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| **Tertiary ICT Excellence Awards Submission Form** | |
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| **Submitter Name:** | Jamie Hart, François Bissey, Paul Arnold |
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| **Abstract Title:** | ***Versatile Computing Solutions: UC’s Research Compute Hub as a Swiss Army Knife for Modern Research*** |
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| **Describe the technology or process that is core to your submission. Please be precise in describing exactly why this should be considered for the awards (max 500 words).** | |
| UC has built a comprehensive all in one solution (UC Research Compute Hub) for high performance computing; and developed a process for future expansion to cover many research and teaching needs for years to come.  We have implemented a modern HPC style cluster to help deliver research and teaching workloads. UC Research Compute Hub is a central research compute platform, playing crucial role in advancing research, enhancing education, and fostering collaboration and innovation across the university. Sempre and DoItNow were selected as the strategic partner for delivery and ongoing management services, utilising Dell Technology hardware.  This solution was delivered following stakeholder engagement and codesign. Its design ensures it can evolve alongside emerging technologies and user demands. The virtualised, cloud-bursting architecture aligns with UC’s 2020 vision of using Digital as a strategic enabler. It supports agile scaling, cost transparency, and future-proofing—key pillars of modern IT service delivery. UC-RCH went live in April, has since expanded thanks to co-investment from the School of Mathematics and Statistics, demonstrating value and potential early on with strong user interest. This project has shown also how a seemingly simple infrastructure project has catalyzed broader institutional change, introducing a culture of responsible Research Data Management. | |
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| **Briefly summarise how your submission supports and is valued by your organisation. Describe the customer or business benefits of the technology or process. For example, which key strategies did the enhancement meet, what business problem needed to be solved, or perhaps how does a key customer group benefit from a new or improved delivery process. (max 500 words).** | |
| UC released its Strategic Vision Tangata Tū, Tangata Ora in 2020 after years of post-earthquake disruption and rebuild. The University undertook a major rebuild resulting in modern science and technology facilities.  Our problem? UC’s Research Compute Cluster (RCC) reached end of life in 2024, and as part of the UCs Digital Transformation’s Cloud Programme, a project to invest in a new private cloud was launched.  Initially, our goal was to replace an existing central research compute cluster which was reaching end-of-life. As we embarked on what seemed to be a simple infrastructure project, it became clear that our eResearch services required an overhaul in both strategy, process and technology. We engaged fully with our researchers, departmental technicians, research computing specialists in Australasia to fully understand the area of eResearch fully. At this point, UC had 1 sole eResearch Consultant managing research compute on his own.  After our engagement with research stakeholders we pivoted to a strategy that delivered multiple initiatives, new processes, governance and a multi cloud strategy utilising both private and public cloud platforms. Our project team members led out important eResearch initiatives, with all roads leading back to this critical infrastructure work.  Our academics were in need of a future focused, secure, flexible platform to do compute intensive research. Building the UC-RCH has not only delivered this, but has led to the creation of an eResearch ecosystem, enabling digital research to thrive at UC.  With the launch of the UC Research Compute Hub, not only are our research community are able to focus more on their research, UC is able to manage the resources transparently, and efficiently in partnership with our users. | |
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| |  | | --- | | **Describe the broader applicability of the enhancement across different teams, departments, or institutions and how it might support long-term transformation and adaptability in the IT landscape.** | | In 2020, UC began its investment into research infrastructure with Digital as a strategic enabler to deliver relevant, distinctive and world class learning, research, and collaborative experiences to a global audience.  During our discovery process, the eResearch team became a crucial connector between our Research community and Digital Services. A number of initiatives were launched, with some highlights: we re-engaged with the national research infrastructure NeSI, stood up a public cloud proof of concept with AWS and collaborated with the research community to build a new Research Data Management culture which culminated in a policy published earlier this year. These eResearch initiatives were all intertwined, and necessary for us to understand our customer needs better.  Ultimately, the main project was to build a central high performance computing platform, that is available to our researchers and collaborators. UC-RCH is a central computing resource, employing a simple user-friendly interface (Open OnDemand). We wanted the delivery of a stable platform, with the framework of having a service partner (Sempre) manage our research cloud infrastructure and DoItNow! providing ongoing platform support. This has allowed our staff to focus on our core eResearch consultancy and training work and help us accurately account for the ongoing costs of running UC-RCH. With this transparency of cost, we will be able to show back the value of the resources to our users.  Careful change management ensured our users, stakeholders and colleagues were informed during our journey, with some those key stakeholders joining the procurement process in decision making and governance. This engagement with faculty generated early interest, and co-investment in early expansion of the hub. We are now fielding more enquiries for teaching and research related co-investment into the UC-RCH.  While infrastructure is critical, our project team also led several foundational eResearch initiatives that have shaped a broader digital research ecosystem at UC. These included:   * Establishing a new culture of Research Data Management, culminating in UC’s first Research Data Management Policy; * Running pilot projects using public cloud resources to explore scalable, flexible research environments; * Driving knowledge creation in our eResearch at UC webpages and training to upskill researchers in digital tools and practices; * Hosting weekly eResearch Clinics to provide hands-on support and foster community engagement; * Implementing cost governance and transparency for cloud resources, enabling informed decision-making.   With the launch of UC-RCH, researchers can now focus more on their core work, while UC ensures that resources are managed **transparently, efficiently, and in partnership with users**. This marks a significant step forward in enabling digital research to thrive at UC—not just through technology, but through culture, collaboration, and strategic alignment. |   **Describe how the project was taken from vision/idea to delivery, what challenges were met and how they were handled on the way (max 500 words).** | |
| The legacy Research environment was identified for replacement, and we wanted to provide the best possible solution for our growing research community. We worked through a strategic design with supporting requirements then went out to market in early 2024.  A busy evaluation team completed evaluation of the 7 responses in June of the same year and proceeded to award the contract with vendor kick-off happening in early October. A cross-functional and collaborative team for delivery was established between faculty members, Digital Services (including the ongoing environment owners), and vendor teams under an established governance team. This gave us fast decision-making from the directly interested parties.  Design approval was split between infrastructure design, approved in early November, to commence ordering of equipment, and then system configuration and design, approved in late November. This allowed us to meet the 20-day lead time for the hardware delivery without impacting the overall timeline.  Build of the infrastructure was completed in early December with installation and configuration of the software components commencing soon after. Configuration continued throughout February and March with training for our environment-owning teams starting at the end of March.  UAT was completed through early April with some real research loads being run in the new infrastructure with great results. It was a definite ‘surprise and delight’ moment for our customers and made any build issues seem a distant memory.  Through a big team push, we went live on the system – newly christened UC – Research Compute Hub – at the end of April and started welcoming our researchers onto the new platform.  Final configuration of the AWS cloud-bursting, which allows us to expand out usage into a configured AWS mirror of the on-premises cluster, completed in early May. This functionality gives us more flexibility and helps us manage our workloads through the expected increase in usage. Ongoing cost management of both the on-premises environment and the new AWS bursting environment has been set-up to ensure that we can provide cost visibility, cost alerting, and good decision-making during operations.  We have even managed to expand the cluster within two months of go-live. With recognition of the overall benefit to our research community, The School of Mathematics and Statistics decided to invest in the platform, enabling us to purchase and deploy more hardware.  Some of the challenges we have had to overcome:   * Global vendor delivery team * Bespoke system configuration – no two HPC systems are the same * Vendor understanding of the UC environment * Two separate vendor teams   These challenges were largely overcome by having multiple weekly stand-ups to get everyone on the same page, hearing the same information, and bringing in UC specialists when required.  Following this fantastic experience, we have fully handed over to our BAU team who were actively involved throughout the delivery which definitely ensured a successful outcome. | |
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| **Please detail any technologies that were implemented to deliver your enhancement or supply any other information you think may assist your submission (max 500 words).** | |
| The cluster was deployed with a wide combination of technologies by the vendor. After the master node was provisioned, the other nodes where deployed and populated using Canonical’s juju orchestration framework. Juju leverages many other technologies such as Canonical’s MASS (Metal As A Service), LXD containers, Ansible and terraform to deploy platforms and applications.  In our cluster, Juju installed the base operating system using MASS, then deployed OpenStack onto the nodes. Once OpenStack was deployed, terraform was used to create the various components of the cluster as virtual machines or containers.  The technology is supposed to make extending the cluster to new hardware just as easy as running a master script (the juju incantation) to the right target. Similarly, if we need to reconfigure the cluster to deliver more virtual machines or containers, the resizing is just a configuration change away.  Cloud bursting is enabled by having a permanent VPN connection to a small machine in AWS on which essential components are synchronised. When cloud bursting occurs, a cluster of the right size is deployed in AWS, the user data is synchronised, and job is run. Once the job is finished the cluster is shut down after 10 minutes. This cool off period allows another job to immediately use the already existing cluster. | |
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| **Please supply the name, title and contact details of two people whom our judges may contact as referees. Ideally the referees should have knowledge of the implementation and its benefits from a customer or Institutional management perspective.** | |
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| **Please list all technology suppliers involved in the project.** | |
| **Sempre Technologies**  **Dell Technologies**  **DoItNow!** | |