2016
Planit Testing Index

Reporting on a decade of industry data.

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CELEBRATING 10 YEARS PLANIT TESTING INDEX

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1. Introduction

Marking the tenth annual release of the Planit Testing Index, our 2016 report proudly builds upon a full decade of industry-leading software testing analysis, allowing software practitioners and professionals to share knowledge and gain insights into the application of testing across different facets of the software industry.

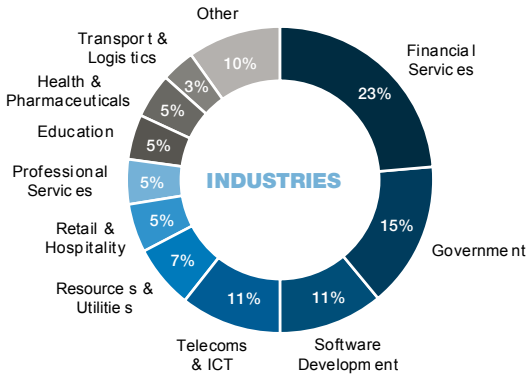
Celebrating ten years of first-hand research, the Planit Testing Index continues to offer a comprehensive, unparalleled report of software testing across project methodologies, budgets, business cases, activities, types, benefits, conditions, outcomes, strategies, trends and tools in Australia and New Zealand.

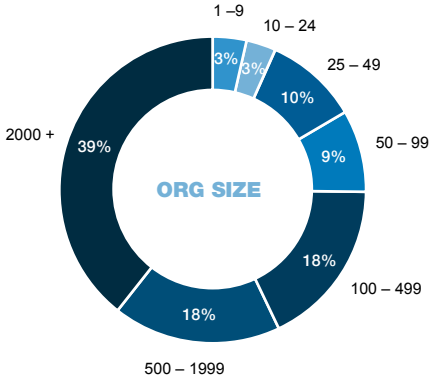
Our 2016 report analyses data gathered from **254 participants** across a wide range of industries/ sectors including financial services (24%, down 2 percentage points), **government** (15%, down 3 points), **software development** (11%, up 1 point) and **telecoms & ICT** (11%, down 1 point).

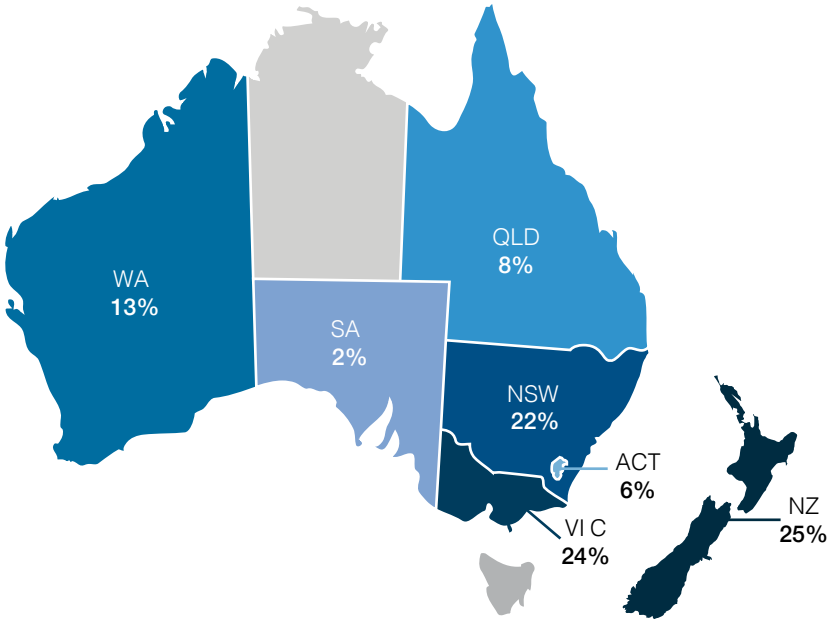
The majority of respondents held a **leadership role** in their organisation/projects (54%), including 15% IT executives, 4% project managers, 31% test managers and 4% Agile leads. The balance comprised of specialists and practitioners in testing, business analysis, software development and Agile.

A quarter (25%) of respondents were representing small organisations of less than 100 staff, with 36% mid-market representatives in the 100 – 2,000 space, and the remaining 39% belonging to large organisations with headcounts surpassing 2,000 employees.

These respondents represent 12,199 **total projects**; 9,828 from **Australia** and 2,371 from **New Zealand**.







In Australia, almost one-quarter of total Index Survey respondents were based in **Victoria** (24%), closely followed by **New South Wales** (22%) and **Western Australia** (13%). Smaller representation was received from **Queensland** (8%), the **Australian Capital Territory** (6%) and **South Australia** (2%).

In New Zealand, the most active respondents shared equal distribution between **Wellington** and **Auckland** (11% each), followed by **Hamilton** (2%) and **Christchurch** (1%).

2. Executive Summary

The age of digital transformation is upon us as digital systems have become the new battleground for competitive advantage. In the quest to appease customers, user experience is paramount with poor performance and defects being considered unacceptable for many organisations.

In this digital landscape, some key themes and trends have presented themselves.

1. Continuous everything

In an effort to accelerate delivery, reach first to market and unlock value quickly, organisations have adopted processes around integrating quality in every step, to avoid rework and allow iterative releases without compromising customer experience through brand-damaging defects.

- Whether following a pure Agile methodology or a hybrid, Agile is now being applied in the majority of projects, with Government now amongst those adopters.
- The impact of DevOps is really yet to be felt, but will surely become a factor over the coming years as more and more organisations embrace DevOps principles.

2. Technical and cross-functional skillsets

Demand for testers to be cross-functional and technical has exploded, with automation skills in high demand. This trend is only set to escalate, as organisations increase their automated test coverage with growing emphasis on scripts being executed automatically in response to developers checking-in code, ensuring that defects are caught immediately.

3. Efficiency through tools and solutions

The need for speed and efficiency is also driving adoption of cloud-based infrastructure and services. This includes cloud-based development and test environments, now being used by more than half of the industry, up 20 percentage points from 2015.

The full report will take you on a journey through what kinds of projects have been popular in 2016, where organisations are investing, why they are investing in testing, how projects performed, what conditions characterised projects and how performance, automation and tools are being utilised. It looks at the trends expected to impact projects over the coming years and compares the state of the industry against the past ten years of data.

3. What kinds of projects were popular?

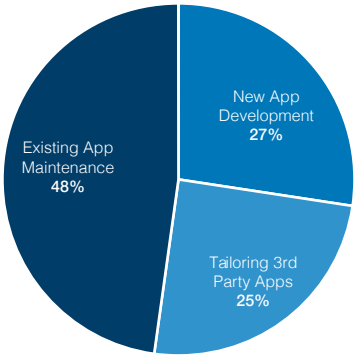
In 2014, 40% of all project work focused on developing new applications, a ten year high that came off the back of a low in 2013 (19%) bolstered by the popularisation of 'Mobile First Design'. Since that time, the bulk of project work has shifted back towards the **maintenance of existing apps**, accounting for 48% of projects in 2016, potentially due to the growing complexity of maintaining compatibility and quality in this diverse and dynamic mobile landscape. Meanwhile, 27% of projects in 2016 focused on **new app development** and **tailoring third party apps** represented one quarter of projects.

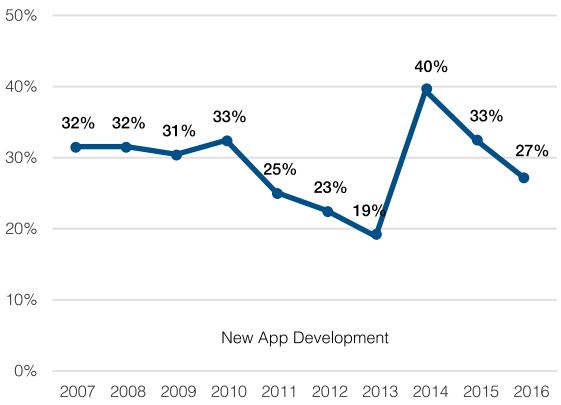
The gap between new app development in Australia and New Zealand has widened to 11 percentage points in 2016, with 36% of NZ project work being focused on **creation of new apps** compared to 25% from Australia. Last year's statistics displayed a significantly smaller gap between these figures with only 3 percentage points difference (New Zealand reported 35% new app development in comparison to Australia's 32%).

In Australia, **Queensland** has proven itself to be a key hub of new app development in 2016, with 42% of QLD respondents noting new app development as a primary project type, overtaking **New South Wales** at 25%.

New app creation in the **government** sector has increased by 7 percentage points to 38% from last year, in comparison to the **private** sector which has dropped 6 percentage points to 27% in 2016.

Whilst there is an expectation that the Internet of Things (IoT) will be one of the next drivers in new development work, it appears that few organisations have formalised projects or strategies in this area.

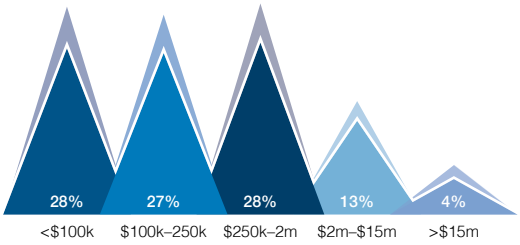




4. Where are organisations investing?

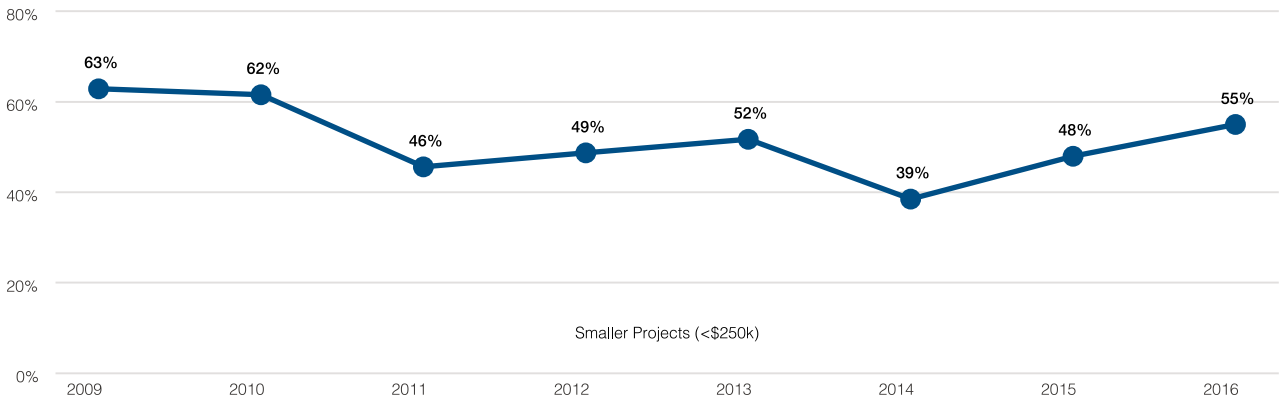
Project budgets

2016 saw organisations commence more projects with **smaller budgets** (below $250k), leading to a 7 percentage point increase from 2015. This category has fluctuated significantly over the past decade, influenced by factors including inflation, 'appisation' and the movement to smaller iterative releases.

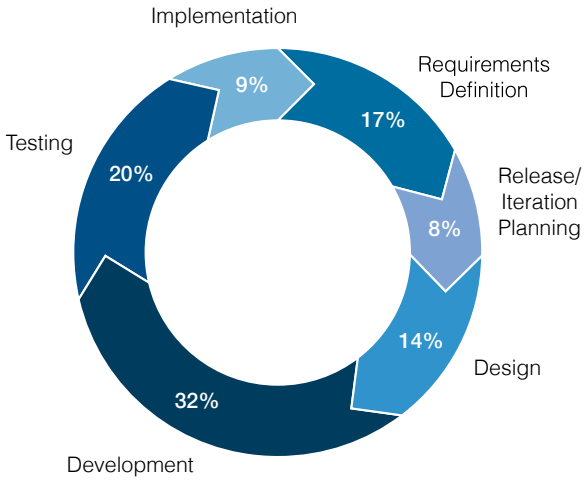


Large project budgets have increased significantly in the **government** sector, with $15m plus projects increasing by 5 percentage points to 8% in 2016. The opposite has occurred in the **private** sector, with large project budgets dropping 4 percentage points to 3% from the previous year.

At the next budget tier down, projects valued at $2m to $14.9m have increased by a relative 34% from 2009 to the present across all sectors, whilst a relative 8 percentage point decline in projects less than $100k was experienced from 2009 to the present.



Project budget allocation

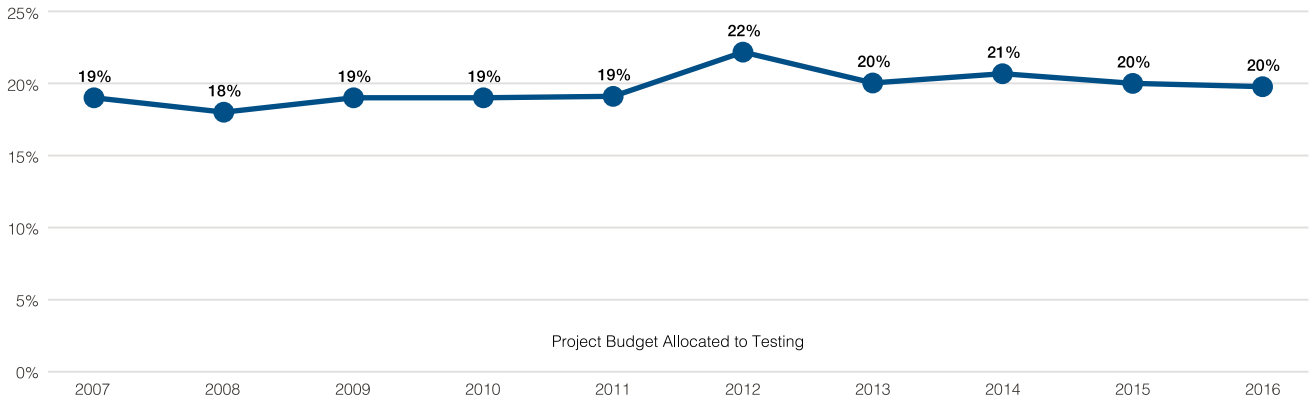


Software development continues to receive the highest share of project budgets at 32%, consistently reported as such from 2007 – 2016, with only a 1 percentage point drop experienced over the last decade.

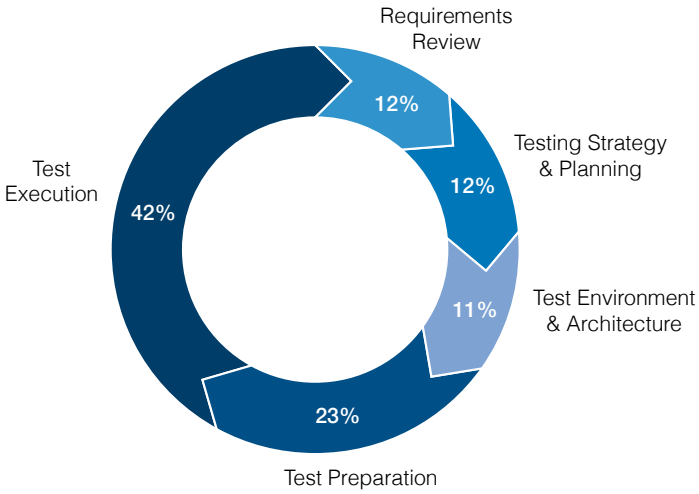
Investment in **requirements** is up 1 percentage point, receiving 17% of project budgets, with a slightly higher investment being made by **telecoms & ICT** at 19% of project budgets, 2 points above the average.

Budget allocation to **testing** has also been steady at 20% of project funds, retaining relative consistency with Index responses over the last decade, only registering modest movement between a low of 18% in 2008 and a high of 22% in 2012.

Budget allocation towards testing in the **government** sector has decreased by 2 percentage points from 20% in 2015 to 18% in 2016, whilst the **software** industry registered a 3 point increase to 22% in 2016, the highest among the sectors analysed.



Allocation across testing phases



Retaining consistency with Index responses provided over the last decade, **test execution** remains the most utilised form of testing allocation at 42% in 2016, following a high of 49% in 2008 and a low of 40% from 2011-2012.

Allocation of testing towards test execution this year was most prominent in the **software development** sector (50%), followed by the **private** (43%), **financial** (42%) and **government** (38%) sectors. This figure was also reported at 42% in 2015 and has experienced a 2 percentage point increase from 2011 – 2016.

The second highest allocation of testing in 2016 was towards **test preparation** at 23%, reported by 31% of **government** sector respondents at 9 percentage points more than the **private** sector at 22%.

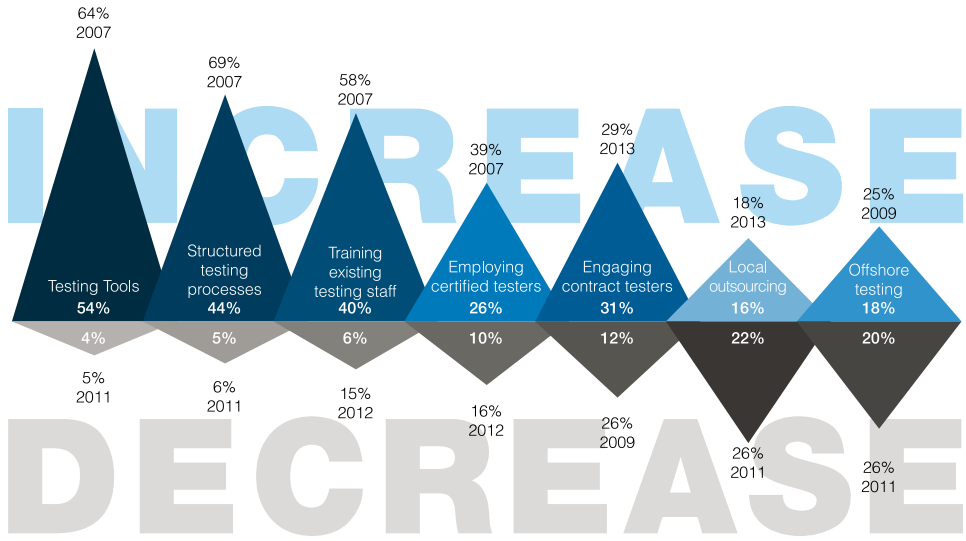
Allocation of testing towards test preparation has been consistently reported at 23% from 2011 - 2016, dropping down slightly from a high of 26% reported in 2008 and 2010.

2016 saw a relatively even distribution of testing allocation between **requirements review** (12%), **test strategy & planning** (12%) and **test environment & architecture** (11%), with testing allocation towards requirements review slightly higher in the **private** sector (12%) in comparison to the **government** sector (9%) in 2016.

Each of these three categories have remained statistically consistent over the last decade, experiencing a 1 percentage point increase for testing allocation towards requirements review and a 2 percentage point decrease for test strategy & planning and test environment & architecture between 2011 – 2016.

Testing allocation towards **requirements review** was noted at 14% in **New Zealand** this year, 3 percentage points higher than **Australia**'s 11%.

Investing in tools and processes



Over the past decade, **investment in testing tools** has never dipped, registering a net increase of at least 33% year-on-year each and every year. This can be attributed to increasing reliance on software and adoption of new technologies to ensure quality.

In 2016, this net increase in tools investment was an impressive 49%, with only 4% of respondents expecting to decrease their investment in testing tools. Across **New Zealand** organisations, there was a net increase of 73% compared with **Australian** organisations who registered 41%. The least amount of net growth in spending on tools was reported by **government** at 18%.

Similarly, the upswing of new methodologies and practices designed to accelerate delivery, such as Agile and DevOps, has meant that **investment in structured testing processes** has also seen a substantial net increase, with 44% expecting this investment to increase (up 5 points) compared with just 5% who expect their investment in this area to decrease (down 1 point).

Investing in the testing team

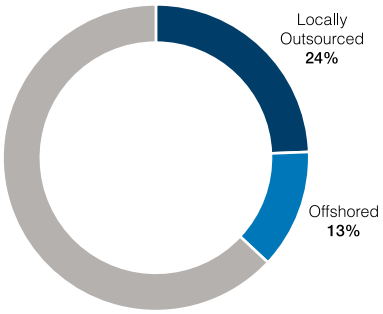
There is a concerted effort among organisations to keep their test teams relevant with the right skillsets. This is reflected through the increasing investment in both training for existing staff as well as employing testing staff with certified skillsets.

36% more organisations saw their **investment in training** increasing rather than decreasing. The **software** industry was the most eager to keep their teams upskilled, with 64% foreseeing an increase in investment in training, with the balance (36%) expecting no change in training investment. No respondents in this sector saw their investment in training decreasing.

26% of organisations were looking to increase investment in sourcing skills for their projects by **employing certified testing staff**. The **telecoms & ICT** sector was the most focused on bringing these skills in, with 33% expecting an increase in spend on employing certified testers compared to 7% expecting spending to decrease in this area.

Outsourcing of testing effort

Skills shortages and the rate of technical change has maintained decade-high levels of outsourcing, with 37% of all testing being outsourced. In fact, only a third of organisations performing all of their QA activities use in-house resources.



Local outsourcing

Local outsourcing of testing activity was the most popular form of outsourcing, utilised by 61% of 2016 respondents and accounting for 24% of testing effort. Past Index statistics show a minor 1 percentage point decline in local outsourcing from 2007 – 2016.

Outsourcing locally was most prominently experienced in the **telecoms & ICT sector** (41%), followed by above average utilisation in the **financial** (27%) and **government** (26%) sectors. Average utilisation was discovered in the **private** sector (24%), whilst lowest use of local outsourcing was reported in the **software development** sector (19%), 5 percentage points lower than the 2016 average of 24%.

Consistent with years gone by, organisations are looking to shift their investment in local outsourcing from more traditional models (expected net decline of 4%) to **on-site contract testing professionals** (expected net increase of 19%), although this ambition has rarely been realised.

Offshored outsourcing

In comparison to local outsourcing, **offshoring** was discovered to be used by 50% of 2016 Index respondents, but only accounted for 13% of testing activity. This figure is level with 2015 but up over double the level of uptake reported in 2007 (6%).

Offshored projects are most prominently utilised by the **telecoms & ICT** (19%), **financial** (18%) and **private** (14%) sectors in 2016. Much lower utilisation of offshoring was recorded in the **government** sector (4%) in 2016 at 8 points below the industry average, however this figure marks a significant increase in comparison to zero offshored government projects reported in 2015.

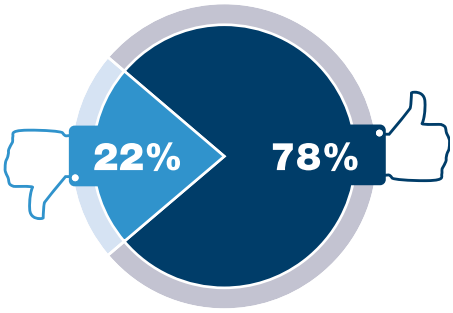
Higher utilisation of offshoring was reported in **Australia** (15%) in comparison to **New Zealand** (6%) in 2016, marking a 9 percentage point difference between the two countries. This marks a significant increase for both Australia and New Zealand this year however, with only 1% off-shored projects for both countries reported in 2015.

The **telecoms & ICT** sector outsourced 60% of their testing work, double that of the **software** and **government** sectors (reporting 30% each).

Like local outsourcing, more organisations are hoping to decrease their offshore investment (22%) than those looking to looking to increase their investment in this area (18%).

5. Why invest in testing?

View of testing



Positive view of testing

In 2016, 78% of organisations hold a positive view of testing. This includes almost one-quarter (24%) who agree that **testing is strategically important to ensure organisational success**. This response has experienced an 11 percentage point increase from 2007 – 2016, beginning with a low of 13% in 2007 and achieving a high of 26% in 2012.

Significantly above average respondents share this view in the **software development** sector (39%), whilst slightly above average sentiment towards testing as strategically important for organisational success was found in the **ICT** (27%) and **financial** (25%) sectors.

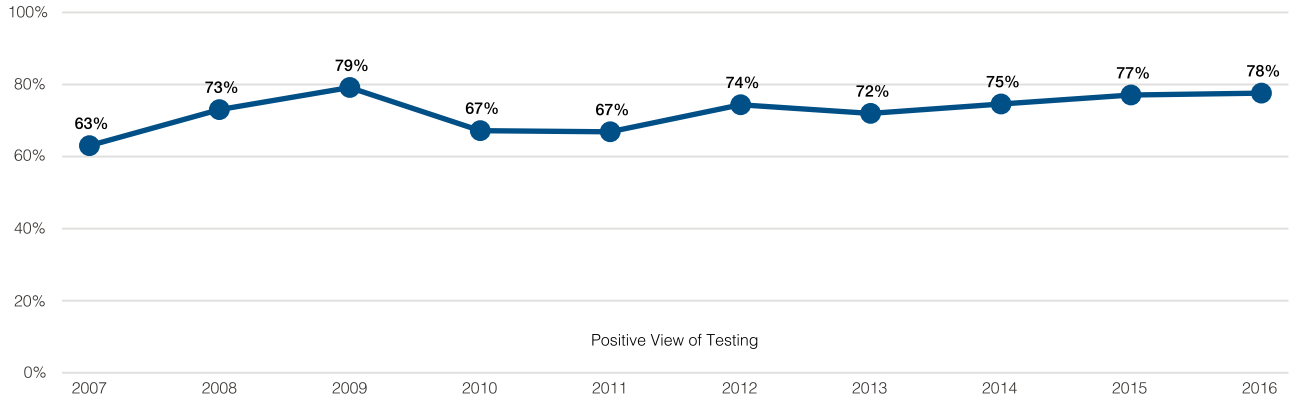
Additionally, over half of 2016 respondents (53%) believe that **testing is a critical element in producing reliable software**, with this sentiment increasing by 4 percentage points from 2007 – 2016, reaching a low of 44% in 2011 and a high of 57% in 2008.

Negative view of testing

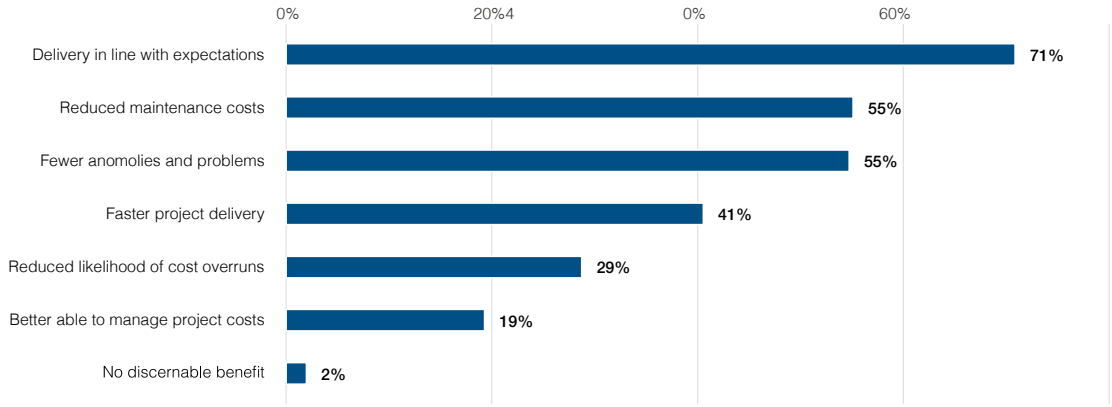
On the negative end of the spectrum, testing was considered a **necessary evil** in 14% of respondent's organisations. This was slightly up from 11% reported in 2015, but overall experiencing a significant 12 percentage point decrease from 2007 – 2016. This sentiment was significantly higher in the **government** sector (21%) in comparison to the **private** sector (13%) by 8 percentage points.

Responses towards testing as a **cost to be minimised** is down 4 percentage points to 6% in 2016 from 10% the previous year. Overall, the view that testing is a cost to be minimised has remained consistently low (less than 1 percentage point variance) over the last decade.

Only 3% of 2016 respondents believe testing is a **low priority**, and this sentiment has reduced by a relative 2 percentage points over the last ten years, experiencing a high of 7% in 2010 and a low of 2% in 2009, 2012, 2013 and 2015. No responses were provided for this option in the **software** and **ICT** sectors, however more **government** (5%) respondents share this sentiment in comparison to the **private** (3%) sector, marking a 2 percentage point difference.



Benefits of increasing testing investment



70% of respondents cited multiple noteworthy benefits when increasing investment in testing, while 28% provided one response and a further 2% saw no discernible benefit when boosting this investment.

Most common among these benefits was **projects being more likely to deliver results in expectations**, reported at 71% this year and continually being the top reason for increasing testing investment from 2011 – 2016. This figure reached a peak of 78% in 2013 and a low of 71% in 2014 and 2012.

Also retaining consistency as the 2nd most reported benefit of increasing investment in testing over the last decade is **reduced maintenance cost after project implementation**, 4 percentage points less than the previous year and 6 percentage points down from 2011 – 2016. This sentiment was reported significantly more by **Agile** practitioners (59%) over users of **traditional** methodologies (29%), noting a 30-point difference.

Business cases for testing

With these benefits in mind, what primary business case was most commonly put forward to senior management when justifying investment in testing?

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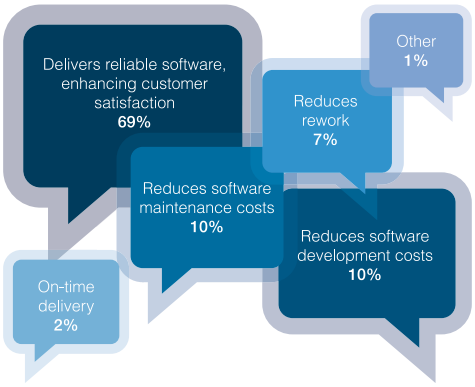


The majority of 2016 respondents note **delivery of reliable software, enhancing customer satisfaction** as the primary business case for testing at 70%. This marks a 2 percentage point decrease in this response from the previous year, however this business case for testing has increased by 11 percentage points from 2007 – 2016. This was the most prominent primary business case in the **software development** (82%) and **telecoms & ICT** (74%) sectors.

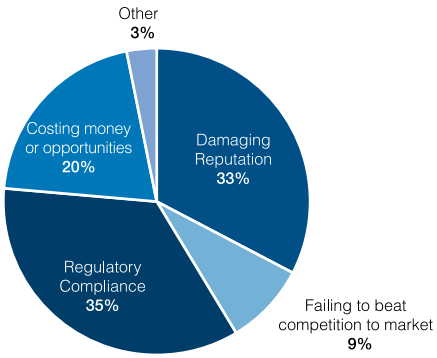
Reducing software maintenance costs post implementation was the most popular secondary business case for testing at 39%, matching the same response rate provided in 2015. This response was most prominent in the **software** (57%) sector, followed by **government** (46%) and the **financial** (43%) sectors.

Risks being mitigated

The most common application of testing as a primary risk mitigation strategy was **compliance with legal / regulatory frameworks**, answered by 35% of 2016 respondents and increasing by 16 percentage points from 2007 - 2016. More than half of these responses were received from the **government** sector at 56%, in comparison to 31% from the **private** sector.

40% of respondents who use testing as a risk mitigation strategy for compliance with legal and regulatory requirements also use **traditional** methodologies (such as Waterfall and V-Model), in comparison to 29% of respondents in this category who use **Agile**.

Testing to **avoid damaging reputation** is the second most popular primary risk mitigation strategy at 33% in 2016. This was primarily noted by 43% of respondents from the **software development** sector, which is 10 percentage points higher than the 2016 average.



The use of testing to avoid damaging reputation has increased 9 percentage points from 2007 to the present, significantly higher utilised by Agile (37%) over **traditional** (20%) practitioners in 2016.

Losing money or costing opportunities is the third most utilised application of testing as a primary risk mitigation strategy in 2016 at 20%, experiencing an 11-point increase from 2007 to 2016. This was noted by 22% of respondents in the **private** sector in comparison to 10% in the **government** sector, and 27% in the **software development** sector in comparison to 15% in the **telecoms & ICT** sector (marking a 12-point difference in both respective instances).

6. How did projects perform?

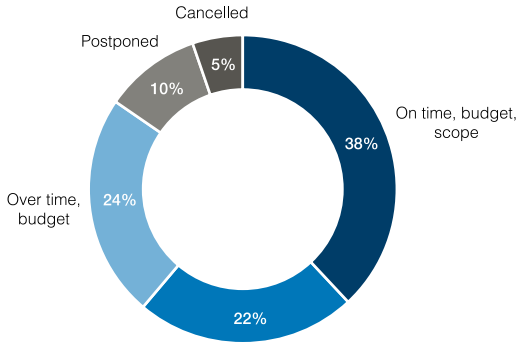
Project outcomes

38% of projects are reported to be completed optimally in 2016, delivered **on time, budget and scope**. This is one percentage point higher than 2015 (37%), and this figure has fluctuated significantly from 2007 to the present, hitting a low of 33% in 2008 and peaking at 52% in 2013.

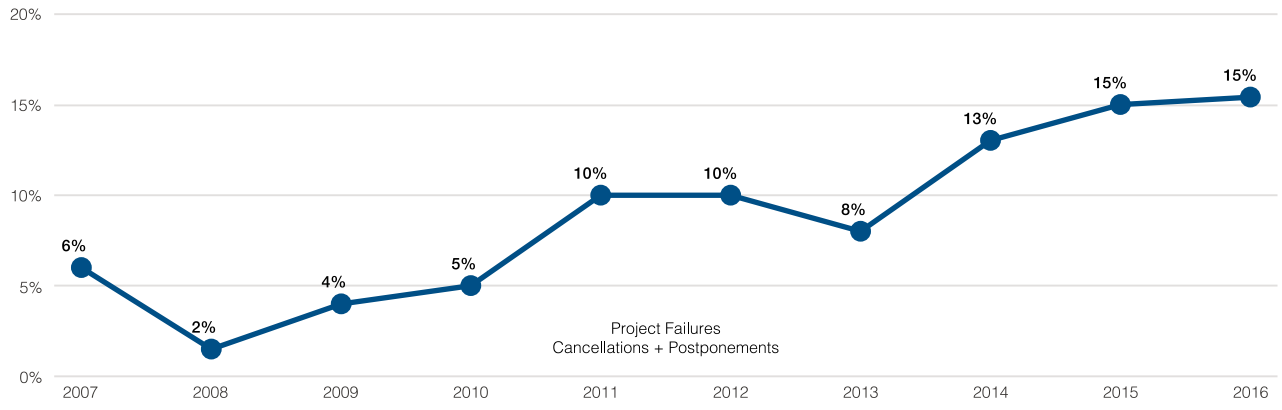
Victoria continues to out-perform the 2016 average by 10 percentage points, with a significantly higher number of projects completed **on time, within budget and scope** at 48%. This is 8 percentage points higher than **NSW** (40%) and a significant 29 percentage points higher than **QLD** (19%) and **WA** (19%).

Among the regions represented in this study, QLD reported the highest number of projects completed **over time and over budget** at 43%, 20% higher than the 2016 average.

As with 2015, project **postponements** and **cancellations** remain at a combined 15% in 2016, continuing to remain at the highest level on record. Project postponement has steadily increased by 1 to 2 percentage points year-on-year from 4% in 2009 to 10% in 2016. Project cancellation figures have fluctuated over the last decade, hitting a low of 0% in 2009 and peaking at 6% in 2015.



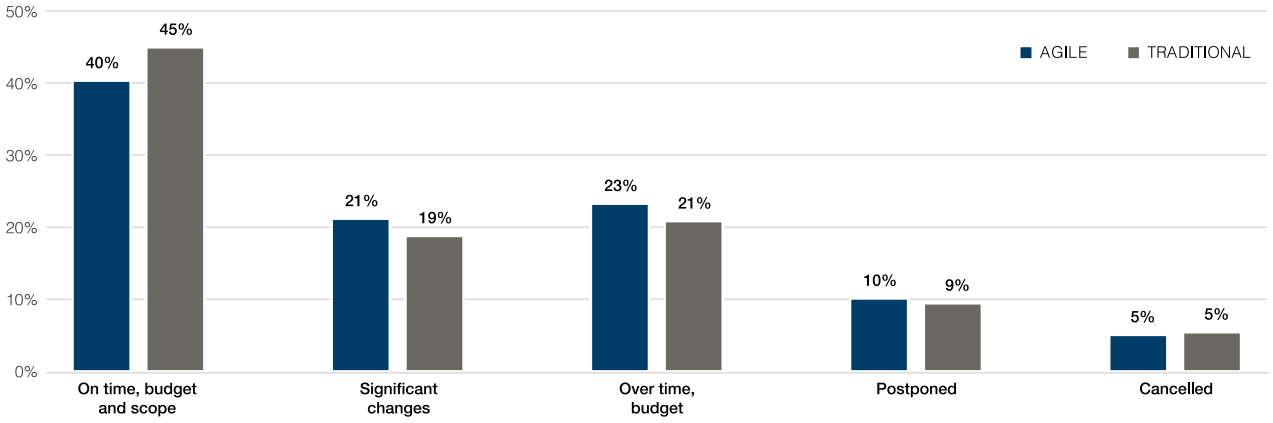
Significant Changes



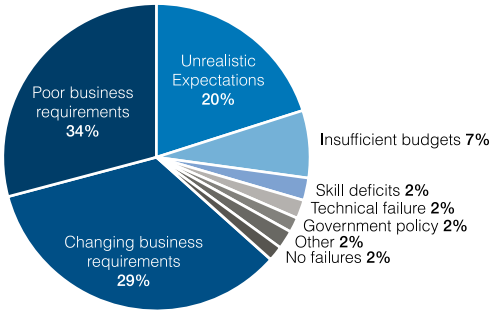
Project Failures
Cancellations + Postponements

For the first year on record, **Agile** has drawn level with **traditional** in terms of project failures, as organisations mature in their application of this methodology. The gap between these methodologies in terms of failures has narrowed over the years, with a slim 2 percentage point difference being reported in 2015.

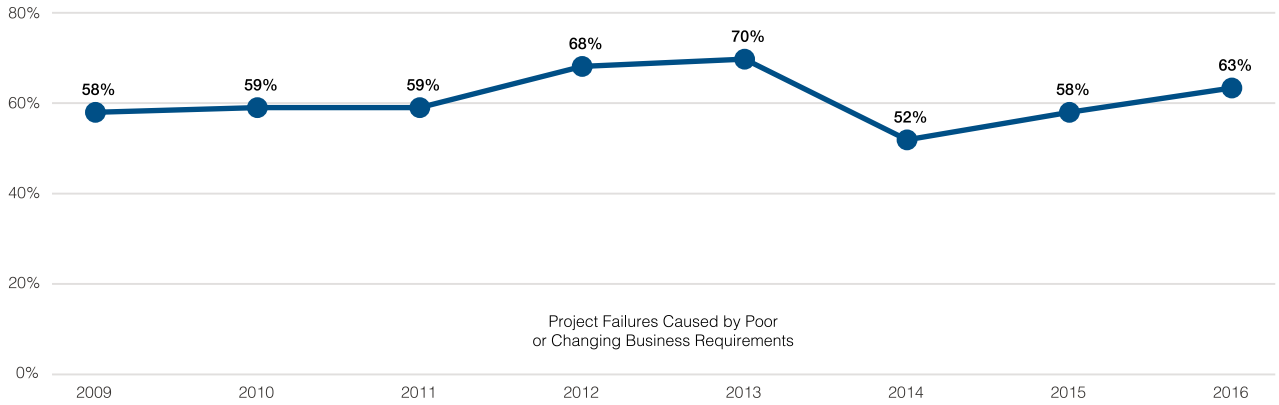
Poor or changing business requirements remains the combined leading primary cause of project failure in 2016 at 63%, divided into **poor business requirements** (34%) and **changing business requirements** (29%). This is an overall 5 percentage point increase from 2015, with an additional 5 percentage point increase observed from 2009 to the present, reaching a peak of 70% in 2013 and a low of 54% in 2014.



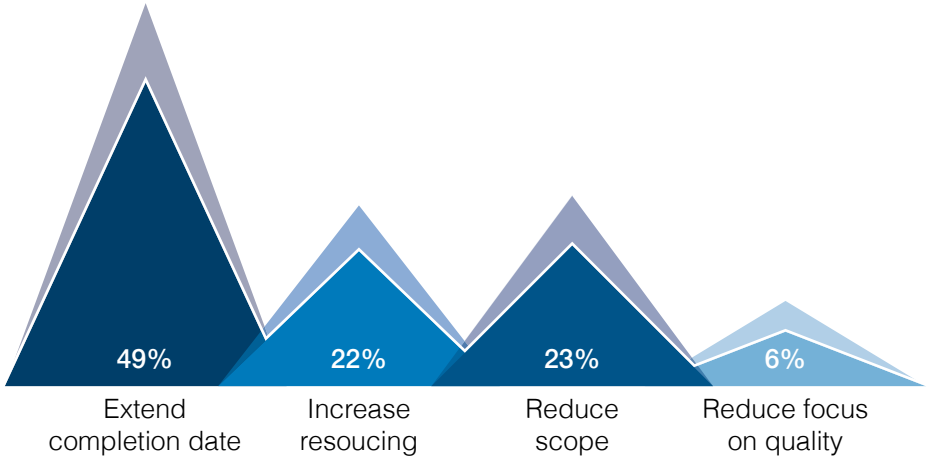
Causes of failure



41% of **government** sector respondents noted poor business requirements as a primary cause of project failure, in comparison to 33% from the **private** sector, noting an 8 percentage point difference between the two. Well above the average of 2%, 10% of **software** industry respondents noted **technical failure** as a primary cause of project failure, whereas zero **ICT** sector respondents noted technical failure to be an issue.



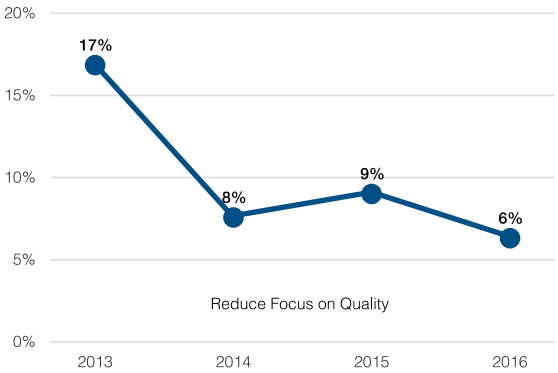
Strategies under pressure



When a project comes under pressure, 71% of organisations are unwilling to compromise the quality or scope of the project. Most 2016 respondents reported **extending the completion date** as their primary strategy if a project is to come under pressure at 49%, noting a 5 percentage point increase from 2015. This was even more prevalent in the **software** industry at 60%, closely followed by the **telecoms & ICT** sector at 59%.

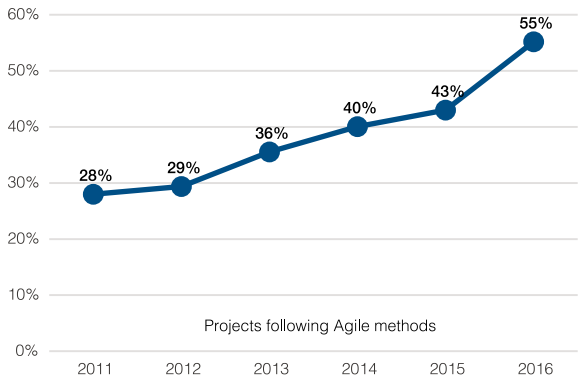
37% respondents from the **financial services** sector reported completion date extension as a primary strategy under pressure, 12 percentage points below the 2016 average. Instead, their most common course of action was to **significantly reduce the scope of deliverables** (38%). This was utilised as the primary strategy under pressure among 25% of **Australian** organisations and 17% of **New Zealand** organisations. This strategy is also prominently utilised in the **private** sector at 24%, an 11 percentage point difference in comparison to 13% in the **government** sector.

Reducing focus on quality is the least utilised primary strategy under pressure by all respondents at 6% in 2016, 3 percentage points lower than 9% in 2015. This figure was lower than the 2016 average in the **private** (5%), **development** (4%), **financial** (3%) and **ICT** sectors (0%), however reducing quality as a primary strategy was reported by 15% of **government** sector respondents, 9 percentage points higher than the 2016 average. Reducing focus on quality as a primary strategy under pressure has reduced by a relative 75% since 2008.



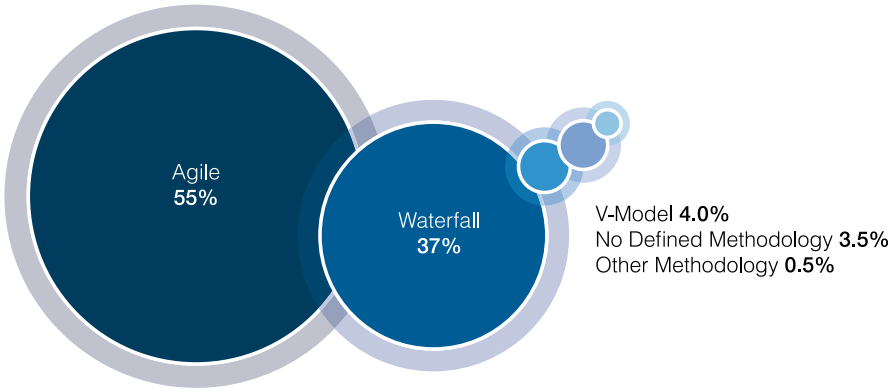
7. What conditions characterised projects?

Methodologies



The vast majority of organisations (94%, up 6 points) are now utilising **Agile** in some portion of their projects as a means to accelerate delivery. Nonetheless, its prominence continues to grow with Agile achieving a majority share of all projects undertaken in 2016 at 55%, up 12 percentage points since 2015 and doubling in adoption since 2011 (28%). 6,734 of respondent projects utilised Agile in 2016, in comparison to 5,002 following traditional methods of Waterfall and V-Model.

The prevalence of Agile is even higher in **New Zealand** at 66% in comparison to **Australia** at 53%, a 13 percentage point difference. When examining sectors, Agile is most utilised by **software industry** respondents at 73%, 18 percentage points higher than the 2016 average. The sector with the lowest Agile adoption, **government**, is also the area demonstrating the most significant growth, up 18 percentage points from 27% last year to 45% in 2016.



For years, the benefits of Agile have been touted by industry professionals, including improved responsiveness to change, team collaboration and overall project success, and its impact can be seen in the adoption of **traditional** methods, with the cumulative total of Waterfall and V-Model projects down 8 percentage points since 2015 to 41%. This includes a massive 13 percentage point drop in V-Model projects, down to just 4%.

The **ICT** sector makes the most use of **Waterfall** at 46%, 9 percentage points more than the 2016 average. This is followed by the **government** (41%), **financial** (38%) and **private** (7%) sectors.

V-Model is most common in the **public sector**, at 9%, in comparison to 4% in the **private** sector. This is significantly down from 14% use by **government** and 18% **private** sector respondents in 2015. V-Model is used by 9% of **telecoms & ICT** sector respondents, 5 percentage points higher than the 2016 average. It is lowest utilised in the **software** industry at 1%.

When testing starts

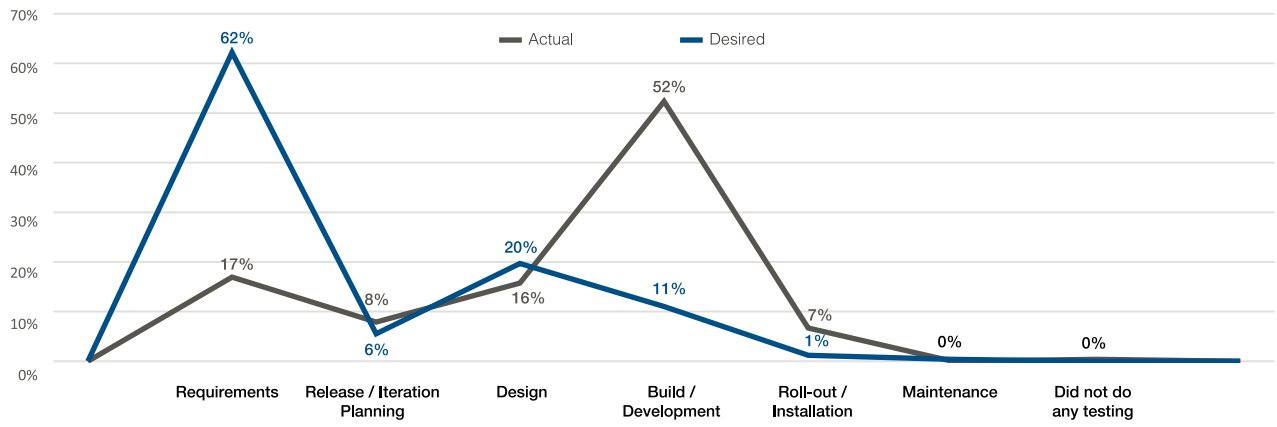
62% of respondents would prefer testing to begin at the **requirements** phase, in comparison to 17% of 2016 respondents noting that this is when testing begins. This marks a 4 percentage point increase in actual testing beginning at the requirements stage (up from 13% in 2015), and a 7 percentage point decrease in the desire to start testing at the requirements phase (down from 68% in 2015).

Testing beginning at the requirements phase this year experienced a 12 percentage point increase in **New Zealand** (24%) in comparison to **Australia** (14%), marking a shift from the previous year's statistics where Australia (14%) began testing at the requirements stage more prominently than New Zealand (12%).

The **financial** (27%) and **telecoms & ICT** (26%) sectors start testing at the requirements phase at a higher rate than the 2016 average (17%), whereas the **software** industry (11%) is lower than the 2016 average by 6 percentage points.

More than half (52%) of 2016 respondents report that testing begins at the **build/development stage**, in contrast to 12% noting a desire to begin testing during this phase. Testing was reported to start at this juncture by approximately half of respondents in each sector, with significantly higher uptake in the **software** industry (68%) this year (16 percentage points higher than the 2016 average of 52%).

Actual testing at the build / development level has fluctuated slightly above or below 50% over the last ten years, reaching a peak of 65% in 2012 and a low of 56% in 2015. The desire to start testing at this level has gradually declined by 13 percentage points from 2011 – 2016, reaching a high of 24% in 2011 and a low of 12% this year.



Project conditions

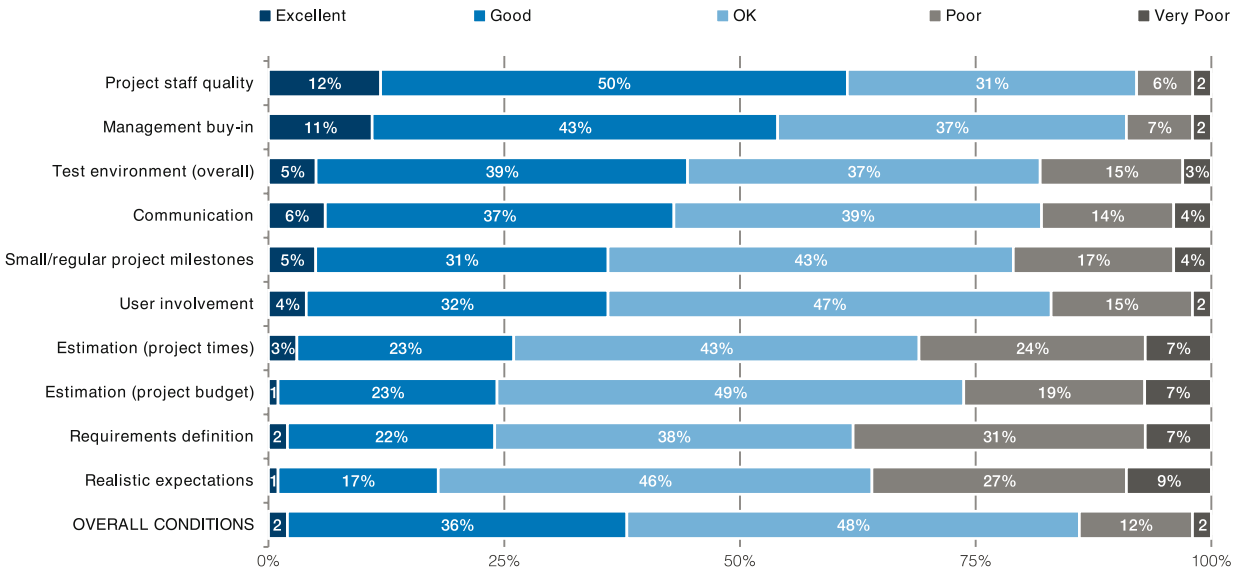
Overall, the industry was feeling more positive about their project conditions in 2016, with a 2 percentage point gain in positive opinions (38%) at the expense of neutral opinions (14%), while negative opinions of overall project conditions remained stable at 14%.

When looking deeper into project conditions, most favourable areas continue to be **project staff quality** and **management buy-in**, while the least favourable areas remain **realistic expectations** and **requirements definition**.

Another area looked upon positively was **user involvement**, remaining consistent with results reported in 2015, with 36% holding a positive opinion in this area with **Agile** (38%) responding more positively than organisations following **traditional** methods (26%). The same could be said of **communication** (44%) and **test environments** (44%), although the gap between **Agile** (49% for both) and **traditional** (27% and 28% respectively) was even more substantial.

Another area where **Agile** (42%) responded more positively than **traditional** (22%) was in **small/ regular project milestones**. This should come as no surprise as this is a cornerstone of the Agile methodology. However, the most positive responses in this category were posted by the **software** and **ICT** industries, with over 50% of respondents in each of these industries having a positive view of their milestones.

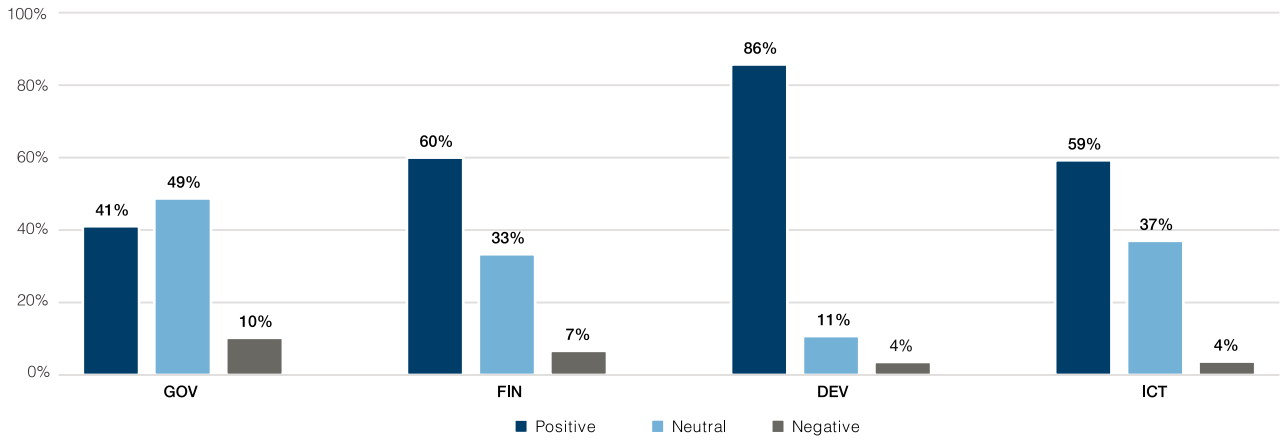
At the negative end of the spectrum, poor **estimation** remains a burden to projects both in terms of project timelines and budgets. Nonetheless, budgetary estimation and timeline estimation each received a more positive response compared with 2015, improving 11 percentage points in net opinion for timelines (to 6% negative overall) and improving 2 points in net opinion for budgets (to 2% negative overall).



Project staff quality

Project staff quality registered the most positive sentiment since 2009, with 62% of respondents considering their staff as 'good / excellent' while only 7% reported their staff to be 'poor / very poor'.

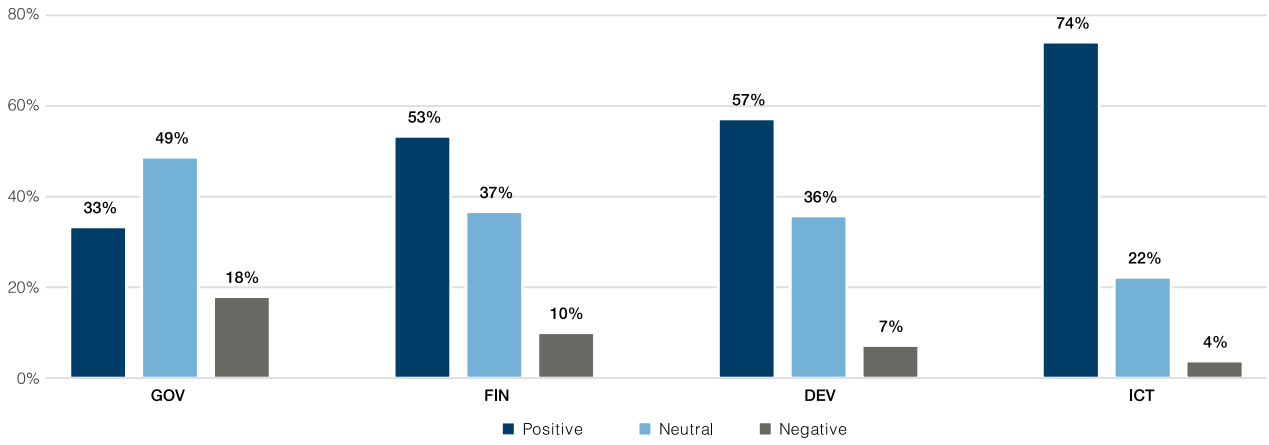
The opinion towards the quality of project staff varied significantly between industries, with the **software** industry registering by far the most positive opinion, coming in at a net positive of 82%. While still registering a net positive, at 31%, **government** was less impressive.



Management buy-in

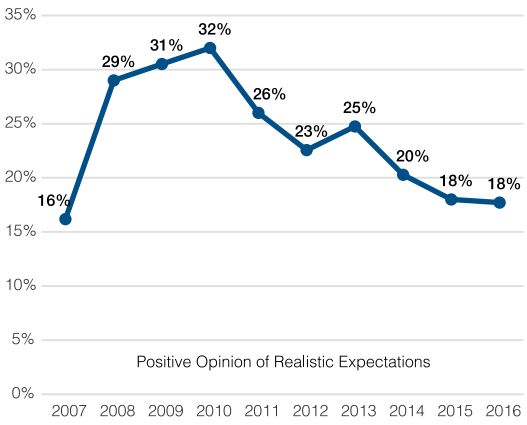
2016 reported a 6 year high in **management buy-in**, with 54% of respondents considering management buy-in as 'good / excellent' compared with 9% stating it to be 'poor / very poor'.

In **telecoms & ICT**, management buy-in proved to be a very positive attribute, with 74% rating their management team as 'good / excellent' in this area. This is over double the portion of the **government** sector, among whom only a third considered management buy-in to be a positive attribute in their organisation.



Realistic expectations

After requirements, **unrealistic expectations** has consistently been next most troubling condition in projects causing failure. 2016 is no exception, as unrealistic expectations were cited to be the primary cause of 20% of projects failures.



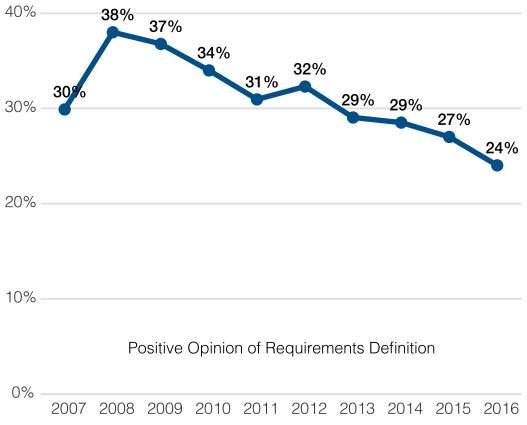
When asked to rate realistic expectations, only 18% considered this to be a positive attribute in their organisations while 36% reported a negative rating. This equated to a 9 year low in respondent sentiment.

The least realistic of all was **financial services**, who reported a 30 percentage point difference between positive (15%) and negative (45%) opinions.

Requirements definition

Requirements keep getting worse. In 2016, excellence in requirements definition continues to be a rarity (consistent at 2%), with fewer organisations feeling positive about their requirements than ever before (24%). In fact, 2016 is the most negative net opinion of requirements on record, with 14 points more respondents possessing a negative view of their requirements than those that have a positive view.

The industry investing most heavily in requirements definition, **telecoms & ICT**, is reaping the benefits of this investment.



Not only did half as many of these respondents report a negative opinion of their requirements (19% vs. the average of 38%) but they also performed best in terms of project cancellations and postponements at just 3% and 8% respectively.

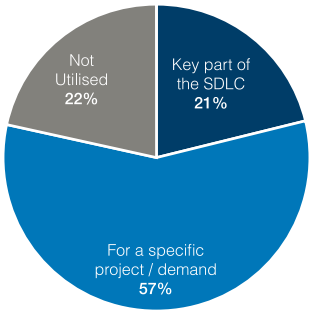
Still, no-one from the **telecoms & ICT** industry considered their requirements to be ‘excellent’, with a third considering them to be ‘good’ and a half considering them to be ‘OK’.

The **software** industry saw the greatest spread in responses, with 39% of respondents classing their requirements definition as ‘good’ or ‘excellent’, and 36% considering it to be ‘poor’ or ‘very poor’.

8. Who is focusing on CX through performance?

For too long performance has been seen as a matter of ensuring a system does not fall over, when it is about ensuring customer experience (CX) through appropriate response times and minimising impact in the case of failure.

Performance testing utilisation

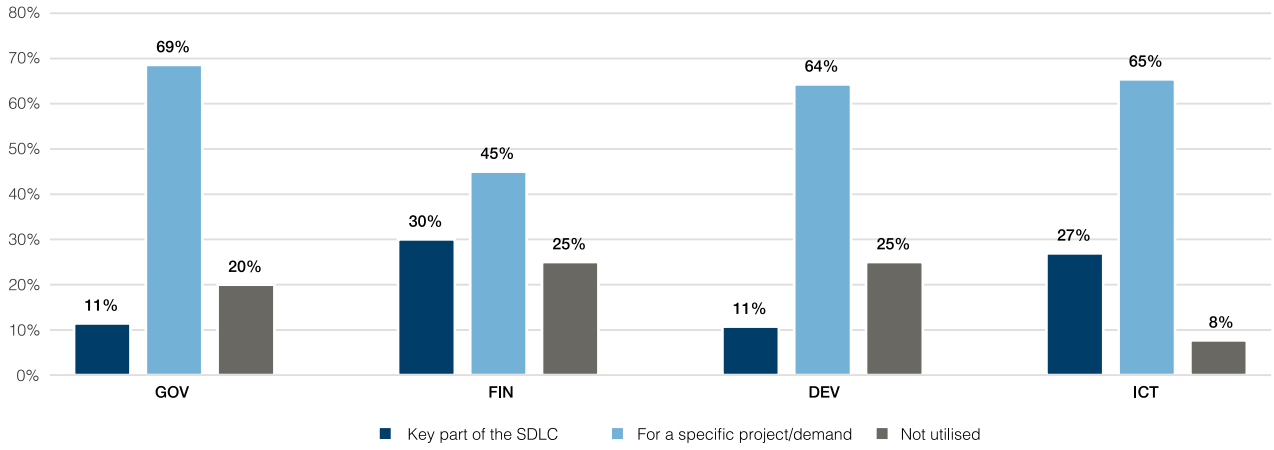


While most technical areas of testing have been increasing in adoption, performance has bucked the trend, with 3 percentage points fewer organisations utilising performance testing as a **key part of the SDLC** (21%) in 2016.

Perhaps more alarming is the 6 percentage point increase in organisations **not utilising performance testing** in any capacity (22%).

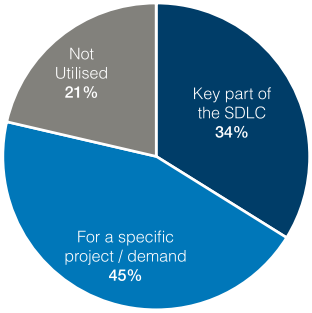
The sectors most likely to embrace performance testing in their SDLC were **financial services** (30%) and **telecoms & ICT** (27%). Meanwhile, only 11% of **government** respondents utilise performance testing as a key part of the SDLC, 12 percentage points lower than the **private** sector and 10 percentage points lower than the 2016 average.

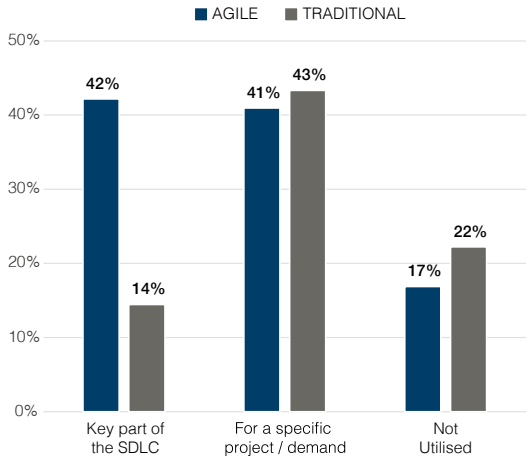
Interestingly, **government** organisations were the most likely to use performance testing **for a specific project/demand** at 69%, 12 points higher than the industry average. However this is not enough as highlighted by recent high profile system failures, such as the Australian Bureau of Statistics' Online Census. This event has flicked a figurative switch in government, and we expect the sector's adoption of performance measures to be much higher in 2017.



9. Where, why and how to automate?

Test automation utilisation

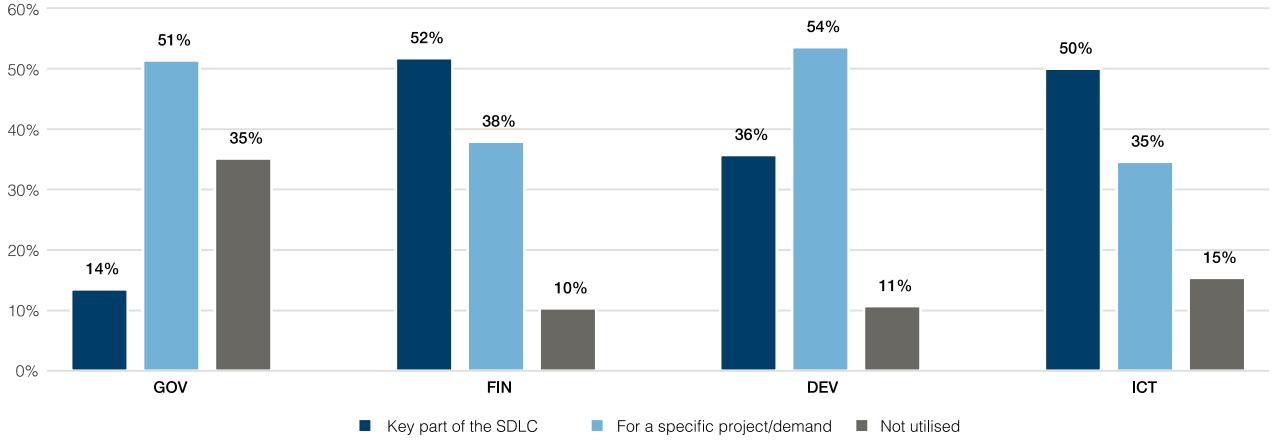




Automation is the widest reaching and most widely known trend in software projects. While this is business as usual among innovators and early adopters, the majority of companies are still formalising their automation practices, with 21% of laggards not using test automation in any capacity.

34% of respondents use test automation as a **key part of the SDLC**, noting a 3 percentage point increase from the previous year and an 8 percentage point increase from 2014 – 2016.

The sectors who have most readily adopted automation are **financial services** (52%) and **telecoms & ICT** (50%). Meanwhile, only 14% of **government** respondents included automation as a key part of their SDLC, 23 percentage points lower than the **private** sector (37%). In fact 35% of **government** organisations were not utilising automation in any capacity.



45% of 2016 respondents use test automation **for a specific project/demand**, 4 percentage points higher than 41% last year, and matching 45% reported in 2014. This figure was significantly larger in **Australia** (49%) compared to **New Zealand** (33%), noting a 16 percentage point difference. Meanwhile, **New Zealand** (41%) reported higher utilisation of test automation as a key part of the SDLC in comparison to **Australia** (32%).

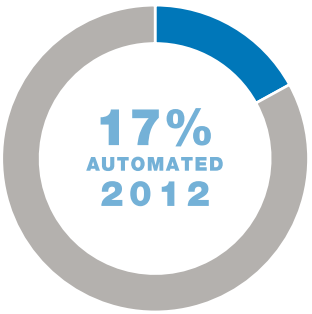
Not surprisingly, organisations who primarily followed **Agile** practices in their projects had a far higher rate of automation adoption as an essential part of their SDLC at 42%, 28 percentage points higher than their **traditional** counterparts.

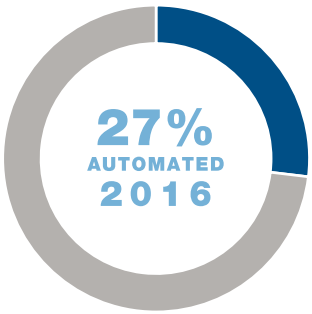
Automated test coverage

Overall automated test coverage was reported at 27% this year, marking a 10 percentage point increase from 2012 – 2016. There was a 19 percentage point difference in automated test coverage between organisations primarily using **Agile** (32%) and **traditional** (13%) methodologies. A similar difference was noted when comparing automated test coverage in the **private** sector (30%) with the **public** sector (13%).

Above average overall automated test coverage was noted in the **ICT** (39%) and **development** (34%) sectors.

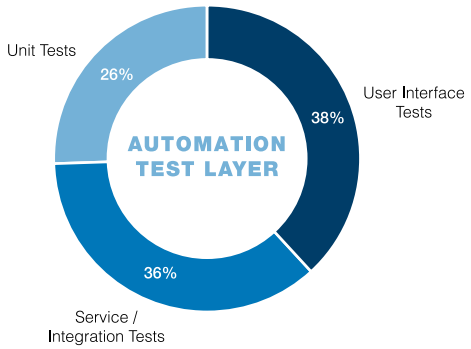
Among adopters of automation, the amount of test coverage that is automated has not changed quite as significantly, coming in at 34% this year, 4 percentage points above the figures reported in 2012.





Where automation is conducted

When examining the overall responses for test layers where automation is conducted it appears relatively evenly balanced with slightly more automated **user interface tests** (38%) and **service/integration tests** (36%) being carried out ahead of automated **unit tests** (26%).



Upon closer inspection, it can be seen that most individual organisations invest the majority of their automation effort in one of these testing layers, with 26% of organisations primarily automating at the user interface layer, with a further 20% of organisations favouring the service/integration layer and finally 13% predominantly automating unit tests.

Agile organisations were more likely to invest more automation effort earlier in the development cycle at the unit testing layer (28%) 7 points higher than **traditional** organisations, with an inverse gap being reflected in automated service/integration tests where traditional projects focus 41% of their effort.

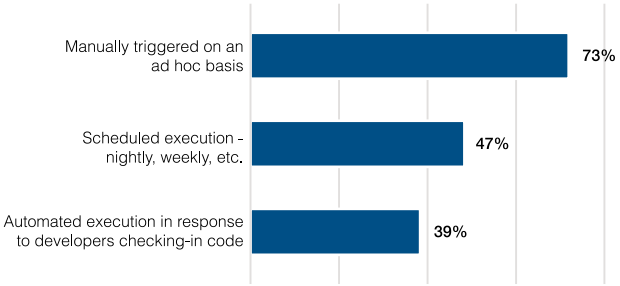
How automation is executed

Amongst users of automation, the most common means of executing automated tests is by **manually triggering them on an ad hoc basis**, a path taken by a majority of organisations (73%). Fewer organisations were **scheduling execution of automated tests** (47%) or **automating execution in response to developers checking-in code** (39%).

Scheduling execution of automated tests, e.g. nightly, weekly, etc., was more prevalent among **private** sector respondents (49%) and those primarily following **Agile** methods (53%) in comparison to **government** respondents (35%) and those following **traditional** methodologies (38%).

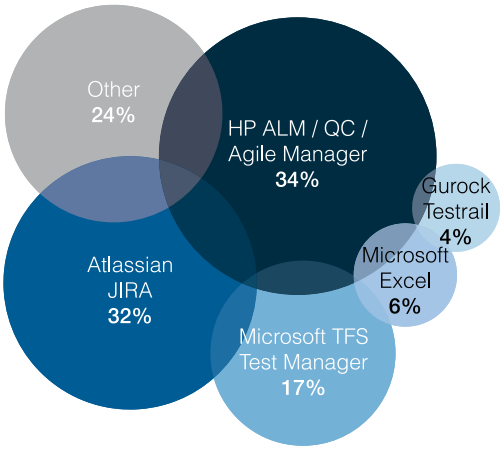
The gap was even larger in automating execution in response to code check-in, a method used by only 13% of **government** automation users and 19% of organisations following **traditional** methods. By comparison, 43% of **private** sector automation users automated their execution, a path also followed by 53% of **Agile** organisations.

As practices mature, we can expect a shift towards automated execution in response to code check-in as organisations seek efficiencies through instant verification, minimising the likelihood that defects can make their way further down the development lifecycle where their impact becomes much more costly.



10. What tools are being utilised?

Test management tool utilisation



HP ALM / QC / Agile Manager was reported as the most utilised test management tool at 34% in 2016. This marks the first time since 2013 that HP's test management tools were the highest utilised testing toolset. Despite taking the top spot this year, overall utilisation of HP ALM / QC / Agile Manager has reduced by 9 percentage points from 2013 – 2016.

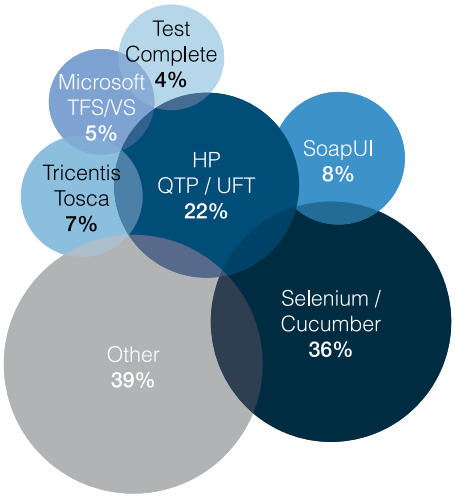
The majority of users of the HP suite in 2016 are reported to use **traditional** methods (40%) in comparison with **Agile** (28%), marking a 12 percentage point difference.

Significantly higher use of the HP suite was found in the **government** sector (56%) in comparison to the **private** sector (30%), marking a 26 percentage point difference between the two. The **software** industry had the lowest uptake of HP's test management tools at 14%. A large difference in HP's market share was also posted between **Australia** (40%) and **New Zealand** (15%), highlighting a significant 25 percentage point difference.

Atlassian JIRA has shifted into second place on the list of most utilised testing tools, with its usage reported by 32% of 2016 respondents. Above average use of Atlassian JIRA was noted in **financial services** (40%) who had twice the adoption reported in the **government** sector (20%).

At 17% utilisation, **Microsoft TFS Test Manager** is the third most used test management tool in 2016, noting a 2 percentage point increase from 15% in 2015. **Agile** (21%) organisations made significantly higher use of Microsoft TFS Test Manager in comparison to those following **traditional** methods (7%) in 2016, noting a 13 percentage point difference.

Test automation tool utilisation

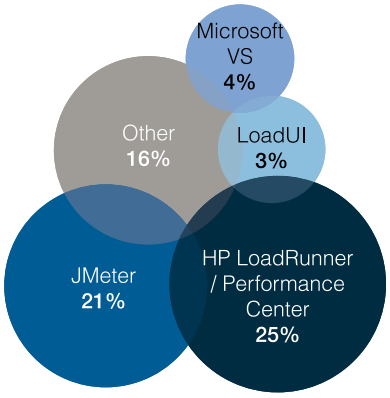


Among our respondent pool, over 30 automation tools were reported to be used. None more than **Selenium / Cucumber** retaining its top spot at 36% utilisation in 2016. Selenium / Cucumber has gradually increased in popularity, achieving second place with 25% utilisation in 2013 and increasing in use by 11 percentage points from 2013 – 2016. The highest usage of Selenium / Cucumber for test automation was reported in the **software** (60%) and **financial services** (45%) industries, with lower levels of utilisation amongst **government** (26%).

Selenium / Cucumber adoption is significantly higher utilised by organisations primarily practising **Agile** (42%) in comparison to those following **traditional** methods (24%).

In second place, the former king of the automation tools, **HP QTP / UFT**, was utilised by 22% of organisations in 2016, reflecting an 8 percentage point decrease in utilisation as a test automation tool from 2013 – 2016. This was more commonly used in **government** (33%) with lower usage in the **software development** (7%) sector, 15 points under the 2016 average.

Performance testing tool utilisation



One-quarter (25%) of 2016 respondents rate **HP LoadRunner/Performance Center** to be the most utilised performance testing tool, however, this response has experienced an 11 percentage point decline from 2013 – 2016. The biggest users of HP's performance tools were the **telecoms & ICT** (37%) and **government** (36%) sectors, with few (10%) of the **software** industry utilising this toolset.

HP's presence in the **Australian** market was again much more significant (30%) than the **New Zealand** market (9%) for performance tooling, registering a significant 21 percentage points of difference.

JMeter is the 2nd most utilised performance testing tool in 2016 at 21%, experiencing a minor 1 percentage point decline in usage from 2013 – 2016. This tool is most prominently used for performance testing by the **software industry** (29%) with below average usage in the **government** sector (13%).

An 11 percentage point difference was discovered regarding the use of JMeter for performance testing in **Australia** (18%) and **New Zealand** (29%) in 2016.

Cloud utilisation

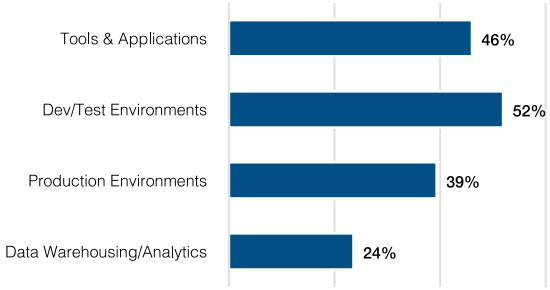
For many years organisations were touting their plans for embracing cloud-based tools and technologies but the uptake did not match their ambitions. Now, in 2016, we can see many organisations achieving their long laid plans, with cloud-based development and test environments leading the way at 52%.

In 2016, 46% of respondents noted cloud utilisation for **tools and applications**, marking a 9 percentage point increase from 2015 and a 36 percentage point increase from 2012 – 2016. This was most prominent in the **telecoms & ICT** (63%) sector, but below average in the **government** sector (36%).

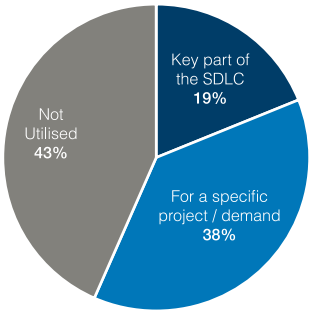
Making significant gains this year, cloud-based **development / test environments** was reported to be used by over half of respondents (52%), a significant 20 percentage points higher than the previous year's 32%. Coming in 27 percentage points above average utilisation was the **software** industry at 79%.

Cloud use for **production environments** was reported at 39% utilisation in 2016, experiencing a slight 7 percentage point increase from 32% in 2015. Most prominent use was in the **software development** (57%) sector, and a 16 percentage point difference in cloud use for production environments was reported from the **private** sector (42%) in comparison to the **government** sector (26%).

Cloud utilisation was least used for **data warehousing/analytics** at 24% in 2016, 3 percentage points lower than the figure reported in 2015. This was reported to be notably lower than average by 7 percentage points in the **financial** sector (17%).



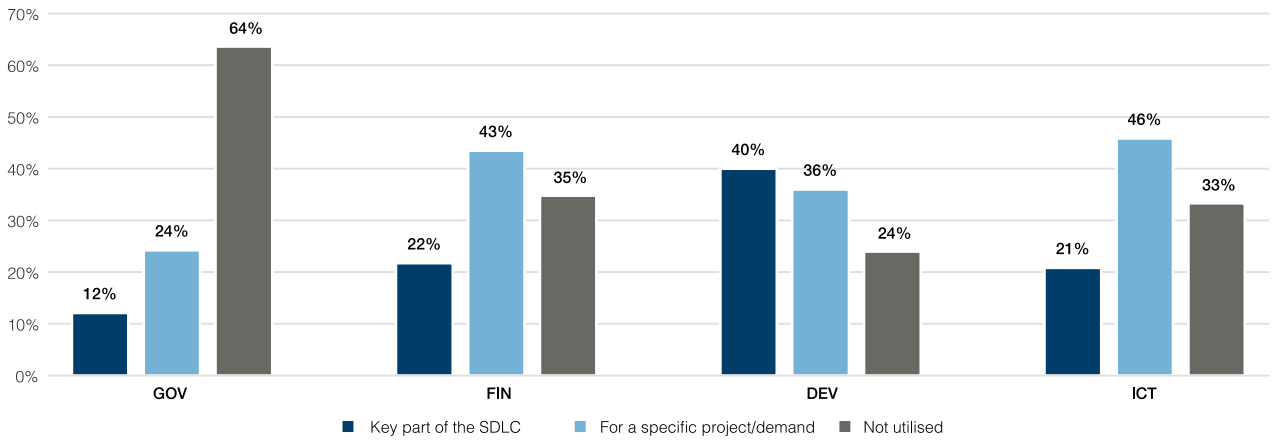
Service virtualisation utilisation



Uptake of service virtualisation has remained static over the past year as many professionals and, in cases, entire organisations have limited understanding of what service virtualisation is and its power in accelerating project delivery of highly integrated systems, alleviating bottlenecks in test environments to start testing earlier. Currently, only innovators and early adopters are embracing virtualisation as a **key part of their SDLC** (19%, up 6 percentage points since 2014), many of whom were in the **software** industry (40% using as a key part of their SDLC).

With 38% of organisations using service virtualisation **for specific projects**, it's clear that the majority are trialling this technology. This is particularly the case in the **telecoms & ICT** and **financial services** industries (46% and 44% respectively).

Still, the largest response in 2016 was '**no use of service virtualisation**' at 43%. The **public** sector was most likely to not use service virtualisations at 64%, 24 percentage points higher than the **private** sector (40%). This is followed by the **financial** (35%), **ICT** (33%) and **software development** (24%) sectors, with the highest utilisation of service virtualisation found in the **software** industry at 19 percentage points difference in comparison to the 2016 average.



11. What trends will impact projects over the coming years?

When given the opportunity to discuss the trends that respondents expected to impact their roles and projects over the next 5 years, **Automation** was again reported to be the top singular movement influencing the industry. In fact, it was referenced by 41% of respondents, marking a significant increase of 15 percentage points since 2015. This was most prevalent in the **telecoms & ICT** sector at 59%.

Terms associated with rapid and continuous delivery were also hotly identified as trends impacting projects over the coming years, with **Agile** (22%), **DevOps/TestOps** (11%), **Continuous Integration/ Delivery** (8%) and **Time to Market** (3%) together amassing a 44% response rate. Agile was a trend particularly noted among **government** (36%), the **telecoms & ICT** sector (30%) and organisations following **traditional** methods (26%).

With the current rate of change in **Tools** (15%) and **Technologies** (4%), it is no surprise that innovations in this space were referenced by 19% of respondents, complimented by 4% who expected trends in **Training in Technical Skillsets** to impact their roles and industry. There was a noteworthy gap in the perceived impact of Tools and Technologies in the **private** (21%) and **public** (8%) sectors.

While some respondents still see innovation in **Mobile Devices** (4%) as considerably affecting their roles, others are looking towards the ever-growing **Internet of Things** (4%). Only a few innovators referenced **AI & Robotics** (2%) to affecting their roles. Where will this figure be in 2-3 years' time?

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