GROWING SMARTER PROSPECTUS

Mildura Smart Horticulture Cooperative Research Centre

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Precision Horticulture | Precision Education | Precision Innovation
> Targeted Commercial Outcomes

#smarterfarmer
“Agribusiness innovation is now increasingly being found in partnerships and alliances between research organisations and industry; from multi-national agribusiness giants with billions of dollars at their disposal all the way to small-scale start-ups with little more than a good idea, determination and some savvy investors.”

Dr John Manners
Director, CSIRO Agriculture
As we continue into the age of innovation, we will continue to see rapid change and ‘old world’ singular solutions will no longer meet demands. Everything needs to be connected into a true ecosystem that requires much more than the basic research methodologies that many universities still embrace. Digital disruption will continue to drive innovation and there will be winners and losers. The winners will be the early adopters that have a complete ecosystem and the horticultural space is right in the firing line.

With a focus on IIoT, The Mildura Smart Horticulture Cooperative Research Centre (MSHCRC) offers a true innovation and applied research facility where there are relevant and applied education, research and commercialisation outcomes.

This means that it will work to deliver applied, directly applicable and useful commercial applications and solutions. Importantly, it will also provide the support infrastructure in terms of trained staff and students that not only have hands-on experience, but have also gained training and qualifications in the process – and most importantly are shareholders in the solutions.

“22.5 billion IoT devices will be installed by 2022”
THE MILDURA SMART HORTICULTURE COOPERATIVE RESEARCH CENTRE

In a period of rapid change, a myriad of solutions are being developed at an increasing rate throughout the horticultural industry. This leaves producers with complex options and considerable investment risk. Therefore, it’s vital that our horticultural industry and farmers can assess and apply the best of these new solutions so that production and profitability can be boosted in a sustainable manner.

At present, there is no coordinated program dedicated to the rapid development and adoption of technology-based TURNKEY solutions for Australian horticulture (a turnkey solution simply means that the product with appropriate support is ready for use immediately). The MSHCRC will meet this need through a national and international integration of applied Research and Development (R&D), commercialisation and the critical inclusion of education and distribution components that respond to the priorities identified by the industry and provides TURNKEY solutions appropriate to Australian horticulturists.

The MSHCRC will be a true ecosystem where vocational education and training (VET) students gain applied experience and micro qualifications. They will also have the opportunity to work alongside and in partnership with university students, large horticultural companies, family growers, energy and technology companies, specialists in robotics, machine learning, IIoT, water management and soil biology experts and custodians, from Australia and around the world.

The goal of MSHCRC is to develop, test and commercialise IIoT solutions, robotics, renewable and solar energy models and associated technology thereby increasing the horticultural sectors productivity and sustainability. It will position itself as a world recognised centre of excellence in applied education, applied tech research and commercial development and will provide pathways from concept to market, VET training to higher education, and ideas to market.

The MSHCRC ecosystem includes:

• The latest IIoT technology, a dedicated Local Area Network and hardware

• Experience laboratory (where horticulturists can see, play and evaluate the latest technology in a real-world environment)

• Applied VET education and research (where students learn in a real-world environment alongside industry, technologists and manufacturers)
• Applied university level research and education (this includes micro qualifications and degree level outcomes)

• Exposure to real world problem solving and tech development (for example, in terms of IoT, the MSHCRC will research and develop sensor technology in the precision horticultural space, as well as design and assemble the tech and train students to design, sell, install, program, code and maintain the technology on a commercial basis). This will be the first turnkey innovation and education ecosystem in the horticulture space in Australia.

• High intensity crop trials and development including infrastructure and production line systems

• New crop trials and development

• Research into aeroponics, aquaponics and brackish water tolerant crops

• Access to start up support, including seed capital, relevant mentors, a funded accelerator program, an incubator, making place and entrepreneurial training and environment

• Renewable energy, energy storage and solar technology

• Turnkey solutions from paddock to plate and the use of blockchain technology in terms of value add and supply chain management and payment systems

• A true cooperative research centre where students, the community, industry, large and small business and tech companies all work in partnership to provide applied turnkey solutions that can be brought to market quickly, whilst getting relevant training and education in the process

Australia’s horticultural industry benefits from proximity to high-growth export markets in Asia, and possesses a solid reputation for food quality and safety. As well the recent trade agreements these are significant advantages, but they can only be realised if our on-farm productivity growth keeps pace with that of our global competitors, while addressing production, business, environmental and social constraints.

The MSHCRC focuses on cross-sector on-farm supply chain issues, to drive productivity through precision horticulture solutions from paddock to plate.
It is generally recognised that it is no longer sufficient for producers to respond to rapidly changing conditions on an individual or single solution basis.

Navigating the challenges will require an agile approach: strength, flexibility and responsiveness to change with clear development objectives embedded in a multi-disciplinary innovation ecosystem, cross-sector regime.

**PRECISION FARMING TURNKEY SOLUTIONS**

MSHCRC will develop cross-sector turnkey solutions to benefit horticulturists in production management, business management, and risk management. Stakeholders will include students, researchers, customers, financiers, accountants, investors, insurers, tech developers, equipment companies, consumables companies and manufacturers. This approach will enable our primary industries, communities and governments to take the next step to better horticultural practice and production.

MSHCRC will focus on a whole of supply chain and production approach. Taking a real-world turnkey whole of farm systems approach to commercially address these challenges, will enable our horticulturists to make the next step change in horticultural production and on an agile and holistic basis. It will do this at the same time as positioning the Mildura region as an international leader in horticulture, supply chain, water management technology and energy technology.

Despite the backdrop of rising costs and falling commodity prices, Australia can be placed as an international leader in farm production. The turnkey solution will assist in alleviating many of the challenges faced by the horticultural & agricultural sector such as labour shortages, ageing farmer populations, unforgiving landscapes, digital disruption, education and training challenges, climate change and the ever-increasing complex social innovation and regulatory compliance.

As a collaborative venture, MSHCRC will bring agriculture’s end users into close contact with world class research and education capabilities of industry, educators and science to produce leading edge technical, environmental and practice-related solutions that integrate effectively in a defined, commercially focused, operational framework.

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Agribusiness is predicted to become Australia’s next $100bn industry by 2030.
EDUCATION PROGRAMS AND OUTCOMES

La Trobe University and SuniTAFE, in partnership with industry and end users, identify, develop and deliver internationally recognised VET training, micro qualifications and degree level education. These programs have been created to research, operate and maintain technology as well as to meet and provide solutions for the growing labour and systems installation and management needs. The training and education component of the MSHCRC brings a whole new element to traditional CRCs and is the missing link.

A key element of the MSHCRC is SuniTAFE’s Smart Farm training centre at Cardross. The Smart Farm is a 24-hectare working farm with commercial crops. It’s a real-world organic classroom where research, education, training, product development and testing combine. Broken up into easy to manage multiples of one hectare lots, it provides a mix of traditional crops such as citrus, grapes, almonds, olives, avocados, and dried fruits as well as new crop trials such as ginger and medicinal hemp. It will also be a trial site for emerging/alternate energy.

Research and development

The SuniTAFE Smart Farm will have the most up-to-date methods for energy and water management and application for each type of crop. The farm will have its own LoRaWan network and each block will have its own:

- Sensor networks and systems for water management
- Fertigation management
- Heating and cooling irrigation
- Controlled and individually captured drainage for research and analysis purposes
- Full diagnostic and sensor monitoring for any application required
- Smart classrooms
- Smart laboratory
- Access to equipment suppliers, technology partners, seed capital, research capital, and state of the art systems
- Plant stock, tissue stock
- A state of the art green house with associated technologies
- Solar and energy storage for horticultural applications such as pumping

There will be 40-50 billion devices connected to the internet by 2020.
BUILDING HUMAN CAPABILITY

Significant gaps already exist and hinder growth potential for the area’s horticulture sector. Specifically, this includes attracting more people to agriculture and horticulture, building a basic set of skills, addressing critical job roles and issues around seasonal employment.

Future workforce requirements are yet to be contemplated by some. They do this at their own peril, and it’s a risk to the sector and our region.

A perception exists amongst the region’s youth that horticulture does not provide challenging or lucrative career prospects. Integrating horticulture and agriculture pathways into schools, delivers insight and early buy-in to retain the region’s best and brightest young people.

Critical job roles are those that are difficult to attract and recruit or take a long time to develop the skills – or perhaps they don’t exist yet. They cover Farm Hand, Farm Manager (next generation), Food Safety Manager, Irrigation Manager, Tractor Operator, Packing Shed roles, Line Supervisors, Quality Control, Agronomists, Water Sources / Brokers, Agri-technologists, energy solution providers and a cohort of technology support staff. A relevant contemporary workforce development strategy that identifies digital disruption threats and opportunities is required to ensure that these skill shortages are addressed and appropriate training for these roles is developed.

Capability development needs include contract consulting on compliance across the sectors, digital skills, leadership, mentoring, transition and knowledge management, running the farm as a business, on-farm training and skills stocktake – plus expanding the pool of industry based experts suitably skilled to develop their emerging talent.

Target areas

Education and training for multi-generational farmers with required digital skills, technology support staff, advisors/consultants, farm service providers, and social networks and adoption.

Change the perceptions of careers in horticulture to retain talented young people by demonstrating highly desirable job prospects.

Outcomes

• The development of a nationally integrated and accredited education and training scheme for the horticulture and agtech sectors. This includes universities, the vocational education and training sector and industry to provide micro qualifications, certificates, diplomas, short courses and higher degrees that grow the digital capability of the horticultural sector.
• New approaches to knowledge education, transfer and dissemination

• Real world applied training and education that responds to industry needs and demands

• Training and education that is linked to research and development projects such as IIoT and LoRaWan technology proving applied hands-on experience for students to learn, deploy, manage and maintain the technology and systems developed – potentially creating whole new industries and importantly, real jobs

• A skilled future farm sector workforce that meets today’s demands and importantly is upskilled to meet the changing landscape that productivity challenges and digital disruption demand

Programs will be designed, developed and implemented using an entrepreneurial mindset, based upon industry needs, feedback and insights.

There is the opportunity to reimagine the purpose of many existing resources in the region and upgrade physical assets and capabilities, to better match the needs of industry and future jobs.

Exploring new crops and demonstrating state of the art practices and technology by establishing a Smart (Digital) Farm is a key outcome.

To *increase the attractiveness of the industry, provide innovative, immersive learning experiences*, and engage learners, *Agriculture and Horticulture STEM experiences* will be facilitated.

This involves students solving real world problems in a dual context of on-farm, in the workplace and at SuniTAFE, collaborating with partner education providers like La Trobe University’s AgriBio Centre and the University of New England Precision Agriculture Research Group (SMART Farm) and Smart Region Incubator.

In a recent report produced by the Regional Australia Institute titled *Innovation in Regional Australia* (p.4, 2017), “Places like Playford, Wakefield and Port Pirie (SA), Glenorchy (Tas), Broken Hill (NSW) and Mildura (Vic) are all near the bottom of the innovation rankings. Despite many years of concerted effort, these places are not showing the innovation and entrepreneurship ingredients that can help them transition to a new economic base”.

Entrepreneurial capability needs to be encouraged with a number of activities and events planned, including exploring innovative ideas and in future, a data hacking event utilising the information from the SuniTAFE Smart Farm and Internet of Things (IoT) devices.

Increasing the numbers of international students drawn to the region, as well as building offshore capability development opportunities, will support the region’s global reputation as a leader in Agriculture and Horticulture.
In a process of co-creation, our Smarter Horticulture partners from research, horticulture, technology, and industry will work closely with the MSHCRC board to establish an overall research strategy and prioritise problem-based R&D&C programs.

Digital disruption in agriculture and horticulture requires farmers, growers, agribusinesses, educators and policy makers to harness the benefits associated with the changes that are occurring. By tapping into vast amounts of data, digital technologies have the potential to change farm production practices, inform decision-making and influence the ways that jobs and careers are seen in these sectors.

Whilst some farmers and growers are implementing Internet of Things devices to record and capture data, there is a knowledge and skills gap in what to do with that data, how to analyse it, look for trends, insights and commercial applications.

The MSHCRC will drive initiatives to research and develop solutions within a framework designed to build farming sector resilience across the following integrated research, development and commercialisation programs.
MANAGING INFIELD HORTICULTURAL VARIABILITY

Target areas

- Improved spatial and temporal management of production inputs and outputs such as fertiliser, water, chemicals and labour on crops in the greenhouse and blocks

Outcomes

- Turnkey Solutions that seamlessly capture localisation of orchards, vineyards, market gardens and crops, providing real-time optimisation of landscape and pastures health and performance

- Solutions that integrate infield variability with production yield and inputs for the purposes of real-time and post-analysis performance to assist in planning farm activities

- Automated systems that optimise the use of farm inputs throughout the production lifecycle and seamlessly integrate with the farming system

- Developing intensive turnkey horticultural systems

- The next generation of precision horticulture systems that integrate seamlessly with the grower and the farming system, while embracing simplicity, functionality and serviceability in enhancing on-farm

- Developing turnkey paddock to plate systems and supply chain enhancements using blockchain technology, precision sensors, machine learning and automation
OPTIMISED FARM OPERATIONS

Target areas

- On-farm connectivity
- Labour efficiency
- Energy efficiency
- Waste management
- Machinery and system interoperability
- Reduction of on-farm risks
- New crop varieties development
- Landscape and climate enhancement
- Time saving and workplace safety
- Input efficiency
- Training and education
- Solar energy
- Pest and weed management
- Traceability through supply chain

Outcomes

- Automated systems that optimise the use of farm inputs such as labour, energy, capital and infrastructure, and seamlessly integrate with the farming system for planning and performance of farm activities
- Solutions that provide farm performance analytics and forecasting capabilities for the purposes of optimising future farm-wide operations, including benchmarking, environmental performance and financial performance, while enabling social compliance and communication of the food and fibre production story
- On-farm solutions such as wearables that reduce insurance risks through tools that monitor OH&S
- Solutions that provide early warning and management of multiple land-use impacts, biosecurity events, and climate related

- On-farm wireless networks for the efficient communication of on-farm data and remote system monitoring and management and automation
- New techniques and technologies that provide resilient, low cost, independent on-farm energy sources, and enhance waste management
ONLy BY PLACING THE HORTICULTURAL SECTOR AT THE HEART OF THE INNOVATION PROCESS CAN WE EFFECTIVELY UNLOCK ITS PRODUCTIVITY POTENTIAL

The current pace of technological development, advance and obsolescence means that behind the farm gate, the farmer faces complex decisions accompanied by unprecedented investment risk.

To ameliorate this, Growing Smarter programs will have a solid, on-farm research foundation, ensuring that outputs represent a genuine response to an identified need and are truly ‘fit-for-purpose’.

Growing Smarter programs will produce outcomes with effective cross-sector pathways to adoption. Each project will involve the farmer and farming groups at every stage, so that R&D adheres to a highly responsive protocol. A multilateral facilitated learning process between farmers, farm advisors, industry partners and service providers, coupled with agile project methodologies and an inbuilt incubator approach, will ensure that every solution is rigorously subjected to on-farm situational testing at every stage of its design, development and deployment. This ongoing process of iteration, from inception to launch and beyond, will heighten the commercial viability of Farming Smarter solutions in domestic markets. With R&D firmly integrated with regionally applicable adoption pathways and value propositions, effective routes will be designed that can then be replicated in diverse overseas markets.

DELIVERING TECHNOLOGY-BASED OUTPUT

Whether a solution is a technology-based approach or service, or a stand-alone or connected technological product, it is vital that it presents the end user with a minimal investment risk.

The MSHCRC is solutions focused. Smarter Horticulture solutions may include, education, technology, tools, systems, services, systems integration, data capture, or AgTech products and engineering, coupled with management approaches, new practices or protocols.

Outputs may bring digital technologies onto the farm, or utilise digital technologies in new business processes or data analysis.

It is vital that all outputs utilise open standards and platforms for data, communications protocols and software, thereby reducing the entry and ongoing cost for service providers to implement solutions on a broader scale.

Firm criteria will be applied during the development of all Smarter Horticulture projects to ensure that the solutions will:

• Interface with existing and emerging agriculture systems
• Integrate seamlessly across existing platforms
• Link on-farm information with business platforms to support evidence-based financial management
• Adhere to a framework of rigorous standards for integration and compatibility
JOIN THE MILDURA SMART HORTICULTURE COOPERATIVE RESEARCH CENTRE (MSHCRC)

Through effective collaboration, we can deliver a research, commercialisation and adoption program that meets the increasingly complex demands of the burgeoning horticultural sector.

We are keen to engage partners who can make a financial and/or in-kind commitment to Smarter Horticulture.

Financial investments can be ‘untied’ for flexible use in supporting projects, or ‘tied’, to support a specific project. The MSHCRC’s in-built flexibility means you can become a partner in four ways:

- **As a Core Partner**, you will be involved in shaping aspects of the MSHCRC’s direction and business model, including its legal, fiscal, governance and operational structure; R&D strategy and milestones; and intellectual property and commercialisation agreements

- **As a Supporting Partner**, you will be involved on a more flexible basis – for example, you might invest on a per-project basis. We can set up an agreement that meets our respective business objectives and priorities

- **As a Business Partner/ Investor** you will work on your business identified problems and needs on a project needs basis

- **As a Brand Partner** you can be associated with the lead smart horticultural research and education facility in Australasia, you can engage with your relevant target audience and support your market segment as well as have access to contemporary education and training for your staff, relationship and marketing opportunities with all investors and partners, other value propositions as identified