



CHARLES STURT
UNIVERSITY



Application

Higher Education Endowment Fund

August 2008

The National University of Inland Australia

Higher Education Endowment Fund 2009 Funding Round

Section 1. Proposal summary

Proposal title: **Science Laboratory Complex for Integrated Science Precinct: Sustainability and Bio-security in Food Production and Animal and Human Health.**

Institution: Charles Sturt University (CSU)

Location of proposal: Wagga Wagga Campus

Costs

Total estimated cost of proposal	\$67.5m
Total amount requested from Australian Government	\$34.0m
Percentage of total costs requested from Australian Government	50%

Proposal Timeframes

Estimated start year	2009
Estimated finish year	2012
Duration (years)	3
Operational life (years)	20
Estimated start year	2012

Proposal Summary

CSU is a leader in professional education and applied research in agricultural, veterinary, environmental and biomedical sciences. CSU requests \$34m to build a state-of-the-art teaching and research laboratory complex as the centrepiece of an integrated science precinct (together with \$18.5m from CSU and \$15m from the NSW Government) to support teaching and research in the basic sciences relevant to agriculture, biomedical and veterinary/animal sciences. This complex will strengthen CSU's science education and innovation capacity establishing an important science base in inland Australia to address contemporary local, national and global challenges, including climate change, drought, food security, bio-security and health.

Disclosure

The Australian Government and the HEEF Advisory Board will publish the proposal title, institution, location and proposal summary on the HEEF website. Please check the box to confirm that no confidential information appears on this page.

Section 2. Proposal specifics

Location

Address	Boorooma Street, Wagga Wagga
Provide details of the location	The science laboratory complex will be located within the CSU Integrated Science Precinct on the Wagga Wagga Campus on land adjacent to the Schools of Agricultural and Wine Sciences and Animal and Veterinary Sciences. This Precinct is located immediately adjacent to the research facilities of the NSW Department of Primary Industries.

Discipline area

Discipline area(s)	Biological Sciences and Biotechnology
FOR code(s) ¹ (where applicable: 4 digit Group codes only)	0301 (Analytical Chemistry), 0304 (Medicinal and Biomolecular Chemistry), 0305 (Organic Chemistry), 0601 (Biochemistry and Cell Biology), 0604 (Genetics), 0605 (Microbiology), 0606 (Physiology), 0607 (Plant Biology), 0608 (Zoology), 0699 (Other Biological Sciences), 0701 (Agriculture, Land and Farm Management), 0702 (Animal Production), 0703 (Crop Pasture Production), 0706 (Horticultural Production), 0707 (Veterinary Sciences), 0908 (Food Sciences), 1001 (Agricultural Biotechnology), 1004 (Medical Biotechnology), 1101 (Medical Biochemistry and Metabolomics), 1103 (Clinical Sciences), 1107 (Immunology), 1108 (Medical Microbiology), 1109 (Neurosciences), 1111 (Nutrition and Dietetics), 1115 (Pharmacology and Pharmaceutical Sciences).

Financial details

Total proposal cost	\$67.5m
Amount requested from Australian Government	\$34.0m
Percentage of total costs requested from Australian Government	50%

¹ FOR means Field of Research, classified to Group (4 digit) level according to the *Australia and New Zealand Standard Research Classification 2008* (the ANZRC may be accessed at <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1297.0Main+Features12008?OpenDocument>).

Cash flow estimates (\$ million)

	Total	Australian Government HEEF	Institution CSU	Co-Investment DPI, NSW Gov
Year 1 09-10	14.0	2.0	10.5	1.5
Year 2 10-11	27.6	15.1	5.0	7.5
Year 3 11-12	25.9	16.9	3.0	6.0
Total:	67.5 m	34.0 m	18.5 m	15.0 m

Note: All stated amounts must be **GST exclusive**

Contact Person

Name: Professor Ian Goulter
 Position: Vice-Chancellor and President
 Phone number: 02 6338 4209
 Fax number: 02 6338 4838
 Email: igoulter@csu.edu.au

Section 3. Extended description

This Expression of Interest seeks a \$34m contribution from HEEF to construct a state-of-the-art teaching and research science laboratory complex within a world-class Integrated Science Precinct on the Wagga Wagga campus at CSU. The HEEF contribution will be combined with a committed contribution of \$4m from CSU and a requested \$12.5m from NSW Government to build the laboratory complex within the Integrated Science Precinct, to which CSU and DPI have committed a further \$14.5m and \$2.5m respectively.

Inland Australia is a major source of national economic wealth. Rural and mining commodities account for around 60 per cent of Australia's total exports and the sustainability of these sectors is therefore critical to national social and economic goals. However, the effects of climate change (and its implications for food, water, energy and bio-security and human health) will demand more productive and sustainable uses of resources requiring a renewed investment in professional skills and innovation across inland production sectors and communities.

CSU has given the highest priority within its *University Strategy 2007-2011* to supplying the skilled professionals and conducting applied research to meet the challenges and opportunities of inland Australia. To support these priorities CSU has made a strong commitment to professional programs with a science base, especially in the agricultural, veterinary and biomedical sciences and to research in these fields. These commitments are mutually reinforcing: highly qualified science graduates contribute to the extension of skills and innovation into practice, while quality and excellence in basic and applied science research, and state-of-the-art facilities, attract undergraduate and postgraduate students (who will become Australia's future science educators and researchers) and contribute to quality and excellence in educational outcomes. CSU's proposal is based on this holistic view wherein the quality of the undergraduate science experience and the quality of research and the research environment are integrally linked.

Located across the Murray-Darling Basin (MD-B), CSU is strategically committed to the delivery of professional education and research that meets the needs of our immediate and national communities. CSU has already invested in the development of world-class facilities and curriculum in agricultural, veterinary and biomedical sciences. The University's location in close proximity to primary producers and inland communities has enabled CSU to readily translate educational and research outcomes into immediate impacts. The proposed laboratory complex will assist CSU to extend these impacts by enhancing interaction across science teaching, learning and research.

The Integrated Science Precinct is being built around the existing facilities and laboratory infrastructure of the Schools of Agricultural and Wine Sciences, Animal and Veterinary Sciences, and Biomedical Sciences and adjacent to the research facilities of the DPI. The major section of the Laboratory Complex in this Precinct is designed to encourage student-staff flow and contact within a three-storey structure. The ground floor of this building (\$14.7m) contains four *Teaching Laboratories* (capacity for 120 students each), shared preparation/ support facilities (PC2 compliant), offices for 10 technical staff, audio visual/information communications technology (ICT) capacity for lecture delivery to/from teaching laboratories, and related equipment. Office accommodation and an Auditorium and Learning Commons are proposed to be located within the building. These will provide space for delivery of large lectures and small seminars, for e-learning via on-line access to journals/databases, for holding professional conferences and for social interaction space linked to these activities.

The upper two floors of this building (\$11.4 m) feature 45 *Research Modules*, each configured for undergraduate, honours and research students with work benches, writing space, support facilities, equipment, and space for staff-student interaction. The associated facilities within this laboratory complex of *Glasshouses* (\$2.0m) and *Controlled-environment Facilities* (\$2.2m) are located adjacent to this building, while the *Integrated Field Laboratory* (\$3.7m) (Rhizolysimeters; Automated Rainout Shelters) is located nearby.

The linkage of this world class laboratory complex with CSU's existing field facilities, e.g. large animal facilities, creates unique *in vivo* teaching, learning and research opportunities. Together with associated preparation, chemical store, waste handling, and support services, the complex will allow student and staff access to biological materials for observation and measurement in teaching or research. A state-of-the-art learning environment will be a feature of this laboratory complex, with fast ICT connections for local/international contact with national and international teaching and research partners. The scale of the laboratory complex provides efficiency and quality in delivery of teaching, learning and research for inland Australia, Australia as a whole, and, through the ICT facilities, the world.

Committed co-investments from CSU to the Integrated Science Precinct in which the science laboratory complex is located include the *Veterinary Diagnostic Laboratory* (\$8.5m), *Molecular Biosciences Laboratory* (\$4.0m), and *Wine Research Laboratory and Facilities* (\$6.0m). Other committed co-investments to the Precinct include \$2.5m from DPI for a *Plant/Grain Processing Facility and Offices*. CSU has approached the NSW Government separately to seek further support of \$12.5m for the EOI. [NSW universities have jointly approached the NSW Government to request support for HEEF and EIF bids. In line with the NSW response to NCRIS, the NSW Minister for Science and Medical Research has indicated an intention to establish a defined position once the outcome of the EOIs is known and following formal discussions with the Commonwealth. In this regard, the Government expects to make a commitment to the most promising projects that are consistent with NSW Government Strategy].

CSU's vision for the science laboratory complex includes:

Creation of functional critical mass in the basic underpinning sciences: The laboratory complex will group staff, undergraduate and post-graduate students, providing the environment for effective teamwork and knowledge sharing that is the key to advancing CSU's leadership position in basic and applied agricultural sciences and bio-sciences.

Integration of equipment: Cost-effective use and maintenance of equipment for both teaching and research, and enhancement of interactions between teams is best achieved by clustering the users into a state-of-the-art laboratory complex within an integrated science precinct (c.f. Bio21, Melbourne; IMB, Brisbane).

Creation of social interaction spaces to nurture innovation: People create the new knowledge that leads to evolutionary and revolutionary discoveries. Innovative learning and research, and "out of the box" ideas will prosper where spontaneous interaction is encouraged as staff and students mingle and share ideas and problem solving.

Provision of the graduates to address the problems facing inland Australia: Research shows that CSU's graduates are more likely to commence and build professional practice in inland communities providing the skills, and extending innovation, to ensure the sustainability of both inland productive capacity and national social and economic health.

Section 4 - Expected outcomes

Principle 1: Expected Impacts

The science laboratory complex extends CSU's commitment to basic and applied research and the development of graduates with requisite professional and scientific skills, with particular regard for the agricultural, veterinary and health needs of inland Australia.

The expected impacts of the science laboratory complex (and the Integrated Science Precinct in which it is located) will be:

- creation of world class teaching and research space, with enhanced access to PC2 level facilities and the ability to work within OGTR and AQIS standards;
- improved efficiencies in the use and maintenance of resources through co-location;
- improved collaboration and multi-disciplinary teaching and learning;
- increased undergraduate enrolments and graduate numbers in basic and applied science and health degrees;
- increased exposure of undergraduate students to basic and applied science research;
- promotion of the value of basic and applied science research to undergraduates to encourage continued education through enrolment in honours and PhD programs and employment in science careers;
- expanded staff engagement with research (including collaboration with visiting scientists, students and international research groups) to inform teaching and learning;
- enhanced engagement with industry and the professions (eg. fostering interactions with research conducted by DPI);
- creation of critical mass in basic interdisciplinary research, delivering graduates with the diverse skill sets to address major challenges and opportunities confronting Australia;
- growth in research outcomes that address significant issues such as climate change, drought, bio-security, food security and specific health issues like cardiovascular disease;
- enhanced internationalisation through overseas RHD students and visiting scientists;
- increased numbers of staff engaged in basic research.

Over the past 10 years CSU has intentionally clustered its undergraduate teaching laboratories adjacent to its research laboratories and clinical facilities e.g. CSU's new Dental Laboratories and Clinics, Environmental and Analytical Laboratories and Veterinary Diagnostic Laboratory. The intent of this approach is to expose undergraduates (and potential tertiary science students) to leading scientific research facilities and researchers in the same environment in which they learn basic underpinning sciences. Student surveys and subject evaluations support the position that this approach increases the number of people choosing a science career, inspires students to further studies in science and encourages an interest in the creation of new knowledge. The inclusion of the science laboratory complex in the Integrated Science Precinct will allow this strategy to be greatly accelerated.

Despite significant progress over the last 20 years, CSU is restricted by its current facilities, with the majority of teaching laboratories available on the Wagga Wagga campus being too small and disconnected to facilitate the necessary quality of the undergraduate science experience or the interactions among students and between students and research. It is proposed to house four 120-seat undergraduate science teaching laboratories in the complex, allowing broader engagement among students, improving efficiencies in the management of facilities and reducing unnecessary duplication. The facility is designed to maximise the use of modern teaching techniques, including ICT, closed circuit microscopy display, wireless connectivity and flexible group work. The teaching spaces will provide a superior learning experience for undergraduates and maximise interactions between staff and students including research higher degree students and visiting scientists, thereby

exposing both existing and prospective scientists to the full potential of their interests. The expected outcome is a significant improvement in the quality of the science learning and research.

In addition to attracting more undergraduate students to Honours and PhD studies, the proposed complex will allow a wider range of fundamental research at an enhanced level of quality and higher capacity. This proposal will provide space designed to create interactions, with access to facilities meeting PC2-level requirements, and within AQIS standards. Such facilities and opportunities do not just attract good staff, they attract high calibre students, more visiting fellows and enhance CSU's ability to win competitive grants and attract international research students.

The proposal will enhance efficient use of resources and maximise collaboration by bringing together staff and students from a range of disciplines. Consistent with CSU's commitment to partnership, it will also enhance collaboration with industries and the science professions (e.g. fostering interactions with staff from DPI). Staff and students from different areas (biomedical sciences, agricultural sciences, animal sciences, chemistry, wine science, water and environmental science) are currently working in geographically separated laboratories across the Campus. The proposal will result in critical mass of expertise and infrastructure, more efficient use of space and equipment, co-location of platform technologies, a richer environment for technical staff and research students, and enhanced coordination and maintenance of equipment. By bringing these disciplines together, this development will enable multidisciplinary contact and the sharing of ideas - the basis for successful innovative research.

Through the proposed HEEF investment, CSU aims to advance quality and excellence in higher education by:

- enhancing the University's undergraduate teaching, graduate training and research through increased critical mass in the basic sciences, better harnessing of the expertise of our staff, improving the education for CSU's students and exploiting the opportunities of collaborative science;
- using CSU's strong disciplinary mix to produce well-rounded graduates with relevant skill sets who will be committed to collaboration with, and service to, inland communities and industries;
- hosting research partners who will take advantage of our unique environmental, social and agricultural systems to address, cooperatively, issues confronting inland Australia and the world; and
- transferring the University's knowledge and experience through local, national and international linkages, education and training.

Research has shown that 88% and 70% graduates of CSU's agriculture and health science courses respectively who come from inland Australia take up employment in inland locations providing the skill base to sustain the economic activity and social fabric of these communities and thereby national economic capacity. For on-campus students from metropolitan locations, the retention figures are 44% and 20% respectively. Hence significant numbers of the graduates from these facilities will be able to contribute more directly and innovatively to the productivity and sustainability of inland Australia and the national economy.

Principle 2: Strategic Relevance

The vision of CSU stated in the *University Strategy 2007-2011* is to be 'A national University for excellence in education for the professions; in strategic and applied research; and flexible delivery of learning and teaching', with a clear commitment to building our international impact through teaching and research collaborations. This HEEF proposal is strongly aligned and critically important to the attainment of the University's strategic objectives embedded within this Strategy. The proposal takes a holistic view wherein the quality of the undergraduate science experience and the quality of associated research and the research environment are integrally linked.

CSU's *Course Plan* includes the objective to 'Enhance the quality and scope of CSU's profile of professional courses'; specifically:

- 'enhance the quality of courses, through improved links with research, depth of staffing, and support facilities;
- enhance the quality of courses through consolidating the profile of disciplines and fields of study in order to improve depth of staffing and resources;
- increase collaboration with international universities in course provision.'

CSU's *Research Plan* clearly identifies that the University will 'Conduct strategic and applied research of international standard which:

- creates new knowledge.
- is applied for the benefit of our inland communities.
- enhances collaboration with industry.
- facilitates opportunities for linkages with learning and teaching.
- focuses on [specific areas of research strength].'

The *Research Plan* has a core focus on conducting research that is of direct relevance to inland communities and their productive capacity, and by extension national social and economic health. For example, CSU specifically identifies agricultural sustainability including agricultural innovation; land, water and society; and wine and grape science as research strengths. Since 2000, the University has systematically invested core resources in these areas to provide the necessary resources to support excellence in teaching and learning. The National Wine and Grape Industry Centre (NWGIC), established in 1997, is a partnership across CSU, DPI and the NSW Wine Industry Association. The Centre works directly on problems identified by the Australian Viticulture and Wine Industry and recently won a \$15m research grant 'Wine Growing Futures' from the GWRDC. In 2005, CSU created, in partnership with DPI, the EH Graham Centre for Agricultural Innovation on the Wagga Wagga Campus. In 2005, CSU introduced a new professional program in veterinary science to meet demand for veterinarians qualified in production animals and herd management and has integrated this teaching strength into its research priorities. Biomedical researchers at CSU are also working on the identification of antimicrobials from soil bacteria and are involved with the molecular analysis of soil organisms and the identification of a novel bioactive. This research has resulted in significant industry funding, national and international patents held by CSU.

The health of inland communities is similarly a key area of interest. CSU has one of the broadest ranges of health and allied health programs of any university in Australia. This capability is strongly supported by growing strengths in health research of relevance to inland communities. For example, inland people are more likely to die of cardiovascular disease than their metropolitan counterparts. The CSU Cardiovascular Research Unit is an internationally competitive research group in cardiovascular science and medicine with projects ranging from molecular diagnosis of sudden cardiac death to management of depression in heart failure patients. Macrophages play a central role in the aetiology of both acute and chronic inflammatory diseases. Current research undertaken at CSU has enabled

characterisation of Acot7, a protein involved in inflammation in macrophages and a therapeutic target for inflammatory diseases. The proposed facility will enable a better understanding of macrophage biology in relation to inflammatory diseases, and to identify modulators of this target. A significant aspect of this research is the integration of cell biology and structural biology.

CSU has developed a strong and focussed trajectory in the above areas and is now seeking additional buildings and infrastructure to make the significant shift from linear to exponential growth in both teaching and research facilities. CSU's current teaching facilities have limitations. The CSU Sutherland Laboratories were constructed in the 1960s and 1970s to cater to student numbers and construction/regulatory standards of 40 years ago. These facilities struggle to cope with the demands of increased student numbers and new discipline developments. The Sutherland Laboratories have a capacity of 32, 40 and 66, but have not had any improvements since their construction 40 years ago. The current Chemistry Laboratory has a capacity of 52, so multiple classes have to be run to cater for subjects with enrolments up to 400 undergraduates. This greatly restricts the University's ability to provide a first class teaching experience.

Previously, CSU focussed its resources primarily on supporting plant and animal research at the applied end of the basic-strategic-applied research continuum, but now needs to take the next step on this trajectory and fast track the development of the associated basic science research strengths. The agricultural and plant focus of our research profile has a long history in terms of recognition and support, and has been further strengthened by recent appointments in strategic research. Likewise, the University has recruited world-class animal science researchers as part of the establishment in 2005 of the Veterinary Science degree. This has greatly enhanced the University's capacity to undertake high-end science, but the development of appropriate research facilities is now needed to support this capacity. CSU has committed \$4.0m of its own capital development funding to the new laboratory complex to support these researchers with their focus on Molecular Biosciences.

Two major current initiatives of CSU relate strongly to this proposal. Since 2005 CSU has appointed seven Strategic Research Professors, with strong international research profiles, directly into our areas of science research strength. These Professors need enhanced infrastructure to continue their internationally recognised work and recruit honours and research students. The second initiative is the introduction of a Research Centre Fellow Scheme whereby some 55 researchers are released from teaching for a 6 month full-time period each year to work in CSU's Research Centres on their research activities. The research activities of some 15-20 Research Centre Fellows would be accommodated in the proposed facilities.

The final critical question that arises is: *Will the investment proceed without HEEF funding?* The short answer is "yes" but, with CSU's current resources, this investment could only proceed over a significantly extended time period. However, time is not on Australia's side with predictions of rapid climate change impacting on agricultural productivity and food security and disturbances in pathogen-animal-human ecology threatening animal productivity and human health (c.f. the SARS outbreak; the avian influenza threat). With the investments the University has recently made in new courses and strategic staff, CSU is ready to provide critical leadership in both the training of a new cadre of science-based professionals as well as fundamental research which will address several key issues confronting Australia in the areas of human health and world agriculture. CSU and its partners are looking for support from HEEF to help create this new environment and to assist in addressing the challenges and problems facing inland Australia, Australia as a whole and the world, by building a new cross-disciplinary Integrated Science Precinct at our Wagga Wagga campus. CSU needs this complex to bring to fruition its plan for a new environment where capable research-active staff and high quality students interact in a multidisciplinary way.

Principle 3: Desired Collaboration

CSU has a strong, demonstrable success in collaboration and extensive links are maintained with a broad range of stakeholders. CSU has distinctive collaborations due to its unique location in the food bowl of south-eastern Australia and has been referred to as 'the University of the Murray-Darling Basin'. A wide range of agricultural food, fibre and livestock commodities are produced within this geographic area. CSU education and research address the challenges that impact on these products such as climate change, water scarcity, food security, biosecurity and the skills shortage. Our agricultural research targets the dryland and irrigated mixed farming zone, the permanent pasture areas and the semi-arid rangelands of south-eastern Australia. No other university in Australia is able to cover so completely this spectrum from basic research to adoption by industry. CSU is also unique in non-metropolitan Australia in its profile of health and biomedical science programs. It is the major provider of health and medical scientists to inland Australia and nationally, and has strong partnerships with health providers.

CSU's research centres of excellence emphasise collaboration and partnership. The EH Graham Centre for Agricultural Innovation is a partnership with the DPI and the National Wine and Grape Industry Centre (NWGIC) is a partnership with the DPI and the NSW Wine Industry Association. These Centres integrate innovative research for increased productivity, extension and education programs in agriculture, animal/veterinary sciences and wine science/viticulture. The UNESCO approved International Centre of Water for Food Security (IC:WATER) has joint appointments with CSIRO Land and Water. Together with CSU's Institute for Land, Water and Society (ILWS) it brings a natural resource management and socio-economic focus to critical scientific and policy issues. The IC: WATER is also the Regional Coordinating Unit for Australasia of UNESCO's International Hydrological Program: Hydrology for the Environment, Life and Policy. In this role the Centre undertakes research to improve understanding of production systems and of water, nutrients and salt balances in the Murrumbidgee River catchment, the first assessment of its kind in any catchment in Australia. The underlying principles identified here are now being applied to a sustainable water yield assessment for the whole M-DB. The University has also recently established the Centre for Inland Health (CIH) to co-ordinate and lead research and practical solutions and policy to improve health outcomes in non-metropolitan regions.

Stakeholder engagement

The location of CSU in the heart of the M-DB, its proximity to its inland stakeholders and its close links with the DPI extension services and industry ensures stakeholder engagement in problem identification as well as solution creation and adoption. For example, the EH Graham Centre's Industry Advisory Committee comprises seven independent industry representatives who provide advice on the research priorities and stakeholder engagement of the Centre and promote the research outcomes. This partnership guarantees that the new knowledge generated by our research will have a clear path to market with a high probability of adoption and practice change by land managers. The NWGIC and ILWS have similar external Advisory Boards, the latter chaired by Dr Ken Matthews, Chair and Chief Executive of the National Water Commission. The Centre for Inland Health works with local Area Health Services and health service providers in identifying issues and solutions related to improved health outcomes.

Labour force linkages

CSU's undergraduate and postgraduate courses have a strong applied component and many of the courses have been specifically developed for distance education and flexible delivery to students already working in the field. These students provide a pool of high quality graduates who are often already employed in an industry of relevance to their course of study. Joint student supervision with key collaborators in the workplace is a strong focus: CSU's students are required to spend periods of time at different organisations and industry

to increase their skills base and relevance. Workplace learning enhances the skills base of the University's students such that CSU graduates are both well-rounded and self-reliant professionals on graduation and predominantly choose to take up productive employment in inland Australia.

National collaborations

CSU will continue to work with a broad range of collaborators, in addition to DPI and CSIRO Land and Water, including through the Co-operative Research Centres (e.g. CSU partners with the CRCs for National Plant Biosecurity, Future Farm Industries and Irrigation Futures) and with funding organisations, such as ARC, GRDC, GWRDC, MLA, RIRDC, AWI and ACIAR. The University is involved in a number of new national collaborative plans, e.g. the National Adaptation Research Plans including the National Climate Change Research Strategy for Primary Industries (CCRSPI), the Primary Industries Adaptation Network (PIAN) of the National Climate Change Adaptation Research Facility (NCCARF), and the NCRIS Terrestrial Ecosystems Research Network.

International links

International collaboration is a cornerstone of CSU research and many collaborative links are already in place in North America, Europe and Asia. CSU also delivers strategic research that benefits developing countries. For example, ACIAR is funding studies on dairy cattle productivity in Pakistan as well as work to improve the understanding and management of rice pathogens in Cambodia. The University has ongoing research at the International Rice Research Institute in the Philippines. IC: WATER conducts international collaborative research projects in the Philippines, China, India and Pakistan. CSU's NWGIC conducts collaborative research with partners in France, Germany, Switzerland and USA. CSU is also collaborating in agricultural and veterinary projects with partners in other countries such as Sudan, Thailand, China, North Korea, Eritrea and East Timor, for example, evaluation of recombinant vaccines for control of tropical fasciolosis in cattle, a major parasitic disease that suppresses animal productivity causing global losses of more than US\$2.0b p.a. to livestock producers. These linkages lead to CSU offering PhD training opportunities to international students from diverse countries and this will grow in the future as the research activity and critical mass in the basic sciences at CSU expands with HEEF support. Researchers from these institutions will have full and ongoing access to our facilities in order to further enhance our collaborative linkages.

Similarly, the CSU Cardiovascular Research Unit, in collaboration with Peking University in China, has been working on the genetic mutations of congenital long QT syndrome, a genetic disorder affecting mainly children causing sudden death. This ongoing collaborative project has made several major discoveries, one of which was to use a patient's electrocardiogram to predict the genotype of the fatal disease. This new diagnostic tool enables clinicians to assess the genetic types of the disease and decide which type of drugs or devices to use for treatment.

Summary

The science laboratory complex will secure CSU's ability to undertake basic and strategic research in future food productivity, bio-security, human and animal health, climate change, environmental sustainability and water scarcity. CSU's distinctive mission, location and profile mean that it must build its own capacity in science-based education and research. CSU's mission to serve inland Australia and build and retain a science workforce for inland Australia would be compromised if it had to rely on laboratory capacity outside its region.

Principle 4: Desired Co-investment

The laboratory complex and associated integrated science precinct will have substantial co-investment from CSU and its partners which will ensure that the maximum leverage is generated from HEEF funds. A total of \$18.5m has been committed by CSU to components of this bid (\$4.0m for the laboratory complex itself and \$14.5m for the associated Integrated Science Precinct). Specifically, CSU has committed \$8.5m to the construction of a Veterinary Diagnostic Laboratory (VDL) [delivery due late 2009], which is located across the road from the site for the proposed new complex. The VDL will contain state-of-the-art laboratories for diagnostic biochemistry, haematology, microbiology, parasitology, pathology and virology and a PC2-level post mortem facility. The VDL will adopt a molecular biological approach to diagnostics and implement tools such as PCR and modern ELISA based assays. It is planned that training will be offered in the VDL to students studying in the Veterinary Science and Animal Science courses at CSU as well as providing a node for postgraduate training to address the national shortage of veterinary pathologists. This investment follows CSU's earlier investment of \$4.6m in the Veterinary Pre-Clinical Centre, co-located next to the VDL in the precinct.

Research and training in molecular biosciences will also be a key focus of the new laboratory complex, to which CSU has committed \$4.0m. One of the key objectives in this application is to bring together scientists with like research strengths by co-locating the laboratories from the Schools of Agricultural and Wine Sciences, Animal and Veterinary Sciences and Biomedical Sciences into an integrated science precinct. CSU expects this co-location to maximise interactions between related, but currently disparate, groups asking fundamental, basic research questions. Co-location with other disciplines, such as chemistry, will similarly enhance prospects for inter-disciplinary collaborations. This will enable new research approaches using modern molecular tools to improve understanding of animal diseases, plant productivity, food security and human health. CSU anticipates that such multi-disciplinary research may lead to new bioscience products of significant benefit to Australia.

The NWGIC, located nearby on campus, has significant research facilities. The facilities at NWGIC are heavily utilised, receiving \$15m in GWRDC support for their programs over 2005-2011, with high level training offered to graduate students from Australia, the USA and Europe. CSU is committed to investing a further \$6.0m in an expansion of the NWGIC laboratories. This will enhance our capacity to evaluate climate, viticultural and winemaking impacts on wine quality under controlled environment conditions, and complements the chemistry laboratories proposed as part of the new HEEF investment.

CSU has close collaborative linkages with the DPI, Wagga Wagga Agricultural Institute, regional offices, laboratories and greenhouses already co-located within the proposed precinct. The EH Graham Centre for Agricultural Innovation is a strong alliance linking CSU and DPI, with co-investment (including a co-funded director) from both partners in its operation. In addition, DPI has agreed to locate future investments appropriately within the new precinct, so that maximum advantage is obtained from the strategic co-location of facilities for joint use. DPI will invest \$2.5m (2008-11) in new infrastructure for the precinct, including a \$2.0m facility for processing of plant and grain samples from field experiments (capable of handling the large numbers and sample sizes involved in plant breeding and other extensive field experiments) and a further \$0.5m for offices. The NSW Government has been approached for a further \$12.5m for the science laboratory complex. The NSW Minister for Science and Medical Research has indicated an intention to establish a defined position on funding once the outcome of the EOIs is known and following formal discussions with the Commonwealth. CSU will pursue further co-investment from relevant partners from industry and agribusiness.

Principle 5: Required Capabilities - research, teaching and learning expertise

CSU has the expertise to make optimal use of the new infrastructure requested to enhance greatly its undergraduate teaching, research and graduate training. The request has three main components: (i) the building of new undergraduate teaching laboratories to enhance undergraduate/graduate teaching in biochemistry, botany, chemistry, microbiology, plant physiology, plant sciences and soil science; (ii) the creation of a new learning and research science zone to drive functional critical mass at CSU, enhancing the ability to offer high level undergraduate training to domestic and international students as well as exposing undergraduates to the research life of the University; (iii) the provision of new facilities, including equipment, to optimise undergraduate and graduate teaching program as well as research programs, with clustering of high-end research equipment in the molecular biosciences to accelerate equipment sharing, maintenance, technology uptake and student training.

Increased science enrolments at undergraduate level at CSU have been one of the major drivers for the need to improve undergraduate training laboratories, and have led to additional staff recruitment. It is notable that CSU is one of the largest providers of agricultural higher education in Australia (about 10% of national enrolments and 25% of national distance education enrolments). CSU has the expertise to take full advantage of this new infrastructure. CSU is recruiting new staff, from the levels of Lecturer to Professor, to create intellectual capacity that will further underpin and greatly strengthen the undergraduate and post-graduate training and research across the University as well as attract other researchers and students. CSU has renewed its staff in the Schools of Agricultural and Wine Sciences, Animal and Veterinary Sciences and Biomedical Sciences, significantly enhancing research capability. For example, to address the critical shortage of skilled veterinary scientists in inland Australia, and the increased bio-security risks to Australia's animal production, CSU has invested in the recruitment of over 30 academic staff to establish the new School of Animal and Veterinary Sciences, the only veterinary program in Australia with a principal focus on production animals and herd management. These recruits represent both young investigators as well as senior veterinarians, recruited from within Australia and overseas.

Since 2005, CSU has made a major investment in Strategic Research Professors in a range of scientific discipline areas with the multiple aims of developing and delivering strong, contemporary science curriculum driving high level research as well as providing experienced mentorship to emerging researchers. These professors have been recruited from eminent institutions such as McGill (Canada), Cornell (USA), UWA and the International Water Management Institute (Sri Lanka) and bring a wealth of teaching and research experience to CSU. Many CSU professors continue to hold joint appointments in North America and UK, ensuring that research directions engaged by staff at CSU are informed by developments at the highest international level. For example, Professors holding appointments in the EH Graham Centre for Agricultural Innovation have links to the International Rice Research Institute in the Philippines, those in the NWGIC have links to the Paris-Grignon National Agronomics Institute, and staff in the Centre for Inland Health have links to Liaocheng People's Hospital (LPH) in China. These professors will conduct research of an international standard in the new laboratory complex and provide the leadership, vision and inspiration to ensure its optimal use.

Principle 6: Required Capabilities - planning and management skills

CSU's Division of Facilities Management (DFM) includes a Department of Planning, Design and Construction (PD&C) and a Department of Operations and Maintenance (O&M). These Departments have well qualified staff, experienced in oversight of planning, design and construction of complex state-of-the-art new buildings, e.g. the new Veterinary Science facilities, as well as the efficient operation, maintenance and renovation of existing building stock.

PD&C consists of an in-house staff of qualified and experienced architects, engineers and construction managers, who currently oversee annually approximately \$50m of existing construction and renovation work across CSU's nine campuses. The in-house PD&C staff address initial scoping and planning for each project and then oversee the tendering for architects/ engineers for the various projects. Once the outsourced design professionals are on board, the PD&C staff liaise between the in-house clients and the designers in directing further planning, design and construction documentation to achieve the optimal building design to meet CSU's needs. In partnership with the out-sourced design professionals and in-house design staff, PD&C construction managers oversee the management and coordination of each project to obtain the optimum end product.

In 2007 CSU received \$65m in funding from the Department of Health and Ageing for a new Dentistry Program to start at CSU in February 2009. \$54m of this funding was to cover design/construction of two large teaching and clinic facilities at Wagga Wagga and Orange campuses and three teaching clinics at Dubbo, Bathurst and the Albury-Wodonga campuses, and accommodation. The two large teaching and clinic facilities have been designed and are currently under construction. The planning and design for all five facilities is being completely overseen by in-house PD&C staff. Currently underway, also, at the CSU Wagga Wagga Campus, is a series of projects for the School of Animal and Veterinary Sciences for which significant DEEWR funding has been received. One project (Veterinary Pre-Clinical Centre, \$4.6m) has successfully provided for teaching in the Veterinary Science courses; a second project was recently completed (Veterinary Clinical Centre, \$8.7m) on schedule and on budget; a third project – a renovation for teaching/ office space for the School (Graham Building, \$3.3m) is underway and is on schedule and budget; a fourth project, construction of the Veterinary Diagnostic Laboratory (\$8.5m), is in the final design stages. In addition, CSU is currently managing the planning, design and construction of \$33m of new student residences across three campuses; a \$35m campus relocation / renovation / new construction project at its Albury-Wodonga Campus; various NWGIC projects; construction of sporting facilities and extensive renovation; and maintenance projects across all campuses.

A thorough assessment of existing assets was undertaken several years ago and has been recently updated. As new buildings and newly renovated buildings come on-line at the various campuses, O&M staff are trained in the optimal operation of all building systems and a preventive maintenance program has been established. With recent extensive experience, DFM provides experienced professional oversight for the optimal design, construction and maintenance of all existing and new capital assets for education and research, allowing for the best possible use of the assets by students, faculty and staff. Most of the major projects currently under development are planned for completion by end of 2009. If the University is successful with its HEEF bid, DFM will have sufficient in-house resources to take up this new challenge and is ready to support the development of the proposed laboratory complex.

A comprehensive budget for the \$34m requested from HEEF has been prepared by DFM and contains detailed costings for all buildings and equipment.

Principle 7: Required Capabilities - financial viability

Charles Sturt University is a financially stable and secure institution. For the financial year ended 31 December 2007 the University generated \$280m in revenue and incurred \$248.2m in expenses, achieving an operating result of \$13.8m (once the \$18m one-off funding provided by the Commonwealth Government in 2007 to construct the dental facilities is removed). The University achieved best practice in the financial benchmarks as determined by DEEWR and calculated by the NSW Audit Office from the annual accounts of the University for the financial year ended 31 December 2007. The cash reserves of the University also increased in 2007, from approximately \$119m as at 31 December 2006 to approximately \$125m as at 31 December 2007. These funds form the investment portfolio of the University and, for the year ended 31 December 2007, earned just under \$10m in interest. These earnings are directed to capital expansion of infrastructure necessary to achieve the strategic direction of the University and to ensure excellence in the teaching and research facilities.

The University has developed a comprehensive capital development plan linked to its strategic plan for the coming five years. This provides for growth in student numbers, particularly postgraduate research students. The University currently manages a portfolio of \$433m (from the 2007 annual accounts) in property infrastructure. All of the physical assets are valued and depreciated annually. An updated condition report allows the University to provide proper periodical maintenance to all assets.

In the recent past, the Division of Finance has successfully managed the financing of (including solving a series of complex taxation issues), and the professional financial oversight during construction of, a number of large scale capital developments, ie. student residence expansion (\$33m), establishment of a dental school (\$59m), establishment of the School of Animal and Veterinary Sciences (\$40m), and the relocation of the Albury-Wodonga Campus of the University to a new site at Thurgoona (\$35m).

In summary, the Division of Finance has the skill, financial management capability and experience to oversee effectively the implementation of this \$67.5m project incorporating the \$34m HEEF investment bid.

Section 5 – Other information

Requirement for HEEF Funding

Please state why other Australian Government funding sources are not appropriate for this proposal.

Please limit your response to 100 words.

CSU's Capital Development Plan extends through 2011. This Plan has projected income totalling \$200m for 2008-2011, which includes \$31m from the Government's Roll-In, \$16m from the Capital Development Pool and \$11m from the Better Universities Renewal Fund. These funds are committed to providing the infrastructure needed to maintain and develop our current teaching and research facilities. CSU aims to accelerate its science teaching and learning, and research trajectory by developing high-end basic science facilities to complement its applied research orientated facilities. CSU cannot redirect or attract funding from other Government funding sources to fulfil our significant aspirations in this area.

Experts

Expert One

Name: Professor John Boyer

Position: DuPont Professor of Biochemistry and Biophysics, University of Delaware, USA.

Phone number: + 1 302 645 4014

Fax number: + 1 302 645 4007

Email: boyer@udel.edu

Relationships to the applicant and project: He has been a Visiting Professor

Expert Two

Name: Professor Norman Williamson

Position: Professor and Program Director, Veterinary Sciences, Massey University, NZ.

Phone number: + 64 6 350 5057

Fax number : + 64 6 350 5634

Email: n.williamson@massey.ac.nz

Relationships to the applicant and project: None

Confirmation of Financial Timeframes



By ticking this box, you are confirming that your institution can meet the financial timeframes outlined in Section 2

Confidential information

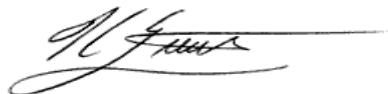


By ticking this box, you are confirming that you have clearly labelled any confidential information contained in this proposal.

Vice Chancellor or equivalent approval

I, Professor Ian Goulter, agree that Charles Sturt University can meet the aforementioned financial commitment and timeframes, subject to further development of a full application in the second stage.

Signed:

A handwritten signature in black ink, appearing to read 'I. Goulter', with a long horizontal flourish extending to the right.

Date: 14 August 2008