Te Mahere Matihiko
Digital Blueprint

FY22–25

agresearch
āta mātai, mātai whetū

AgResearch Digital Blueprint FY22-25

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Re:
imagine
think
volutionise
DIGITAL

> “Digitalisation is bringing change to all parts of science, from agenda setting to experimentation, knowledge sharing and public engagement.”
>
> *The Digitisation of Science, Technology and Innovation: Key Developments and Policies OECD (2020), OECD Publishing*

In the recently launched AgResearch strategy, *Tā Mātou Rautaki*, we talk of preparing for a future where technology, existing and yet to be imagined, will offer opportunities for transformed pastoral and agri-food sector value chains. *Te Mahere Matahiko* (this Digital Blueprint) recognises that more widely, technology will continue to fundamentally alter how we work, connect with each other and, via our innovative science, solve the problems of today for a brighter tomorrow.

These are uncertain times, both globally with the ongoing impact of the COVID-19 pandemic, and nationally in imminent reforms to Aotearoa’s science system through Te Ara Paerangi | Future Pathways programme. In the face of uncertainty, we are comforted with knowledge that whatever vehicle may be used, our nation will have an ongoing need “to enhance the value, productivity and profitability of New Zealand’s pastoral, agri-food and agri-technology sector value chains to contribute to economic growth and beneficial environmental and social outcomes for New Zealand”.

To remain true to our kaupapa we must embrace these changes as an opportunity to reimagine, rethink and revolutionise our digital future.

We have committed that *Te Mahere Matihiko* (the Digital Blueprint) and *Te Ara Pūnaha Hangarau* (the Systems Roadmap), will:

- Put our people and science at the heart of the design
- Support our refreshed strategic direction
- Take a modern approach to systems architecture
- Ensure that we continue to meet our obligations for cyber security and compliance.

In forming tā mātou matawhānui matihiko, our vision for digital, we considered not only the challenges we face in delivering science today but explored trends in technology, science and innovation eco-systems and broader society to anticipate what tomorrow might look like: what we will be doing and how we will be doing it.

Te Mahere Matahiko seeks to enable the aspirations as outlined in *Tā Mātou Rautaki* (2021) and the *Science Plan* (2019). Further, we seek to use our digital tools to facilitate transparent, respectful and supportive change as we transition to new structures and new ways of working and undertake our digital transformation.

Section One

Developing Te Mahere Matihiko

Ō mātou tāngata.
Ō mātau mātauranga.

We have listened, we have put people, their knowledge and our science at the heart of our blueprint.

We are committed to putting our people and science at the heart of *Te Mahere Matihiko*. In developing this Digital Blueprint, we sought input from across AgResearch to understand not only current pain points and challenges but to also capture opportunities and aspirations from our people on the digital experience they desire for the future.

We are grateful for the time, passion, and ideas contributed by the members of the Digital Blueprint Advisory Group. The Advisory Group sought insights and learnings from AgResearch initiatives, other research organisations, and outside of the CRI sector to define the digital experience of the future and agree the Design Principles which underpin this Digital Blueprint.

A hypothesis of the future has been drafted into a Digital Playbook. The Playbook supports the Digital Blueprint through exploring possible threats and opportunities offered by digitalisation as distant as 2030 using design thinking narrative techniques.

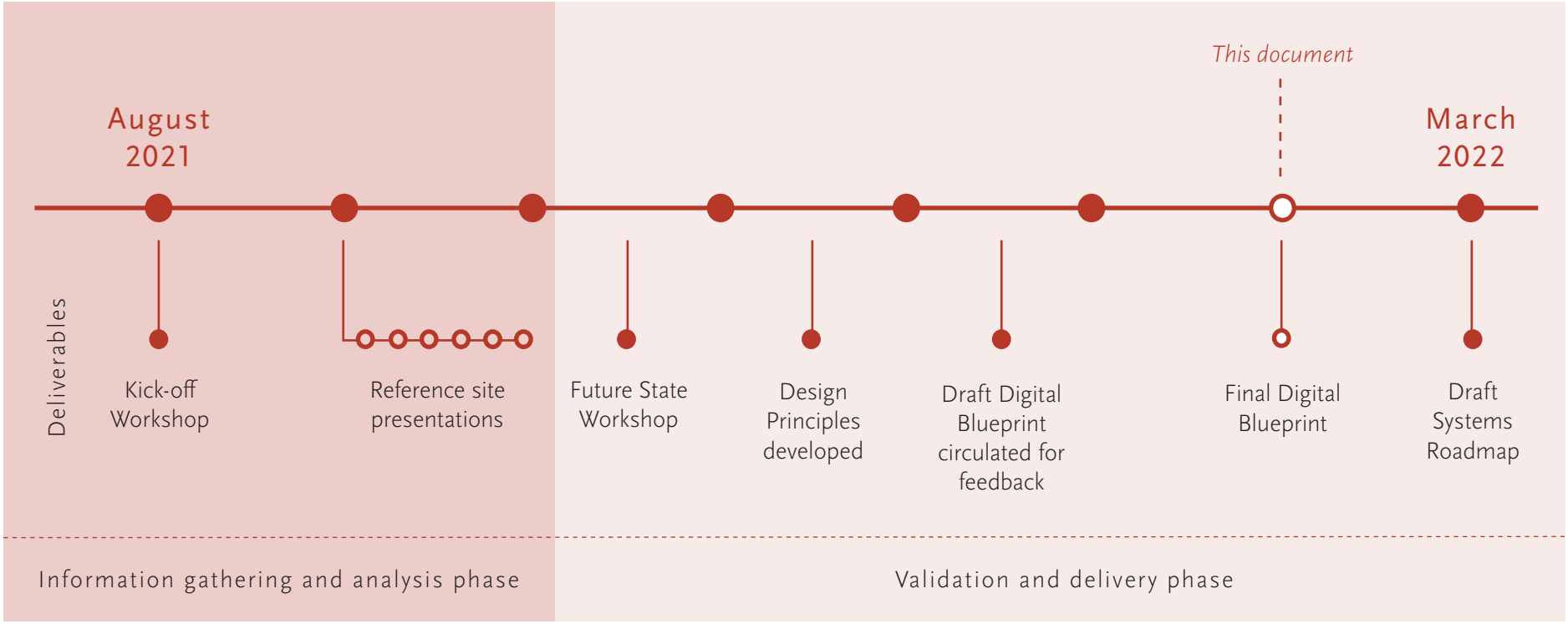
Risks, including cyber security and compliance are reflected in the Design Principles.

Te Ara Pūnaha Hangarau, the Systems Roadmap, is the tactical plan for delivering the Digital Blueprint. It defines the programme of digital and digitally-enabled work to FY25.

We would like to thank the following organisations and their teams for their assistance:

- inTense Solutions (Mia Morrish) for facilitating the development of this Blueprint.
- Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- University of Auckland
- Wageningen University
- Farmlands Cooperative
- Tasman District Council
- House of Travel
- KPMG New Zealand
- IoT Dev Zone (Andrew Leckie)

The process


This document
August 2021
March 2022
Deliverables
Kick-off Workshop
Reference site presentations
Future State Workshop
Design Principles developed
Draft Digital Blueprint circulated for feedback
Final Digital Blueprint
Draft Systems Roadmap
Information gathering and analysis phase
Validation and delivery phase

Section Two

Strategic Context

> "Advances in digital technologies and data availability are changing the way agriculture works around the world. AgResearch is positioning itself at the cutting edge of this change and looking to invest in technology and understanding of data in order to be at the forefront of advances in the pastoral sector."

Value of Crown Research Institutes in Aotearoa New Zealand's science system today, Science New Zealand

The environment we are operating in is undergoing significant change, not only through digitalisation accelerated by global pressures, such as the COVID-19 pandemic and the climate crisis, but also within a national context in reforms signalled by the Crown to reshape the priorities, funding and structures that comprise Aotearoa's science system. It is impossible to separate our future from these external factors.

Te Mahere Matihiko recognises that the coming years will challenge us to consider, plan, and undertake change and, whilst our purpose will remain, the current operating structure may be very different to what we have today. In recognising and accepting that reality, we have identified four interconnected factors that underpin this Blueprint:

- Te Ara Paerangi | Future Pathway: embracing the proposed programme of change signalled by the Crown, we see Future Pathway as an opportunity to revitalise the science system and look forward to presenting our ideas for the future of the sector and our vision for digitalised science in Aotearoa.
- **Operational efficiency:** the need to continue evolving our processes and systems in order to exploit intelligent automation, advanced analytics and other smart tools to reduce our back-office costs. Such efficiencies will allow us to continue re-balancing investment in favour of science delivery.
- **Digital transformation:** the desire to digitalise our science and the way agriculture works. This is not simply the adoption of more technology throughout the science lifecycle but developing the requisite skills and mindsets, supported by culture and policies, that allow our people and stakeholders to be agile and innovative.
- **Open science:** adopting open science as normal where appropriate for our research, sharing knowledge, data and tools as early as possible in the research and innovation (R&I) process, in open collaboration with all relevant stakeholders. Open science has the potential to increase the quality, efficiency and impact of R&I, lead to greater responsiveness to our mega challenges, and increase trust of society in the science system.

Te Ara Paerangi | Future Pathways

Contribution to the co-design of a reshaped science system in Aotearoa and undertaking the efficient and effective transition into new structures.

Operational Efficiency

The continuous evolution of our processes and systems to optimise back-office operations using advancements in analytics, automation and sensing technologies.

Open Science

Embrace 'open science' as the modus operandi for our research. In partnership with other CRIs and the wider stakeholder community, establish a National Research Data Infrastructure as a step towards an open science cloud that unlocks the digital capability and services within individual organisations through federated gateways and standards for the good of all.

Digital Transformation

Our desire to revolutionise the way we deliver science using new technologies, mindsets and ways of working; our desire to transform agriculture through the development and use of digital tools.

Te Mahere Matihiko supports the refreshed strategic direction laid out in *Tā Mātou Rautaki*. We discuss each of these four interconnected factors in more detail, and their alignment to our focus areas of Science Excellence, Partnerships, Mātauranga Māori and Smart Investments in the following pages.

Section Three

Te Ara Paerangi | Future Pathways

MBIE's Future Pathway programme will set the priorities for research, science and innovation to address the challenges facing New Zealand, such as the transition to a low-emissions economy and how to better reflect Te Tiriti and mātauranga Māori. Initial consultation through a government Green Paper commenced in the fourth quarter of 2021.

Designing the future

The Government has signalled that they will set priorities that reflect complex challenges such as climate change, reconsider the funding system for science and re-design the structure of institutions to deliver.

We need to take a strong position in order to build the necessary capability to act on those priorities and better adapt to fast-paced change.

Te Ara Paerangi | Future Pathway is an opportunity for AgResearch to help set the digital agenda across Aotearoa's science system. We see this as the right time to reimagine what a digitalised science sector would look like, to rethink how technology services are delivered, and to revolutionise the sector approach to digital delivery.

We will collaborate with other CRIs' IT functions throughout the co-design phase to ensure we have a holistic understanding of our collective needs, that we leverage common capability in the design of the future state and retain scarce and in-demand technical skills.

A safe transition

Reshaping of institutions has been signalled and is inevitable. We intend to take **an RSI sector** leadership role in the transition to new structures and collaborative models to ensure that our people's experience of change is one of transparency and respect. We will support our people through the safe transfer of the data and tools they require to continue delivering great science.

A well-planned transition that acknowledges the resources required to deliver an effective and efficient approach, is one that identifies the risks and actively works to mitigate them. We will plan and prepare for transition through the curation of our knowledge.

We see transition as having the greatest potential to disrupt delivery of our Systems Roadmap but conversely as a significant opportunity to realise a transformed digital delivery across the research, science and innovation sector.

The information technology functions across research institutions are candidates for efficiency gains. This must be balanced with the desire for greater technology adoption and digital developments. The technical skills in this area have become a sought-after and scarce resource: we will need a sector-wide, transition approach to ensure that we retain capability.

System assurance

Transition management

Information asset inventories

Entity incubation/establishment

Transfers/disestablishment

Licensing

Data catalogues

Governance

Agreements

Service catalogues

System strategies

Cost-sharing

Cybersecurity

Skills inventories

Operating models

Dual running

Transition will be a multi-year, complex programme that challenges us to consider how to make smart investments during a period of ambiguity and to collaborate on dual-running of systems and processes to deliver business-as-usual while we undergo disruption.

Section Four

Operational efficiency

> “Creating value for Aotearoa and our sector by investing wisely in our people and our science. As a profitable company, commercial returns from our work can be reinvested back into innovative science that enhances our ability to deliver on our core purpose.”

Tā Mātou Rautaki, AgResearch

1 Employee experience

Over recent years the AgResearch employee ‘Our Voice’ surveys have highlighted ongoing challenges for our people when carrying out processes within the current Information Systems architecture.

In understanding the user experience, we will look at the whole person: the tools that support their specialist areas and the ease and efficiency with which they engage corporate processes and compliance activities.

The ongoing COVID-19 pandemic has shown the need to ensure that our people can work, collaborate and continue to be a community even when we are physically remote. The right technology platforms and digital products are essential to our ability to deliver even in times of uncertainty and disruption.

Digital equity through deliberate inclusion must be an area of focus. Digital inclusion means increasing motivation, ensuring access, developing skills, and engendering trust in digital tools across our AgResearch community.

2 Integrated System

AgResearch has typically invested in systems from a functional perspective with minimal emphasis on the inter-connectivity of our end-to-end processes, such as Procure-to-Pay. This has created inefficiencies with double-handling of information and manual duplication across the Information Systems architecture.

In the future, we will acknowledge that the process of research, and the enabling business processes, require connected data and systems and we will no longer invest in point solutions without considering the end-to-end process.

Using modern architecture approaches we will develop an infrastructure of published and consumable data services allowing our ecosystem to better serve us with timely, accurate information through whichever user interface and step in process our people engage with. This will also enable us to link disparate datasets and glean meaningful insights in both science and business delivery.

3 Process improvement

Our people have articulated the need for processes and systems that empower them and a business rules framework that supports their delegated authority and simplifies approval processes.

Digitalisation affords us opportunities to streamline business functions through intelligent automation. Today's market solutions are field ready with web and smart apps that allow users to carry out administrative and management activities without being desk-bound, enabling us to meet our people's desire for greater freedom and flexibility in how, where and when they work.

Smart use of spatiotemporal techniques can enable us to prioritise workflow and information for individuals to match current priorities and location. These approaches will decrease the "noise" of non-science activities and enable greater conformance to good practice and matters of compliance.

4 Alignment

Digital success relies on a coherent framework of policies, processes and systems that work harmoniously to achieve the intended business outcome on clear and concise terms.

AgResearch established the Business Efficiency Programme in 2020 to deliver efficient systems and processes of which this Digital Blueprint and Systems Roadmap is an important step.

Going forward we need to consider holistically the systems, capabilities, services, and supporting tools (such as methodologies and frameworks) that enable us to leverage functionality whilst ensuring that we continue to manage, govern and protect our as-built information environment. This goes beyond corporate processes to how we conduct and deliver our science. It also goes beyond AgResearch to the wider science system with greater policy coherence and trust between research data communities needed to increase sharing of public research data across organisational borders.

Section Five

Transformative change

> "AgResearch will be the eResearch sector leader, empowering its researchers to apply advanced data driven research methods and applications in tackling current and future challenges and delivering value in a dynamic primary sector environment."

eResearch Platform Strategy, AgResearch

Digitalisation of science

Digital transformation entails a significant and irrevocable change to how we deliver our science, how we operate and how we engage.

It is all too easy to focus technology delivery on back-office efficiencies where market offerings are plentiful, however we aspire to strength in digital delivery for our core purpose and have already detailed an eResearch Plan to:

- Grow capability in digital research methods and tools;
- Establish a flexible eResearch Infrastructure with fit-for-purpose components;
- Deploy new digital services that support efficiency, quality and reproducibility of research and other AgResearch operations; and
- Position AgResearch as a Sector Leader amongst the CRIs in the eResearch area.

However, we recognise that the digitalisation of science is not an insular organisational activity and requires a more considered approach across the wider science system and with our stakeholders.

Tā Mātou Rautaki calls for us to deliver more transdisciplinary initiatives and to do so requires that we have access to the supporting digital products and services. The desire to undertake inter-, multi- and transdisciplinary research requires a more nuanced approach to data acquisition and data-sharing, balancing trust and social license with the delivery of insights and innovation. In the context of Aotearoa, this includes recognising and protecting Māori data sovereignty.

Science digitalisation brings several challenges, including the need to account for the increasing costs of managing data and keeping it secure. Greater policy coherence and trust between research data communities are needed to increase sharing of public research data across borders. Co-operation is required to build and provide access to cyber-infrastructure internationally and comply with mandates coming from research funders. We see an opportunity to begin addressing these matters within a New Zealand context through collaborative efforts across CRIs and through proposals into Te Ara Paerangi | Future Pathway, the most significant of which is to formalise collaborative, federated research capabilities through the establishment of a National Research Data Infrastructure (NRDI) as a step towards an Open Science Cloud for Aotearoa. Aotearoa.

Room exists within science to better exploit advanced digital technologies including the use of artificial intelligence (AI), blockchain and smart sensors. There are already several initiatives within our science portfolio exploring digital twins, augmented and mixed realities, and the development of digital tools that will eventually become commercial products on farms and in factories of food and fibre producers. We need to accelerate policies and plans across these and emergent technologies to ensure we can adopt and exploit advancements as they become available.

Most urgently this requires establishing a culture where digital is endemic within the research lifecycle. At its most basic, our focus will be digital equity across our science, beginning with stimulating digital mindset within our science cohort and making available a catalogue of services and capability easily used for planning, funding and delivery of science. This includes access to platforms, industry partnerships and diverse connectivity options that enable remote sensing and remote working as well as brokering access to science research services that may be available from other organisations, regardless of an NRDI.

Digital acceleration of food and fibre

Adoption of digital tools across all sectors has been accelerated by the COVID-19 pandemic. The response to limit the spread of the virus has significantly changed the way we work, deliver services, sell and buy products, and interact with each other. For some organisations the change has been irrevocable with knowledge workers maintaining some work from home privileges or not returning to offices even once restrictions have been lifted. The disruption to food and fibre supply chains has been significant and has highlighted how inequitable access to digital solutions is for our rural communities in particular.

Access to high-speed connectivity in rural areas remains a significant issue in Aotearoa,[1] however digital accessibility goes beyond infrastructural issues to the availability and analysis of data; and the willingness of farmers, processors, and manufacturers to adopt technologies and contribute their own data to the benefit of the overall food and fibre system.

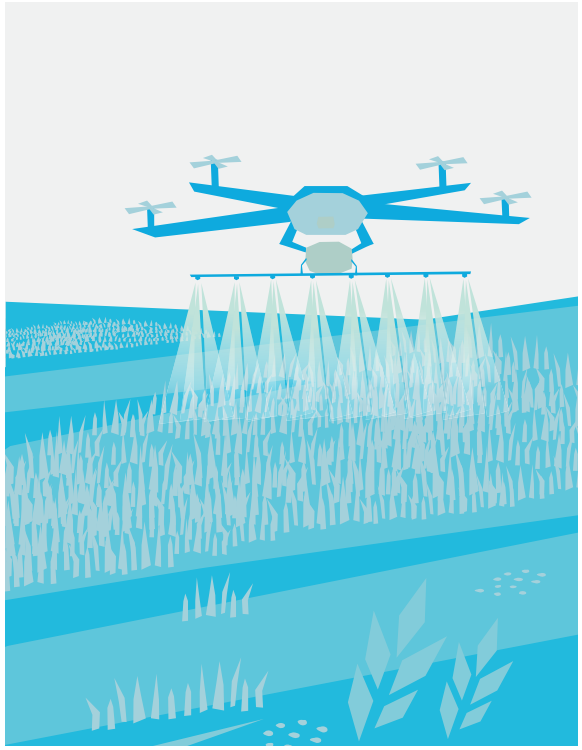
A significant impediment, as with digitalisation of science, is the level of trust across organisational borders and, where trust can be established, the interoperability of systems to exchange data in meaningful ways.

In the same way as we must establish a digital culture internally, we will need to work with our external stakeholders to understand the impediments to their digital adoption and collaborate on solutions that consider their context. This will mean more transdisciplinary approaches to investigation, solution design and commercialisation that encompasses information technology and user experience design skills to supplement our science.

Recovery for New Zealand's food and fibre sector in a post-pandemic world can be accelerated by insightful analysis, investments in automation and cost-reducing precision techniques, and trading on our quality and premium products. We can play our part in this by demonstrating how new business models – such as the subscription economy – can be applied to make our insights and services more accessible.

Issues of data standards cannot wait upon government initiatives - we should advocate on behalf of our stakeholders to embark in this work through a NRDI and by leading on standards related to food and fibre interoperability.

[1] *Agribusiness Agenda 2021, p21.*

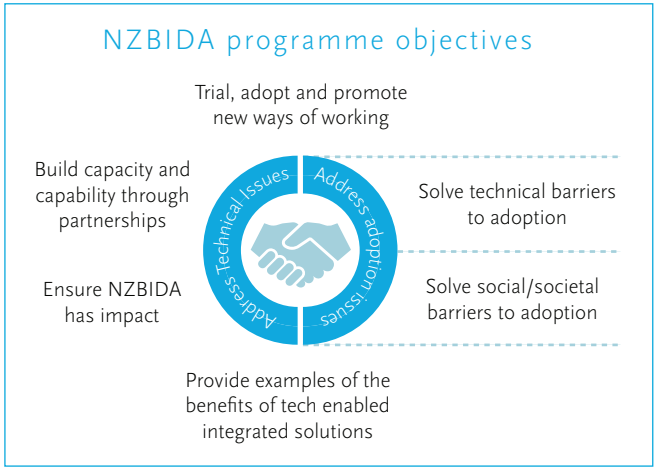


NZBIDA

AgResearch's New Zealand Bioeconomy in the Digital Age (NZBIDA) programme is about harnessing the power of digital technologies to enable the transformation of New Zealand Food Systems. Through Proof of Concepts, it has been testing the hypothesis that digital technologies are vastly more effective in addressing difficult problems than using reductionist approaches with the mission of "accelerating the transition of New Zealand agricultural system to the sustainable future through digital technologies. The focus is on food production systems sustainability, resilience and consumer wellbeing."

Through co-design with stakeholders and consumers to address both technical and adoption issues, the programme has five objectives to achieve its outcomes and the ambitious vision that "by 2025, establish that integration of technologies, data, science, models, systems and design can enable innovative systems-level solutions and smart, informed decision-making through the value chain, setting a transformation pathway for New Zealand food systems."

NZBIDA programme objectives



Innovation Centres of Excellence

Digital Agriculture

With the aspiration that we are New Zealand leading in agricultural decision-making tools and ruminant production and world class in animal-based food production systems and ruminant genomics and breeding, the Digital Agriculture Innovation Centre of Excellence (ICE) will deliver integrated data and innovative digital technologies to help farmers and stakeholder improve production, quality, security, and safety thereby building sustainability and resilience into the food system.

The Digital Agriculture ICE has capabilities in:

- Systems science–from seed to consumer
- Modelling
- Machine Vision
- Data Science
- Genomics
- Statistics
- Bioinformatics
- Artificial Intelligence
- Geospatial, visualisation and systems modelling

The Digital Agriculture ICE is the capability vehicle through which we will influence the digitalisation and accelerated transformation of the food and fibre sector.

A facility to support digital innovation

For AgResearch to remain relevant in an increasingly connected and data-driven world, a coherent approach to our ICE and digital-focussed programmes is required so that we can continue to reference and learn from previous initiatives as we embark on new ones. We also require the requisite hardware, software and technical skills to be readily available in support of our scientists.

For us to maintain currency and relevance, exposure to, and familiarity with, the available tools is key. Knowledge-sharing and training in the use of new digital technologies and techniques is fundamental to the continued professional development of our people.

The Data and Digital (D&D) Innovation and Concept Lab is proposed to be a physical space equipped with recent and emergent technologies to allow our people to demonstrate and trial new technology solutions and consider, with the support of technical specialists, how these could be applied to their disciplines. This includes advances in sensor technologies, a range of connectivity options from radio to 5G and beyond, micro-computing and wearables, visualisation and immersive experiences, among a plethora of other technology opportunities.

It will allow stakeholders and collaborators from around the world to convene via strongly integrated physical and digital facilities.

The D&D Innovation and Concept Lab will also be a facility for systems and user testing with sandboxes for our people to better understand how their solutions will perform on a diverse range of connectivity, end-user compute and cyber scenarios prior to on farm and factory field-testing. It will also play host to regular hackathon events to encourage transdisciplinary collaboration, digital creativity and rapid prototyping on solutions to complex problems.

We will undertake feasibility and design studies for this facility in 2022. It is our intent that this facility eventually be made available through the NRDI.

Section Six

An open science infrastructure for Aotearoa

We will embrace open science for our research and advocate for the development of sector-wide research platforms and infrastructures for all New Zealand. Looking to overseas trends we see the benefits of federated research data infrastructures that have been gaining momentum internationally. We will continue to prioritise collaborative design of our national research infrastructure and co-investment in digital technologies and services that unlock capability for all New Zealand.

Our long-term vision is for a federated, Open Science Cloud for Aotearoa which provides access not only to published data but a plethora of services and capabilities that support a digitalised science sector including code repositories, AI agents and automation accelerators.

In the near-term we support the development of a National Research Data Infrastructure (NRDI). A research data infrastructure for New Zealand is not a novel concept: a National Research Data Programme (NRDP) was proposed as part of eResearch 2020 led by the New Zealand eScience Infrastructure (NeSI), the Research Education Advanced Network New Zealand (REANNZ) and New Zealand Genomics Limited (NZGL) as co-patrons.

The NRDP proposed five major programme outcomes that are seen as building blocks for a national eResearch infrastructure:

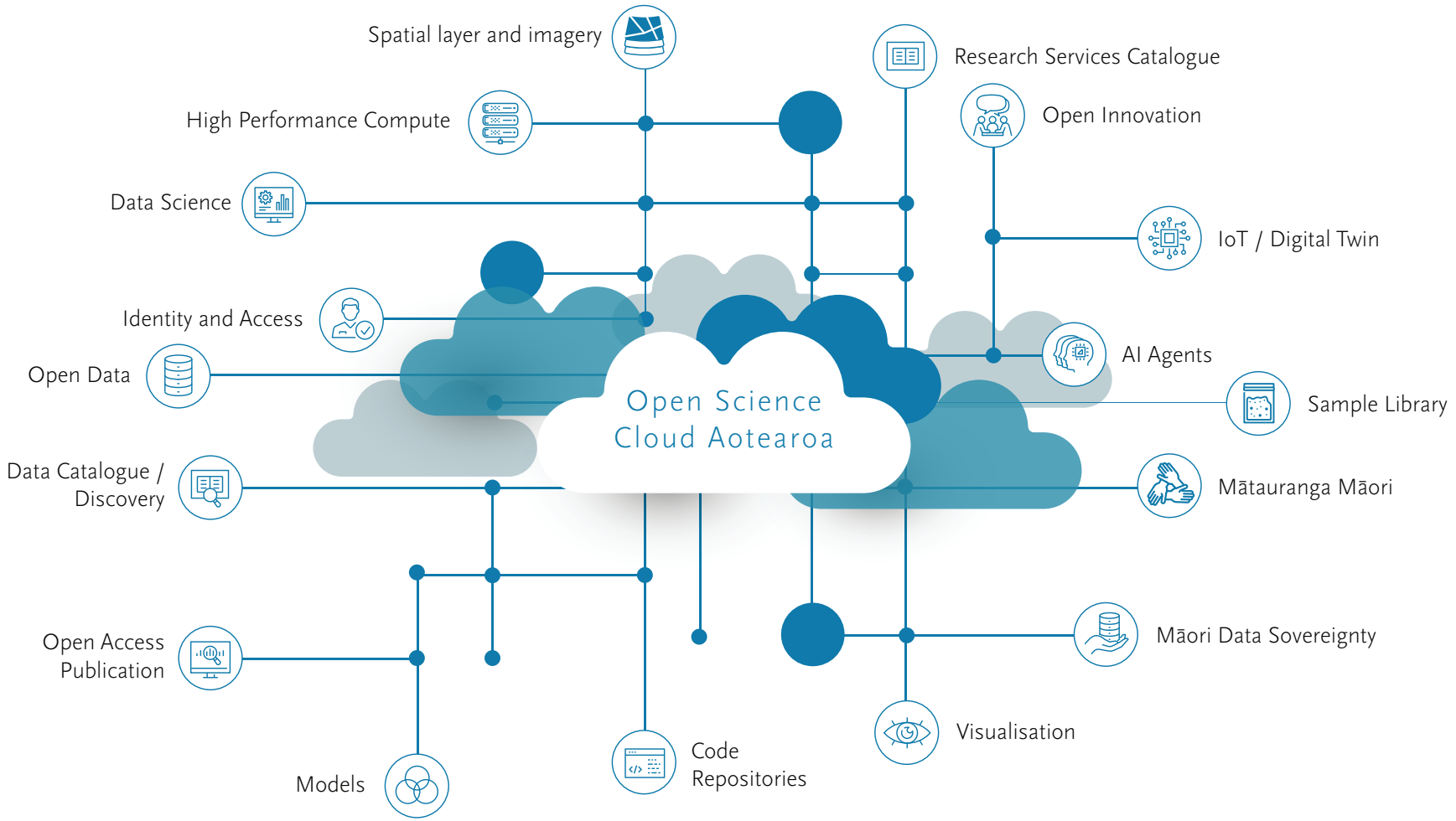
1. A national metadata catalogue for research data;
2. A comprehensive professional development programme
3. Operational support for data management
4. Development of active data bridges
5. Aligned national and institutional policies.

We agree that progress on these five outcomes are required to establish and mature a National Research Data Infrastructure with a focus on ensuring our science community has the requisite digital literacy to engage meaningfully in the development of data standards in their specialist areas.

We also believe that weaving the principles of Māori data sovereignty into the fabric of the NRDI is essential to its success and is a significant factor in creating an NRDI that is distinctively and uniquely Aotearoa-based. We will ensure that Te Tiriti o Waitangi obligations are addressed in the refreshed NRDP.

Establishment of NRDI is an international trend. In Europe this is aligned to the European Commission's policy priority for open science and the continued development of the European Open Science Cloud. This presents Aotearoa with an opportunity to consider overseas approaches to NRDI development as well as looking within the New Zealand context at data commons and Spatial Data Infrastructure (SDI) initiatives and learnings on interoperability and public-private partnership.

We recognise that centralised coordination will be required at the outset and so we are advocating for NeSI to continue leading the NRDP on behalf of the eResearch sector. Concurrently, our science community need to convene consortia for specific research domains and methods in order to agree the standards for their respective disciplines. We intend to lead work in subjects and methods related to food and fibre production.



Te Ara Paerangi | Future Pathway seeks to deliver a connected, resilient and adaptable modern system. We believe that the time is now to engage in a sector discussion on the national approach to deliver Open Science, Open Innovation and collaborative ideation, and to accelerate the delivery of an NRDI. Further, we must consider now what role the NRDI will play in a more digitalised RSI sector and how it can be used to publish not only data but research outputs, models, code, services, and intelligent capabilities to future-proof this fundamental infrastructure.


Design
App
UX
Visual
Usability
Web
UI
Project
Resource

Flexible, tailored experiences

We imagine a digital experience of the future that truly empowers our people. A digital experience that enables us to deliver science excellence through real and near-time data collection, novel approaches to analysing large and complex datasets, and by allowing us to visualise and experience our physical world augmented by insight and foresight.

It is our intent to ponder deeply how we can embed Te Ao Māori into our digital practices in an authentic way, one that acknowledges and celebrates our Māori heritage and respects Te Tiriti o Waitangi.

The turmoil of 2020 and 2021 has required an accelerated adoption of digital tools to connect our AgResearch community. When we look past these challenging times, we see technology not merely as a necessary tool to keep us working, but as a facility through which we can engage more widely with stakeholders and potential collaborators; and as a way to deepen and strengthen our partnerships.

Timely access to key information will enable us to monitor our performance, to course correct and to make smart decisions and smart investments.

It will allow us to hold ourselves accountable for the outcomes we commit to and to understand when and why we must reconsider what we are doing.

We have laid out a vision of a digital experience for the future that is flexible to our needs and tailored for our individual experience. We aspire to a future where technology frees us to work when and where it serves us and those we work with, untethers us from our desks, allows us to balance life and work for greater wellbeing and allows us to weight investment of our time and resources in the delivery of science. We see our digital approach supporting and delivering to our Ways of Working Framework.

We acknowledge that today's digital experience is far from the ideal we are striving for. Achieving the vision laid out in *Te Mahere Matihiko*, (this Digital Blueprint), will require considered tactical investment through Te Ara Pūnaha Hangarau, the Systems Roadmap, to FY24. Our challenge is to balance the response to today's very real system and process issues with laying the foundations for tomorrow's experience.

Section Seven

Tā mātou matawhānui mō te matihiko | Our vision for digital

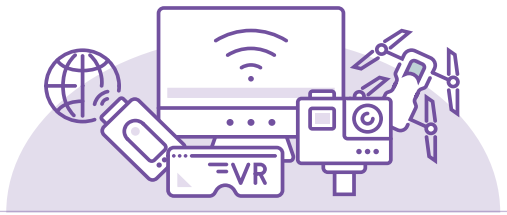
1 Empowering

Digital technologies are the enablers of deeper, more meaningful interactions, and are facilities through which new partnerships can be and will be established.

From the use of dynamic translation services to improve communication, to AI detecting patterns within complex and/or disjointed data sets and suggesting transdisciplinary collaborations, digital technologies allow us to access new ways of doing science and more efficient methods to undertake corporate processes.

Digital offers all our people flexibility to work in a way that serves them, those they work with and for, and on the things that are core to their jobs.

Our systems and processes are flexible to quickly meet changing business needs and can be adjusted to help us meet our goals.



2 Inclusive

Our people have equitable opportunity to participate using digital technologies. They know of, and understand, how digital technology unlocks opportunities to connect, learn, deliver and create efficiencies.

Our digital products and processes are accessible to a range of abilities and levels of adoption and have been implemented with a positive primary user experience as an absolute requirement; we are careful with the pace of change. Our field research is connected even in remote and challenging environments.

We can experiment and learn without fear and develop the skills necessary for an enriched digital experience. We have easy and timely access to training and support when the need arises.

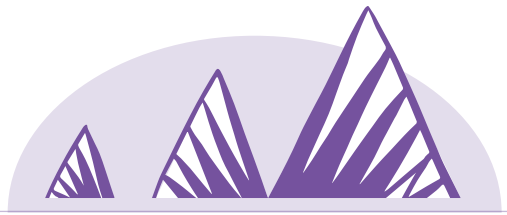
We trust that we are in control of our personal information and have conscious and informed adoption and outward utilisation of digital tools.

3 Te Ao Māori

Our commitment to Māori is embedded in our digital experience from the way that we manage our systems and data aligned to the principles of Māori Data Sovereignty to the language and visuals across the user interfaces that we interact with.

The digital culture is one founded on manaakitanga (care to others in our domain) and kotahitanga (unity and collective benefit); ours is a community facilitated and supported by our digital tools which welcomes all and celebrates our rangapū mahitahi (partnerships).

We reflect Te Ara Tika in our approach to digital and work closely with Māori stakeholders so that the digital tools we design and develop consider Māori contexts, support mātauranga and are harmonious with tikanga and kawa.

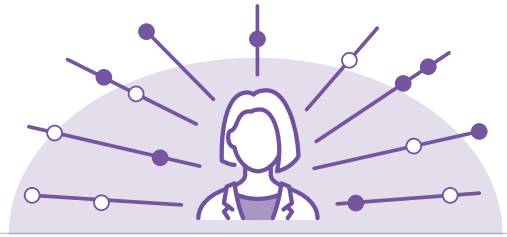


4 Intuitive

Technology is ambient, accessible and constantly learning our, and our partners', needs and preferences.

Our people are known to us on an individually unique and personal level. Using our human experience platform, we have a digital experience that offers assistance which will result in increased efficiency, quality and job satisfaction, identifies positive experiences and amplifies them across the organisation, assists us to focus on the truly important information and activities, and remain connected to our teams, stakeholders and projects.

Whether through traditional computing devices or through the use of voice assistants and immersive environments, we can be certain that the processes we engage with and the information we have brought to us reflect our preferences, ways of working, current environment and dynamic priorities.



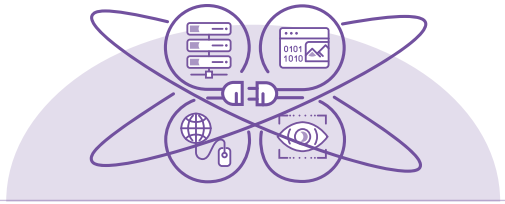
5 Connected

Our systems are highly connected to provide efficient and personalised services and outcomes. Our data are consolidated and linked so we can have a broad view across datasets and drill down into detail as required.

We can rely upon our ecosystem to ensure that data is recorded in, and queried from, the appropriate repository regardless of what viewer mechanism we use to enter or report upon them. Data is timely, accurate and can be relied upon to make good decisions.

Interoperability is key to allow data to be transferred across business units and organisational boundaries so that we can gain new insights from integrated, transdisciplinary datasets.

Protections are in place to enable us to meet our commercial, ethical, cyber and privacy obligations in a hyper-connected environment. This includes the principles of Māori Data Sovereignty.



6 Safe

Our people and all whom we work with are safe in the digital world. Our data, information and identities are kept secure. Our consent is sought for the use of our digital identity, and we are certain that information about us is used ethically for the betterment of our organisation and to achieve our common goals. We can inspect actions that have taken place on our fundamental records.

We trust that our leaders make good decisions and that wise investments are being made on the platforms and products which are core to our ways of working. Functionality we rely upon is protected.

Our digital literacy has matured, as has the digitalisation of our offering, and we understand our role in keeping ourselves and our community cyber safe. We have developed individual competence in information management including our rights and obligations for the curation and sharing of data.

Section Eight

Ngā Mātāpono Hoahoa Matihiko | Digital Design Principles

As an organisation, we are committed to putting people and science at the heart of our digital future. *Te Mahere Matihiko* and *Te Ara Pūnaha Hangarau* are underpinned by 10 Digital Design Principles which reflect our desire to work and collaborate guided by shared ideals. Our digital approach will:

1 Put people at the heart of digital

Our focus is to develop processes, tool, and services that empower our people, allowing them to spend their time and energies on the delivery of value-add activities and high-quality, innovative science. To do this we will reflect our Ways of Working Framework to create a digital environment that:

- Is safe and secure
- Provides choice
- Is open and connected
- Has the right tools
- Is adaptable and efficient.

Understanding user needs and context is key to creating tools that meet their intended outcomes and garner wide-spread support and adoption. We will employ user-centred design techniques throughout the development lifecycle from requirements, prioritisation and design through to testing and acceptance.

2 Be guided by science

We will implement technology platforms to mobilise and accelerate the digitalisation of science. We will support our scientists in developing digital products that contribute to prosperous land-based enterprises; and enable science to gather data in near- and real-time; to analyse large and disjointed datasets; and find patterns and insights in complex data. Novel methods and models will be guided by scientific rigour.

We will strive to keep pace with science, to broker capability that allows us to act quickly on new innovations and inventions. Conversely, we will challenge science to consider new paradigms, methods and digital tools to improve the delivery of research.

We will embrace and enable transdisciplinary initiatives and actively pursue open science principles to share and grow our knowledge.

3 Make an impact

We will support the delivery of *Tā Mātou Rautaki* by providing the technology foundations for digitalised science and agriculture.

We will align our investments in digital solutions with the strategic goals of the Science Plan by:

- Making available technology platforms that support the production of knowledge and innovations;
- Assisting in transdisciplinary research and the development integrated data and innovative digital technologies; and
- Using AI, automation, sensing technologies, digital twin and other advanced and emergent technologies to support scientific analysis and understanding.

4 Take a broad view

The uncertainties of a post-pandemic future and the disruption of sectoral reforms requires us to consider our investments in context of the RSI sector as a whole. We will consider the plans and strategies of our partners in our decision-making and continue to collaborate and co-invest in digital technologies and services with other CRI.

In developing these principles, we have sought guidance and learning from both within and outside the research sector. We will continue to look outward to share knowledge and glean wisdom. We will reflect on our own work to learn from previous endeavours.

We will continue to look for global trends and emergent technologies to consider how they might impact our science and disrupt our sector, fostering innovation and invention through disseminating these insights to our people.

5 Reflect our diversity

People are at the heart of our digital experience and so we will reflect and celebrate our diversity.

We seek to create digital equity through inclusivity, adopting the focus areas outlined in Te Mahere mō te Whakaurunga Matihiko, New Zealand's Digital Inclusion Blueprint. We will observe Te Ara Tika in our approach to integrate the principles of Te Ao Māori within our digital environment.

We will ensure our people have access to the resources and support to continue uplifting their digital literacy, managing the pace of change to ensure our digital environment is accessible to a range of abilities, level of adoption and connectivity. We will develop greater flexibility in our technology platforms to provide choice to our people in the devices and configurations that support their individual needs.

6 Be connected, adaptable and resilient

The right technology platforms and digital products are essential to our ability to deliver even in times of uncertainty and disruption. We will take a modern approach to systems architecture to ensure the interoperability, stability, security and scalability of our digital environment.

We will be Cloud-first and service-oriented as we refresh, replace and re-platform our aging solutions. We will seek heterogenous supply and connectivity to better serve our diverse range of research projects and stakeholders.

7 Improve continuously

We acknowledge that our digital environment is a constantly evolving work in progress. We will be agile in our approach and seek to deliver value and results early through minimum viable product, trusting that we will seek continuous improvement of our digital solutions.

We will reflect on our processes, ways of working and our principles in order to learn from our previous experience and adjust accordingly. We will be courageous in our decision-making.

We are open to ideas and will listen to our people and stakeholders; in our advocacy will constructively debate and challenge so our delivery remains connected to the evolving needs of our community.

We will continue to invest in our people and capability to ensure we frequently deliver increased efficiency, quality and job satisfaction.

8 Meet our obligations

We will ensure that we meet our obligations to our people and stakeholders through good governance of our digital environment,.

To keep our information safe, we will comply with the standards and good practices expected of us, develop solutions which are secure by design, and seek comfort through regular assurance.

To hold ourselves accountable for the outcomes we commit to, we will use digital solutions to actively assist us in meeting our wider obligations and to support our reporting. Our decision-making will be based upon timely and accurate information.

9 Align our values

We will be guided by our shared ideals and work in accordance with our common values. We will be conscientious in our decision-making and will consider the sustainability, inclusivity and ethical implications of our development approach and technology sourcing.

We aspire to be ethical in the delivery of our digital environment, to support New Zealand and Māori business and to consider the ethics of suppliers when procuring services.

We will reflect our organisational culture in the digital culture we develop, encouraging the competencies, behaviours and ownership we aspire to in the framework of policies, processes and systems that comprise our digital environment.

10 Demonstrate commitment to each other

Transparency and dialogue will underpin the digital culture we develop; one founded on manaakitanga (care to others in our domain) and kotahitanga (unity and collective benefit).

We will invest in our people so that they have the knowledge and skills to meaningfully engage with our digital environment and are enabled to understand their rights and obligations.

We will seek participatory leadership through governance and reference groups and own the decisions we make. We will inspire and engage our people to share responsibility for making tā mātou tūruapō mō te matihiko (our vision for digital) a reality and for ensuring our information and systems are kept secure. We will have each others' back. We are One AgResearch.