



# **Queensland Government Research and Development Expenditure Report 2012-13**

Compiled by the Office of the Queensland Chief Scientist

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**Queensland Chief Scientist**



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*This report is based on information supplied by Queensland Government agencies on their research and development expenditure for 2012-13. The Office of the Queensland Chief Scientist would like to thank staff for their continued collaboration in collecting research and development data.*

## Headlines

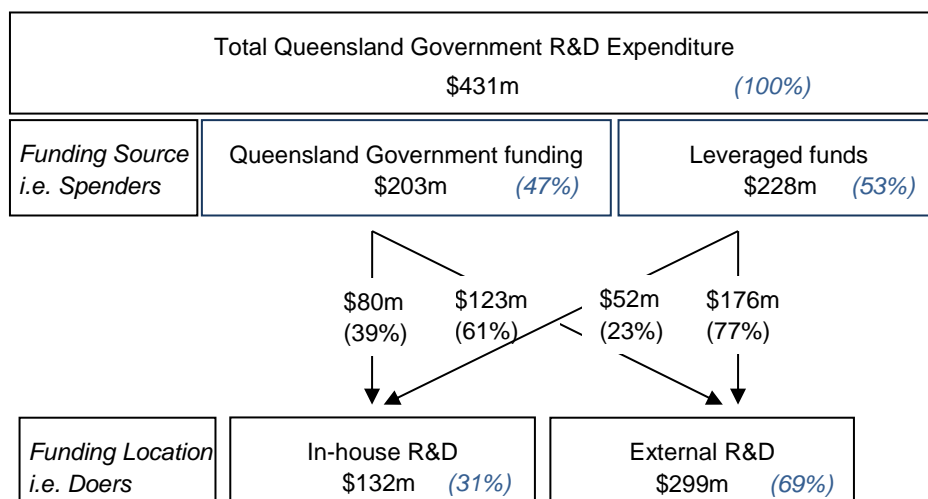
- **Queensland Government spend...**on research and development (R&D) in 2012-13 was \$203m plus leveraged funds of \$228m totalling \$431m, down from \$634m in 2011-12 or 32%.
- **Total Queensland Government expenditure...**including funds leveraged by QIMR of \$91.5m gives a 'real' total of \$523m for 2012-13 (QIMR data not reported in previous years).
- **Current expenditure...**by the Queensland Government (excluding leverage) of \$181m has remained relatively the same across the last 3 years. Including leverage current expenditure has fallen to \$346m, illustrating that the relatively unchanged Queensland Government investment is not attracting the same amount of leverage i.e. \$420m in 2011-12; \$413 in 2010-11.
- **Capital investment...**by the Queensland Government (excluding leverage) has decreased considerably to \$23m in 2012-13, from \$58m in 2011-12 and \$109m in 2010-11. This decrease is also reflected when including leverage i.e. \$86m in 2012-13; \$213m in 2011-12; \$288m in 2010-11 and \$164m in 2009-10. This decrease is due to infrastructure commitments coming to an end (including Smart State Strategy projects).
- **Leverage...**on Queensland Government funds has reduced again in 2012-13 at only \$1.12 for every \$1.00 spent on in-house and external R&D, compared to \$1.74 leveraged in 2011-12. This is the lowest leverage rate since 2010-11 and is primarily caused by the substantial reduction in capital investment where leverage rates are high.
- **DSITIA is the largest funder of R&D...**within the Queensland Government and invested 36% (\$72m) of Queensland Government funding. DAFF is the second largest at 28% (\$57m).
- **Health is the largest area of research...**performed across a number of departments and government bodies including QIMR with 50% (\$263m of \$523m) of funding going towards this area of research. Of this \$263m:
  - \$97m is DSITIA competitive grant funding and other funding e.g. including Centre of Advanced Imaging, Institute of Molecular Bioscience and the Queensland Tropical Health Alliance
  - \$155m expended by Queensland Health, the HHSs and QIMR, and
  - \$12m expended by various departments and government bodies
- **Four Pillars research investment has decreased...**in dollar terms (including leverage) from the previous year, i.e. \$144m in 2012-13 and \$166m in 2011-12 invested across agriculture, resources, and construction.

# In Summary

## ‘Spenders and Doers’ of R&D

Figure 1 summarises the total Queensland Government R&D expenditure for 2012-13 (excluding external funds obtained by the Queensland Institute of Medical Research (QIMR)).

**Figure 1: Breakdown of total Queensland Government R&D expenditure for 2012-13 (excluding QIMR leveraged funds of \$91.5m, not previously reported)\*.**



\*Numbers have been rounded, resulting in individual amounts not always adding up to totals.

**It should be noted that**, in this 2012-13 report, we have included for the first time data available for the QIMR (now QIMR Berghofer Medical Research Institute). In 2012-13, the Queensland Government provided approximately \$14m to this institute, which the institute supplemented with approximately \$91.5m from other sources (classified here as ‘leveraged funding’). As such - in order to compare ‘apples with apples’ - we have in the first instance (and in Figure 1) excluded QIMR external funds of \$91.5m in order to provide a more useful comparison with previous years.

From Figure 1...

## R&D spend by Queensland Government and leveraged sources

- The total Queensland Government spend on R&D including leveraged funds in 2012-13 was \$431m (down from \$634m in 2011-12), a decrease of \$203m (or 32%) on the 2011-12 expenditure.
- \$203m of this was Queensland Government funding (down from \$231m in 2011-12, a reduction of 12%) of which \$80m was spent in-house and \$123m spent externally.
- A further \$228m was leveraged from the Australian Government, universities, businesses and other external sources (down \$175m, or 43% on the \$403m leveraged in 2011-12).
- Total in-house (located within the Queensland Government) R&D activity was \$132m, down 45% from \$237m in 2011-12.

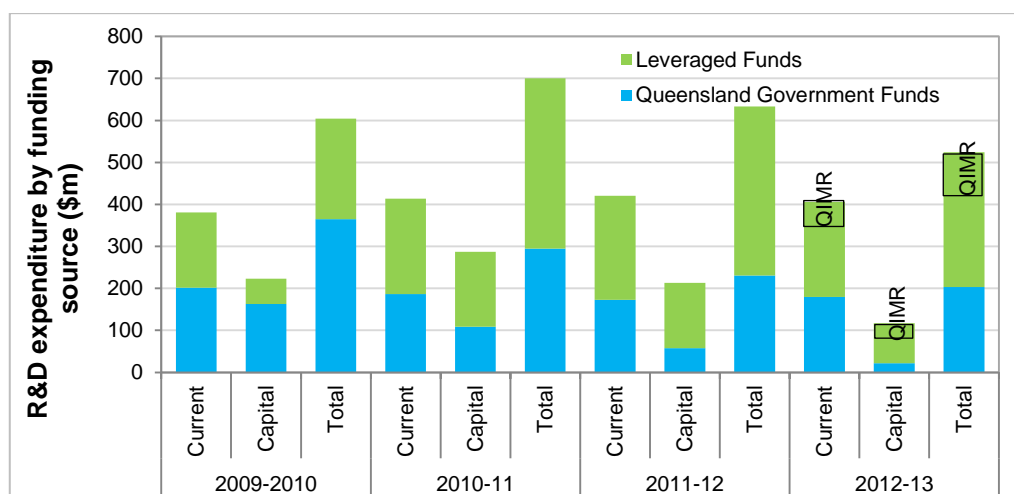
## Current expenditure

- Total current expenditure (including leverage, but excluding money leveraged from QIMR) is down to \$346m (18%) in 2012-13 (from \$420m in 2011-12) (see Table 1).
- Note, (see Figure 2 below) that actual current expenditure by the Queensland Government to fund research (both in-house and externally) has stabilised over the last three years with \$181m in 2012-13, \$173m in 2011-12 and \$187m in 2010-11.
- Current spend has decreased by 18% in (including leverage) from 2011-12 (see Table 1).

**Table 1: Total Queensland Government R&D expenditure for 2012-13 and 2011-12 across capital (infrastructure and current investment) and Queensland Government funds and leveraged funds (excluding QIMR leveraged funds of \$91.5m)\***

\$431 million Total Spend*							
Expenditure Type	Queensland Government Funds (\$m)		Leveraged Funds (\$m)		Total Expenditure (\$m)		Percentage change from 2011-12
	2012-13	(2011-12)	2012-13	(2011-12)	2012-13	(2011-12)	
Current	181	(173)	165	(247)	346	(420)	-18%
Capital	23	(58)	63	(155)	86	(213)	-60%
Current + capital	203	(231)	228	(403)	431	(634)	-32%

**Figure 2: Total Queensland Government R&D expenditure from 2010-11 to 2012-13 highlighting QIMR's leverage in the 2012-13 financial year (including QIMR leveraged funds of \$91.5m).**



## Capital expenditure

- Total capital expenditure (excluding QIMR) decreased in 2012-13 to just \$86m of the total Queensland Government's R&D spend (down from \$213m in 2011-12) (see Table 1). This is a decrease of 60% in capital expenditure from 2011-12
- Of the capital spend, \$23m were Queensland Government funds (down from \$58m in 2011-12). This corresponds to the completion of several infrastructure projects, and major Smart State Strategy projects nearing completion.

### **Leverage (QIMR excluded)**

- In 2012-13 only \$1.12 was leveraged for every \$1.00 invested into R&D by the Queensland Government. This includes in-house and external R&D (compared to \$1.74 leveraged in 2011-12). This is the lowest leverage rate seen since 2010-11 and is primarily caused by the substantial reduction in capital investment.
- Our in-house R&D leveraged \$0.65 from every \$1.00 spent (in 2011-12 \$0.89 was leveraged). Each \$1.00 spent externally leveraged \$1.43 (down from \$2.76 in 2011-12). These have also decreased primarily due to capital works ceasing.

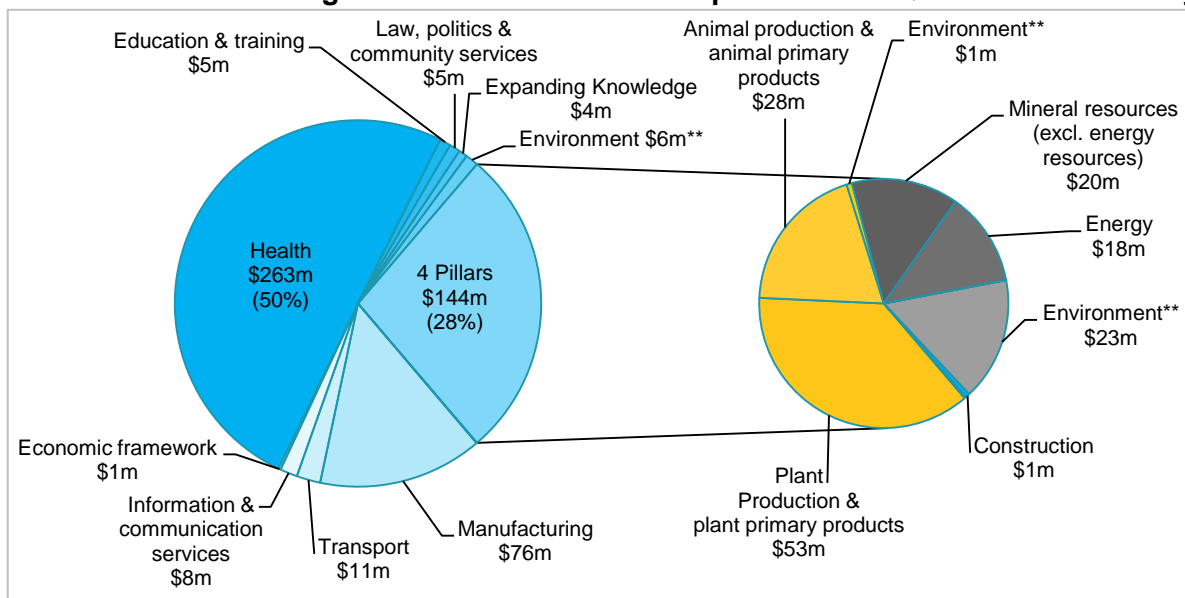
### **QIMR**

- QIMR is one of six government bodies and statutory authorities that perform R&D. It is the top player in this space representing 85% of the government bodies and statutory authorities spend on R&D.
- A large amount of QIMR's R&D funding is leveraged (\$91.5m) from external sources such as the Australian Government, including the National Health and Medical Research Council and other competitive funding sources, as well as philanthropies and community donations.
- QIMR's external leveraged funds have not been included in the leverage rates for this report, in order to be consistent with previous reports, as noted above.

### **Sector specific R&D expenditure (QIMR included)**

- The Department of Science, Information Technology, Innovation and the Arts (DSITIA) is the largest funder of R&D within the Queensland Government and invested 36% (\$72m) of Queensland Government funding in performing research across a variety of disciplines and funding external research, as well as substantial infrastructure commitments (e.g. The Centre for Advanced Materials Processing and Manufacturing and the Queensland Tropical Health Alliance). The Department of Agriculture, Fisheries and Forestry (DAFF) is the second largest funder of R&D at 28% (\$57m).
- The Department of Health spent 14% (\$28m of \$203m) of Queensland Government funds, with an additional 5% (\$10m) spent by nine of the 17 Hospital and Health Services (HHSs - board-run hospitals that provide public health services in Queensland, reporting to the Department of Health and set up in 2012).
- Health is the largest area of research and is performed across a number of departments and government bodies including QIMR with 50% (\$263m of \$523m) of funding going towards this area of research (see Figure 3). Of this \$263m:
  - \$97m is DSITIA competitive grant funding and other funding e.g. including Centre of Advanced Imaging, Institute of Molecular Bioscience and the Queensland Tropical Health Alliance
  - \$155m was expended by Queensland Health, the HHSs and QIMR, and
  - \$12m was expended by various departments and government bodies
- Four Pillars research investment has decreased in dollar terms (including leverage) from the previous year, i.e. \$144m in 2012-13 and \$166m in 2011-12 invested across agriculture, resources, and construction.

**Figure 3: Total R&D Expenditure by socio-economic objective for 2012-13 – classified by intended outcome of the research rather than geographical location. The smaller pie chart illustrates the alignment of SEOs to the four pillars of the Queensland economy\***



\*The four economic pillars are: **Agriculture (yellow)**: animal production and animal primary products, plant production and plant primary products, and projects aligned to agriculture and environment. **Construction (blue)**: construction. **Resources (grey)**: mineral resources; energy; and projects aligned to resources and the environment and **Tourism** on which there was no expenditure.

\*\*The Environment SEO has been split into three sections: Environment research that aligns directly to the Agriculture sector, Environment projects that align to the Resources sector, and the remaining Environment research that is not aligned to the Four Economic Pillars (in the larger pie chart).



# Purpose of the report

## Introduction

Expenditure on Research and Development (R&D) is one of the most widely used measures of innovation input, and the assessment of Queensland's R&D portfolio can highlight the strengths and weaknesses of its innovation system.

In 2008-09 almost \$4 billion was spent on R&D in Queensland. The Queensland Government owned and managed 7 per cent of this research and development portfolio with investments in in-house research activities and external research projects and grants<sup>1</sup>. It is through this expenditure that the state government directs R&D towards specific economic, social and environmental outcomes consistent with the government's overall priorities.

Partnerships between the Australian Government, state governments, the higher education sector and industry have been important to deliver key capabilities and critical infrastructure in the past and will be increasingly important in the future. By assessing these relationships we can adapt our research portfolio to deliver real outcomes that will benefit Queensland and Queenslanders.

Since 2004-05, an annual R&D expenditure report has been developed by the Office of the Queensland Chief Scientist (OQCS). This report details the money spent by the Queensland Government in 2012-13.

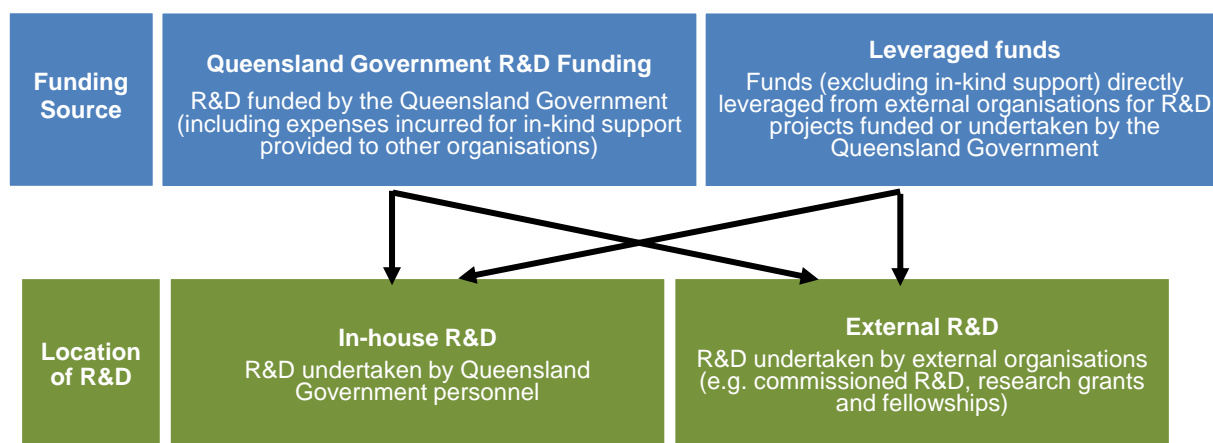
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<sup>1</sup> Australian Bureau of Statistics, 8112.0 - Research and Experimental Development, All Sector Summary, Australia, 2008-09 (<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8112.02008-09?OpenDocument>) (Note: This is the most current data for R&D by the ABS as this data is published every two years and there is no data currently available beyond the baseline year.)

## Scope

This report provides financial information on the Queensland Government's R&D expenditure during 2012-13 (Figure 4), and the money leveraged from external sources. All R&D funding has been attributed back to departments that existed at the beginning of 2012-2013 (that is July 2012) and those that funded the research, rather than performed it.

**Figure 4: Breakdown of R&D expenditure included in the report<sup>2</sup>**



The report includes an analysis of:

- the level of R&D expenditure reported by Queensland Government agencies, government bodies and hospital and health services (HHSs)
- the breakdown of R&D by the funding source (who provided the funding)
- the breakdown of R&D by location (the sector<sup>3</sup> who performed the R&D)
- the alignment of R&D expenditure with the Queensland Government's Four Economic Pillars and the Australian Bureau of Statistics (ABS) classification system (see Appendix B: Figure 15 and 16).

For the first time, data has been collected from government bodies and statutory authorities that perform R&D. The largest data set belongs to the Queensland Institute of Medical Research (QIMR, now QIMR Berghofer Medical Research Institute). For the sake of comparison, with the datasets of previous years you will find throughout this report tables and figures that:

- exclude QIMR's \$91.5 million leveraged funds to provide a useful comparison with previous years
- include QIMR's \$91.5 million leveraged funds to provide an updated account of government spend.

A reviewed set of Queensland Science and Research Priorities was published in January 2014. In future reports, these priorities will be used to assess R&D expenditure (Appendix A.1 and A.2). However, in this report (and the previous one), as there were no prevailing R&D priorities, the Queensland Government Four Economic Pillars were used: Agriculture, Construction, Resources and Tourism.

<sup>2</sup>Queensland Government R&D expenditure reported here differs from that reported by the Australian Bureau of Statistics, which refers solely to Queensland Government in-house R&D (funded by the Queensland Government and external sources).

<sup>3</sup>E.g. universities, business, private non-profit

## Research and Development definition

For the purpose of this report R&D is defined in accordance with the *Frascati Manual*<sup>4</sup> which is the internationally recognised standard in this area as determined by the Organisation for Economic Cooperation and Development (OECD), specifically:

*'creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.'*

This includes basic research, strategic research and applied research, and experimental development. It also includes administration and the indirect supporting activities which support R&D and are treated as overheads.

It does not include science activities such as routine monitoring and data collection, quality control, testing and standardisation, or scientific and technical services. The R&D definition also excludes: market research; operations research or statistical analyses; policy-related studies; routine computer programming; and the extension or commercialisation of R&D.

Several Queensland Government departments, such as the Department of Science, Information Technology, Innovation and the Arts (DSITIA), undertake various and important science-related activities that do not fall within the above R&D definition, so such activities are not captured in this report.

## Other definitions and categories used

R&D expenditure refers to money expended (excluding Goods and Services Tax) in the indicated financial year. It includes capital expenditure for R&D facilities, such as the acquisition of land and buildings. Current expenditure includes labour costs, project materials, administration and other overheads, and the costs of indirect services (for example, library materials and computer services).

Leveraged funds refer to cash contributions by external organisations towards R&D projects funded or performed by the Queensland Government. This includes direct contributions only, that is the expenditure forming part of an R&D contract or agreement. This does not include in-kind support (for example time use of internal databases or staff time not directly attributed to the project). Where the Queensland Government does not hold the financial records for amounts expended by external organisations on a project in 2012-13, leveraged funds are calculated pro rata (based on the overall commitment by organisations to the project and the Queensland Government's expenditure on the project in that year).

The definitions used for different R&D sectors (for example, universities and business) referred to in this report are equivalent to those used by the ABS. This year we have individually identified those government bodies and statutory authorities that perform R&D.

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<sup>4</sup>Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development, OECD, Paris, 2002, [http://www.oecd-ilibrary.org/science-and-technology/frascati-manual-2002\\_9789264199040-en](http://www.oecd-ilibrary.org/science-and-technology/frascati-manual-2002_9789264199040-en).

In the context of this report, *Queensland Government R&D funding* refers to money provided from departmental budgets. *Total Queensland Government R&D expenditure* includes both Queensland Government funding and leveraged funds.

## Data collection

The Office of the Queensland Chief Scientist (OQCS) commissioned the Queensland Government Statistician to collect 2012-13 expenditure data from Queensland Government departments. This year, in addition to the Queensland Government departments, we have included:

- the Hospital and Health Services (previously captured under Queensland Health, but now separate entities)
- Queensland Government bodies, authorities and commissions that perform R&D.

Data was not collected from government-owned corporations<sup>5</sup>, which for R&D reporting purposes are captured under the business sector (that is business expenditure on R&D).

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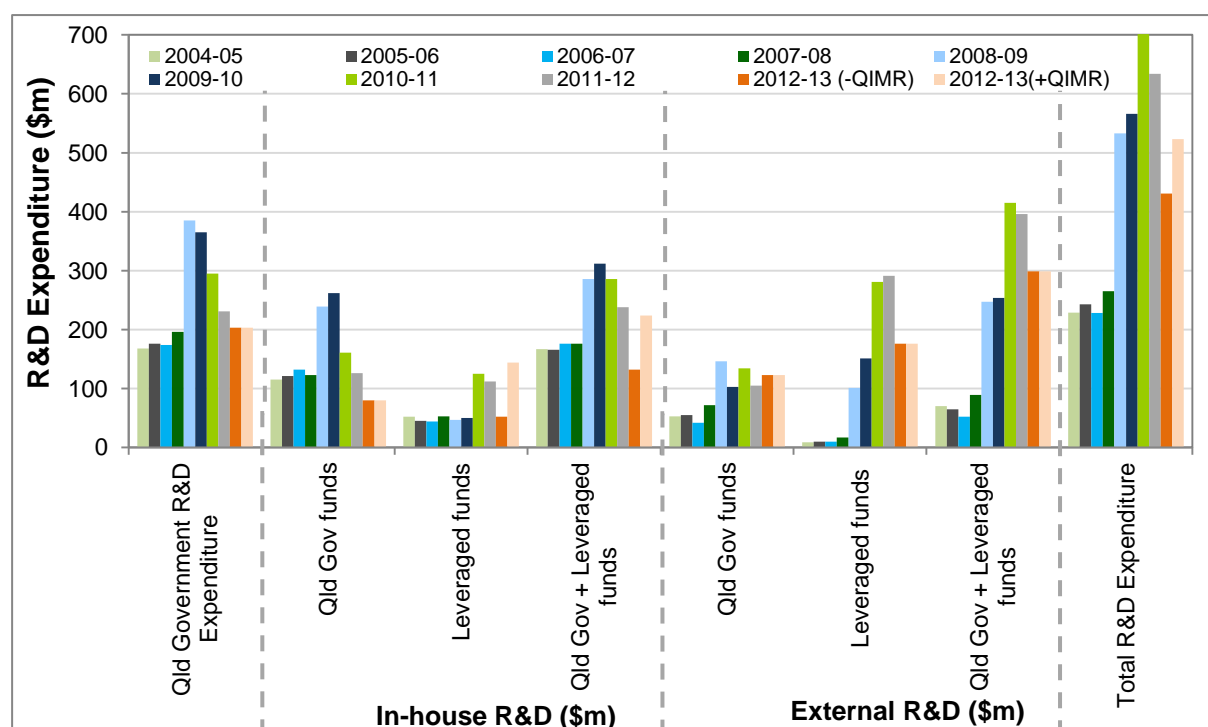
<sup>5</sup> E.g. CS Energy Ltd, ENERGEX Ltd, Gladstone Ports Corporation Limited and Queensland Rail Limited.

# 1. R&D Expenditure from 2004-05 to 2012-13

The last four years have seen significant investment in updating existing and constructing new research infrastructure in Queensland. Sites such as the Health and Food Sciences Precinct and Ecosciences Precinct, Smart State Medical Research Centre (now the new QIMR Berghofer Medical Research Centre building), and the Translational Research Institute have increased Queensland's capacity for research and science, and created a strong research presence for Queensland around the world. With greater Queensland Government commitment also came greater leverage capacity. As shown in Figure 5, in 2008-09 our *Queensland Government + Leveraged funds*, for both *in-house* and *external* R&D doubled. Since this time Queensland Government R&D expenditure has been in decline with just \$203 million in 2012-13.

While a decrease in spend was observed in 2012-13, the actual value was inflated with the addition of the statutory authorities, as QIMR has a significant leverage portfolio. As such, two data sets have been provided in Figure 5, with the last bar representing the data collected in 2012-13 (including QIMR's \$91.5 million leverage portfolio), and the second last bar represents the data collected excluding QIMR's leverage amount for ease of comparison with previous years, in which government bodies and statutory authorities were not included.

**Figure 5: Total Queensland Government R&D expenditure from 2004-05 to 2012-13 (excluding and including QIMR's \$91.5m leveraged funds)**



\*Total R&D Expenditure = Qld Gov + Leveraged Funds, In-House + External (\$m)

Total R&D expenditure has decreased by a third from \$634 million in 2011-12 to \$431 million in 2012-13 (not including QIMR leverage funds). Queensland Government funding of R&D performed in-house has also declined since 2009-10.

The inclusion of QIMR data this year increased the government's leveraged funds for in-house R&D. This is an anomaly in the 2012-13 data due to the \$91.5 million leverage obtained by QIMR which skews the in-house leverage portfolio. This would not occur if data was not collected from government bodies and statutory authorities. However, it was felt important to include these statutory authorities as they are funded by the Queensland Government and their inclusions provides a more complete picture of R&D spend by government. In contrast, leveraged funds have decreased dramatically (39%) for external R&D (last bar in Figure 5).

If QIMR's \$91.5 million is excluded, in 2012-13 only \$1.12 was leveraged for every \$1.00 spent from the Queensland Government's investment in R&D. This includes in-house and external R&D and is a reduction on the \$1.74 leveraged in 2011-12. This is the lowest leverage rate since 2010-11 and is primarily caused by the reduction in capital investment.

Our in-house R&D (excluding QIMR) leveraged \$0.65 from every \$1.00 spent (in 2011-12 this was \$0.89). Each \$1.00 spent externally leveraged \$1.43, down from \$2.76 in 2011-12 (Table 2). This decrease is primarily due to the cessation of capital works. Including QIMR funds the average leverage across the state increases to \$1.80 for every \$1.00 spent in-house. Table 2 details the leverage rates which include QIMR's leveraged funds.

Proportionally, Queensland's investment in research has changed this financial year, as 69 per cent of funds are spent externally (46 per cent in 2011-12) and 31 per cent in-house (54 per cent in 2011-12). In addition, the extent of our commitment has changed. In 2008-09, the Queensland Government invested \$385 million, followed by \$365 million in 2009-10, \$295 million in 2010-11, \$231 million in 2011-12, and \$203 million in 2012-13. Each year has seen a successive reduction in Queensland Government funds and this has an impact on our ability to leverage (that is dollar for dollar matching) with the Australian Government, universities and businesses.

**Table 2: Total Queensland Government R&D expenditure from 2004-05 to 2012-13 across in-house and external locations**

(Note: Numbers have been rounded, resulting in individual amounts not always adding up to totals)

Qld Government R&D Expenditure (\$m)	In-house R&D Qld Gov funds (\$m)	In-house R&D Leveraged funds (\$m)	In-house R&D Qld Gov + Leveraged funds (\$m)	External R&D Qld Gov Funds (\$m)	External R&D Leveraged Funds (\$m)	External R&D Qld Gov + Leveraged funds (\$m)	Total R&D Expenditure (In-house + External funds) (\$m)
<b>2012-13 (+QIMR)<sup>‡</sup></b>							
203	80 (39%)*	144 <sup>‡</sup> (\$1.80) <sup>††</sup>	224	123 (61%)*	176 <sup>‡</sup> (\$1.43) <sup>††</sup>	299	523
<b>2012-13 (-QIMR)<sup>α</sup></b>							
203	80 (39%)*	52 <sup>α</sup> (\$0.65) <sup>††...</sup>	132	123 (61%)*	176 <sup>α</sup> (\$1.43) <sup>††.</sup>	184	431
<b>2011-12</b>							
231	126 (54%)*	112 (\$0.89) <sup>†...</sup>	237	105 (46%)*	291 (\$2.76) <sup>†...</sup>	396	634
<b>2010-11</b>							
295	161 (54%)*	125 (\$0.78) <sup>†...</sup>	286	134 (46%)*	281 (\$2.09) <sup>†...</sup>	415	701
<b>2009-10</b>							
365	262 (72%)*	50 (\$0.19) <sup>†...</sup>	312	103 (28%)*	151 (\$1.48) <sup>†...</sup>	254	566
<b>2008-09</b>							
385	239 (62%)*	47 (\$0.19) <sup>†...</sup>	286	146 (38%)*	101 (\$0.69) <sup>†...</sup>	247	533
<b>2007-08</b>							
196	123 (63%)*	53 (\$0.43) <sup>†...</sup>	176	72 (37%)*	17 (\$0.23) <sup>†...</sup>	89	265
<b>2006-07</b>							
174	132 (76%)*	44 (\$0.33) <sup>†...</sup>	176	42 (24%)*	10 (\$0.25) <sup>†...</sup>	52	228
<b>2005-06</b>							
176	121 (69%)*	45 (\$0.37) <sup>†...</sup>	166	55 (31%)*	10 (\$0.18) <sup>†...</sup>	65	243
<b>2004-05</b>							
168	115 (68%)*	52 (\$0.45) <sup>†...</sup>	167	53 (32%)*	9 (\$0.18) <sup>†...</sup>	70	229

\*Percentage of Queensland Government expenditure

<sup>†</sup>Leveraging rate

<sup>‡</sup>2012-13 expenditure data including QIMR's \$91.5m external leverage amount.

<sup>α</sup>2012-13 expenditure data excluding QIMR's \$91.5m external leverage amount.

## 2. R&D expenditure by funding source: ‘spenders’ (who provides the funding)

In past years, the Queensland Government has successfully grown its leverage portfolio to maximise its investment in R&D. Leverage sources come in many forms including private non-profit organisations, businesses (usually as an equal contribution on grant funding) and the Australian Government (equally contributing on projects as well as offering competitive research grants for in-house R&D).

This past financial year saw a significant reduction in capital expenditure as infrastructure projects drew to a close. In 2012-13, the total spend was \$431 million, down from \$634 million in 2011-12 (this does not include QIMR’s leveraged funds). Of this, \$203 million was Queensland Government funds alone (spent across current and capital) and \$228 million was leveraged funds. In total, \$86 million was spent on infrastructure (capital expenditure) (Table 3) and \$23 million came from Queensland Government funds.

**Table 3: Total Queensland Government R&D expenditure for 2012-13 and 2011-12 across capital (infrastructure and current investment) and Queensland Government funds and leveraged funds (excluding QIMR leveraged funds of \$91.5m)\***

\$431 million Total Spend*							
Expenditure Type	Queensland Government Funds (\$m)		Leveraged Funds (\$m)		Total Expenditure (\$m)		Percentage change from 2011-12
	2012-13	(2011-12)	2012-13	(2011-12)	2012-13	(2011-12)	
Current	181	(173)	165	(247)	346	(420)	-18%
Capital	23	(58)	63	(155)	86	(213)	-60%
Current + capital	203	(231)	228	(403)	431	(634)	-32%

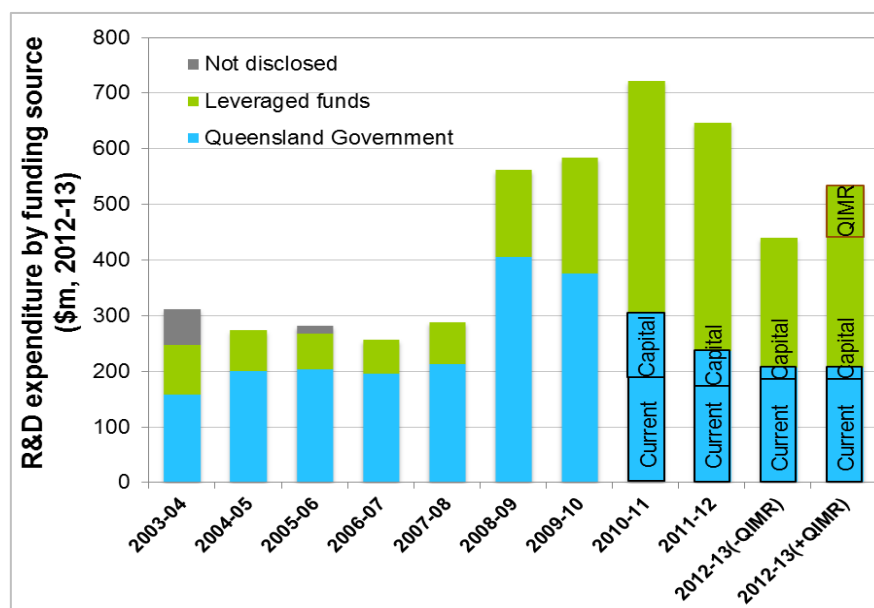
This reduction in capital expenditure and the completion of major Smart State Strategy projects and programs resulted in a decrease in total Queensland Government R&D funding (including leveraged funds) since the peak in 2010-11.

Note, however, that actual current expenditure by the Queensland Government to fund research (both in-house and externally) has remained steady over the last three years with \$181 million in 2012-13; \$173 million in 2011-12 and \$187 million in 2010-11 (Figure 6 and 7).

In addition, we can see that QIMR’s leveraged funds of \$91.5 million make up 17 per cent of total funds in 2012-13 (\$91.5 million of \$523 million). This includes \$31.3 million on infrastructure (capital expenditure) for QIMR (Figure 6 and 7).



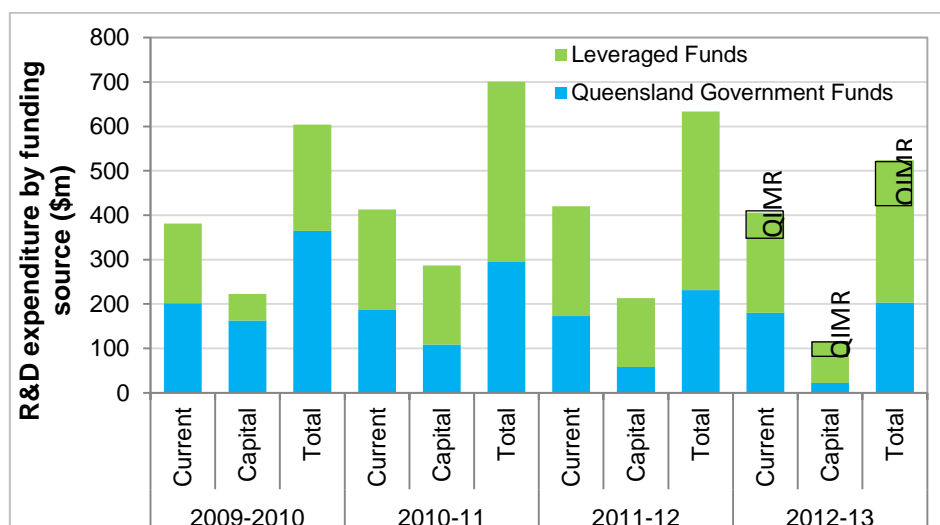
**Figure 6: Total R&D expenditure by funding source, 2003-04 to 2012-13\*\* (highlighting the QIMR leveraged funds of \$91.5m).**



\*Includes Queensland Government R&D expenditure and leveraged funds.

\*Categorisation of expenditure into capital and current expenditure was only implemented from 2009-10 onwards.

**Figure 7: Total Queensland Government R&D expenditure from 2010-11 to 2012-13 highlighting QIMR's leverage in the 2012-13 financial year.**

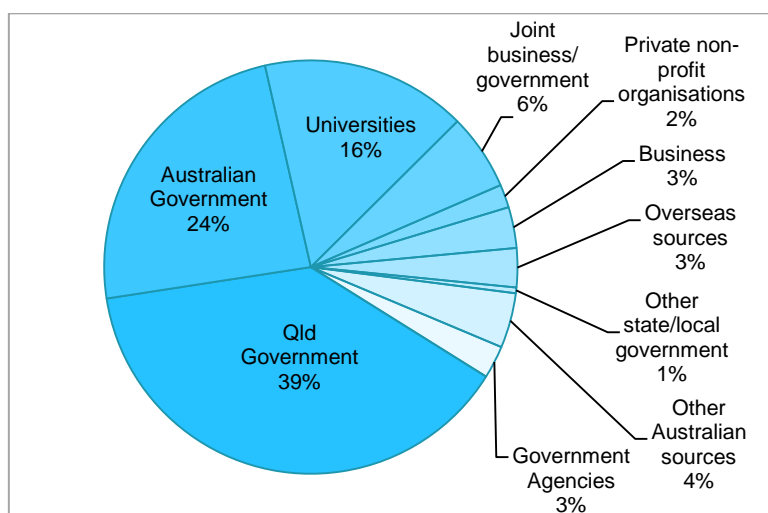


Over the last five years the greatest impact on our investment dollars has always been the leverage component and this appears to have continued in 2012-13. In 2012-13, the Queensland Government investment in R&D leveraged \$1.12 for every dollar invested, resulting in \$228 million in leveraged funds. This represents a decrease from 2011-12 in which \$1.74 was leveraged for every \$1.00 spent providing \$403 million in leveraged funds from \$1.37 leveraged in 2010-11.

This past financial year saw a decrease in funding obtained from the university sector at only 16 per cent (\$84 million) down from \$134 million in 2011-12 (or 20 per cent of total R&D

expenditure). The joint business and government sector increased their investment to 6 per cent of total R&D contributions, from \$24 million in 2011-12 to \$31 million in 2012-13 (Figure 8).

**Figure 8: Total R&D expenditure (\$431 m) by funding source, 2012-13\* (including QIMR leveraged funds of \$91.5m)**



\*Includes Queensland Government R&D expenditure and leveraged funds

\*\*Private non-profit organisations include: PA Research Foundation, Cancer Council Queensland, and the Leukaemia Foundation of Queensland.

The Queensland Government's major source of leverage is the Australian Government with \$125 million invested in Queensland (24 per cent of total R&D expenditure) in 2012-13 - this includes QIMR funds of \$58 million in funds leveraged by QIMR from Australian Government sources (48 per cent of total R&D expenditure) (Figure 8). While Australian Government funds increased as a percentage in 2012-13 from 28 per cent in 2011-12, total value is down from \$178 million in 2011-12 to \$125 million. Australian Government funding programs include the Education Investment Funds (which provides \$25 million to QIMR for infrastructure, more than \$30 million in NHMRC funding, Australian Research Council funding, and Queensland Cyber Infrastructure Foundation Ltd funds) (Table 3).

**Table 3: Australian Government funding sources contributing to the \$126 million leveraged for Queensland Government research (including QIMR leveraged funds of \$91.5m)**

Australian Government Funding Source	R&D Expenditure 2012-13 (\$m)*
ARC	5
ACIAR	3
NHMRC	37
CSIRO	1
Australian Government Departments	75
Department of Agriculture	1
Department of Broadband, Communications and the Digital Economy	1
Department of Education, Employment and Workplace Relations	8
Department of Health and Aging	1
Department of Industry, Innovation, Science, Research and Tertiary Education	59
Other government departments	4
Australian Institutes and Councils	0
Australian Government Programs	1
<b>Total</b>	<b>126</b>

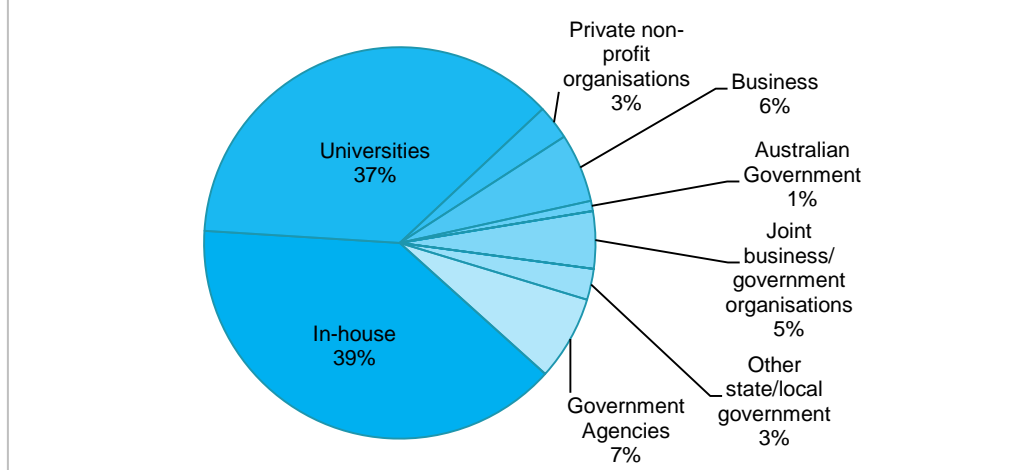
\*Numbers have been rounded, resulting in individual amounts not always adding up to totals.

### 3. R&D expenditure by location: ‘doers’ (the sector performing the R&D)

The Queensland Government performs R&D (this is defined as in-house). It also partners with external organisations to perform research and funds research through grants, fellowships and infrastructure investments. The Queensland Government also supports R&D performed by external agencies and institutes.

During this current tight fiscal climate, new funding for R&D collaborations has been minimal. In 2012-13, \$80 million of the \$203 million invested by the Queensland Government was used for in-house research (that is research located at Queensland Government sites) (Figure 9). Previously, 54 per cent (\$126 million) of government funds was invested in in-house R&D. This has dropped to 39 per cent in 2012-13. Over the last few years, the universities have received the greatest external share of this funding, whilst in-house R&D retained the majority of Queensland Government funding. In 2012-13 this changed with the university sector receiving 37 per cent of Queensland Government funds and in-house receiving 39 per cent of Queensland Government funds.

**Figure 9: Queensland Government R&D expenditure (\$203m) by location i.e. sector performing the R&D 2012-13**



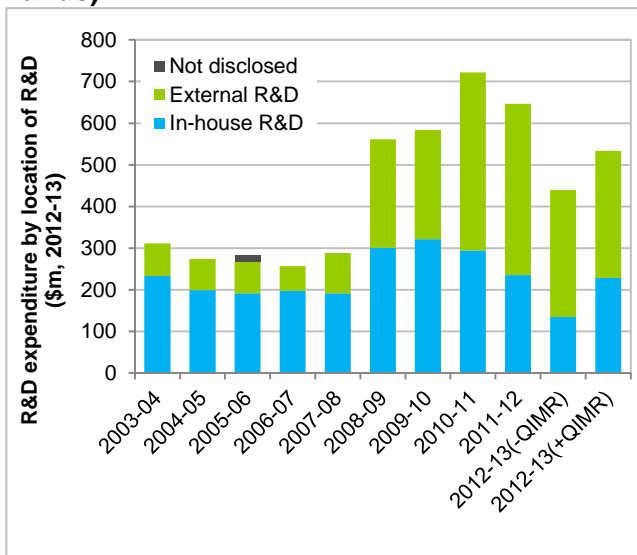
Overall, the total investment for in-house R&D by the Queensland Government (including leveraged funds and QIMR funds) was \$132 million (down \$99 million from 2011-12) (Figure 10). In 2012-13 this included the payment of more than \$21 million in capital funds from DSITIA to the universities through partnership agreements, plus operational funding of more than \$10 million provided to the Institute for Molecular Bioscience at The University of Queensland. This is 19 per cent of DSITIA's total spend.

Queensland Government funds provided to other locations such as government bodies and statutory authorities (7 per cent, \$14 million), the business sector (6 per cent, \$11 million) and joint business/government organisations (5 per cent, \$10 million) are minor in comparison to funds provided to universities.

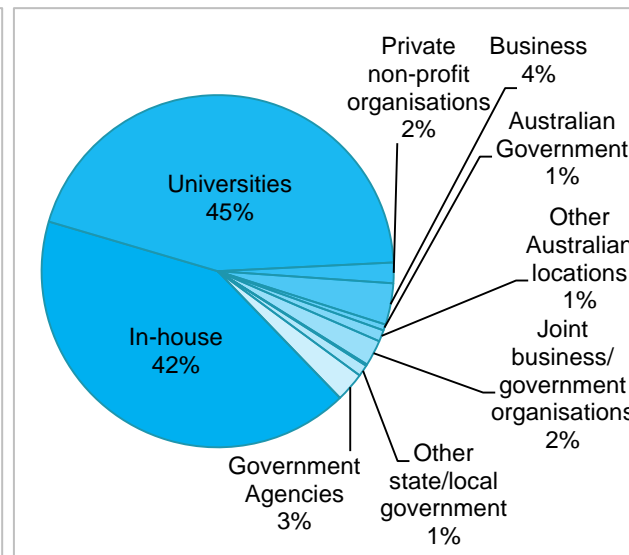
As indicated in Figure 11, the universities also gained the largest share of total funds (Queensland Government and leveraged funds) at 45 per cent (\$234 million of \$408 million). This total includes QIMR's \$91.5 million in leveraged funds and the significant capital leverage

obtained by the universities. With government commitment and leverage, the capacity to contribute to R&D is substantially increased by the university sector.

**Figure 10: Total R&D expenditure (\$431m) by location, i.e. sector performing the R&D, 2003-04 to 2012-13\* (incl. QIMR leveraged funds)**



**Figure 11: Total R&D expenditure (\$431m) by location, i.e. sector performing the R&D, 2012-13\* (incl. QIMR leveraged funds)**



\*This dataset has been adjusted for CPI.

## 4. R&D expenditure of Queensland Government agencies

This financial report details Queensland Government expenditure under the administrative arrangements in place in 2012-2013. As such, this report is not directly comparable with previous expenditure reports, as many departments have changed or no longer exist.

The spread of Queensland Government R&D expenditure across the government's agencies is displayed in Table 4. More detailed information on departmental R&D expenditure is provided in Appendix B Table 8.

R&D Expenditure was attributed to the Queensland Government agency funding the R&D. In some instances, this differed from the department reporting the R&D expenditure, for example, this includes funding provided to QIMR by the Department of Health. This funding is attributed to Department of Health as they are the funding agency. As such, values here may differ from the values reported by individual Queensland Government agencies to OQCS.

**Table 4: R&D expenditure of Queensland Government agencies, 2012-13**

<b>Queensland Government Agency</b>	<b>Queensland Government Expenditure (\$m)*</b>	<b>% of Total</b>
Department of Aboriginal and Torres Strait Islander and Multicultural Affairs	0	0%
Department of Agriculture, Fisheries and Forestry	57	28%
Department of Communities, Child Safety and Disability Services	1	1%
Department of Community Safety	2	1%
Department of Education, Training and Employment	3	2%
Department of Energy and Water Supply	2	1%
Department of Environment and Heritage Protection	4	2%
Department of Health	28	14%
Department of Housing and Public Works	0	0%
Department of Justice and Attorney General	0	0%
Department of National Parks, Recreation, Sport and Racing	0	0%
Department of Natural Resources and Mines	10	5%
Department of Science, Information Technology, Innovation and the Arts	72	35%
Science and Innovation	68	33%
Science Delivery	4	2%
Department of the Premier & Cabinet	1	0%
Department of Transport and Main Roads	3	2%
Hospital and Health Services	10	5%
Government bodies and Statutory Bodies	9	5%
Queensland Police	0	0%
<b>Total</b>	<b>203</b>	<b>100%</b>

<sup>†</sup>In 2012 the Queensland Health Department was separated into the Department of Health, and seventeen Hospital and Health Services (HHSs) as part of machinery-of-government changes. The process which began on 1 July 2012 restored control of services back to local Health Boards in communities across Queensland (these are listed in Appendix A.3).

\*Numbers have been rounded, resulting in individual amounts not always adding up to totals.

DSITIA is the highest funder of R&D within the Queensland Government, investing \$72 million or 35 per cent of Queensland Government funds (Table 4). Part of this funding was used to perform research across a variety of disciplines by the Science Delivery unit and a large part was used to fund external research, as well as fund substantial infrastructure commitments (for example, The Centre for Advanced Materials Processing and Manufacturing and the Queensland Tropical Health Alliance). A significant portion of DSITIA's investment (\$68 million of \$72 million, 94 per cent) is aligned to the Science and Innovation unit and is tied to long-term capital investments.

The next largest funder of research was the Department of Agriculture, Fisheries and Forestry (DAFF) (28 per cent, \$57 million) which was expended on direct R&D investments and commissioning research through the Queensland Alliance for Agriculture and Food Innovation (QAAFI) and BSES Limited, now Sugar Research Australia (SRA).

The Department of Health spent \$28 million (14 per cent) with an additional \$10 million (5 per cent) invested by the Hospital and Health Services. This also includes the \$13.97 million provided to QIMR as operation funding upon which QIMR leverages substantially to develop a significant R&D portfolio.

## 5. Hospital and Health Services

In 2012, as part of machinery-of-government changes, the Department of Health was established with seventeen independent Hospital and Health Services (HHS). The HHSs are statutory bodies governed by a Hospital and Health Board and are monitored by the Department of Health. The process which began on 1 July 2012 restored control of services back to local Health Boards in communities across Queensland (listed in Appendix A.3).

Of the seventeen HHSs, one did not respond to our request for data and seven responded stating that 'R&D was not funded or performed' by their organisation. This left nine organisations contributing to the HHS data set, including the Department of Health (Appendix B: Table 8 and 9 details this information).

A significant portion of the 'Health' expenditure in 2012-13 is a grant given by the Department of Health to QIMR to the value of \$13.97 million (included in the Department of Health spend) (Table 5). The Department of Health also provides funding to the Queensland Emergency Medicine Research Foundation Ltd (\$2 million) and just over \$1 million to the Mater Medical Research Institute for research.

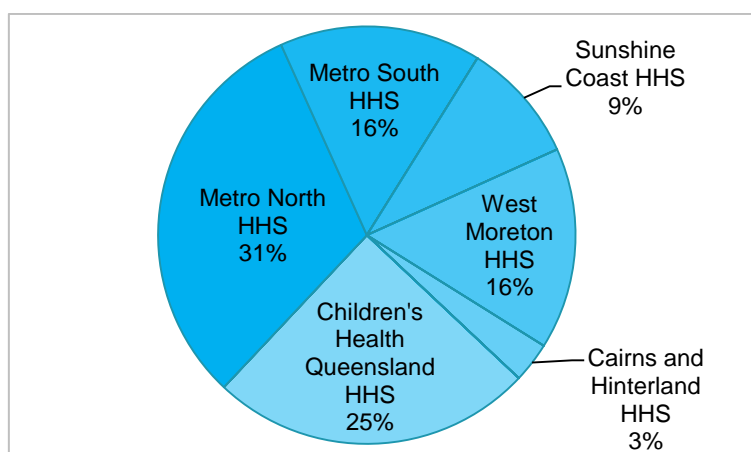
**Table 5: Queensland Government funds and leveraged funds spent in 2012-13 by the Department of Health and the Hospital and Health Services**

Queensland Government Agency and HHS	Qld Gov R&D expenditure (\$m)*	% of Total	Leveraged Funds (\$m)*	% of Total	Qld Gov + Leveraged Funds (\$m)*	% of Total
Department of Health	28	74%	1	4%	29	47%
Cairns and Hinterland	0	0%	1	3%	1	1%
Children's Health	1	4%	7	28%	8	13%
Darling Downs	0	0%	0	1%	0	0%
Gold Coast	0	0%	0	0%	0	0%
Mackay	0	0%	0	0%	0	0%
Metro North	2	5%	8	35%	10	17%
Metro South	0	1%	5	20%	5	8%
Sunshine Coast	1	2%	2	9%	3	5%
West Moreton	5	14%	0	0%	5	8%
	38	100%	23	100%	62	100%

\*Numbers have been rounded, resulting in individual amounts not always adding up to totals.

Of the seventeen HHS, only seven invested in research and although the table indicates a zero value for five of the HHSs this indicates their R&D investment is low (and is rounded up or down). The greatest expenditure has occurred with the Metro North HHS (31 per cent) and the Children's Health Queensland HHS (25 per cent) spending the largest amount on R&D (Figure 12).

**Figure 12: Total R&D expenditure for the Hospital and Health Services (\$32m) for 2012-13\***



\*Includes Queensland Government R&D expenditure and leveraged funds

In 2012-13, the Department of Health provided support in the form of research fellowships to the value of \$7.67 million. This funding provides research in the areas of respiratory diseases, infectious diseases, cardiovascular medicine, cancer biology, mental health, midwifery, paediatrics, etc. The value of the fellowships was provided by the Health and Medical Research Unit and differs from the amount estimated from the Health data collected in this data set. In fact, \$2.73 million in fellowships funding has not been captured. This raises the concern that data collection across HHSs may not completely reflect the complexities of research across the health department.

This also raises the concern for the recovery of funds should the recommendations by the Independent Hospital Pricing Authority (IHPA) be accepted. On 1 July 2018, the IHPA may recommend transitioning from block grants to activity-based funding for 'teaching, training and research' provided by public health institutions to the value of 40 per cent. As suggested in the report:

*'...the resources allocated for research in health services are not adequately tracked nor are the outputs from health and medical research usually audited. This makes it difficult to accurately determine the investment in health and medical research in health and health service settings.'*<sup>6</sup>

Various recommendations will be made from this study and it will be important for the Queensland Government, and correspondingly the HHSs, to undertake changes to their current reporting systems, to fully benefit from this.

<sup>6</sup>Independent Hospital Pricing Authority. Define teaching, training and research and identify associated cost drivers for ABF purposes. Literature Review. July 2013. Paxton Partners Pty Ltd.



## 6. Government bodies and statutory authorities

While there are many government bodies performing various roles (such as enacting legislation, heading up commercial entities owned by government, licensing and regulating industries, managing complaints) there are only a few that perform or spend money on R&D. In response to this, a request was made for government bodies and statutory authorities to provide R&D expenditure data for 2012-13.

Government bodies like authorities, boards and committees can be either established by an Act of Parliament or by a decision of executive government, either through the Cabinet process or by individual ministers or chief executive officers of government agencies. This is the first time we have captured detailed expenditure by these agencies.

In previous expenditure reports, R&D investment by government bodies has only been captured through collaborative projects and joint ventures, except for the Queensland Museum (QM), which was captured as part of the DSITIA, and the Motor Accident Insurance Commission (MAIC) which was provided through Queensland Treasury and Trade. In this report, MAIC is now listed under government bodies and statutory authorities, as is QM which has had this structure since 1970.

The Queensland Art Gallery, MAIC and Q-COMP spend a majority of their funds externally, but the opposite is true for the Queensland Competition Authority, QIMR and QM which perform their R&D primarily in-house.

As discussed previously, QIMR received money from the Department of Health to the value of \$13.97 million for operational costs (this is reviewed annually). QIMR is one of six government bodies and statutory authorities that perform R&D. It is the top player in this space, with 85 per cent of the government bodies and statutory authorities spend' which includes \$91.5 million of leveraged funds. These funds are sourced from the Australian Government, including the National Health and Medical Research Council (NHMRC), other competitive funding sources, and philanthropy and community donations. It also includes \$31 million allocated to capital in 2012-13.

## 7. Alignment with Queensland Government Priorities

A reviewed set of Queensland Government Science and Research Priorities was published in January 2014 and will be used in future reports to assess R&D expenditure (see Appendix A.1 and A.2). However, in this report and the previous report, as there were no prevailing R&D priorities, the Queensland Government four economic pillars were used. The Four Economic Pillars are: Agriculture, Construction, Resources and Tourism. Also, in order to compare 2012-13 expenditure with the previous year we have excluded the QIMR leveraged funds (\$91.5 million) in this section to provide a more useful comparison.

For this report, R&D projects have been aligned to the ABS classifications for Socio-Economic Objectives (SEO) and also to the Fields of Research (FOR)<sup>7</sup>. Further explanation of these classifications can be found in Appendix B, Table 6 and Table 7 (with further breakdown of the data to identify expenditure within the four economic pillars for SEO in Appendix Table 10).

The SEO relates to the outcomes of the R&D while the FOR indicates the techniques and the research area used to perform the research. An explanation of the two codes is below:

### **Socio-Economic Objective (SEO)**

- The SEO classification allows R&D activity to be categorised according to the intended purpose or outcome of the research rather than the processes or techniques used in order to achieve this objective. For example, a project identifying lifestyle factors that cause kidney disease would be aligned with the Health SEO as it provides health outcomes.

### **Fields of Research (FOR)**

- The FOR classification allows R&D activity to be categorised according to the field of research. In this respect, it is the methodology used in the R&D that is being considered. For example, a project developing an artificial material for use in joint replacements would be aligned with Engineering as it utilises engineering-based techniques, rather than the health outcome it would provide for.

With this in mind, it is important to note that direct comparison between the classifications is not possible. Only one code has been chosen for each project.

Although total R&D expenditure has decreased by \$203 million, there is an increasing focus on government priority areas. As a percentage spend, the level of research investment has improved upon the previous year, with 33 per cent invested across Agriculture, Resources, and Construction (up from 26 per cent in 2011-12). In terms of the individual four pillars, Agriculture was the largest at \$82 million (19 per cent), followed by Resources (\$61 million, 14 per cent), and then Construction at \$1 million (0.2 per cent). The four pillars are represented in the smaller pie chart of Figure 13. The government did not perform tourism research based on the definitions of this report, but they do undertake market research, operations research and technical analyses. However, this falls outside of the definitions of this report.

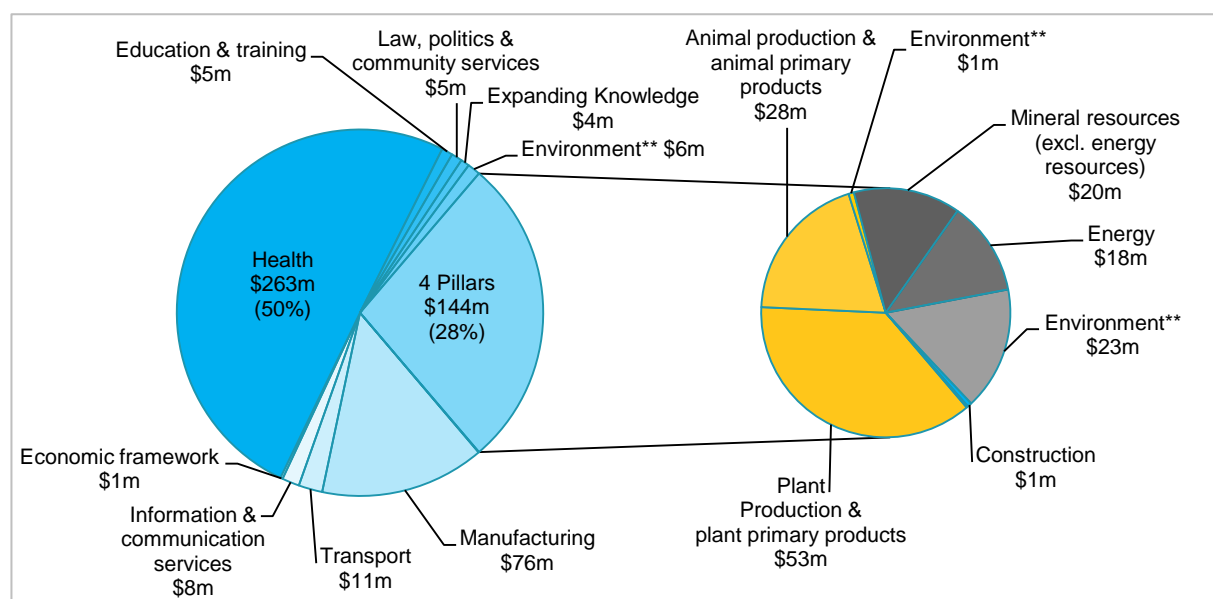
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<sup>7</sup>1297.0 - Australian and New Zealand Standard Research Classification (ANZSRC), 2008 can be found at: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/1297.0Main%20Features12008?opendocument&tabname=Summary&prodno=1297.0&issue=2008&num=&view=>

To further clarify the Four Economic Pillar spend, it was necessary to split an SEO across the two pie charts ie the Four Pillar spend (small pie chart) and the remaining spend (larger pie chart). For the Environment SEO some of the research projects align directly to the Agriculture sector, some align to the Resources sector and some Environment research is not aligned to the Four Economic Pillars. The Environment SEO has been split into three Environment categories. For example, 'Genetic control of pathogens in Barley' is Environmental research that aligns with the Agriculture Pillar as the socio-economic benefits will give the greatest impact in this area. In the Resources Pillar, there is Environment research on 'Coal seam gas water disposal to streams'. In addition research on the 'Queensland's Integrated Marine Observing System (Q-IMOS)' does not align directly to the Four Economic Pillar areas.

Research with a health-outcome is not restricted to the Department of Health and the HHSs - 40 per cent (\$171 million of \$431 million) of total Queensland Government R&D expenditure in 2012-13 went towards research with a health outcome (down from 62 per cent in 2011-12) (Figure 13). This includes research funded by DSITIA grants and fellowships, research funded by the Departments of Community Safety, and National Parks, Recreation, Sport and Racing, the Department of Health and the Hospital and Health Services.

**Figure 13: Total R&D Expenditure by socio-economic objective for 2012-13 – classified by intended outcome of the research rather than geographical location. The smaller pie chart illustrates the alignment of SEOs to the four pillars\***



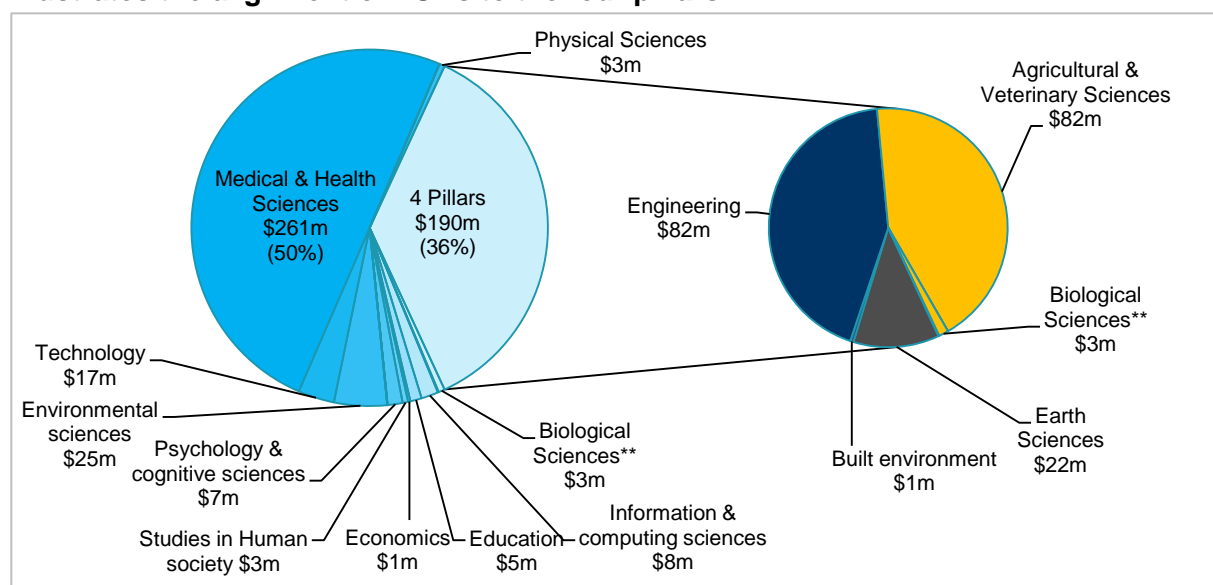
\*The four economic pillars are: **Agriculture (yellow)**: animal production and animal primary products, plant production and plant primary products, and projects aligned to environment in the agriculture space. **Construction (blue)**: construction. **Resources (grey)**: mineral resources; energy; and projects aligned to resources and the environment and **Tourism** of which there was no expenditure.

\*\*The Environment SEO has been split into three sections: Environment research that aligns directly to the Agriculture sector, Environment projects that align to the Resources sector, and the remaining Environment research that is not aligned to the Four Economic Pillars (in the larger pie chart).

In terms of FOR classification, we see a similar investment in the Health classification (Medical & Health sciences) of \$170 million (39 per cent) (Figure 14). There is significant research in Agricultural and Veterinary sciences (20 per cent or \$85 million) driven by DAFF. The non-pillar areas like Environmental sciences (6 per cent or \$25 million) and Technology (4 per cent or \$17 million) also have some capability behind them.

To further clarify the Four Economic Pillar spend, it was necessary to split an SEO across the two pie charts ie Four Pillar spend (small pie chart) and the rest (larger pie chart). For the Biological Sciences FOR some of the research projects align directly to the agriculture sector. As such, the Biological Sciences has been split into two groupings (Figure 14). For example, 'Biological suppression of nematodes in grain-growing soils' is research aligned to the Agriculture Pillar whereas 'Ecological monitoring and baseline studies on rainforest and woodland reptile fauna' is also Biological Sciences, but is not aligned to the Four Economic Pillars'.

**Figure 14: Total R&D Expenditure by field of research for 2012-13 - classified by intended outcome of the research rather than geographical location. The smaller pie chart illustrates the alignment of FORs to the four pillars\***



\*The four economic pillars are: **Agriculture (yellow)**: animal production and animal primary products, plant production and biological sciences research in the agriculture area. **Construction (blue)**: built environment and engineering in the construction space. **Resources (grey)**: earth sciences, and **Tourism** of which there was no expenditure.

\*\*The Biological Sciences FOR has been split into two sections: Biological Sciences research that aligns directly to the Agriculture sector and Biological Science research that does not align to the Four Economic Pillars (in the larger pie chart).

The Education and Training spend is only 1.2 per cent of total R&D investment which does not align with the international education and training industry being Queensland's fourth largest export industry, and second largest services export after tourism<sup>8</sup>. Education export revenue for Queensland was worth \$2.22 billion in 2012-13 with the sector employing more than 20,000 people. It is evident that investment in this area could be stronger, and while the government may not be the place to perform R&D in this sector it is the ideal place to drive and leverage R&D activity.

<sup>8</sup>Trade and Investment Queensland Australia, Education and Training (<http://export.qld.gov.au/export/export-industries/education-training/>)

## 8. Findings and Recommendations

The Queensland Government's investment in science and research has been strengthened over the past 15 years. Since 1998, the Queensland Government has spent more than \$5 billion on scientific infrastructure, projects and skills; leveraging an additional \$4 billion to provide an overall investment of more than \$9 billion (including the 2012-13 R&D expenditure data).

In 2012-13, the Queensland Government's R&D investment of \$203 million was matched by \$228 million of externally generated funds, giving a total of \$431 million. This represents a decrease of 32 per cent from the 2011-12.

For every dollar invested by the government, a further \$1.12 was leveraged (a reduction from last year's value of \$1.74). For every dollar of government R&D funds spent externally, a further \$1.43 was leveraged. It is believed that this value remains high due to the capital funds still being spent externally by the university sector and the significant leveraged funds obtained for these investments.

QIMR received money from the Department of Health to the value of \$13.97 million for operational costs. QIMR is one of six government bodies and statutory authorities that perform R&D and has the largest expenditure on R&D of all government bodies and statutory authorities (85 per cent). This includes \$91.5 million of leveraged funds sources from the Australian Government including the NHMRC, other competitive funding sources, and philanthropy and community donations. It also includes \$31 million allocated to capital in 2012-13.

In 2012-13 there was a reduction in capital (infrastructure) from previous years with only \$86 million being spent. Of this investment only \$23 million was from Queensland Government funds. With major commitments in R&D infrastructure showing a reduction annually, Queensland will need to continue to deliver a strong commitment to people and skills in order to maintain momentum and strengthen our collaborative efforts.

There is still an indication that the main performers of R&D funded by the Queensland Government are in-house R&D (42 per cent) and the university sector (45 per cent). The business sector obtains only 4 per cent of this funding (although this report only captures R&D funds provided to businesses from the government). However, it is important for government to grow our business sector commitments, encourage greater collaboration with industry and strengthen our R&D portfolio. This would also tie in well with grants on offer under the Accelerate Science and Innovation Program and the Queensland Science and Research priority to *'Remain internationally competitive by attracting and retaining science and research talent. This will be done through early-career researcher support programs in priority areas and by encouraging research-focussed mobility and effective translation between industry, academia and government.'*

Capturing the R&D spend across the hospitals in Queensland has always been a large task. It is now more difficult to capture this information as it comes from seventeen HHSs and the Department of Health. However, ensuring we capture correct and complete information on the research spend within these agencies is essential, not only for accuracy, but also because of the activity-based funding model that may come into being in 2018, and with it, the recovery of

40 per cent of 'teaching, training and research' functions provided by public health institutions from the Australian Government.

The focus on socio-economic areas shows a reasonable investment in the four pillar R&D areas (33 per cent, \$144 million). With Health included, this equates to 73 per cent of our R&D spend on Resources, Agriculture, Construction and Health. This shows strong alignment with the government's priorities and this should be continued.

Research with a health-outcome is not restricted to the Department of Health and the HHs with 40 per cent (\$171 million of \$431 million) of total Queensland Government R&D expenditure in 2012-13 going towards research with a health outcome (down from 62 per cent in 2011-12). This includes research funded by DSITIA grants and fellowships, and research funded by the Departments of Community Safety, and National Parks, Recreation, Sport and Racing, the Department of HHs. This decrease is due to some capital infrastructure commitments made in the health and medical space, coming to an end.

It is obvious that the significant spend we see by DAFF and in the Agricultural pillar areas aligns well with the export capability of the agriculture and food products sectors (19 per cent of the total R&D spend and it accounts for nearly 20 per cent of Queensland's exports, as well as underpinning the major goal of doubling agricultural production by 2040). However, this alignment is not seen in the construction sector (just 0.2 per cent) in terms of R&D spend - *'The property and construction sector in Queensland is a key economic driver contributing more than \$30 billion each year to the state's economy. It is the state's largest private sector industry and the largest direct employer.'*<sup>9</sup>

With the Queensland Government defining ten key Queensland Science and Research Priorities (Appendix A.1), alignment to these should show an increasingly strong portfolio on research and science investment for Queensland in years to come. The use of the *R.E.D.S. Decision Rules* (Appendix A.2) by government will give better assessment and targeted investment in science and research, and when used in conjunction with the *Science and Innovation Investment Framework* we can deliver a viable and resilient research and innovation community and investment portfolio.

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<sup>9</sup>Trade and Investment Queensland Australia, Education and Training (<http://export.qld.gov.au/export/export-industries/infrastructure-construction/>)

# APPENDICES

## Appendix A - Further Information

A.1 Queensland Science and Research Priorities

A.2 Queensland R.E.D.S. Decision Rules

A.3 Hospital and Health Services

## Appendix B - Additional Tables

## Appendix C - Department Information



# APPENDIX A – Further Information

## A.1 Queensland Science and Research Priorities

The Queensland R&D priorities and objectives used in the previous report were reviewed by the OQCS, DSITIA, and the R&D Queensland Committee. As such, the Queensland Government has decided upon ten science and research priorities which will guide future investment in order to deliver practical research to unlock the state's potential and enable Queenslanders to share in the full benefits of successful resource use.

These priorities provide the focus of activity that the Queensland Government views as important, developed through consultation across government, with the university and research sector, and with industry. However, recognising fiscal constraints it will obviously not be possible for government to provide additional funding for all these areas. Therefore, alignment of an activity or project within the scope of a priority does not assume or imply that the activity or project might obtain funding. Choices by government will have to be made in the near term, informed by the investment principles and through independent advice to the Science Minister from the Science and Innovation Advisory Council.

### Queensland Science and Research Priorities

- Developing and delivering **enhanced production technologies, tools and practices** to help grow productivity, reduce waste and add value to our four pillar sectors: **resources** (including energy and mining), **construction**, **tourism**, and **agriculture** (including food).
- Remain internationally competitive by **attracting and retaining science and research talent**. This will be done through early-career researcher support programs in priority areas and by **encouraging research-focussed mobility and effective translation** between industry, academia and government.
- **Protecting our biodiversity** and heritage: marine and terrestrial.
- Natural advantage **clean(er) - and renewable - energy technologies** development (e.g. gas, solar, biofuels).
- Ensuring the **sustainability of our physical** and especially our **digital infrastructure** critical for research and - correspondingly - strategically leveraging national programs (including making use of 'big data').
- **Building resilience and managing climate risk**, through the design and development of construction technologies for extreme weather event resistance (floods, cyclones, droughts), **particularly in tropical environments**.
- Early detection, treatment, and (ultimately) prevention of **age-related and Queensland dominant diseases** (e.g. skin, tropical).
- Improving **health** data management and **services delivery** (including telemedicine).
- Ensuring **sustainable water use** and delivering **quality/water security** in a variable climate and in a resources-intensive economy.
- **Digitally-enabled technologies**, e.g. the development and application of advanced modelling, visualisation, sensing and simulation technologies, tools and practices, including robotics.



## A.2 Queensland **R.E.D.S.** Decision Rules

To support better assessment and targeted investment in science and research, the Queensland Chief Scientist has developed the R.E.D.S. Decision Rules after extensive consultation. These rules are 'signals' that will influence the many decisions to incrementally move the system in a good direction. The rules can be used to assess an entire portfolio or a single project and taken together with the *Investment Principles* outlined in the *Science and Innovation Investment Framework* and aim to create a viable and resilient research and innovation community, delivering great outcomes for all Queenslanders and positioning Queensland on the national and global stage.

The science and research investment decision rules (**R.E.D.S.**) are:

### **R**Real Future Impact

Will the proposed science and research investment increase tangible positive net benefit/impact for the state?

### **E**External Commitment

Are the necessary collaborative research partners engaged (locally and internationally)? And in seeking much better translation, are the end users of the research engaged, with appropriate skin in the game?

### **D**Distinctive Angle

In this arena, is it clear what is in it for Queensland and/or why are we doing it here?

### **S**caling towards critical mass

Do we have, or are we able to, assemble the necessary critical mass, collaboratively and of competitive excellence, to make a real and effective contribution? Both, to the R&D, but also the absorptive capacity, e.g. in industry, and do we have a 'Team Queensland' approach in place?

## A.3 Hospital & Health Services

The Hospital and Health Service areas as of 13 July 2012<sup>10</sup> are:

Cairns and Hinterland  
Cape York  
Central Queensland  
Central West  
Children's Health Services  
Darling Downs

Gold Coast  
Mackay  
Metro North  
Metro South  
North West  
North West  
South West  
Sunshine Coast

Torres Strait -  
Northern Peninsula  
Townsville  
West Moreton  
Wide Bay



Prepared by: Statistical Output, Health Statistics Centre, 28 June 2012  
Hospital and Health Services by Facilities as at 1 July 2012

<sup>10</sup> Hospital and Health Services Map (<http://www.health.qld.gov.au/maps/>)

## APPENDIX B – Additional Tables

**Table 6: The Socio-economic objective (SEO) classification as defined by the Australian Bureau of Statistics (1297.0 - Australian and New Zealand Standard Research Classification (ANZSRC), 2008)**

The ANZSRC SEO classification allows R&D activity to be categorised according to the intended purpose or outcome of the research, rather than the processes or techniques used in order to achieve this objective.

SEO SECTOR AND DIVISION CODES AND TITLES
Sector A: Defence
81 Defence
Sector B: Economic Development
82 Plant Production and Plant Primary Products
83 Animal Production and Animal Primary Products
84 Mineral Resources (excl. Energy Resources)
85 Energy
86 Manufacturing
87 Construction
88 Transport
89 Information and Communication Services
90 Commercial Services and Tourism
91 Economic Framework
Sector C: Society
92 Health
93 Education and Training
94 Law, Politics and Community Services
95 Cultural Understanding
Sector D: Environment
96 Environment
Sector E: Expanding Knowledge*
97 Expanding Knowledge

\*Sector E Expanding Knowledge is for the categorisation of R&D which does not have an identifiable socio-economic objective. This is usually the case for pure basic research or strategic basic research, as defined in the Type of Activity classification. Applied research and experimental development, by definition, have an identified socio-economic objective and therefore should not be categorised in this sector.

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/1297.0Main%20Features62008?opendocument&tabname=Summary&prodno=1297.0&issue=2008&num=&view=>

**Table 7: The Fields of research (FOR) classification as defined by the Australian Bureau of Statistics (1297.0 - Australian and New Zealand Standard Research Classification (ANZSRC), 2008)**

The ANZSRC FOR allows R&D activity to be categorised according to the methodology used in the R&D, rather than the activity of the unit performing the R&D or the purpose of the R&D.

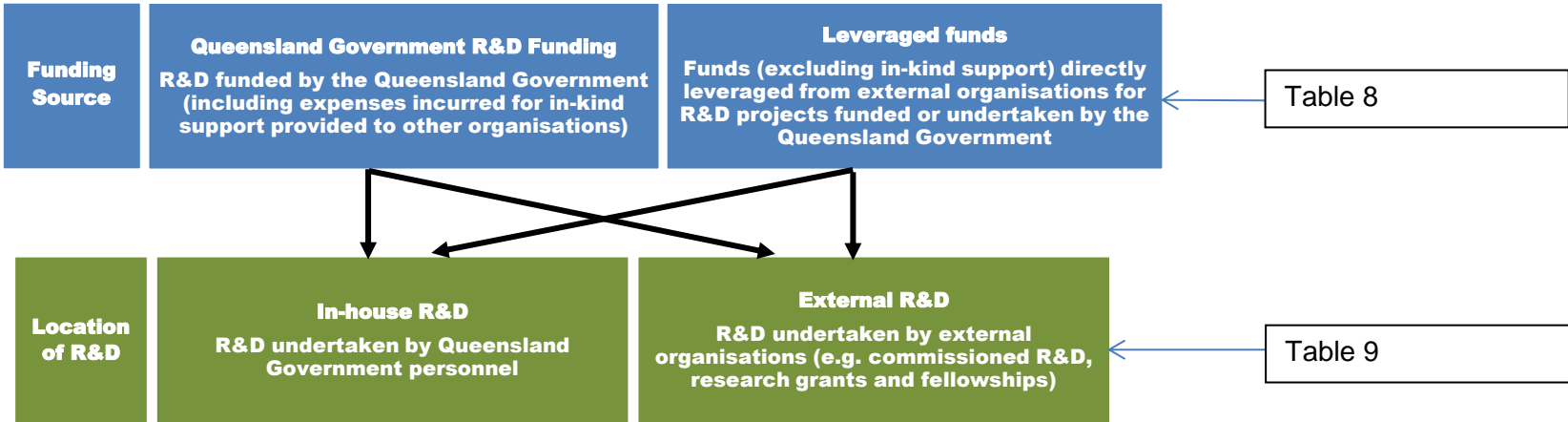
FOR DIVISION CODES AND TITLES
01 Mathematical Sciences
02 Physical Sciences
03 Chemical Sciences
04 Earth Sciences
05 Environmental Sciences
06 Biological Sciences
07 Agricultural and Veterinary Sciences
08 Information and Computing sciences
09 Engineering
10 Technology
11 Medical and Health Sciences
12 Built Environment and Design
13 Education
14 Economics
15 Commerce, Management, Tourism and Services
16 Studies in Human Society
17 Psychology and Cognitive Sciences
18 Law and Legal Studies
19 Studies in creative Arts and Writing
20 Language, Communication and Culture
21 History and Archaeology
22 Philosophy and Religious Studies

In the interests of international statistical comparisons, the FOR classification, as far as is practicable, aligns at the two digit Division level with the OECD's Fields of Science 2007 classification.

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/1297.0Main%20Features52008?opendocument&tabname=Summary&prodno=1297.0&issue=2008&num=&view=>

The figure below is identical to the one used earlier in this report (Figure 4, page 7) to explain the breakdown of R&D in this report. The figure explains the funding source and funding location areas. It has been replicated below to provide further clarification on the following two tables (Table 8 and 9).

**Figure 15: Further breakdown of R&D expenditure included in the report<sup>11</sup>**



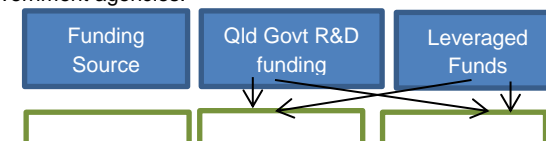
<sup>11</sup>Queensland Government R&D expenditure reported here differs from that reported by the Australian Bureau of Statistics, which refers solely to Queensland Government in-house R&D (funded by the Queensland Government and external sources).

**Table 8: Total Queensland Government R&D\* expenditure by agency (Queensland Government funding + leveraged funds) 2012-13 (this includes the \$91.5m leveraged by QIMR)**

Queensland Government Agency	Qld Govt Expenditure (\$m)*	% of Total	Leveraged Funds (\$m)*	% of Total	Qld Govt + Leveraged Funds (\$m)*	% of Total
Department of Aboriginal and Torres Strait Islander and Multicultural Affairs	0	0%	0	0%	0	0%
Department of Agriculture, Fisheries and Forestry	57	28%	29	9%	86	16%
Department of Communities, Child Safety and Disability Services	1	1%	1	0%	2	0%
Department of Community Safety	2	1%	0	0%	2	0%
Department of Education, Training and Employment	3	2%	2	0%	5	1%
Department of Energy and Water Supply	2	1%	0	0%	2	0%
Department of Environment and Heritage Protection	4	2%	0	0%	4	1%
Department of Health	28	14%	1	0%	29	6%
Department of Housing and Public Works	0	0%	0	0%	0	0%
Department of Justice and Attorney General	0	0%	0	0%	0	0%
Department of National Parks, Recreation, Sport and Racing	0	0%	0	0%	1	0%
Department of Natural Resources and Mines	10	5%	3	1%	13	2%
Department of Science, Information Technology, Innovation and the Arts	72	35%	159	49%	231	44%
Science and Innovation	68	34%	156	49%	78	15%
Science Delivery	4	2%	3	1%	3	0%
Department of the Premier & Cabinet	1	0%	0	0%	1	0%
Department of Transport and Main Roads	3	2%	0	0%	4	1%
Hospital and Health Services	10	5%	23	7%	33	6%
Cairns and Hinterland Hospital and Health Service	0	0%	1	0%	1	0%
Children's Health Queensland Hospital and Health Service	2	1%	7	2%	9	2%
Darling Downs Hospital and Health Service	0	0%	0	0%	0	0%
Gold Coast Hospital and Health Service	0	0%	0	0%	0	0%
Mackay Hospital and Health Service	0	0%	0	0%	0	0%
Metro North Hospital and Health Service	2	1%	8	2%	10	2%
Metro South Hospital and Health Service	0	0%	5	2%	5	1%
Sunshine Coast Hospital and Health Service	1	0%	2	1%	3	1%
West Moreton Hospital and Health Service	5	3%	0	0%	5	1%
Statutory Bodies	9	5%	103	32%	111	21%
Motor Accident Insurance Commission	6	3%	10	3%	16	3%
Q-COMP	0	0%	0	0%	0	0%
Queensland Art Gallery	0	0%	0	0%	0	0%
Queensland Competition Authority	1	1%	0	0%	1	0%
Queensland Institute of Medical Research	2	1%	92	29%	93	18%
Queensland Museum	1	0%	1	0%	1	0%
Queensland Police	0	0%	1	0%	1	0%
<b>Total</b>	<b>203</b>	<b>100%</b>	<b>321</b>	<b>100%</b>	<b>523</b>	<b>100%</b>

\*Includes Queensland Government funding and leveraged funding sources. R&D expenditure was attributed to that Queensland Government agency performing the R&D. In some instances, this differed from the department reporting the R&D expenditure. As such, values here may differ from the values reported by individual Queensland Government agencies.

\*Numbers have been rounded, resulting in individual amounts not always adding up to totals.



**Table 9: Total in-house and external expenditure by Agency for 2012-13 (this includes the \$91.5m leveraged by QIMR)**

Queensland Government Agency	In-house Funds (\$m)*	% of Total	External Funds (\$m)*	% of Total	Total (\$m)*	% of Total
Department of Aboriginal and Torres Strait Islander and Multicultural Affairs	0	0%	0	0%	0	0%
Department of Agriculture Fisheries and Forestry	70	31%	15	5%	85	16%
Department of Communities, Child Safety and Disability Services	0	0%	2	1%	2	0%
Department of Community Safety	1	1%	0	0%	2	0%
Department of Education, Training and Employment	3	1%	2	1%	5	1%
Department of Energy and Water Supply	0	0%	2	1%	2	0%
Department of Environment and Heritage Protection	2	1%	2	1%	4	1%
Department of Health	6	3%	23	8%	29	6%
Department of Housing and Public Works	0	0%	0	0%	0	0%
Department of Justice and Attorney General	0	0%	0	0%	0	0%
Department of National Parks, Recreation, Sport and Racing	0	0%	0	0%	1	0%
Department of Natural Resources and Mines	12	5%	1	0%	13	2%
Department of Science, Information Technology, Innovation and the Arts	10	4%	221	74%	231	44%
Science and Innovation	4	2%	221	74%	225	43%
Science Delivery	6	3%	0	0%	6	1%
Department of the Premier & Cabinet	0	0%	0	0%	1	0%
Department of Transport and Main Roads	0	0%	3	1%	4	1%
Hospital and Health Services	24	11%	8	3%	32	6%
Cairns and Hinterland Hospital and Health Service	1	0%	0	0%	1	0%
Children's Health Queensland Hospital and Health Service	7	3%	1	0%	8	2%
Darling Downs Hospital and Health Service	0	0%	0	0%	0	0%
Gold Coast Hospital and Health Service	0	0%	0	0%	0	0%
Mackay Hospital and Health Service	0	0%	0	0%	0	0%
Metro North Hospital and Health Service	10	4%	0	0%	10	2%
Metro South Hospital and Health Service	5	2%	0	0%	5	1%
Sunshine Coast Hospital and Health Service	1	0%	2	1%	3	1%
West Moreton Hospital and Health Service	0	0%	5	2%	5	1%
Statutory Bodies	95	42%	17	6%	112	21%
Motor Accident Insurance Commission	0	0%	15	5%	15	3%
Q-COMP	0	0%	0	0%	0	0%
Queensland Art Gallery	0	0%	0	0%	0	0%
Queensland Competition Authority	1	0%	0	0%	1	0%
Queensland Institute of Medical Research	92	41%	1	0%	93	18%
Queensland Museum	2	1%	0	0%	2	0%
Queensland Police	0	0%	1	0%	1	0%
<b>Total</b>	<b>224</b>	<b>100%</b>	<b>299</b>	<b>100%</b>	<b>523</b>	<b>100%</b>

\*R&D Expenditure was attributed to the agency funding the R&D. In some instances, this differed from the agency reporting the R&D. As such, values here may differ from the values reported by individual Queensland Government agencies. For projects funded by multiple government agencies, leveraged funds were divided equally between the agencies. Funds leveraged for in-house R&D were attributed to the department performing the R&D.

\*Numbers have been rounded, resulting in individual amounts not always adding up to totals.



**Table 10: Queensland Government and leveraged R&D expenditure by the Queensland Government Four Pillars separated into SEO codes (ABS) for 2011-12 and 2012-13 (not including the \$91.5m funds leveraged by QIMR).**

Qld Government Pillar Alignment	Socio-economic objective	R&D Expenditure (\$m)*			
		2011-12	% of Total	2012-13	% of Total
<b>Tourism</b>	Commercial services and tourism	0	0%	0	0%
<b>Agriculture</b>	Plant Production and Plant primary products	68	11%	53	12%
	Animal production and animal primary products	19	3%	28	6%
	Environment	34	5%	1	0%
<b>Resources</b>	Mineral resources (excl. energy resources)	10	2%	20	5%
	Energy	33	5%	18	4%
	Environment	17	3%	23	5%
<b>Construction</b>	Construction	2	0%	1	0%
<b>Non-aligned</b>	Manufacturing	5	1%	76	18%
	Transport	6	1%	11	3%
	Information and communication services	3	0%	8	2%
	Economic framework	0	0%	1	0%
	Health	395	62%	171	40%
	Education and training	9	1%	5	1%
	Law, politics and community services	3	0%	5	1%
	Cultural understanding	0	0%	0	0%
	Expanding Knowledge	28	4%	4	1%
	Environment	0	0%	6	1%
	<b>Total</b>	<b>632</b>	<b>100%</b>	<b>431</b>	<b>100%</b>

\*As there were no prevailing Queensland Government Science and Research priorities in the 2012-13 financial year we have used the ABS FOR and SEO codes.

\*Numbers have been rounded, resulting in individual amounts not always adding up to totals.



## APPENDIX C – Department Information

**Table 11: Department, HHS and Government bodies & statutory authorities listing**

<b>Departments</b>	<b>Response</b>
Department of Aboriginal and Torres Strait Islander and Multicultural Affairs	Responded
Department of Agriculture Fisheries and Forestry	Responded
Department of Communities, Child Safety and Disability Services	Responded
Department of Community Safety	Responded
Department of Education, Training and Employment	Responded
Department of Energy and Water Supply	Responded
Department of Environment and Heritage Protection	Responded
Department of Housing & Public Works	Responded
Department of Justice and Attorney General	Responded
Department of Local Government, Community Recover & Resilience	Responded
Department of National Parks, Recreation, Sport and Racing	Responded
Department of Natural Resources and Mines	Responded
Department of Premier and Cabinet	Responded
Department of Science, Innovation, Technology, Innovation and the Arts	
Science and Innovation	Responded
Science Delivery	Responded
Arts	No R&D
IT	No R&D
Department of State Development, Infrastructure & Planning	Responded
Department of Tourism, Major Events, Small Business and the Commonwealth Games	No R&D
Department of Transport & Main Roads	Responded
Queensland Health	Responded
Queensland Police	Responded
Queensland Treasury & Trade	Responded
<b>Government Bodies and Statutory Authorities</b>	
Anti-Discrimination Commission Queensland	No R&D
Commission for Children and Young People and Child Guardian	No R&D
Crime & Misconduct commission (CMC)	No R&D
Economic Development Queensland Board	No R&D
Electoral Commission of Queensland	No R&D
Health Quality and complaints commission	No R&D
Integrity Commissioner	No R&D
Legal Services Commission	No R&D
Motor Accident Insurance Commission	Responded
Office of the Information Commissioner (OIC)	No R&D
Princess Alexandra Hospital Research and Development Foundation	No R&D
Public Service Commission	Responded
Q-COMP	Responded
Queensland Art Gallery	Responded
Queensland Building Services Authority	No R&D
Queensland College of Teachers	No R&D
Queensland Competition Authority	Responded
Queensland Industrial Relations Commission	No R&D
Queensland Institute of Medical Research	Responded



Queensland Law Reform Commission	No R&D
Queensland Local Government Grants Commission	No R&D
Queensland Studies Authority	No R&D
Queensland Museum	Responded
QRAA	No R&D
Queensland Reconstruction Authority	No R&D
Residential Tenancies Authority	No R&D
Safe Food Production Queensland	No R&D
Skills Queensland	No R&D
State Library of Queensland	No R&D
South Bank Corporation	No R&D
Tourism and Events Queensland	No R&D
Trade and Investment Queensland	No R&D
Translational Research Institute	No R&D
Wet Tropics Management Authority	No R&D
<hr/>	
<b>Hospital and Health Services</b>	
Cairns and Hinterland Hospital and Health Service	Responded
Cape York Hospital and Health Service	No R&D
Central Queensland Hospital and Health Service	No R&D
Central West Hospital and Health Service	No R&D
Children's Health Queensland Hospital and Health Service	Responded
Darling Downs Hospital and Health Service	Responded
Gold Coast Hospital and Health Service	Responded
Mackay Hospital and Health Service	Responded
Metro North Hospital and Health Service	Responded
Metro South Hospital and Health Service	Responded
North West Hospital and Health Service	No R&D
South West HHS	Responded
Sunshine Coast Hospital and Health Service	Responded
Torres Strait-Northern Peninsula Hospital and Health Service	No R&D
Townsville Hospital and Health Service	No Response
West Moreton Hospital and Health Service	Responded
Wide Bay Hospital and Health Service	No R&D

\*Cape York and Torres Strait HHS's are to merge by mid-2014