Innovation Measurement Framework

Innovation Insights Guidance Note

Queensland Government

Introduction

Innovation is an important driver of long-term prosperity for all types of economies – local, state or national.[1] Measuring the impact of government investment in innovation is of key interest to government agencies, to inform policy decisions and programming. For this reason, use of appropriate quantitative and qualitative innovation system measures is crucial for monitoring progress and assessing impact.

This Guidance Note provides general suggestions for approaching the development of an innovation measurement framework (IMF) and how it can be used as part of the program and policy lifecycle. It also provides an example IMF for Queensland, which was developed in 2022 by the Department of Tourism, Innovation and Sport (DTIS), following targeted consultations across the government and university sectors (Annex 1).

For a more comprehensive discussion of innovation metrics and data see the Federal Government's report on *Improving Innovation Indicators*[2] and the Organisation for Economic Co-operation and Development's (OECD) Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data (Fourth Edition, 2018)[3] (OSLO Manual).

A word on innovation

Innovation activities are varied and involve multiple stakeholders from the private and public sectors. This diversity has given rise to various definitions of innovation that are localised to a particular sector, ecosystem, program or group.

The OECD's Oslo Manual defines innovation as: *a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process).*

The Australian Bureau of Statistics (ABS) draws on the conceptual definitions and guidelines included in the Oslo Manual and defines innovation as *the introduction of a new or significantly improved good or service; operational process; organisational/managerial process; or marketing method.*[4]

Innovation Measurement Frameworks

What is an innovation measurement framework?

An innovation measurement framework (IMF) outlines metrics, measurement strategies and data sources that can be used to monitor the state of innovation and/or impact of innovation policies, programs and activities.

An IMF should be fit for purpose and cover a defined scope, such as a key government initiative, industry sector or other relevant area of interest, or a jurisdiction or geographic area.[5] The focus for analysis in an IMF are innovation activities, their inputs and outputs.

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1   Productivity Commission, 2022, 5 Year Productivity Inquiry: Innovation for the 98% – interim report. www.pc.gov.au/inquiries/current/productivity/interim3-innovation

2   Innovation Metrics Review | Department of Industry, Science and Resources

3   Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition | en | OECD

4   Australian Bureau of Statistics, 2022, Innovation in Australian Business methodology. www.abs.gov.au/methodologies/innovation-australian-business-methodology/2020-21https://www.abs.gov.au/methodologies/innovation-australian-business-methodology/2020-21#glossary

5   OECD/ Eurostat, 2018, Oslo Manual 2018: Guidelines for collecting, reporting and using data on innovation, 4th edition, the measurement of scientific, technological and innovation activities, www.oecd.org/science/oslo-manual-2018-9789264304604-en.htm

An innovation measurement framework is made up of key concepts and components. Depending on the purpose of the required framework, the structure and organisation of the key concepts and components will vary. See below and Annex 1 for examples of how key components and concepts are used in the example IMF for Queensland.

Examples of innovation measurement frameworks

There are many innovation measurement frameworks available. Examples include:

- the Federal Government's *Innovation Metric Framework* and Innovation Metrics Scorecard for the Australian innovation system.[6] The associated report assesses current measurement challenges and available data for innovation metrics, followed by recommendations for action

- the *OECD Oslo Manual* is a statistical guideline for applying concepts, classifications and statistical methods for collecting innovation data.[7] The Manual contains recommendations for measuring and collecting survey data and quantitative statistical analysis

- the *Global Innovation Index* conceptual framework organises key concepts around innovation inputs and outputs.[8] The conceptual framework describes the inputs and outputs model which is used to derive an aggregate country ranking of innovation performance.

Innovation measurement frameworks in the policy and program lifecycle

An IMF can be used to facilitate design, planning and evaluation. Having a measurement framework established prior to commencing design, planning or an evaluation will support these activities.

Design	Planning	Evaluation
At the design stage, an IMF can assist with clarifying and testing ideas about the change that the strategy or program(s) are intending to bring about. The framework can be used as part of the theory of change and program logic processes to ensure a clear relationship between inputs, activities, outputs and outcomes.	At the planning stage, an IMF can assist discussions about metrics and data sources relevant to identified outcomes. For example, to clarify the types of metrics most suitable for strategic objectives aimed at influencing an aspect of the innovation system. If a strategy precedes a program, an IMF can support discussions about metrics and data availability for program outcomes in terms of demonstrating contribution to the strategy.	An IMF can be used in an evaluation or review, as the framework illustrates the intended change, goal, objectives, or achievements that are desired in the innovation system through using policy and program levers. The identified metrics are important to guide an evaluation to assess the achievement of outcomes.

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6   Department of Industry, Innovation and Science.2022, Improving Innovation Indicators: Better Data to Track Innovation in Australia, pp.xxxiii- xxxvi, 14-18. www.industry.gov.au/sites/default/files/2022-09/improving-innovation-indicators.pdf

7   OECD/ Eurostat, 2018, Oslo Manual 2018: Guidelines for collecting, reporting and using data on innovation, 4th edition, the measurement of scientific, technological and innovation activities, www.oecd.org/science/oslo-manual-2018-9789264304604-en.htm

8   WIPO, 2020, Annex 1 The Global Innovation Index (GII) Conceptual Framework www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2020-appendix1.pdf

Developing innovation measurement frameworks

Top tips for developing an IMF

1. Ensure the scope and purpose for the IMF is well defined and agreed

- clarify the intent and goal of the framework, ascertain what is in and out of scope, determine the specific area(s) of interest, and identify the specific data needs of the end users of the framework. This will help to determine the key concepts and components of the framework, as well as guide the selection and prioritisation of relevant metrics

- if the measurement framework is to inform government policies or programs, ensure the relevant goals are clearly identified so that the framework and selected indicators will meet the needs of the relevant authorising environment

- if possible, develop a program logic prior to the development of the measurement framework (see Developing a Program Logic Model Information Sheet)[9].

2. Build on existing frameworks and knowledge

- avoid 're-inventing the wheel' and where possible, build on existing work and frameworks.

3. Ensure metrics are relevant and realistic

- the selection of specific innovation metrics at various levels (e.g. system, department and/or program) will be guided by the theory that explains the innovation system and the intended or desired change

- the selection of metrics is guided by concepts/themes, strategic intent, data availability, and capacity and capability to collect and analyse data

- consider the qualities of metrics in terms of accuracy, relevance, reliability, timeliness, coherence, comparability and accessibility[10]

- metrics developed in collaboration with key stakeholders as part of the theory of change or program logic development will facilitate alignment of metrics across levels.

4. Structure for the framework is fit for purpose

- metrics can be arranged according to components or desired outcomes. Alternatively, metrics can be arranged according to 'inputs' and 'outputs'

- it may also be useful to have a multi-level structure that cuts across each element or component to show alignment of metrics with the broader objectives.

5. Consider how the data will be analysed

- appropriate collection of data and reporting of metrics alone is not enough to support policy and business decisions to improve innovation performance or assess impact. Meaningful analysis to identify trends, key issues and interpretation of findings is required to inform policy discussions. Having appropriate resources to conduct analysis is as important as having a fit-for-purpose framework.

For other practical tips for developing performance measurement frameworks, refer to the Performance Measurement Frameworks Information Sheet, developed by the Queensland Government Statistician's Office as part of the Queensland Government Program Evaluation Guidelines.[11]

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9   Queensland Government Statistician's Office, Queensland Government Program Evaluation Guidelines – s3.treasury.qld.gov.au/files/Developing-a-program-logic-model-Information-Sheet-QG-Program-Evaluation-Guidelines.pdf

10   OECD, 2018, Oslo Manual, pp. 215–16.

11   Queensland Government Statistician's Office, Queensland Government Program Evaluation Guidelines – s3.treasury.qld.gov.au/files/QGSO-Performance-measurement-frameworks-Info-sheet.pdf
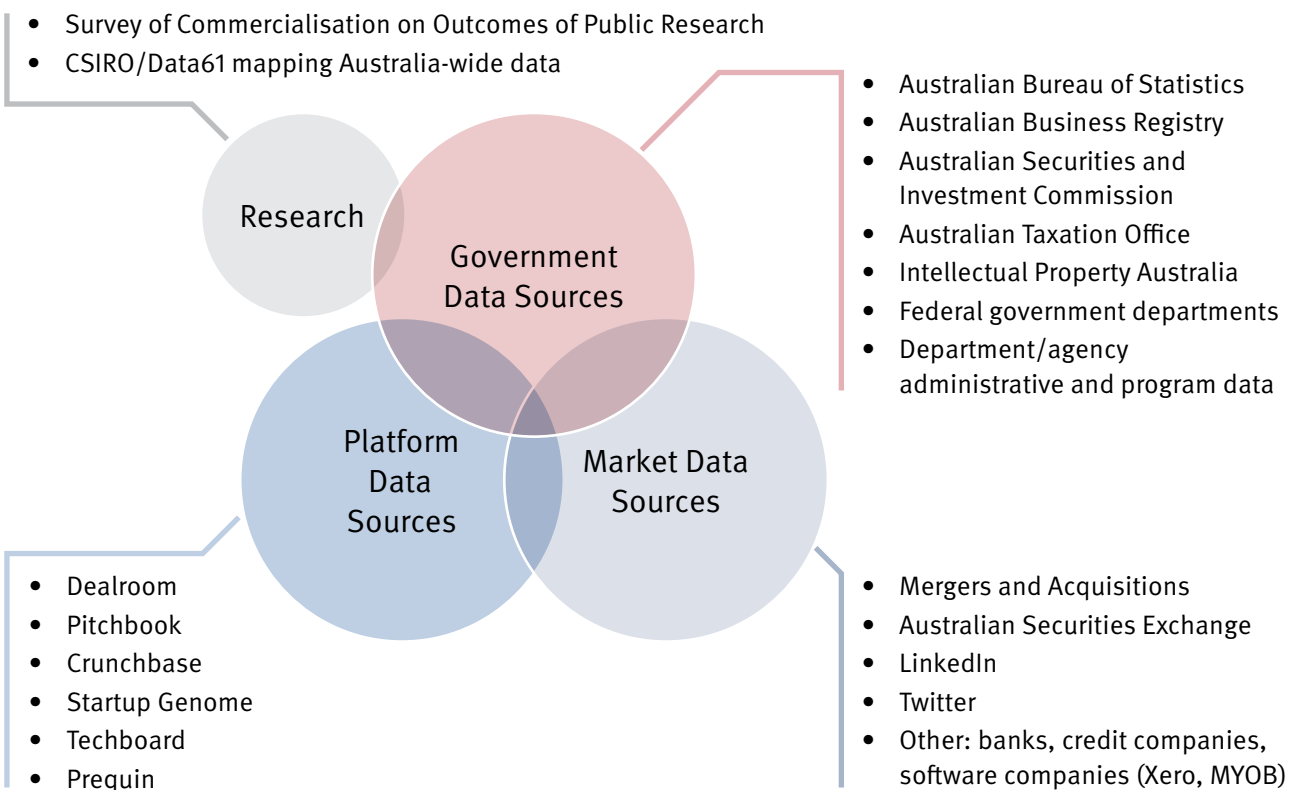
Data sources for innovation

Types of data sources can be grouped into government, market, research, and platform data sources.

- government data – sourced from government program and administration activities
- research data – sourced from research funded by government and/or industry. The data may be granular because it has been collected to examine a specific subject
- platform data – includes private/commercial platforms, profiles, lists and surveys, often available for purchase or subscription
- market data – includes data sourced from entities such as innovation hubs, accelerators, incubators, investors, universities, corporates, and philanthropists as well as social media and press reports.

Organising the collection, cleaning and collation of data can often be a resource intensive task, both in terms of financial and labour costs. Not all data sources are easily accessible, freely available or may have restricted access. These challenges should be considered upfront, which may assist in developing fit for purpose metrics.

Figure 1 illustrates examples of main data sources used in measuring innovation. It is not an exhaustive list of sources as data availablility changes over time.

Figure 1 Examples of innovation-related data sources

- Survey of Commercialisation on Outcomes of Public Research
- CSIRO/Data61 mapping Australia-wide data

Research

Government Data Sources

Platform Data Sources

Market Data Sources

- Australian Bureau of Statistics
- Australian Business Registry
- Australian Securities and Investment Commission
- Australian Taxation Office
- Intellectual Property Australia
- Federal government departments
- Department/agency administrative and program data

- Dealroom
- Pitchbook
- Crunchbase
- Startup Genome
- Techboard
- Prequin

- Mergers and Acquisitions
- Australian Securities Exchange
- LinkedIn
- Twitter
- Other: banks, credit companies, software companies (Xero, MYOB)

This Note and Annex 1 describe quantitative metrics. It is recognised that qualitative metrics and data sources are complementary to quantitative statistical analysis.

For example, data on perspectives and experiences of stakeholders or participants can yield valuable information about program outcomes. In addition, text data gathered from program reports or social media can provide information about trends at a point in time or over time.

The use of quantitative and/or qualitative data is driven by the program or policy need for insights. Like quantitative metrics and data sources, the development of qualitative metrics and identification of data sources should be fit for purpose.

Queensland Innovation Measurement Frameworks

While excellent reference sources, the existing national and international frameworks and benchmarks do not provide sufficient granularity for state level policy interest areas.

Therefore, as part of the Queensland State of Innovation (SOI) project[12], DTIS has been working to develop relevant innovation measurement frameworks that:

1. present metrics in a way that is useful for state government innovation policy and program development

2. guide the selection of metrics, indicators and data sources to assess the impact of state government policy initiatives on innovation

3. provide useful metrics for cross jurisdictional comparisons.

An example innovation measurement framework

The example of an innovation measurement framework provided at Annex 1 was developed by DTIS following targeted consultations across the government and university sectors. The framework describes an approach to innovation measurement at the state and/or territory level. The framework outlines quantitative data sources.

The framework has been deliberately developed to capture broad components and emphasises multiple levels of analysis. This allows it to be translated into policy interest areas by state and/or territory governments. This example will inform data collection and metric development for the Queensland State of Innovation project.

The example framework is focused on economic outcomes, however metrics for social and environmental impacts can be developed where it is a policy objective of the agency or organisation.

Framework components

The framework is made up of five components adapted from the innovation measurement framework described in the report by the Department of Industry, Innovation and Science[13]:

- new ideas and knowledge

- human capital and entrepreneurship

- knowledge distribution

- technology diffusion

- operating environment.

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12   The State of Innovation project is part of a broader data and metrics solution to better understand the impact of innovation and entrepreneurship on the economy and aims to sustainably provide an objective and up-to-date picture of innovation in Queensland.

13   Department of Industry, Innovation and Science. 2022, *Improving Innovation Indicators: Better Data to Track Innovation in Australia*.

Components	Description
Creation, development or application of new ideas and knowledge	Includes metrics related to activities that facilitate the creation, development and application of ideas and knowledge. This includes research and development investment by sectors (business, higher education and government), and the application of ideas to create new goods, services and processes in new markets.
Human capital and entrepreneurship	Includes metrics related to investment and activities that facilitate the capability building of the population through the education sector, workforce and entrepreneurship.
Knowledge distribution	Includes metrics related to activities that facilitate knowledge asset exchange, transfer and adoption. For example, publications, intellectual property, collaborations and networks.
Technology diffusion	Includes metrics related to activities that build capability and exchange, transfer, adopt and/or translate technology in a variety of sectors. Digital innovation is included this broad umbrella term of 'technology'.
Operating environment	Includes metrics related to the operating environment, including infrastructure and business, financial and economic conditions.

Note: Not all components will be relevant for measurement frameworks for all strategies or programs.

Framework levels

To ensure that program outcomes demonstrate impact at the department and system levels, the framework also includes three layers that cut across each component: program level, department/ agency level and system level. This structure encourages the alignment of metrics across levels to strengthen the relationship between levels.

System level	Department level	Program level
This refers to the state as the aggregate level at which state government policy aims to influence. In other frameworks, the 'system' may be the national economy. Metrics at this level relate to key components of innovation system within the state economy.	This level recognises the remit of agencies to influence economic impact through their respective strategic or policy levers. Metrics at this level relate to the specific strategic objectives or outcomes of the agency or organisation. Ensure that selected metrics align with the innovation system in which the strategy or policy is situated.	This level recognises the function of agencies to action their strategy or policy through programs, projects or initiatives. These can be a single program or suite of programs. Selected metrics at this level can be aligned to key metrics at the department level.

Advance Queensland Roadmap Innovation Measurement Framework

The *Advance Queensland Innovation for a Future Economy: 2022–2032 Roadmap* was released in mid-2022 and sets out the direction, key priority outcomes and initiatives for the next phase in Queensland's innovation journey.

DTIS is developing a tailored innovation measurement framework to support the specific requirements for assessing the impact of the Roadmap. It is expected that this will be completed in 2023.

> This Note was developed by the Innovation Program Design and Insights team in the Department of Tourism, Innovation and Sport.
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> For more information, please contact advancequeenslandcorro@dtis.qld.gov.au