

# Preface

There is a growing interest in information technology (IT) by indigenous peoples around the world. Indigenous peoples see this as a means of preserving their traditional cultures for future generations as well as providing their communities with opportunities for economic and social renewal. There are many potential benefits that indigenous peoples can enjoy from information technology, including e-commerce and employment opportunities, better education and service delivery and enhanced communication.

However, in an age dominated by information technology, indigenous peoples have often found themselves separated by the digital divide. The cost of the new technologies, the geographic isolation of many communities, low levels of computer literacy and lack of awareness of how the technologies might serve indigenous goals and interests have led to this low adoption of the technology. There are also many cultural concerns, particularly related to the management of indigenous knowledge, language issues and questions of cultural appropriateness.

Recognition of these constraints will be necessary before indigenous peoples gain full access to the new technologies and all the benefits that they bring. Governments, indigenous community leaders, non-government service providers and educators are looking for solutions to these problems. They are looking for information to guide their policy making. This book is a step towards achieving this.

This book is an essential tool for community leaders, policy makers, researchers, educators and students involved with policy decisions related to indigenous communities. Topics covered provide both theoretical and empirical information. The topics emanate from a broad cross section of the research community and practitioners, and explore many interesting ideas and opinions that give voice to indigenous peoples on the role of information technology in their lives. About half the contributors are indigenous, and the remainder, have worked with indigenous communities for many years. The book will enable the reader to make informed decisions for planning and action in indigenous IT-related areas.

Contributions to the book are global. All continents where there are major indigenous communities are represented: North and South America, Australia, Asia, the Pacific and Africa. Many different peoples are included, such as the Orang Asli of Malaysia, the Maori of Aotearoa (New Zealand), the Yanomi community of the Amazon, the Wendat-Wyandotte Nation of Canada, the Himba people of Namibia and the Torres Strait Islanders of Australia.

The book is organized into chapters and short case studies which provide examples of IT implementations that have been successful in serving indigenous needs and goals. The articles show how information technology can be developed to fit indigenous culture and social practices, rather than forcing indigenous peoples to adapt to information technology.

## **Section I:**

### **Indigenous People and Information Technology: Issues and Perspectives**

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In the first section of the book we present chapters which address general issues regarding indigenous peoples and information technology. These include questions of indigenous adoption and participation in information technology, globalization issues and concerns of power and control.

The opening chapter, *Portals and Potlatch*, comes from Canadian authors Carol Leclair and Sandi Warren. Appropriately enough, it consists of a conversation reflecting the oral form of communication that characterizes most indigenous cultures. They discuss protocols for knowledge sharing using information technology which are based on an indigenous ethic of exchange and reciprocity, and founded on respect for the elders and for intellectual property. The authors stress the importance of context in traditional communication and show how context can also be created around online knowledge. As the Potlatch ceremonies of First Nations involve transfer of knowledge in a process of cre-

ating shared meaning, so information technology portals can provide a collective reality if they are grounded in indigenous principles and law. An important insight to come from these authors is the readiness of indigenous peoples to adopt new technology — to “steal fast horses” — if it can serve their communities’ goals.

Juan Francisco Salazar is also interested in the reality of cyberspace for indigenous peoples. *Indigenous Peoples and the Cultural Construction of Information and Communication Technology (ICT) in Latin America* explores issues of indigenous adoption and control of the new digital technologies which go beyond simplistic discussions of the digital divide. He points out that many indigenous communities and organizations have established a Web presence in order to pursue activities as diverse as political advocacy, e-commerce, biodiversity research and the creation of a coordinated pan-indigenous movement. The communities assert their right to decide on what terms they will engage with the Internet and new media, redefining technology and conceiving of it differently from other populations.

In *Indigenous Knowledges and Worldview: Representations and the Internet*, Judy Iseke-Barnes and Deborah Danard take a different approach, focusing on many of the problematic issues surrounding the Internet and the way in which indigenous peoples are portrayed on Web sites. In particular, they note three aspects: commodification, by which indigenous peoples are reduced to stereotypes to sell products, the power over representations of indigenous peoples which is exercised by non-indigenous institutions and the distance which separates indigenous peoples from those who are seeking to define them. These misrepresentations produce destructive outcomes for indigenous peoples, no less serious than past practices of colonization. The authors call on indigenous peoples, particularly Web artists, to find new ways of using information technology which will support indigenous identities and communities.

Robyn Kamira is also interested in issues of control or, more specifically, governance. In her chapter, *Kaitiakitanga and Health Informatics: Introducing Useful Indigenous Concepts of Governance in the Health Sector*, she draws on the Maori concept of Kaitiakitanga, an idea which includes guardianship, stewardship and responsibility. She notes that after many decades of unsuccessful attempts to improve Maori health, more control is needed by Maori over health data and other information which impact their well-being. Indigenous perspectives must be included into public policy since Western approaches have failed indigenous peoples. Though she places her arguments for indigenous concepts of governance within the area of health informatics — her particular field of interest — they might well be applied to any area of information technology which impacts the lives of indigenous peoples.

Victor Giner Minana reports on quite a different topic: UNESCO’s project *ICTs for Intercultural Dialogue (ICT4ID)*. During the 2004-2005 biennium UNESCO sponsored five pilot projects with the San people of southern Africa,

the Himba of Namibia, the Pygmy Forest People of Gabon in central Africa, the Quechua in Peru and various indigenous peoples in Bolivia. The projects fostered indigenous cultural resources and dialogue with the outside world through developing the communication capacities of the people using a range of information and communication technologies, including digital film making, multimedia exhibitions and the digitization and repatriation of archives. The results of the pilot projects are currently being evaluated prior to the implementation of more projects over the next two years.

The final three case studies which conclude this section all provide a portrait of what information technology means to indigenous peoples and how it has transformed their lives. Pauline Hui Ying Ooi interviews five indigenous information technology undergraduates in her study, *ICT and the Orang Asli in Malaysia*. So far, the involvement of the Orang Asli with information technology is very small due to lack of education, the high cost of computer equipment and lack of basic infrastructure in their villages. However, they are generally willing to accept new technologies as long as the technologies do not threaten their traditional values. As the younger generations gain formal education, adoption of computer technology is likely to increase.

In *My Life with Computers on a Remote Island* and *How Computers Came into My Life*, two authors from Dauan Island in the Torres Strait, Bethalia Gaidan and Margaret Mau, describe how they learnt to use a computer and the changes that information technology has made to their lives. Bethalia Gaidan narrates how she used to have to travel to the main island by dinghy, small plane and then ferry in order to do the payroll before computerized payroll systems were introduced: At low tide she would wade through the mud to get to the boat, or in bad weather it would be dangerous to travel. Margaret Mau tells of the trials and tribulations of learning how to use computers as she assumed positions of responsibility in the government of her island and the council that oversees the region. For both women, living and working on one of the most remote islands in the world, computers have made a huge difference. As Margaret Mau says, “They make the world become your oyster.”

## Section II:

### Technology in Education

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This section explores the ways information technology is being used as an educational tool from an indigenous perspective. Even when indigenous peoples have access to the same education as non-indigenous peoples, they often experience difficulties as a result of isolation, culturally inappropriate educational programs and learning styles. Information technology allows these difficulties to be addressed in innovative and interesting ways.

Christopher Robbins explores the problems of educating diverse indigenous populations scattered on many distant islands in the South Pacific in his chapter, *Developing Culturally Inclusive Educational Multimedia in the South Pacific*. After expansive research, three major recommendations for instructional design were suggested: “learning in wholes,” the encouragement of observation and imitation and the use of vernacular metaphors and local languages. From these principles, multimedia was developed, thereby allowing students at the University of the South Pacific to develop and grow according to their own cultures, and teachers were encouraged to add local content.

In quite a different vein, the accessing of Internet banking services by indigenous peoples is described by Fiona Brady in her chapter, *Learning to Internet Bank*. Communities in the Torres Strait, due to their isolation in the Far North of Australia, have little or no opportunity to visit banks. Their need for this service provides the impetus to develop the skills required, as all alternatives are prohibitively expensive. Online banking — for many people today taken for granted — provides a rich learning experience for these peoples. The study provides a useful lens to view the process of technology skill acquisition, which the author interprets from a number of theoretical perspectives.

Michael Donovan, in his chapter *Can Information Communication Technology Tools be Used to Suit Aboriginal Learning Pedagogies?*, addresses the need to design programs that address educational outcomes for indigenous students. He notes a coincidence between ICT pedagogy and aboriginal pedagogy, and therefore suggests that ICT can be a useful tool to improve aboriginal education. He proposes “Outcamp” learning centres, placed in remote communities: These centres would provide Internet access with up to 15 computer terminals in a comfortable environment, allowing students to access a server where information is managed, with the support of an education facilitator. Programs could be designed to cater for the individual needs of these students and contextualize learning within their community setting.

Instructional design and technology (ITD) is discussed by Wanjira Kinuthia in her chapter, *Instructional Design and Technology Implications for Indigenous Knowledge: Africa’s Introspective*. In particular she looks at indigenous knowledge as a resource, and investigates its place within the educational design process. She suggests that indigenous knowledge should be integrated into instructional design, thereby recognising that knowledge is dynamic, and reflects the culture to which it belongs.

Education, driven by the allied need to improve health programs, is the basis for the case study by Gale Goodwin Gómez, *Computer Technology and Native Literacy in the Amazon Rain Forest*. The Yanomani Intercultural Education Program was linked to the village health program, which at the time had high infant mortality rates as a result of epidemics of communicable diseases and malaria. Some 32 villages and over 400 students now participate in the pro-

grams. An interesting outcome is the production by teachers of teaching materials and newsletters.

Effective Maori teaching and learning and effective e-learning are examined in the case study by Terry Neal, Andrea Barr, Te Arani Barrett and Kathie Irwin in *Toi Whakaoranga: Maori and Learning Technology*. The progress made in the past using culturally appropriate educational content was seen to be under challenge by the potentially monocultural new e-learning environment. To address their concerns, workshops were conducted to develop appropriate Maori e-learning content and training.

Indigenous peoples have traditions of story telling and oral communication which are essential to their learning environment. How these stories are being recorded and placed on CD-ROM for use in educational environments form the basis of Ella Inglebret, Susan Rae Banks, D. Michael Pavel, Rhonda Friedlander and Mary Loy Stone's case study: *Multimedia Curriculum Development Based on the Oral Tradition*. Allowing indigenous peoples to speak, and using the multimedia medium, is preserving this rich cultural experience.

The development of a Pre-IT course at the University of Technology, Sydney, Australia, is the study by Stephen Grant, Max Hendriks and Laurel Evelyn Dyson in *The Indigenous Pre-IT Program*. From earlier modelling of a similar approach for indigenous students to study law, this course provides a bridge for students to enter tertiary education in the field of information technology. With the course offered successfully twice to date and a third planned for 2006, this is a successful ongoing program.

The use of problem-based-learning (PBL) for indigenous Australians has been the basis for the piloting and implementation of problem-based e-learning (PBeL). Rosemary Foster and Michael Meehan, in *Problem-Based Online Learning and Indigenous Tertiary Education: Reflections on Implementation*, explore the issues and limitations associated with this form of e-learning. Access to online computing and multimedia generally is explored.

Language and cultural recovery are investigated by Tish Scott in *Student Technology Projects in a Remote First Nations Village*. Here the year 6/7 students were given several community-based projects which were the result of research and field trips. From these, six short multimedia presentations were produced by the students. It was seen that through the use of digital technologies culture could be acknowledged, preserved, revitalised and shared.

Russell Gluck and John Fulcher, in *Draw-Talk-Write: Experiences and Learning with Indigenous Australians that are Driving the Evolution of Word Recognition Technology*, explore the use of a large variety of electronic media for indigenous Australians to use in their own language to tell stories. The equipment used includes electronic white boards, tablets, scanners, digital voice recorders, computers and word recognition engines. By using these means, orally rich people can share their language with others and build understanding.

### Section III: Cultural Preservation and Revitalisation

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Indigenous cultures around the world are under threat. Many communities no longer live on their traditional lands and much of the knowledge is now held by older people, who are concerned that the culture is not being passed on to the younger generation. Many indigenous languages are also threatened, with few remaining fluent speakers. Traditional knowledge and language resources are often stored away in museums and libraries, placed there by anthropologists and linguists in the past, but largely inaccessible to the indigenous owners.

The multimedia capabilities, storage capacity and communication tools offered by information technology provide new opportunities to preserve and revitalize indigenous cultures and languages, and to repatriate material back to communities from national cultural institutions. In particular the graphical, video and audio facilities of multimedia speak directly to cultures which are principally rooted in spoken language, music, dance, ceremony and visual forms of artistic expression. In this section we present three startlingly different approaches to indigenous living cultural archive systems and also a selection of projects aimed at ensuring that indigenous languages continue into the future.

One of the most successful indigenous cultural database systems that has been implemented to date is described by Martin Hughes and John Dallwitz in *Ara Irititja: Towards Culturally Appropriate IT Best Practice in Remote Indigenous Australia*. This system was developed expressly for the Anangu people, who live in the environmentally challenging desert regions of Central Australia, but it has also been adopted by a number of other communities. The development process was careful and painstaking, involving Anangu participants at every stage in order to ensure that the resulting interface, database, security and hardware were culturally and environmentally appropriate. An interesting feature of the Ara Irititja database is the mobile workstation, which is heat-proof, dust-proof, mouse-proof, equipped with an uninterruptible power supply and which can be wheeled around or placed on the back of a truck and taken anywhere the community wish to use it, indoors or out. The authors question standard IT best practice and show how “everything we think we know, believe is essential, or take for granted as axioms” must be set aside when designing systems which truly meet the needs of indigenous peoples.

There are other approaches to building indigenous living cultural archives. Brett Leavy, in *Digital Songlines: Digitising the Arts, Culture and Heritage Landscape of Aboriginal Australia*, illustrates a radically different approach which uses games-engine technology and data gathered from global positioning systems to create three-dimensional virtual environments in which the user can



discover indigenous culture, stories and artefacts. The design of the system reflects the fundamental link between the land and indigenous culture. It has an extremely attractive interface and high levels of interactivity with figures in the landscape. At present the system is in the prototype phase, but has several potential market applications including indigenous heritage management, education, tourism and entertainment.

Katina Michael and Leone Dunn present another approach in *The Use of Information and Communication Technology for the Preservation of Aboriginal Culture: The Badimaya People of Western Australia*. They suggest interactive vector-based maps as a portal to multimedia content and digitized document and photographic archives. Since the focus of their work has been linguistic, they propose the Badimaya lexicon as a directory for organizing the multimedia resources. Since most of the people now live away from their traditional lands, the development of systems like these is very important in maintaining a link with their culture.

Given the crisis in many indigenous languages today, systems developers and linguists are teaming up to design programs to help revitalize these threatened languages and ensure that the younger generation have the opportunity to learn them. As one Tagish elder says, language is the “root and heart of our culture.” In *Indigenous Language Usage in a Bilingual Interface: Transaction Log Analysis of the Niupepa Web Site*, Te Taka Keegan, Sally Jo Cunningham and Mark Apperley describe a Web site which provides access to Māori newspaper articles. The analysis reveals usage patterns which have implications for the design of similar sites. Importantly, their study shows that Māori and bilingual speakers are making considerable use of the Web site and therefore a great need exists for resources such as this.

The range of different indigenous language systems being implemented around the world is best seen in a series of short case studies. Kate Hennessy and Patrick J. Moore, in *Language, Identity, and Community Control: The Tagish First Voices Project*, describe a Canadian attempt from the Yukon to undo the assimilationist educational practices of the past which forbade Tagish and Tlingit children from speaking their language. The Tagish tongue has only one remaining fluent speaker, but a database and Web site allowing community members to read while they listen to sound recordings is helping to address this issue.

An Australian project is described by Daryn McKenny, Baden Hughes and Alex Arposio in *Towards an Indigenous Language Knowledge Base: Tools and Techniques from the Arwarbukarl Community*. Twenty people are learning the Arwarbukarl language of the Hunter Valley region north of Sydney using linguistic knowledge management software available via the Web or on CD, which incorporates text, graphics, audio and video to create a rich learning experience.



Glenn Auld reports on a project from the remote north of Australia in *Ndjébbana Talking Books: A Technological Transformation to Fit Kunibídjí Social Practice*. Ndjébbana is spoken by only 150 people, but is being passed on to the children through innovative, multimedia “talking books” which play recordings of stories while at the same time highlighting the words displayed on a simple-to-use touch screen.

Interactive multimedia is again the foundation of *A Talking Dictionary of Paakantyi*, described by David Nathan and available on CD-ROM. This case study illustrates how language projects evolve in consultation with indigenous participants into far richer outcomes than originally anticipated, in this instance with the addition of insightful explanations of Paakantyi usage supplied in English by the community members and incorporated into the dictionary.

The final study, by Gary Holton, Andrea Berez and Sadie Williams, centres on *Building the Dena'ina Language Alaska Archive*. This archive provides otherwise unavailable copies of audio recordings and documents of the Dena'ina Athabascan language of Alaska. It is helping to revitalize a language which had ceased to function in daily communication and, by incorporating best practice methodologies of digital preservation, is ensuring that the language materials will be an enduring and permanent resource for the community.

## **Section IV:**

### **Applications Transforming Communities**

This section explores the ways in which computer systems are being designed specifically with indigenous peoples and their special needs in mind. Though indigenous peoples employ many of the same types of applications that non-indigenous peoples use — for example, financial and accounting packages to help them run businesses, word processing programs to write letters and other documents; and e-mail, mobile phone and text messaging technology for communication — indigenous peoples also have particular requirements which systems design must take into account.

In the first chapter of this section, *Ethnocomputing with Native American Design*, Ron Eglash explores an aspect of indigenous life which is of great interest to most indigenous communities around the world, that of art. He shows how computer simulation tools such as the Virtual Bead Loom and the SimShoBan basketry simulation can be used to help school students learn about traditional Native American art and at the same time express their individual creativity. Moreover, since the tools exploit mathematical concepts embedded in these art practices, students learn about mathematics at the same time. The

tools demonstrate how good design practices which respect indigenous culture and involve collaboration with indigenous communities can yield positive results in a number of areas.

An application of information technology which is receiving a great deal of focus at the moment is GIS — geographic information systems. Given the strong attachment to the land that indigenous peoples traditionally have and the dispossession that many suffered in the process of colonization, these systems have a huge potential to either assist or hinder indigenous claims to legal title over their countries. In *Cut from the Same Cloth: The United States Bureau of Indian Affairs, Geographic Information Systems, and Cultural Assimilation*, Mark H. Palmer takes the more pessimistic view that GIS is being used as yet another tool in the assimilation of Native Americans. He argues strongly that communities are not being allowed to participate fully in modern cartography. The maps being produced therefore do not truly reflect Native American cultural landscapes, geographic knowledge and place names.

Andrew Turk, on the other hand, in *Representations of Tribal Boundaries of Australian Indigenous Peoples and the Implications for Geographic Information Systems*, assumes a more positive view, seeing GIS as an important tool in furthering indigenous land claims and access to resources. He explores how indigenous concepts of boundary — often more indeterminate than Western approaches — might be properly represented in systems which incorporate social and ethical issues in their design. He foresees the development of a truly indigenous GIS which faithfully reflects the culture and beliefs of native peoples.

Given the poverty and lack of local employment opportunities that characterize many communities, economic development of indigenous communities is particularly important. Remoteness is a significant factor here, and e-commerce provides a means of overcoming distance by giving direct access to global markets for indigenous products and services. Roger W. Harris, Doug Vogel and Lars H. Bestle, in their chapter *E-Community-Based Tourism for Asia's Indigenous Peoples*, demonstrate how community-based tourism is assisting indigenous peoples in the Asian region earn tourist dollars without having to go through intermediaries. Currently there is a boom in world tourism and the Internet is restructuring tourism distribution channels, allowing easy access for computer literate “geo-tourists” who are searching for more experiential, village-based tourism products. People like the Kelabit in Sarawak, Malaysia, are pioneering this community-based e-tourism. It allows communities to operate tourism on their own terms, enjoy a fair share of the profits and remain on their traditional homelands.

Some short case studies on a range of applications serving indigenous needs conclude this section. In *Computerised Tests of Brain Function for Use with Indigenous Peoples*, Sheree Cairney and Paul Maruff describe a program in the area of indigenous health called CogState. This has been developed to as-

sess cognitive function in cases of drug abuse and mental illness. It allows patients who live in remote areas and have difficulty in accessing hospital testing facilities to be assessed using a simple program based on card games, an activity that is popular with many aboriginal people. The program allows them to remain in their community and can be administered under a tree, on a verandah or even on the beach. It is a good case of information technology adapting to indigenous needs and circumstances.

Shigenobu Sugito and Sachito Kubota present their *Alliance Project: Digital Kinship Database and Genealogy* — a system designed specifically for recording indigenous family relationships. These relationships are typically characterized by strong lateral interconnections rather than the vertical trees usual in Western genealogies. Because of the different way that indigenous peoples view their genealogy, systems which have been designed in the West to catalog such relationships are totally inappropriate. Software such as Alliance is important in helping indigenous peoples gain recognition of their identity, particularly where they were removed from their traditional lands, and is also being used in establishing land rights since these are often related to kinship.

Marcia Langton, Odette Mazel and Lisa Palmer give an overview of the *Agreements Treaties and Negotiated Settlements Database*, which provides an online gateway to resources to assist in policy-making, governance and other issues relating to agreements formed between indigenous peoples and governments, companies and other organizations. Like the other systems described above, it is appropriate to indigenous culture and serves a specific indigenous need. One can imagine in time other specialist computer applications arising to fill a full range of indigenous requirements.

## **Section V: Linking Communities and Improving Access**

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Isolation marks many indigenous communities. This can be either geographic or social isolation. Access to ICT is limited because indigenous peoples often live in remote regions, far from major communications infrastructure. Social factors prevent access to technology available to the wider community. Without ICT, indigenous peoples are often denied communication with the outside world and with each other. They are denied access to a range of government and non-government services, such as education, health, justice, welfare, banking and commercial services. They are also denied access to national and global markets for sale of their arts, crafts and tourism services.

Essentially, ICT can reduce the disadvantage of location for remote communities. However, a number of issues need to be addressed before these benefits can be realized because the very remoteness of the communities, their small populations and environmental challenges mean that implementation of technology is difficult and costly. In Section V we showcase some of the projects and technologies which have been successful in linking communities together and improving access.

Anne Daly reports on a common approach to overcoming access problems for poor communities in her chapter *The Diffusion of New Technologies: Community Online Access Centres in Indigenous Communities in Australia*. Community technology centres, or telecentres, provide indigenous peoples with access to computer technology and the Internet by spreading costs across the community and so increasing affordability. Through interviews with centre managers, indigenous community members and service providers, she considers factors which make centres successful. These include a strong commitment by the community to the development and ongoing management of the centre, a close integration of the centre to community activities (including development goals and cultural activities) and the funding of training for staff and community members.

Another approach to improving access is outlined in Laurel Evelyn Dyson's *Wireless Applications in Africa*. A range of wireless technologies are delivering cost effective services in a continent where traditional, wired infrastructure is lacking, where populations are often itinerant, literacy levels are low and there is little money to spend on technology. Four implementations are examined to demonstrate how new approaches to mobile design are producing culturally and environmentally appropriate technology: the Himba's satellite-based mobile telephone network, Cyber Sherpherd, Cybertracker and WorldSpace satellite Internet radios. Wireless devices offer portability to semi-nomadic peoples, can be designed with graphical interfaces and menus to suit the literacy levels of people coming from an oral culture and may well provide a real option for indigenous peoples all around the world.

Overcoming geographic isolation often requires new, innovative technological approaches. Mehran Abolhasen and Paul Boustead, in their case study *UHF-Based Community Voice Service in Ngannytjarra Lands of Australia*, show how a new radio network is providing communication in one of the remotest and most challenging desert environments in the world. The Ultra-High Frequency radios are smaller, more portable devices than what was previously available and are run off a community-owned network that allows free calls and is therefore cost-effective.

An important implementation in remote Australia in recent years is the *Cape York Digital Network*, detailed by 'Alopi Latukefu in his case study. This network addresses the "tyranny of distance" and lets a number of indigenous com-

munities achieve some independence and control of their communication needs via a high bandwidth network. A number of services are offered including Internet banking and videoconferencing, which allows virtual “visits” to family members in prison. One innovative facility is the Indigenous Stock Exchange, which encourages investment in indigenous enterprises.

Though governments often see providing infrastructure as the key issue in overcoming disadvantage for isolated indigenous communities, projects which do not include social factors are likely to fail. Ryan Sengara describes the *Redfern Kids Connect* project which operates in an inner city neighbourhood of Sydney, Australia. Here it is not geographic isolation, but rather high levels of socio-economic disadvantage which keep aboriginal children from accessing information technology. The project addresses this by fostering positive interactions and relationships within a computer laboratory context.

A computer lab is also the setting for J. David Betts’s case study, *Community Computing and Literacy in Pascua Yaqui Pueblo*. Located near Tucson, Arizona, the Pascua Yaqui community have learnt computer skills, improved school achievement and developed new literacies, as people interact in the lab in English, Spanish and Yaqui, their native tongue. The computer clubhouse has become a drop-in centre for youth, who work with mentors on multimedia projects, robotics, graphics, video and animation, and there is also a music studio. The project shows the potential for well-developed programs to build social capacity on a number of fronts which go well beyond basic computer literacy.

The final contribution in our book by Linda Sioui illustrates how information and communication technologies can be used to link communities once problems of access are overcome. *Reunification of the Wendat/Wyandotte Nation at a Time of Globalization* shows how the Internet is allowing indigenous peoples to reconnect and reform their communities out of the diaspora which resulted from colonial policies antagonistic to indigenous sovereignty and well-being. The Wendat First Nation, originally from Ontario, Canada, were dispersed from their homelands to Quebec, Oklahoma, Kansas and Michigan, but have now formed virtual groups such as Wendat Gathering, Wendat Longhouse and Longhouse Women, which allow daily communications. It illustrates how information technology can be used as a force for good to overcome the injustices of the past, how it can serve indigenous goals for self-determination and how it can ensure the continuation of indigenous cultures and indigenous languages in the modern world.