meijers, 2009; Underdal, 1980).

Box 1: Benefits of integration

- Promote synergies between sectors (win-win solutions)
- Improve the achievement of cross-cutting goals
- Enhance focus on broader public good agendas rather than narrow sector-oriented goals
- Avoid duplication and promote consistency between planning instruments from different sectors and/or levels of governance
- Encourage greater understanding of linkages with other sectors
- Support innovation in policy making and implementation

(Stead and Meijers, 2009, p. 319.)

2 Substantive integration through *coherence*

A substantive perspective focuses on the outputs of planning and other decision making processes, particularly the range of instruments deployed to address complex problems. Integration is more likely when instruments, defined as tools of governance that aim to achieve public policy objectives (Rogge and Reichardt 2016, p. 1623), exhibit a level of *coherence*. A mix of instruments is coherent if it is free of major contradictions and individual instruments are able to work together (through synergies and mutual reinforcements) to support a greater goal (Kern and Howlett, 2009; Cejudo and Michel, 2017). There are a number of elements to this, which are explored in section 2.3, but first we shall focus on the instruments of planning used in Australia to affect urban development and water servicing. In section 2.1, we briefly describe these planning instruments, distinguishing between mixes of urban planning and water planning instruments, then comment on their application and highlight particular instrument types that hold the greatest integration potential.

2.1 Typology of planning instruments

Planning systems vary across Australian states and territories as a consequence of the constitutionally defined relationship between the states and the Commonwealth, which places planning authority largely at the state level. While each planning system has evolved differently over time, they share some common planning instruments organised in a similar hierarchy that allow for a systematic and meaningful comparison (Gurran et al., 2015). Instrument typologies provide a useful way of analysing the potential effects of a particular instrument or combination of instruments (Macintosh et al., 2015). Particular mixes of substantive instruments for urban and water planning can be distinguished across three analytic levels that broadly characterise different 'arenas' of governance activity (Figure 2).

At the *direction-setting level*, overarching policies and strategies articulate long-term aspirations for the future and supporting goals and objectives to guide decision making. These policies and strategies are formulated in line with legislative mandates and Ministerial directions.

At the *plan-making level*, a variety of spatially explicit plans direct long- to medium-term changes in land use, urban form and (water) infrastructure delivery at the catchment, corridor and precinct scales. By contextualising high-level policy directions and providing specific guidance for implementation activities, plan-making instruments serve as a bridge between the direction-setting and implementation levels.

At the *implementation level*, directions, plans and regulatory instruments dictate where, what and how: (a) land use and development occurs; and (b) infrastructure is constructed and connected. Other non-statutory instruments guide some aspects of building and infrastructure design.

Table 1 describes the range of water and urban planning instruments at each level (also depicted in Figure 3) that may positively or negatively influence the realisation of water sensitive urban development outcomes. These instruments exist in some form in each state, although the format, status and associated terminology may differ (see examples in Table 2).

These instrument typologies highlight two mostly distinct mixes of water planning and urban planning instruments that are largely developed and implemented along sectoral lines. Both mixes appear to have a logical hierarchy, with abstract and big picture policies and strategies at the direction-setting level followed by increasingly more specific, technical and prescriptive guidance for development activities at the implementation level. This is especially true of urban planning systems, potentially reflecting the well-established processes and relationships evident in that sector, and its integration with other forms of governance such as statutory law that gives additional weight and support to the implementation of objectives (Hurlimann and Wilson, 2018). For water planning, relationships between different levels are less clear because guidance on water matters is dispersed across many instruments. This situation reflects a mostly siloed planning approach to water services (e.g. water supply, sewerage, drainage, waterways) and fragmented functions (e.g. policy, service delivery, regulation), spread across multiple organisations and levels of government (e.g. Infrastructure Australia, 2019). Despite the maturity of integrated urban water management concepts in the Australian water industry (e.g. Mitchell, 2006), practice remains dominated by the siloed management of water services. This highlights the potential difficulties for a sector like urban water, which is not yet integrated itself, to better integrate with other sectors.

Both water planning and urban planning instrument mixes also support translation between levels, with high-level state and regional directions converted into tangible and localised outcomes or requirements for development activity. In reality though, strategic planning is not always translated into relevant implementation actions, with the bulk of planning effort typically focused on responding to local level development applications rather than being driven by strategic, place-based visions (Infrastructure Australia 2018, p. 40). For the water sector, alignment is further hampered by gaps in planning scales (e.g. Furlong

et al., 2016). Recent integrated urban water management planning in Melbourne's north growth corridor identified the 'sub-catchment' as an optimal planning scale (Foundry, 2019). The sub-catchment is a 'corridor' geo-spatial scale that is significant to landscape functions (e.g. movement of water) and urban development patterns (e.g. development fronts). Planning at this scale requires stakeholders to work across multiple jurisdictional and sectoral boundaries in order to identify particular servicing opportunities that would otherwise be too difficult to pursue at smaller scales, such as recycled water schemes. So far very few integrated urban water management plans at the sub-catchment or corridor scale have been observed across Australia.

Looking across the water planning and urban planning instrument mixes, sector-based governance structures appear to reinforce sector-led planning approaches that do not always facilitate cross-sectoral, place-based outcomes (Infrastructure Australia, 2018). Water is rarely a focal point for urban planning (Infrastructure Australia, 2019), with most water-related objectives or provisions reflecting a narrow or partial view of the total water cycle (e.g. focusing on water supply or stormwater management) (e.g. Williams, 2020; Tawfik et al., 2020). Horizontal alignment is further complicated by spatial and temporal disparities between the planning activities of the two sectors (e.g. Ran and Nedovic-Budic, 2016; Chapman, 2011). This disconnect facilitates 'problem shifting' by permitting risks to be created in one part of a catchment (e.g. upstream development activities) that subsequently produce consequences elsewhere (e.g. downstream receiving environments). Specifically, the jurisdictions of planning and water authorities, and the geographic coverage of their respective instruments do not always correspond (e.g. local government area versus catchment) (Productivity Commission, 2020). And while the hierarchy of both instrument mixes range from long-term (at the direction-setting level) to short term (at the implementation level), the planning horizons for each sector are often different and sometimes out of sync (Hurlimann and Wilson, 2018). This may lead to reactive servicing measures because water is considered late in the development cycle after urban layouts with standard servicing templates are set, or situations where infrastructure provision lags urban development (e.g. supply augmentation in established areas) (Infrastructure Australia, 2018). Some of these issues may be a consequence of planning frameworks that defer uncomfortable decisions to later stages of urban planning, when spatial scales and timeframes may limit the solutions available (Smith et al., 2020).

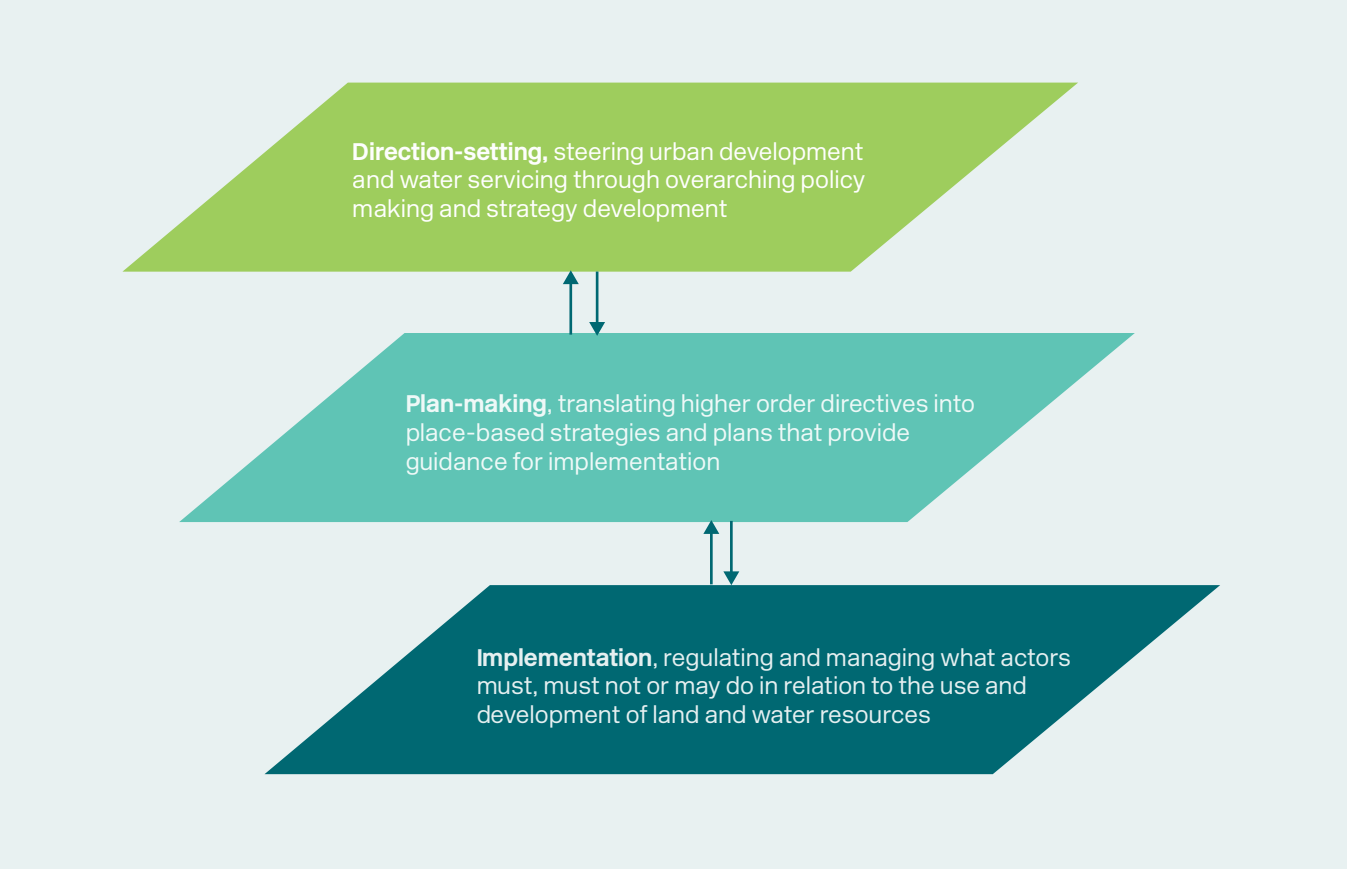


Figure 2. Three analytic levels of water and urban governance activity. (Based on Ostrom, 2005.)

Planning, water and environmental protection legislation

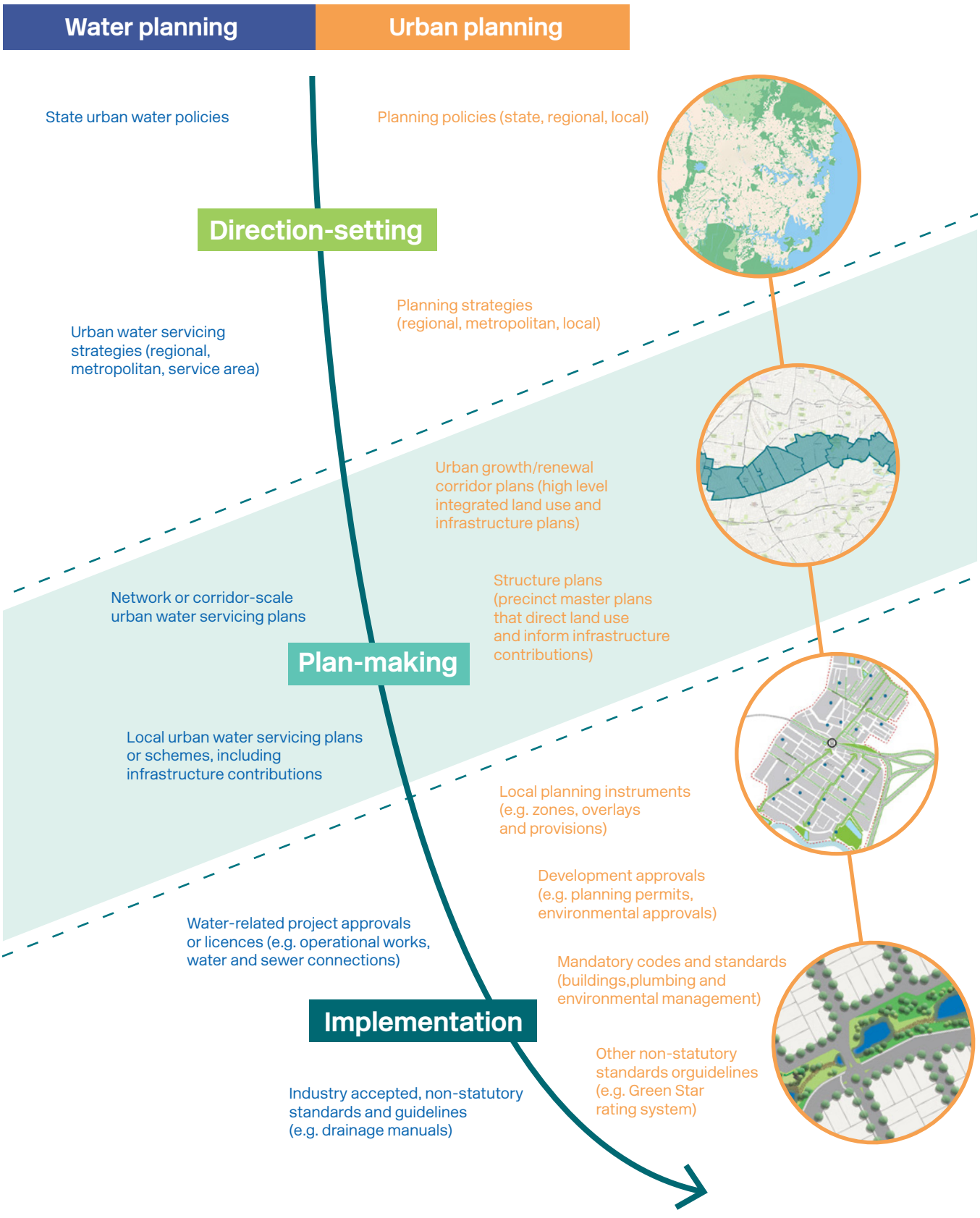


Figure 3. A generalised hierarchy of water and urban planning instruments, organised according to direction-setting, plan-making and implementation levels. Plan-making (shaded) is a bridge between direction-setting and implementation.

Table 1. Water and urban planning instruments that influence urban development in Australia.

Water planning	Urban planning
Direction-setting	
State urban water policies, contained in state government documents like state water plans, specify strategic directions and objectives for urban water services, typically related to their safety, affordability, reliability and long-term sustainability. These policies, along with relevant servicing strategies, guide the activities of state water agencies, authorities and water service providers. **Urban water servicing strategies** are long-term strategic documents produced by state water agencies or water authorities to guide the use, development and management of water resources. They are prepared for regional, metropolitan and/or service areas, and typically focus on specific services such as water supply, drainage, sewerage or waterways. Strategic water supply planning is the most common undertaking. These strategies articulate a range of objectives and actions to secure sustainable water supplies for residential, commercial, environmental and cultural uses, typically over 20–50 years.	**Planning policies** specify goals and objectives to guide decision making in relation to a range of matters that influence urban development, such as housing supply, design quality, natural resources, employment, transport and infrastructure. They exist at state, regional and local planning scales, typically integrated through state planning frameworks. State planning policies provide the highest level of policy control and guidance, while local planning policies deal with specific matters at the lowest level. Policies must be considered and given effect by responsible authorities when exercising a discretion. **Planning strategies** set out a long-term vision (e.g. 20–30 years), supporting goals and directions to guide development of a region, metropolitan or local government area. Strategic metropolitan plans, for example, are long-range planning instruments developed by state government. They specify land use and infrastructure requirements to direct localised development and infrastructure provision, mainly through private investment and the market (Searle and Bunker, 2010). These strategies often contain a range of key planning policies.
Plan-making	
Network urban water service plans are comprehensive infrastructure plans developed by water utilities to service urban growth. They guide the delivery of water-related infrastructure (e.g. water supply, sewerage and drainage schemes) within a service area or a particular subset (e.g. growth corridor) over a specified period. They typically identify new infrastructure assets or upgrades required to service forecasted growth, anticipated timeframes for future works, expected capital and operating expenditure, and mechanisms to fund the provision of infrastructure. **Local urban water service plans** are prepared by water utilities for a local area (site, precinct or township). They set out detailed servicing strategies and designs that respond to local conditions and identify mechanisms to allocate infrastructure costs (e.g. developer contributions). Local plans are commonly service-specific schemes for infrastructure provision but may also adopt an integrated, total water cycle approach to service provision, and reflect a broader range of perspectives through more inclusive and collaborative forms of engagement in their development.	**Urban growth/renewal corridor plans** are high-level integrated land use and infrastructure plans that set the strategic direction for future urban development within growth areas and, to a lesser extent, urban renewal areas that typically span multiple metropolitan local government areas. The plans identify areas for housing, employment, transport, town centres, open space and key public infrastructure. They may also identify specific areas that require further 'structure planning', such as activity centres or transit-oriented precincts. The form, status and depth of corridor plans vary across the states. **Structure plans** are holistic master plans that guide land use change, infrastructure funding and delivery, urban form and other social, economic or environmental objectives for a site, typically a precinct. The level of detail varies across the states, and can depend upon the type and breadth of issues encountered, with additional guidance provided where significant site constraints exist.

(*Continued*)

Table 1. Water and urban planning instruments that influence urban development in Australia. (*Continued*)

Water planning	Urban planning
Implementation	
Water approvals or licences authorise holders to undertake certain types of works (e.g. installing and operating water assets such as pipelines, bores or pumps, drainage channels and flood retarding basins), as well as take and use water from an aquifer, waterway or other regulated water body. At the lot scale, approvals issued by water utilities are required for new (or changes to existing) connections to water supply, sewerage and/or recycled water networks. A range of supporting procedural instruments provide detailed guidance on requirements for assessing and approving applications. **Industry accepted, non-statutory standards and guidelines** produced at the state level also influence water servicing and urban design outcomes such as the *Queensland Urban Drainage Manual* produced by the Institute of Public Works Engineering Australasia Queensland, and Melbourne Water's *Water Sensitive Urban Design Engineering Procedures*.	**Local planning instruments**, such as zones, overlays (or special control areas) and other planning provisions impose highly specific requirements relating to the use, development, protection and conservation of land (e.g. permitted land uses, building controls, stormwater treatment targets). They are typically contained within a planning scheme, which is a statutory document that sets out local policies and regulations for land use and development activities within a particular local government area. **Development approvals** are legal documents issued by planning authorities that allow the holder to carry out building works, change the use of land, subdivide land or undertake any other development activity that requires consent. Environmental licences, permits or approvals are also required for land uses or development activities that may impact the environment (as regulated by state environmental authorities) or identified matters of national significance (such as threatened species or heritage places). Supporting procedural instruments provide detailed guidance on requirements for assessing and approving applications. **Codes and standards** specify minimum requirements and criteria for designing and constructing built form and infrastructure, such as roads and pavements, landscaping and drainage systems. These can be national, state or local requirements. Key examples include the Building Code of Australia, Plumbing Code of Australia and Australian Standards, which are incorporated into state planning and building regulations. State variations of these national codes also exist, such as the Queensland Development Code. Other **non-statutory standards or guidelines** may also influence built form and streetscape outcomes, particularly those that have been produced by respected bodies and have widespread industry acceptance. Examples of these at the national level include the Green Building Council of Australia's *Green Star rating system* and Austroads' *Guide to Road Design*.

2.2 Planning instruments that facilitate integration

While existing water planning and urban planning instrument mixes are limited in their integration, some instrument types at each analytic level (i.e. direction-setting, plan-making and implementation; Figure 2) have greater capacity than others to facilitate the integration of urban development and water servicing considerations.

This highlights the need to design instrument mixes in ways that address the particular challenges that arise at each level. Broadly speaking, integration is often stronger and easier to achieve at the direction-setting level, potentially reflecting the inherently abstract and simplified nature of instruments at that level. But, it faces greater challenges at the implementation level where conflicting objectives become apparent and trade-offs must be made (Persson, 2007). Before discussing important instrument design attributes, we will briefly explore the instrument types capable of supporting integration at each analytic level.

At the direction-setting level, 'multi-sectoral' or 'integrated policy strategies' (e.g. strategic metropolitan plans) and 'policy frameworks' hold the greatest integrative potential (e.g. Candel, 2017; Nordbeck and Steurer, 2016; Persson, 2007). These strategic, 'steering' instruments seek to address the shortcomings of sector-based policies and strategies in tackling complex, cross-cutting issues by establishing a holistic set of long-term objectives and priorities (Candel, 2017; Persson, 2007). For strategies, this is supplemented by long-term, place-based visions that articulate a desired future state or set of outcomes, often through goal statements related to land use, infrastructure and other features that affect the look, feel and function of a city (Holden, 2012). They also have a coordinative function, triggering the use of particular instruments and activities within multiple sectors to maximise complementarities and synergies (Nordbeck and Steurer, 2016). Other key attributes include a degree of flexibility, with content regularly reviewed and updated as community preferences and environmental conditions change (Kotzebue, 2016).

In terms of format, integration objectives can be pursued through a single instrument that represents joint outcomes for all sectors involved (e.g. single overarching strategy), or a series of linked instruments that support sectoral ownership (e.g. multiple sector-based strategies that when combined form a coherent overall strategy) (Stead and Meijers, 2009; Nordbeck and Steurer, 2016).

At the plan-making level, urban planning instruments have the greatest integrative potential. Spatial plans bring together the whole picture by combining strategies for different urban elements such as land use and infrastructure, at a scale that is meaningful for assigning responsibilities, attracting and allocating resources, and regulating development activity (Kidd and Shaw, 2007; Vigar, 2009). Such plans have long been recognised as 'primary tools' for influencing future urban growth and development (e.g. Baer, 1997). They are especially good at aligning infrastructure planning, particularly funding and delivery mechanisms, with strategic planning priorities (e.g. Vigar, 2009).

Table 2. State-based examples of urban and water planning instruments, organised according to direction-setting, plan-making and implementation levels.

Level	Victoria	New South Wales	Western Australia	South Australia	Queensland	Tasmania
Direction-setting	Plan Melbourne 2017–2050 Water for Victoria State Planning Policy Framework	A Metropolis of Three Cities – The Greater Sydney Region Plan Metropolitan Water Plan State Environmental Planning Policies	Perth and Peel @ 3.5 million Waterwise Perth Action Plan State Planning Policies	The 30-Year Plan for Greater Adelaide State Planning Policies (draft) Water for Good	ShapingSEQ: South East Queensland Regional Plan 2017 State Planning Policy South East Queensland Water Strategy	Tasmanian Planning Policies Northern Tasmania Regional Land Use Strategy TasWater Long Term Strategic Plan 2018–2037
Plan-making	Growth Corridor Plans (e.g. South East) Integrated Water Management Plans (e.g. Ballarat)	District Plans (e.g. Western City) Greater Parramatta and the Olympic Peninsula: Place-based Infrastructure Compact Pilot	Sub-regional planning frameworks (e.g. South Metropolitan Peel) District Structure Plans (e.g. Albion)	Structure Plans (e.g. Inner Metro Rim) City of Salisbury's Integrated Water Cycle Management Plan	Local Government Infrastructure Plans City of Gold Coast Water Strategy 2019–2024	Greater Launceston Plan Ringarooma River Catchment Water Management Plan Legana Structure Plan
Implementation	Development Contributions Plan Overlay Drainage schemes Urban Stormwa-ter: Best Practice Environmental Management Guidelines	Building Sustainability Index (BASIX) Apartment Design Guide Floodplain Development Manual	Residential Design Codes Guideline for the approval of non-drinking water systems in Western Australia	Planning and Design Code (draft) Stormwater Pollution Prevention – Code of Practice for the Building and Construction Industry	Queensland Development Code Water Resource Catchment Overlay Code	Tasmanian Planning Scheme Derwent Estuary Program's Water Sensitive Urban Design (WSUD) guidelines

The optimal scale of such plans is typically associated with functional areas related to the catchment or city region (e.g. Woltjer and Al, 2007; Kidd and Shaw, 2007; Vigar, 2009; Rode, 2019; Hull, 2005). There is also considerable variety in the depth of such plans, ranging from spatial visions that are mainly communication tools, through to blueprints or master plans that map and describe a place in detail.

At the implementation level, the greatest opportunities for integration lie in incorporating 'water sensitive' provisions in local planning instruments, codes and standards. The degree of integration depends on how urban planners and industry regulators interpret 'integrated urban water management', and related concepts like 'water sensitive urban design'. Planning instruments at this level tend to focus on stormwater management and only marginally consider other aspects of integrated urban water management, such as fit-for-purpose alternative water uses (Williams, 2020). A fuller application of these integrated concepts is more likely if planning instruments clearly define all relevant sub-components and specify quantitative, mandatory targets, design requirements and guidelines in relation to each (Williams, 2020).

2.3 Designing coherent instruments

Coherently designed instruments that complement and reinforce, rather than obstruct or overlap each other, are more capable of addressing complex problems and achieving multi-sectoral objectives (Cejudo and Michel, 2017; Howlett and Rayner, 2007). However, it is important to remember that design simply controls the potential of an instrument; coherence can only be fulfilled through coordinated implementation (Cejudo and Michel, 2017). Given the designers are often not the implementers, instruments must be formulated in ways that ensure they will be applied as intended (Underdal, 1980; Chapman, 2011). The following four design attributes provide some assistance in this regard, with the aim of enhancing the integration potential of instrument mixes.

The four Cs

The four design attributes relate to the choice, comprehensiveness, consistency and clarity of planning instruments (Figure 4). We identified these attributes by synthesising academic literature and case study analysis. They are suggestive and advisory, not definitive or prescriptive, and intended to stimulate different ways of thinking about the design of an instrument or instrument mix.

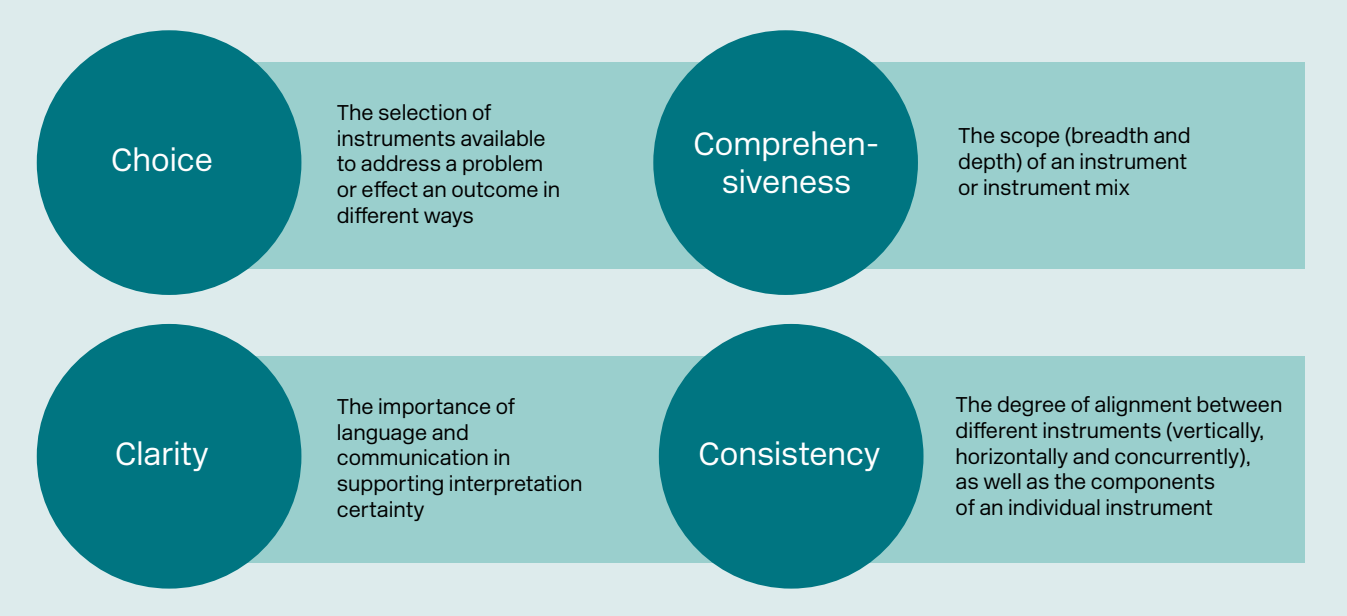


Figure 4. The four Cs.

Choice

Different instruments can affect the same problem in different ways, and with varying degrees of effectiveness, so the *choice of instruments* is particularly important. It requires understanding the range of instruments available and how they can affect—through regulatory, economic or informational means (Vedung, 1998)—different dimensions of a complex problem. Some instruments may have a greater impact or are more suited to a particular task than others. For example, 'hard' or mandatory instruments may be more appropriate than 'soft' guidelines because they contain stronger directions that are more likely to influence development outcomes (e.g. Candel, 2017; Berke and Godscalk, 2009). Their suitability could be tied to the 'acceptability' of particular instruments, with some seen as more legitimate and authoritative than others (Macintosh et al., 2015). For example, environmental performance standards adopted and enforced by servicing authorities are likely to have greater weight than best practice guidelines referenced in state environmental protection policies. Using such instruments could help to elevate the status of water considerations in planning and development activities.

Aside from the traits of individual instruments, it is also important to consider how different instruments interact with each other so as to maximise positive interactions among instruments (Howlett and Rayner, 2007). Ultimately these choices cannot be separated from the prevailing political context and governance 'style', which is likely to limit the choices available and see particular instruments favoured over others (Macintosh et al., 2015; Howlett and Rayner, 2013). For example, policy makers may prefer instruments that incentivise performance outcomes rather than prescribe specific solutions or actions.

Choice key points

- Consider the full range of instruments available, recognising the limits imposed by prevailing political and institutional cultures.
- Choose instruments that are appropriate for the particular task or objective at hand, able to elevate water considerations and maximise impact.
- Choose a mix of instruments that interact positively with each other to address different dimensions of a complex problem.

Comprehensiveness

Comprehensiveness is concerned with the scope of an instrument or instrument mix, and particularly the extent to which complexity is recognised in the way problems and goals are defined. Comprehensive instruments are evidence-based, reflect the perspectives of a broad range of stakeholders and consider the cumulative implications of different issues (Ran and Nedovic-Budic, 2016). Comprehensiveness can be measured by the interdependencies between issues (e.g. water management and urban liveability), their spatial and temporal consequences (e.g. long-term water quality impacts of increasing urbanisation across a catchment) and the range of actors affected (e.g. private developers, local communities, water service providers) (Underdal, 1980). Narrow or sectoral understandings that do not acknowledge the cross-cutting nature of a problem are unlikely to foster collective governance responses (Chapman, 2011; Candel and Biesbroek, 2016). This highlights the relationship between problem framing and goal setting, with holistic problem definitions more likely to result in multi-dimensional goals and priorities focused on aligning the activities of different sectors (Candel and Biesbroek, 2016). For urban and water planning, this means recognising the role of *all* water system services in delivering a range of development outcomes such as attractive urban environments, social cohesion and local identity, investment opportunities and healthy waterways.

Comprehensiveness key points

- Define issues extensively and exhaustively, based on evidence and a full range of stakeholder perspectives.
- Formulate goals to reflect a problem's complexity and promote cross-sectoral alignment.
- Recognise water's contribution to a range of social, economic and environmental outcomes for urban development by adopting a total water cycle perspective.

Clarity

An instrument's clarity describes the extent to which its components, particularly its objectives and directions, are clearly articulated and sufficiently specific to guide implementation. Instruments with SMART objectives—Specific, Measurable, Achievable, Realistic and Time-bound—are more likely to have a higher degree of clarity (Nordbeck and Steurer, 2016). For example, integrated urban water management principles can be translated into SMART goals and targets relating to urban form (e.g. % pervious area), public realm (e.g. % canopy cover) and waterways (e.g. pollutant load reductions), among other things. Because planning instruments seek to influence activity in different sectors, they need to create a clear and common framework of understanding that reconciles differences in professional cultures and practices (such as vocabulary, skill sets, ways of thinking, procedures and priorities) among water and urban planners (e.g. Peters, 2018; Woltjer and Al, 2007). Shared understandings also support more effective coordination and implementation (Peters, 2018). This is particularly important given implementers and designers are generally different actors. Goals and issue areas, which are likely to be many and varied in such instruments, need to be unambiguous and clearly ranked in importance to ensure implementation occurs as intended (Sabatier and Mazmanian, 1979). This also prevents implementers from 'cherry picking' those aspects of most interest to them (Nordbeck and Steurer, 2016).

Consistency

Consistency describes the degree of alignment between instruments. At a minimum, a consistent instrument mix is characterised by an absence of contradictions such that instruments are able to coexist without undermining each other (Rogge and Reichardt, 2016). Strong consistency is associated with positive, rather than neutral, interactions between instruments, such as when they work together in a harmonious and mutually supportive way to achieve a common purpose (Howlett and Rayner, 2013; Candel and Biesbroek, 2016; Cejudo and Michel, 2017). This can be achieved through the deliberate design of instrument mixes that maximise synergies while minimising redundancies and avoiding counterproductive effects (Howlett and Rayner, 2013). Consistency can be further distinguished by variations across vertical, horizontal, temporal and internal dimensions (Rogge and Reichardt, 2016; Underdal, 1980). *Vertical consistency* refers to aligning instruments between different governance levels (e.g. consistency between state and local planning policies), while *horizontal consistency* describes the extent of compatibility between different instruments across the same organisation, jurisdiction or planning scale (e.g. street trees and road safety policies) (Norton, 2008). The status of different instruments at a given point in time describes their *temporal consistency* or concurrency (Rogge and Reichardt, 2016; Baer, 1997). This is important when planning the sequencing of housing and infrastructure delivery, to ensure necessary services are provided to communities in a timely and coordinated manner (Infrastructure Australia, 2018). Finally, *internal consistency* reflects the degree of alignment between instrument components (e.g. goals are reflected in proposed implementation actions) (Norton, 2008).

Clarity key points

- Ensure instruments can effectively guide the activities of different sectors by creating a clear and common framework of understanding that transcends differences in professional cultures and practices.
- Formulate objectives and directions as precisely as possible (e.g. Specific, Measurable, Achievable, Realistic and Time-bound) to maximise the likelihood that an instrument will be interpreted and implemented as intended.
- Clearly indicate the relative priority of different objectives to prevent important directions from being delayed or ignored during implementation.

Consistency key points

- For instrument mixes, consider the degree of alignment between instruments across governance levels, issue areas and time. Ensure strong consistency by maximising reinforcing and synergistic effects, while avoiding contradictions.
- For each instrument, make sure its components work together harmoniously (e.g. objectives relate to identified issues and are reflected in proposed actions).

Common pitfalls to avoid

Previous efforts to integrate sectoral activities by making instrument mixes more coherent have often failed to achieve desired outcomes as a result of three design pitfalls: layering, drift and conversion (Howlett and Rayner, 2007). Most existing instrument mixes have evolved incrementally over long periods. New instruments are often added to an existing mix without abandoning old ones (*layering*) (Howlett and Rayner, 2007). Sometimes strategic directions change but associated implementation instruments remain the same (*drift*) (Kern and Howlett, 2009). Or existing instrument mixes from one sector are redeployed to serve the goals of another (*conversion*), often with unintended consequences (Howlett and Rayner, 2013; Howlett and Rayner, 2007).

These approaches (layering, drift and conversion) can compromise the effectiveness of an instrument mix through inconsistencies, ambiguity or fragmentation. But, this can be avoided by recreating or restructuring an instrument mix using targeted replacements that improve coherence (Kern and Howlett, 2009). However, apart from planning reform packages, very few circumstances support a complete overhaul of planning instruments, suggesting that most designers will need to work within the confines of existing instrument mixes (Howlett and Rayner, 2013). To avoid ineffectual integration attempts, designers should first identify elements of existing instrument mixes that can be supplemented or replaced to improve coherence, and second, base new designs on a sophisticated analysis of instrument dynamics that considers both technical and political challenges (Howlett and Rayner, 2007).

Ultimately, complete coherence may be impossible given the complexity of contemporary challenges and the inherently divergent interests that governance systems need to manage (Rogge and Reichardt, 2016; Stead and Meijers, 2009). So, we need to consider the 'human dimension' of integration, which can sometimes be more important than the type or quality of instruments deployed (Stead, 2008; Cowell and Martin, 2003). Practice suggests efforts to improve coherence may lead to highly integrated instruments, but not necessarily produce much effect in the real world (Cejudo and Michel, 2017; Candel, 2017; Baer, 1997). That depends not only on the design of instruments, but also their implementation (see Figure 5), which in turn is influenced by institutional factors such as organisational capacity, political will and resourcing (Cejudo and Michel, 2017). We cannot assume "good planning automatically translates into good implementation" (Kotzebue, 2016, p.1099). Accordingly, to prevent instruments from becoming 'paper documents' that are not carried out (Berke and Godschalk, 2009), we need to look at how actors work together to make decisions and implement planning instruments (see section 3).

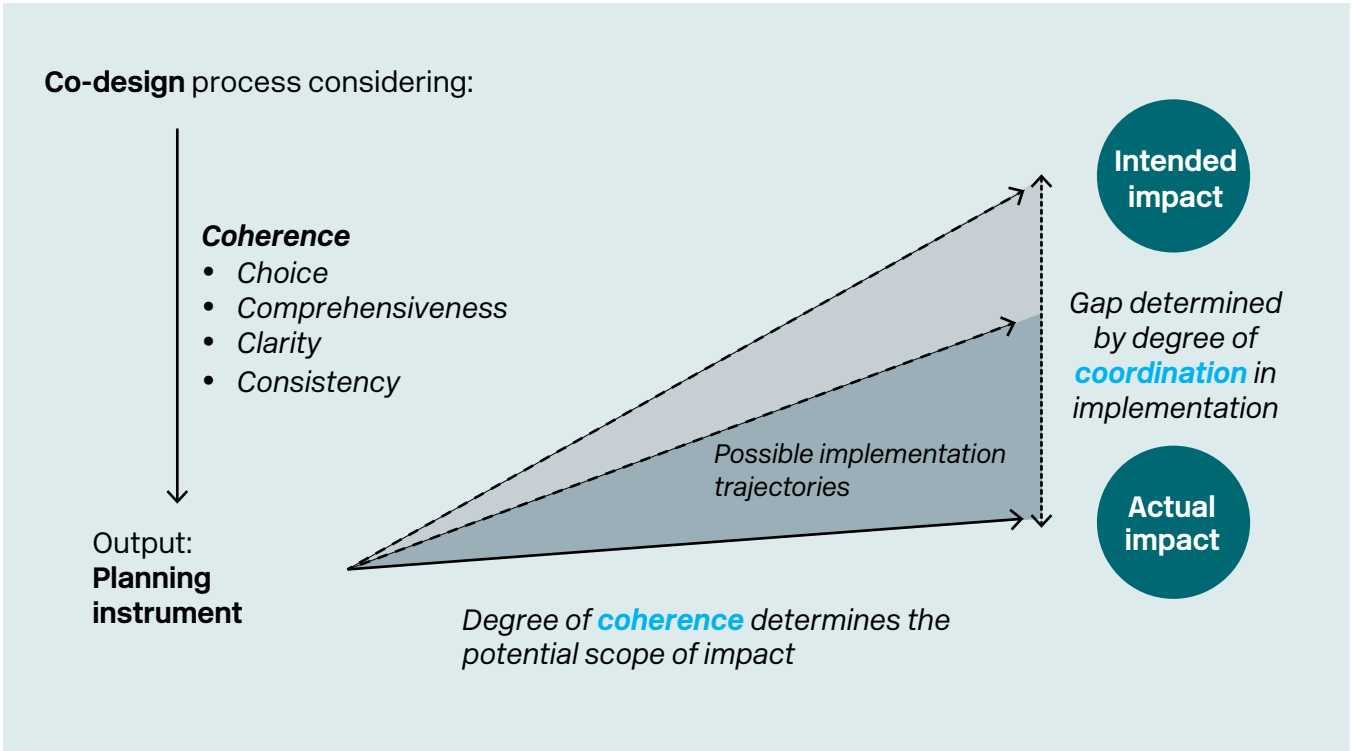


Figure 5. Relationship between coherence and coordination and its effects on implementation outcomes.

3 Procedural integration through *coordination*

Effective coordination is needed to achieve coherence (Cejudo and Michel, 2017). This procedural aspect of integration is broadly concerned with aligning the tasks and efforts of different actors in pursuit of a shared goal or agenda (Stead and Meijers, 2009). It is particularly focused on the planning processes and governance structures used to formulate and implement planning instruments, rather than the substantive content dealt with by these instruments (Cejudo and Michel, 2017; Peters, 2018; Tosun and Lang, 2017).

Coordination is particularly important in two separate but related activities where actors interact to: (1) set priorities and directions through strategy development, policy or plan-making (known as policy or administrative coordination), and (2) resolve implementation issues and delivery arrangements (known as operational coordination) (Margerum, 1999; Persson, 2007). The first typically involves senior policy makers and administrators, and seeks to align related strategies and policies of different organisations; while the second often comprises various technical experts and seeks to align related delivery mechanisms (Kidd and Shaw, 2007). Although different in focus and the actors involved, both forms of coordination are shaped by similar dimensions. Variations in these dimensions can explain differences in the scale of coordination (see Figure 6), which can range from totally independent to highly interdependent actors and activities (Peters, 2018). The latter is likely to require different governance structures, which due to their static nature are much harder to change than processes (Candel and Biesbroek, 2016; Rode, 2019).

3.1 Actor involvement

Fundamentally, coordination is about the quality of interactions between actors to address a complex problem. So understanding the *type of actors involved* and the *extent of their involvement* is important, because actors clearly determine the course and outcomes of interactive processes (Kotzebue, 2016; Candel and Biesbroek, 2016). This dimension of coordination primarily relates to interactions among government and industry practitioners. Separate considerations apply to community engagement, which are not discussed in this document (for guidance on such matters, see Rogers et al., 2020).

Which actors to involve largely depends on how the problem is defined. The more comprehensive and cross-cutting the problem scope, the more actors with affected interests are likely to be identified and formally or informally involved (Candel and Biesbroek, 2016). For place-based planning matters, coordinative activities should at a minimum involve key approval agencies that can influence the outcomes delivered by urban development (e.g. local governments, state planning agencies, water authorities and service providers).

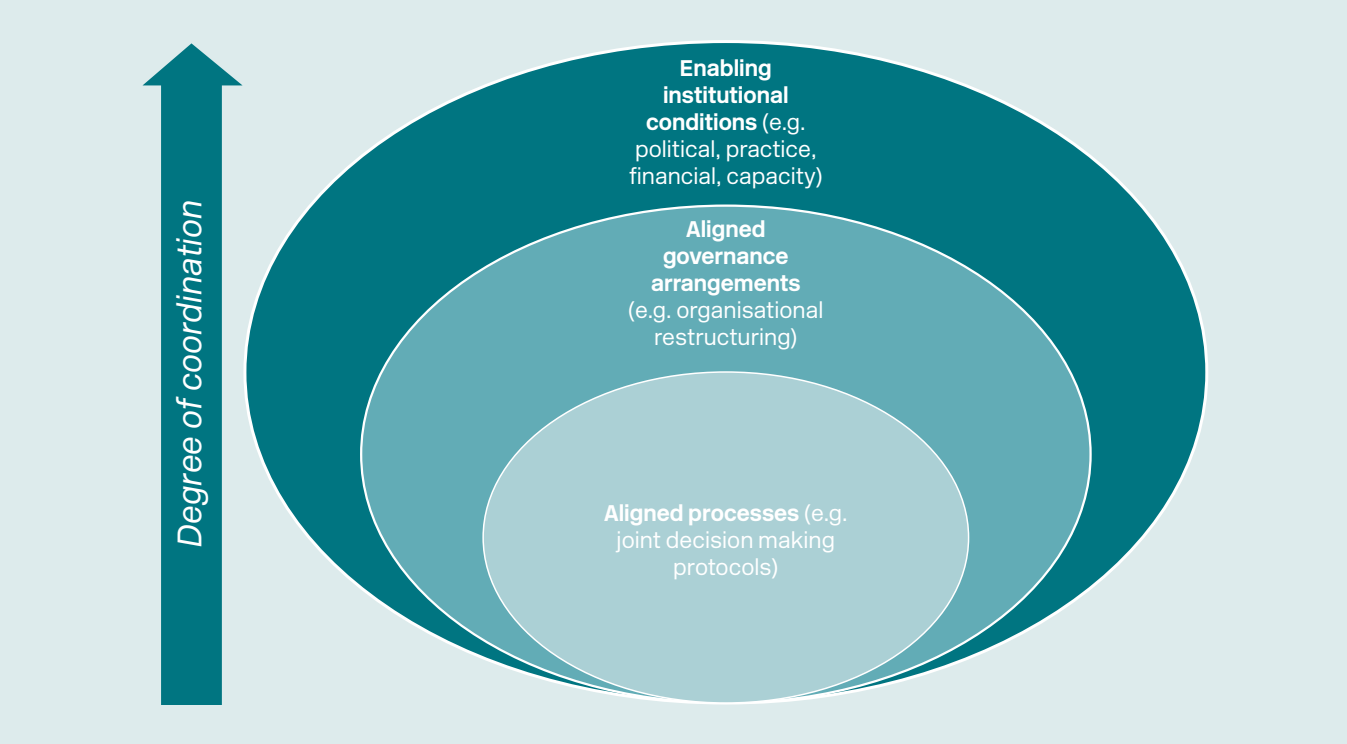


Figure 6. Variations in degree of coordination.

When it comes to the individuals involved, there are particular behaviours and personality characteristics that are associated with more effective collaborators (e.g. Taylor, 2009; de Boer and Bressers, 2013; Taylor et al., 2011):

- *Motivations and values*: Actors with a strong personal commitment to a particular issue, reflecting an intrinsic motivation rather than their role description, are more likely to persist and generate ongoing momentum (Taylor et al., 2011). While different actors will have different goals, a degree of similarity or mutual reinforcement promotes synergy (de Boer and Bressers, 2013). Understanding the motivations of other actors can help identify opportunities to work together and achieve multiple goals. Further, broad and somewhat abstract concepts such as integrated urban water management, liveability and resilience can provide a common frame of reference to unite different but related goals. But these concepts are often understood differently, so it's important to collectively clarify their scope and meaning upfront.
- *Cognitive skills (e.g. strategic thinking)*: The ability to see those opportunities for mutual benefit depends on how individuals learn and interpret information (e.g. Kotzebue, 2016). Greater scope for synergy exists when individuals engage in big picture thinking, and seek to understand other viewpoints and interdependencies between different roles, including how their activities might help others achieve their own objectives (e.g. stormwater manager recognises that diverting stormwater runoff supports waterway managers achieve ecological health objectives).
- *Capacity to effect change*: Different actors have varying abilities to influence outcomes, depending on the types of power they can exercise (e.g. Taylor, 2009). Power can be derived from an individual's formal position (e.g. approver) within an organisation (*structural power*), their ability to mobilise financial and human resources (*dispositional power*), and/or their personality traits (e.g. visionary), skills (e.g. leadership) and expertise which facilitate the use of particular tactics or strategies (e.g. networking) (*relational power*) (Taylor, 2009; Arts and van Tatenhove, 2005). Coordination efforts are more likely to be effective when collaborators can exercise influence, and do not hesitate to use the powers (statutory, political or otherwise) available to them.

The nature and extent of involvement can range from infrequent and mostly informal interactions to very frequent and formal interactions (Candel and Biesbroek, 2016). The latter characterises highly integrated forms of coordination, and generally requires actors to be more accessible, willing to cooperate and committed (through financial contributions and binding agreements), and give up greater autonomy to facilitate joint decision making (Stead and Meijers, 2009). Formality is clearly an important dimension that influences the effectiveness of coordination (Peters, 1998). Formalising interactions commits actors to deliver particular actions, and enhances the legitimacy of coordinative efforts and the credibility of outputs. While informal interactions offer greater flexibility, their outcomes are more likely to be contested, particularly if they challenge existing instrument mixes.

Plan-making and implementation will likely require extended periods of interactions, particularly to resolve complex, long-term matters. But personnel changes, resourcing constraints, lost support or momentum, 'collaboration fatigue' and/or other issues may see efforts fall apart or intentionally scaled down over time (e.g. Candel and Biesbroek, 2016). This suggests a need to balance a range of potentially competing factors (e.g. certainty versus flexibility, comprehensiveness versus timeliness) to ensure interactions are fit for purpose, recognising that in some circumstances intermittent and highly targeted interactions may be more appropriate than continuous forms of engagement.

3.2 Information sharing and decision support tools

The degree of information and knowledge exchange is another important dimension that can determine the effectiveness of coordination efforts. The quality of outputs clearly depends on the quality of inputs, with coherent and coordinated responses to complex problems more likely when a shared context exists, that is, a common understanding of the problem and the roles of each actor (Ran and Nedovic-Budic, 2016). This depends on the nature of information flows and communications between different actors. The more extensive the information sharing, the faster and more effectively actors can compile a reliable, accurate and comprehensive picture of the problem (Cejudo and Michel, 2017).

Sharing information also improves the appropriateness of responses to a problem by enabling a more holistic approach to options evaluation. It supports the use of methodologies and tools able to assess, compare and prioritise different options from an overall, place-based perspective as opposed to the singular perspectives of each actor or sector (Underdal, 1980).

For example multi-criteria analyses, strategic impact assessments and benefit-cost analyses can integrate social, economic and environmental considerations, and assess cumulative impacts to help decision makers understand the full breadth of consequences associated with different options (Eggenberger and Partidario, 2000; Yigitcanlar and Teriman, 2015).

In the context of water sensitive approaches to urban planning, shared geographic information-based planning support tools are particularly important means of integration (Ran and Nedovic-Budic, 2016). These tools can inform and empower planning activities by organising, integrating and visualising data to clearly and effectively communicate ideas, support exploratory analyses and combined assessments (e.g. flood risk assessments under different land use and development scenarios), and facilitate multi-actor interactions and deliberations (Kuller et al., 2017).

3.3 Approaches to coordination

Coordination is often facilitated through procedural arrangements that support a joint, cross-sectoral approach to direction-setting, plan-making or implementation activities (see examples in Table 3). The emphasis here is on how to integrate different sectoral activities through different processes and structures (Persson, 2007). It encompasses and builds upon previously discussed considerations (i.e. who to involve, information sharing, assessment approaches and decision support tools). A range of instruments and structures can be deployed to achieve different levels of coordination (Cejudo and Michel, 2017; Tosun and Lang, 2017). Minimum levels are typically characterised by procedural information instruments, which provide pertinent information to other actors involved in planning activities in an effort to seek their opinions, influence their decision making and facilitate network management (Macintosh et al., 2015). As the degree of coordination increases, so too does the complexity of procedural instrument mixes and actor configurations. In addition to information exchange, higher levels of coordination are characterised by greater sharing of resources (human, financial, material) and more formally defined rules and responsibilities (Cejudo and Michel, 2017).

Process-focused approaches to coordination do not seek to change existing governance arrangements. Rather, they target decision making processes or procedures that exist within and across fragmented sectors, organisations and levels of government to indirectly affect outcomes (Persson, 2007; Candel and Biesbroek, 2016). Organisational actors largely operate in the same way, but new or modified procedures are put in place to generate synergy by aligning related tasks and efforts (Cejudo and Michel, 2017; Peters, 2018). This approach assumes coherent outcomes are more likely when decision making processes themselves are coherent (Rogge and Reichardt, 2016). When it comes to urban and water planning, procedural alignment must address differences in planning horizons (Vigar, 2009). This requires understanding key tasks and milestones within related urban and water planning processes to establish two-way procedural linkages that can facilitate early, proactive input of water servicing or urban form considerations in either planning process, and thereby embed water and urban design principles in key planning documents.

Table 3. Examples of procedural instruments that facilitate coordination through processes or structures.

Level	Decision making processes and protocols	Inter- or intra-organisational structures
Direction-setting	• Statutory requirements to jointly develop overarching strategies or ensure consistency among multiple strategies • Human resource policies and procedures supporting inter-organisational cooperation (e.g. job rotations)* • Statutory requirements for consultation* • Professional codes of practice conducive to integration*	• Cabinet or interagency committees • Cross-sectoral policy teams • Temporary task forces or working groups • Governmental advisory bodies • Central, boundary-spanning steering body
Plan-making	• Guides for joint research, fact finding and development of information bases • Integrated assessment approaches • Funding participation in collaboration	• Permanent place-based, multidisciplinary planning teams • Temporary, project-based working groups
Implementation	• Protocols for joint processing of sector approvals, licences, permits etc. • Joint accountability, monitoring and reporting protocols (e.g. joint performance indicators)	• Service delivery partnerships • Project steering groups • Inter-agency review teams • Joint budgeting arrangements

Notes: *Relevant across all three analytic levels.
(Based on Vigar, 2009; Candel and Biesbroek, 2016; Eggenberger and Partidario, 2000; Stead, 2008; Tosun and Lang, 2017; Underdal, 1980.)

The degree of coordination achieved through process interventions alone is likely to be limited. Structural changes will also be required if highly embedded forms of coordination are sought. These types of changes affect organisational structures, and are designed to improve governance arrangements by addressing weaknesses or gaps in institutional capacity (Persson, 2007). New legislative requirements, redistribution of resources and responsibilities, and collaborative networks are just some of the ways in which structures can be changed to better coordinate and synchronise efforts (Rode, 2019; Holden, 2012; Underdal, 1980). Highly advanced forms of coordination and integration are likely to involve new mandates that guide actors to operate under new logics (Cejudo and Michel, 2017). This can be achieved in different ways:

- *Merging two or more existing portfolios, departments or functions into a single entity*. For example, reforms of Berlin's administration amalgamated urban planning and design, housing, building, transport, and environment functions to create one of the world's most comprehensive urban development departments (Rode, 2019). In Victoria, the Department of Environment, Land, Water and Planning (DELWP) seeks to create "a liveable, inclusive and sustainable Victoria with thriving natural environments" by bringing together climate change, energy, environment, water, forests, planning and emergency management functions into a single department to maximise connections between communities, industries, economies and the environment (DELWP, 2020). Similarly, regional councils like Townsville City Council are in a unique position to integrate activity because they hold a broad range of responsibilities, from strategy and policy, through to planning, regulation and service delivery across a significant geographic area (Tawfik et al., 2020).
- *Assigning existing organisations new mandates or responsibilities, supported by formal accountability mechanisms*. According to Persson (2007), this would involve requiring organisations to internalise integration principles by, for example, instructing different organisations to develop their own strategies, with targets and timetables that align with a particular integration agenda, such as building resilient communities. This is designed to force these organisations to consider how the sectors they regulate influence development outcomes, in connection with the activities of other sectors, so they can develop their own procedures, capacities and cultures that support broader integration objectives. As an example, European Union sub-councils responsible for defining and implementing sector-based policies were first instructed in 1998 to integrate environmental considerations into their respective activities to give effect to a treaty requirement for environmental integration (European Commission, 2020).
- *Creating a new decision making body that oversees and steers coordinated responses to complex, cross-cutting problems.* This could take the form of a new agency established to promote certain values (e.g. liveability) (Cejudo and Michel, 2017; Underdal, 1980), or a boundary-spanning, overarching authority structure that coordinates and aligns the work of other agencies to achieve a common, central goal (Underdal, 1980; Candel and Biesbroek, 2016). To effectively facilitate integration, these structures should combine hierarchical and network forms of governance (Rode, 2019). The institutional design of the Greater London Authority, for example, combines centralised decision making at the city-wide scale with network modes of coordination (Rode, 2019). The strategic authority, created in 2000 to promote London's economic, social and environmental wellbeing, is duty-bound to achieve policy integration by developing mutually consistent and reinforcing strategies (dealing with transport, health, spatial development, culture, economic development and environment policy) (West et al., 2003). Similarly, the Greater Sydney Commission in New South Wales was established as a new government agency with a dedicated responsibility for planning the Greater Sydney metropolitan region. The Commission coordinates and aligns the planning for development, transport and housing across the metropolis through its strategic oversight and assurance functions. It prepares and updates the Greater Sydney Region Plan and associated district plans, as well as approves councils' local strategic planning statements that set out the 20-year vision and priorities for their local areas (Greater Sydney Commission, 2020).

Compared with process changes, a structural approach to coordination is much more difficult to implement, requiring longer lead times and greater efforts to generate results. But it is likely to be more effective in creating and sustaining lasting change (Persson, 2007).

The discussion so far has focused on ways to improve the capacity of governance 'infrastructure' (i.e. the instruments, processes and structures that make up governance systems) to facilitate integration. While optimal levels of coherence and coordination can be theoretically 'built in'; in practice, the degree of integration ultimately realised will depend on how these systems are operated (Vigar, 2009). Accordingly, it is important to acknowledge the 'soft' institutional conditions that affect the translation of integration rhetoric into concerted action (Candel, 2017; Hull, 2005).

Political will, executive leadership, the skill and commitment of decision makers, trust cultures, cross-sectoral relationships and communication are just some of the factors that determine the quality of implementation, and the extent to which coherent instruments reach their full potential (e.g. Sabatier and Mazmanian, 1979; Rogge and Reichardt, 2016; Rode, 2019; Stead and Meijers, 2009; Vigar, 2009). Other enabling institutional factors are listed in Table 4.

Table 4. Example institutional factors that facilitate coordination and integration.

Political	Practice
• Big picture problem definitions and identification of cross-cutting issues • High-level political commitments to, and backing for, planning integration that goes beyond symbolic statements • Recognition that integration increases the ability to manage uncertainty and complexity • Convergent professional ideologies, interests and approaches • Relatively equal status of collaborators • Recognition of mutual dependencies among actors • Trade-offs and clearly identified priorities that deliver the best overall community outcomes • Public debate, interest and support for planning integration	• Organisational leaders and cultures that support coordination and integration • Group-based approaches to problem solving • Prior history of cooperation, culture of trust • Similarity of structures, needs, capabilities and services of organisations involved • Complementary organisational or personnel roles • Proximity between collaborators, improving ease of interaction and communication • Ability to involve or seek input of diverse actors, beyond formal authorities • Robust evidence base for decision making • Heterogeneous and open practitioner networks that facilitate integration
Financial	**Capacity**
• Perceived gains from coordination (in terms of time, financial resources, information, legitimacy etc.) • Funding arrangements that support integrated activity (e.g. budget allocations to cross-cutting issues rather than sectors) • Risk and resource sharing for joint projects • Economies of scale as a result of planning at functional, rather than administrative, spatial scales • Incentives and reward systems that promote integration through metrics that go beyond cost and time	• Shared framework of understanding to support inter-discursive communications, manage conflict and reach agreement on issues, priorities, actions etc. • Willingness, personal capacity and skills to make connections and work collaboratively • Perspective taking, able to understand the viewpoints of other actors • Multidisciplinary education, training and socialisation to facilitate more holistic and integrative ways of thinking • Informational resources (e.g. guidelines) for advancing integration • Monitoring and evaluation to capture learnings

(Based on Stead and Meijers 2009, Table 1, p. 325; Candel, 2017; Rode, 2019; Stead, 2008; Carter et al., 2005.)

4 Bringing it all together: degrees of integration

This paper has described key considerations relating to two key aspects of integration. The first aspect, substantive integration, focuses on the quality of planning instruments. Coherently designed planning instruments use the 'right' mix of tools to deliver desired outcomes, comprehensively scope the problem at hand, clearly communicate key directions and actions, and work well together to maximise synergies across sectoral domains. The second aspect, procedural integration, focuses on the actors, processes and structures involved in formulating and implementing planning instruments. Different approaches to coordination can be adopted depending on the degree of procedural integration sought. Process-focused approaches can deliver basic forms of coordination relatively quickly, while structural approaches provide more advanced and longer-lasting forms of coordination but require more time and effort to implement. Other dimensions of coordination focus on actor characteristics and the quality of their interactions, information and decision support tools, and various features of the enabling context.

Overall, realising water sensitive outcomes through integration is no easy task. Strategies need to influence diverse actors, the quality of their interactions and the instruments they deploy, as well as the governance structures within which they operate. This complexity suggests 'perfect' integration, through 'complete' coherence and coordination, may be impossible in practice (Rogge and Reichardt, 2016; Stead, 2008). Pragmatically speaking, the costs of such efforts would likely outweigh the benefits (Underdal, 1980). Further, the inherent contradictions that characterise democratic political systems appear to suggest incoherence can hardly be avoided (Stead and Meijers, 2009). There are (and always will be) tensions requiring ongoing management that may limit the degree of integration that can be achieved (Van den Broeck, 2013). For example, quantitative, long-term targets that promote clarity and certainty may give way to vague objectives that are more politically palatable and provide greater flexibility in implementation (Nordbeck and Steurer, 2016; Baer, 1997; Potter and Skinner, 2000). The breadth and complexity of these tensions is likely to vary across the three levels of governance activity, with the degree of integration achieved expected to decrease as you move from direction-setting to implementation levels and attempt to realise policy rhetoric in planning and operational activities (Rode, 2019; Vigar, 2009).

Apart from feasibility considerations, questions remain about the degree of integration that *should* be pursued and whether different forms of integration will be more appropriate in different circumstances. We cannot assume maximum integration is always the answer to cross-cutting problems (Candel, 2017). In some instances, too much coordination can be more of a problem than not enough, or 'over-designing' a planning instrument to improve its coherence may be as ineffective as under-designing (Peters, 2018; Peters, 2020). Less ambitious forms of integration have fewer barriers to overcome, and may be all that is required to satisfactorily address the problem at hand, particularly in the short term (Candel, 2017; Candel and Biesbroek, 2016). For example, simple solutions such as information exchange or one-off coordinated action, can provide an effective and immediate response to a pressing and discrete issue (Candel and Biesbroek, 2016). Complex, long-term solutions may be more appropriate in other settings, such as strategic planning exercises, provided the various streams of prolonged activity do not lose sight of desired outcomes (Peters, 2020). Ultimately, contextual factors (e.g. actors, issues, resources, spatial and temporal dimensions of activity) will determine the degree of integration that is likely to be beneficial in each situation (Kidd, 2007).

An integration scale offers a useful starting point for understanding the degree of integration currently supported by existing governance infrastructure, the degree of integration that may be required to advance their objectives, and a means of tracking integrative progress over time. The scale presented in Table 5 highlights the need to consider coherence and coordination aspects simultaneously to enable truly integrated activity. However, change over time is unlikely to happen in a linear manner. For example, integration trajectories may advance and then diminish before advancing again. Similarly, different aspects of integration may not move in a concerted manner: coherence and coordination levels at a particular point in time may not match, they may move (increase or decrease) in different directions or at different paces, and may not necessarily 'catch up' with each other (Candel and Biesbroek, 2016). The integration scale cannot possibly capture the full messy reality of contemporary governance systems, but it can help practitioners distinguish between different levels and aspects of integration to determine where to focus efforts and what interventions may be required to solve complex problems.

Table 5. Scale of integration for urban and water planning.

	Degree of integration			
	Low	**Low-Medium**	**Medium-High**	**High**
Coherence	***Direction-setting*** The problem is defined narrowly, considered to fall within sectoral boundaries. Sectors are highly autonomous in setting goals.	***Direction-setting*** The problem is still predominantly perceived as falling within sectoral boundaries, but there is some recognition that the efforts of other sectors are part of addressing the problem. Greater intra-sectoral integration evident in sector strategies. Some shared, multi-sector goals established.	***Direction-setting*** An increasing recognition of the cross-cutting nature of the problem is reflected in greater alignment of policy goals across multiple sector strategies.	***Direction-setting*** Shared policy goals embedded within an overarching, cross-sectoral strategy for urban development and water servicing.
	Plan-making Plan-making instruments do not recognise the cross-cutting nature of water servicing and urban development aspirations. Water planning instruments mostly deal with aspects of the water cycle separately. There is no strong push for integration across the water sector.	***Plan-making*** Some recognition of cross-cutting nature of water servicing and urban development aspirations but plan-making instruments tend to be service and sector based e.g. water supply and stormwater plans are distinct instruments, and urban development plans assume traditional water servicing approaches.	***Plan-making*** Two-way recognition of water servicing and urban development aspirations in sector based plans. Diversification of substantive instruments deployed to support implementation of place-based aspirations.	***Plan-making*** Water servicing aspirations integrated within cross-sectoral spatial planning instruments. Substantive instruments embedded within all potentially relevant sectors.
	Implementation No or very little alignment among substantive instruments of different sectors. Instrument mixes are purely sectoral.	***Implementation*** Some efforts by one or more sectors to improve intra- and inter-sectoral consistency of instrument mixes.	***Implementation*** Adjustment and alignment of instrument mixes within multiple sectors to jointly address the problem. Consistency becomes an explicit aim.	***Implementation*** Full reconsideration of sectoral instrument mixes, resulting in a consistent, cross-sectoral instrument mix that is designed to meet a clear and comprehensive set of goals.

(*Continued*)

Table 5. Scale of integration for urban and water planning. (*Continued*)

Coordination	Degree of integration			
	Low	**Low-Medium**	**Medium-High**	**High**
	Direction-setting Strategies and policies largely developed along service and sectoral lines. Coordination largely intra-sectoral, focused on improving efficiency. Formally, few interactions with other sector actors take place.	***Direction-setting*** Greater intra-sectoral coordination to develop more integrated sector based strategies. More information exchange and interactions with other sectors to align strategic goals.	***Direction-setting*** More regular and formal exchange of resources and coordination to align strategy and policy making efforts across different sectors.	***Direction-setting*** Formal coordination structures facilitate integrated, cross-sectoral strategy and policy development.
	Plan-making Plan-based, procedural information exchange primarily with referral authorities.	***Plan-making*** Ad hoc attempts at place-based planning, coordinated through temporary structures with multi-sector representation.	***Plan-making*** Increasing number of procedural instruments that facilitate actors from different sectors to jointly develop place-based plans.	***Plan-making*** Permanent place-based coordination structures with multi-sector representation, responsible for developing and reviewing place-based plans.
	Implementation Water services and other infrastructure delivered, managed and regulated by individual sectors acting alone.	***Implementation*** Coordination largely focused on aligning decision making processes and procedures, e.g. processing of related approvals for a given development application.	***Implementation*** Project-based coordination structures to align implementation efforts of multiple sector actors.	***Implementation*** Boundary spanning, decision making bodies with the capacity to coordinate, steer and monitor efforts of different sectors.

(Based on a synthesis of academic literature, particularly Candel and Biesbroek (2016) and Cejudo and Michel (2017), and analysis of case studies.)

Glossary

Term	Definition	Source
Actors	The individuals, groups and organisations that play a variety of roles in planning and delivering urban development and water services.	
Governance	The combinations of actors, structures and processes that steer and coordinate urban development and water management practices.	Bettini and Head, 2013
Instruments	Tools of governance that aim to achieve public policy objectives through coercive, economic and/or normative means. This paper is particularly interested in the instruments of planning used in Australia to affect urban development and water servicing.	Rogge and Reichardt 2016, p. 1623; Vedung, 1998
Integrated urban and water planning	Integrated urban and water planning describes a means for achieving water aspirations through the urban development process. This enabling context is created through the conscious and systematic integration of water planning with urban planning.	
Procedural instruments	Types of instruments that shape the processes by which other instruments are developed, implemented and evaluated, including who should be involved and what they should do (e.g. statutory requirements for consultation, mandatory considerations for development approval decisions, formal appeals processes)	Howlett, 2017; Macintosh et al., 2015
Processes	The means by which actors are able to influence, and be influenced by structures. It is through their interactions (struggles, exercises of power, coalition building, negotiations and cooperation) that actors are able to change or reinforce structures.	Geels, 2004; Lawrence and Suddaby, 2006; Fischer and Newig, 2016
Structures	Institutions, including organisational arrangements, which provide the enabling and constraining contexts for (inter)action. Institutions are broadly defined as rules. Rules may be formal and explicit (e.g. laws), or informal (e.g. norms and conventions).	Geels, 2004; Kooiman, 2003; North, 1990
Substantive instruments	Types of instruments that seek to alter the substance of activities carried out by actors (e.g. land use and development controls, construction codes and standards).	Howlett, 2017
Urban planning	Urban planning is concerned with shaping cities, towns and regions by managing development, infrastructure and services to deliver liveability, productivity and sustainability benefits for the whole community. It is both a forward-looking activity, in allocating land for future uses, and a decision making process, in controlling the pace and type of development.	Planning Institute of Australia; The Planning Academy, 2013
Water planning	Water planning refers to the planning and management of urban water systems (i.e. water supply, wastewater and stormwater, waterways and floodplains) to enable the sustainable growth of cities, towns and regions. This broad understanding of water planning moves beyond traditional conceptions—focused on the safe and reliable delivery of segregated water supply, sewerage and drainage services—to emphasise a total water cycle planning and management approach that supports the delivery of a broader range of urban liveability, productivity, resilience and sustainability benefits.	Marlow et al., 2013
Water sensitive city	A water sensitive city provides water system services in a way that reflects an integrated approach to infrastructure, the built form, the environment, governance and community, to deliver outcomes that support the enduring sustainability, liveability, resilience and productivity for a place's community and ecosystems.	Hammer et al., 2018
Water sensitive urban development	Water sensitive urban development refers to urban expansion (through greenfield development) and intensification (through infill redevelopment) that incorporates sustainability and liveability principles, with a particular focus on water as a key enabler. Successful implementation requires adoption of a holistic view of the urban water cycle and services, and consideration of environmental impacts on the larger ecosystem and catchment. Water sensitive urban developments are a critical building block for 'water sensitive cities', that is, cities which support sustainable, resilient, liveable and productive communities.	Sharma et al., 2012

References

Arts, B. and van Tatenhove, J. (2005). Policy and power: a conceptual framework between the 'old' and 'new' policy idioms. *Policy Sciences*, 37(3-4), pp.339-356.

Baer, W.C. (1997). General plan evaluation criteria: An approach to making better plans. *Journal of the American Planning Association*, 63(3), pp.329-344.

Berke, P. and Godschalk, D. (2009). Searching for the good plan: A meta-analysis of plan quality studies. *Journal of Planning Literature*, 23(3), pp.227-240.

Bettini, Y. and Head, B. (2013). *Specifying the Urban Water Governance Challenge*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

Candel, J.J. (2017). Holy Grail or inflated expectations? The success and failure of integrated policy strategies. *Policy Studies*, 38(6), pp.519-552.

Candel, J.J. and Biesbroek, R. (2016). Toward a processual understanding of policy integration. *Policy Sciences*, 49(3), pp.211-231.

Carter, N., Kreutzwiser, R.D. and de Loë, R.C. (2005). Closing the circle: linking land use planning and water management at the local level. *Land Use Policy*, 22(2), pp.115-127.

Cejudo, G.M. and Michel, C.L. (2017). Addressing fragmented government action: Coordination, coherence, and integration. *Policy Sciences*, 50(4), pp.745-767.

Chapman, D. (2011). Engaging places: Localizing urban design and development planning. *Journal of Urban Design*, 16(4), pp.511-530.

Cowell, R. and Martin, S. (2003). The joy of joining up: modes of integrating the local government modernisation agenda. *Environment and Planning C: Government and Policy*, 21(2), pp.159-179.

de Boer, C. and Bressers, H. (2013). Water resource co-management and sustainable regional development. *Management Research Review*, 36(2), pp.1238-1251.

Department of Environment, Land, Water and Planning. (2017). *Integrated Water Management Framework for Victoria*. Retrieved from https://www.water.vic.gov.au/liveable/integrated-water-management-program/iwm-framework (accessed August 2020).

Department of Environment, Land, Water and Planning. (2020). *What we do*. Retrieved from https://www2.delwp.vic.gov.au/our-department/what-we-do (accessed August 2020).

Eggenberger, M. and Partidário, M.R. (2000). Development of a framework to assist the integration of environmental, social and economic issues in spatial planning. *Impact Assessment and Project Appraisal*, 18(3), pp.201-207.

European Commission. (2020). *Environmental Integration*. Retrieved from https://ec.europa.eu/environment/integration/integration.htm (accessed September 2020).

Fischer, L.B. and Newig, J. (2016). Importance of actors and agency in sustainability transitions: A systematic exploration of the literature. *Sustainability*, 8(5), p.476.

Foundry. (2019). Upper Merri Creek Sub-Catchment Issues Paper. Retrieved from https://uppermerricreek.com.au/introduction-upper-merri-catchment (accessed June 2020).

Furlong, C., De Silva, S. and Guthrie, L. (2016). Planning scales and approval processes for IUWM projects; lessons from Melbourne, Australia. *Water Policy*, 18(3), pp.783-802.

Geels, F.W. (2004). From sectoral systems of innovation to socio-technical systems insights about dynamics and change from sociology and institutional theory. *Research Policy*, 33(6-7), pp. 897-920.

Geerlings, H. and Stead, D. (2003). The integration of land use planning, transport and environment in European policy and research. *Transport Policy*, 10(3), pp.187-196.

Greater Sydney Commission. (2020). *Who we are*. Retrieved from https://www.greater.sydney/who-we-are (accessed August 2020).

Gurran, N., Gilbert, C. and Phibbs, P. (2015). Sustainable development control? Zoning and land use regulations for urban form, biodiversity conservation and green design in Australia. *Journal of Environmental Planning and Management*, 58(11), pp.1877-1902.

Hammer, K., Rogers, B.C., Chesterfield, C., Church, E., and Gunn, A. (2018). *Vision and Transition Strategy for a Water Sensitive Greater Sydney*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

Holden, M. (2012). Is integrated planning any more than the sum of its parts? Considerations for planning sustainable cities. *Journal of Planning Education and Research*, 32(3), pp.305-318.

Howlett, M. (2017). Policy tools and their role in policy formulation: Dealing with procedural and substantive instruments. In: M. Howlett and I. Mukherjee (Eds.), *Handbook of Policy Formulation* (pp.96-111). Cheltenham, UK: Edward Elgar Publishing.

Howlett, M. and Rayner, J. (2007). Design principles for policy mixes: Cohesion and coherence in 'new governance arrangements'. *Policy and Society*, 26(4), pp.1-18.

Howlett, M. and Rayner, J. (2013). Patching vs packaging in policy formulation: Assessing policy portfolio design. *Politics and Governance*, 1(2), pp.170-182.

Hull, A. (2005). Integrated transport planning in the UK: From concept to reality. *Journal of Transport Geography*, 13(4), pp.318-328.

Hurlimann, A.C. and March, A.P. (2012). The role of spatial planning in adapting to climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 3(5), pp.477-488.

Hurlimann, A. and Wilson, E. (2018). Sustainable urban water management under a changing climate: The role of spatial planning. *Water*, 10(5), p.546.

Infrastructure Australia. (2018). *Planning Liveable Cities: A place-based approach to sequencing infrastructure and growth*. Reform Series. Retrieved from https://www.infrastructureaustralia.gov.au/publications/planning-liveable-cities-place-based-approach-sequencing-infrastructure-and-growth (accessed July 2020).

Infrastructure Australia. (2019). Chapter 9. Water, in *An Assessment of Australia's Future Infrastructure Needs: The Australian Audit 2019*. Retrieved from https://www.infrastructureaustralia.gov.au/australian-infrastructure-audit-2019-water (accessed July 2020).

Kern, F. and Howlett, M. (2009). Implementing transition management as policy reforms: a case study of the Dutch energy sector. *Policy Sciences*, 42(4), pp.391-408.

Kidd, S. (2007). Towards a framework of integration in spatial planning: an exploration from a health perspective. *Planning Theory & Practice*, 8(2), pp.161-181.

Kidd, S. and Shaw, D. (2007). Integrated water resource management and institutional integration: realising the potential of spatial planning in England. *Geographical Journal*, *173*(4), pp.312-329.

Kooiman, J. (2003). Interaction. In: *Governing as Governance* (pp.11-26). London: Sage Publications.

Kotzebue, J.R. (2016). The EU integrated urban development policy: managing complex processes in dynamic places. *European Planning Studies*, 24(6), pp.1098-1117.

Kuller, M., Bach, P.M., Ramirez-Lovering, D. and Deletic, A. (2017). Framing water sensitive urban design as part of the urban form: A critical review of tools for best planning practice. *Environmental Modelling & Software*, 96, pp.265-282.

Lawrence, T.B. and Suddaby, R. (2006). Institutions and institutional work. In: R. Clegg, C. Hardy, T.B. Lawrence, W.R. Nord (Eds.), *Handbook of Organization Studies* (2nd ed., pp. 215-254). London: Sage Publications.

Macintosh, A., Foerster, A. and McDonald, J. (2015). Policy design, spatial planning and climate change adaptation: a case study from Australia. *Journal of Environmental Planning and Management*, 58(8), pp.1432-1453.

Margerum, R.D. (1999). Implementing integrated planning and management: A typology of approaches. *Australian Planner*, 36(3), pp.155-161.

Marlow, D.R., Moglia, M., Cook, S. and Beale, D.J. (2013). Towards sustainable urban water management: A critical reassessment. *Water Research*, 47(20), pp.7150-7161.

Mitchell, V.G. (2006). Applying integrated urban water management concepts: a review of Australian experience. *Environmental Management*, 37(5), pp.589-605.

Nilsson, M.N. and Persson, A.S. (2003). Framework for analysing environmental policy integration. *Journal of Environmental Policy & Planning*, 5(4), pp.333-359.

Nordbeck, R. and Steurer, R. (2016). Multi-sectoral strategies as dead ends of policy integration: Lessons to be learned from sustainable development. *Environment and Planning C: Government and Policy*, 34(4), pp.737-755.

North, D. (1990). An introduction to institutions and institutional change. In: *Institutions, Institutional Change and Economic Performance* (Political Economy of Institutions and Decisions, pp. 3-10). Cambridge: Cambridge University Press.

Norton, R.K. (2008). Using content analysis to evaluate local master plans and zoning codes. *Land Use Policy*, 25(3), pp.432-454.

Ostrom, E. (2005). *Understanding Institutional Diversity*. Princeton: Princeton University Press.

Persson, A.S. (2007). Different perspectives on EPI. In: M.N. Nilsson and K. Eckerberg (Eds.), *Environmental policy integration in practice: Shaping institutions for learning* (pp.25-48). London, UK: Earthscan.

Peters, B. G. (1998). Managing horizontal government: The politics of coordination. *Public Administration*, 76, pp.295-311.

Peters, B.G. (2018). The challenge of policy coordination. *Policy Design and Practice*, 1(1), pp.1-11.

Peters, B.G. (2020). Designing institutions for designing policy. *Policy & Politics*, 48(1), pp.131-147.

Planning Institute of Australia. (n.d.). *What is Planning?*. Retrieved from https://www.planning.org.au/becomeaplanner/what-is-planning (accessed March 2020).

Potter, S. and Skinner, M.J. (2000). On transport integration: a contribution to better understanding. *Futures*, 32(3-4), pp.275-287.

Productivity Commission. (2020). *Integrated Urban Water Management — Why a good idea seems hard to implement*, Commission Research Paper, Canberra.

Ran, J. and Nedovic-Budic, Z. (2016). Integrating spatial planning and flood risk management: A new conceptual framework for the spatially integrated policy infrastructure. *Computers, Environment and Urban Systems*, 57, pp.68-79.

Rode, P. (2019). Urban planning and transport policy integration: The role of governance hierarchies and networks in London and Berlin. *Journal of Urban Affairs*, 41(1), pp.39-63.

Rogge, K.S. and Reichardt, K. (2016). Policy mixes for sustainability transitions: An extended concept and framework for analysis. *Research Policy*, 45(8), pp.1620-1635.

Rogers, B.C., Gunn, A., Church, E., Lindsay, J., Hammer, K., Dean, A. and Fielding, K. (2020). *Principles for engaging communities in water sensitive city transitions*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

Sabatier, P. and Mazmanian, D. (1979). The conditions of effective implementation: A guide to accomplishing policy objectives. *Policy Analysis*, 5(4), pp.481-504.

Searle, G. and Bunker, R. (2010). Metropolitan strategic planning: An Australian paradigm?. *Planning Theory*, 9(3), pp.163-180.

Sharma, A.K., Cook, S., Tjandraatmadja, G. and Gregory, A. (2012). Impediments and constraints in the uptake of water sensitive urban design measures in greenfield and infill developments. *Water Science and Technology*, 65(2), pp.340-352.

Smith, B., Tawfik, S., and Chesterfield, C. (2020). *Enabling water sensitive urban development: planning and governance opportunities for Perth*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

Stead, D. (2008). Institutional aspects of integrating transport, environment and health policies. *Transport Policy*, 15(3), pp.139-148.

Stead, D. and Meijers, E. (2009). Spatial planning and policy integration: Concepts, facilitators and inhibitors. *Planning Theory & Practice*, 10(3), pp.317-332.

Tawfik, S. Smith, B., and Chesterfield, C. (2020). *Enabling water sensitive greenfield development in Townsville*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

Taylor, A.C. (2009). Sustainable urban water management: Understanding and fostering champions of change. *Water Science and Technology*, 59(5), pp.883-891.

Taylor, A., Cocklin, C., Brown, R. and Wilson-Evered, E. (2011). An investigation of champion-driven leadership processes. *The Leadership Quarterly*, 22(2), pp.412-433.

The Planning Academy. (2013). *What is planning?.* Retrieved from http://theplanningacademy.com.au/what-is-planning (accessed March 2020).

Tosun, J. and Lang, A. (2017). Policy integration: Mapping the different concepts. *Policy Studies*, 38(6), pp.553-570.

Underdal, A. (1980). Integrated marine policy: What? Why? How?. *Marine Policy*, 4(3), pp.159-169.

Van den Broeck, J. (2013). Balancing strategic and institutional planning: The search for a pro-active planning instrument. *disP - The Planning Review*, 49(3), pp.43-47.

Vedung, E. (1998). Policy Instruments: Typologies and Theories. In: M. Bemelmans-Videc, R. Rist, and E. Vedung (Eds.), *Carrots, Sticks and Sermons: Policy Instruments and Their Evaluation* (pp.21-58). New Brunswick, NJ: Transaction Publishers.

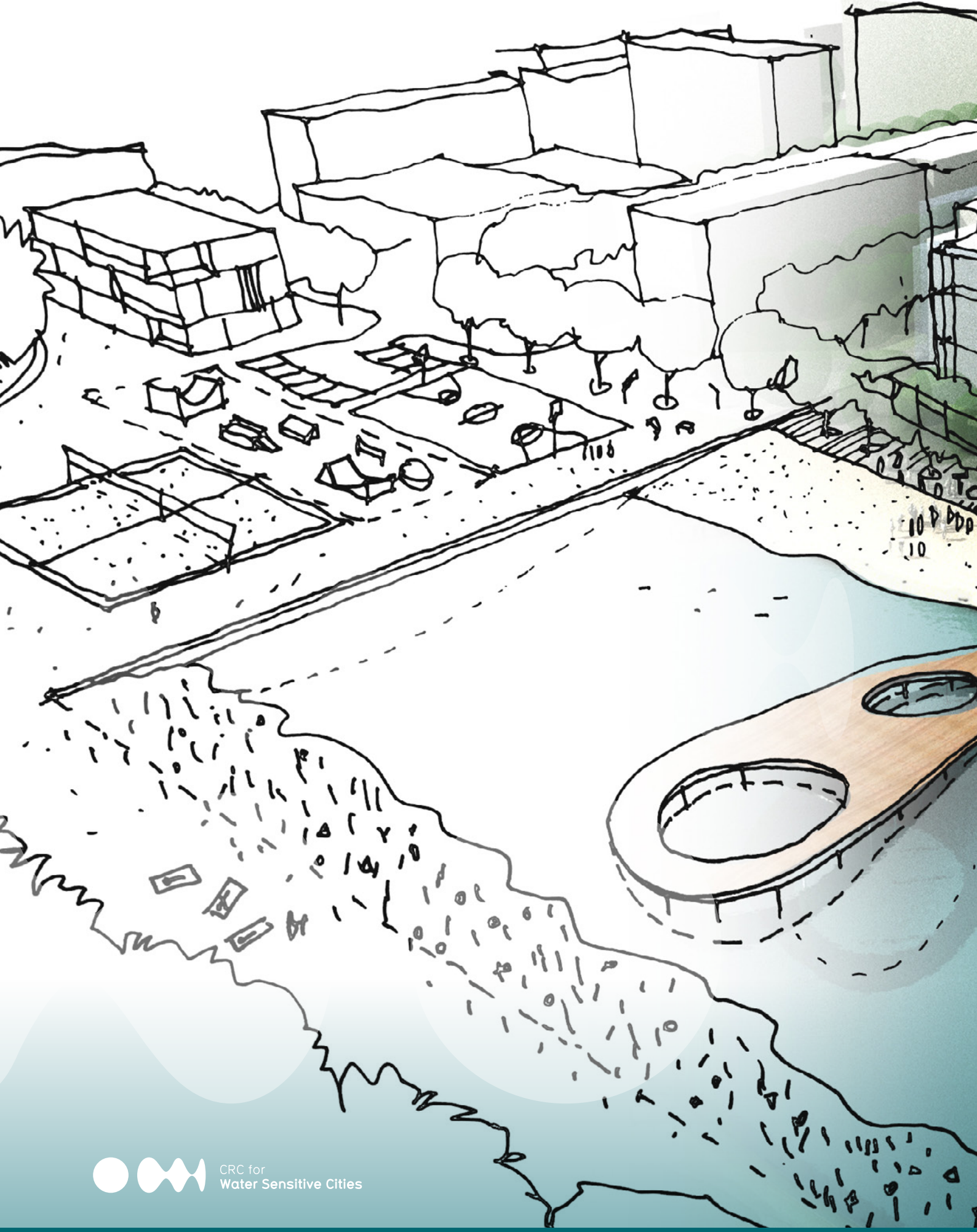
Vigar, G. (2009). Towards an integrated spatial planning?. *European Planning Studies*, 17(11), pp.1571-1590.

West, K., Scanlon, K., Thornley, A. and Rydin, Y. (2003). The Greater London Authority: problems of strategy integration. *Policy & Politics*, 31(4), pp.479-496.

Williams, D. (2020). The influence of statutory land use planning on water sensitive urban design practices. *Australasian Journal of Water Resources*, 24(1), pp.60-72.

Woltjer, J. and Al, N. (2007). Integrating water management and spatial planning: strategies based on the Dutch experience. *Journal of the American Planning Association*, 73(2), pp.211-222.

Yigitcanlar, T. and Teriman, S. (2015). Rethinking sustainable urban development: towards an integrated planning and development process. *International Journal of Environmental Science and Technology*, 12(1), pp.341-352.



CRC for
Water Sensitive Cities

Cooperative Research Centre for Water Sensitive Cities

27 Chancellors Walk
Monash University
Clayton, Victoria 3168

info@crcwsc.org.au

www.watersensitivecities.org.au