

Software Engineering in Australasia

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Six months ago an important call was made for researchers globally to provide insights into the way Software Engineering is done in their region. Heeding this call, we hereby outline the position Software Engineering in Australasia. This article first considers the software development methods, practices and tools that are popular in the Australasian software engineering community. We then briefly review the particular strengths of software engineering researchers in Australasia. Finally, we make an open call for collaborators by reflecting on our current position and identifying future opportunities.

Software development methods, practices and tools

Historically, much of what we know about software development methods, practices, and tools is shaped by technology vendors. In many cases, these vendors are positioned in very large economies, and, thus, those software engineering communities can be equally large. For instance, 53% of the software development companies represented in the popular VersionOne 2014 survey had > 1000 employees¹, in contrast to the small and medium-sized enterprises (SMEs) that are typical in Australasia. Unsurprisingly, 65% of those surveyed by VersionOne were from North America, and while there has been improvement in participation from other continents in 2020, the recent results from VersionOne are still heavily skewed to North America and Europe². From time to time however, the utility of these methods, practices and tools is investigated beyond these larger economies, providing lessons for the software engineering communities in other regions.

One such study surveyed practitioners working in Brazil, Finland, and New Zealand in a transnational study where similar findings were reported across the three territories [1]. Outcomes from this study revealed that the sample of practitioners surveyed focused on a small portfolio of projects that were of short duration. In addition, Scrum and Kanban were used most; however, some practitioners also used more traditional methods. Coding Standards, Simple Design and Refactoring were used most by

¹ <https://explore.digital.ai/state-of-agile/9th-annual-state-of-agile-report>

² <https://explore.digital.ai/state-of-agile/14th-annual-state-of-agile-report>

practitioners, and these practices were held to be largely suitable for project and process management [1]. Interestingly, another study also found the same threats to software development success across Brazil, Finland, and New Zealand [2]. While evidence here suggests that there may be similarities in the software development landscapes across the three countries, and particularly in terms of the size of organisations, this evidence may also point to the global language that is 'software engineering'. In fact, globally, software engineers now place increasing value on agility and methods and practices that aid this process, notwithstanding the various hybrids that are typically implemented in practice [3].

This is fitting, given that sales of software and related services rose by 31% from 2017 to 2019 in New Zealand to \$9.8 billion, with published software accounting for \$3.1 billion³. The positive trend is also reported in Australia; between 2005 and 2019, the productivity benefits from the growing digital economy increased Australia's steady state GDP per capita by 6.5%⁴. With the adoption of 5G and other emerging digital technologies, the contribution of digital to productivity will only grow. The Australian software industry landscape is responding to this growth with diversity, ranging from vibrant startups to Sydney-based tech giant Atlassian, known for products such as Jira, Confluence, Bitbucket, and Trello. According to recent work on analysing requirements changes in Agile teams [4], the most frequently practised Agile method in Australian companies is Scrum, with a mean team size of 18 members and a mean iteration length of just under five weeks. The most followed Agile techniques are daily standups, Kanban boards, sprints, and the sprint backlog, whereas pair programming and self-assignment were the least followed practices.

Software development research

Australasian software engineering researchers work in all knowledge areas. Figure 1 provides a word cloud depicting Australasian software engineering researchers' focus, where the size of the word denotes the relative degree of research focus across all active researchers. Of the areas listed, empirical software engineering, formal methods, cloud computing, and artificial intelligence are particularly strengths. Other significant research areas covers cloud computing, formal methods, artificial intelligence and machine learning, programming languages and algorithms, program analysis and repair, mining software repositories, software security, software engineering tool support and HCI, requirements engineering, software design and architecture, software engineering education, software quality and testing, software development methods and practices, process mining, software measurements, empirical software engineering, human factors in software engineering, green software engineering, NLP applications, distributed systems, empirical methods

³ <https://www.stats.govt.nz/information-releases/information-and-communication-technology-supply-survey-2019>

⁴ <https://www2.deloitte.com/au/en/pages/economics/articles/australias-digital-pulse.html>

committee is to bring together leading software engineering research teams from New Zealand universities in a coordinated centre of research excellence with a strong industry focus and raise the level and profile of New Zealand software engineering research. SI[^]NZ has also facilitated increased collaboration among software engineering researchers in New Zealand.

In Australia, Prof John Grundy has been awarded an ARC Laureate Fellowship, one of the most prestigious research awards in Australia. Seven early-career academics received an Australian Research Council (ARC) Discovery Early Career Researchers Award (DECRA) over the last few years (i.e. Aldeida Aleti, Christoph Treude, Marcel Boehme, Li Li, Xin Xia, Chakkrit Tantithamthavorn, Patanamon Thongtanunam).

Notwithstanding the COVID-19 pandemic and the barriers to travel recently, we invite the world to travel to Australasia for research study leave to facilitate more exchanges. You may contact any of the authors of this article or others in the wider Australasian software engineering community about visiting. In addition, there is an open call for support for Australasia's bids for hosting conferences, and also for colleagues to travel to the region for conference attendance and to forge partnerships. In the short term, we warmly look forward to hosting you for ASE2021⁷.

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⁷ <https://conf.researchr.org/home/ase-2021>