Capacity needs analysis for the Western Australian agricultural research, development and extension sector: Interviews

- Data, digital and modelling

May 2026

By Jane Wightman Consulting for the WA Agricultural Research Collaboration

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1. Executive summary

This report presents findings from a series of interviews exploring data, digital and modelling capacity in the context of the Western Australian (WA) agricultural research, development and extension (RD&E) sector. The study forms part of a broader capacity needs analysis for the sector.

Semi-structured interviews were conducted online with six interviewees from a diverse group of digital-enabled roles across the WA agricultural sector, including commercial service providers, industry organisations, farming businesses, consultancies, research groups and ag-tech companies. Insights presented in this document summarise key themes, systemic challenges and enablers and opportunities identified, and provide evidence for shaping recommendations in the final section of this report.

The interviews provide a clear and consistent picture; digital and data capacity is now fundamental to WA's agricultural RD&E system, yet the sector remains constrained by gaps in workforce capacity, translation, data interoperability and organisational readiness. Major disconnects between digital ambition and capacity, as reported by interviewees include:

- Fragmented, incompatible datasets and weak interoperability
- Data, digital and modelling translation
- Digital recruits lacking agricultural context, slowing implementation
- Large volumes of data that cannot be fully utilised
- Short-term projects unable to generate meaningful datasets
- Universities lagging in digital preparation of graduates.

Interviewees consistently stressed that people, not technology, are the key limiting factor, as indicated by:

- A shortage of hybrid roles: digital agronomy translators, data stewards, digital extension specialists, interoperability specialists and workflow designers
- Heavy reliance on international talent and visa challenges
- Geographic barriers limiting contextual learning
- Growing cybersecurity risks across the agricultural digital ecosystem
- Organisational culture, trust and leadership as major enablers or barriers to digital adoption.

Successful examples of the use of data, digital programs and platforms were also highlighted such as AI-driven analysis of trial data, rapid AI synthesis of research gaps and modelling enabled by increased computing power.

2. Foreword

The WA Agricultural Research Collaboration (WAARC) is Western Australia's (WA's) platform for collaborative agricultural research and development, bringing together government, universities, and industry to address key challenges such as climate resilience, productivity, sustainability, and biosecurity. Through its "Team WA" approach, WAARC drives practical, industry-led research that maximises impact while building capacity and strengthening the State's future agricultural workforce.

In August 2025, WAARC commissioned a capacity needs/gap analysis (Needs Analysis) to identify and validate WA's current and future human capacity requirements in the agricultural research, development and extension (RD&E) sector. This work is intended to guide WAARC and others in planning and investment to equip the sector with the expertise, skills and workforce structure to meet emerging challenges over the next 5 to 15 years. The work is a point in time stocktake, conducted by Queensland-based Jane Wightman Consulting.

Five reports relating to the Needs Analysis are now publicly available (May 2026):

1. Capacity needs analysis for the WA agricultural RD&E sector: Summary report
2. Capacity needs analysis for the WA agricultural RD&E sector: Literature review
3. Capacity needs analysis for the WA agricultural RD&E sector: Sector-wide survey
4. Capacity needs analysis for the WA agricultural RD&E sector: Interviews (Workforce pipeline and early career attraction)
5. Capacity needs analysis for the WA agricultural RD&E sector: Interviews (Data, digital and modelling **(this report)**

Apart from the Summary report, these reports reflect the chronological flow of the study, which began in August 2025 and was completed in December 2025. The reports should not be considered independently of each other, but as a part of a package.

The aim of the Literature review was to ascertain what evidence was already available about needs/gaps in human capacity in the sector for WA, and to use this information to guide the structure and questions for the survey. The sector-wide online survey was the key data collection mechanism for the Needs Analysis, with 92 respondents from middle/senior manager, cross-discipline positions across the WA agricultural RD&E sector. Two focused interview topics were then selected from survey findings, with 15 interviews conducted. The Summary report brings together an overview of the findings from the suite of reports.

At each key step in the Needs Analysis process, feedback and validation were sought from a Strategic Advisory Group, comprised of senior and middle managers from key organisations and businesses across the agricultural RD&E sector.

By the WA Agricultural Research Collaboration, May 2026

3. Introduction

This report presents findings from the data, digital and modelling interviews. Insights presented in this document summarise identified key themes, systemic challenges, enablers and opportunities, and provide evidence for shaping recommendations specific to this area of capacity need in the final section of the report.

Throughout this report, the term ‘capacity’ is used and is intended to encompass the skills, knowledge and competencies of individuals and the overall resources, systems and workforce depth that enable delivery. This use of the word capacity reflects how stakeholders commonly describe workforce strengths and gaps across the RD&E system.

Note: Elements of the original Introduction have been deleted to reduce repetition with WAARC’s Foreword, which is included for consistency and context across the suite of Needs Analysis reports.

4. Methodology

Interviewees

The six interviewees represented a broad mix of digital-enabled roles across commercial service providers, industry organisations, farming businesses, consultancies, research groups and ag-tech companies.

Nominations for interviewees were provided by the Needs Analysis Strategic Advisory Group.

Digital and data context to interviewee roles

Most interviewees described digital and data capability as central to their daily operations and decision-making.

Across organisations, interviewees highlighted the integration of multiple data sources, agronomic records, machinery data, remote sensing, modelling outputs and analytics to support growers, coordinate projects, benchmark performance and meet reporting requirements.

Several noted that digital tools are now embedded in everything from project management to environmental monitoring and extension. Large agribusinesses described data science as their fastest growing area for recruitment, with digital transformation reshaping workflows via greater computing power and advanced software.

Consultants and grower-facing organisations emphasised their role in helping clients extract value from the data they already collect, translating complex datasets into meaningful on-farm decisions. Interviewees also pointed to wide variation in digital literacy, requiring organisations to act as interpreters between advanced tools and practical use.

Across most responses, the message was consistent: digital and data capability is now fundamental to operational efficiency, strategic decision-making, organisational credibility and risk management, ‘data runs the business now’.

Analysis of interviews

All interviews were conducted online by the project lead and recorded.

The analysis combined quantitative and qualitative methods. ChatGPT Plus was used to assist in analysing de-identified responses to identify key themes and capacity relationships. All artificial intelligence (AI) assisted outputs were reviewed and validated by the project lead, ensuring analytical rigour and contextual accuracy.

This hybrid approach, combining human expertise with AI-enabled text analysis, enabled systematic identification of key themes, validation of quantitative trends with qualitative insights, and the development of an integrated understanding of WA’s current and emerging RD&E capacity needs for this subject area.

Acknowledgment

We sincerely thank all interviewees for their time, openness and thoughtful contributions. Their insights, drawn from their professional experience, provided the depth and real-world context essential to this analysis. Their willingness to share experiences, challenges and aspirations has directly strengthened the Needs Analysis findings, and we gratefully acknowledge their expertise and generosity.

5. Digital and data capability priorities and disconnects

5.1 How digital and data capabilities shape RD&E priorities

Interviewees consistently described digital and data capabilities as central to shaping RD&E priorities, influencing everything from scientific strategy to funding requirements, operational workflows and industry service delivery. Digital tools drive priorities around interoperability, standardisation and the ability to generate insights across platforms, users and technologies.

One interviewee emphasised that digital priorities are about helping growers ‘collect information, organise it… analyse… predict and then ultimately… layer this AI/ML (machine learning) future’. Another stressed that digital capacity now sits *‘at the centre’*, with all research areas becoming ‘data driven and data enabled’ across agronomy, satellite sensing, disease, genetics, genomics and modelling.

Digital capacity is also reshaping business and research strategy. One organisation has pivoted its scientific direction because low-cost genotyping and increased computing power allow analyses that once took ‘six weeks’ to be completed ‘within a week’, even while ‘doubling the amount of data’. Another described AI as ‘blowing my mind what's going to be around the corner’, with staff already using AI to generate insights from trial datasets that traditional programs could not.

Interviewees noted that data quality, monitoring and reporting are now central to securing and delivering RD&E contracts. As one put it, ‘Any federal contract now has strong MEL (monitoring, evaluation and learning) frameworks… we need the instruments early’. This increasing emphasis on data capacity means to do it properly organisations must structure projects around evidence, outcomes and reporting from the outset.

Despite these shifts, interviewees highlighted substantial disconnects between digital ambition and the realities of implementation.

5.2 Biggest disconnects between ambition and implementation

A major disconnect stems from international structures and external constraints. One interviewee from a global company explained that aligning RD&E priorities across countries is extremely difficult, describing the challenge as ‘trying to get global alignment on what the needs in different markets are’. The Australian team must ‘advocate for our needs to maintain that investment and maintain that innovation’, illustrating how organisational ambition is sometimes limited by global decision pathways rather than lack of capacity.

A second disconnect revolves around translation between technical experts and agricultural domain specialists. Interviewees described a persistent gap where people with data, digital and modelling skills and those with ‘domain knowledge and expertise of what do we want and why’ often ‘stand together talking a totally different language’. This makes digital innovation difficult to embed. Bridging this gap takes significant time, with one interviewee saying it took ‘**** forever’ to understand the diversity of farming systems. New digital staff often ‘have no idea of a southern farming system’ or crop cycles, limiting real-world application. Some organisations are investing heavily in familiarising their data, digital and modelling staff, sending developers to the field so they can ‘feel what it’s like to stand on a large-scale property… and not just see that experience through the code base’.

Several interviewees noted structural and ecosystem level disconnects. One described precision agriculture as ‘hard work’ because foundational data layers are missing, access is inconsistent and datasets are fragmented across the industry. Technology adoption also faces behavioural inertia, where change ‘takes time and effort to absorb and change behaviour on farm’.

Another major barrier is the gap between data capture and meaningful use. Organisations are collecting large volumes of imagery and machine data, but as one interviewee said, ‘we are in the business of capturing data. We haven’t yet worked out how to fully deploy it and utilise it’. Integrating drone, satellite, machine and model outputs remains unresolved. Field staff and farmers lack time, skills or structure to turn datasets into insight. One interviewee summarised this as: ‘Growers don’t have the time and space to really use and leverage the data’. Even when machinery companies collect vast amounts of data, ‘growers don’t have the skills or time to use it’.

Disconnects between funder expectations and practical conditions also limit implementation. Interviewees described unclear project targets, poorly defined reporting frameworks and short project durations that prevent the development of meaningful longitudinal datasets. As one put it, ‘projects aren’t funded long enough to get really good datasets’. Another noted, funders sometimes provide data instruments halfway through a project, which they described as ‘not acceptable’ to efficient and successful monitoring and evaluation.

Finally, interviewees expressed concern that the broader WA system lags behind in digital readiness, particularly universities. Students are reportedly ‘banned from using AI’ and training still relies on ‘doing statistics the traditional way’, which deepens the capacity gap between industry expectations and graduate readiness.

6. Organisational conditions influencing effective digital tool use

6.1 Trust

Interviewees consistently emphasised that effective use of digital tools is shaped far more by trust, culture, collaboration and leadership than by formal policies or technology. Trust and data security were repeatedly described as the foundation for digital uptake. One interviewee noted that ‘the data that growers put into the system has to be secure… they have to be confident it is accessible’ and clearly governed. Their organisation voluntarily pursued certification under the Farm Data Code because ‘it is valuable to have that’.

However, growers remain cautious due to long-standing concerns around data ownership and maturity, with one interviewee observing ‘there’s been this trade-off between… sensitivity towards data ownership… even if it is aggregated and de-identified’. As one put it, ‘No one actually cares about the policy… do I trust this person or not? Or do I trust this entity or not?’

Trust takes time to build, with interviewees pointing to long periods where clients asked, ‘What is going to happen if I do this and you know, do that?’ Access to data is also shaped by fragmentation rather than rules. Rainfall data, for example, sits across multiple systems, ‘on-farm weather station’, ‘rain gauge’, BOM, so agronomists use whatever is easiest, even if less accurate. This reflects a wider theme: culture, norms and practical ease of access determine whether digital tools are used.

6.2 Collaboration

Collaboration culture and skills were identified as equally critical. Interviewees highlighted that meaningful digital innovation depends on interdisciplinary collaboration, with one stressing that the ‘number one focus has to be around building collaborative skills capabilities’.

Current academic culture often works against this, with ‘people in universities… working in small groups and being very self-focused’, which limits large, agile digital programs. Some organisations counter this by treating funders as ‘co-investors’, allowing greater agility and alignment between digital tools, research design and end-user needs.

6.3 Structural constraints and staff capacity gaps

Interviewees also described several structural and organisational constraints. ‘The cost, the initial setup…’ burden remain a significant barrier. IP and data-sharing tensions create additional friction. One organisation historically shared everything with partners, but custom systems have created awkward expectations: “We are sharers… but now funders see it and say, ‘We want that system’”. This forces organisations to balance openness with protection, especially given growing investment in digital infrastructure.

Staff capacity gaps also limit digital tool use. Tools are ‘only as good as the user’, and uneven digital capacity leads to inconsistent use and broken workflows. This is compounded in organisations operating within restrictive government IT environments. One interviewee noted: ‘We are a bit restricted… but they are starting to open up the can’. These IT constraints limit what tools, integrations and AI systems organisations can adopt.

6.4 Leadership, culture and translational roles

Several interviewees stressed that culture, openness and leadership attitudes are often the biggest enablers. In one organisation, innovation emerged because leaders ‘just let people play in this space… make sure everyone’s got a passion and they are very happy to try new innovative things’. Successful digital implementation also depends on strong relationships between data scientists and domain experts. Data scientists often need to ‘dumb down their language so that people like me can understand it’.

Leadership capacity was flagged as a major determinant of digital maturity. Workplace culture also shapes recruitment and retention, with one interviewee noting that organisations that say, ‘we can’t get staff’ need to ‘have a look at your culture’.

7. Where focused investment in digital and AI capacity would deliver the greatest leverage

7.1 People are the highest value investment

Across interviewees, the strongest and most consistent message is that the greatest leverage comes from investing in people, particularly those who sit at the intersection of digital capacity and agricultural domain knowledge.

One interviewee stated directly: ‘I would invest in people… because the technology is not going to solve the problems itself’. They stressed that current capacity near the farm gate is limited and the real need is developing people’s ability ‘to ingest and know which tool to use’.

This requires training that builds ‘multi-dimensional thinking’ and the ability to make informed trade-offs within complex production systems. Investment across tertiary pathways was seen as essential to help new professionals understand technical, commercial and agricultural environments.

These transnational facilitators are rare, stretched thin and critical to enabling digital adoption. One proposal to counteract this was a targeted training and collaboration initiative involving research bodies, industry, commercial organisations and digital agriculture businesses with clear value propositions. The program would coach how to bridge digital, agronomic and practical settings. The aim is to ‘create the space for trust to develop and real collaboration to occur’. This would form a highly capable, long-term cross-sector team, potentially evolving into a ‘Team Australia Ag’ model.

7.2 Focus investment on adoption, not AI development

A second strong theme is that investing in AI capacity alone would not deliver impact. One interviewee argued: ‘AI… is just another analytical component in data’. They stated that the real leverage lies in investing in the demonstration of adoption benefits, because ‘people are not adopting this technology’.

Without clear evidence of economic returns, farmers prioritise other activities: ‘If I was a farmer… I would be future trading. I would not be worried about my data analytics… the economic benefit… has not been clearly demonstrated’. Thus, priority should go to adoption demonstrations, practice change programs and economic validation rather than additional AI development.

7.3 Grower capacity gaps limit impact

Several interviewees reiterated that the biggest return comes from building capacity rather than systems: ‘It is definitely around the people… freeing their time and focusing on collaborative efforts'. They identified weak data literacy and applied digital capacity among growers and RD&E staff, observing: 'Growers don't have the time or skills to leverage their data' and even highly digital corporate growers admit 'they use their data well, but they still say they do not use it well enough'. As a result, they would invest in data-skilled facilitators, digital extension roles, capacity building for growers and RD&E practitioners. Structured human capacity investment was seen as creating sector-wide uplift far more effectively than additional hardware or software.

7.4 Large-scale integration of datasets

A contrasting but complementary perspective identified the greatest leverage point as investing in cross-sector data infrastructure that enables large-scale integration of datasets.

One interviewee prioritised joining datasets across the WA grains system from organisations such as CBH, John Deere, national data centres, Centre for Crop and Disease Management (CCDM), Grains Research and Development Corporation (GRDC) and breeding companies to 'go solve nitrogen', described as WA's 'biggest input cost', 'biggest emission source' and 'biggest negative drag on profitability'. They highlighted the value of allowing large language models to explore integrated datasets without predefined assumptions: 'We are now at the point where we do not actually know… but if you have got big datasets, you actually let the large language model explore and see what it comes up with'. Here, the priority is cross-sector data architecture and collaboration rather than capacity building in a single organisation.

One interviewee noted that precision agriculture remains a frontier but argued that there is no market failure requiring public investment, as 'service providers… are getting better' at providing cost-effective solutions.

8. Hybrid roles and missing skill sets needed to make digital innovation genuinely useful

8.1 Key missing hybrid roles

Interviewees consistently emphasised that digital innovation is limited not by technology but by missing hybrid roles that can bridge digital capacity, agricultural domain knowledge, commercial reality and user-centred design. The sector lacks people who can connect research, tools and real-world farming systems in a way that delivers usable value.

The most frequently identified gap is the need for individuals who can 'bridge the gap' between research and commercial application. Interviewees highlighted roles that can embed 'commercial realities' early in research projects so that tools have a pathway to impact. These individuals convert technical requirements into 'a customer experience' and require structured exposure to agriculture to design tools growers can actually use.

A core missing capacity is people who combine deep agricultural understanding with digital skill sets. Interviewees described this as the 'nexus… of having the skill and understanding either in the same person, or in a close-knit team' that can sustain cross-collaboration. This includes people with IT capacity who genuinely understand modern farming systems, not just those with limited farm exposure such as 'the farm with 20 cows…'. Agronomists with digital literacy (Geospatial Information Systems (GIS) coding, spatial data handling) are also in short supply.

8.2 Missing skill sets and capacity gaps

Two major missing data and digital skill sets were also repeatedly mentioned:

- **Data interoperability specialist:** The 'single biggest limitation… is the interoperability of the data itself' because machinery, software and sensors operate in incompatible formats, the system lacks people who can automate 'the amalgamation or the integration of data'. Current users do not have the processing capacity or technical tools to handle these data flows.
- **Advanced users who can handle high-dimensional data:** There is a shortage of people beyond the farm who can understand and work with large, complex datasets and 'amalgamate them together'.

Interviewees also identified gaps in experimental design capacity. Without good design, 'you are not actually going to answer the research question', even with large datasets or sophisticated analytics. Poor alignment between data collection and research intent limits digital value.

Digital innovation within machinery companies is creating new skill needs. Modern harvesters adjust settings 'instantaneously' using radar-enabled sensing, requiring new roles such as electronic engineers, staff who understand machine data capture and technicians who can interpret and support on-machine analytics. Sales staff often ‘don’t even know what it is capable of’, revealing a widening capacity gap.

Interviewees foresee greater need for tech-savvy graduates from computer science and AI who can apply AI in agricultural contexts. Many ‘are into the tech and do not know where to apply it’, so earlier exposure to agriculture is needed.

Several interviewees pointed to missing enterprise-level capacity issues: One being workflow and process analysis capacity, saying organisations lack people who understand and optimise digital workflows. As one put it: ‘Knowledge gaps in workflows are really important and I think that is missing’. Another capacity issue is digital project management and integration skills.

Many tools, such as M&E (monitoring and evaluation) platforms, evolve into complex systems that require integration and coordination. One interviewee explained they started with developing an M&E platform, but it has morphed into a project management system and the industry lacks skills to manage it.

9. Successful examples of data, digital, modelling or AI-informed decision making

Interviewees provided multiple examples showing how digital tools, modelling and AI are already informing real decisions in RD&E and on farm. Several examples demonstrate clear success, while others highlight persistent constraints that limit full deployment.

Example 1: Long-running use of grid soil sampling, interpolation and modelling to create ‘variable rate prescriptions’ for lime

A long-running example involved the use of spatial soil data, grid sampling and modelling to inform lime application decisions. High-resolution soil sampling is ‘interpolated, fed into models that determine how much lime you need to apply’. The resulting outputs are adapted with ‘agronomic context’ to produce ‘variable rate prescriptions’. This practice is well established, adoption has been ‘increasing… for about 10 or 15 years’ and is now ‘common practice’. The success of this example stems from strong integration of digital data capture, modelling, agronomic interpretation and on-farm decision support.

Example 2: AI-driven analysis of crop variety trials identified flowering-time triggers

Another clear example involved AI-driven analysis of crop variety trial data. Staff fed large datasets into an AI tool and asked it to identify flowering-time triggers. AI quantified the contribution of day length and thermal time, ‘this variety is 70 percent day length, 30 percent thermal time’, and highlighted genetic responses breeders ‘don’t know’ because they had not analysed the data this way. This illustrates how AI can generate insights that traditional research had not produced, enabling faster interpretation of complex data.

More examples: AI used to accelerate analysis and decision making

Interviewees also described several operational examples of AI being used to accelerate analysis and decision making:

- AI for co-design synthesis and road-mapping: Organisations use AI to turn co-design workshop outputs into usable models or roadmaps, ‘We use AI to model and roadmap what we do with that information… it takes out that assessment period… AI does that work for us’.
- AI to rapidly synthesise livestock research gaps: AI completed a livestock research gaps analysis in two months instead of eight.
- Another strong example relates to an annual meta-analysis used to guide breeding advancement decisions. Previously, processing statistical analyses took six weeks, but improved computational power (‘bigger computers, supercomputer type thing’) and

better software that could ‘deal with that level of data’ enabled completion ‘within a week’ while ‘doubling the amount of data going into it’. Falling genotyping costs, ‘cheaper to genotype than it is to have a plot in the field’, also shifted scientific strategies and supported more data-rich decision making.
- AI for information retrieval and decision support: AI gathers information and frames decisions, ‘We have been using AI to gather information and frame decisions… we are [in the] early days’.

Challenges and what made success possible

Challenges identified by interviewees:

- Large imagery datasets cannot yet be fully deployed or utilised.
- Persistent challenges with incompatible formats, unstructured data and limited analytical capacity.

Despite collecting large volumes of imagery data, organisations ‘haven’t yet worked out how to fully deploy it and utilise it’. This highlights ongoing difficulties with data integration, unstructured imagery analytics and turning raw data into actionable insight.

Across all examples, successful digital and AI-enabled decision making depends on:

- strong integration of data capture, modelling and agronomic context
- adequate computing power and modern software
- staff capacity to interpret outputs
- clearly defined decision pathways
- alignment between data formats, tools and analytical methods.

What made success possible:

- Strong integration of data capture, modelling and agronomic interpretation.
- Increased computing power and modern software.
- Clear analytical pathways and well-structured datasets.

10. Additional workforce pipeline issues and related insights

Recruiting challenges and geographic barriers

Digital development roles prioritise IT capacity, while agricultural experience is seen as optional or sometimes misleading. For regional agronomy roles, interpersonal skills matter most, with digital skills viewed as teachable. A major challenge is geography: many digital experts work in Melbourne, Sydney or the Gold Coast, making it difficult and time-consuming to expose them to real farming contexts, ‘you can get them to the edge… but that’s a whole day out’.

Structural constraints in industry-wide digital capacity

Interviewees expect future dominance of large, globally designed digital agriculture platforms (e.g. advanced machinery operating systems), which requires WA agriculture to prepare for technologies built overseas rather than locally. They argue the sector needs deliberate, training-oriented cross-sector collaboration cohorts rather than ad hoc meetings: ‘actually create the space for real collaboration’.

Strong reliance on international talent and visa constraints

Some centres have ‘32 different nationalities’ and only ‘about 10 percent’ of staff are Australian born. Visa delays and restrictions create a ‘double whammy’ for recruitment. Domestic students rarely come from agriculture, ‘pretty much every domestic student comes from an area other than agriculture’.

Cybersecurity as a major workforce and system risk

Cybersecurity was described as a ‘major, unaddressed risk’, with agriculture being ‘the most vulnerable industry… no one is talking about how at risk we are’. The complexity of multi-stakeholder systems, large capital flows and poorly protected platforms makes the sector especially exposed.

Need for verified data and policy frameworks

Interviewees emphasised the need for credible policy frameworks ensuring AI outputs are ‘factually correct’, connecting this to climate-policy debates and risks of misinformation.

11. Recommendations

The following data, digital and modelling recommendations have been prioritised based on the strength, frequency and consistency of themes raised across the data, digital and modelling interviews.

Human capacity data, digital and modelling issues that interviewees identified as the most critical, most frequently repeated and most directly constraining digital adoption are at the top of Section 11.1 below. These include roles and skills repeatedly described as missing, essential for translation, or urgently required to bridge the gap between data science and agricultural practice.

Recommendations relating to systemic, governance or infrastructure conditions, while still important, were mentioned less frequently or framed as enablers rather than core capacity gaps. These are presented in Section 11.2.

11.1 Recommendations - Core human capacity needs

Below are nine recommendations related to human capacity data, digital and modelling issues that interviewees identified as the most critical and directly constraining; ranked from most to least as emphasised in the interviews:

a) Build a cohort of digital agronomy translators and digital extension specialists: These roles connect data science with real farming systems, ensuring digital tools are usable, relevant and trusted. Investing in these hybrid professionals closes the translation gap that is repeatedly stopping digital innovation from reaching growers.

b) Strengthen applied digital capacity across growers, advisers and RD&E staff: Many staff and growers can access data but lack the skills to interpret and apply it effectively. Structured training in analytics, coding, GIS, modelling and decision support will enable people to turn raw data into meaningful insights. The level of ability required will dictate the type of training delivered.

c) Develop structured cross-sector training, induction and exposure pathways: Digital and AI specialists need hands-on exposure to farms, seasons and machinery to understand agricultural realities. This can happen at three levels: At high school with IT students, at university with data science, engineering and technology students and with early career digital and AI professionals.

d) Strengthen data stewardship, long-term technical roles and digital workforces: Digital transformation depends on people who curate, clean, manage and maintain datasets, not one-off project staff. Long-term data stewardship roles protect WA's data assets, reduce duplication and build continuity across decades.

e) Build data interoperability, workflow and integration capacity - Digital systems fail when data from sensors, machinery, satellites and software cannot talk to each other. Investment in interoperability specialists and end-to-end workflow design ensures data moves cleanly from collection to decision making.

f) Invest in adoption pathways and economic demonstration, not new tools alone - The biggest barrier is low adoption, not a lack of tools, so investment must focus on demonstrating economic benefits and supporting practice change. Clear decision pathways and real-world demonstrations make digital innovation worthwhile for growers.

g) Build AI interpretation, safety and responsible use capacity - As AI becomes embedded in RD&E workflows, staff must understand its risks, limitations and appropriate use. Responsible AI frameworks protect growers, maintain trust and support accurate, transparent decision-support tools.

h) Modernise university and higher degree research (HDR) training for digital agriculture - Current university programs are not preparing graduates for an AI-enabled agricultural future. Updating curricula to include digital workflows, AI, modelling and geospatial analytics will strengthen the long-term workforce pipeline.

i) Invest in cybersecurity capacity and system protection - Agriculture is now one of the most vulnerable sectors to cyberattacks, yet cybersecurity skills are scarce. Building ag-specific cybersecurity capacity protects data, equipment, supply chains and farm businesses.

11.2 Recommendations - System, infrastructure and governance enablers

Below are a further six recommendations around system, infrastructure and governance enablers of delivery of good digital, data and modelling systems:

a) Incentivise data sharing through funding conditions - Without clear expectations, many datasets stay hidden in organisations and never support broader innovation. Attaching data-sharing requirements to funding ensures that public investments deliver shared value.

b) Establish a WA agricultural data governance framework - A unified governance approach gives growers certainty about ownership, access, privacy, consent and security. This builds trust and reduces fragmentation so datasets can be linked and reused safely.

c) Develop a shared data infrastructure / federation layer - A federated model connects datasets across organisations without forcing centralisation, enabling new analytics and modelling. Linking systems across the Department of Primary Industries and Regional Development (DPIRD), universities, grower groups and Regional Development Commissions unlocks insights currently trapped in silos.

d) Build strong industry research data partnerships - Partnerships with machinery companies, tech providers and national data centres allow WA to connect critical datasets and tackle high-value problems like nitrogen use efficiency (NUE). These partnerships work best when governance is shared and the benefits for each partner are clear.

e) Invest in field-ready digital infrastructure and connectivity - Patchy connectivity and slow data transfer limit digital adoption, modelling and sensing across regional WA. Strengthening telemetry, edge processing and sensor networks ensures data can flow reliably from paddock to cloud.

f) Build AI-enabled knowledge systems to reduce ‘research on the shelf’ - Many RD&E outputs remain unused because they are difficult to access, navigate or interpret. AI-enabled knowledge systems can surface relevant insights quickly, helping growers, advisers and researchers apply existing research to real problems. Identify any current knowledge systems and encourage collaboration and one platform accessible to all, delivering one source of truth.

12. Conclusion

The interviews provide a clear and consistent picture; digital and data capacity is now fundamental to WA's agricultural RD&E system, yet the sector remains constrained by gaps in workforce capacity, translation, data interoperability and organisational readiness. While digital ambition across organisations is high, implementation continues to lag due to structural, cultural and human-capacity barriers.

Across all organisations - commercial providers, research groups, farming businesses, universities and technology companies - digital and data functions are becoming embedded in daily operations, strategic decision making and service delivery. Interviewees emphasised that 'data runs the business now', and digital tools underpin everything from agronomy support and breeding analytics to environmental monitoring, benchmarking and large-scale modelling. Advances in computing power, low-cost genotyping, AI and machine learning are reshaping workflows, accelerating analysis and opening new opportunities for insight generation.

However, several systemic constraints prevent the sector from realising the full value of digital innovation. The most significant barrier is the shortage of people who can bridge digital capacity and agricultural domain knowledge. Interviewees stressed that digital transformation depends on people, translators, integrators, data stewards, digital extension specialists, agronomists with data literacy, analysts and cross-disciplinary collaborators. These hybrid roles are currently scarce and growing this capacity is viewed as the highest-leverage investment.

Organisational culture, collaboration and trust also strongly influence digital maturity. Trust governs data sharing far more than policy, while university silos, restrictive IT systems, capacity inconsistencies and global corporate structures can hinder progress. Fragmented datasets, incompatible formats, missing data layers and a persistent gap between data capture and meaningful utilisation exacerbate these challenges. Several organisations continue to collect more data than they can analyse, interpret or deploy effectively.

The workforce pipeline faces additional pressures, including limited agricultural experience among new digital entrants, geographic barriers to contextual training, reliance on international talent, visa constraints, and at times mismatches between university training and industry digital needs. Interviewees also identified cybersecurity as an emerging, under-addressed risk across the entire agricultural digital ecosystem.

Despite these barriers, the interviews also demonstrate strong examples where digital and AI capabilities are already delivering value, from variable-rate lime programs and high-dimensional breeding analytics to AI-enabled synthesis of research gaps and co-design outputs. These successes highlight what is possible when data capture, modelling, context and capacity are aligned.

Overall, the findings point to a system where the foundations for digital transformation exist, but coordinated, long-term investment in people, interoperability, trust, governance and adoption pathways is essential. Building skilled human infrastructure, translators, integrators, data stewards and digitally capable agronomists, and attracting university-trained data, digital and modelling specialists are essential to strengthening WA’s agricultural RD&E system. Equally important is management support that enables effective interdisciplinary teams, ensuring digital and data innovation can be fully realised.