

**THE UWA INSTITUTE OF AGRICULTURE
STRATEGIC PLAN
2015-2019**

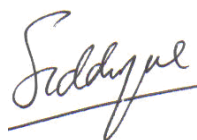
30 June 2015

A STRATEGIC PLAN FOR THE UWA INSTITUTE OF AGRICULTURE

The UWA Institute of Agriculture (IOA) is an institute established by The University of Western Australia (UWA) with a mandate to integrate the University's research, education, training and communication in agriculture and related natural resource management.

IOA is led by a Director with the support of an Industry Advisory Board for strategic direction. It is governed through an executive group, the Institute Management Board. IOA's operations are managed as a set of flexible new and emerging themes encompassing the academic and physical resources of relevant schools and research centres within the Faculty of Science, Faculty of Medicine, Dentistry and Health Science, Faculty of Engineering, Computing and Mathematics, UWA Business School, Faculty of Architecture, Landscape and Visual Arts and Faculty of Law at UWA.

The intent of this document is to outline the purpose, operating environment, and the vision, mission and strategic intent of The UWA Institute of Agriculture.

A handwritten signature in black ink, reading "Siddique", with a horizontal line underneath the name.

Professor Kadambot Siddique
Hackett Professor of Agriculture Chair and Director

MISSION AND VISION

MISSION

To enhance The University of Western Australia's contribution to the advancement of agriculture and to the management of natural resources in selected international, national and regional settings.

For Western Australia, the Institute works with the agricultural and natural resource management sectors to create knowledge, and improve workforce skills, such that those committed to agriculture may advance their individual aspirations, contribute to local and regional prosperity, and exercise responsible stewardship of the environment.

VISION

Provide research-based solutions to food and nutritional security, environmental sustainability, and agribusiness.

THE GLOBAL CHALLENGE: WHY AGRICULTURE MATTERS

Against a backdrop of rapid growth in demand, changing climate, declining natural resources, changeable trade policies, and regional disturbances, agriculture's ability to increase future food supplies and meet nutritional needs is a critical issue for the advancement of humanity.

The world's population is growing, and is expected to continue to do so until the mid-21st Century - fueling a commensurate increase in demand for food. Concurrently, increasing affluence is changing the patterns of demand from low-input staples to higher-input higher value plant and animal products. Equally, industrialisation in developing economies is increasing the demands on agriculture to produce fibre, fuel and industrial raw materials.

Yet, as demand grows, the world's finite supply of agricultural land and water are declining under the pressures of climate change, urbanisation and human-induced environmental degradation.

As a new challenge, increased affluence and education are bringing to the fore new attitudes and a political activism toward how food and fibre is produced. People are re-evaluating their relationship to the natural world and the environment, and demanding products produced to higher environmental and ethical standards.

Both internationally, and for Australia, the challenge is to meet society's future needs for nutritionally appropriate food, fibre and fuel in ways that can be sustained into the future – economically, environmentally and socially.

Recognition that agriculture must be productive, environmentally responsible and contribute to building strong, self-sustaining communities, locally, nationally and internationally is at the heart of the programs of the UWA Institute of Agriculture. These programs align with Australia's national research priorities related to food and water security and living in a changing environment.

The Facts of Life

- Maintaining the world's food supply is the most critical issue for human existence.
- Globally, about 800 million people are currently undernourished (FAO).
- Food insecurity and malnutrition are interrelated. Hunger and hidden hunger (micronutrient deficiencies) deprive people of reaching their potential, especially for children and women.
- World population is projected to increase to over 9 billion by the mid-21st Century and, just to keep pace, food production must increase by over 50%.
- This increase in food production has to come from shrinking natural resources, particularly land and water.
- World economic growth will see rapidly changing food preferences and, increasingly, more demanding standards for food quality.
- Degradation of agricultural lands, urban encroachment and competing uses of scarce resources for agriculture is increasing the cost of production and will require farmers to continue to adapt to change through innovation and improved management practices.
- Climate change is expected to have an increasing impact on the world's agriculture and natural resources. Australia, already the world's driest inhabited continent, is predicted to get drier in the southern agricultural regions, with an added complication of increased climate variability.

THE UNIVERSITY CONTEXT

The University of Western Australia (UWA) is committed to excellence across the spectrum of the sciences where UWA has disciplinary strength, world-class staff and infrastructure, and a significant strategic advantage offered by place and time (<http://www.research.uwa.edu.au/research>). The plant, animal and earth sciences that contribute to sustainable food production and environmental stewardship are amongst these areas of strength (*'Plant sciences and sustainable food production'* was identified as one of the University's six key strategic research areas in its Operational Priorities Plan 2009-13), and the UWA Institute of Agriculture works within this overarching context to support Australia's national research priorities related to food and water security and living in a changing environment.

Given these special strengths the key responsibility for the Institute of Agriculture is to mobilize the intellectual and physical capital present within UWA toward resolution of the issues and opportunities facing agriculture and natural resource management.

Critical is the Institute's role in developing and facilitating cross-faculty collaboration so that multi-disciplinary approaches can be brought to bear on agricultural issues. Modern agriculture makes demands on advanced business practices and risk management, computing, robotics, remote sensing and even the social sciences concerned with human behavior in areas such as technology transfer and change in rural communities, in addition to the traditional fields of plant, animal and soil sciences and resource management.

The Institute works in collaboration with the University's Faculties, Schools and Centres, and especially with those within the Faculty of Science; and in doing so aims to align its activities with the Integrated Planning Exercise (IPE) Plans of its University partners. This integrative/collaborative approach is critical to the success of the Institute, its partners, and to science at UWA. In particular, the Institute contributes to two of the Faculty of Science's 'Big Picture Themes', namely 'Feeding the world' and 'Restore and maintain balance in the natural environment'.

In education, responsibility for undergraduate education and post-graduate training remains with the University's faculties. The Institute retains a role in communicating, and linking undergraduate students to the opportunities for careers in agriculture and resource management. It also plays a role in integrating the opportunities for postgraduate training in Agriculture-related disciplines.

The Institute's business model is to motivate, facilitate and integrate the productive capacity of the Faculties, Schools and Centres of the University with the objective of bringing the benefits of the University's research and training in the fields of food production and resource management to the community. The Institute's activities are therefore intentionally cross-faculty, and collaborative with multi-disciplinary Centres and external stakeholders.

An overarching principle of the Institute's operations is that its impact will be within Schools and Centres, with all students and research grants attracted to the University through the Institute's activity placed within, and managed by, a School or Centre (with Institute input where appropriate). As a matter of policy, all research grant, postgraduate research student training and publication-linked income received by the University as a result of Institute-sponsored activities flow back to the Institute's 'members'¹ in their respective Schools. Outputs from scientific research are credited to Schools and Centres with suitable acknowledgement of the Institute.

The 'value add' the Institute extends to its members¹ is:

- Opportunities to leverage the Institute's relationship with research funding organisations. Existing relationships include GRDC, ACIAR, ARC, State and Federal Government agencies, CRCs, RIRDC, MLA, HIA, COGGO, Catchment Councils, Bayer and NPZ;
- Expediting access to facilities including the UWA Farm Ridgefield;
- Participating in international research collaborations with universities and other public and private organisations;
- Access to high calibre, often fully-funded, international postgraduate students, and sourcing of high quality students suitable for prestigious International Postgraduate Research Scholarships and Endeavour Awards;
- Attraction of visitors to UWA (e.g. Research Fellows for 6-12 month visits most undertaking research and publishing with academic staff);
- Partnerships with national and local research organisations - for example CSIRO, DAFWA and other Universities;
- Connecting UWA with local industry for problem identification, and with prospective industry partners for research funding and joint projects;
- Mentoring the undergraduate and postgraduate student body in the Agricultural Science Major of the BSc and the Master of Agricultural Science;
- Promoting the profile of researchers and the scope of agriculture within UWA, and with the community and research funding organisations through the Institute's website, media statements, newsletter, annual report, events (e.g. postgraduate showcase), and personal advocacy; and
- Opportunities to present and discuss ideas and initiatives with the Industry Advisory Board; a panel of highly recognised and respected people in industry.

¹ 'Members' of UWA Institute of Agriculture are those academic staff with an interest in agriculture and/or natural resource management, and who personally commit to membership of the Institute through participation in one of the Institute's themes; or who have expressed interest in the Institute's activities in other ways. Most are staff or adjuncts of one of the Schools of the Faculty of Science or relevant Centres, but membership potentially extends across all Faculties of the University.

IOA MANAGEMENT BOARD

Reflecting the diversity of the University's potential contributions to agriculture and natural resource management, the Institute is governed by an **IOA Management Board (IMB)** chaired by the Dean, Faculty of Science.

The role of the IMB is to establish policy and high-level strategic direction, ensure appropriate governance and accountability, monitor the Institute's performance, advise and support the Institute's Director and Associate Directors. IMB will hold monthly meetings.

Dean, Faculty of Science or nominee (Chair)

Pro-Vice-Chancellor (Research)

Head, School of Agricultural and Resource Economics or nominee

Head, School of Animal Biology or nominee

Head, School of Plant Biology or nominee

Head, School of Earth and Environment or nominee

Director, Plant Energy Biology, ARC Centre of Excellence or nominee

Director, The UWA Institute of Agriculture

Associate Directors, The UWA Institute of Agriculture

Business Manager (Executive Officer), The UWA Institute of Agriculture

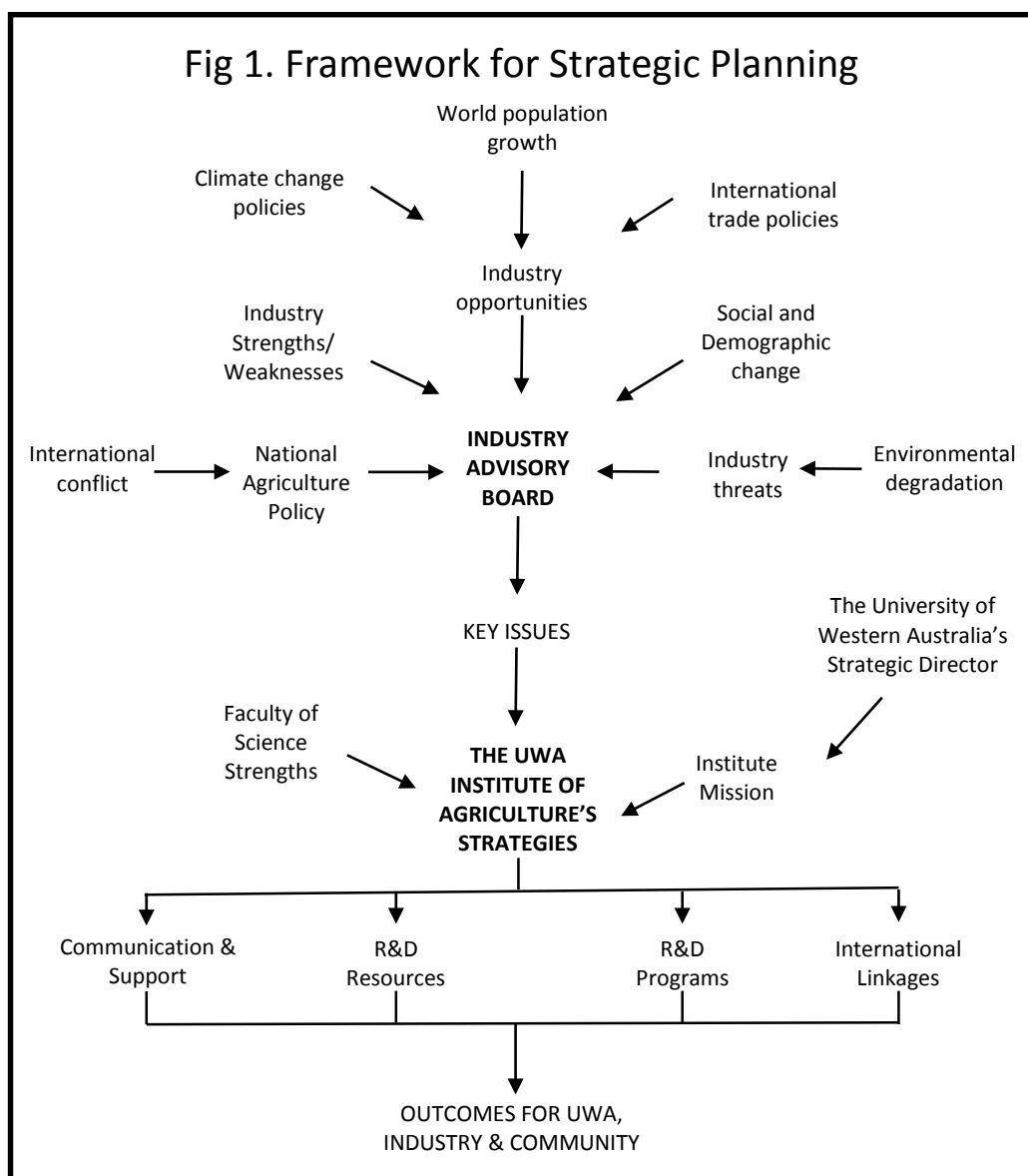
Faculty Manager (Strategy and Research), Faculty of Science

INDUSTRY ADVISORY BOARD

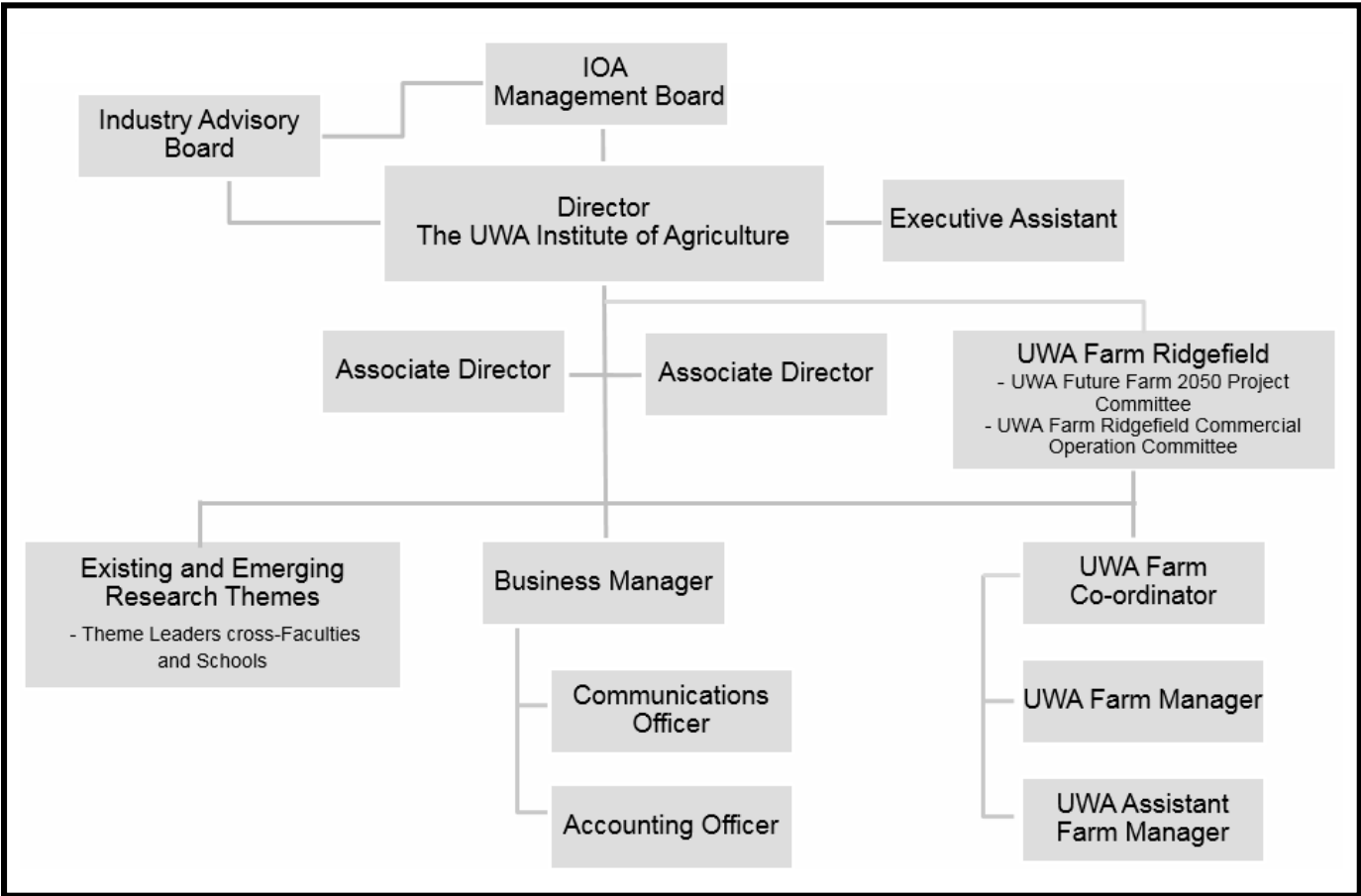
The **Industry Advisory Board (IAB)** is a major conduit for the Institute’s industry interaction, advice and feedback. The IAB has an independent Chairperson, and members chosen from a cross section of the agricultural and natural resource management industries. The Dean of the Faculty of Science, and the Director of IOA are also members of the IAB.

The key responsibilities of the IAB are:

- High-level Industry feedback on agricultural industry trends, needs and issues in order to guide the Institute’s strategic planning and policy setting.
- Providing independent advice to the Director on formulating the Institute’s responses to strategic issues.
- Enhancing the profile of the Institute and UWA to the industry and wider community.



IOA ORGANISATIONAL STRUCTURE



STRATEGIC OBJECTIVES

The Institute will be successful if it achieves its mission to enhance UWA's contribution to agriculture and natural resource management. Because agriculture is so diverse and UWA's responsibilities in research, teaching, and training are comprehensive, 'success' for the Institute must be judged against a set of diverse criteria. This includes a shared responsibility through the Institute and the Faculties, Schools and Centres within the University.

Strategic performance objectives for the Institute for the period 2015-2019 are:

- Demonstrable adoption of technology and products developed by Institute facilitated R&D programs.
- Active stakeholder (RDCs, commercial organisations, grower groups) interaction with the Institute, demonstrated through joint participation in Institute sponsored events.
- Enhanced partnerships in collaborative research projects and postgraduate research student supervision both across UWA and with key external partners.
- Contribution to regional and national debate on agricultural and resource management issues, demonstrated through popular communication and coordinated submissions to relevant government enquiries/developments.
- An improvement in UWA's rankings on relevant indices².
- An increase in the absolute number of 'agricultural' publications, combined with an increase in the proportion of UWA's total indexed output³.
- An increase in publication quality so that 65% or more of the 'agricultural' publications are in the top 20% of journals in this field of research.
- Sound management of the UWA Farm (Ridgefield).

² For Life and Agriculture Science, UWA is currently ranked 24th in the world in terms of fellowships of academic staff, publications, and citations in the Shanghai Jai Tong Academic Ranking of World Universities (<http://ed.sjtu.edu.cn/ARWU-FIELD2007/LIFE.htm>); is currently ranked 34th in Agriculture under the 2014 Performance Ranking of Scientific Papers for World Universities released by the National Taiwan University: National Taiwan University Ranking (<http://nturanking.lis.ntu.edu.tw/>); and is currently ranked 41st in Agriculture and Forrestry in the QS World University Rankings (<http://www.topuniversities.com/university-rankings/university-subject-rankings/2015/>).

³ Over the period 2007-14, UWA produced 18,251 research papers, reviews and proceedings papers indexed by Thomson Reuters Web of Science. 1,747 of these items have been classified agricultural related research outputs

HOW WE DELIVER

The Institute of Agriculture harnesses the University strengths and diversity through four strategies:

- 1. Integration: Bringing together the University's agricultural research and communication activities; integrating complementary activities across disciplines and organisational units, and providing a focus for leading-edge research, development, extension and adoption (RDE&A).**

The Institute integrates across the broader University community through a '**Theme Leadership Group**'. The group (previously termed a Program Leaders Committee) includes the leaders of the major agricultural and NRM research themes developed through the Institute and supported by the University, representatives of relevant University Centres, plus individuals who can contribute in specific ways when a targeted effort is required. This is a broader and more flexible group than the previous Program Leaders Committee and allows the Institute to draw more widely on the University's expertise in agriculture, NRM, food science, health, business and other areas.

The roles of the group are to consider and develop research themes, taking into account the strengths of UWA and its research objectives, share information on agricultural (including NRM) and food-related activities across the University community, and act as a communication medium between the relevant Schools and Centres and the Institute.

Through the group, the Institute's integration objectives are:

- Draw together the University's personnel with research, teaching, training and communication interests in agriculture and NRM, under the umbrella of the Institute of Agriculture.
- Identify and integrate complementary activities across disciplines and organisational units.
- Identify and develop research themes that are relevant to agriculture and NRM (locally, regionally and internationally), and which draw on the strengths of the University.
- Provide a focus for leading-edge R&D through a flexible program structure.
- Respond pro-actively to the changing education and research environment faced by the University, and identify needs and opportunities that this change provides.
- Sound management of the UWA Farm (Ridgefield) to enable access for multidisciplinary research.

- 2. Communication: Strengthening communication links with regional industry, farmer groups and the broader regional and scientific communities.**

Effective communication of research outcomes and training opportunities at UWA to farmer groups, industry, collaborators (state, national and international), funding bodies and potential students is a core strategy. Equally, the Institute has a role in listening to growers, advisors and agribusiness and bringing back their ideas and perspectives to contribute to the identification of key issues and opportunities.

The Institute's communication objectives are:

- To increase the rate of uptake and extent of use of the University's agricultural research outputs by industry, farmer groups and the community at large.
- To enhance UWA's identity and reputation for high quality agricultural research and timely delivery of outcomes. Funders of research will increasingly demand higher standards of research management from their provider organisations, and evidence of efficient and timely research

management processes will become important in investment decisions.

- To attract talented undergraduate and post-graduate students to undertake training and research in agriculture at the University.

3. Connecting: Fostering national and international linkages and alliances that bring new knowledge and expertise to Western Australia, and allow Western Australia to share its knowledge with the world.

State, national and international linkages connect regional agriculture to the world's leading Centres of agricultural innovation and relevant Government and non-Government organisations. Through these linkages, agriculture can benefit from the transfer of knowledge, expertise, management practices and materials such as germplasm. Exchange of academics and students can bring the best minds to focus on agricultural problems and opportunities. Equally, UWA and our partners' innovation and expertise can be transferred to other countries for the benefit of all.

The Institute's 'connecting' objectives are:

- Establish formal research, postgraduate teaching and research training relationships between UWA and leading international universities and other research organisations with complementary expertise and interest in agriculture and NRM.
- Develop stronger and more committed consultative links with WA-based tertiary institutions and Government agencies to more effectively harness the state's academic resources in agriculture and NRM.
- Work with National research, development and extension strategies for agriculture to ensure the capability base of UWA is well understood and remains relevant to such national planning.
- Liaise with Government agencies and funding bodies to showcase UWA's expertise and resources.

4. Resourcing: Increasing the pool of resources available for investment in critical RDE&A in Western Australia and in relevant national and international issues.

Increasing the overall quantum of research and development applied to regional, national, and international issues will improve outcomes for the agricultural sector. Many studies have shown that investment in agricultural research and development has a high benefit to cost ratio.

The Institute's resourcing objectives are:

- To increase UWA's share of the total funding pool available for agricultural and natural resource management, and tap novel sources of funding for agriculture and NRM research and research training.
- Maintain a vigorous higher degree by research (HDR) program in agriculture and NRM, accessing both Australian and international sources for high quality students and HDR funding.
- Identify new opportunities for UWA research, teaching and training in areas related to agriculture and NRM.
- Manage the University Farm Ridgefield to maximise its value for research and HDR student training whilst protecting the University's investment.

KEY PERFORMANCE INDICATORS

The Institute's strategic performance objectives will be met through its strategies of integrating, communicating, connecting and resourcing. Key Performance Indicators (KPIs) for these strategies for the period 2015-2019 are:

1. Integration

Measures:

- At least two new, multi-disciplinary research projects initiated through Institute action involving groups inside and outside the University.
- A 5% p.a. increase in the total number of publications (with >65% in top 20% of journals) with the institute by-line and an increase, over time, in the number of publications with authorship including more than one School or Faculty.
- An ERA rating for agriculture of 4 or 5 by 2018 with at least two sub-fields measured at 4 or 5.
- Evidence of adoption of technology and products developed by the Institute facilitated R&D Programs.

2. Communication

Measures:

- An increase in awareness (through 5% p.a. increase in media coverage) of the Institute of Agriculture and partner Schools/Centres and its objectives amongst its audience groups – industry, growers, agricultural advisors, researchers (as measured by media presence, invitation/participation in field days, attendance at forums and guest lectures organised by the Institute).
- An increase by 5% p.a. in the number of graduate students successfully applying for post-graduate studies in agriculture and NRM at UWA.
- An annual minimum of three meetings or events where UWA capabilities in agriculture and NRM are showcased to RDE and development corporations.

3. Connecting

Measures:

- Instigate at least two joint initiatives in agriculture and NRM with other Australian universities.
- Facilitated actions associated with at least two University-level agreements on joint research, HDR student training and teaching in agriculture with Universities in China, and two with Universities in other countries where UWA can offer special expertise.

4. Resourcing

Measures:

- Attract to UWA at least two major national research initiatives in agriculture or NRM by 2019 (Minimum life-time budget of \$5 million each).
- Identify and engage one new source of investment each year for agricultural research from agribusiness and government that add value for all partners.
- A target of 10 full-fee paying HDR students in agriculture and NRM at any one time.

APPENDIX – INDUSTRY ADVISORY BOARD

Dr. Terry Enright	Chair (Farmer)
Mr. Ben Sudlow	Manager, Fertiliser Sales and Marketing, CSBP
Mr. Neil Young	Farmer
Mr. Philip Gardiner	Farmer
Mr. Rod Birch	Farmer
Mr. Peter Metcalfe	Executive Director, Livestock Industries, DAWFA
Dr. Dawson Bradford	Chairman WAMMCO
Ms. Verity Klemm	Strategic Projects, Science and Planning Directorate, Department of Water
Dr. Michael Robertson	Deputy Chief, CSIRO Ecosystem Sciences
Mr. Shane Sander	Consultant, Agvise Management Consultants
Dr. Richard Williams	Customer Stock and Quality, CBH Group
Prof. Tony O'Donnell	Dean, Faculty of Science
Prof. Kadambot Siddique	Director, The UWA Institute of Agriculture
Ms. Bianca Tabbakh	Business Manager, The UWA Institute of Agriculture

RESEARCH THEMES

The Institute's role is to facilitate and co-ordinate to best advantage the research undertaken by the University's academic resource. This may involve extending existing research areas, or the fostering of new research interests, either with existing staff, or through identifying key staff appointments to develop new areas of research.

Existing major research activities include: agricultural economics, conservation agriculture, crop science, crop genomics, greenhouse gas emission abatements, integrated pest management, plant abiotic stress tolerance, plant breeding and genetics, plant mineral nutrition, sheep nutrition, reproduction and production, soil biology, weed science and herbicide resistance management.

For the period 2015-2019, recognising industry opportunities and the existing expertise within the University, the Institute supports members to further develop research themes in one or more of the following areas:

- **Crop Root & Rhizosphere**

Leaders: Plant Biology – Associate Professor Megan Ryan, Dr. Louise Barton

Staff that will contribute include: Professor Tim Colmer, Professor Daniel Murphy, Professor Andy Whiteley and Professor Kadambot Siddique

Manipulation of root architecture and function, including rhizosphere biology, provides the next frontiers in advancing crop production by both genetic and agronomic means. It is an area where UWA has significant strength.

The theme will have three major research, development and extension components: drought, transient waterlogging and mineral nutrition, with modeling, postgraduate training and technology exchange components being a part of each of the three themes. The focus will be on root processes and the interaction of roots and soil abiotic and biotic environments, to enhance crop performance

- **Sustainable grazing systems**

Leaders: Professor William Erskine and Professor Graeme Martin

Staff that will contribute include: Professor Phil Vercoe and Associate Professor Megan Ryan

Sustainable grazing systems are essential to provide feed for the various animal production systems in WA. These falls into two main types: extensive rangeland systems and mixed crop-pasture systems. UWA has been actively researching the crop-pasture and animal production nexus based on its own active research capability and in close cooperation with other national and international R, D, E and A partners.

This theme will focus on the contribution of livestock industries to the solution to global food supply, grazing systems need to be sustainable, which means several problems need to be addressed, including: i) Consumption of human food by livestock; ii) Livestock species and genotypes poorly adapted to the local environment; iii) Poor animal health and welfare resulting in sub-optimal productivity; iv) Provision of adequate animal nutrition; v) Environmental footprint.

- **Water for food production**

Leaders: Winthrop Professor Keith Smettem and Dr. Matthew Hipsey

Staff that will contribute include: Dr. Michael Considine and Professor Kadambot Siddique

Meeting the food needs of an increasing world population will require improved efficiencies in irrigated agriculture and better use of finite water resources. The challenge is to produce more food with less water. The development of irrigation schemes requires water fit for purpose, delivery systems that are economically and technically efficient, optimization of on-farm water use for maximum return and minimisation of detrimental impacts on the local environment.

This theme will be underpinned by teaching (undergraduate units, Masters and PhD) and research components: economics, plant water use, agronomy and irrigation design will underpin these components. There will be a strong focus on industry collaboration and engagement, water balance and irrigation modeling, postgraduate training and technology exchange.

- **Food and human health**

Leaders: Research Professor Jonathan Hodgson and Dr. Michael Considine

Development of healthier foods and food ingredients can make a positive contribution to both the Australian economy and human health. The development and validation of healthy foods that meet consumer desires is an exciting challenge for the Australian agri-food industries. To satisfy this growing need, we must train the next generation of scientists and industry champions and provide guiding knowledge on policy development for the Australian academic and industry bodies.

This theme will focus on the development of a collection of healthy functional foods and ingredients, as well as improved processes for their production / manufacture. The research will deliver scientifically validated evidence for the promotion of new foods, as well as significant added value to agricultural industries

- **Agribusiness ecosystems**

Leaders: Assistant Professor Amin Mugeru and Winthrop Professor Tim Mazzarol

The Agribusiness Ecosystems theme will focus on addressing issues related to the governance of agribusiness firms along the food value chain with a focus on changing consumer behaviour due to changes in dietary and consumption patterns, adoption of new innovations, production and financial risk management, farm productivity and profitability, global food security and nutrition, commodity marketing, new venture creation and governance structure of co-operative enterprises.

It will also examine the behaviour of agribusiness ecosystems using the framework and will seek to map the structure, growth, performance and health of selected agribusiness ecosystems drawing in a wide range of expertise from social sciences fields, including economics, business strategy and entrepreneurship, geography, public policy and administration, sociology, and political sciences are will be involved in theme.

The aim is to build a robust model of the agribusiness ecosystem that can be applied to regional, national and global contexts and used to develop in-depth understanding of how to facilitate these systems.