


Institute for a Broadband-Enabled Society

Annual Report 2010



IBES
Institute for a
Broadband-Enabled Society





Aligning research and industry interests to drive innovation
in broadband applications to deliver seamless experiences for
the benefit of Australian society.

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Welcome to the first annual report of the Institute for a Broadband-Enabled Society (IBES).

Established in July 2009, IBES is an exciting new multidisciplinary research venture focusing on applications of next-generation broadband and the benefits of these applications to Society. IBES brings together a diverse team of the University of Melbourne's world-leading researchers.

In the first year of activities we have established 40 funded research projects, involving 144 researchers from across 28 departments at the University of Melbourne. Outside collaborators participating in these projects include NICTA, VerSI, University of Tasmania, Monash University, Swinburne University, Defence Science and Technology Organisation, and University of California San Diego. This annual report gives an overview of these projects and highlights the broader goals and objectives of IBES.

IBES' research is divided into five broad themes: Health and Wellbeing, Education and Learning, Network Deployment and Economics, Service and Business Transformation, and Social Infrastructure and Communities. This research is enhanced through a state-of-the-art test-bed laboratory which provides unique advantages to university researchers and industry collaborators alike.

An important part of IBES' activities is the Industry Partner Program, which has 19 members from a range of multinational telecommunications equipment vendors, ICT companies, telecommunications service providers, Australian small and medium enterprises and research organisations. The support we have received from our partners has exceeded expectations, and we are very grateful for the encouragement we are receiving from them.

I hope that in addition to providing a summary of our activities, that this report provides an insight into some of the opportunities made available by ubiquitous high-speed broadband provided by the National Broadband Network. As we look to our next year of activities, we expect continued growth, which will enable IBES to cement itself as a leader in research into the next generation of broadband services, applications and end user experiences.



Rod Tucker

IBES is a cross-disciplinary research institute dedicated to innovations in products, services and end-user experiences that maximise the benefits of new broadband technologies to Australian society. The Institute's activities covers a wide range of fields including Education and Learning, Health and Wellbeing, Business and Service Transformation, Network Deployment and Economics, and Smart Communities and Infrastructure.

IBES is becoming a focal point for research and innovation across the full spectrum of social, business and technological activities associated with and influenced by or the Australian National Broadband Network.

The Institute has built upon the internationally recognised expertise at the University of Melbourne, in areas such as e-health, e-education, digital environments, culture and communications, environmental monitoring, broadband information systems and advanced technologies for broadband delivery. The Institute now serves as an umbrella organisation for research at the University of Melbourne related to broadband technologies.

The primary focus of the Institute is to seek out and develop opportunities for collaborations between members of the University of Melbourne's research community and researchers in other universities, other research organisations, and industry. Since its inception IBES has stimulated and nurtured strong collaborations between University of Melbourne researchers, industry and government.

IBES Funding

IBES is jointly funded by the University of Melbourne and the Victorian State Government, through the Department of Innovation, Industry and Regional Development. IBES is very grateful for the ongoing support of the Victorian Government.

Additionally, IBES' income is supplemented by the generous support of our Industry Partners. In the first year of operation IBES has received \$764,000 in cash and in-kind support from its Industry Partners. A full list of Industry Partners is included on Page 12.

IBES Research

In its first year of operation, IBES has committed \$1.3 million to support a range of research activities across its five research themes. A total of 40 research projects have been established through two rounds of seed funding. Additionally, IBES has provided five PhD top-up scholarships to postgraduate students whose research is aligned with IBES. Figure 1 shows a breakdown of projects by theme.

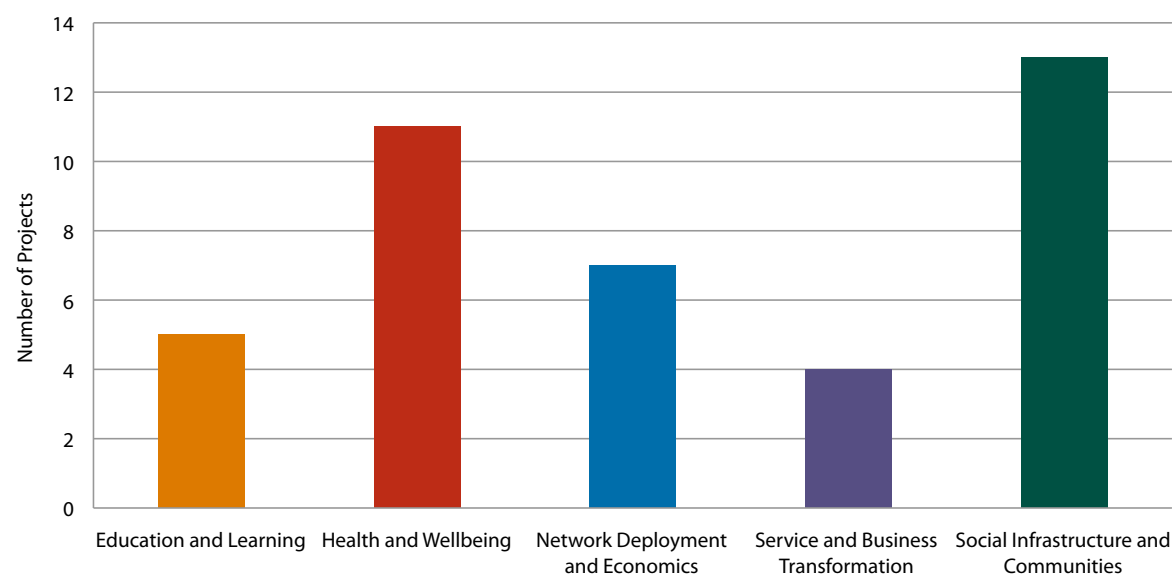


Figure 1: Breakdown of research projects by theme

144 researchers employed by the University of Melbourne are engaged in the research program at IBES, and actively contribute to project outcomes. The specialisation of these researchers is many and varied, coming from across the University community including:

- Faculty of Architecture, Building and Planning
- Faculty of Arts
- Faculty of Medicine, Dentistry and Health Sciences
- Faculty of Science
- Faculty of the VCA and Music
- Melbourne Business School
- Melbourne Graduate School of Education
- Melbourne Law School
- Melbourne School of Engineering
- Melbourne School of Land and Environment

IBES researchers are collaborating with a total of 21 researchers from other universities and research institutions from around the world. A full list of research projects is included in Table 1. Details of each project is outlined in the following chapters and a list of researchers, including collaborators and PhD students, that are associated with IBES appears at the end of this report.

**Table 1 (opposite):
List of IBES projects**

Theme	Project Title	Funding Source
Education & Learning	Towards a distributed international ethnographic museum	Round 1
	Convict founders & survivors of Tasmania	Round 1
	Using broadband-enabled technology to create a presence in classrooms for children who are absent due to health conditions	Round 1
	3D virtual reality training	Round 2
	Connecting learners for collaboration across diverse communities	Round 2
Health & Wellbeing	Personal patient (patient controlled) record	Round 1
	IBES electronic health records - ethical and social issues project	Round 1
	Making pathology reports smarter by incorporating user characteristics in design	Round 1
	Haptic tele-rehabilitation: latency implications for system stability and clinical communication	Round 1
	Promoting guideline concordant care for young people with depressive disorders	Round 1
	Broadband for first episode psychosis patients	Round 1
	Broadband-enabled connections for young people with disabilities in ethnic communities	Round 1
	Broadband-enabled delivery of physical fitness and dietary programs for young people with serious mental illness	Round 1
	Mobile and broadband technologies for ameliorating social isolation in older people	Round 1
	Virtual visits for women's health	PhD
	Smart homes for the elderly	PhD
	Wireless broadband monitoring of knee osteoarthritis	Round 2
	Concordance between real-time teledentistry assessments and face-to-face examination	Round 2
	Telestroke study	Round 2
Network Deployment & Economics	NBN cost benefit analysis methodology	Round 1
	Green Internet	ARC & IBES PhD
	Long range passive optical network	NEC/ARC
	NBN modelling	CUBIN
	NBN deployment techno-economic model	Round 2
	Scalable and energy-efficient deployment of video-rich services over next generation networks	Round 2
Service & Business Transformation	Building a digital user guardian	Round 2
	Crowd-sourcing human knowledge on spatial semantics of placenames	Round 1
	Returns on ICT investment in the third sector	Round 1
	Assessing the potential barriers to the adoption of high-speed broadband by Australian business	Round 1
Social Infrastructure & Communities	SmartStreet	Other
	Screen stories and community connections	Round 1
	Gardens of tomorrow in broadband-enabled neighbourhoods	Round 1
	Broadband-enabled public screens: from display to interaction	Round 1
	Demand response in smart grids	Round 1
	Broadband in the home: a longitudinal study	Round 1
	Data assimilation and modelling for early and rapid bushfire detection using broadband technology	Round 1 & PhD
	Online decision support for crop irrigation	Round 1
	Social interaction through universal broadband access in public spaces	PhD
	Early detection and mitigation of disastrous events with broadband-enabled social interaction technologies	Round 2
	Death, grieving and memorialisation	Round 2
	The role of high speed broadband in telecommunications between people with limited speech and the health workforce	Round 2
	Political issues analysis system	Round 2
	UniTV	Round 2

IBES is very fortunate in having an experienced Advisory Board who bring a strong mix of commercial and research skills in telecommunications and the digital economy to help IBES align industry and research interests.

Professor Rod Tucker

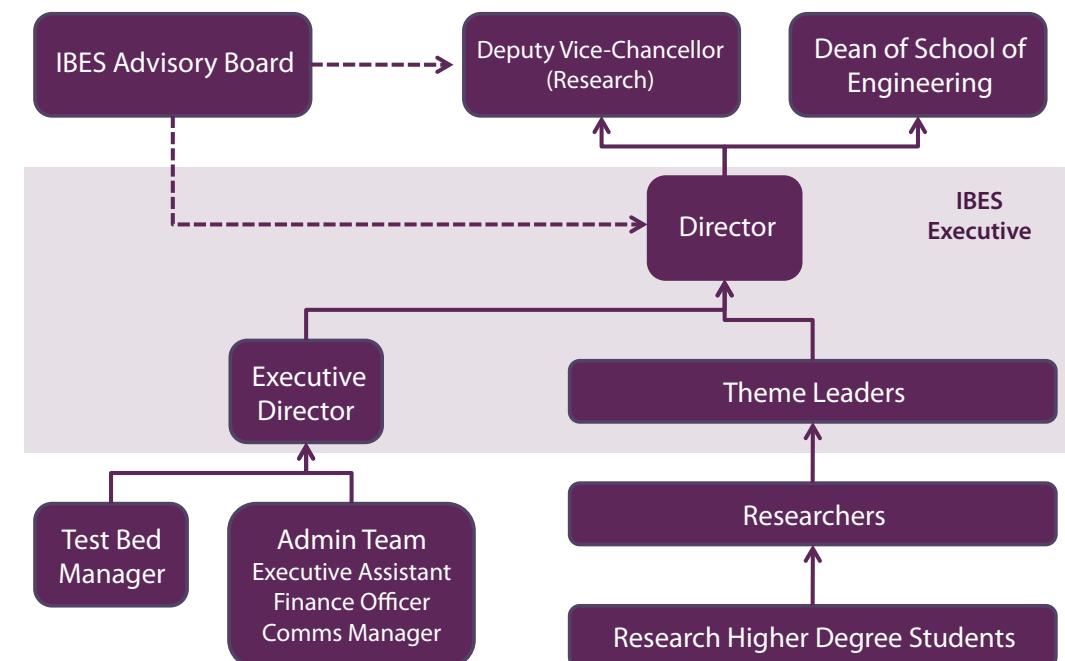
Laureate Professor Rod Tucker is the Director of the Institute and is assisted by an Executive Committee comprising senior academics from across the University. A list of Executive Committee members is included on the following page.

IBES Advisory Board

The inaugural IBES Advisory Board comprises distinguished industry leaders in the ICT sector, who are assisting the Institute to achieve its goals and to maximise its influence and impact. The Advisory Board provides advice on matters relating to research directions, business strategies, and industry linkages. The Advisory Board was convened twice in the first year of operation.

Members of the Advisory Board are:

Steve Wood Chair	CEO Tennis Australia
Genevieve Bell	Intel Fellow, Director, Interaction & Experience Research
Chris Hancock	CEO AARNet Pty Ltd
Shaun Page	Vice President Juniper Networks (ANZ)
Mike Quigley	CEO NBN Co Limited
Les Williamson	Vice President Cisco (ANZ)





Rod Tucker (Director)

Laureate Professor

Rod's research areas in telecommunications include fixed and wireless networking, with a particular focus on energy efficiency. Rod is a Fellow of the Australian Academy of Science, a Fellow of the Australian Academy of Technological Sciences and Engineering, a Fellow of the Optical Society of America, and a Fellow of the Institute of Electrical and Electronics Engineers (IEEE). In 1997 he was awarded the Australia Prize for his contributions to telecommunications.



Pat Auger

Associate Professor, Melbourne Business School

Pat's research focuses on the field of information systems and e-Commerce including the strategic use of Internet-based electronic commerce in business, the impact of digitisation on firm performance and the main determinants of e-commerce performance in the retail sector. He is currently the academic director of the Executive MBA program at the Melbourne Business School.



Lynda Ball

Lecturer, Melbourne Graduate School of Education

Lynda's research relates to the use of technology for the teaching and learning of mathematics including pedagogical issues and student engagement, assessment and teacher professional learning. Lynda is the newest member of the IBES Executive, joining in May 2010.



Dianne Chambers

Senior Lecturer, Melbourne Graduate School of Education

Dianne's research areas include the use of technology in teacher education, technology-enriched problem based learning, and education for sustainability. Dianne serves as Assistant Dean (Learning Technologies) in the Melbourne Graduate School of Education. She teaches undergraduate and postgraduate students studying in the areas of early childhood, primary and secondary education.



Bharat Dave

Associate Professor, Architecture, Building and Planning

Bharat's research revolves around innovative spatial design practices and futures supported by digital technologies. He is currently the Associate Dean (Outreach) in the Faculty of Architecture, Building and Planning and leads the Critical Research in Digital Architecture group.



Joshua Gans

Professor, Melbourne Business School

Joshua's research interests range from the economics of innovation to game theory and intellectual property. His specialisations include the nature of technological competition and innovation, economic growth and regulatory economics. Joshua is the Foundation Professor of Management (Information Economics) at the Melbourne Business School.



Kathleen Gray

Senior Researcher, Health Informatics, Faculty of Medicine, Dentistry and Health Sciences and Department of Information Systems

Kathleen's research focuses on health informatics and her current interests include emerging use of web technologies in healthcare and education, and how consumers, carers, clinicians and researchers learn to make effective use of new information and communication technologies in healthcare. Kathleen currently serves on the Victorian e-Health Network Committee.



Steve Howard

Professor, Department of Information Systems, Faculty of Science

Steve's research focuses on the interface between the computational sciences and the social sciences, specialising in human computer interaction and computer supported cooperative work. His current focus looks at how computing can alleviate problems of real social concern, such as illness, social marginalisation and isolation, and environmental degradation. Steve is currently the Head of the Department of Information Systems.



Gregor Kennedy

Associate Professor, Health Informatics, Faculty of Medicine, Dentistry and Health Science

Gregor's research focuses on health informatics and virtual environments. His current research interests include the use of 3D haptic, immersive virtual environments for education and training, the use of emerging technologies for learning, the development of digital literacy, and interactions in intersected virtual and physical environments.



Ivan Mellado

Commercialisation Manager, Melbourne Ventures

Ivan leads the University of Melbourne's intellectual property management and commercialisation practice in the areas of information communications technology and the physical sciences. Ivan brings a depth of management experience, having held senior roles in general management, marketing and sales with leading organisations.



Scott McQuire

Associate Professor, Media and Communications, Faculty of Arts

Scott's research explores the social effects of new media technologies, with particular attention to their impact on the social relations of space and time, and the formation of identity. He has led research projects on digital cinema, immersive environments and the implications of distributed networks on urban space.



Rens Scheepers

Associate Professor, Department of Information Systems, Faculty of Science

Rens' research focuses on approaches to assess the business value potential of emerging information technologies. His research has examined the business value returns and impact on service delivery of a variety of emerging information and communication technologies in sectors such as manufacturing, consulting, policing, aged care, banking, hospitality and health care.



Liz Sonenberg

Pro Vice-Chancellor (Research Collaboration) and Professor, Department of Information Systems, Faculty of Science

Liz is a Professor in the Department of Information Systems. In her role as Pro-Vice Chancellor, Liz promotes and supports multi-disciplinary activity across the University of Melbourne. Liz played a key role in the establishment of IBES, and now that the Institute is fully operational she has stepped down from the Executive Committee. IBES is very grateful for her ongoing support.



Kate Cornick

Executive Director, IBES

Kate's roles include co-ordinating the administrative activities of the Institute, promoting research collaborations and building relationships between the University, research organisations, industry and governments. Previously she worked as an advisor to the Minister for Broadband and received a PhD from the University of Melbourne in optical telecommunications in 2007.

Industry Partner Program

IBES has established an Industry Partner Program that provides partners with a neutral ground where companies and researchers can interact, collaborate and debate issues relating to the rollout and use of broadband technologies in Australia.

The Partner Program is modelled on similar programs at Universities in the United States of America. To date, the program has successfully facilitated collaborative interactions between a number of Partner Companies and researchers at the Institute.

In the first year of operation IBES has received \$764,000 in cash and in-kind support from Industry Partners. This has allowed IBES to expand its operations, by supporting more research projects and developing the Test Bed facility. IBES is very grateful for the support it has received and looks forward to growing the Partner Program, and its activities over the following year.

Platinum sponsors



Gold sponsors



Empowered by Innovation



Test-bed partner



Sponsors



Connectivity partner



Test Bed



IBES has established a state-of-the-art broadband network test-bed laboratory. The test-bed laboratory is a valuable resource for researchers across the full spectrum of activities in the Institute. The test-bed enables researchers to trial new ideas and innovations in a real-life networking environment. Researchers can perform experiments, ranging from configuring applications vertically through the technology stack through to assessing end user reactions to new services and applications.

The test-bed configuration places IBES in the unique position of being able to offer industry a diverse environment in which they can configure, test, optimise and showcase their broadband-enabled applications and services.

The test bed consists of end user, access, aggregation and transport components. These interconnect with typical retail service provider equipment. The equipment can be configured in a variety of ways to allow almost any network topology and architecture to be simulated.

The equipment has largely been donated by Industry Partners and IBES is particularly grateful for this support.

The end user component consists of passive optical network (PON) optical network termination devices - the customer end points of the fibre to the premises network. The test-bed also houses examples of end user devices found in the home or office, such as 3D televisions, iPads, computers, notebooks and smart phones. Wireless routers, IPTV set top boxes and media servers have been donated by Netgear. Cisco has donated Telepresence video conferencing equipment.

There are a number of different passive optical network systems in the test-bed which have been donated by Huawei, Allied Telesis and NEC. The aggregation and transport network consists of Huawei equipment. The service edge component provides connectivity to the Internet and co-located applications such as video on demand media servers, as well as connectivity to off-site hardware and applications.

The fibre infrastructure that interconnects the optical components in the test-bed, has been donated by Warren and Brown Technologies. Pacific Broadband Networks has donated, installed and configured a radio frequency overlay system that will enable delivery of video content over the IBES test-bed.

The IBES test-bed is connected to the AARNet network, and IBES is looking to link the laboratory to facilities in other universities and research institutions.

State-of-the-art test gear, including load generators and impairment generators have been donated by Anue, Spirent and Telecom Test Solutions for use in the test-

bed. This will enable researchers to emulate real world network characteristics in a closed and controlled environment, meaning they can verify their applications and service work as required. Over the coming months more equipment and software platforms donated by industry partners will be integrated into the test-bed environment.

In its second year of operation, IBES is looking to grow the test-bed facility, and activities in the test-bed are expected to increase over the first few years of operation. This will provide broadband service providers and equipment vendors the opportunity to trial new equipment, test cross-vendor interoperability, and to showcase new innovations.

It is anticipated that the test-bed may also provide an incubation facility for small and medium enterprises wishing to develop new broadband applications.

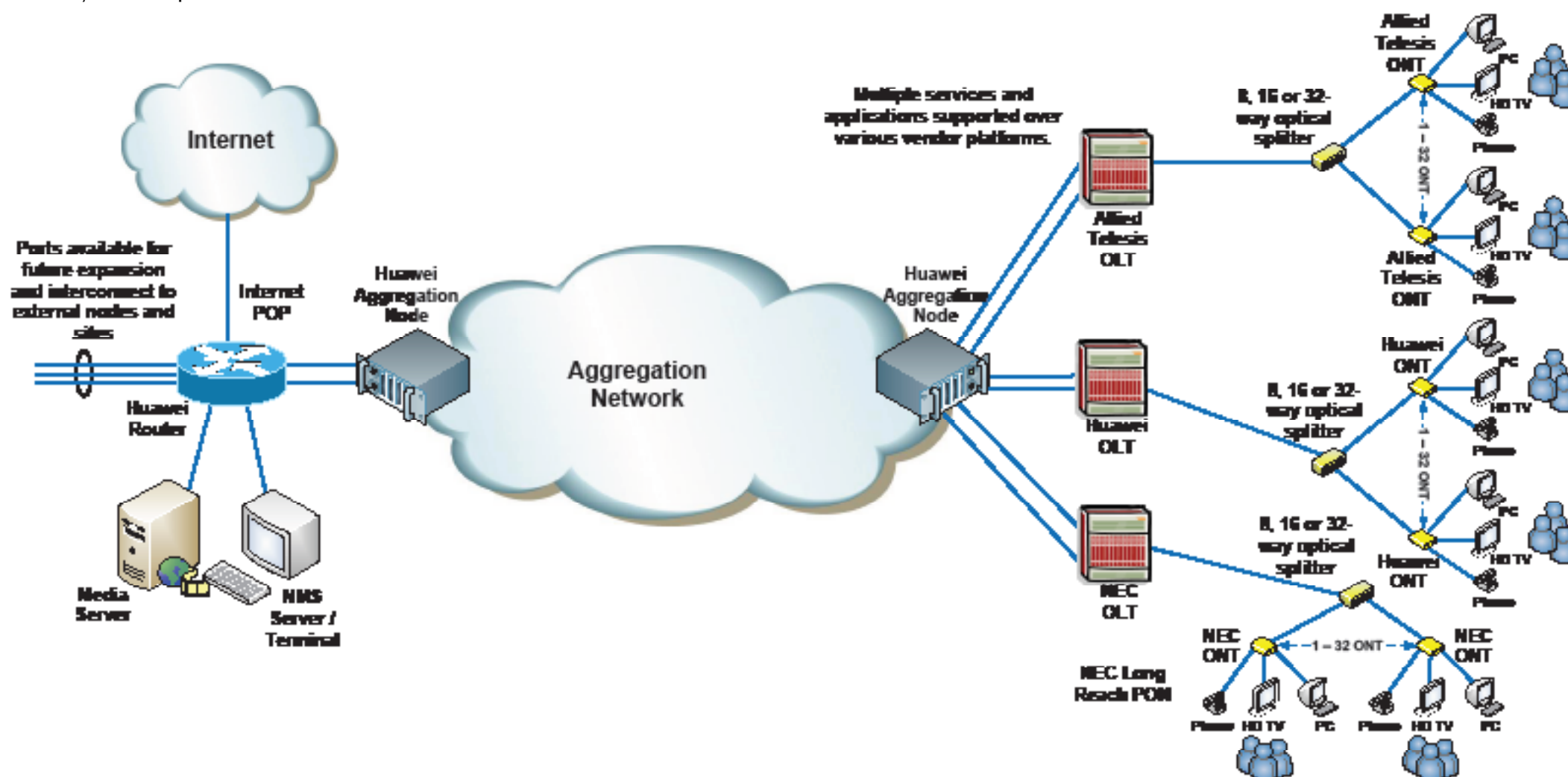


Figure 2: The test-bed architecture

In its first year of operation IBES has held a number of events including:

- 12 internal workshops to promote collaborations between researchers
- 3 workshops bringing together research and industry representatives, including Industry Partners
- 3 public research seminars

A full list of events is included at the end of this report.

IBES has also generated a number of news worthy events, and continues to receive significant media attention.

Significant events include:

The official launch of IBES on 15 July 2009 was attended by the Premier of Victoria, John Brumby; the State Minister for Innovation, John Lenders; the Minister for Broadband, Communications and the Digital Economy, Stephen Conroy.

On 12 January 2010 IBES announced its foundation membership of the GreenTouch™ Consortium which brought together leading Information and Communications Technology (ICT) industry players and researchers to fundamentally re-invent the network and reduce ICT energy consumption up to a factor of 1000. For more information about the GreenTouch Initiative, please visit: www.greentouch.org.

On 3 March 2010 IBES hosted the launch of the Victorian eHealth Network, a collaboration that will promote and support the application of IT to improve health and wellbeing. The Network is providing a forum for government,

industry, research organisations and education providers to foster growth, innovation, and the development of new eHealth products and services.

On 28 April 2010 Alcatel-Lucent's research arm, Bell Labs, the University of Melbourne and the Victorian State Government announced they are partnering to establish the Centre for Energy-Efficient Telecommunications (CEET). The Centre will conduct research on a broad range of telecommunications network infrastructure elements and will focus on how those elements can be made more energy efficient.

The IBES research program continues to attract media attention. Specific projects that have featured in the press include Crowd-sourcing human knowledge on spatial semantics of placenames¹ and Using broadband-enabled technology to create a presence in classrooms for children who are absent due to health conditions². Additionally, the Telestroke Study appeared on Channel 7 news³.

A full list of media articles on IBES and its research program are included in on page 96.

1 ACM Tech News, <http://www.acm.org/> August 20, 2010

2 Orb Article (in media listings)

3 http://www.youtube.com/watch?v=C-mELBbBL_I

A photograph of a classroom where a line of students is seated at desks, each with a computer monitor. The student in the foreground, a young woman with light brown hair, is looking towards the camera with a slight smile. The other students are looking at their computer screens. The room has educational posters on the wall.

education and learning

Education and Learning encompasses learning in both formal and informal settings and involves learners of all ages. Ubiquitous high speed broadband provides a way to build the capacity of teachers, students, and the wider community through increased learning opportunities and choices. Innovations and best practices informed by research become accessible to all. Access to educational opportunities will be improved, regardless of location. High speed broadband has the potential to provide learners with a range of educational opportunities beyond their local environment. Students, regardless of their location, will be able to take classes with specialist educators and adults will have access to further learning and higher education.

The Education and Learning theme is fostering innovative multidisciplinary research to develop the learning opportunities made possible by high speed broadband. Researchers at IBES are investigating ways in which rich information resources can be made more accessible and how remote education can facilitate learning opportunities that are currently unavailable. Research in this theme demonstrates how connecting Australians via broadband opens new learning and social opportunities.

Using broadband technology to showcase one of Australia's great archival treasures

The digital panopticon: convict founders and survivors of Tasmania

Between 1803–1853 at least 72,500 convicts were transported to Tasmania. From the point of their arrest in the British Isles and other parts of the empire to the date of their release in Australia these individuals were the subject of intense documentation (a 'paper panopticon'). Amongst other things we know the colour of their eyes, how tall they were, where they were born, where they were sent to work. These records are considered to be of such international importance that in 2007 they were inscribed onto the UNESCO memory of the World Register.

Today, over 700 volumes of these records (a total of over 95,000 images) have been digitally captured as a result of a collaboration between the University of Tasmania, the University of Melbourne, University of New South Wales, Flinders University, the Australian National University, and the Tasmanian Archives and Heritage Office. The records are available online through the Tasmanian Archives and Heritage Office website, however, access is currently limited by download speeds, inadequate indexing structures, cumbersome user interfaces, and a lack of aids to assist record interpretation.

This project has produced a state of the art index and retrieval system that unlocks Tasmania's convict records. The index system allows the raw convict data to be easily searched and links this to other relevant information such as photographs of the convict, their house or their relatives. The information gathered in this state of the art online database is of interest to academics working in the field of history, demography and epidemiology; family historians; schools and other educational users, heritage sites and the wider tourism industry.

The beta version of the software received a positive response when it was launched at the Menzies Research Institute in Hobart in June 2010.

Streaming Australian research data to the world: towards a distributed international ethnographic museum

Nick Thieberger

Rachel Nordlinger

Cathy Falk

Steven Bird

Linda Barwick

Linguistics and Applied Linguistics

Music

Computer Science and Software Engineering

University of Sydney

Technological advances are resulting in an exponential increase in the possible uses of broadband-enabled media including audio and video sources. While the Internet provides access to a vast amount of information, media representing small and endangered languages is not always very accessible.

This project focuses on building an online network of language collections linking transcripts and media, in existing international digital language archives by leveraging their collections. The project aims to develop a networked virtual museum of human languages. The researchers are achieving this by developing an exemplar database using open-source techniques and sample media from field recordings made in the language of South Efate (central Vanuatu).

The project will also allow a number of previously unavailable language collections to be made public. Additionally, it will provide a means for accessing the Pacific and Regional Archive for Digital Sources in Endangered Cultures (PARADISEC) collection which currently contains 2,500 hours of digital audio files. Academics and the general community who have an interest in the diversity of the world's languages will benefit from the outcomes of this project.

*Through his work on this project
Nick Thieberger was appointed to
the Advisory Board of the World Oral
Literature Project*



I would be IN school but not AT school:

creating a classroom presence for children who are absent due to health conditions

Julie Green | Paediatrics & Melbourne Graduate School of Education

Frank Vetere | Information Systems

Amy Nisselle

Glenda Strong | Royal Children's Hospital Education Institute

Forty-one percent of Australian children have at least one chronic health condition. Annually approximately 10,700 school-aged children are admitted to The Royal Children's Hospital in Melbourne presenting significant barriers for continuity of education for many children.

For some children, protracted periods of hospitalisation and repeat admissions affect multiple stages of learning and development. Additionally, when children are absent from the classroom, there is a risk that 'out of sight, out of mind' may contribute to disconnection with the school leading to a sense of isolation from friends.

Broadband-enabled technologies provide an excellent opportunity to connect these children with their schools and contribute to a culture of learning across hospital and school settings.

This project investigates the impact of creating a 'presence' in the classroom for children who are absent from school due to hospitalisation. The project has involved creating a prototype 'orb' based on ambient technology that improves a child's sense of connection to their peers and school community. The orb achieves this by giving the child a virtual presence in the classroom, allowing peers to see when the child is well enough to communicate with.

Findings from this study will contribute to evidence-informed policy development for continuity of education for children with health conditions.



Prototype Orbs

3D virtual reality training | Round 2 Project

Gregor Kennedy | Health Informatics

James Bailey

Ed Kazmierczak | Computer Science and Software Engineering

Terry Judd | Medical Education Unit

Stephen O'Leary | Otolaryngology

Fully immersive 3D 'virtual reality' environments have great value in education and training with flight simulators setting the benchmark. In the future we are likely to see a convergence of reduced costs with developing 3D virtual reality training environments; new delivery platforms such as 3DTV and IPTV; and ubiquitous high speed broadband.

A range of skills can be developed in a 3D virtual reality environment such as procedural and decision making skills. Through the use of broadband, immersive training can be undertaken by an individual in their own time, at their own pace or through timetabled, guided instruction.

This project will develop a prototype system for user feedback in 3D virtual reality environments. This will be achieved through the development of data mining protocols for 3D virtual reality metrics and an understanding of how feedback based on these metrics can be used by students and instructors.

Connecting learners across diverse communities | Round 2 Project

Jon Pearce

Shanton Chang

Suelette Dreyfus

Chris Platania-Phung | Information Systems
Melbourne Law School

Mary Ainley | Psychological Sciences

Gregor Kennedy | Health Informatics

Lindy Joubert | Architecture, Building and Planning

Collaboration between peers is widely acknowledged as being highly beneficial to students' learning. Innovative broadband-enabled applications provide an opportunity to connect learners from different cultural and social contexts.

This project is developing a prototype system that will bring together several broadband technologies to facilitate collaboration between diverse groups of students and their teachers, by connecting:

- Primary schools in remote and rural locations with urban school children;
- Aboriginal students in Fitzroy Crossing (WA) with students in Melbourne; and
- Teachers and students from primary schools in Victoria with sister schools in Japan, Indonesia, Korea and China.

The project will determine the key principles that need to be considered in the successful design and implementation of a broadband-enabled collaborative system for learning.

The Australian health sector faces major challenges, such as an ageing population, the rise in chronic disease, uneven access to specialist care, complex and costly diagnostic and therapeutic modalities, the healthcare consumer movement and health workforce shortages. New broadband technologies can contribute to improved healthcare delivery and personal wellbeing by enabling improvements in the quality and safety of care, access to services, and innovations in clinical care and health maintenance. Targeted home-based care and mobile care, linked or integrated health services, real-time and just-in-time monitoring of health and illness, personalisation of care using genomic information are some of the possibilities that are enabled by next generation broadband.

The IBES health and wellbeing theme aims to foster multidisciplinary research that investigates the use of next generation broadband in health care. Over 50 researchers from disciplines as diverse as architecture, computer science, general practice, information systems, mechanical engineering, philosophy, physiotherapy and social work are investigating provisions for ageing well and aged care services, support for youth mental health and wellbeing, the adoption of the personal electronic health record and opportunities for healthcare over distance.



Mobile and broadband technologies for ameliorating social isolation in older people

Frank Vetere | Information Systems

Lars Kulik | Computer Science and Software Engineering

Elizabeth Ozanne | Social Work

Growing old makes people more vulnerable to factors such as diminished social networks, bereavement, and health problems. There are currently over 50,000 socially isolated Victorians over 65 years old. It is expected that this number will increase to 75,000 by 2020, a growth of 46%.¹

As the incidence of social isolation is growing, so too is the use of broadband by older Australians. Currently, 48% of people over 65 have Internet at home, compared to 73% for the rest of the population. Of all age groups, the largest increase in use of the Internet is by people aged 65-74 years.² This increase will continue as broadband technologies become more affordable, as younger adults already accustomed to broadband become older and as the number of older Australians increases due to demographic changes.

Despite this connectivity emerging technologies are not being created to address social isolation in older people, nor are they capitalising on an older population that is connected through Internet and mobile telephony.

Current research in generotechnology (technology for older people) is dominated by assistive medical technologies. Generotechnolgy for health and wellbeing needs to also address broader issues such as social connectedness. The Web 2.0 phenomenon that has triggered enormous changes to social networking and user-generated content is yet to significantly impact older people.

By drawing upon knowledge about older people and the design of Internet technology, the research is developing a prototype system that addresses key aspects of social isolation.

¹ R Naufal *Addressing Social Isolation Amongst Older Victorians*, Department of Planning and Community Development, Victoria 2008

² Australian Bureau of Statistics *Australian Social Trends* 2008

Smart homes for the elderly – recent developments in Korea

Sung Jun Kim | Architecture, Building and Planning

Korea is a country with an ageing population. It is expected that in 19 years more than fourteen percent of the total population will be aged 65 years or more. The rapidly ageing population combined, with a lack of aged care facilities, led to the recent developments of 'silver towns', defined as high-rise apartment units targeted specifically at the ageing population. The silver towns are increasingly being conceived, designed and marketed as a smart living environment for the elderly, making use of embedded information and communications technologies to support older people in their homes.

This project is investigating five silver towns built between 1998 and 2007. The study is identifying the range of spatial elements and smart technologies integrated in these environments. The research focuses on the adoption and patterns of use of embedded technologies by elderly residents and is comparing outcomes with non-technology embedded silver towers to identify changes, if any, in spatial layouts and usage patterns. The research aims to offer insights into the extent to which silver towns integrated with smart technologies deliver higher quality services from the perspectives of elderly residents. It is expected that the insights will help inform the development of future silver towers and the associated use of embedded technology.





In Australia, mental disorders (led by depression) account for more than 50% of the total disease burden for young people aged 12-25. Only a minority of young people who experience depression receive an intervention, and of those who do, few receive the best available, evidence-based treatment.

Specifically targeted interventions have the potential to improve the way in which mental health and wellbeing is managed for young people, and to assist with preventing or minimising impacts of isolation in areas such as employment, education, physical health and social inclusion.

While there are a lot of online resources available for youth, including those who are isolated there is little understanding of what such young people want or need in terms of treating mental illness. The research underway at IBES aims to develop new understanding as to how broadband-enabled technologies can be used by different groups whose focus is meeting the mental health and wellbeing needs of isolated youth.

This research project is developing a prototype interactive system that addresses specific end-user needs. Four sub-projects outlined below will investigate the use of the prototype system for youths with mental health issues resulting from isolation (due to a physical disability or geographical location), through to illnesses such as psychosis or depression.

Promoting guideline concordant care for young people with depressive disorders

Sarah Hetrick
Magenta Simmons

Centre for Youth Mental Health

Lena Sanci
Jane Gunn

General Practice

The target group for this project is young people diagnosed with depressive disorders in general practice. This part of the project aims to establish and test an online tool for young people, their carers and treating clinicians that facilitate evidence-based practice, and thereby improve the management and treatment of depression in this age group. The project is assessing the effectiveness of the online intervention, including changes in the rate at which evidence-based treatment recommendations for young people with depression are followed.

Youth mental health and wellbeing online

Broadband for first episode psychosis patients

Reeva Lederman
Greg Wadley
Eoin Killackey

Information Systems

John Gleeson
Mario Alvarez

Psychological Science

ORYGEN Youth Health Research Centre

First episode psychosis (FEP) most commonly has its onset in late adolescence and early adulthood. The majority of FEP patients experience a relapse within the first year after clinical remission and up to 82% experience a relapse by 5 years.

This project is developing a broadband-enabled intervention for relapse prevention following remission from a FEP event. The aim of the project is to build and trial prototype tools that allow young patients to connect in an appropriate way, subject to known motivations, over a distance to their case-managers at a specialist first-episode psychosis treatment program for youth.

Broadband-enabled connections for young people with disabilities in ethnic communities

Mary Ainley | Psychological Science
Shanton Chang | Information Systems

This project is investigating the impact of the use of broadband-enabled social networking applications on socially isolated youth from various ethnic backgrounds with disabilities. Broadband technologies can enrich lives by providing opportunities for young people to develop online networks that connect them with peers and the broader social community. The researchers are examining the impact of these connections on the mental wellbeing of youths, and how carers and case workers might be able to monitor activities to provide high quality care management. The project will study the impact of online social networking on participants' quality of life and wellbeing and as an effective means of delivering high quality care management.

Broadband enabled delivery of physical fitness and dietary programs for young people with serious mental illness

Floyd Mueller
Martin Gibbs
Eoin Killackey

Information Systems

ORYGEN Youth Health Research Centre

Recent research has demonstrated that young people with mental health problems can derive enormous mental health and wellbeing improvements through the delivery of programs designed to improve their physical fitness and dietary habits. However, these programs are intensive in terms of time commitment required from participants as well as from health professionals. The aim of this project is to investigate how programs can be delivered using broadband-enabled technologies to achieve time and cost savings. The project is investigating ways to use broadband-enabled technologies to extend the effectiveness of mental health interventions so that the benefits derived by recipients persist for longer periods, by developing a service that is designed to deliver physical fitness and dietary programs to young people with mental health issues. The physical fitness program developed will be modeled on the popular C25K (couch to 5km) 10 week running program with participants entering a 5km fun run as a group at the end of the program.

The health sector is an information rich environment, in which the medical profession has traditionally controlled both access to and the form of information. Health data is currently stored in multiple places, often 'siloes', and has the challenge of privacy, data accessibility, comparability and initial collection.

The advent of ubiquitous and high-speed broadband will allow sharing of patient information rapidly between sites, and allowing clinicians to access real time data during a patient consultation. It will also enable patients to interact with their health information through the implementation of Electronic Health Records (EHR).

The introduction of EHRs has the potential to significantly change the balance of information and, therefore, power in doctor-patient interactions. No longer will doctors be in a position to filter information, such as test results. Patients will be able to search health databases based on their own results rather than their memory or understanding of what was discussed within the consultation.

The Individual EHR - an indexing service that allows health data to be available to all providers at the time of need - has been proposed in recent national e-health strategies as well as the recent hospital and health reform documents. Patients will have the ability and will be expected to be custodians of this information.

A research cluster at IBES is investigating different aspects of the implementation of IEHRs, including ethics and governance issues relevant to the rollout of IEHRs, personalised interface for patients, and a prototype IEHR decision-support tool.

Ethical and social issues associated with IEHRs

Michael Arnold

Craig Fry

Chris Pearce

Merle Spriggs

Philosophy, Anthropology and Social Inquiry

General Practice

Population Health

There is emerging evidence of uncertainty by investigators, health professionals and ethics committees around the challenges posed by new health research technologies such as IEHRs. Current research ethics, guidelines and professional codes struggle to keep up with ongoing innovation. This represents a risk of ethical breaches in the use of new methods, and a threat to public acceptability and the funding of new initiatives in the health sector.

This project seeks to explicate the views, practices and needs of stakeholders and identify key ethical challenges in relation to electronic health records. The research includes an investigation of the range of attitudes among key stakeholders towards the IEHR, the potential benefits and harms, privacy and confidentiality requirements, and how patients perceive and interact with electronic records.

It is anticipated that this study will form the basis of a larger national study that will aim to develop practical ethical guidelines and decision-making resources to address current needs in relation to electronic health records.

Multi-site immigrant health database and decision support tool, clinical viewer and personal patient record to improve clinical outcomes for immigrants and refugees in Victoria

Beverley-Ann Biggs | Medicine
Georgina Paxton | Royal Children’s Hospital
Marianne Hibbert | BioGrid Australia

Over the last twelve years there have been over 120,000 Humanitarian entrants to Australia of which over 25 percent have settled in Victoria. Clinical care of refugees and immigrants is challenging due to the complexity of their medical problems, including infectious diseases and nutritional deficiencies. Available evidence suggests at least 50 percent of refugees require specialist referral. In any presentation there are typically multiple issues to address requiring numerous tests to coordinate and results to follow-up. This has led to fragmented health care, unnecessary repetition of diagnostic tests, and non-attendance at follow-up appointments.

This project will test developing a multi-site web-based clinical information management system across specialist adult and child refugee services in Victoria. It will provide point of care decision support to clinicians, improve follow-up of patients, and permit practice evaluation and clinical research with the ultimate goal of better health and health services for this patient group. It will also enable improved sharing of information with patients, with the expected outcomes of increased understanding of and adherence to treatment and greater health system efficiency.



Making pathology results smarter

Reeva Lederman
Stephen Smith
Suelette Dreyfus
Basil Alzougool | Information Systems Paul Monagle | Royal Children’s Hospital

To be successful, an IEHR needs to be easily accessible and understandable by patients as well as clinicians. Typically health data is not in a format that is easily interpreted by patients. For example, pathology reports are designed as a concise record of test results, and are interpreted by the physician. The technical emphasis of these reports makes them difficult to understand for many patients, representing a communication barrier between patient and physician.

By designing the content of health records to be automatically customised, it is expected that patients will have an increased understanding of their illness and will be empowered to better manage their treatment plans and disease.

This project aims to build an understanding of the principles involved in transforming the pathology report that a patient with a chronic disease typically receives into a customised health tool designed to help that patient better understand, monitor, and manage the disease. It is investigating the relationship between the design of a health message and an individual’s information-processing orientation and health-behaviour related outcomes.



Developing low-cost in-home tele-rehabilitation system targeting the treatment of arm and hand function after stroke.

Haptic tele-rehabilitation:

latency implications for system stability and clinical communication

Denny Oetomo	Mechanical Engineering	Mary Galea	Physiotherapy
Gregor Kennedy		Ed Kazmierczak	Computer Science and Software Engineering
Ioanna Ioannou	Health Informatics	Dragan Nesic	Electrical and Electronic Engineering

Stroke is a major public health problem. Almost 50,000 Australians have a stroke each year costing \$2.14 billion. Eighty-five percent of these people have an initial deficit in arm function and there is clear evidence that early rehabilitation of the arm and hand after stroke is highly effective. However, for a number of reasons, arm training is frequently given a lower priority than walking training in hospitals and clinics, with a recent study finding that only six percent of rehabilitation time is allocated to the affected upper limb.

The application of broadband-enabled technologies in the provision of alternative rehabilitation methods for stroke survivors has the potential to significantly improve health care services and health outcomes in Australia.

This project is developing a low-cost in-home tele-rehabilitation system to assist stroke patients in the rehabilitation process. The prototype system consists of a desktop robotic platform to which the patient's arm is strapped, and a rehabilitation software program that provides exercises with various degrees of difficulty. Clinicians can interact with a patient via the Internet using the software program, which allows them to monitor and change computer-based movement tasks according to the patient's performance and needs.

Issues associated with an Internet-based rehabilitation system are being investigated including the robustness of operation of the rehabilitation robotic device across a broadband network and the interaction between clinicians and patients.

Virtual visits: Investigating the acceptability of webcam consultations for young adults' sexual health

Cameryn Garrett | Centre for Women's Health, Gender and Society

Access to health care is one of the major factors influencing rates of sexually transmitted infections. Many barriers exist for young people accessing sexual health care, particularly for people living in rural areas, including limited options around medical providers, lack of confidentiality, and a lack of transportation. A possible solution to decreasing these barriers is the use of webcam consultations, allowing people to access sexual health specialists from their own computer. High speed broadband will make webcam consultations in rural areas a viable option by offering high speed Internet across the nation.

This research project is investigating the circumstances that would lead young people in Australia to choose webcam consultations for sexual health. The project is also evaluating the use of webcam and telephone consultations for people in rural Victoria being offered at the Melbourne Sexual Health Centre. It is anticipated that results from this research will inform attempts to increase access to sexual health care for young Australians.

Wireless broadband monitoring of knee osteoarthritis | Round 2 Project

Tim Wrigley
Kim Bennell
Daniel Lai
Marimuthu Palaniswami | Melbourne School of Physiotherapy
ISSNIP & Victoria University
Electrical and Electronic Engineering

Knee osteoarthritis is a common chronic joint disease amongst older adults. In 2007 7.8 percent of the Australian population had knee osteoarthritis and according to Access Economics this is projected to increase to 11 percent by 2050.

There is no cure for knee osteoarthritis, with treatment limited to symptomatic pain relief via drugs, and physiotherapeutic exercise. At end stage disease, joint replacement may be necessary.

Disease incidence and progression is closely related to knee joint loading, which usually can only be assessed under standardised conditions in a complex gait laboratory.

This project is developing a prototype device that will be integrated with a mobile phone to enable remote monitoring of patients as they undertake typical daily activities.

It is expected that real time monitoring over extended periods will enable more accurate assessment of knee joint usage patterns, natural disease progression, and development of more effective interventions.

Telestroke study | Round 2 Project

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Stephen Davis
Les Bolitho | Medicine
Marimuthu Palaniswami
Jayavardhana Gubbi | Electrical and Electronic Engineering

Stroke is a major cause of morbidity and mortality in Australia. There is an annual incidence of 48,000 new strokes and the risk of death is 25 to 30 percent. Of those who survive, stroke contributes to 25 percent of all chronic disability in Australia.

Acute stroke is caused by a blockage of one of the arteries in the brain resulting in interrupted blood supply. The administration of a thrombolytic agent (clot-busting medication) can be used to unblock the artery, restore blood supply to the brain, resulting in a better clinical outcome. However, the delivery of thrombolytic agents requires around-the-clock availability of a stroke neurologist to clinically assess the patient.

A significant number of hospitals in rural Victoria do not have access to a stroke neurologist. A recent survey by the National Stroke Foundation reported that 72 percent of Australian hospitals were unable to provide acute stroke treatment.

This pilot study aims to show the feasibility and effectiveness of a telestroke system between a comprehensive stroke centre (Royal Melbourne Hospital) and a rural health centre (Wangaratta District Base Hospital).

Telestroke systems include teleconferencing infrastructure installed at the emergency department of the rural hospital and on a laptop computer provided to the stroke neurologist. The system allows stroke neurologists to remotely assess stroke patients presenting to rural hospitals.

Concordance between real-time teledentistry assessments and face-to-face examination | Round 2 Project

Rodrigo Mariño
Mathew Hopcraft
David Manton
Michael McCullough | Melbourne Dental School

Elizabeth Ozanne | Social Work
Irene Blackberry | General Practice

Older people living in residential aged care facilities have been identified as a significant risk group for dental diseases in Australia. In 2005, there were more than 41,000 Victorians living in high or low care residential facilities on a permanent basis. Just over half of the residents are dentate, and dental treatment needs are high. They are often physically and cognitively impaired, medically compromised and dependent on others to maintain their oral hygiene. Additionally, rural and regional Australia has an increased proportion of older people living in their communities and these communities are ageing more rapidly than their metropolitan counterpart.

Face-to-face patient examinations are regarded as the most accurate method for correct oral health diagnosis. However, only 11 percent of aged care residents have seen a dentist in the past 12 months. Few dentists provide dental care for residents of aged care facilities.

This project is investigating whether improvements in accessibility and appropriateness of oral health services can be achieved by using broadband technologies to screen for oral disease in older people living in residential aged care facilities.



network deployment and economics

The technology base for advanced broadband network infrastructure is well developed and most of the equipment needed for the deployment of fibre-to-the-premises (FTTP) is commercially available. However, there are a number of remaining questions relating to the optimisation of broadband infrastructure for Australian conditions; particularly in remote and regional regions. In addition, there is a need for further research on advanced technologies for future enhancements of the fibre and wireless access network infrastructure. This includes higher-bandwidth optical solutions such as wavelength-division-multiplexed passive optical networks and advanced point-to-point optical networking.

Researchers in this theme are developing a framework for carrying out a cost-benefit analysis of broadband networks and are undertaking techno-economic studies of broadband rollout strategies. In addition, studies of energy efficiency in broadband networks are enabling researchers to find methods for reducing energy consumption in the access network and in broader network-wide technologies such as video content delivery networks, cloud computing and storage services. This theme also has a program to develop a fibre access network that provides a longer reach into regional areas than existing technologies.



NBN cost-benefit analysis methodology

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Melbourne Business School

In April 2009, the Federal Government announced its plans for the National Broadband Network. Since the announcement the NBN has attracted a lot of attention with many calling for a cost-benefit analysis of the network. However, many of the potential benefits of the NBN are either public or societal in nature, may be quite diffused or require a ubiquitous broadband service. These features may require different approaches to cost-benefit analysis compared to situations where benefits and costs are predominantly private in nature, are concentrated in a single set of hands or where the benefits are not reliant on universal availability.

Cost-benefit analyses of the NBN in the public domain have been partial by necessity and have often primarily focused on private costs and benefits. While some key quantitative elements of an NBN cost-benefit analysis may ultimately be unknowable such as the expected size of benefits from widespread use of e-Health initiatives, this project is developing and refining the techniques used to capture this data.

This project is developing a template addressing the key methodological issues for a cost-benefit analysis, focusing on the network's social benefits.

Through the work of the Green Internet Project, Melbourne University was invited to be a foundation member of GreenTouch Initiative dedicated to decreasing the Internet's global energy consumption.

The Green Internet

Kerry Hinton
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Rod Tucker
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Electrical and Electronic Engineering

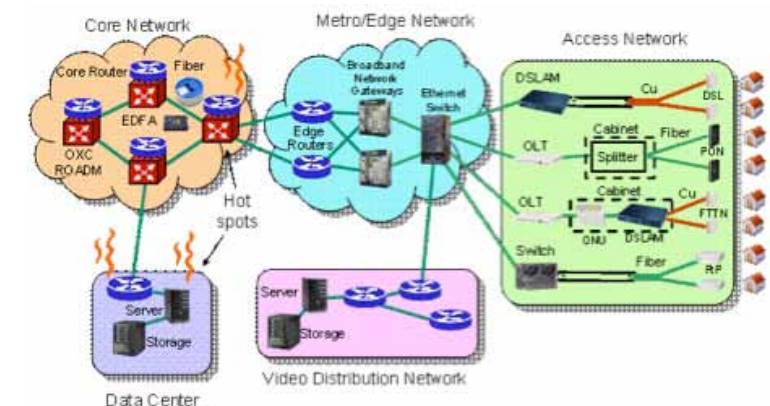
The evolution of the Internet is now intimately entwined with national and international economic growth. New broadband services are continually being developed driving continued exponential growth of Internet traffic for the foreseeable future.

Meanwhile the Internet's growth has often been seen as providing multiple avenues for reducing the environmental impact of society. However, this relies on the energy consumption of the Internet itself not becoming a problem. If the current rate of growth of the Internet continues without due consideration of its energy consumption then several significant constraints to this growth will emerge. In particular, the Internet will suffer an "energy bottleneck" which refers to problems related to providing the electricity needed to power the equipment used by the Internet.

The Internet relies on a significant amount of specialised equipment that must be supplied with vast amounts of electrical power. The provision of this energy has already become a major issue for many companies which rely on the Internet.

If the energy bottleneck is not resolved the future growth of the Internet will suffer creating a significant impact on social and economic development.

The aim of the Green Internet Project is to develop understanding of the power demands of the Internet and to use this understanding to devise methods for improving the power efficiency of the Internet as its physical size and information capacity increases. This research project is developing an insight into the technological barriers to the growth of the Internet and providing ideas and innovations for building a more power-efficient Internet with vastly enhanced bandwidth.



Simplified Internet architecture used to provide a "first-cut" estimate of the energy consumption of the Internet.



Long reach passive optical networks

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Passive Optical Networks (PONs) are a fibre to the premises technology that is widely considered to be the most efficient fibre access technology for new deployments in urban areas. Typically PONs can provide broadband service to customers who are up to 20km from the local telephone exchange. This makes them suitable for deployment in built-up areas, but the lower population densities of rural areas pose problems for the rollout of fixed infrastructure. As a result wireless or satellite technologies have been proposed as an alternate technology for rural areas. While these technologies play an important role in the telecommunications landscape, they are unable to compete with PON infrastructure on capacity and throughput.

This project is focused on the development of an advanced fibre access technology, called Long Reach Passive Optical Network (LR-PON), that can attain a reach beyond 60km from the local exchange, thereby extending the potential reach of fibre to the premises technologies into areas where alternate technologies would have been typically deployed.

IBES researchers have demonstrated a 60km reach LR-PON system that serves 32 houses without using any active equipment in between the local telephone exchange and the customer premise. We have demonstrated speeds of 80 Megabits bits per second to each house. Modelling has demonstrated that a 60km LR-PON could provide fibre to the premise coverage to over 93% of homes and business in Australia.

This project is supported by the Australian Research Council through a linkage grant with NEC.

New and efficient technologies

Scalable and energy-efficient deployment of video services

| Round 2 Project

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Thas Nirmalathas
Chien Aun Chan
André F. Gyga | Electrical and Electronic Engineering
Finance

Christopher Leckie
Aaron Harwood | Computer Science and
Software Engineering

Internet-Protocol Television (IPTV) is regarded as one of the most promising services that can generate new revenue opportunities for Internet service providers on next generation networks.

The video on demand service is an important element of IPTV that allows users to access video content at any time from a remote server.

The conventional approach of video on demand delivery establishes a dedicated connection between each user and the video server. As a consequence, IPTV services could overwhelm the Internet backbone and access networks with potentially hundreds of millions of users watching high bandwidth video streams with dedicated links. This not only has important ramifications for the traffic on the network, but also the energy consumption of the network.

This project is exploring issues that influence the scalability of video streaming applications based on a hybrid peer-to-peer mode of delivery. It aims to gather insights for the design of cost-effective and energy-efficient IPTV deployments over next generation networks.

Building a digital 'user guardian' | Round 2 Project

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Darryl Veitch
Lele Zang
Paul Tune | Electrical and Electronic Engineering
Joshua Gans | Melbourne Business School

The Internet is often referred to as a utility infrastructure that is as essential to modern life as roads or electricity. However, in contrast to traditional networks, its evolution and operation are not under anyone's control and its behaviour cannot be reliably predicted. End users cannot easily determine if their service adheres to the product offerings of their service provider. Additionally, it is hard for network operators to troubleshoot the network when issues arise.

The rollout of next generation networks will accelerate the opportunities offered by high speed broadband, but also the number and seriousness of problems arising from incomplete information about the network itself. Increasingly, these issues will include 'traditional' technical issues such as raw performance, as well as those of a regulatory, legal, policy, and private nature. Software tools that measure and analyse network performance are needed to determine who is responsible for performance levels, such as slow download speeds, and to enable operators to troubleshoot their networks.

This project aims to design a simple prototype of a 'User Guardian' that comprises a modular software component that provides information on regulatory and technical issues, including accurate measures of download speeds and other traffic statistics.



service and business transformation

Organisations in the commercial sector, the non-profit sector, and in government are continuously finding new ways to leverage the Internet to communicate more effectively with their stakeholders such as customers, business partners, donors, and citizens. High speed broadband has the power to have dramatic impacts on the quality, innovativeness, and reliability of services delivered to all of these sectors. However, there are a vast number of questions to be answered if business, government, and individuals are to make full use of these capabilities.

The Service and Business Transformation theme brings together researchers from a diverse range of backgrounds to better understand end-user requirements as broadband technologies are developed, including in small and large enterprises, not for profit organisations and home users. A team of researchers are also developing new tools and techniques for automated capture of human knowledge about place names which has the potential to transform many location based services.





Crowd-sourcing human knowledge on spatial semantics of placenames

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Linguistics and Applied Linguistics

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Linguistic descriptions of places are central to how people understand and communicate about geographic locations. Examples of place descriptions include place names, like “Federation Square” or “St Vincent’s Hospital”, and spatial relations between places, like “near the hospital” or “at the museum”.

Databases for capturing and storing place descriptions have increasing social, economic, and financial value in a wide range of important applications including emergency management, navigation, web search and tourism. However, the lack of techniques for automatically generating data about how humans use place descriptions is a critical barrier to building smarter information services capable of using place descriptions.

To address this issue, this project is developing new tools and techniques for automated capture of human knowledge about place names. This is being achieved through the development of a mobile, location-based game. The game, based on standard open-source web mapping technology and playable on any 3G mobile phone, will elicit human place descriptions as part of a treasure-hunt like game, where players must describe their locations to one another.

This project will significantly improve our current understanding of and techniques for dealing with placenames. It will enrich placename databases, improve human-computer interaction and support Australia’s spatial information sector in providing smarter products and services. It will also increase the usability in applications such as smart address validation and localisation using richer content and functionality of placename databases and improve support for dialogue about places in areas such as incidence reporting, car navigation, address matching or local search.



The Hybrid SmartStreet Project promotes the tangible benefits broadband will bring to all Australians through digital broadcasts containing broadband-enabled content and services delivered over high-speed Internet connections.

Hybrid SmartStreet project

Pat Auger
Hafiz Islam | Melbourne Business School

The rollout of next generation broadband networks will bring about new opportunities that will transform the way we live our lives. It will transform the way content is delivered for a diverse range of services including health, education, business, government and entertainment.

Novel broadband applications and services available on the market today, such as Hybrid Television Services' content and service platform CASPATM on-demand platform, provide exciting research opportunities that enable us to better understand consumer behaviours as we transition to an environment where high speed broadband is ubiquitous.

IBES researchers have partnered with Hybrid Television Services with the aim of investigating the value of converged digital broadcast with broadband-enabled content and services delivered over high speed Internet connections through the CASPA content and services portal. IBES researchers are investigating the drivers and barriers for the uptake of new broadband services, the role of the three screens (mobile phone, notebook and television) and the role of advertiser in subsidising content and services.

This project is supported by Hybrid Television Services.



Potential barriers to the adoption of high-speed broadband by Australian business

Pat Auger | Melbourne Business School
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Catherine Middleton | Ryerson University, Canada

High-speed broadband has the potential to transform businesses by opening up new frontiers for interaction with customers and supply chain partners, and enabling the development of novel products and services.

For broadband adoption to thrive in the Australian environment, it is important to understand how businesses perceive its benefits as well as potential barriers to the development of applications and services.

Barriers to adoption could include awareness issues, knowledge barriers, cost perceptions, lack of initial coverage and a lack of critical mass. Insights into these potential barriers and approaches to overcome them can assist in the rollout of broadband across the country.

The project is investigating adoption barriers across a spectrum of small and large businesses in Australia in both the business to business and business to consumer context. The project is expected to provide insights in terms of the kinds of services and applications which will enable broadband adoption in the Australian context.

Examining and tracking decisions made by Third Sector Organisations as they appropriate Web 2.0 applications and other broadband services

Returns on ICT investment in the third sector

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Graeme Johanson | Information Systems and Centre for Community Networking Research
Larry Stillman | Monash University

According to research report by the Productivity Commission, Third Sector organisations (not-for-profit social welfare and public-good agencies) can be inherently innovative. However, the report identifies that Third Sector organisations experience significant problems with the take up of new technologies including prescriptive conditions from government, risk aversion, and lack of resources for experimentation and evaluation.

All these problems relate to the difficulty of convincing those responsible for funding that investment in broadband-enabled technologies will be justified by the return on the investment.

Ubiquitous high speed broadband provides an opportunity for many Third Sector organisations to explore new ways of service delivery. Web 2.0 technologies have demonstrated their value as social media in many business and public service applications but their appropriation across the Third Sector is just beginning.

As new broadband technologies are rolled out it is important that organisations credibly assess their impact. This is especially relevant to Third Sector organisations that are often characterised as resource poor, therefore need robust methods to assess and optimise their investments in ICT.

This project is seeking to examine the decisions made by Third Sector organisations as they appropriate Web 2.0 and other broadband applications. Novel processes and models for assessing the return on this investment in broadband, based on the Social Return on Investment model are being developed and applied.



social infrastructure & communities

High-speed broadband is a vital dimension of contemporary social infrastructure comparable to roads, water and electricity. Broadband availability drives changes in patterns of social interaction across a wide spectrum of activities, ranging from established media platforms such as television to emergent forms of social networking and user-generated content creation. Demonstrated applications vary from large-scale interactive environments such as intelligent buildings and smart urban precincts down to the level of the individual home and even personal apparel. We believe that the successful deployment of new technologies demands a critical perspective informed by co-operation between researchers from multiple disciplines.

This theme aims to foster innovative interdisciplinary research projects to investigate emerging opportunities and challenges in areas such as remote monitoring (smart grids and meters, responsive buildings and intelligent environments), innovative communication platforms and responsive, participatory culture. It will enable researchers to address contemporary issues such as social inclusion and social diversity, to assist organisations to improve service delivery to urban, regional and remote communities, and to develop innovative applications which not only find new uses for our cultural heritage, but facilitate new possibilities for user-led innovation.

Early and rapid bushfire detection is a critical factor to ensure the safety of people and the environment.

Data assimilation and bushfire modelling for early and rapid bushfire detection

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Peter Farrell	
Parisa Saeedian	Electrical and Electronic Engineering
Mark Garvey	Country Fire Authority
Kevin Tolhurst	Forest and Ecosystem Science
Jessica Block	University of California, San Diego
Malka Halgamuge	Civil and Environmental Engineering

Many communities in Australia and abroad face a significant threat to their livelihood through bushfire. This is exemplified by the devastating bushfires in Victoria in 2009.

A number of tools are available to assist in the detection of bushfires including computer based airborne mapping systems, line scanners, infrared devices and cameras, and the provision of geospatial information. Because of the complexity of these systems careful coordination is needed to guarantee that the various event management teams collect timely, clear and useful information.

High speed ubiquitous broadband will facilitate transmission of high-resolution on-demand video and image communication between remotely located places during fires both to provide information to the coordination centre and to disseminate predictions and warnings to first responders and the public.

Building upon the comprehensive risk assessment tool for bushfire disasters developed by a member of the research team, this project aims to improve the existing bushfire model by permitting real-time inclusion of satellite data and information from spotters and the public.

Additionally, the use of a small sensor network is being investigated to feed environmental data to the fire model. It is anticipated that this data will enable better estimation of possible fire events and assist first responders and the public in a bushfire through the provision of real time information.



Demand response in smart grids

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Slaven Marusic	
Yee Wei Law	Electrical and Electronic Engineering
Bharat Dave	
Peter Raisbeck	Architecture, Building and Planning
Jeremy Moss	Philosophy, Social Justice Initiative

Australia’s electricity transmission and distribution infrastructure is coming under increased stress as a result of hardware ageing, population growth and climate change. Eighty percent of the energy consumed in Australia still comes from coal-based power stations.

The smart grid has been hailed as a solution to these ailments as it enables the electricity network to self-diagnose and self-heal. It is energy efficient, environment-friendly, accommodating to alternative energy sources, and motivates demand response. However, there are concerns in the community that some people will be adversely impacted by such a scheme, for example people with health concerns who require air conditioning when it is hot.

While efforts are underway to make smart grids a reality in Australia, several engineering and social issues require careful attention. Demand response enables consumers to modify their consumption behaviour in response to pricing and other related information. The primary motivation for demand response is to empower consumers with the capability to schedule energy usage to reduce their cost and carbon footprints.

This project is developing a practical load rationing scheme that makes a positive socio-economic impact. Load rationing is a relatively new concept where instead of disconnecting multiple customers from the grid the energy supplier advises customers to scale back consumption by a certain percentage. Electricity supply is thus maintained without disconnections, providing security for consumers with health related supply needs.

It is expected that load rationing will enable full user control while remaining sensitive to the concerns expressed by the community to ensure that people relying on electricity for health reasons is supplied continuously.



Gardens of tomorrow in broadband-enabled neighbourhoods

Jon Pearce
Wally Smith | Information Systems

Adrian Pearce | Computer Science and Software Engineering
Nigel Stork | Resource Management and Geography

Social networking has given us huge advances in the sharing of information. However, we are only now beginning to see the potential to supplement this knowledge using the vast amount of data accessible through wireless sensor networks monitoring the environment, usually found in large-scale agricultural applications.

Most gardeners in Melbourne are still watering using manual systems and while they can get some advice as to how much water is required, there is currently no advice available that can adequately take into account the varying microclimate of their particular garden.

The research team has already developed a sophisticated online water simulation program allowing gardeners to model their gardens and share these water-demand models with users around Victoria enabling the collective sharing of information

about strategies that work in different environments.

This project is now developing expertise and understanding of the use of sensor networks within the domestic environment through the collection of environmental data. This is being achieved through a wireless sensor network that will monitor conditions in a domestic garden and feed the data to a simulation that models garden watering.

The project will facilitate the sharing of users' simulation parameter settings for various garden/plant/microclimate combinations and will provide feedback to the system to assist the user with more effective settings for local conditions. It will give advice to users of what others have done in similar situations, based on a 'wisdom of the crowds' approach.

More information is available online at: www.smartgardenwatering.org.au

Online decision support for crop irrigation

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The value of Australia's agricultural industries was \$38.5 billion in 2006-2007. More than two-thirds of agricultural production is exported generating \$27.8 billion in export revenues.

This industry is facing new challenges associated with changes to the growing conditions, through both climatic change and pressures on precious resources such as water and energy.

This project focuses on the decisions about the use of water in horticulture, specifically enabling the implementation of new online irrigation decision support methods in viticulture. In the case of grape vines, recent heat waves have had significant deleterious effects on yield. Those growers who took steps to massively irrigate in advance of days of extreme heat suffered much less than others. Water is very expensive and the decision to pour large quantities onto the vines is not one to take lightly.

The researchers are developing an online assessment tool that accommodate plant water stress information based on Crop Water Stress Index, stomatal conductance sensing data collected by the grower as well as data (both historical and forecast) from the Bureau of Meteorology and economic information to help the grower in making these crucial decisions.

The long-term aim of this project is to provide online tools to assist in management of resource use in horticulture and agriculture. These will provide advice on various important economic decisions to be made by growers based on information available online and sensed data from the field.

Early detection and mitigation of disastrous events with broadband-enabled social interaction technologies | Round 2 Project

Shanika Karunasekera		Alex Skvortsov	
Rao Kotagiri		Ajith Gunatilaka	
Aaron Harwood	Computer Science and	Chris Woodruff	Defence Science and
Timothy Baldwin	Software Engineering	Ralph Gailis	Technology Organisation
Philippa Pattison	Psychological Sciences		

Although social networking technologies were originally created as a means of personal communication between people they have recently found an important role as an emergency alert system. For example, during the California wildfires, the Mumbai terror attacks, and recent Iran unrest, many people found Twitter a useful means of getting the latest updates on the situation. Because of the effectiveness of these social networks, some organisations such as the Red Cross and government agencies in USA have also made use of these networks to promptly inform people about evacuation routes and to provide other updates.

During major disasters many telecommunication networks are known to have failed due to traffic overload. Internet micro-messaging communication technologies are able to better handle such traffic overloads due to queued transmission and the limited message size. Investigating the suitability of these emerging micro-messaging technologies to complement the existing communication techniques is of vital importance.

This project is investigating how we can harness micro-messaging technologies, found within social networking services such as Twitter and Facebook, to help identify and provide rapid response in emergency situations, including natural disasters such as bushfires, and accidental or deliberate chemical, biological, or radiological releases.





Broadband-enabled public screens: from display to interaction

Scott McQuire
Nikos Papastergiadis | Culture and Communication

Frank Vetere
Martin Gibbs
Floyd Mueller | Information Systems

Video screens are an increasingly common part of contemporary architecture and urban space. To date, publicly located video screens have primarily been used for advertising. This has impacted negatively on the civic values of public space, and also means that other possible uses have remained relatively unexplored.

The recent development of a new generation of large screens, built in traditional public spaces such as Melbourne’s Federation Square, have challenged the assumption that public video screens can only support advertising. However, while these screens have begun to explore new forms of community engagement, through live broadcasts of major sporting and cultural events, and significant social events such as the National Apology to the Stolen Generations (2008), screen content currently remains largely restricted to passive modes of display.

High-speed broadband technology will make a critical difference to public screen infrastructure in two respects. Firstly, screens will shift from being stand-alone installations to being conceived and operated as nodes in interlinked networks.

Secondly, screens will become active surfaces capable of responding to a new array of inputs, including the movements of those in their vicinity. It is this second trajectory that this project will investigate.

Experiments with interactive public screens have so far been largely confined to ‘touchscreen’ interfaces, with a few experimental SMS based interfaces such as SMS-TV at Federation Square, which enables visitors to send text messages to the screen for public display. More sophisticated interfaces enabling embodied forms of interaction have developed in the arts sector, but they tend to be ‘one-off’ projects with high price tags.

This project is developing and testing a prototype system that enables screens to support a range of proximity-based user interactions. It is anticipated that the project will assist to address the widely perceived decline of public space by enabling better utilisation of media infrastructure to facilitate public engagement and interaction.





Broadband in the home: a longitudinal study

Michael Arnold | Philosophy, Anthropology and Social Inquiry
Bharat Dave | Architecture, Building and Planning
Bjorn Nansen | Culture and Communication
Rowan Wilken | Swinburne University

The Australian home has become a place characterised by a range of information and communication technologies with many that rely on broadband technology for their operation. These include, but are not limited to, cabled and wireless communication systems, interactive computer games, online social networking, and personal entertainment systems.

Our insatiable demand for increasing bandwidth continues and over the next five years will almost certainly drive a wider uptake of high-speed broadband. Understanding the ways people use broadband technologies in domestic and community settings is important to Australia's future from a social, technological and economic perspective. Effective, evidence-based policy and policy implementation depends on developing a detailed and improved understanding of the current nature of Australia's broadband use.

This project aims to provide crucial, detailed baseline data on the social, cultural, and technological dynamics that shape Australia's current domestic broadband usage.

It will undertake a foundational study of domestic broadband use in various sites prior to, and throughout the rollout of high-speed broadband services. The project will form the basis for a longitudinal study on high-speed broadband usage in domestic settings which will become an important tool for stakeholders concerned with broadband-enabled technologies. The resulting data can help inform government and private sector initiatives in planning for and implementing the new broadband network.



Screen stories and community connections

Lisa Gibbs
Kabita Chakraborty
Bjorn Nansen
Elise Davis

McCaughey Centre

Frank Vetere | Information Systems
Colin MacDougall | Flinders University

Recent initiatives in Australia, the UK, and the US have demonstrated that it is possible to provide access to low-cost convenient computing and Internet technology in specific settings such as public housing estates.

While early indications are that such digital inclusion initiatives have the potential to be a cost effective way of reducing inequities, marginalisation and promoting social inclusion, there remain significant gaps in our knowledge. Little is known about the possible impacts such initiatives have on the wellbeing of young people living and working in newly established suburban and urban growth areas.

This project seeks to understand how new media technologies are being used by families in different geographical settings. This is being achieved through qualitative research that explores the way new media technologies are being used by families from different socioeconomic and geographic settings.

This project seeks to inform and support digital wellbeing for young people and their families, and to facilitate social infrastructures in suburban growth areas through digital technologies.

The outcomes of the project will inform the Alannah and Madeline Foundation cybersafety campaign and to develop broad principles for digital wellbeing, participation and literacy of young people and their families. It will also contribute to VicUrban's design and construction of the Cardinia Road residential and business precinct being developed, which is situated on the urban fringe of Melbourne's South East growth corridor.

The project is supported by the following partners:

- VicHealth Centre for the Promotion of Mental Health and Community Wellbeing
- The Alannah and Madeline Foundation (AMF)
- VicUrban
- Flinders University.



Social interaction through universal broadband access in public spaces

Marcus Diaz | Culture and Communication

This project explores how universal broadband access in urban public spaces can develop new forms of social interaction through a combination of mobile broadband, Internet-enabled devices, locative media and user-friendly social networking tools have the potential to create ad-hoc communities and generate social interaction between strangers by linking participants in the online world and the urban environment. However, there are a number of technical issues such as unreliable connection, the need for special net-enabled devices, variable signal coverage and urban terrain constraints.

Even more importantly there are unresolved social issues relating to the use of broadband in public spaces such as privacy management, the unfamiliarity of using net-enabled devices in public places and the willingness (or not) of strangers to interact with each other and develop trust.

This project explores how universal broadband access in urban public spaces can develop new forms of social interaction through a combination of new tools. This project will contribute to our understanding of broadband-enabled social interaction by examining a range of existing initiatives and proposing new technologies and applications to promote social interaction in public places.

Death, grieving and memorialisation in a broadband-enabled society

Round 2 Project

Martin Gibbs | Information Systems
Connor Graham | Information Systems
Michael Arnold | Philosophy, Anthropology and Social Inquiry
Tamara Kohn | Philosophy, Anthropology and Social Inquiry

The significance of death can scarcely be overstated. Death provides a uniquely important perspective from which to understand social life, and its gravitas renders other events relatively inconsequential. If we are interested in the online experience of life we have much to learn from the online experience of death.

In broadband-enabled societies people’s experiences of death and death related practices are currently subjected to two contradictory trends. Firstly, communities tied to a traditional notion of place are eroded so the social structures and practices including grieving, mourning and remembrance are undermined. Secondly, the rise of online networking supports new connections through virtual communities.

This project is examining the contradictions in this landscape by investigating the intersection of broadband and death. It focuses on four detailed case studies examining the role of broadband technologies in the experience of death, grieving and memorialisation.

UniTV | Round 2 Project

Ken Clarke | Electrical and Electronic Engineering
Brad Gathercole | Electrical and Electronic Engineering
Paul Devitt | Scholarly Information
Ben Loveridge | University Library
Helen Thomson | University Library
Andrew Christie | Melbourne Law School
Ian Lang | Victorian College of the Arts
Kelvin Param | Marketing and Communications
Diane Squires | Marketing and Communications
Sean Cubitt | Culture and Communication

Ubiquitous high speed broadband services offer an exciting opportunity for new types of service providers to enter a media landscape that is traditionally dominated by large corporations. Potentially, organisations that produce content will be able to offer their services and products and contract directly to the end user.

The UniTV project brings together a huge variety of both existing and newly created customised content from numerous sources at the University of Melbourne and combines them with interactive applications such as shared learning and virtual workspaces.

This project will manage a staged roll-out of a University IPTV service from the IBES test-bed onto the Parkville campus and then the Internet. As well as working on the technical and content issues, the UniTV researchers include legal, copyright, and marketing experts who will work out the optimum operating model and identify any hurdles that may exist to an effective deployment of the service.





The role of high speed broadband in telecommunications between people with limited speech and the health workforce | Round 2 Project

Louise Greenstock | Australian Health Workforce Institute
Peter Brooks | Communication Rights Australia
Jan Ashford | **Brendan Wickham** | General Practice Victoria

Evidence shows that the Internet offers potential solutions to enable people with little or no speech to make themselves heard and to interact with others. This has been seen in the introduction of the National Relay Service (NRS) which offers, among other things, an Internet based medium for conversational interaction for people with hearing impairment, visual impairment and little or no speech.

The NRS itself identified challenges arising from unreliable, inconsistent and ‘slower than optimal’ Internet connection. What is not known at this stage is what the greater capabilities of high speed broadband will offer to people with limited or no speech, many of whom use a high- or low-tech communication aid, in the management of their own health and interaction with health professionals.

This project is exploring user experiences of the NRS at current and future broadband speeds. Additionally the project is investigating the role of the NRS in enabling access to health services and interaction with health professionals.

Political issue analysis in an age of the ‘data deluge’ | Round 2 Project

Craig Bellamy | VeRSI
Conal Tuohy | Culture and Communication
Sean Cubitt | **Martin Gibbs** | Information Systems
Andy Williamson | Hansard Society, United Kingdom

The Internet as a vital component of our political information systems. Although extensively used by governments and civil society groups, its effects upon political processes (particularly deliberative political processes) remains relatively unknown.

This project will design an online Political Issues Analysis System to assist users research and analyse political issues. The tools will deliver information about important political topics using key data sources, within a coherent deliberative framework. The project aims to evaluate the needs of users in comprehending political issues through the application of semantic indexing and data matching tools and to design a prototype fulling these needs.

IBES media coverage

New Institute to Drive Broadband Innovation

The Melbourne Newsroom, The University of Melbourne, 20 July 2009

IBES Launch speech

The Hon. Sen. Stephen Conroy, Minister for Broadband, Communications and the Digital Economy
July 2009

IBES – an exciting innovation focused on the National Broadband Network

Melbourne Ventures Innovation Summer 2009, December 2009

Melbourne Uni's IBES broadband research unit teams with TiVo distributor to test NBN applications

IT Wire, 9 December 2009

Speech – 2010 International Consumer Electronics Show, Las Vegas

The Hon. Sen. Stephen Conroy, 8 January 2010

IBES joins Internet energy-efficiency consortium

Communications Day, 13 January 2010

Huawei ups the NBN ante with new IBES partnership

Computerworld, 15 January 2010

Huawei and IBES collaborate to strengthen ICT research in Victoria

The Melbourne Newsroom, The University of Melbourne, 15 January 2010

IBES joins global R&D on Internet energy

IT Wire, 17 January 2010

Communications Turn Totally Green – GreenTouch Initiative

EE Times, January 2010

IBES research projects revealed: NBN cost benefit analysis methods, smartgrid study

Communications Day, 11 March 2010

Quigley appointed to IBES advisory board

Communications Day, 16 March 2010

Emerging Institutes

Melbourne University Research Review 2009, March 2010

Telecommuting Future

Melbourne University Research Review 2009, March 2010

Warren & Brown Technologies and Institute for a Broadband-Enabled Society team up to drive fibre further

Ferrett, 17 May 2010

Warren & Brown Technologies joins University of Melbourne (IBES) team

Voice & Data On Line & Multi Media Victoria, 26 May 2010

NBN 101: The Economic Argument

Computerworld, 30 June 2010

Ambient Orb

Shine, Victorian Government Department of Education and Early Childhood Development, July 2010

IBES Seminar and Workshop Program

Seminars

What do Canadians do with broadband networks: applying insights from the Canadian Internet Use Survey to the NBN

Catherine Middleton | University of Toronto
26 November 2009

A 21st century infrastructure?: Broadband, daily life and Australian digital economy

Genevieve Bell | Intel Fellow
16 March 2010

Putting collaboration at the heart of learning

Michelle Selinger | Cisco Internet Business Solutions
8 June 2010

Workshops

Social Infrastructure and Communities*

22 September 2009

Education and Learning*

24 September 2009

Network Deployment and Economics*

29 September 2009

Service and Business Transformation*

2 October 2009

Health and Wellbeing*

19 October 2009

Service and Business Transformation*

30 October 2009

Education and Learning*

24 September 2009

IBES Industry Partner Program – Defining the Research Program

2 February 2010

Launch of the Victorian eHealth Network Industry Cluster

3 March 2010

Telehealth and healthcare at a distance: what is the role of the National Broadband Network?*

14 April 2010

Ageing well: what is the role of the National Broadband Network?*

19 April 2010

Education and Learning*

10 May 2010

Network Technologies*

13 May 2010

Planning and strategy workshop for CEET*

27 May 2010

MEI and IBES co-hosted a Victorian Smart Grid Planning Workshop

21 June 2010

* Internal Workshop

IBES Publications and Presentations

Journal Publications

R Ayre, K Hinton, B Gathercole, K Cornick. 'A Guide to Broadband Technologies' The Australian Economic Review, vol.43, no.2, pp.200–8, June 2010

J Baliga, R Ayre, K Hinton, W Sorin, R Tucker. 'Energy consumption in optical IP networks', Journal of Lightwave Technology, vol.27, no.13, pp. 2391–2403, February 2009

J Baliga, K Hinton, R Ayre, R Tucker. 'Carbon Footprint of the Internet' Telecommunications Journal of Australia, vol.59, no.1, pp. 05.1–05.14, February 2009

J Bradley, R Kippen, H Maxwell-Stewart, J McCalman & S Silcot. 'Research note: The Founders and Survivors Project', The History of the Family vol.14, pp.4, 2010

J Ellershaw, J Riding, K Lee, A. Tran, L Guan, R Tucker, T Smith, E Stumpf. 'Deployment Costs of Rural Broadband Technologies', Telecommunications Journal of Australia, vol.59, no.2, pp.29–1–29–16, July 2009

G Shen, R Tucker. 'Energy-minimized design for IP over WDM networks' Journal of Optical Communications and Networking, vol.1, no.1, pp. 176–186, June 2009

N Thieberger. 'Anxious respect for linguistic data: the Pacific and Regional Archive for Digital Sources in Endangered Cultures (PARADISEC) and the Resource Network for Linguistic Diversity (RNLD)'. Margaret Florey. (ed.). Endangered languages of Austronesia, Oxford: OUP. pp.141–158, January 2010

R Tucker. 'Broadband facts, fiction and urban myths', Telecommunications Journal of Australia, vol.60, no.3, August 2010

R Tucker, R Parthiban, J Baliga, K Hinton, R Ayre, W Sorin. 'Evolution of WDM optical IP networks: A cost and energy perspective', Journal of Lightwave Technology, vol.27, no.3, pp. 243–252, February 2009

X Wang, W Yang, A Wheaton, N Cooley B Moran. 'Automated Canopy Temperature Estimation via Infrared Thermography: A First Step Towards Automated Plant Water Stress Monitoring', Journal of Computers and Electronic in Agriculture, May 2010

Conference Papers

- J Baliga, R Ayre, K Hinton, R Tucker. 'Architectures for Energy-Efficient IPTV Networks' OFC/NFOEC paper OThQ5, March 2009
- K Chakraborty. 'Negotiating culture, space and identity: how innovative methods can support interviews with children'. Association of Social Anthropologists of the UK and the Commonwealth Annual Conference, Belfast, Ireland, 13-16 April 2010
- N Dang. 'Digital Diversity', Australian Computers in Education Conference, Melbourne, 6-9 April 2010
- C M Disanayake, M N Halgamuge, R Kotagiri, B Moran, P. Farrell. 'Signal Propagation effects on IEEE 802.15.4 Radio Link in Fire Environment', Fifth International Conference on Information and Automation for Sustainability, ICIAFs'10, Colombo, Sri Lanka, 17-19 Dec 2010
- M. Feng, K. Hinton, R. Ayre, R. Tucker. 'Reducing NGN Energy Consumption with IP/SDH/WDM', E-energy, 1st International Conference on Energy-Efficient Computing & Networking, Passau, Germany p.187, April 2010
- L Gibbs, K Chakraborty. 'Social Inclusion projects at the McCaughey Centre'. Australian Social Inclusion Conference, Melbourne, 28-29 January 2010
- K Hinton, J Baliga, R Ayre, R Tucker. 'The Future Internet-an Energy Consumption Perspective', The 14th OptoElectronics and Communications Conference, Paper FT1, 2009
- K Lee, J Riding, A Tran, R Tucker. 'Extended Reach Gigabit Passive Optical Networks for Rural Areas using Raman and Semiconductor Optical Amplifiers' 14th OECC, paper ThH3, July 2009
- H Maxwell-Stewart. "'To Fill Dishonoured Graves": Assembling Life Course Data for Transported British Convicts'. University of Guelph, Ontario, Canada, May 2010
- R Naufal, F Vetere. 'Successfully Connecting Socially Isolated People' International Federation on Ageing, May 2010
- A Nisselle, J Green, S Hanns, X T Dang, A Jones, F Vetere. "'They're hard to break': using netbooks to support learning and social connections in a children's hospital.' Australian Association for Research in Education conference, Melbourne, November 2010
- S Peng, K Hinton, J Baliga, R Tucker, Z Li, A Xi. 'Burst Switching for Energy Efficiency in Optical Networks', OFC/NFOEC 2010, Paper OWY5 (3 pages), March 2010
- P Saeedian, B Moran, K Tolhurst, M N Halgamuge. 'Prediction of Spotting in Wildland Fires', Fifth International Conference on Information and Automation for Sustainability, ICIAFs'10, Colombo, Sri Lanka, 17-19 Dec 2010
- T Smith, R Tucker, K Hinton, A Tran. 'Packet Delay Variance and Bandwidth Allocation Algorithms for Extended-Reach PON', OECC 2009, Paper: ThB1 (2 pages) 2009
- N Thieberger. 'Culture clash-Humanities research and computing: a case study of Interlinear Glossed Text (IGT)' Australian National Corpus Workshop, Sydney, 4 December 2009
- N Thieberger. 'Using the right tools for the job: technology in support of language documentation' Linguistic Society of America, Baltimore, January 2010
- N Thieberger. 'Spoken language corpora: Applications for small languages' Taiwan e-Learning and Digital Archives Program (TELDAP) International Conference, March 2010
- N Thieberger. 'Documenting the documents preserving records of Pacific languages' Australian Association for the Advancement of Pacific Studies Conference, Melbourne, 10 April 2010
- W Yang, X Wang, A Wheaton, N Cooley, B Moran. 'Automatic optical and IR image fusion for plant water stress analysis', Proceedings of the 12th International Conference on Information Fusion, Seattle, Washington, USA, pp.1053-1059, 6-9 July 2009

Presentations

- Kate Cornick participated in a Panel of Experts at the *PricewaterhouseCoopers Australia Telco Industry Session*, Melbourne, 5 February 2010
- Kate Cornick was a keynote speaker at the *Optus Network Division Conference*, Sydney, 12-16 April 2010
- Kate Cornick was a panel member at the *AIMIA V21 Conference: Meet the New Generation Digital Business Models*, Melbourne, 15 April 2010
- Kate Cornick participated in a panel session at the *Commsday Summit*, Sydney, 20 April 2010
- Kate Cornick presented at the *Nucleus Connect Conference*, Singapore, 16 June 2010
- Scott McQuire gave a public lecture on 'Participatory Public space' at the *Adelaide Festival Artists' Week*, Adelaide, 28 February 2010
- Bjorn Nansen presented on 'Mathletics: Profit, Pedagogy, Play' at the *Research Institute for Cosmopolitan Cultures*, University of Manchester, UK, 3-4 June 2010
- Bjorn Nansen presented the paper 'Children, ICT and negotiating a Rights-Based Approach to Research within Australian Academia: Ethics, Methods, Strategies' at the *University of Antwerp*, Belgium, 27-28 May 2010
- Bjorn Nansen, Kabita Chakraborty and Lisa Gibbs present a poster 'Screen Stories and Community Connections' at the *MaroMelbourne Forum and Project Expo*, Melbourne, 24 March 2010
- Rod Tucker was a panellist in the Smart Infrastructure theme at the Federal Government's Broadband Future Forum, Sydney, 18 December 2009
- Rod Tucker presented at *Tokyo Institute of Technology*, Japan, 8 March 2010
- Rod Tucker spoke at the *Intelligent Green Conference*, New Zealand, 6 May 2010
- Rod Tucker presented at the *CeBIT National Broadband Network Conference*, Sydney, 24 May 2010
- Julie Green, Amy Nisselle and Glenda Strong presented at the *2010 Innovation Showcase: Department of Education & Early Childhood Development*, Melbourne, 10 May 2010

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IBES financial information

Contributions (cash and in-kind)	
University of Melbourne	\$3,006,757.31
Industry (cash and in-kind)	\$746,000.00
Victorian Government	\$1,000,000.00
Total	\$4,752,757.31

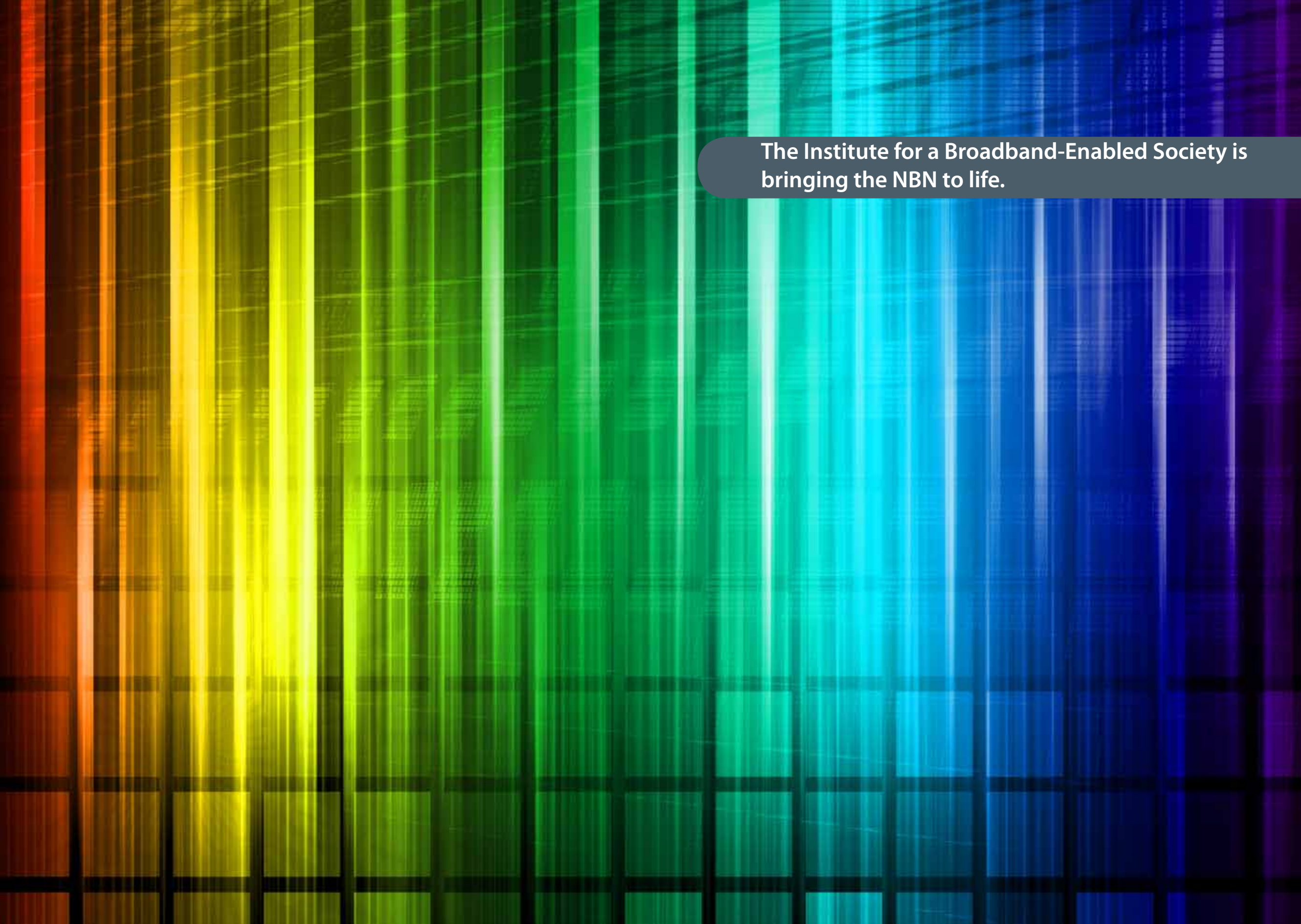
Table 2: Cash and in-kind contributions to IBES

Cash expenditure	
IBES staff salaries	\$670,620.79
Research seed funding*	\$1,318,470.00
PhD top-up scholarships	\$25,000.00
Test-bed set up and operations	\$179,031.96
Office operating	\$8,124.27
Marketing and events	\$23,323.75
Travel	\$24,415.58
Legal service	\$10,616.80
Total expenses	\$2,259,603.15

* Includes \$449,000 allocation for second round seed funding

Table 3: Cash expenditure.

Note this table does not include IBES activities carried out using in-kind contributions



The Institute for a Broadband-Enabled Society is
bringing the NBN to life.

Alcatel-Lucent 


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 **HUAWEI**

 **HYBRID
TELEVISION
SERVICES**


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