

Telstra Research Laboratories (TRL)

1987-2006

Telstra Research Laboratories (TRL) were Australia's largest telecommunications research facility before its closure in 2006. For around 80 years *The Labs* (PMG, Telecom, Telstra), helped to determine Telstra's strategic, financial and technical position related to technological, political and vendor decisions. Their expertise was used to solve unforeseen technical issues and verify appropriate technical solutions by developing expertise and evaluating new and novel technologies and techniques. These were used to make recommendations for improvements to telecommunication services for all Australians regardless of location or ability to access them. TRL also had collaborations and impacts around the world by reviewing and adding to local and international standards. The staff of The Labs included an international array of Electrical, Electronic, Optical, and Networking Engineers; Computer and Material Scientists, Linguists, Technical staff, CAD Operators and Specialist Fabricators to design build mechanical and hardware-based prototypes. Many of these were world experts in their fields.

In TRL I developed keen analytical skills and experience across multiple, diverse technologies and domains analysing and interpreting data from theoretical and practical experiments, proof of concepts and field sites trials. I authored detailed, unbiased evaluations incorporating a wide variety of considerations included: usability, accessibility, reliability, total cost of operation, legislative requirements, potential political impacts, competition (local and international) and the potential impacts and benefits of emerging trends. These qualities and attributes were used with all projects within TRL, and since.

Final role: Senior Research Technologist, Brendan.Edwards1@team.telstra.com

- *TRL developed adaptability, quick understanding across a broad range of different domains in a research environment and keen analytical skills.*

Starting at the Telstra Research Laboratories (TRL), where for a science geek like me, was a bit like a Disneyland where behind every door was something new. At TRL, I worked across multiple domains and technologies requiring adaptability and quick learning of sometimes, quite complex concepts. TRL began as a federal government entity providing solutions all aspects telecommunication in Australia and collaborated internationally.

I gained experience product and service evaluation and writing research papers; developing hardware and software; with considerations for usability, accessibility; changing priorities of different political parties, company and department leaders, and budgets.

Working in TRL developed a sense of working for and improving the Australian community.

When TRL closed in 2006 I transitioned by formalising my experience in TRL with a Masters in Virtual Communications.

While working at TRL I participated in:

- Developing new and novel optical fibre measurement techniques and formulations
- Measuring the configuration of mobile base station antennas and new measurement techniques
- Lighting simulation and overvoltage protection of telephone exchanges, systems and on-premises devices
- Advanced life cycle testing of products and components (photovoltaics')
- Long term evaluation of photovoltaic prototypes and Remote Area Power Systems (solar, wind, generator and new novel batteries in association with CSIRO and Energy Victoria)

I was promoted from a technical stream to an IT stream and developed online products and services including:

- Location Based Services using mobile phones and devices (Technical Analyst)
- Identity Management using Email Aliases (Project Leader)
- Broadband application Development Evaluation: Video Mail (Technical Lead)
- Interactive Television and Internet on TV: iTV (Technical Specialist)
- Natural Language Interface for Intranet / Internet Information Retrieval (Analyst/Programmer)

These final projects inspired undertaking the Masters in Virtual Communications at RMIT.

Competencies

- Analysed, identification and recommendation of process, reliability and customer experience improvements to various projects enabling increased service quality perception and a reduction in help desk calls.
 - Bigpond On-line Registration Process using non-PC devices.
 - Mobilaris middleware recommendations
- Managed and coordinated, project deliverables and client interaction:
 - Video mail project during leaders' absence
 - Geckomail / Pmail email aliases identity management project
- Co-ordinated and chaired internal, multiple business units and external clients for potential business opportunities.
- Conceptualised novel products and services and assessing customer and infrastructure benefits and impacts.
 - iTV Communicative Services User Interface (iCSUI)
 - Evaluating Video Mail with potential 'Value Added' Services
- Simplified complex service concept for client to demonstrate Value Added Services to external ISPs.
 - Geckomail / Pmail email alias and identity management application for Telstra wholesale
- Promoted accessibility and Interactive Television design principles for development and evaluation of products, services and customer experience requirements.

Achievements

- Recommendations to improve service access by non-PC devices accepted.
- Self-initiated report educating stakeholders of requirements for selecting new video mail applications and products received a very positive response from client.
- Member of TRL Staff Consultative Committee using people skills to liaise and converse with diverse and geographically separated staff to report concerns to management.
- Provided technical advice assessing application and development team of proposal for Telstra Broadband Development Fund project (2000)
- Mentoring senior team member in staff and project management, project deliverables and work/life balance
- Co-ordinated and chaired multi business unit conference in XML, content write once, publish anywhere philosophy.
- Gave independence to a work colleague with the use of a speech operated power switch for a heater.
- Instigated demonstration of concept-based searches for crime analysis to Australian Federal Police (AFP)
- Recipient: TRL High Achievement Award for Intelligent Information Navigation (1998)

Internal Organisational Liaison

- Initiated, co-ordinated and chaired multi-business unit presentations to promote the use of the XML publish once philosophy and technologies. I suggested the adoption of standardised development applications to reduce product licence fees. I introduced Interactive Television (iTV) design principles and concepts to simplify the design of on-line services and improve customer experience.
- Instigated a report documenting the criteria for selecting a new broadband product and service to educate all stakeholders of requirements and benefits of aspects other than the purchase price alone. The report received extremely positive response from clients allowing the project to continue in a time of downturn and client reduced funding and retained two staff members.

External Organisational Liaison (Business Development)

- Initiated dialogue and initial contact for demonstration of TRL developed Concept Based Search Engine technology to Australian Federal Police (AFP) for use in crime scene records and data analysis. The demonstration was to promote technology to potential external clients.
 - This project won the TRL High Achievement Award for Intelligent Information Navigation (1998) this award is based on technical excellence, business benefit and customer focus.
- Coordinated and developed response to Tender RFI between manufacturer and client. Assisted in successful negotiations with product manufacturer by offering several alternative web-based strategies for marketing and cross promotion.

Recognition of Expertise

- Regarded as technical expert for the preliminary assessment of project proposal and development team for a Telstra Broadband Fund Project approval in 2000. This proposal was successful in the first round of evaluation.
- Acceptance of recommendations for process, reliability and usability enhancements of on-line registration process to reduce calls to front of house help desk and to improve customer experience for non-mouse devices.
- Actively promoted Accessibility and Interactive TV / Game Console user interface design principles in developing new on-line products and services.

Internal Committees and Staff Development

- Gave independence to a work colleague by identifying and purchasing a speech operated power adapter to reduce the reliance on others to activate an under-desk heater in their office. Knowledge of current speech recognition projects, products and applications provided a solution in the form a widely available 'toy' that met price and purpose.
- Mentored a senior staff member in time and project management techniques to ensure consistent high quality and timely delivery of outputs that also took into consideration work and life balance of other team members.
- Member of Staff Consultative Committee reporting staff concerns directly to management not typically raise through ordinary channels. Involved using interpersonal skills to liaise and converse with diverse, geographically separated staff to highlight significant OH&S and other staff concerns.
- Member of TRL Emergency Control Organisation (Fire Warden)

Work History

1987-mid 2006

Department | Mobile Services

A group of engineers, scientists and technical team staff evaluated and documented device front end, backend, application development tools, network compliance and services for the mobile network. These involved technical, usability and accessibility requirements, which involved collaboration with the Human Factors Group. The mobile network was fast becoming a significant financial input to Telstra. This group had team members reviewing and recommending updates to corporate, national and international standards.

Location Based Services for Mobile Devices

mid 2005-2006

Job Role: Team Member.

Responsibilities: Research and Analysis, Product Evaluation, Client Presentations.

- Evaluated the technical and user requirements of mobile network middleware application used for network-based Location Based Services (Mobilaris emulator)
 - Recommended simplification of installation process and branding opportunity for Sensis directory Services in emulator mapping application
- Designed a process to simply evaluate suitability of GPS handsets and test sites by evaluating the accuracy of GPS functionality in handheld devices in real world environments. Using Land Services Victoria [Interactive Mapping Tools from Land Victoria](#), I was able to locate appropriate, reliable, easily accessible, calibrated survey points to evaluate positional accuracy. Various environments were assessed including concrete canyons (at the base of tall buildings in city environments), adjacent to potential high voltage interference (near tram lines), heavy foliage coverage (under large trees) and in open spaces.
 - [GPS Handset Evaluation Guidelines](#) TRL DME 17637
- Analysed Location Based Games used by Telecommunication providers including business models, pricing and technology compatibility with Telstra networks.
 - [An Overview of Location Based Games deployed by Telecommunications Operators](#) TRL DME 14254
- Coordinated Business Unit Training Course for Technical Writing negotiating time and budget constraints (Writing technical Documentation, New Horizons)

Identity Management - Email Aliases

mid 2004-mid 2005

Job Role: Project Leader

Responsibilities: Project Management, resource co-ordination, document writing, client presentations

- As Project Leader
 - Managed project development to handover to external clients (Firstwave).
 - Managed documentation handover to external client (Firstwave).
 - Monthly progress reporting and deliverable completion.
 - Documented and simplified processes for installation and operation for other users.
 - Documented application concept and competitive analysis for clients.
- Used Unix and Java programming tools for application development and management, archiving and transfer of project to client. (Tomcat Server, Jakarta Struts, SUSE Linux OS)
- Simplified the concepts of the E-mail Address Alias and Identity Management project for a range of stakeholders. The project was developed for the reduction and elimination of SPAM email and On-line Identity theft.

Department | Interactive Media

This group comprised of engineers, computer scientists, psychologists, audio and video specialists and technical staff evaluating and recommending products, services, video and audio compression algorithms and network topologies for the Bigpond broadband network and interactive television and game console services. There was considerable interaction with the internal Human Factors department for usability and accessibility. This group had team members reviewing and recommending updates to corporate, national and international standards.

Some of their responsibilities included:

- Expertise was used to verify appropriate compression type and rates for video to minimise artifacts like jpeg 'jaggies', colour bleeding and rendering moving object correctly (Red AFL football in full, fast motion)
- Expertise was used to evaluate and verify appropriate compression type and rates for audio with different audio types having distinct artifacts (blurred stereo imaging, tonal inconsistencies, volume compression and file sizes etc)
- Expertise was used to prevent Telstra from investing in Adam's Platform, which claimed to be able to send full motion video over dial up internet (56Kb).
- Usability and Accessibility requirements were considered and deployed when developing interfaces for low resolution screens.
- Evaluating online payment methodologies (a patent application was submitted)

Development and Evaluation of Broadband Applications for Internet (Video Mail)

2000-mid 2004

Job Role: Team Member (Technical Lead)

Responsibilities: Project Management, Research and Analysis, Product Evaluation, Client Presentations

- Managed Video Mail project during team leader's absence.
- Developed application specification, preference and benchmark requirements for Telstra broadband by evaluating a wide range of video mail software and hardware products.
- Developed preliminary business requirements specifications for product managers outlining product selection and implementation issues of convergent video services.
 - [Development of a Video Mail Selection Criteria](#) TRL DME 7447
- Developed a novel test service to educating each stakeholder group of the requirements and constraints of the other stakeholder groups. By describing how each group evaluates a product, architecture, specifications integration, training and maintenance requirements and constraints, more appropriate product choice could be made. The test service was an online will kit that covered legislation, storage, system integration, usability, file size and media compression methods, ongoing maintenance, staff training,
 - [Evaluating Video Mail with potential 'Value Added' Services](#) TRL DME 7448
- Evaluated and reported on suitability of video-based applications, products and services on an ad hoc request basis against the developed benchmark.
- Liaised and coordinated relationship with product developer to provide an Application Server for extended evaluation. (Inspar Mediaposter).
- Technical advisor for Telstra Broadband Development Fund review assessing development team and product – in this case: Versereo Broadband Server (Project 139).
- Developed comprehensive Information Packs for new Product Managers explaining the impacts of various video email concepts, technologies, methodologies, products and business models.

Interactive Television and Internet on TV (iTV)**1998-2000**

Job Role: Team Member

Responsibilities: Research and Analysis, Concept and Product Evaluation, Technical Documentation and Recommendation, Client Presentations.

- Mentored senior team member in project planning, project estimation and staff management with a project using web graphics and development applications (Fireworks, Dreamweaver).
- Conceptualised a demonstrated novel iTV application and described potential the service applications and network impacts and trends for service delivery via Foxtel (Pay TV) set top boxes.
 - [iTV Communicative Services User Interface \(iCSUI\)](#) TRL DME 2866
- Co-ordinated and chaired multi business unit presentation of XML for cross platform content delivery and write once, publish anywhere paradigm. Participants included Corporate Accounting, t.com, and Telstra System User Documentation. Introduced the possibility of leveraging the technology and product licensing company wide.
- Recommendation accepted to modify the Bigpond online registration site and process for devices without a mouse (Sega Dreamcast Game Console and Ezenet Internet on TV Set top Unit)
- Evaluated speech recognition devices and developed speech-based applications for simple navigation.
- Designed and developed survey form using television and HTML design principles for a low-resolution TV screen. Reported survey results for the iTV trials.
- Secondment to t.com (Melbourne) Telstra portal for web site compliance testing
 - User acceptance testing by verifying link operation and validity.
- Attended International Web Accessibility Summit, Interactive Information Institute, RMIT University
- Attended Web Content, Creation and Acquisition Conference (Net Fest), Melbourne

Internet Services on Game Consoles**Study into Alternative Navigation Methods (3D)**

Department | Artificial Intelligence and Knowledge Management

This group comprised an international team of computer scientists, mathematicians, linguists and specialist technical staff. Building expertise in knowledge management and artificial intelligence infrastructure, techniques and methodologies, they provided proactive and strategic guidance related to Telstra's application and processes investments. Using proof of concepts to demonstrate functionality and commercial viability, ideas developed here were commercialised, returning external licencing fees to Telstra. Members of this group won international awards for their algorithms. Some of their responsibilities included:

- Developing a natural language interface for information retrieval, to interpret the intent of the user search. Search engines at that time were text based, removing all stop words and only using stem and root words and weighting.
 - A commonly used example was *a wine glass* versus a *glass of wine*; each have different meanings.
 - Stop word removal example: *Wine* and *Glass*. *a* and *of* (stop words)
 - Stem word example: *blessed*, *blessing*, *blesses*, *blest* = *bless* (stem).
 - Thesaurus example: *tumbler*, *highball*, *chalice*, *jigger*, *mug*, *snifter*... = *glass* (root)
- Developing categorising algorithms to group similar search results.
- Developing applications for sentiment analysis

Natural Language interface for Intranet Information Retrieval

1997-1998

Job Role: Team Member

Responsibilities: Programmer, Research and Analysis, Service Support.

- Conducted Level 2 and 3 help desk support for enterprise trial of search TRL natural language concept engine (internal trial: Telstra Intranet).
- Developed text processing and manipulation applications (C++ and MS Visual studio) and steams.
- Developed and curated grammar and thesaurus word lists for the concept engine. Lists included stop words and synonym variations. Synonyms listed in order of closeness to the original term. Word order was also used programmatically to represent weighting and importance.
- Instigated demonstration of concept-based searches for crime analysis to Australian Federal Police (AFP)
- Liaised with external computer suppliers and coordinated equipment upgrades and purchases of computer equipment and software for approximately 40 staff.
- Promoted from Technical Officer to Information Technologist
- Recipient: TRL High Achievement Award for Intelligent Information Navigation

- Designed, conducted and reported on benchmarking evaluation for precision and accuracy of TRL concept search engine against best of breed keyword-based search engines for the director of the TRL, who presented findings to company directors and other decision makers within the company. The benchmarking was to evaluate the technology developed by TRL, regardless of data set used, in an unbiased way. However, the data sets needed to be equivalent; and TRL was indexing the wider internet like the other search engines. TRL had developed a restricted sample database of news articles that was stored on internal servers. The database was static and articles were not being updated. Other search engines were constantly being updated and were indexing a much wider range of dates and sites that could impact results. To test the technology and evaluate the precision and accuracy of results, search and survey questions were crafted to provide an accurate, unbiased indication of user perceptions. The internal test sample database was audited for dates and content. Search queries were constructed and selected to ensure the same time range was returned. The same queries were used in all benchmarked search engines and the TRL engine and then compared. Seeking advice from mathematicians, the list of questions was given to survey recipients. Results were based on recipient perceptions of accuracy and relevance. The survey results were reviewed amongst the team to confirm the experiment design and results. The results indicated the TRL concept engine was much better than the other engines listed. The director of TRL presented the findings.

Department | Electromagnetic Compatibility (EMC)

This group was responsible for the evaluation, remediation, recommendations, policy, and standards development related to electromagnetic interference. Custodians of the infamous Blue Room of absorbers. This group had team members reviewing and recommending updates to corporate, national, and international standards. Some of their responsibilities included:

- Developing measuring equipment and standards for detecting radiation near transmission antennas and field sites
 - Go-No-go Meter for OH&S when working around radio base stations and live microwave antenna.
 - Signal strength and coverage application using antenna radiation patterns and environmental terrain.
- Evaluating the impacts of external signals on mobile services
 - Industrial microwave ovens on the GSM mobile frequencies; both operating at 900MHz.
 - Testing cell switching on mobile phone connectivity by travelling on trains.
- Independently assessing mobile phone frequencies and levels on human brains and other body parts
- Measuring and confirming mobile base station antenna radiation patterns
 - Caldermeade (off site field site) field site in a radio quiet environment. Small transmitter around 1km away from a 30 tower across a flat field tower where antennas were lifted, mounted, rotated, and measured.
 - OATS building (Open Air test Site) using a novel Near Field measurement technique; this was used to validate the technique, and measurements from the Caldermeade field site.

Mobile Base Station Antenna Compliance Evaluation

1996-1997

Job Role: Team Member.

Responsibilities: Research, Analysis and Development, Technical Documentation, Programmer

- Developed software application for controlling and measuring readings from Spectrum Analyser, Electronic Multimeter and Electric Motor Drive using HP Basic and GPIB interface.
- Maintained Hewlett Packard (HP) terminals with GPIB interfaces for test controlling and recording test instruments. The terminals were failing, no longer supported by HP, with terminals cannibalised to make reliable and operational units. Known good spares were separated, documented, and safely stored.
- Instigated and coordinated the migration from HP terminals to PC's with GPIB controller cards to improve reliability, reduce the cost of ownership and the reliance on obsolete equipment. The PC's with GPIB controllers were used until TRL closed in 2006.
- Assisted in the recording and reporting of antenna specifications and assisted in the management and decommissioning of antenna test facility.
- Assisted in the development of a new Near Field antenna measurement technique and conducted antenna pattern measurements using the new technique.

Completed Riggers and Dogman certification (still current)

Completed Tower Climbing course (climbed channel 10 transmission tower in Nunawading)

These activities have been performed at the Caldermeade Antenna Test Range and the Open-Air Test site (OATS) facility at the Clayton site.

- Performance and specification evaluation of antennas that are to be used, or that are currently in use, in the Telstra mobile cellular networks. This has included co-authoring reports on the results of these tests.
- Evaluation of new and novel measurement techniques for the measurements of mobile network antennas. The major project involved Near Field probing. This included hardware design and construction to allow a small receiver probe to scan the Near Radiation Field of an antenna. Software using HP Basic was developed to automate the setup and running of the measurement equipment as much as possible.
- Another project involved developing a method for measuring the gain of an antenna using various Near Field type techniques, none of which had been for this purpose before.

These methods were designed to eventually replace the Caldermeade Antenna Test Range.

NOTE: The OATS facility was a building (approximately 20m long, 10m wide and 6m high) constructed of wood and plastic with no metallic components except for the ground plane as the floor.

Department | Telecommunications Science and Technology

This group comprised of engineers, scientists, chemists, and specialist technical staff provided expert opinion on the reliability of hardware, diagnosing issues, vendor compliance and evaluation new hardware and technologies. Facilities included a high voltage lightening simulation laboratory, simulated sun, solar panel testing laboratory, industrial environmental ovens, scanning electron microscope, external and remote field sites. This group had team members reviewing and recommending updates to corporate, national, and international standards.

Using a scanning electron microscope enabled seeing the internal of 'silicon chips working' in real time and display conductive silver spike growth on a silicon chip substrate that was caused intermittent operation and failure in exchanges. Staff included industrial chemists evaluating new battery technologies including constructions and chemical compounds. There were industrial environmental chambers two stories high used for accelerated lifecycle testing of equipment and components. This was to test many years equivalent lifetime in much shorter time periods, or for simulating specific conditions. There was a shielded lightening simulation laboratory run by 'Dr Lightning' for testing OH&S scenarios of high voltage on plant, equipment, and people. This group had team members reviewing and recommending updates to corporate, national, and international standards. Some of their responsibilities included:

- Evaluating the electrical isolating and safety properties of Telstra gumboots
- Evaluating the OH&S implications of activating the knife switch in a telephone exchange for the manual battery backup. (used high speed mechanical film camera to measure arc)
- Evaluating new battery technologies (sealed vs lead acid) and formulations (longevity, charge cycling)
- Evaluating new and returned solar panels for reliability, compliance, and energy efficiencies.
- Evaluating novel remote area power systems (remote microwave repeater stations across central Australia)
- Vendor contractual obligation compliance
- Product hardening and reliability improvements (specifically for lightening prone environments)

Field Site and Laboratory Management

1991-1996

- Managed and maintained the Simulated Sun solar panel test laboratory.
- Assisted in the measurement and evaluation new solar panels for compliance with Telstra and Australian standards from Australian and International vendors including prototype, pre-production, and field samples.
- Managed and maintained the Remote Area Power Systems (RAPS) field site at Tortoise Head Lodge on French Island (Westernport Bay). The project was a collaborative venture partnered with CSIRO, Energy Victoria, and Tortoise Head Lodge. I liaised with the property owners and other parties relating to site access and other interactions. Measured readings from components (batteries, wind generator, sine wave inverter, diesel backup generator), replaced and maintained sensors and provided other site maintenance as required.
- Assisted with measurements of gel filled batteries to replace lead acid batteries on a remote microwave test site, along the Old Gunbarrel Highway near the border of South Australia and Western Australia, 400km South of Curtain Springs, via the remote community of Amata. Charging and discharging and measuring capacity.
- Assisted with the commissioning of the solar panel test site on the Alice Springs telephone exchange.
- Assisted in the decommissioning of the North Shore Hospital solar panel test in Sydney (high salt environment).

Failure Analysis of T200 (Telstra Standard telephone)

1990-1991

- Determined that user behaviour and unfamiliarity with the operation of the new T200 telephone hook switch was a significant factor the high number of returned handsets testing with 'No Fault Found'. This instigated changes to modify the hook switch design, reducing the number of handsets returned under warranty.
- Developed a solution to reduce the static charge to ears of Northern Territory T200. Humidity was an issue and audio levels and clarity needed to be perceptively unaffected. By using a small mylar disc in the earpiece, high voltage isolation was increased, reducing static charge from the earpiece and the audio response was unaffected.

Design Improvements to High Voltage Test Equipment and Processes

1990-1991

- Measured the compliance of over voltage protection devices used in various telecommunications equipment, including telephone exchanges and handsets.
- Increased the throughput and accuracy of over-voltage device testing by assessing, coordinating, and implementing process, reliability and usability improvements of in-house designed, custom-built test equipment.

Promotion from Telecommunications Technical Officer to Senior Telecommunications Technical Officer

Investigate a methods of Solar Panel Identification

Telstra was one of the world's largest users of Solar panels. They are used extensively in the remote Telstra communications network for microwave links and remote telephone exchanges. Centralised network monitoring indicated battery power was low, interrupted or absent on several occasions. Physical investigations discovered that multiple module arrays had been removed without permission (stolen). The solar modules were expensive to replace (per unit cost), plus manpower and materials due to the distances to the remote locations and the urgency required for replacement.

The project was to identify modules and Telstra property to reduce theft and improve network reliability and involved:

- Collaboration with field staff, corporate power groups, corporate identity unit, and product suppliers to address solar panel theft.
- Investigation, development and testing of anti-theft identification methods for solar panels, including:
 - Use of non-removable glass platens marked with the Telstra logo for module identification.
 - Exploration of proprietary packaging and labelling to clearly mark Telstra property.
 - Exploration of the OH&S requirements and implications of the application and storage methodologies of various adhesive materials
 - Testing and documenting the effects of power output on solar modules of identification methods in the Simulated Solar Test Laboratory

Outcomes of the Project included:

- Recommendations from the investigation were directly implemented in new supplier contracts for solar modules.
- Improved contract terms with suppliers to include proprietary packaging, reducing theft risk.
- Enhanced ability to identify and protect Telstra-owned solar panels, especially in remote areas.
- Corporate branding indicated that the silver contact lines of photovoltaic cells displayed through the Telstra logo, and so did not meet branding guidelines.

Call Centre Resource Simulator

Telstra employed staff and resources in Call Centres Australia wide for billing, connecting, moving and cancelling services, support and other enquiries. This project interface was developed using Borland Visual Delphi to enable easy adjustment of numerous KPI variables including call wait times, call times, time between calls, staff numbers etc. Adjusting various KPI's generated estimates for the required human resources. My role was the development of the application and user interface utilising usability concepts, under the guidance of the lead researcher.

The result was an application that could display expected KPI's for the number of staff; and if KPI's were to be adjusted or increased, what would be the required number of staff that needed to be allocated for the KPI's to be met.

Another outcome was the realisation that all KPI's could be met, yet no solutions to customer issues could be provided. If no solutions were provided, reputational damage could ensue. The KPI's were potentially measuring easily measurable metrics, yet not the most appropriate metric. Solutions provided and customer satisfaction, impacting reputation, and potentially income...

Completion of Certificate of Technology and Traineeship

1987-1990

Trainees participated in six-month rotations between departments while completing final stages of certificate qualification.

Trainee Rotations

- Training Lab
General orientation of operation of the laboratories and external promotional opportunities.
- Major Project
Built a light-based voice communications device, like the old tin can and string telephone updated using industrial lasers, industrial translucent food tube, vapour deposited aluminium on mylar sheet as reflective diaphragm, using small sheets of solar panel mounted into a Dolphin torch as the receiver. This was displayed down at the Geelong Science and Technology Fair
- Optical System and Networks
Drawing (stretching a long thin fibre from a rod of glass) optical fibres on an inhouse built fibre drawing machine. Different compositions of glass rods were developed using inner and outer layers with different light reflective properties. My role was to manually control the speed of the drawing machine to ensure consistent fibre diameters.
- Electromagnetic Compatibility **1989-1990**
Major Project
The construction and commissioning of a large Transverse Electromagnetic Cell (TEM Cell). The TEM cell is used for calibration of RF probes and the measurement of electromagnetic compatibility specifications of equipment used in and around the Telstra Networks. My involvement included documenting the preparation and assembly of the aluminium structure. It also involved matching the impedance of the centre, Septum shelf to the end connectors to ensure a uniform impedance across the whole of the TEM cell's chamber.
- Telecommunications Science and Technology

Education

- Master of Arts (Virtual Communications) RMIT University, Melbourne, Victoria 2006
 - Completed after TRL closed.
 - Research Paper: Can emotional cues be employed in Internet Communications Technologies to establish, sustain or increase membership participation in a Community of Interest?
 - I proposed a new *Emotional Consumer Model* based on *Recognition and Anticipation, Perception, Motivation and Memory* replacing the traditional Rational or Logic consumer model.
- Diploma of Engineering Barton Institute of TAFE, Melbourne, Victoria 1998
- Associate Diploma of Engineering (Computer Systems) Barton Institute of TAFE 1998
- Associate Diploma of Engineering (Electronics) Barton Institute of TAFE, Melbourne 1990
- Certificate of Technology (Electronics) Moorabbin College of TAFE, Melbourne, Victoria 1991
- Basic Electronics certificate Moorabbin College of TAFE, Melbourne, Victoria 1985

Also, various internal OH&S training courses and external software programming courses.

Other Interests

Volleyball: hardcourt (indoor), beach: (indoor and outdoor)	1995-2017
World Masters Games (Melbourne) Beach Volleyball (Bronze)	2002
SCUBA Diving. Recreational 40m	1987-2012
Qualified NASDS Master Diver	2002
Qualified PADI Divemaster (not current)	2006
Cave Diving Association of Australia (CDAA - 464) (not current)	2002

Australia:

- Victoria: Port Phillip Bay, Warrnambool, Port Fairy.
- WA: Rowley Shoals (Continental Shelf, off Broome), Exmouth (Navy Pier) and Ningaloo Reef.
- QLD: Whitsunday Islands.
- NSW: Sydney, Merimbula, Bermagui (The Gulch)
- SA: Mt Gambier (cave dive training), Fleurieu Peninsula (HMAS Hobart).
- Tasmania: Bicheno.

International:

• South America: Antarctica, Ushuaia, Rapa Nui (Easter Island), The Galapagos Islands	2003-2004
Member of Frankston Tourism Network	2006
Mechanical Clocks (Skeleton Brass and Glass)	
Recipient: Queen Scout Award	