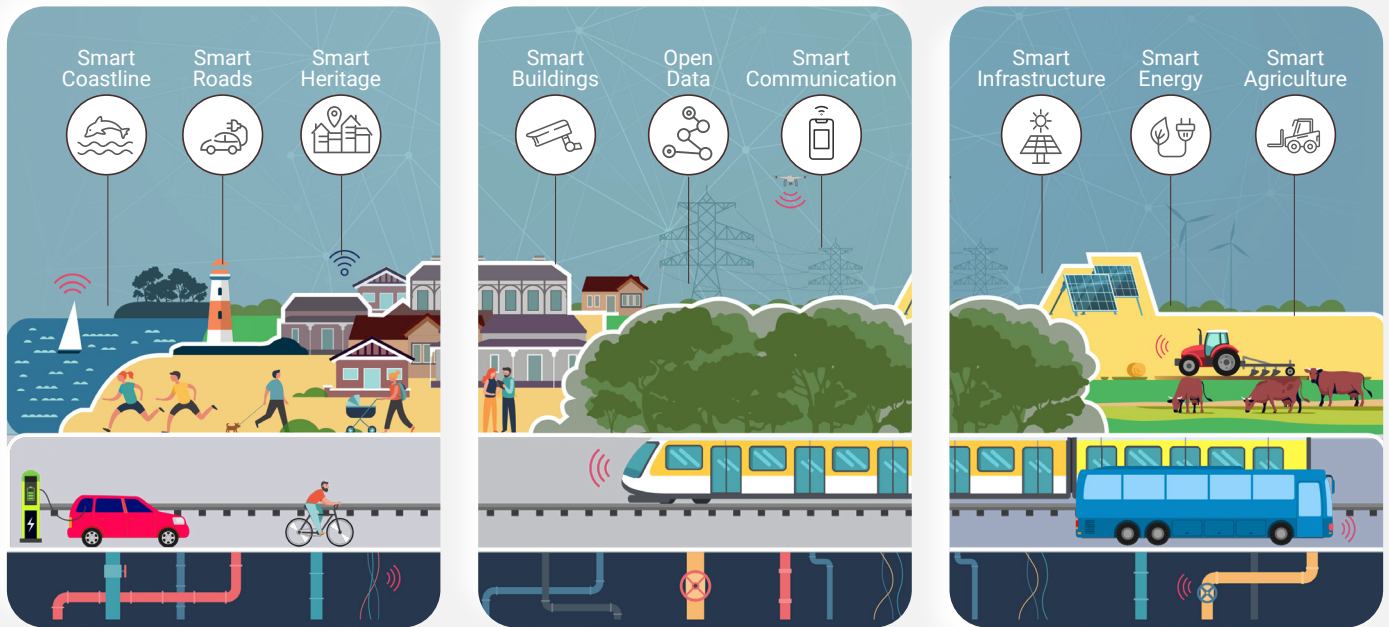


Smart Precedents for Smart Regions

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Smart Regional Spaces.

Acknowledgements

Acknowledgement of Country

We acknowledge the Traditional Custodians of Country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

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Contents

Introduction	2
1. ChillOUT Hubs – Georges River, New South Wales, Australia	4
2. Machine Learning for Land Use Mapping – Queensland, Australia	6
3. NSW Disaster Dashboards – New South Wales, Australia	8
4. Solarkiosk E-HUBBs – Remote Sites, Worldwide	10
5. Snap Send Solve App – Australia and New Zealand	12
6. Coogee Smart Beach Project – City of Randwick, New South Wales, Australia	14
7. Indigenous-led Technology Training – Province of British Columbia, Canada	16
8. Village Story Map Welcomes Newcomers – Schendelbeke, Belgium	18
9. ARGO Augmented Archeology App – Germany and Luxembourg	20
10. Kinkuna Smart Park Promotes Active Play – Eglinton, Western Australia, Australia	22
11. UV-Smart, Heat-Smart Cool Playground – Merrylands, New South Wales, Australia	24
12. Haidian AI Park – Beijing, China	26
13. Cochrane On-demand Local Transit (COLT) – Cochrane, Alberta, Canada	28
14. SAUVÉR Regional Electric Car-sharing – Province of Québec, Canada	30
15. The Rural Baba Residence Project – Bulgaria	32
16. Tech-enabled Dementia Care Training – Fukuoka, Japan	34
17. Drones Deliver Blood to Remote Areas – Rwanda	36
18. Cargo Delivery by e-Bike – Burgsteinfurt, Steinfurt, Germany	38
19. Building Connectivity in Rural America – United States of America	40
20. Adopt an Olive Tree – Oliete, Spain	42
21. Interactive Map for City Tree Foraging – Christchurch, New Zealand	44
Image References	46
Text References	50

Introduction

What are Smart Places?

Smart places are spaces where “physical and digital environments converge.” [1, p3] They are characterised by smart initiatives—projects, products, processes, and collaborations—underpinned by smart technologies.

Smart initiatives transform both hard and soft elements of the built and natural environments. Hard elements include public parks and public transit. Soft elements include governance and education. [2,3]

Smart initiatives and the data they produce are used to respond to a range of challenges and opportunities. The rich information produced from smart initiatives enables governments, planners, and designers to make better decisions. This improves the quality of life for individuals and communities. [4]

Smart initiatives are “manageable, scalable, sustainable and, most importantly, create efficiency in local services and provide benefits to the community.” [5, p3]

Smart places are comprised of three interconnected layers. The tech base consists of technological hardware and connected devices. It includes smart cards, sensors, fibre optics and the National Broadband Network, the Internet of Things (IoT), and Wi-Fi.

A second layer consists of data analysis capabilities and smart applications (commonly called apps) created for websites and smartphones. This layer includes software programs, digital dashboards, government portals, virtual reality, and artificial intelligence.

The final layer represents the adoption and use of smart initiatives by individuals and communities. [6] This layer is critical. Once people engage with smart initiatives, smart places can change how they live, work and play.

Smart initiatives can also be understood to involve one or more of the six key elements of smart places: smart

governance, a smart environment, smart living, smart mobility, smart people, and a smart economy. [4,6,7]

The Smart Places Movement

The smart places movement offers numerous economic, environmental, and social benefits. To date, the narrative has been predominantly city centric. Many of the ideas generated respond to rapid urbanisation and densification, and their consequences. [5]

Urban-centred smart initiatives may not easily translate to the spatial scales, assets, geographically dispersed communities, or distinct (and often opposite) challenges faced by regional areas. Because of this, “regional councils and their communities need to be supported to engage with the smart places movement and achieve the benefits it has to offer.” [5, p3]

Smart Regional Spaces: Ready Set Go!

The Smart Regional Spaces: Ready Set Go! project is a collaboration between the Department of Regional NSW, The University of Sydney, and the University of New South Wales Sydney. The project team is working alongside three ‘pilot’ councils in New South Wales: Armidale Regional Council, Lithgow City Council, and Parkes Shire Council.

The project aims to move the discourse from smart cities to smart regions, and to support regional councils in their efforts to increase the use of data and technology to make better decisions and improve the quality of life in their communities. [6]

Being ‘smart-ready’ will look different for each council, as they work in collaboration with their communities to identify and implement context-sensitive smart strategies, projects, programs, and tools. [5]

To support and strengthen the role of regional councils



Smart Regions – View from Mount Panorama, NSW.

as leaders in delivering smart places, the Smart Regional Spaces: Ready, Set, Go! project will deliver online, interactive digital tools and resources, including this collection of Smart Precedent Projects.

Smart Precedent Projects

An international scoping exercise was undertaken to find a collection of exemplary smart projects that had been implemented. The scale of the projects range from a single site to a neighbourhood, a city or town, a state or region, or an entire country.

Most of the precedent projects address an issue or opportunity relevant to some or all of regional NSW, and many have the potential to be replicated. A few of the precedents are more inspirational. They are presented to illustrate the kinds of smart initiatives that have been undertaken in various parts of the world. There are doubtless many other examples of smart projects that are underway across the globe but the 21 included here provide ample food for thought.

You can explore the precedent projects in any order.

Either continue reading or click on the title of a project of interest on the **Contents** page to go directly to that example.

Please note that in-text citations are shown by numbers in square brackets. Full image references and text references for each section of this e-book are listed at the end of the document.

ChillOUT Hubs

Georges River, New South Wales, Australia

2018 – Ongoing



Mortdale ChillOUT Hub.



Hurstville ChillOUT Hub.

“Smart public spaces are streets, public open spaces, and public facilities using technology to improve the quality of life of our communities.” [1, p5]

Project Summary

ChillOUT Hubs are innovative open-air community spaces enabled with smart technologies. These multi-functional hubs provide flexible spaces to meet, work and play. They aim to increase community connectivity and knowledge exchange, while also providing localised cool spots to combat rising temperatures and the effects of urban heat islands. [2,3]

Each hub integrates a powered Smart Tree shade structure, smart furniture such as powered seats and tables, charging points, IoT environmental sensors, public Wi-Fi, solar power, lighting, smart bins, and smart drinking fountains, as well as public art and greenery. [2,4] The environmental sensors capture data on urban heat microclimates, user numbers, and utilities. This data is collated and displayed on a smart asset management (SAM) dashboard, allowing Council to effectively manage its infrastructure and make informed planning and environmental decisions. [2]

The Hubs are designed as a modular system that can be customised based on local needs and context. [3] Three ChillOUT Hubs were installed in different locations across the Georges River Council Local Government Area: Belgrave Street in Kogarah, Timothy Reserve in Hurstville, and the town centre in Mortdale. [5]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

To inform the design of the prototype ChillOUT Hubs, the project team undertook a discovery process to understand the context of each site, including demographics, user needs, and the environmental setting. [2,3]

The Kogarah ChillOUT Hub is located on Belgrave Street, outside the library along a busy thoroughfare, offering a place to rest outdoors in a shaded space, work by connecting to Wi-Fi and plugging in a laptop, or wait in a well-lit location. [2] The Hurstville Hub is located within Timothy Reserve, a suburban park, where it offers a place for picnics, parties, seating overlooking the playground, charging points, and a drinking fountain. [6] The Mortdale Hub is located within the town centre and offers a shaded and digitally equipped meeting point for the community. [6]

Each hub is smart enabled. Powered smart furniture, including seats and tables, also provide device charging. Smart bins include sensors to determine fill levels and alert for fire. Smart water fountain sensors track use and monitor leaks and faults. Climate sensors measure local weather conditions. A remote power monitoring system captures faults, consumption, and usage. [7] Urban heat is mitigated through greenery and cooling pavement paint. [6]

The ChillOUT Hubs are connected to the IoT network delivering sensor data to Council via the SAM dashboard. This data will provide a base for future design and planning decisions, and is available to other councils, researchers, and technology entrepreneurs. [6]

Collaboration and Partnerships

The prototype ChillOUT Hubs were developed by Street Furniture Australia in partnership with The University of New South Wales and The University of Sydney's joint Smart Social Spaces research team, as well as Georges River Council in suburban Sydney, Australia. The project was funded by the Australian Commonwealth Government's Smart Cities and Suburbs Program. [4]

Georges River Council oversaw the site selection, preparation, and installation processes. The universities' Smart Social Spaces team conducted research evaluating the installations and their community impact. They also developed the accompanying SAM dashboard. Street Furniture Australia was responsible for the design and construction of the hubs with input from its partners, which included the CM+ Group architectural consultants; LX Group for IoT and electronics; Wattwatchers for energy monitoring; Smartsensor for eBin sensors; Onyx Solar; Solar Power Australia; TTW (Taylor Thomson Whitting) Engineering; Superlight LED Lighting; Total Control Electrical; and WaterGroup IoT for the smart drinking fountain. [2]

Key Features

- Open-air community spaces, community connectivity, and knowledge exchange.
- Integrated shade, seats, and tables.
- Free Wi-Fi, general purpose power outlets, and USB ports.
- Sensors to gather microclimate data.
- Digital dashboard for data visualisation, analysis, and asset management.

Relevance for the Regions

- Low-cost effective solutions that bring the community closer together through technology.
- Helps to reduce the digital divide within communities by offering free public Wi-Fi and charging stations.
- Modular design that allows for scalability and replicability.

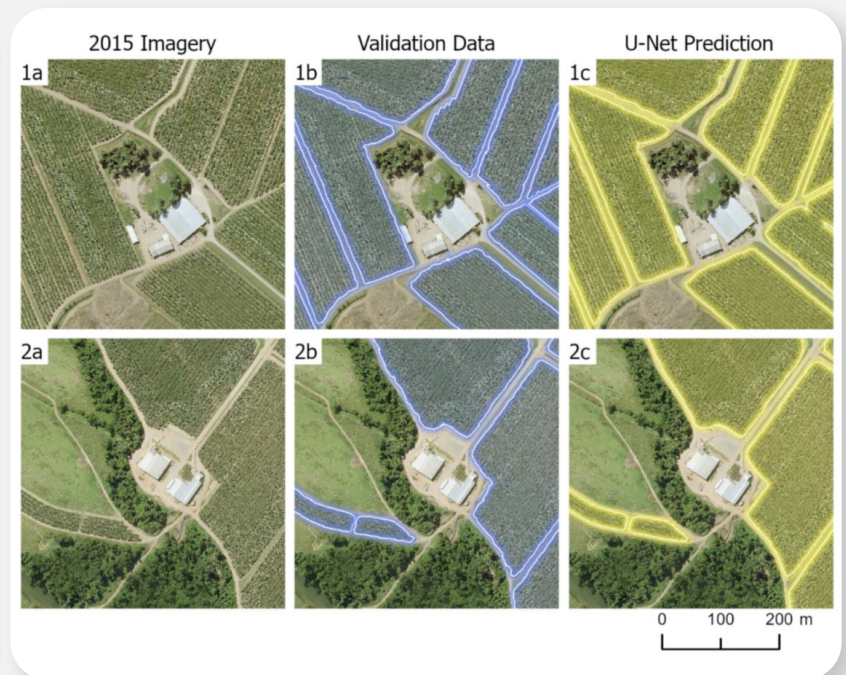
Machine Learning for Land Use Mapping

Queensland, Australia

2015 – Ongoing



Fitzroy River Delta, Queensland.



Correctly classified areas of banana plantations.

“With the computers drawing the crop lines, this allows our scientists to focus on the image interpretation, produce data faster and have more confidence in their decision-making process.” [1]

Project Summary

The Queensland Government’s Department of Environment and Science is using ‘computer vision’ technology, a subset of machine-learning and artificial intelligence, to map and classify land use features within satellite imagery, such as agricultural crops. [2,3] Computer vision refers to the engineering of computers to read and understand patterns in digital images, videos, and other visual inputs. [2,3]

The Department’s Remote Sensing Centre undertook the mapping of banana plantations in parts of northern Queensland. [4] Using existing data, imagery and algorithms, the computer model was trained, using colour and spatial arrangement patterns, to recognise mapped banana plantations within one area, the Johnstone catchment, to predict the presence of banana plantations within another area, the Tully catchment. [1,3] The trial demonstrated that a task that took one person approximately six weeks to complete manually could be performed by a computer model in a matter of minutes with an accuracy of 97%. [2]

The Department estimates that a fully trained computer model could reduce the time of manual state-wide mapping of land use from 30 years to less than one year. [2] Possible applications include land management; biosecurity monitoring; biodiversity conservation; natural disaster monitoring, relief, and recovery (e.g., for cyclones and fires); and infrastructure monitoring (e.g., mining and coal seam gas). [1,2]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

Since 1999, the state government's Remote Sensing Centre has manually mapped and assessed land uses throughout Queensland as part of the Queensland Land Use Mapping Program (QLUMP). This involves the manual desktop interpretation of imagery, hand-digitisation, and classification of land uses by trained staff; all of which is a time and resource intensive process. [2,5] Remote sensing classification, which uses colour to identify features, began automating this process. However, computer vision technology is not able to accurately distinguish between trees and other vegetation of a similar colour. [5]

Computer vision uses a type of machine learning called deep learning and a 'convolutional neural network' or CNN. [3,6] The project's CNN operates in two phases: training and prediction. The training phase integrates thousands of satellite imagery patches with existing data and mapping to train the model to identify chosen features (e.g., banana plantations). The prediction phase integrates new satellite imagery patches with the trained model files to produce a prediction (e.g., the location of unmapped banana plantations). Further CNN training has allowed other types of vegetation to be identified and mapped, including sugar cane plantations and woody vegetation. [2,3]

Collaboration and Partnerships

The banana plantation mapping trial was funded through the Department's \$41.8 million Accelerating Science Delivery Innovation program. Envista, a private company, was engaged to work with the Department and the Remote Sensing Centre. [2] Development of the computer vision model relied upon a fusion of existing data and high-performance supercomputing; cloud computing; big data technologies such as CUDA-enabled (Compute Unified Device Architecture) Nvidia graphic processing units; Python; Tensorflow; GDAL, the Geospatial Data Abstraction Library; NumPy; Keras; and satellite imagery. [1]

Data and mapping outputs are available to other Queensland Government agencies, industry groups, catchment managers, landholders and farmers. The trial upskilled staff within the RSC to apply the technology to other projects, including mapping of crops in the Fitzroy Natural Resource Management Region [1] and fire scar mapping. [7] The Department has begun collaborations with the Australian Federal Government and the New South Wales Government to facilitate the application of this technology to other parts of Australia. [5]

Key Features

- Image analysis using computer vision technology.
- Machine learning and artificial intelligence (AI) technology.
- Near real-time data monitoring and analysis for crops and during emergencies.
- Remote sensing for crop management.
- Accuracy and efficiency in mapping specific types of crops and vegetation.
- Automation of land use mapping with 97% accuracy [2] and significant time and cost savings.

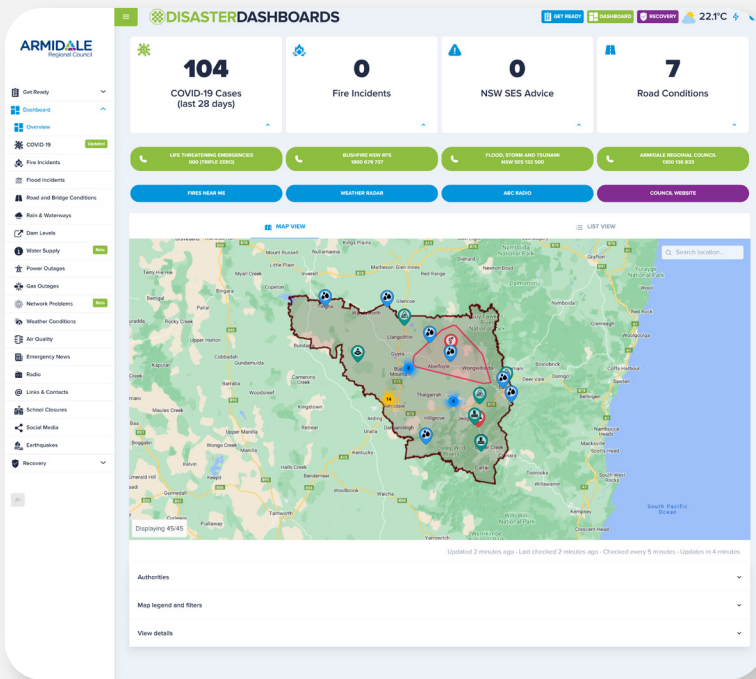
Relevance for the Regions

- Ability to map and analyse large areas of land quickly.
- Automation lowers time to map sites and reduces labour costs.
- Provides data sharing and information across governments, communities, and industry.
- Increases understanding of land impacted by natural disasters.
- Assists with regulatory compliance (e.g., the Biodiversity Conservation Act 2017).

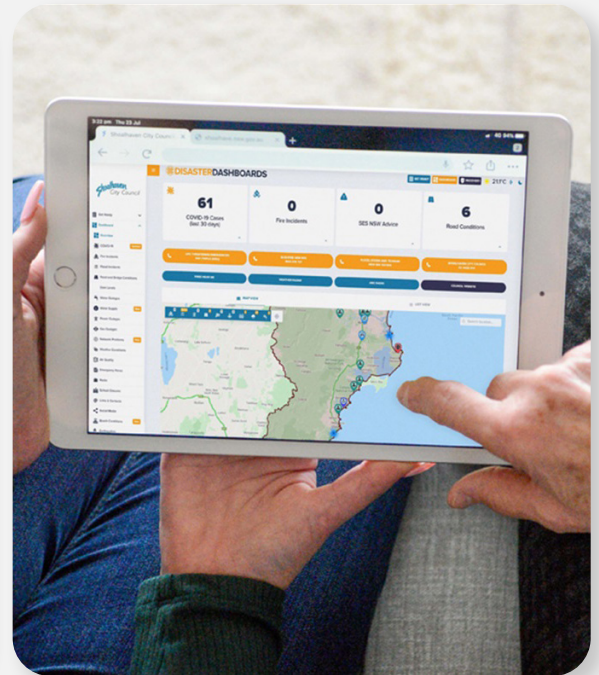
NSW Disaster Dashboards

New South Wales, Australia

2020 – Ongoing



Armidale Disaster Dashboard.



Shoalhaven Disaster Dashboard.

To provide the “community with a reliable and authoritative source of situational awareness and timely information to help them assess, think, decide and act during business as usual through to potential emergency situations as they begin to unfold.” [1]

Project Summary

Dashboards are increasingly used as an important means of communication and interaction between governments and citizens. [2] They can be used for a range of purposes including aggregating and visualising infrastructure use, public transport availability, and emergency management and response. The Disaster Dashboard portal was developed by the New South Wales Government via Resilience NSW (since replaced by the NSW Reconstruction Authority). It was piloted by 27 councils in the summer of 2020-2021. [3] Dashboards can now be used to find local information for all geographies (e.g., city, shire, region, state). [4]

A Disaster Dashboard is a web-based emergency management platform designed to provide members of the community with real-time access to information regarding emergency events such as bushfires, storms, and floods. [4,5] The dashboard supports users with specific alerts and advice on unfolding emergencies, as well as general resources relating to emergency preparedness, management, and recovery. [4,6] It empowers the community to make informed decisions to help reduce the impacts of emergencies.

As a one-stop-shop, the dashboard collates and displays information from a variety of sources, including emergency services, the weather bureau, and social media. In doing so, “the emergency dashboard provides a huge amount of value in automating and centralising all relevant data to help save time and costs.” [4]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

The New South Wales Disaster Dashboard is a web-based platform that was built using the latest versions of Angular and Nest.JS. It uses Google and Microsoft Azure cloud computing services that are hosted across multiple datacentres within Australia. [4] A light version of the dashboard with limited features can be viewed if network connectivity is low. The dashboard has three main sections, as follows.

The Disaster Dashboard section features a map that displays live information from multiple sources. The map shows the location of hazards or emergencies, and the page provides statistical data, key telephone numbers, and relevant social media content.

The Get Ready section provides general information and resources related to emergency preparedness, including identifying risk, creating a plan, preparing your home, staying aware, and how to share information. Resources cover emergencies such as storms, floods, bushfires, infrastructure failure, human infectious diseases, and biosecurity.

The Recovery section provides information relating to emergency relief and recovery. This includes government grants and funding, donation opportunities, and support organisations.

Collaboration and Partnerships

Disaster Dashboards were developed by Resilience NSW and funded through the Regional Disaster Preparedness Program. They complement the Resilience NSW Get Ready Program, which provides councils with targeted information, resources, and support for emergency preparation to increase the resilience of their communities.

Disaster Dashboards have been rolled out across more than 40 councils in New South Wales. These include Armidale Regional Council, Bellingen Shire Council, Cessnock City Council, Shoalhaven City Council, Midcoast Council, Central Coast Council, Bega Valley Shire Council, City of Newcastle, Nambucca Valley Council, Muswellbrook Shire Council, and Snowy Valleys Council. [4]

Each dashboard incorporates data and information dispersed across multiple platforms and managed by different agencies. Information is collated from the relevant council, NSW Health, NSW State Emergency Service, NSW Rural Fires Service, Manly Hydraulics Lab, Transport NSW, My Road Info, Ausgrid, Essential Energy, Endeavour Energy, the Bureau of Meteorology, Shark Smart, Australian Bureau of Statistics, and other government agencies. [4]

Key Features

- Digital dashboards and mapping.
- Software as a Service (SaaS).
- Near real-time data monitoring and analysis.
- Supports disaster preparedness, management, and recovery.
- Provides disaster recovery assistance and resources in one place.
- Helps individuals and communities develop resilience.

Relevance for the Regions

- Focuses on preparedness for natural disasters.
- A central source of locally relevant information during emergencies.
- Improved and immediate dissemination of key information during disasters.
- Faster disaster management and recovery.

Solarkiosk E-HUBBs

Remote Sites, Worldwide

2018 – Ongoing



GRAFT Solarkiosks – Social Spaces.



GRAFT Solarkiosks – Retail Spaces.

A Solarkiosk E-HUBB has a frame and wall panels that can be made locally and modified to become storefronts, communication hubs, health clinics, and more. Each kiosk includes an integrated solar array and battery that can power appliances and charge many cellphones at once. [1]

Project Summary

German-designed Solarkiosks are energy-generating multipurpose modular solar structures. Solarkiosk Solutions used this design to develop the largest solar powered trading network in rural, off-grid communities of Sub-Saharan Africa. From 2011 to 2019, they deployed over 200 solar powered retail hubs in remote areas of Botswana, Ethiopia, Ghana, Kenya, Rwanda, and Tanzania. They employed over 350 engineers and 'last mile' experts, creating thousands of jobs at installation sites and serving millions of customers with solar-powered and sustainable products. [2]

Solarkiosk Solutions distributed tens of thousands of solar products, sustainable products, and services at affordable prices, "tackling the issue of poverty penalty" in places without "formal last mile distribution" systems for goods and services. They have reached over five million customers in 15 countries, many in Africa and others in Denmark, Jordan, Bangladesh, and Indonesia. Their understanding of what people in off-grid areas need to thrive, and how to operate a complex organisation in a challenging environment means they are "often sought for consulting clients worldwide on last mile business models and operations." [2]

Since its inception, the Solarkiosk E-HUBB has been recognised with numerous awards for product design and sustainable energy use. [2]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

Solarkiosk Solutions designs, develops, deploys and, with their partners, operates turnkey solar solutions and business models for off-grid frontier markets worldwide. Their award-winning E-HUBB is a multi-functional solar powered 'business-in-a-box' that provides energy and connectivity. It has powered mini-clinics and schools, offered water purification, and provided internet cafés and other retail outlets. Their E-HUBBs provide a constant supply of electricity to local entrepreneurs, acting as a business-to-business mini-grid in remote communities. [2]

Since 2011, Solarkiosk Solutions has installed more than 250 solar powered kiosks (E-HUBBs) in frontier markets. In 2019, they expanded to become a trading platform, solar system integrator, service provider, and incubator. Solutions developed for the humanitarian sector include COVID test and vaccination centres "in the most challenging environments with restricted access and resources." They have become the biggest solar powered last mile distributor in East Africa, and one of the leading last mile infrastructure implementers in the world. [2]

Collaboration and Partnerships

The Solarkiosk E-HUBB was designed by Graft Labs in Berlin, Germany. [3] During the initial deployment of the kiosks in Sub-Saharan Africa, Solarkiosk Solutions partnered with SES Techcom Services to provide internet connection to E-HUBBs via satellite signal. This partnership was described as "the first of many steps to deliver off-grid, connected solar infrastructure solutions for underserved communities worldwide, providing individual users, businesses, schools, medical centres, and farms with basic services such as education, healthcare, internet connectivity, and satellite TV." [4]

Solarkiosk Solutions has since worked with additional partners to incubate and pilot sustainable business solutions in what they call "frontier markets." Their partners have included 8 minute energy, ABInBev, Coca-Cola Ekocenter, Danish Refugee Council, EAP, ERGO Munich RE, Ericsson, Eutelsat, GIZ, Hope Foundation, Klabu, Plan International, SES, Siemens Healineers, Siemens| Stiftung, Solarworx, The Pulse, TIGO, Total, UNHCR, UNICEF, and UNITAR. [2]

Key Features

- Solarkiosk Solutions provide distributed energy resources for various sectors. [2]
- Kiosk frames and wall panels can be locally manufactured using steel, aluminum, or brick. [1]
- Total power capacity of 1 to 4 kW can be increased by using a canopy expansion to add more solar panels. [1]
- Smart metering helps determine how much power certain components use at what time of day, and how they can be connected most efficiently. [5]

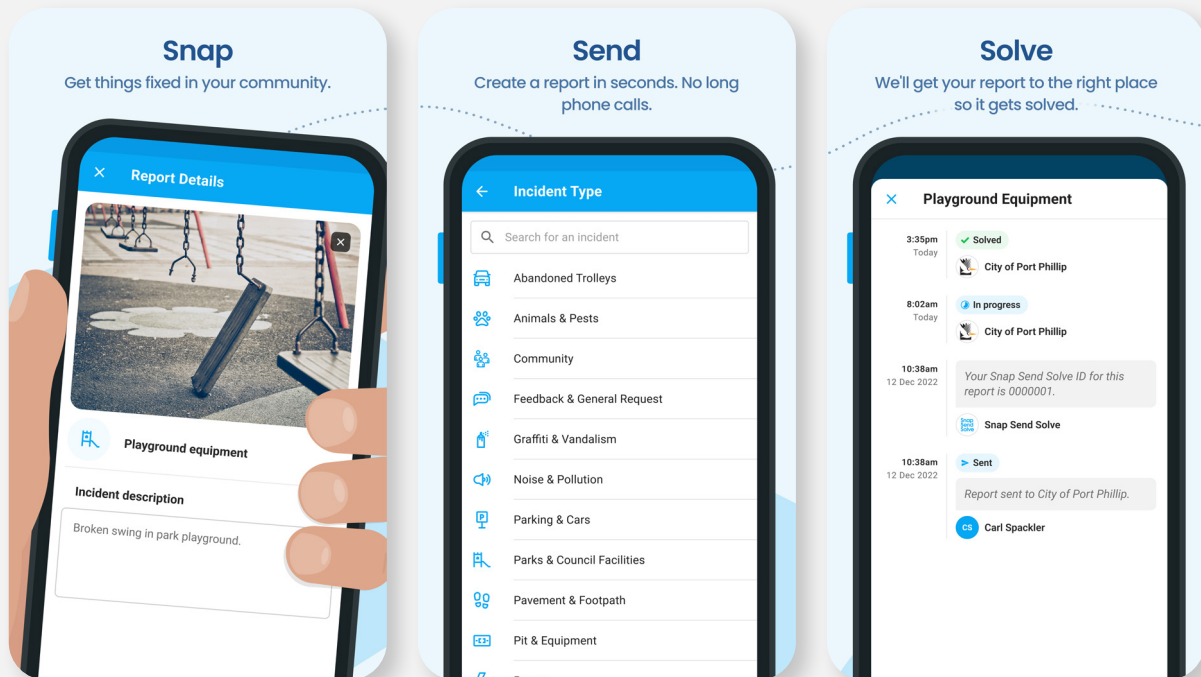
Relevance for the Regions

The use of distributed energy resources is rapidly increasing in Australia. [6] The Australian Energy Market Commission explains that rooftop solar photovoltaic units, wind generating units, battery storage, and combined heat and power units that use waste heat to provide cooling "have the potential to provide consumers with a range of benefits," including lower electricity costs and improved reliability. [7]

Snap Send Solve App

Australia and New Zealand

2011 – Ongoing



Snap Send Solve app interface.

Convenient and easy to use, the Snap Send Solve App allows individual community members to “report any issue, anytime, anywhere.” [1]

Project Summary

Snap Send Solve is a mobile app simplifies the reporting of community issues and incidents such as graffiti, dumped rubbish or litter, damaged infrastructure, abandoned trolleys, fallen trees, or potholes. The app is easy and convenient to use. It allows community members to “report any issue, anytime, anywhere” by selecting the type of incident they wish to report, snapping a photo, and hitting send. [1]

Using GPS technology, the app identifies the location of the issue and automatically directs an accurate and complete report to the relevant participating council or authority. Community members no longer need to know where and how to report a particular issue. Snap Send Solve does it for them.

The app is engaging to use and encourages people to be a ‘community legend’ by serving as extra eyes and ears in their local area. Residents who use the app can play an active role in creating cleaner, safer and smarter communities, improving overall liveability. [1,2]

Having the app helps to streamline services for councils and authorities. It saves time and money, and contributes to increased customer satisfaction. The Snap Send Solve app is available for use in every local government area (LGA) across Australia and New Zealand. [1]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

The Snap Send Solve app has been designed to make reporting a community issue fast and convenient. The app is free to download and use. When submitting a new report, the app prompts users to take a photograph and confirm their location, either by manually entering an address or using location data on the photograph through image geotagging. Users are then prompted to select the incident category, such as abandoned cars or vehicles, pavements and roads, parks, water and sewer, or animal related issues. An image of the incident and any additional details can be added before sending the report to the identified council or authority.

Councils and authorities can customise the app with branding, custom incident types, and customised questions and messages. They can reassign reports meant for other authorities, access the dashboard, and integrate reporting into existing work management systems including Pathway, TechnologyOne and Civica. [2]

Launched in 2010, the app now has more than 500,000 users in Australia and New Zealand. It has sent approximately 3.7 million reports. [1]

Collaboration and Partnerships

The app was developed by Australian Danny Gorog, founder and CEO of Snap Send Solve. The idea came about from his own experience, when he realised that he had no idea how or where to report a broken swing at a local park. Early development of the app was supported by the Victorian state government through a business competition that invited start-ups to develop apps and software using publicly available data. [3]

Snap Send Solve collaborates with more than 720,000 Councils and authorities across New Zealand and Australia, including Waverley Council, City of Parramatta, East Arnhem Regional Council, Greater Dandenong, and City of Port Phillip. Participating utility providers include Sydney Water, Telstra, Orion, and Central Highlands Water. Business and not-for-profit partners include Australia Post, NBN, and the New South Wales State Emergency Service (SES). [4]

Key Features

- Mobile application (app).
- Free and easy access to the app.
- GPS technology and geotagging of photographs if users wish.
- Easy to report incidents on the go by snapping and sending photographs.
- Councils benefit from improved customer service.

Relevance for the Regions

The Snap Send Solve app provides community members with the opportunity to report issues and assist with the management of public infrastructure. The app simplifies the reporting process by identifying the responsible agencies, based on the type of infrastructure affected and the location where the issue was reported.

Coogee Smart Beach Project

Randwick City Council, New South Wales, Australia

2018 – Ongoing



Smart lockers.



Smart beach dashboard.



Smart sunscreen.

“The Coogee Smart Beach project seeks to adopt a wide variety of current and emerging technologies to make visiting the beach easier and safer.” [1]

Project Summary

The Coogee Smart Beach project has seen a suite of smart initiatives rolled out at Coogee Beach, in Randwick City Council’s local government area in Sydney’s eastern suburbs. [2]

The Smart Beach has free high-speed Wi-Fi and Yellowbox smart lockers, as well as more than 40 wireless sensors that monitor parking, bins, and barbecue usage. There are on-site digital signage boards and the online Coogee Smart Beach dashboard, which display real-time information on beach conditions, the availability of amenities and services, aquatic safety cameras, and an expanded CCTV network. There is also a digital Fallen Lifesavers Memorial, which is interactive. The smart initiatives rely on Council data and other open data that allow 24/7 monitoring of the beach and surrounding streets. [2,3,4]

The Coogee Smart Beach project aims to optimise visitor experiences, while addressing key issues faced by one of Sydney’s most popular beaches. These include traffic congestion, waste management, facility and amenity servicing, and land and water safety. [2,4] It was also a testbed to validate the use of smart initiatives prior to rolling them out to other beaches. [2]

Project benefits include more efficient service delivery by Council, cost reductions, increased visitation to local businesses that are contributing to economic development, and an improved sense of public safety. [2]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

A key feature of the project is its digital signage boards. The boards display real-time information about beach conditions, including air and water temperature, wind direction, solar UV ratings, wave height, swell, and dangerous conditions. The boards also display information on amenities and services including Wi-Fi, Yellowbox smart lockers, smart bins, and smart barbecues, as well as parking, public transport, and ride-sharing service availability. [2,3]

The smart initiatives were rolled out at Coogee Beach over an 18-month period in 2019 and 2020. Many initiatives have proven to be successful and subsequently introduced at other beaches. These include aquatic safety cameras at Clovelly, Little Bay, Malabar, and Maroubra Beaches, in addition to a smart beach dashboard and weather station sensor network at Maroubra Beach. [2,4]

Collaboration and Partnerships

The Coogee Smart Beach Project was jointly funded by the Australian Government's Smart Cities and Suburbs Program and Randwick City Council. Project partners include Coogee Surf Life Saving Club, the Coogee Precinct Association, Peclet Technology, Ubidots, Meshed, Christie Barbecues, Database Consultants Australia Solutions, Yellowbox, Smart City Solutions, ECS Security and Investigations, Hitech Support, and John Coluston Electrical. [2,4]

Ubidots collaborated with Peclet Technology to provide the digital display board and dashboard graphs, as well as charts and maps. Meshed, an Australian-based LoRaWAN Internet of Things integration company, delivered the smart sensors to collect weather station data. [2] DCA Solutions were responsible for integrated smart parking solutions. Yellowbox, a start-up company, provided innovative smart lockers. [5] Smart City Solutions provided sensor technology for the public bins.

The smart initiatives rely on open-source data generated by third parties. These include the Bureau of Meteorology for weather data, Environment NSW for water quality, Transport for NSW for real-time bus availability, and ride-share platforms such as Ola.

Key Features

- Free public Wi-Fi and Yellowbox smart lockers.
- Smart barbecues and bins.
- Smart parking using the PayStay mobile app. [6]
- Wireless environmental sensors, aquatic safety cameras, and CCTV cameras.
- Digital signage boards and an online dashboard, displaying real-time conditions and other information.
- Fallen Lifesavers Memorial, which has an interactive digital display.

Relevance for the Regions

- Pilots are an effective way for councils to test if a technology is an effective and appropriate investment.
- Reduces the digital divide by offering free Wi-Fi to the community.
- Smarter and more efficient asset management.
- Improves management of quickly identified environmental challenges.

Indigenous-led Technology Training

Province of British Columbia, Canada

2002 – Ongoing



Digital Business Model.



High-tech world.

Digital equity is “a state in which every Indigenous person, community and Nation is fully equipped to access and effectively use technology to contribute, thrive, and succeed in today’s digital society, while preserving self-determination.” [1]

Project Summary

The First Nations Technology Council is an Indigenous-led non-profit organisation that serves all 204 First Nations communities in the province of British Columbia, Canada. It works to ensure “Indigenous peoples have full and equitable access to the tools, training and support to maximize the opportunities presented by technology and innovation.” [2]

Digital equity is “more than just access to computers and the internet, it is about influence over the trajectory of technology and its impacts on society.” It is also “a prerequisite for innovation, self-governance, entrepreneurship, education, economic and cultural wellbeing.” [1] This is why the Council’s “education programs have been designed with the needs of both Indigenous communities and technology companies in mind.” [3]

A 2022 study [4] explored the “underlying factors that perpetuate the under-representation of Indigenous people in technology sector jobs.” It identified “opportunities for Indigenous leadership in technology through workplace cultural safety and hiring practices, Indigenous-led education, entrepreneurship and procurement, community–industry partnerships, and telecommunications infrastructure.” [5, p9]

“The lack of reliable, affordable, high bandwidth internet denies Indigenous Peoples the ability to fully exercise their human rights and impedes the implementation of their inherent rights to self-governance and self-determination.” [5, p55]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

The First Nations Leadership Council was founded in 2002 by the British Columbia Assembly of First Nations, the First Nations Summit, and the Union of British Columbia Indian Chiefs, which provided its directives. The mandates given to the First Nations Leadership Council were digital skills development, connectivity, information management, and technical support and services. [6] A strategic renewal in 2013 reimagined its role “in a rapidly changing digital landscape” and positioned it to “support thousands of Indigenous peoples” through comprehensive technology education programs. [2]

A Fundamentals course teaches people “how to operate and maintain a laptop, and how to set up and adjust computer software to work effectively and securely in today’s work environments.” [7] This enables students to take the Foundations in Innovation and Technology [8] and Foundations Digital Transformation [9] courses. Futures in Innovation and Technology offers specialised training in Web Development, UX Design, UI Design, GIS/GPS Mapping, Network Technology, Data Analytics, and Data Science. [10] More focused training is available for Network Technicians [11], Web Development [12], Drone Stewardship [13], and Digital Marketing. [14] Students can become Indigenous Connectivity Champions to choose the best type of internet connection for their communities [15] or join Innovation Nation, an Indigenous Entrepreneurship Program that guides students as they start a business. [16]

Collaboration and Partnerships

The First Nations Technology Council is Indigenous led, with a board of directors representing Indigenous communities from all over the province. Indigenous women hold most of their senior leadership positions. They “work with Indigenous peoples, governments, academic institutions, technology futurists, and social changemakers to create an ecosystem that will lead to fair and equitable access to the tools, resources, and education required for success in the digital age.” [7]

Since 2002, the First Nations Technology Council has “partnered with over 150 Indigenous communities across British Columbia to provide advice, insights, and technology-related training.” It now serves all 204 First Nations communities in British Columbia. [2]

Key Features

- Indigenous students are able to build technology skills, from basic to highly advanced.
- Partnerships with expert educators and technology businesses keeps training relevant.
- Training enables students to gain employment in the growing technology sector.
- Students develop leadership skills that bring added value to their home communities.
- Advances are closing the digital divide for rural and remote Indigenous communities.

Relevance for the Regions

Underserved and remote communities can be at the forefront of the digital revolution through technology training that meets business needs and builds local technology expertise. This precedent provides a model for Indigenous communities to secure “full and equitable access to the tools, training and support to maximize the opportunities presented by technology and innovation.” [2]

Village Story Map Welcomes Newcomers

Schendelbeke, Belgium

2019 – Ongoing



Cyclists on a European street.



Phone and map with QR code.

“The village story map aims to support the integration of newcomers into the village and village life. It thus hopes to improve social relations within the village and make it a more appealing place to live, attracting new families.” [1]

Project Summary

An interactive story map is a paper walking map with QR codes for various locations. Users can “scan the relevant QR code using a smartphone to listen to someone tell a local story related to that place. Stories are collected and told by local residents with help from professional editors and narrators.” [1]

Schendelbeke is a village with less than 2,000 inhabitants in south-east Flanders, about 35 km west of Brussels. The village has a train station that enables commuters to travel directly to the city centre. Schendelbeke has seen reduced agricultural activity, land and farmers, and a loss of open space due to the expansion of industry and private housing. This has had a detrimental effect on village services, particularly shops and cafés. [1]

With the planned addition of about 200 housing units in 2020-2021, council sought ways to increase social contacts and build social cohesion. One was to invite new residents to the annual village walk. “This would enable them to discover hidden beautiful places and roads in the village. On certain points on the map, storytellers would tell historical anecdotes, folktales or memories of people who had lived there, or plans for the future.” The village’s interactive story map grew out of this event. Produced in June 2021, Council presented it “to new residents as a welcome gift.” Maps were also distributed around the village and are available at the local tourist information office. [1]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

The initiative was developed as part of a project on “dynamic villages” supported by Smart Rural 21 and Avansa, a socio-cultural organisation operating in Flanders and Brussels. In phase one, Council “investigated how new inhabitants participate in a village.” They held ‘tiny meetings’ in two places where new residents were concentrated, which acted as case studies. In phase two, Avansa supported residents and council as they examined “how the village will evolve and how it can deal with the new residents,” and helped them create the interactive map. [1]

A village walk with newcomers, where stories were shared by local residents, inspired the idea of creating an interactive story map so others could hear them. Stories include “not only historical stories, but also future dreams, folktales and stories about current events.” They can “use interviews, dialogues, letters, poetry.” Recording the stories requires narrators, an editor, a copywriter, a coach for the residents who will be speaking, a map designer, and possibly musicians. Professional recording equipment is needed but “can be set up in a mobile studio.” [1]

Collaboration and Partnerships

Project funding came from Avansa (35%) and Smart Rural 21, as part of the Dynamic Villages project (65%). Schendelbeke was selected as one of the 21 projects profiled for Smart Rural 21. The set-up and investment costs were €6961 (~\$11,500 AUD). No ongoing costs are expected, “except perhaps for an updated future edition.” [1]

The research done during phase one (‘tiny meetings’ in other locations) “was supervised by Ruth Soenen, author of ‘het kleine ontmoeten’ (‘the tiny meetings’).” For phase two (determining how to welcome newcomers and developing an interactive story map), a professional project coordinator worked for four months at 15% of a full-time equivalent position. A steering committee of residents and village council brought people together to collect stories from villagers. [1]

Smart Rural 21 was “supported by the European Commission (DG AGRI) with the overall aim to promote and inspire villages to develop and implement smart village approaches and strategies across Europe.” Smart Rural 21 ran from December 2019 to November 2022 [2] A key output was a Guidebook on How to Become a Smart Village, which discusses what it means for villages to become smart. It also provides links to the webpages of all the Smart Rural 21 projects, which are organised into eight inspirational themes. [3, pp13–15] Smart Rural 27 was launched in 2020 [4] and runs to the end of 2023. [3, p2]

Key Features

- An interactive walking map with QR codes link to professionally recorded stories by villagers.
- The process enabled a depopulated village to attract and welcome new residents.
- As part of Smart Rural 21, a smart village Guidebook is available with links to other projects.

Relevance for the Regions

Small rural villages have many opportunities to become smart. This precedent is one of many examples emerging from the Smart Rural 21 project. Eight themes emerged, which focus on stronger, resilient, connected, and prosperous rural areas. [3]

ARGO Augmented Archaeology App

Germany and Luxembourg

2016 – Ongoing



Larochette Castle, Luxembourg.



Moselle River Valley, Germany.

Augmented Reality (AR) models created by computer “display ancient monuments in reality on a smartphone or tablet, and thus make them accessible to tourists, even though they have not existed for centuries.” [1]

Project Summary

The ARGO app uses augmented reality (AR) technology to allow users to visualise in 3D how ancient Roman and medieval sites once looked. The app emerged from the ARmob (the Augmented Reality mobile experience), a cooperative project between nine LEADER Local Action Groups (LAGs): six in the Rhineland-Palatinate state of Germany and three in Luxembourg. LEADER is a European Union initiative responsible for the design, delivery, and funding of innovative ideas in rural regions (not individual villages). [1] Technical support for the ARmob project was provided by the University of Trier in Germany. [1,2]

The ARmob project aims to preserve the region’s cultural heritage and increase tourism by making its history more accessible to the public. [1] Computer generated 3D-models of over 100 historic buildings have been created and, through the ARGO app, can be superimposed onto the real-world landscape where they once stood.

Equipped with global positioning system (GPS) technology, the app determines a user’s location, selects the relevant model from the database, and adjusts the model view based on the user’s position. This allows the user to view the building or monument from all sides, creating an interactive and immersive experience. [1] The app is supported by a website that has an interactive map, structure types, building descriptions, and a route-planner. [3]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

The idea for the ARmob project originated in 2014 and a feasibility study was carried out in 2015. The project officially launched in 2016. [1] Working with relevant specialists across the region, the research team undertook a critical examination of images and historical documents for each of the selected sites.

The researchers also collected 3D laser scans of building and monument ruins. A 3D laser scanner projects beams of light that bounce back when they hit a surface, digitally recreating the position and size of an object. Using this information, digital 3D models of the buildings were created and loaded into the ARGO app's database. [1] This enables the app to work offline, using GPS technology to load and position the relevant model.

The cost to develop each model varied depending on the degree of research and documentation required to support the computer visualisation process. A simplified reconstruction cost approximately €2,000 (~\$3,261 AUD) and a more complex reconstruction costs double that. [2] Ongoing project costs are minimal, as the technology requires limited maintenance. Partnering municipalities are responsible for paying the server costs for keeping the data available through 2025. [1]

Collaboration and Partnerships

The ARmob project was co-funded by 90 participating municipalities in the nine LAGs, as well as the European Agricultural Fund for Rural Development (EAFRD). Funding from EAFRD was part of the Rhineland-Palatinate development program (Environmental Measures, Rural Development, Agriculture, Food) and the Luxembourg Programme for Rural Development. [1] EAFRD contributed €1.4 million (~\$2.3 million AUD), with local municipalities contributing between €2,000 and €4,000 each (~\$3,261 to ~\$6,522 AUD). [1]

The idea for the project was originally proposed by the Archaeological Park Vicus Belginum, Germany. [1] The LAGs collaborated with representatives from the local municipalities, local communities, tourism operators, and other specialist authorities across the region. The project was carried out with technical support from the Department of Archaeology at the University of Trier. Pooling of resources and knowledge were key components of the project. The scale and cost of the project made it one of the largest LEADER projects at the time. [1]

Key Features

- Preservation of regional cultural heritage sites in digital form.
- Website for tourists to find site information of interest and easily do route planning.
- Augmented reality (AR) app lets users experience how ancient archeological sites once looked.
- Mobile app uses GPS technology to access stored site data based on user location.
- Computer generated 3D-modelling allows people to experience a site from every direction.

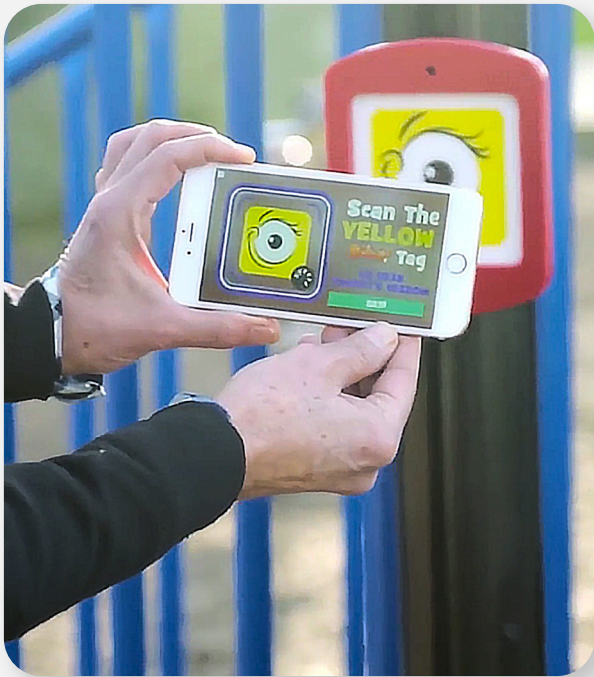
Relevance for the Regions

- Highlights and preserves cultural heritage through digital means.
- Makes local history more tangible.
- Uses technology to enhance visitor experiences.
- "Pooling resources and sharing a common vision is a key parameter for implementing cooperation projects on such scale." [2, p1]

Kinkuna Smart Park Promotes Active Play

Eglinton, Western Australia, Australia

2018 – Ongoing



Scanning a Digital Playground Marker.



Using a Digital Play App.

"Australia's first smart playground" combines digital and physical play for children. [1]

Project Summary

Kinkuna Park is located within the Allara Estate, Eglinton, in the City of Wanneroo, Western Australia. Dubbed Australia's first smart playground [1], the park is equipped with a suite of smart initiatives including Wi-Fi, smart parking, smart meters, smart irrigation, smart lighting, and smart play technology enabled by a smartphone app. [2]

The park hosts mobile and augmented reality (AR) technology provided by Biba Ventures, Inc. [3], which combines physical and digital play for children. [1,2] The technology turns "screen time on its head" by shifting the "screen-fixation and digital inclinations of kids towards healthy, outdoor play." The games "provide the digital rewards kids love, while keeping their butts off the couch." [4]

The park's playground equipment has been fitted with AR markers that, when scanned, can interact with a range of games hosted on the Biba Playground Games smartphone app. The games create engaging and imaginative scenarios, encouraging physical play. [1] Children can chase digital butterflies, search for runaway robots, raid ancient temples, complete laps around a racetrack, or discover dinosaur bones. [4,5,6]

The app remembers previous activities, issuing new challenges with each successive visit, effectively reinventing the playground. [1] The app also collects and reports usage data to Wanneroo Council, providing insights on how and when the playground is being used. [5,6]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

The games were developed based on motivational design and psychology research. [4] Caregivers hold the phone, which allows children “to remain hands-free so they can focus on the physical activity and the fun – not the phone.” [4] The games can be played in any playground; however, additional features are enabled by the AR markers installed in the park, which can be easily installed on new or existing playground equipment. [4]

The Biba Playground Games app “gives parents private access to their child’s gameplay data, as well as offering a host of other helpful functions. Families can use the Play tracker feature to see how their child’s game time is contributing to the 60 minutes of physical activity per day that’s recommended for children.” [6]

The app also sends aggregated, deidentified usage data to councils or playground managers each month. Data includes peak days and hours, demographics and family composition, activity levels, most popular playground equipment, and the impact of weather. [6]

In the first six months of use, data revealed that the playground ranked in the 54th percentile for physical activity worldwide, jumped to the 75th percentile. This indicates that children were using the playground for longer and were being more physically active while there. [7] These data provide valuable insights for the planning, design, and maintenance of playgrounds in order to increase active play.

Collaboration and Partnerships

Private-developer Satterley Property Group and state development agency DevelopmentWA (formerly LandCorp) are responsible for the development of Allara Estate, where Kinkuna Park is located. The park is managed by Satterley Property Group. Installation of the smart technology was a collaborative effort by Satterley Property Group, DevelopmentWA, the local council, the City of Wanneroo; Playground Centre (the playground designers); and Biba Ventures, Inc. [1,7]

The rollout of Biba-powered playgrounds within Australia has occurred in partnership with Playground Centre and Omnitech Playgrounds. [6,8] In addition to Kinkuna Park, the technology has been rolled out in four parks in Adelaide, South Australia and in three parks in Melbourne, Victoria.

Key Features

- Smart interactive playground.
- Multi-sensory, digital and physical play.
- Mobile and augmented reality (AR) technology.
- Wi-Fi.
- Smart parking and smart meters.
- Smart irrigation and smart lighting.

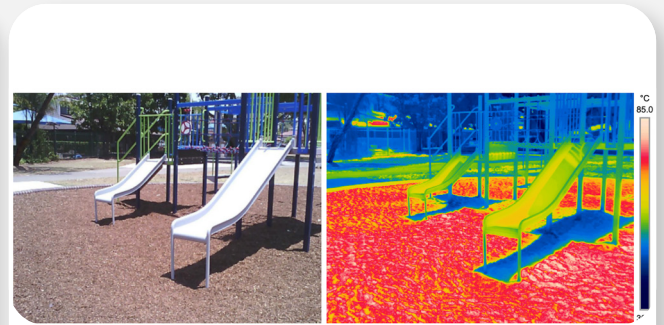
Relevance for the Regions

- Building healthy and active communities.
- Engagement of children in outdoor play using digital technology.
- Can be retrofitted to existing playgrounds.
- AR markers, sensors, and the integrated smartphone app are a low-cost technology solution to promote physical activity in young children.

UV-Smart, Heat-Smart Cool Playground

Merrylands, New South Wales, Australia

2019 – Ongoing



Merrylands Memorial Park playground, before and after cooling retrofit.

“Heat-smart playgrounds can provide a safe and enjoyable place; they can be used longer in summer and act as a cool refuge for the community.” [1]

Project Summary

Cumberland City Council partnered with Western Sydney University to deliver Australia’s first smart playground to protect children from excessive heat and ultraviolet radiation. An existing playground in Merrylands, a suburb of Western Sydney, was retrofitted with first-of-its-kind smart shading and surface materials. They were designed to reduce exposure to ultraviolet radiation and heat, and to improve thermal comfort. [1,2]

Research undertaken by Western Sydney University used thermal imaging and infrared heat sensing technology to capture images of play areas in the park, before and after retrofitting. On an average summer’s day, ‘real-feel’ temperatures of up to 62°C were recorded at the site. Unshaded synthetic turf under play equipment reached temperatures of more than 80°C. [1,2]

Outdoor play on hot days can lead to dehydration, heat exhaustion, burn injuries, and other conditions that pose serious public health risks. Following the introduction of new shade structures and surface materials, temperatures cooled to equal ambient air temperature and surfaces rarely reached temperatures above 35–40°C. [2,3] Remarkably, ultraviolet radiation exposure was reduced from 100% to 0–2%. [3]

The UV-Smart and Heat-Smart Cool Playground prototype showed that with increasingly hot weather, existing playgrounds can be retrofitted in a cost-effective manner to provide safer play spaces for children and families. [1,3]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

The UV-Smart and Heat-Smart Cool Playground project was developed between May 2019 and October 2020. The retrofitted Merrylands Memorial Park playground opened to the public on 23 October 2020. [2]

The playground retrofit consisted of the installation of four key elements: cool materials, a tree canopy, drinking water, and educational signage. [3] The first two elements are essential for designing climate-smart playgrounds. In Merrylands Memorial Park, an advanced, thermal resistant shade sail was installed over the entire playground. [2] The existing dark-coloured bark mulch and rubber softfall were replaced with a light-coloured advanced polyolefin plastomer surface. [3] Thermal imaging and sensing technology were used to assess the performance of the park before and after being retrofitted with the UV-smart and heat-smart materials.

A shade analysis was completed to determine the best placement of eight native trees that were planted around the playground. A drinking water fountain was also installed. Signage has also been provided to educate playground visitors about the research undertaken and how to be UV-smart and heat-smart when playing outdoors. [3]

Collaboration and Partnerships

The project brought together government, academia, and industry. It was funded through Increasing Resilience to Climate Change, a partnership program between Local Government NSW and the NSW Department of Planning and Environment, as well as through in-kind contributions from the project partners. [2]

The project team included members of Cumberland City Council, Western Sydney University School of Social Sciences, Alfresco Shade, Gale Pacific, Polysoft, Kidsafe NSW, Andreasens Green Wholesale Nursery, Cancer Council NSW, Cancer Institute NSW, the Australian Radiation Protection and Nuclear Safety Agency, NSW Health, Western Sydney Local Health Districts, and the Western Sydney Regional Organisation of Councils. [2]

A key project outcome was increased community and industry awareness. A social media campaign was undertaken to promote the project and encourage UV-smart and heat-safe habits. The Western Sydney Regional Organisation of Councils distributed information to all Western Sydney councils. It has since seen new partnerships form around urban heat mitigation. The project has been also presented to industry organisations including Play Australia. [2]

Key Features

- Retrofitted playground significantly lowered exposure to heat and ultraviolet radiation.
- Smart shading consists of a thermal resistant shade sail and strategically placed new trees.
- Smart surface materials are made of a light-coloured advanced polyolefin plastomer.
- Drinking fountain was added.
- Thermal imaging and heat sensing technology demonstrated significant improvements after retrofitting.
- Social media campaign introduced the playground retrofit and promoted climate-smart play.
- UV-Smart and Heat-Smart Cool Playgrounds are scalable and provide a replicable design solution.

Relevance for the Regions

Every council installs, manages, and redevelops playgrounds. Councils and communities can benefit from evidence that supports the use of climate-smart materials in playgrounds to reduce exposure to heat and ultraviolet radiation.

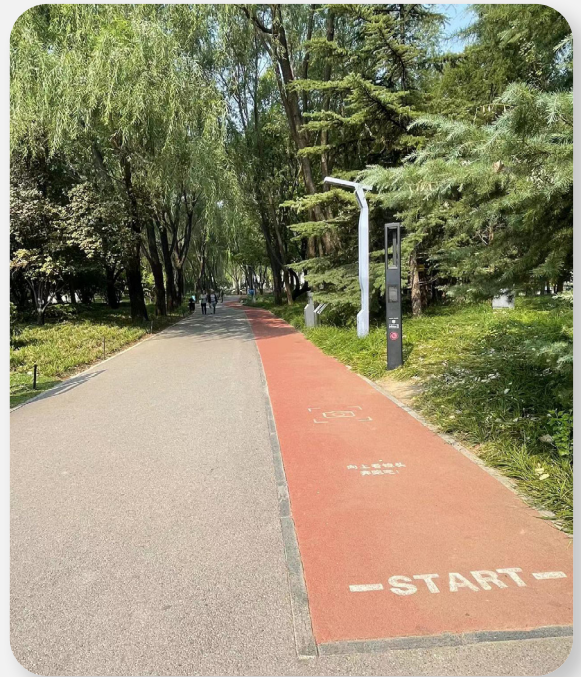
Haidian AI Park

Beijing, China

2018 – Ongoing



Tai Chi station with AR display screen.



Smart running track.

This 40-hectare urban public park integrates Artificial Intelligence (AI) features in a natural setting. Facial recognition software monitors the physical performance of visitors using a running track or Tai Chi station. Many other smart amenities are found throughout the park. [1]

Project Summary

The 40-hectare Haidian Park in Beijing opened 1 November 2018 as the world's first AI park. [2] The addition of AI components to the existing park reportedly took only 10 months. [3] This push was part of China's focus on advancing artificial intelligence, sports performance, and public fitness. [4] The park is free to use and includes a children's play area, an open field where people can picnic or fly kites, and ample greenery. [1]

The artificial intelligence components installed by Chinese technology giant Baidu include facial recognition software that records physical performance on a walking and running track. Cameras installed on light posts along the track monitor people's steps and the results are sent to the person's smartphone. When the user does well, their results are also posted on a 'digital leaderboard' located at the start and end of the track. [1,3]

The AI Park also has a virtual Tai Chi trainer, which consists of a large screen equipped with a camera and motion sensors. When a person stands in front of the screen and follows the exercise prompts, they earn points for accuracy. [1,3]

Other AI features that use facial recognition include vending machines, lockers, and access to a building where people can explore virtual reality products and interact with a walking, talking robot. An eight-seat driverless bus provides free rides on a roadway adjacent to the smart walking and running track. [1,3]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

China declared its ambition to become a world leader in Artificial Intelligence by 2025. Three companies were named national champions of AI technologies: Baidu, China's largest search engine; online shopping giant Alibaba; and video game leader Tencent. In a bid to advance national fitness, AI installations at Haidian Park were reportedly developed and installed within ten months by the Haidian District and the Baidu Company. [3,4] The new AI Park opened in November 2018. [2]

The park was equipped with a wide range of Baidu's AI technologies including a smart track for walking or running, and an augmented reality Tai Chi station. Both of these record and report fitness achievements once people scan their faces to sign in. There are driverless buses, interactive robots, and numerous virtual reality tools to explore. [1] Park users can also scan their faces to use vending machines and lockers.

Barely one year after opening, Haidian Park had been upgraded to include "a brand-new intelligent navigation system, rain garden system, AR interactive platform, smart management platform, electronic music garden," and other interactive technology. [5] In the future, Baidu plans to expand its use of driverless vehicles beyond the park, to geo-fenced roads, city streets, and highways. It also plans to design an entire smart city. [1]

Collaboration and Partnerships

The Haidian District and the Baidu Company jointly redeveloped Haidian Park as the world's first artificial intelligence park. Baidu's plans to significantly expand the use of autonomous vehicles has resulted in partnerships with over 100 companies including Bosch, BMW, Daimler, Ford, Honda, Microsoft, and Nvidia. A fund has also been established to invest in start-ups in the AI space. [1,3]

Key Features

- Haidian AI Park combines open-space natural amenities with AI technology.
- Facial recognition software promotes fitness by recording visitors' progress on a smart walking or running track and at a virtually guided Tai Chi station.
- The park includes smart benches, lights, bins, vending machines, and lockers.
- A driverless bus takes people between stops adjacent to a smart walking and running track.
- Facial recognition enables visitors to enter a building and engage with interactive robots and emerging virtual reality products.
- Interactive robots use Baidu's voice platform, the DuerOS AI assistant, which is similar to Amazon's Alexa, Microsoft's Cortana, Apple's Siri, and The Google Assistant. [6]

Relevance for the Regions

Many of the AI technologies used at Haidian AI Park may not be directly transferable to rural and regional Australia. However, they can inspire communities wanting to incorporate smart technologies into their existing public open spaces. This might include sustainable water and power systems, smart bins, lighting, and lockers, as well as technology-enabled exercise equipment.

Cochrane On-demand Local Transit (COLT)

Cochrane, Alberta, Canada

2019 – Ongoing



COLT transit bus and bus stop.



COLT bus with wheelchair ramp.

Addressing public transit needs can be a challenge for small or rural communities. COLT was the first fully on-demand, stop-to-stop transit service in Canada. It covers 90% of the community of 30,000 residents and costs one-third of a fixed transit system with the same coverage. [1]

Project Summary

COLT, the Cochrane On-demand Local Transit system, became the first fully on-demand, stop-to-stop transit service in Canada when it launched in 2019. With eight wheelchair accessible buses and 145 stops, it operates weekdays and Saturdays and serves 90% of the community. Riders can use a mobile app, website, or telephone to request a stop on a specific day and time, and to reserve a wheelchair or bicycle space. [1]

With a contract based on vehicle hours, COLT can adjust services while staying within budget. This was invaluable during the COVID-19 pandemic, when the Town was able to maintain service for a markedly reduced ridership by using fewer buses. COLT has been designed to grow and can adopt fixed routes as required or add taxi services to create a 'mobility-as-a-service' platform. [1]

In its first five months of operation, COLT completed more than 20,000 passenger trips, saving an estimated 12 tonnes of greenhouse gas emissions. Riders are mostly youth or seniors who previously relied on friends and family to drive them. More independence means less social isolation and easier access to work or after-school activities. Better transportation options also increase the employee pool, especially among millennials, and local businesses are reporting less employee turnover. [2]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

The Town of Cochrane received funding from Alberta Transportation in 2009 to implement a transit service but could not balance coverage and span for under an estimated \$1.5 million annual cost. In 2018, a Transit Task Force was established with Council members, youth, seniors, para-transit users, and social service groups. They explored fixed routes, subsidized taxis, ride-hailing companies, autonomous vehicles, and demand responsive transit. [2]

After robust consultation at community events, seniors' facilities, schools, and with community groups and Town staff, Council opted to use demand responsive transit and approved the Cochrane On-demand Local Transit service. It costs one-third of a fixed route system for the same coverage and is very user friendly. Conventional transit runs on a loop and goes stop-to-stop. Eight COLT buses only go where service is requested so can adjust the number of buses in use. Over 90% of the community is within a 400-metre walking distance of one of its 145 stops. [2]

Collaboration and Partnerships

Following a competitive bid process, COLT partnered with Southland Transportation for buses, and RideCo, a software company specialising in on-demand transit solutions. [3] COLT has since collaborated with Southland's On-It Regional Transit, a commuter bus service that operates weekdays between Cochrane and the city of Calgary. COLT riders can connect at Cochrane's Transit Hub to an On-It bus, which travels to and from the Brentwood LRT Station/University of Calgary and Downtown Calgary. [4] On-It customers can use their commuter pass to ride COLT for free from 5:45 to 9:30 a.m. and from 3:00 to 8:00 p.m. [5]

During the summer, On-It adds a commuter and visitor service from Cochrane's Transit Hub to the Town of Banff. COLT users can also connect to the SWIFT Mini Thni Transit System, which is the Stoney Nakoda Nation's regional transit service. SWIFT also provides commuter service between Cochrane's Transit Hub and Morley, Chiniki Village, and the Stoney Nakoda Resort and Casino. [4,6]

Key Features

- Extensive public consultation determined that 'demand responsive transit' was the most flexible and cost-effective option for the Town of Cochrane.
- Eight buses serve 145 stops 'on demand' on weekdays and Saturdays, covering 90% of the town's 30,000 residents over a dispersed area.
- The popular service costs one-third of a comparable fixed route transit system.
- All COLT buses are equipped with an entrance ramp, one wheelchair space, and a bicycle rack.
- Bookings can be made on the COLT app, website, or by telephone.
- Rides can be purchased individually, in ticket packages, or as monthly passes, and payment can be made with cash or through the app or website when booking.

Relevance for the Regions

The concept of on-demand transit has been around for decades, but "dial-a-ride" has recently gained traction with the prevalence of smart phones and advanced scheduling and route management technology. Transportation planners see on-demand transit as particularly useful in both rural areas and low-density urban areas, where it can provide service at costs well below those of fixed-route transit. [7]

SAUVÉR Regional Electric Car-sharing

Province of Québec, Canada

2017 – Ongoing



SAUVÉR Electric Vehicle.



SAUVÉR RÉGÎM Electric Vehicle.

SAUVÉR is a regional car-sharing service, first established across 16 municipalities in rural Québec, Canada. It reduces greenhouse gas emissions from fleet vehicles and contributes to the electric vehicle 'green route' across the province. [1]

Project Summary

SAUVÉR is a fleet management system for electric or hybrid-electric vehicle sharing. It is used by municipalities and organisations that want to optimise their fleets and encourage a vehicle-sharing economy. Rural municipalities in the province of Québec, Canada use it as a mode of public transport for citizens outside of government business hours. [1,2]

It involves setting up a car-sharing management system, installing charging stations, designing scalable and adaptable long-term electric service stations in municipalities, building car-sharing stations, and promoting car-sharing in the larger community. [1,2] Rentals can generate revenue or be revenue neutral. [3] Car-sharing provides "access to an affordable form of transportation in communities underserved by public transit and taxis." [4,5]

When electric vehicles are not in use by municipal staff—evenings, weekends, and holidays—they can be rented at an affordable hourly rate. Programs such as SAUVÉR offer smaller municipalities a "great method for optimizing the use of their municipal vehicles, while giving residents an affordable low-emission alternative for travel within the city and surrounding areas." [3]

Municipalities can also avoid the unnecessary use of larger fleet vehicles like trucks, thereby saving on maintenance and depreciation costs. Other project benefits include a 50% to 99.8% annual reduction in greenhouse gas emissions and 45% to 83% annual savings in fuel costs compared to conventional vehicles, as well as \$81,180 to \$109,620 in direct and indirect economic benefits annually. [4]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

The City of Plessisville (population 6,551) wanted to install charging stations at city hall. With a grant from the Municipalities for Climate Innovation Program, Plessisville partnered with five neighbouring municipalities in 2017 to pilot the SAUVÉR program (Système d'autopartage avec véhicule électrique en région). [3] Along with implementing SAUVÉR's online car-share management system, municipalities installed car-charging terminals and built electric service stations that could be adapted to suit local and regional needs over time. [3,5]

A \$750,000 grant enabled another 10 rural municipalities to join between 2019 and 2021, each adding an electric vehicle to their fleet. New charging stations added to the 'green route' enabled electric vehicles to travel longer distances and charge at multiple stations. [3,4,5] In 2020, SAUVÉR's electric ride-sharing services were piloted in another region, the Régie intermunicipale de transport Gaspésie—Îles-de-la-Madeleine (RÉGÎM) as part of its intermunicipal rural public transportation network. [6] The RÉGÎM project won a 2022 FCM Sustainable Communities Award for Climate Change Mitigation for the reduction of greenhouse gas emissions. [7]

The SAUVÉR-SiGTiC platform was developed by YHC Environnement to help communities offer smart collective transportation services to residents. In 2020, the YHC Mobilité division was created, which is dedicated to the development of smart public transit and sustainable mobility.

Collaboration and Partnerships

During the pilot, Municipalities for Climate Innovation Program consultants sought out municipalities that had similar issues to Plessisville associated with rural transportation (i.e., long distances to travel, countryside settings). Their assistance in identifying appropriate partner municipalities played a major role in increasing the project's uptake and success. [3] Each municipality established its own electric service station hubs, contributing to the creation of an intermunicipal 'green route.' This enables longer distances to be travelled because multiple stations are available to charge electric vehicles. [4,5] Careful selection of the hub locations is key to success, as they must be convenient and close enough for users to pick up the cars. [3] Without grant funding, the upfront costs associated with purchasing electric cars and charging stations may present a barrier for smaller municipalities. Partnering with other nearby communities is essential for municipalities looking to replicate this model. [8]

Key Features

- Adds one or more electric/hybrid-electric vehicle to the corporate fleet of each participating rural municipality.
- Enables cost savings through the bulk-purchase of vehicles and charging stations.
- Allows municipalities without public transit resources (e.g., taxis, buses) to offer a car-sharing system that community members can use evenings and weekends at affordable hourly rates.
- Encourages the broader adoption of electric transportation by providing local charging stations.
- Reduces greenhouse gas emissions and increases local environmental benefits.

Relevance for the Regions

There are economic, environmental, and social benefits to this type of regional transportation project. Managing equipment and services using shared economy technologies helps communities with scarce financial resources reduce expenses for collective transportation and reinvest revenues in the community. Regional collaboration to implement an electric vehicle ride-sharing service enables the bulk-purchase of vehicles and charging stations, reducing implementation costs and fleet operating costs, as well as greenhouse gas emissions.

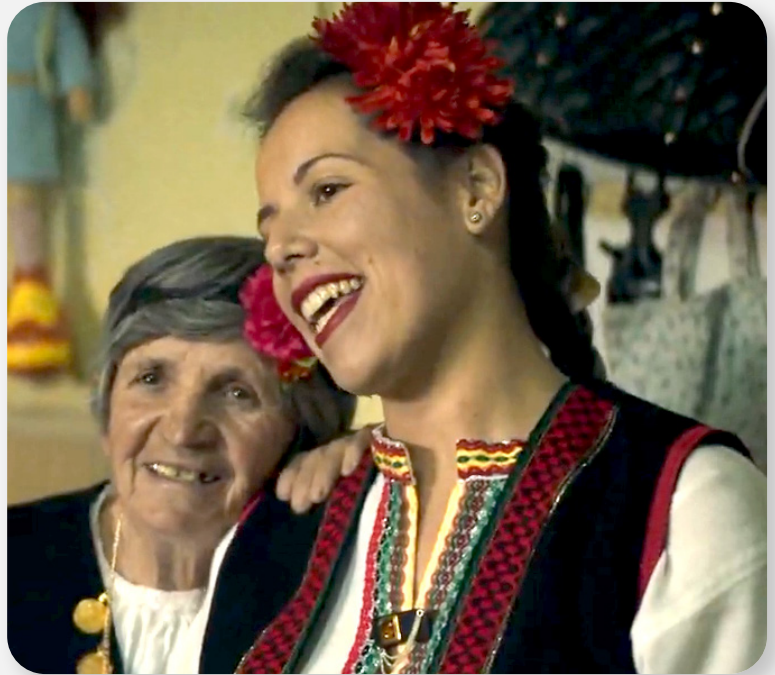
The Rural Baba Residence Project

Bulgaria

2015 – Ongoing



Lady with rose, Pirin, Bulgaria.



Bulgarian women singing.

Baba Residence “is an initiative bringing together urban youth and elderly people in low-density and remote villages in Bulgaria. It gives the opportunity to have a truthful exchange of knowledge and care between youth and elderly through design thinking” and ethnography. [1, p24]

Project Summary

Baba Residence is an innovative social initiative that brings together urban youth and elderly people in rural and remote Bulgarian villages. Baba means grandmother in Bulgarian. [2] Every year, 20 young people spend four to six weeks living and learning in a mountain village. The goal is “to create a meeting point between the entrepreneurial spirit of young people and the traditional culture of elderly people.” [3]

The young people, aged 35 or under, are students or have graduated in the previous two years but remain unemployed. Candidates are first trained for several months in design thinking and ethnological research by professionals with the Bulgarian networking platform Ideas Factory. Participants receive some funding from Ideas Factory for travel and living expenses but are also “supported by the households in which they live.” The goal is to “develop an innovative idea for a product, service, or event that will attract greater interest in the village.” [3] More than 80 participants have been placed in sixteen villages. [3]

Residencies have led to the preservation of “invaluable traditions, crafts and stories from the villages.” [3] These become the source of innovative “products, services, events or initiatives that draw cultural and economic potential” to the villages, [3] contributing to their economic and social development. [1,4] Examples include the creation of a professionally recorded CD of almost extinct folk songs; a social enterprise exporting hand-made local products through an online store; and the launch of a Harvest Festival, among many other successes. [4]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

Each year's project begins with Ideas Factory partnering with organisations and selecting the villages, residents, and participants. Prior to living in the villages, the young people undergo extensive training on human-centred design thinking, social entrepreneurship, and on-site ethnological research skills. [4] During the residency, participants live the daily life of the villagers. As they absorb local knowledge related to folklore, traditions, and crafts, they are "being drawn into the invisible structures of the village people's world – beliefs, rituals, stories, and hopes." [5, p7]

Participants then become part of the Incubator for Baba Innovations at Ideas Factory. There, they can "start working on individual or group social or cultural entrepreneurial ideas" to help the village residents. The Incubator provides access to partnering mentors and experts, who help bring the idea closer to realisation. [2] The Residence has resulted in an online educational platform that tells the story of traditional beaded and crocheted ornaments; and an educational game that teaches Bulgarian embroidery. [3,5, p12]

In 2020, the Rural Baba Residence Project pivoted in response to the Covid-19 pandemic. It organised donation campaigns to meet basic needs in the communities. These included medicines and medical items to protect the health of the elderly, as well as digital devices for children to enable them to have online access to education. [6]

Collaboration and Partnerships

The Baba Residence is part of the program Plovdiv – European Capital of Culture. [6] To bring the residency to life, Ideas Factory partners with a range of stakeholders who are involved in various capacities during the process. These include participants, village residents, municipal governments, sponsors, mentors, local NGOs, and media partners.

In 2015, Ideas Factory partnered with the Plovdiv 2019 Foundation and Ongal Association for anthropology, ethnology and folklore studies. [6] In 2021, Ideas Factory partnered with Tandem, an initiative of the European Cultural Foundation and MitOst e.V, along with the Bulgarian Biodiversity Foundation. Together, they piloted a shorter Baba Residence called the Climartistique edition, which focused on topics related to climate change and its impacts on the agriculture, nature, and culture of the participating villages. [7]

Key Features

- Social innovation in rural and remote areas.
- Multi-generational social interaction, enabling the exchange of knowledge and skills.
- Elderly villagers have the opportunity to share their traditional skills and knowledge.
- Unemployed youth receive practical training and real-world experience to help them launch their careers.
- Social enterprise creation, with technology as a connector, guided by expert mentorship.

Relevance for the Regions

- Revitalisation of communities, economies, and environments—both passive and direct—to counter depopulation in rural areas.
- Social connection for the elderly, bridging isolation and loneliness.
- Addressing unemployment among young people.
- Attracting the migration of young people to or back to the regions.

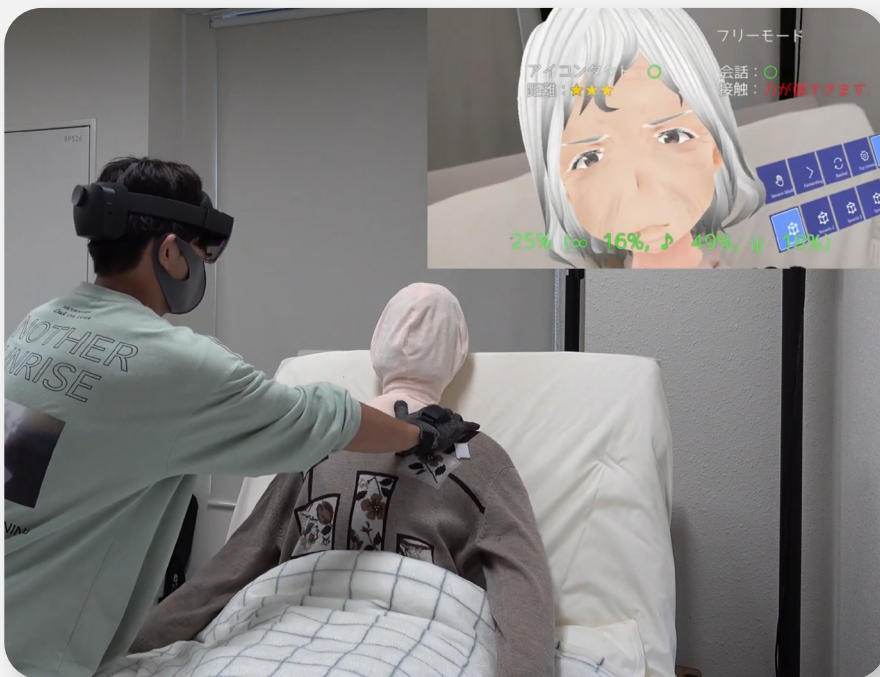
Tech-enabled Dementia Care Training

Fukuoka, Japan

15 October 2018 – 30 June 2020



Care Worker with Man.



Touch Skill Evaluation.

To create “a sustainable health and long-term care model – combining advanced digital innovation with health, medical and welfare systems, with the active participation of citizens to enable citizens to lead healthy and independent lives.” [1]

Project Summary

Japan is entering the age of the Centenarian, in which people will commonly live to the age of 100 or older. [2] It is estimated that by 2025, 100,000 elderly people in the country will require long-term care and that more than half of them will have dementia. [3] In anticipation of this aging demographic, Fukuoka City created the Fukuoka 100 Project, which aims to deliver 100 actions to address future health challenges by 2025. These actions span healthcare, medical and nursing care, and community-building initiatives, which are integrated with information technology, big data, augmented reality (AR), and artificial intelligence (AI). [2]

A key initiative is the Dementia-Friendly City Project that was launched in 2018. It includes a watch-and-care system, where service personnel check on seniors at their homes. This is augmented with Care-Tech solutions, “an innovative system that includes daily check-ups, calls and text messages,” as well as the use of information and communications technology (ICT) where GPS devices can be worn by seniors so they can be tracked if they wander off. [3, p16]

The initiative includes early detection through digital cognitive function tests, Dementia-Friendly Design Guidelines, and a specialised dementia-care method called Humanity, which is used in hospitals, care centres, and communities. [2,4] As part of this, an augmented reality (AR) training system for caregivers—HEARTS—uses a Microsoft HoloLens 2 and realistic, animated models to simulate the interaction between patient and trainee caregiver. [5] This system “enables the evaluation of eye contact and touch skills” such as position and force. [6, p4148]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

The Humanitude method of communication and care techniques for dementia was developed in 1979. It's four pillars are "eye contact, verbal communication, touching, and standing up." The method "emphasizes techniques such as speaking quietly to maintain trust and respect." [7] It "calms the behavior and psychological symptoms caused by dementia and reduces fatigue and burnout of nursing staff." [2, p17]

The method requires close and continuous eye contact and a soft touch, which can typically be difficult to teach and learn. However, the HEARTS training system uses augmented reality and sensing technology to facilitate learning, which was developed using MakeHuman opensource software. A head-mounted AR display is used to superimpose a 3D computer-generated facial model onto the head of a soft doll equipped with tactile sensors. The model simulates a patient's gaze, blinking, and facial expressions. [5,6]

An early model of male faces was replaced with more realistic and animated models of female faces. [5] The trainee caregiver can see and interact with the 'patient' through the AR display, while wearable tactile sensors and sensor gloves measure touch. [5,6] Together, the technologies evaluate the interaction between patient and trainee caregiver and provide feedback via the AR display on eye contact, touch position, quality of touch, and force distribution. [5,6]

The Japanese company ExaWizards developed the Coaching AI and CareWiz apps for Humanitude, which use AI technology to facilitate touch training for caregivers. [8,9] Coaching AI requires wearable, camera-equipped smart glasses and microphones for trainee caregivers, and a camera set above a patient's bed. The CareWiz app offers training videos, telephone consultations with instructors, and an AI-enabled search function for dementia care services. [9]

Collaboration and Partnerships

The Fukuoka 100 Project takes a collaborative All of Fukuoka approach, using the innovative ideas and methods of start-up companies, citizens, medical and nursing care providers, large businesses, universities, and investors. [2,3] ExaWizards partnered with Fukuoka City to deliver Humanitude research and training services in 2016. [8]

Fukuoka 100 and the Dementia-Friendly City Project are supported by the Fukuoka Health Lab, the Care-Tech Program, and the Care-Tech Alliance. [2] The Health Lab is "an open platform to match ideas, products, services, funds, talented people, universities, and business interests... to promote collaborative innovation." [2, p28] The Care-Tech Alliance promotes "the development and commercialization of 'Care-Tech' through start-ups, major companies, medical and nursing care providers, investors," as well as citizen networks. [2, p36]

Key Features

- Improves healthcare for the growing demographic of elderly dementia patients.
- Supports start-ups that provide tech-enabled products and services.
- Uses information and communications technology (ICT), GPS, big data, augmented reality (AR), artificial intelligence (AI), and Software as a Service (SaaS) in the delivery of healthcare.
- Two mobile apps—Coaching AI and CareWiz—are used for specialised dementia-care training.

Relevance for the Regions

- Responds to healthcare and aged-care needs through services that are enabled by technology.
- Provides a watch-and-care system for isolated seniors, along with Care-Tech for remote health oversight.
- Flexible healthcare training systems can support remote learning for those providing dementia care.

Drones Deliver Blood to Remote Areas

Rwanda

2016 – Ongoing



Drone package drop.



Drone package being logged.

“Drone-based transportation of blood in Rwanda was significantly better than was road-based transportation in terms of both responsiveness and hospital blood management.” [1]

Project Summary

Although 83% of Rwandans live in rural areas, Rwanda’s universal health care system reaches over 90% of the population, in part because the government was an early adopter of smart technology. In 2016, it “signed a contract with Zipline, a San Francisco-based drone startup, to streamline blood deliveries.” Previously, when remote hospitals needed blood, it came by road. If kept cool, the donated blood could be stored for about one month. However, some blood products, like platelets, spoil within days. “That logistics issue historically incentivized rural facilities to order more blood than they needed.” [2]

The first drone centre opened in the Muhanga district, with 14 drones serving 21 hospitals in western Rwanda. A second centre was opened in Kayonza, with 10 drones that deliver blood and medication to five rural hospitals and three health centres in eastern Rwanda. Drones can carry up to 1.5 kg of cargo at a time. [3] Each drone centre can make up to 500 deliveries per day. The blood, which is stored in an IV bag, parachutes down to the health facility in an insulated cardboard box. Then the drone returns to base. Rural facilities “can now order rarer blood products, including platelets, fresh frozen plasma, and cryoprecipitates—special proteins isolated from plasma.” [2]

In 2022, researchers studied whether drones measurably reduced travel times and waste. Using the government’s comprehensive health database, they analysed order volumes, delivery times, and locations, as well as the number of units of blood that expired. Drones “consistently outpaced typical driving times. In 12,733 orders over 32 months, the smallest difference was a three-minute boost and the largest was 211 minutes, always in favor of drones.” [2] Blood unit expiration also decreased significantly, by 67% annually. [4]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

Zipline was founded in 2014 and “developed the entire ecosystem, from the drones and logistics software to launch and landing system.” Its operations started in 2016 in Rwanda “with a focus on blood and vaccines.” [5] Zipline then “partnered with the government of Ghana, in West Africa, to deliver blood, medicine, and vaccines by drone.” [2] As of December 2022, it had delivered more than 450,000 packages by drone. Zipline currently operates in Rwanda, Ghana, the United States, Nigeria and Japan, and will soon “be launching operations in Côte D’Ivoire and Kenya.” [5]

In 2022, Zipline “expanded its operational footprint and delivery volume,” fueled by US “\$250 million in venture capital.” The company has raised a total of US \$486 million. In December 2022, the government of Rwanda and Zipline “announced an expanded partnership that will add new delivery sites in rural and urban locations throughout the country – a move that is expected to triple its delivery volume.” Deliveries will now include “medicine, medical supplies, nutrition, and animal health products.” [5]

Research released in April 2022 demonstrated that using drones to deliver blood decreased delivery times from 3 to 211 minutes, depending on comparative road conditions. There were also fewer blood unit expirations per month, for “a 67% reduction at 12 months.” [4]

Collaboration and Partnerships

Zipline has collaborated with the governments of Rwanda and Ghana, is working in the United States, Nigeria and Japan, and will soon start operating in Côte D’Ivoire and Kenya. It has formed a number of partnerships in the past two years that signal its “aspirations to expand within and beyond healthcare.” It now has partnerships with Toyota Group and UPS (the American firm United Parcel Services). Zipline also delivers medical equipment and personal protective gear for Novant Health in North Carolina (USA), as well as health and wellness products for American-based Walmart. The company has also raised US \$486 million in venture capital. [5]

Key Features

- Drones quickly deliver blood and other medical products to remote health facilities in Rwanda, Ghana, and other African nations.
- Drones “can improve timely access to medical products, especially in remote areas, for the emergency provision of blood products.
- Drones can also be used to reduce product wastage in settings where product expirations are common.

Relevance for the Regions

- Rural and remote areas can benefit from drone technology, within and outside of health care.

Cargo Delivery by e-Bike

Burgsteinfurt, Steinfurt, Germany

2017 – Ongoing



Cargo delivery e-bike, Burgsteinfurt.



Delivery by e-bike, District of Steinfurt.

“Electrically assisted cargo bikes make it easier to go car-lite or to ditch driving altogether and pedal (almost) everywhere. The latest generation of these bikes are more customizable and offer e-assist and modular mounting systems.” [1]

Project Summary

The towns of Burgsteinfurt and Borghorst in Northern Westphalia, Germany amalgamated in 1975 to become Steinfurt, a city with a population of 34,000. Borghorst had a flourishing textile industry. Burgsteinfurt, population 14,000, was known mostly for its “75 monumental buildings and moated castle.” [2] Demographic changes and increased online shopping meant its smaller village shops found it increasingly difficult to remain viable. [3]

A project supported by the European Network for Rural Development “aimed to develop a CO₂-neutral bike delivery service in Burgsteinfurt that would benefit local people, local retailers and the environment” by securing a “local supply of products and enabling people who are less mobile or inflexible in terms of time availability to shop locally. The project also aimed to cut down on unnecessary car journeys and to encourage consumers to think more about where they buy their goods.” [3, p2]

The resulting CO₂-neutral bike delivery service focused on the “advantages of local retail, flexibility, speed, trust, regionality, and direct engagement with customers.” Shoppers can order “from local retailers by e-mail or telephone, or centrally via a municipal internet portal.” To further increase demand, local authorities, companies and senior citizens’ facilities were encouraged to take advantage of the service. By its second year, 15 retailers participated in the delivery service. Cooperation with suppliers for a weekly market has also been strengthened through the use of the service. [3, p2]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

The e-bike cargo delivery service in Burgsteinfurt was initiated by the owner of the Kater coffee-roasting company and supported by Steinfurt Marketing and Tourism (SMarT) and the Steinfurter Land LAG (Local Action Group). “DNL mobiel,” a local bicycle shop, “built a cargo bike with an electrically-assisted drive.” Most goods, including perishable items, can be transported in the cargo bike’s “specially designed transportation box.” The bike’s battery was charged at the coffee roaster’s green charging station. [3, p2]

The cargo bike delivery service started in May 2017. A year later, to increase demand, “local authorities, companies and senior citizens’ facilities were once again encouraged to take advantage of the service.” A total of 15 retailers participated in the delivery service that year. [3, p2] A local drinks retailer “received so many requests that it bought its own cargo bike.”

A delivery service using a cargo bike was started in neighbouring Baumberge in the municipality of Billerbeck. The project initiator “also presented the project in other neighbouring municipalities, where similar delivery services have now been established as a result.” [3, p3] A customisable cargo bike allows people to start or reinvent a business “with little investment. From coffee and ice cream to flower delivery, more and more micro-business start-ups are using cargo bikes as a flexible worldwide business model.” [4, p15]

Cargo bikes are “bicycles specifically designed to carry cargo, be it heavy or light, big or small.” Although they have been around for a century, “battery innovations have made contemporary models much more efficient and accessible.” [4, p3] Now spreading throughout Europe, cargo delivery by electric-assisted bicycles provides “a ‘green logistics’ opportunity” for crowded urban centres and smaller rural areas. Using e-bikes for the movement of goods during the first and last mile “can reduce businesses’ carbon footprint drastically.” [5]

Collaboration and Partnerships

SMarT offered organisational support through a new online portal, while the LAG provided financial impetus with a €10,000 grant (~\$16,600 AUD). Among the first vendors were Café Konditorei Probst, Vinothek Steinfurt and Palstring GmbH & Co.KG. By the next year, 15 retailers participated in the delivery service. The project brought together “numerous retailers and entrepreneurs,” and stakeholders continue to work well together. [3, p2]

“The cargo bike model, which was specially designed for the Burgsteinfurt delivery service, is now also being used by the Post Office on the Dutch side of the border.” The Steinfurter Land LAG “has received more enquiries about this project than almost any other, including from other LAGs, municipalities.” The project is very transferable to other regions as it is easy to implement. [3, p2]

Key Features

- Electrically-assisted cargo bicycles are used for the delivery of goods in part of a small German city.
- Inspired many other towns to use e-bikes for first or last mile cargo delivery of local products.

Relevance for the Regions

- Cargo delivery by e-bike is an environmentally friendly way “to tackle carbon emissions and pollution, land use, and energy waste.” [4, p4]
- E-cargo bikes offer an economical alternative to traditional fleet vehicles at the local level. [4, p19]
- Inexpensive to implement and environmentally friendly.

Building Connectivity in Rural America

United States of America

2017 – Ongoing



Farmer using smart irrigation system.



American countryside.

“We define a smart rural community as a rural community that uses effective connectivity to create new sources of value, such as improved quality of life for residents or a more sustainable, innovative, and inclusive economy.” [1, p4]

Project Summary

It was late 2017 when a presidential Task Force on Agriculture and Rural Prosperity “identified rural e-connectivity as a central pillar for promoting agriculture, economic development, job growth, infrastructure improvement, technological innovation, energy security, and better quality of life in rural America.” [1, p12] NTCA–The Rural Broadband Association, a rural telecommunications advocacy group, awards a Smart Rural Community designation to “committed, community-based providers offering high-speed broadband to the farthest reaches of the country,” including Tribal lands. [2] It represents “more than 850 independent, family-owned and community-based telecommunications companies.” [3]

Rural connectivity can “drive economic development by positioning smart communities as desirable places to live and conduct business.” In Colorado, the Logan County Economic Development Corporation “developed a high-speed internet infrastructure to create opportunities for workers in rural and disadvantaged areas.” [4] It believed that remote jobs represented “a viable workforce strategy toward its goal of creating more jobs for its 23,000 rural residents.” [1, p8] In Logan County, the Town of Sterling (population 13,700), attracted “more than 25 new businesses, including boutiques, restaurants, a microbrewery, and an arts co-op, which bring residents back into town and attract tourists.” As part of its commitment to telework, “Sterling opened a coworking facility in the town square, providing a shared workspace and community hub for rural teleworking residents and visitors.” [1, p8]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

In 2017, a presidential task force identified rural e-connectivity as essential to support rural America. This finding prompted the creation of the “American Broadband Initiative, an effort by cabinet agencies to support private sector expansion of rural broadband and effectively steward federal tax dollars in that partnership.” [1, p12] When connectivity “helps rural communities thrive, it produces multiple benefits for residents, businesses, states, and the nation as a whole.” [1, p11]

Rural connectivity can facilitate “new ways of working and increase access to technologies that may streamline operations, increase efficiencies, and create more overall productivity.” [1, p11] However, “it’s up to communities to define what prosperity means to them, create a coalition to rally around a shared vision, and plan for leveraging connectivity in ways that bring that vision to life.” [1, p12]

For example, communities have invested in online “education, as in the Lower Kuskokwim School District in Alaska, or in health care, as in Show Low, Arizona.” [1, p8] The investments made in supporting rural telework in Logan County, Colorado “was a strategy that paid off, with an influx of new teleworking opportunities for local residents and the attraction of more than 25 new businesses into the area, including restaurants, boutiques, an arts co-op, and a microbrewery.” [4]

Collaboration and Partnerships

Federal cabinet agencies had to partner to support private sector expansion of rural broadband and steward federal tax dollars as part of the American Broadband Initiative. [1, p12]

NTCA–The Rural Broadband Association is a telecommunications advocacy group, with membership of “nearly 850 independent rural American telecommunications companies in forty-four states.” [5] It created a Smart Rural Community program to focus attention on the infrastructure development needed to bring smart technology to rural America. It has “recognized and defined a company that serves a Smart Rural Community as one that can: (1) Provide broadband to at least 50% of its service area, meeting or exceeding the FCC broadband speed definition of 25 Mbps down/3 Mbps up; (2) Demonstrate that 50% of its customers subscribe to and use the broadband service; and (3) Exhibit a stated commitment to collaborate actively with other local leaders, including school districts, health care providers, public safety officials, and businesses who work together to incorporate broadband-enabled applications into those facets of rural life.” [4]

Key Features

- Broadband connectivity can provide opportunities for rural communities to address local issues to advance education, the economy, mobility, public safety, sustainability, and quality of life. [1, p8]
- The focus in each location “will depend on the area’s unique characteristics, situation, and community vision.” [1, p5]

Relevance for the Regions

“Increasing access to effective connectivity is a critical first step to improving quality of life for rural residents and meaningfully transforming the local industries that underpin rural economies.” [1, 10] “One thing all smart rural communities will have in common is a backbone of effective connectivity” [1, p5] but “connectivity alone doesn’t make rural communities smart.” [1, p8]

Adopt an Olive Tree

Oliete, Spain

2014 – Ongoing



QR code on a sponsored olive tree.



Harvesting olives by hand.

Smart technology and innovative marketing enabled a rural Spanish village to raise sufficient funds to begin to restore an abandoned olive grove using traditional farming practices. Sustainable rural development has revitalised the region.

Project Summary

The northern Spanish village of Oliete, which means ‘olive grove,’ implemented smart technology and an innovative marketing program to revitalise a centuries-old olive grove with 100,000 abandoned trees. The objective was to create a sustainable rural development model of land stewardship, while employing residents experiencing social or labour exclusion. [1,2]

The project is supported by over 6,000 ‘godparents’ from 26 countries who have each adopted an olive tree for €60 (~\$97 AUD) annually. They receive two litres of the award-winning Mi Olivo extra virgin olive oil per year and are encouraged to visit their tree online and in person. [1,2] The project also has over 40 corporate or institutional supporters. [3]

An online platform for Apadrinaunolivo.org includes a QR Code for each olive tree, sensors in the olive grove, geolocation, a digital field notebook, and the use of drones for video calls and image capture. Adoptive godparents can use a mobile phone app, Mi Olivo, to follow the evolution of their tree. [1,4] Since its start in 2014 with one employee, the project now has 16 staff, more than 6,000 sponsors who have made over 21,000 visits to Oliete, three processing facilities, a cannery, and over 15,000 recovered olive trees. [5]

The project is smart because it uses “modern technologies to give new life to depopulated areas, by restoring value to abandoned endogenous resources and providing local employment opportunities in an intelligent way. It uses social entrepreneurship and applies innovation, technology, ICT and digital tools in ways that are realistic and ‘within the reach’ of even small rural communities.” [4]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

Apadrinaunoilivo.org was founded in 2014 by two computer engineers, whose team manages IT development and project design. They explained the idea to residents, local authorities, farmers, and olive tree owners, then signed custody agreements for the olive trees and hired one person to initiate tree recovery. They commissioned a website and sponsorship process, the development of the Mi Olivo app, a farmer's app, and an image capture process. [4]

Spanish National TV reported on the project, after which sponsorships increased. A supported workplace initiative was introduced to increase staff. Sensors and smart farming equipment were installed in the groves and three olive oil factories were established to process the olives. The sustainable olive oil produced has won several national and international awards. [4]

Restoration of the nearby Alacón orchard began in 2021. It produces vegetables that are roasted in olive prunings and extra virgin olive oil and then canned for sale. [6] The project now includes tourism and educational initiatives, and has repopulated the area. It has also replicated the model in a nearby town to reactivate its vegetable-based horticultural activity. [4]

Collaboration and Partnerships

Collaboration between the founders, local authorities, residents, farmers, and tree owners was essential before launching the project. Sponsorship from individuals around the world who adopt an olive tree provides 60% of the annual income needed to operate the smart infrastructure and manage olive oil production. A further 20% comes from donations from over 40 foundations and private institutions. Another 15% comes from sales of Mi Olivo products and 5% is from income the organisation generates from environmental and social awareness and education activities related to sustainable rural development and smart villages. The direct and indirect jobs created attracted new families to the area and kept the local school open. [4,6] Adopt an Olive Tree was among the Smart Rural Areas in the 21st Century recognised by the European Union from 2019 to 2022. Similar projects need updated computers and mobile equipment, fulltime IT support, and improvements to telecommunication networks in rural areas. [4]

Key Features

- A village of 364 people in northern Spain used smart technology and innovative marketing to begin to revitalise a centuries-old olive grove with 100,000 abandoned trees.
- Local residents with social or labour exclusion or disabilities are employed to care for the trees.
- Adoption of an olive tree costs €60 (~\$97 AUD) per year. Sponsors receive two litres of award-winning olive oil annually and are encouraged to visit their tree online and in person.
- Three oil processing facilities and a cannery have been opened, and a local school has been saved from closure.
- Impacts include sustainable rural development, supportive employment, traditional crop recovery, artisanal vegetable preservation, healthy eating, and food justice.

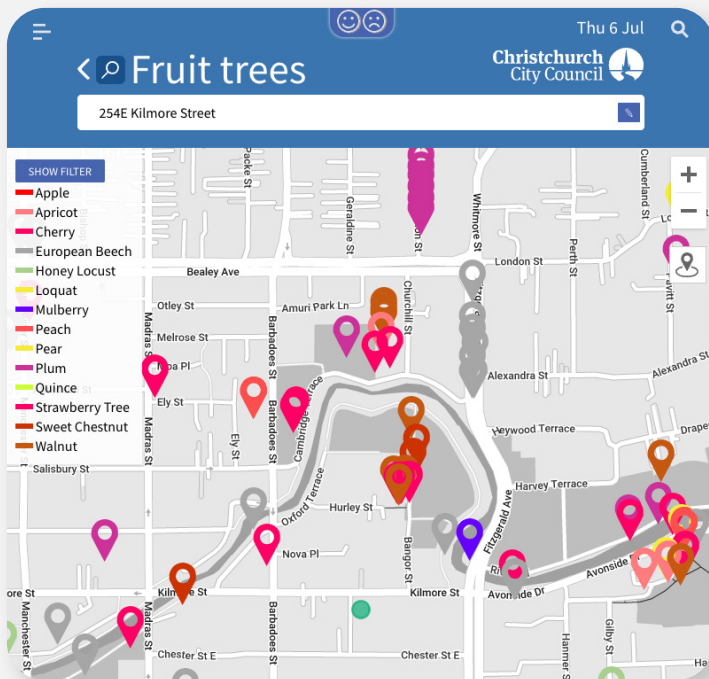
Relevance for the Regions

With increasing interest in 'farm to table' food, there may be many opportunities to engage people in the production of specific agricultural products through smart technology and agricultural tourism. The evolution of Adopt an Olive Tree demonstrates how smart initiatives can lead to economically, environmentally and socially sustainable rural development.

Interactive Map for City Tree Foraging

Christchurch, New Zealand

2020 – Ongoing



Christchurch fruit tree map.



People harvesting pears.

“A new online food map has revealed where people can find free fruit and nuts growing in public spaces in the ‘garden city.’” [1]

Project Summary

Christchurch City Council has been planting trees throughout the ‘garden city’ for many years. It has 122,741 trees in Christchurch and Banks Peninsula, of which 6,846 produce fruit or nuts. More than 52 types of trees have been planted, most commonly “plum, European beech, crab apple, Irish strawberry tree, pear, walnut, honey locust, and sweet chestnut.” [2]

Michael Healy, Council’s Smart City Manager, notes that planting in key locations, such as “around schools, for example, allows children to pick an apple or pear for lunch on the way to school.” However, “many people don’t realise they can harvest from fruit trees growing in public places.” [1]

In early 2020, a ‘fruit trees’ layer was added to Council’s online, interactive SmartView map. It “shows urban food foragers the location of fruit and nut trees on offer in Christchurch’s public spaces.” The SmartView map allows users to zoom in on food-bearing areas, which are often parks or roadsides, to find natural urban food sources that are available year-round. Within days of its launch, the online map “attracted thousands of views.” [1]

In 2023, two foraging walks were added to the Walking Festival, an annual event coordinated by Christchurch City Council. [3] The organiser of the foraging walks is also the founder of the Ōtautahi Urban Foraging group, whose community Facebook group has 10,000 members. [4] “Free food is plentiful throughout Christchurch and Ōtautahi Urban Foraging group wants to help people find it.” [5]

Scale

- Country
- State/ Region
- City / Town
- Neighbourhood
- Site

Design and Implementation

Foraging in Christchurch began in 2010 and 2011 after devastating earthquakes demolished a large part of the city. The 'red zone' was deemed "too unstable to rebuild upon, and 8,000 houses" were removed. Demolition teams left the trees and "now the zone plays host to thousands of fruiting trees and vines. It is a favourite for foragers." In recent years, as "inflation and price increases have sent food prices sky-high, increasing numbers of people are turning to foraging to supplement the contents of their pantries." [6]

For many years, Christchurch City Council has also been planting trees in Christchurch and Banks Peninsula, of which 6,846 produce fruit or nuts. In 2020, a layer was added to Council's SmartView map to show fruit trees. It "allows users to zoom in on food-bearing areas" year-round. The new map feature was announced in January 2020 and "attracted thousands of views" within days. [1] Council indicated that "plans were under way to add more details about the trees such as harvest times, an image of trees, and useful links to help people identify and enjoy this free food." [2]

Collaboration and Partnerships

The Ōtautahi Urban Foraging group was founded after the earthquakes of 2010 and 2011 destroyed large parts of the city. The group lets people "exchange tips for ripe fruit crops, locations for productive trees, and recipes for foraged foods." Its founder says it was "formed to help relieve the stress of poverty." [6] The group's Facebook page has 10,000 followers. [4]

Christchurch City Council worked with "specialists in geographic technology and green spaces" to create a layer for fruit trees for its online, interactive SmartView map. It was an immediate hit. Food foragers were asked to "be careful not to damage the trees when harvesting and only take enough for their own needs. Foraging etiquette means people should care for the trees and leave enough for the next person, so everyone can enjoy the seasonal bounty." [1]

Christchurch City Council coordinates a Walking Festival by working in partnership with 35 plus groups who lead a wide variety of fun and educational walks in April in the areas of Ōtautahi, Selwyn and Waimakariri. In 2023, the Ōtautahi Urban Foraging group organised two foraging walks in separate city areas. [3]

Key Features

- Fruit and nut trees on public land produce food that goes to waste.
- Foragers harvest ripe produce, which is cost-effective and reduces food poverty.
- Government can create a map layer of trees on public land that foragers can use to locate free food.

Relevance for the Regions

- Local governments can add a municipal map layer to show the location of city-owned fruit and nut trees (or other wild foods).
- Foragers can consult the map to find free food on public land that might otherwise go to waste.
- Foraging wild produce helps reduce food poverty for residents.
- Harvesting by foragers can reduce maintenance costs related to cleaning up rotting fruit.

Image References

Front Cover

1. GRAFT Solarkiosks – Retail Spaces: Photo © Andreas Spieß, SOLARKIOSK 06-09. In: Solarkiosk. Architecture Activism. Available at: <https://graftlab.com/en/projects/solarkiosk>. Image courtesy of GRAFT Gesellschaft von Architekten mbH (GRAFT GmbH).
2. Hurstville ChillOUT Hub, Timothy Reserve – Technology charging points: Photo courtesy of JackieChan for Street Furniture Australia.
3. American countryside: Image from Adobe stock (licensed). Smart symbols added by Yuan Wei.

Acknowledgements

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2. Smart Beach Digital Dashboard Display: Photo courtesy of Yuan Wei.
3. Smart Sunscreen Dispenser: Photo courtesy of Kate Bishop.

Indigenous-led Technology Training

1. Digital Business Model: Image from Adobe stock (licensed).
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2. Smart Running Track in Haidian Park: Photo courtesy of Miao Yu.

Cochrane On-demand Local Transit (COLT)

1. COLT Transit Bus and Bus Stop: Photo courtesy of the Town of Cochrane, Alberta, Canada.
2. COLT Bus with Wheelchair Ramp: Photo courtesy of the Town of Cochrane, Alberta, Canada.

SAUVÉR Regional Electric Car-sharing

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Building Connectivity in Rural America

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Adopt an Olive Tree

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