



STRATEGIC PLAN 2020 - 2022

Including Business Plan 2020

January 2020





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Version control

Final

About PATREC

The Planning and Transport Research Centre (PATREC) is a collaboration between the Government of Western Australia and local universities, constituted to conduct collaborative, applied research and teaching in support of policy in the connected spaces of transport and land use planning. The collaborating parties are: The University of Western Australia, Curtin University, Edith Cowan University, Department of Transport, Main Roads Western Australia, Western Australian Planning Commission and the Western Australian Local Government Association.

Publisher

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Executive Summary

The purpose of this Strategic Plan 2020-2022 (the Plan) is to set out the broad strategic direction of PATREC for the three year period 2020-2022, also providing a more detailed action-focussed Business Plan for the inner year, 2020. PATREC Strategic Plans are revised every three years with any interim updates included as part of the annually prepared Business Plans.

This Plan is an update of the Strategic Business Plan 2017-2019, accounting for a number of subsequent changes in strategic and operational drivers, most importantly WA Government's Priorities: Our Priorities – Sharing prosperity and the transport and planning strategies and action plans emanating therefrom.

PATREC's mandate is to conduct collaborative, applied research and teaching in support of policy in the connected spaces of transport and land use planning. Key strategic activities to advance this mandate remain as:

- Multi-disciplinary, multi-institutional applied research in response to identified agency research requirements and knowledge gaps;
- Knowledge transfer through academic and less formal publications, connection events and a website as a reliable and accessible resource for researchers and policy-makers;
- Training, predominantly in the form of professional development through short courses, executive programs and "expert" courses on key topics, conducted in collaboration with other professional and industry bodies where possible; and
- Attracting additional research funds through business development.

The research focus areas for the next three years in support of key policy objectives, underpinned by a supportive information and modelling, are:

- Integrated land use and transport futures;
- Smarter travel decisions;
- Integrated freight system optimisation;
- Emerging technology and network optimisation and intelligence; and
- *Transport infrastructure investment risk management (new).*

Research project undertaken within these focus areas will inform achievement of the following policy objectives:

- Reducing the need to travel.
- Public transport optimisation.
- More freight onto rail.
- Improved traffic flow deferring the need for new road infrastructure.
- Transport infrastructure investment risk management of uncertainty due to disruptive change.

It is in relation to these focus areas that research will be undertaken, with new opportunities and resources sought both in terms of researchers and funds, in order to advance the knowledge base and forge new and innovative evidence-based solutions to support policy in effectively planning and managing Western Australia's future.

Towards the achievement of this three-year plan, key outputs envisaged in the **2020** Business Plan include:

- Completion of six core projects (four incorporated into an iMOVE project), commenced in late 2019 with final Technical Reports published and further stages/additional components with additional funding proposed if appropriate;
- Substantially completing three core projects, commencing in early 2020 (incorporated into two iMOVE projects for this period);
- Completion of Year 1 of 3 of the collaborative Australian Transport Research Cloud - ARDC Platform with AURIN
- AURIN WA Node proposal submitted; and
- Network operations ARC Linkage/CRC Project/Industrial Transformation and other research grant proposals submitted.

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1. INTRODUCTION

1.1 Background

The last PATREC Strategic Plan was produced for the period 2017-2019 including a more detailed Business Plan for the inner year, 2017. Subsequent Business Plans for 2018 and 2019 were produced, including any strategic updates where necessary.

The PATREC Research Advisory Committee (PRAC) together with a series of research project steering committees, has been instrumental in guiding the research direction presented in this Strategic Plan for the period 2020-2022, largely through the process of developing the 2019-21 core research program comprising nine priority research projects. These nine projects, all within the broad ambit of the still relevant research focus areas identified in the Strategic Plan 2017-2019, commenced in late 2019 but will substantively be undertaken during 2020 and 2021, forming the basis of the research activity envisaged in the Business Plan 2020.

The Strategic Plan for the period 2020-2022 incorporating a Business Plan for 2020, is presented to the PATREC Board at its last meeting of 2019, in accordance with the terms of the 2016 PATREC Collaborative Agreement.

1.2 Purpose and Structure

The purpose of this Strategic Plan 2020-2022 (the Plan) is to set out the strategic directions of PATREC for the period, also providing a more detailed action-focussed Business Plan for the inner year, 2020. In line with the 2016 PATREC Collaborative Agreement, the Plan is revised every three years with any interim updates required, included as part of the annually prepared Business Plans.

This Plan has four parts. This introductory section which provides the background to PATREC's current position and the purpose and process of developing the Plan, is followed by a summary of achievement since 2017 and a restatement of the value proposition of PATREC which still remains valid. The third part presents the Strategic Direction with a three year focus which sets out what PATREC will be doing, the context within which it is operating, resourcing allocations for delivery and Key Performance Indicators for measuring the success of delivery. The final part comprises the Business Plan which provides a more detailed view of goals, actions, deliverables, resourcing and a budget for the inner year of 2020.

2. ACHIEVEMENTS IN BRIEF 2017-2019

Guided by the last Strategic Business Plan 2017-2019, PATREC has successfully achieved outcomes across a range of performance areas, including:

- Research Projects
 - Completion of 15 substantial research projects with associated technical reports (Annexure A); and
 - PATREC core research project package (nine projects) for 2019-2021 established, with six commencing by late 2019 (four combined into a single large new iMOVE project and two stand-alone projects)
- Attracting additional financial resources
 - \$2,252,000 of additional funding sourced from non-subscription income (Annexure A).
- Knowledge Transfer & Information Dissemination
 - 200 people attended PATREC's Cost-Benefit Analysis Seminar Series on Cost-Benefit Analysis for Transport Infrastructure (2019);
 - 13 connection events attended by at least 400 stakeholders;
 - New externally-hosted PATREC website developed and updated (2019);

- PATREC book “Planning Boomtown and Beyond Book”, launched (June 2017); and
- Publication of 35 peer-reviewed academic papers (journal articles, book chapters, published peer-reviewed conference papers in proceedings) and 23 technical reports.

3. VALUE PROPOSITION

Within the broad contractual mandate of PATREC being constituted, as recently updated in the new agreement, “for the purposes of conducting collaborative, applied research and teaching in support of policy in the connected spaces of transport and land use planning”, the value proposition goes a step further by clarifying the value which is provided by PATREC to its constituent stakeholders beyond the sum of the individual parts. PATREC has two primary types of stakeholders: universities and government. Ultimately, the outputs sought by universities are primarily more and better academic papers, more external research funding, more postgraduate degrees, more collaboration and profile and more social impact. Government wants access to more, better and relevant evidence to inform plans and policy decisions.

The value-adding role of PATREC remains largely consistent with that presented in the Strategic Business Plan 2017-19 and can be stated as follows:

Capitalising on our extended [international] network of academic expertise and policy partners, our **value proposition** is to **broker and conduct** applied research and teaching in support of policy in the connected spaces of transport and land use planning in order to advance the knowledge base and forge new and innovative evidence-based solutions for effectively planning and managing Western Australia’s future. We do this through the following four key strategic activities:

1. multi-disciplinary, multi-institutional applied research in response to identified agency research requirements and knowledge gaps;
2. knowledge transfer through academic and less formal publications, connection events and a website as a reliable and accessible resource for researchers and policy-makers;
3. training, predominantly in the form of professional development through short courses, executive programs and “expert” courses on key topics, conducted in collaboration with other professional and industry bodies where possible; and
4. attracting additional research funds through business development.

The relative importance of each of these activity areas remains consistent with the priorities set in the Strategic Business Plan 2017-2019, with policy-responsive research and development remaining the highest priority for PATREC together with the associated and necessary business development, followed by knowledge management and transfer, with less resources allocated to education and training.

Proportional Value Contribution

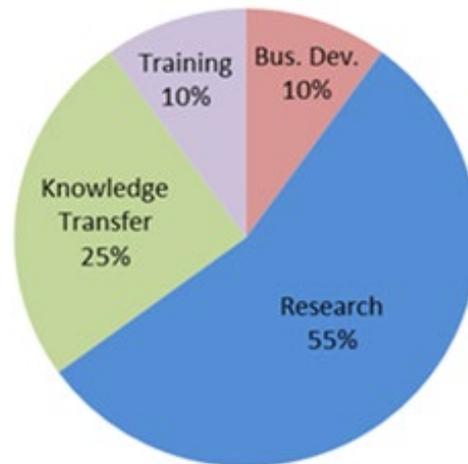


Figure 1: Key PATREC strategic activities and their relative importance

The value-add role of PATREC is further articulated in a set of strategic **objectives** relating to each of the **key strategic activities**:

Key Strategic Activity 1: Brokering and conducting multi-disciplinary, multi-institutional research in response to identified agency research requirements and knowledge gaps

- Identify, articulate, compile and communicate R&D needs of research users and knowledge gaps and opportunities as identified by research providers in the form of research focus areas and priorities.
- Initiate the translation of identified research needs and knowledge gaps into key research questions and project designs.
- Craft the research so as to achieving the R&D balance between more basic and applied research by pitching and designing the research in such a way as to deliver some shorter term, policy-responsive wins, but also enables publishable contribution to the knowledge base in the longer term.
- Coordinate, assemble and mobilise multi-disciplinary, multi-institutional research teams to propose and undertake research projects.
- Track and communicate current R&D activity to avoid duplication, identify knowledge gaps and collaborating opportunities.
- Contribute to the resourcing of R&D through:
 - Inspiring, attracting, acquiring and retaining human resource capacity by:
 - advertising and proactive search to discover potential human resource capacity
 - providing top-up scholarships for postgraduate studies, particularly PhDs
 - contributing to funding of postdoctoral fellowships
 - identifying and communicating available research capacity for optimal sharing of resources.
 - Undertaking core research including baseline studies as a platform on which to build more comprehensive research concepts to be undertaken by larger research teams funded by additional funding.
- Facilitate the establishment of new spin-off research entities if and when it is opportunistic and reasonable to do so.

Key Strategic Activity 2: Ensuring knowledge management and transfer through academic and less formal publications, connection events and an information portal as a reliable and accessible resource for researchers and policy-makers

- Require, produce and monitor the delivery of formal academic and less-formal publications as an essential research output in the form of:
 - Peer-reviewed technical working papers, overseen by an editorial board to ensure quality and published on-line
 - Factsheets on key findings for less academic audiences
 - Academic journal articles, books and book chapters.
- Require, produce and monitor the delivery of specific, practical policy products such as tools, methods and datasets, demonstrated and described.
- Initiate and conduct a range of targeted connection and communication events to inform and be informed of research and policy activities, products and findings in the form of:
 - Research Forums
 - Topic-specific conferences, seminars, workshops and breakfast functions, inviting national and international visiting experts as speakers when appropriate.
- Develop the website into more of a “Knowledge Portal” to disseminate relevant information:
 - Central resource for researchers and policy-makers, agencies (e.g. research supervisors, speakers)
 - One-stop-shop of who’s doing what
 - Facilitating integration with wider community of interest such as urban design and health
 - Data library/management of transport data.
- Raise the PATREC profile by publicising relevant research results.

Key Strategic Activity 3: Brokering the provision of training, predominantly in the form of professional development through short courses, executive programmes and “expert” courses on key topics, conducted in collaboration with other professional and industry bodies where possible

- Of highest priority, identify, initiate and coordinate short courses on topical issues, not too narrowly focussed on transport but also planning, infrastructure, freight, land use, which could be the precursor for formal units, with strong links with industry.
- Fund conversion of research outputs into short course material as a deliverable.
- Identify opportunities to contribute units to existing postgrad courses and undergrad to a lesser extent and coordinate, responsive to industry needs.

Key Strategic Activity 4: Attracting additional research funds through business development

- Replenish core funding through
 - “Brokering” fees on external research income earned
 - Short course fees
 - Affiliate sponsorship.
- Leverage external research funds by:
 - providing core funding to incubate new and innovative research ideas through to the development of project proposals including ARC grants
 - co-funding selected, high impact research projects.
- Identify opportunities, facilitating tendering for and conducting contract research.

4. RESEARCH FOCUS AREAS

PATREC has established five research focus areas in which to undertake research and deliver high-impact outcomes, although collaboration links and overlaps exist. These focus areas have evolved since their initial conceptualisation in the Strategic Plan 2013-16 in response to changing research needs and policy priorities (Figure 2, PATREC Strategic Plan 2017-2019). As part of the collaborative process driven through the PRAC, to prioritise a set of research projects as part of the program of research for 2019-2021, government partners proposed research projects to meet priority policy needs, broadly in line with the PATREC research focus areas. Most policy needs identified, fitted within the focus areas but a potential new area emerged (*italics* in table below) which has now been included as a research focus area. All focus areas are underpinned by an information and modelling platform and some of the external funding opportunities to be explored in the next three years related to this enabling information platform and tools.

Table 1: Research focus areas from previous Strategic Plan 2017-19, with descriptions updated in Business Plan 2019, and new area (*italics*) identified 2019-21 core project prioritisation process

| | |
|----------------------|--|
| Research Focus Areas | Integrated land use and transport futures - Improving land use and transport integration now and into the future, using a systems-based, scenario-oriented, big data analytics approach to longer term strategic forecasting and evaluation, depending on and informing, integrated LU-T modelling |
| | Smarter travel decisions - Focus on the potential for deployment and integration of technology to enable more intelligent and connected transport choices, helping Australian cities use resources more efficiently and deferring the need for new infrastructure |
| | Integrated freight system optimisation - Planning intermodal and general logistics infrastructure for the future needs of Perth |
| | Emerging technology and network optimisation and intelligence - developing a data- and simulation-driven decision support system for optimising road network operations |
| | <i>Transport infrastructure investment risk management - Incorporating uncertainty in transport infrastructure planning and policy through adapting portfolio-wide strategic infrastructure investment planning and management tools, guidelines and frameworks to account for emerging risks</i> |

5. STRATEGIC DRIVERS

Building on the achievements of the last three years in line with the direction set in the previous strategic plan (2017-19), but cognisant of an evolving contextual environment, this Strategic Plan 2020-2022 will guide the operations of PATREC and its research program during that period. Emerging global trends and their potential impacts on transport, the release of the final guiding WA metropolitan Perth and Peel at 3.5 million plans, the WA government's priorities as presented in *Our Priorities – Sharing prosperity* provide an international and local context. Strategic responses from agencies, including DOT's Strategic Plan 2019-22 and the Action Plan for Planning Reform (August 2019), together with the opportunities created by the newly established Infrastructure WA, further highlight priorities to guide the research activities for this period.

An identified internal driver to be addressed in this period is the need to amend the core project prioritisation process to include a specific task for agencies to prioritise needs prior to asking researchers for responsive proposals.

- Transport impacts of emerging global trends
 - Technological – eg Connected and Automated Vehicles, drone deliveries, e-bikes, e-scooters, Electric Vehicles, Blockchain, etc
 - Business Models – Eg Ride sharing, Mobility as a Service (MaaS), etc
 - Trends – public transport use, decline in percentage of younger Australians obtaining drivers licences, etc
 - Customer expectation – seamless provision of services (e.g. Service WA), data privacy etc.
 - Data – Big Data, Artificial Intelligence and Cloud/Edge Computing
- Guiding WA metropolitan plans
 - Perth and Peel@3.5. Perth, Western Australia (2018)
 - Perth and [Peel@3.5million](#) The Transport Network (2018)
- WA Government's Priorities: *Our Priorities – Sharing prosperity*
 - <https://www.wa.gov.au/government/our-priorities-sharing-prosperity>
 - Most relevant Priority: Liveable environment "... where people can easily connect where they live with where they work and play... with easy to access vital services and business without relying on a car ... spend less time commuting."
 - How? "Build METRONET and increase homes located within 1 km of public transport"
 - Target: "By 2031, the number of homes in the Perth and Peel region in close proximity to a public transport node will increase by 45% over 2018 numbers.
- The DoT Strategic Plan 2019-22 (in line with *Our Priorities*)

https://www.transport.wa.gov.au/mediaFiles/about-us/About_P_DoT_Strategic_Directions.pdf

- Most relevant Strategic Priority: Sustainable Transport Solutions
- Key Initiatives
 - Develop and implement strategies to keep Fremantle Port's inner harbour supply chains operating efficiently
 - Develop strategy for mobility as a service
 - Develop State-level strategies, policy and regulations for connected & autonomous vehicles and vessels, electric vehicles, and transport funding
 - Undertake travel demand analysis to increase on-demand transport and public transport usage

- Develop strategic transport policy for ‘movement and place’
 - Future State
 - Complementary, integrated transport systems and networks
 - Efficient intermodal freight networks support economic development and regional prosperity across rail, road, ports, waterways and air transport
 - Intelligent mobility networks provide easy, interconnected and convenient access to the places people want to go
 - Sustainable funding for transport infrastructure
 - Effective regulation of automated vehicles and other new technologies
 - Transport solutions are adapted to climate change
- Action Plan for Planning Reform Aug 2019 (in line with Our Priorities)

<https://www.dplh.wa.gov.au/getmedia/075dc761-ad2a-4f43-99e2-91a246bb4114/PRJ-PR-Action-Plan>

- The planning system should sustain liveability and prosperity by providing for:
 - increased housing choice and diversity to accommodate a growing and ageing population and more diverse households
 - high amenity, safe public spaces and recreation areas for connected, liveable and healthy communities
 - efficient use of infrastructure to reduce the costs of new housing and the costs of living
 - adequate well-connected and appropriately serviced land to support growing economies
 - new transport infrastructure to provide better connections to education, jobs and trade
 - protection of agricultural land, natural resources and valuable eco-systems and climate change mitigation and adaptation.
- Most relevant reform initiative: Planning creates great places for people
 - Urban corridors are realised with integrated planning (A2) - there are many significant urban road corridors, which are priority activity corridors for mixed-use development and consolidated growth but there is tension between land use potential, road use and access. Examples include the Canning and Stirling Highways. The current road planning framework does not align with these proposals, creating an impediment to realising the potential of the corridors
 - Actions:
 - DPLH, Department of Transport (DoT), Main Roads Western Australia (MRWA), in collaboration with local government, will jointly prepare a whole-of-government **Movement and Place** framework as a tool to identify the performance characteristics for traffic, transport and place along urban corridors and consider solutions in terms of design and approvals.
 - Identify pilot projects and test the framework in partnership with local government on identified corridors
- Infrastructure WA

<https://www.infrastructure.wa.gov.au/>

Opportunities exist for the application of our infrastructure project/program evaluation research given the objectives and functions:

- The role of the newly established (2019) Infrastructure WA is to provide advice and assistance to the WA Government on infrastructure matters to support the following objectives:
 - To assist in enhancing the efficiency and effectiveness of infrastructure planning and coordination.
 - To **promote the adoption and use of policies, practices, information and analysis to support sound decision-making in relation to infrastructure.**
- Functions and responsibilities include:
 - delivery of a State Infrastructure Strategy addressing infrastructure needs and priorities for the next 20 years
 - assessing major public infrastructure proposals
 - coordinating the provision of information and submissions to Infrastructure Australia (under the direction of the Premier).
- Operational driver
 - Arising from the process to select the 2019-22 core research projects, the need for an amendment to the project prioritisation process was identified, requiring government to prioritise policy-directed research needs prior to circulating to researchers for expressions of interest proposals.

6. APPROVED CORE RESEARCH PROJECTS 2019-21

The strategic direction of the first two years of the duration of this strategic plan has already largely been set in terms of the approval of a set of core funded research projects. Commencing in late 2018, through a process involving academic leads and teams, project steering committees, the PRAC and Board, a set of nine priority projects were developed and approved by the Board to commence at the end of 2019/early 2020 and continuing through well into 2021. The approach was to use 2019-21 PATREC subscription funds together with iMOVE CRC funds and supplementary cash contributions from partners, to fund these projects. For administrative purposes, the nine approved projects are being packaged into three large iMOVE projects (as sub-projects) and two smaller stand-alone PATREC projects.

Table 2: Approved Projects 2019-21

| Project | Description | Sub-project | Sub-project Objectives |
|--|--|--|--|
| iMOVE 3: Managing transport system investment risk: enhancing patronage predictions and adapting strategic asset management and appraisal processes to account for emerging trends and uncertainty | For transport planners and government transport agencies, the uncertainties of emerging technologies and changing trends challenge conventional transportation decision-making, both for long- and short-term planning. The purpose of this project is to adapt key existing planning tools, guidelines and frameworks to account for uncertainty of changing trends and emerging technologies. This will enable the Transport Portfolio of WA to better manage transport infrastructure investment risks. | Understanding systematic factors driving patronage shifts | To determine the systemic factors driving patronage shifts (including long term labour market characteristics, post GFC demographic shifts, increased capacity in road infrastructure, CBD parking costs and transport trends such as: ridesharing, licenses, fuel prices, vehicle ownership), to (i) enhance the public transport patronage forecasting model for the improved prediction of fare revenues, operating subsidy requirements, levels of service provision and service innovations (ii) facilitate the development of a range of customer centric initiatives to optimise (public transport related) travel behaviour. |
| | | Determining digital journey planning app impacts on patronage | To understand customer experiences of digital journey planning services and influence on mode share for all routine trip purposes (work, school, shopping, recreation, etc) and identify potential improvements to journey planning services in order to ultimately inform the development of a range of customer centric initiatives to optimise (non-car based) travel behaviour. |
| | | Adapting strategic asset management practice to account for uncertainty relating to CAVs | To identify specific impacts of specifically, CAV, disruptive technologies on road (and road/rail interface) asset management practice as well as response actions and opportunities for innovation in order to adapt templates and guidelines; |
| | | Adapting the Portfolio's infrastructure project | To propose adaptation strategies to appraise the uncertainties of |

| | | | |
|--|---|--|---|
| | | assessment and prioritisation framework to account for uncertainty relating to disruptive technology | emerging technologies within the project assessment and prioritisation framework to ensure that advice to decision makers explicitly considers potential future changes to the transport systems. |
| iMOVE 4: Enhanced Vehicle Detection | To investigate alternative vehicle detection technologies for traffic signal control and smart freeway operations through a comparative desktop analysis and field trials of shortlisted technologies at two locations (intersection and freeway) in order to inform the future enhanced detection installation business case and delivery strategy | | |
| iMOVE 5: ITS, modelling and detection | Enhanced network performance through data driven analytics, simulation and modelling | iMOVE ITS Phase 2 | To undertake agent-based simulation of land use and transport scenarios during transition to CAV to determine impacts on land use and transport systems |
| | | LU-T modelling – CubeLand support | To provide customised econometrics training and international best practice review of bid-rent parameters to support deployment of CubeLand |
| Public confidence in use and roll-out of shared, automated and electric – retirement village shuttle bus trial | <p>This overall purpose of this project is to provide unique experimental data on the effects of exposure to and trial of a SAEV on older people’s attitudes, intentions, and behaviours relating to SAEV use. Specific research objectives are to:</p> <ul style="list-style-type: none"> • Assess older people’s receptiveness to using SAEVs. • Measure whether access to a SAEV increases mobility around a retirement village site. • Determine whether exposure to and/or use of the SAEV on retirement village premises changes attitudes to SAEVs and intentions to use SAEVs in other contexts. • Assess the potential for older people to interact with a SAEV by using hand/arm gestures to flag down the vehicle. | | |
| Industrial land analysis – freight demand forecasting | <p>The aim of this project is to further our understanding of Fremantle container trade and its relationship to freight transport usage across Perth and Western Australia. A particular focus of the project is to assist in the analysis of intermodal freight activity and to inform government policy aimed at improving intermodal usage into the future. The project includes analysis of the following aspects of the issue:</p> <ul style="list-style-type: none"> • Identification and analysis of recent container trade growth trends • Short term container trade growth forecasts • Comparison of trade data with business enterprise data for Perth to link trade with land use and freight activity • Description of the industrial landscape of Perth in the context of intermodal terminal planning • Implications of findings for intermodal strategy and policy | | |

Most of these priority projects have the potential to be developed further in subsequent phases beyond 2021 and it is expected that during the period of this Plan, further research will be undertaken in some of these project areas but with additional funding required to support their continuation.

Other potential projects to investigate for conceptualise in the light of strategic drivers:

- Supporting the development of the proposed Movement and Place framework as a tool to identify the performance characteristics for traffic, transport and place along urban corridors and consider solutions in terms of design and approvals, including application and testing of the tool in pilot projects. This is intended as a whole of government initiative and specifically required the involvement of DOT, MRWA and DPLH which makes it an ideal integrated and

collaborative research project to pursue, particularly as the research support to DPLH and the planning and technical service part of MRWA needs to be extended.

- Evaluation and appraisal support to infrastructure project prioritisation (Infrastructure WA).

7. EXTERNAL PROJECTS

PATREC will continue to pursue external project opportunities ie. those projects which do not receive any PATREC core funds. The external projects can be funded by PATREC collaborating partners but contributing additional funds (to subscription payments) and/or by other external funding agencies including the Commonwealth. Some opportunities to continue exploring include:

- RailSmart continued – Development WA; Metronet etc
- LU-T modelling with UQ as part of future iMOVE project - discussion to be held with UQ on 5 December 2019
- Australian Urban Research Infrastructure Network (AURIN) WA Node – to be pursued after outcome of ARDC proposal known
- Cyber-security, network operations and freight tracking with ECU/WA AustCyber Innovation Hub – potential for iMOVE project and/or ultimately part of an ARC Industrial Transformation Research Hub/Training Centre proposal
- PTA - Building on Pulse of Perth to create train incident management system
- ARC Linkage – mathematical prediction of traffic prediction (building on outcomes of iMOVE ITS)

External projects already secured for 2020 will be completed, including:

- Australian Research Data Commons (ARDC)- Australian Transport Research Cloud (Lead: AURIN) – three-year project (notified as successful in December 2019)
- Main Roads Drone Video Analytics (\$85,000; 1 May 2019 – 31 March 2020)
- Multi-Objective Genetic Algorithm Optimisation For Network Widening and Maintenance Scheduling (\$120,000, Main Roads; 1 November 2019 – 31 August 2020)

8. DELIVERING ON THE PLAN

8.1. Human Resources

With leadership, administration and coordination by a small PATREC core team, a much wider team of PATREC project research associates from across the partner universities and with some support from adjuncts, consultants and PhD students, are called upon to conduct policy-informing, applied research. Through the mechanism of project steering committees, researchers are supported and enabled by a dedicated team of agency stakeholders who ensure that the research is well-aligned with policy objectives and that the research outcomes are well-communicated within the agencies and wider if required.

Table 3: Research Administration, Development, Coordination and Management

| PATREC Office | | |
|-----------------------|---------|---|
| Sharon Biermann | 0.4 FTE | Director |
| Vacant | 0.8 FTE | Centre Administrator |
| Research Team | | |
| Sharon Biermann | 0.6 FTE | Director |
| Yuchao Sun | 1.0 FTE | PATREC Research Fellow (traffic engineering), UWA |
| Sae Chi | 1.0 FTE | PATREC Postdoctoral Research Fellow (transport economics), UWA |
| Tristan Reed | 0.8 FTE | PATREC Research Assistant, Curtin |
| Linda Robson | 0.4 FTE | PATREC Research Fellow (urban planning), UWA |
| Haiyan Liu | 1.0 FTE | PATREC Postdoctoral Research Fellow (economics), seconded to DOT |
| Chris Bartlett | 0.4 FTE | PATREC Research Assistant, Computer Science |
| Yan Jie | | PATREC Research Assistant, Software development |
| Daniel Cowen | | Research Assistant, UWA Computer Science |
| Rachel Cardell-Oliver | | Research Associate, UWA Computer Science |
| Mark Reynolds | | Research Associate, UWA Computer Science |
| Doina Olaru | | Research Associate, UWA Business School |
| Kirsten Martinus | | Research Associate, UWA Business School |
| Brett Smith | | Research Associate, UWA Business School |
| Teresa Harms | | Research Assistant, UWA Business School |
| Cate Patterson | | Research Assistant, UWA Business School |
| Tim French | | Research Associate, UWA Computer Science |
| Lyndon Whyte | | Research Associate, UWA Computer Science |
| Wei Liu | | Research Associate, UWA Computer Science |
| Thomas Stemler | | Research Associate, UWA Mathematics |
| Du Huynh | | Research Associate, UWA Computer Science |
| Farid Boussaid | | Research Associate, UWA Electrical, Electronic & Computer Engineering |
| Mohammed Bennamoun | | Research Associate, UWA Electrical, Electronic & Computer Engineering |
| Tim Hoffman | | Consultant |
| Simone Pettigrew | | Research Associate, Curtin |
| Kerry Brown | | Research Associate, ECU |
| Subha Parida | | Research Assistant, ECU |
| Reza Kaini Mavi | | Research Associate, ECU |
| Ferry Jie | | Research Associate, ECU |
| Hadrian Djajadikerta | | Research Associate, ECU |

Not all research-funded positions are secured for the entire duration of the Plan. Additional external funds would be required to maintain the indicated level of research support. In addition, for 2021, a higher level researcher (level D) will be sought to drive research quality across the research focus areas. This position has not been costed in the budget and additional funding will be investigated to support such a role.

Table 4: Core Project Steering Committee participation

| Project | Sub-project | Steering Comm. (gov) | Researchers |
|--|-----------------------------------|---|---|
| iMOVE 3: Managing transport system investment risk: enhancing patronage predictions and adapting strategic asset management and appraisal processes to account for emerging trends and uncertainty | Patronage trend drivers | Claire Thompson, DOT (Chair) Martin Keen, DOT (alt Chair) Martin White, PTA Brendan Lumbers, PTA | Brett Smith, UWA (Lead) Doina Olaru, UWA Rachel Cardell-Oliver, UWA Tristan Reed, Curtin |
| | Journey Planning tools | Claire Thompson (Chair) Martin Keen, DOT Trevor Buckenara, DOT | Tristan Reed, Curtin (Lead) |
| | Asset management | Flori Mihai, MRWA Graham O'Neil, DOT | Kerry Brown, ECU (Lead) Ferry Jie, ECU Hadrian G Djajadikerta, ECU |
| | Appraisal | Andrew Wilkinson, DOT Beth Beere, DOT | Sae Chi, UWA (Lead) |
| iMOVE 4: Enhanced vehicle detection | | Kamal Weeratunga, MRWA (Chair) Cory Ross, MRWA Cas Tesnear, MRWA | Mohammed Bennamoun (UWA) Farid Boussaid, UWA Chao Sun, UWA |
| iMOVE 5: ITS plus modelling | iMOVE ITS phase 2 | Steve Atkinson Kamal Weeratunga Graham Jacoby | Chao Sun, UWA (Lead) |
| | LU-T modelling – CubeLand support | Simon Zheng, DPLH Renlong Han, DOT Ying Huang, DPLH | Doina Olaru, UWA (Lead) |
| Public confidence in use and roll-out of shared, automated and electric – retirement village shuttle bus trial | | Alizanne Cheetham, DOT Simon Grieve, DOT | Simone Pettigrew, Curtin (Lead) Richard Norman, Curtin |
| Industrial land analysis – freight demand forecasting | | Anne-Marie Brits, DOT Chris Sharples, DOT | Tim Hoffman, Consultant (Lead) Rachel Cardell-Oliver Sae Chi, UWA |

8.2. Financial Resources

The 2016 PATREC Collaborative Research Agreement committed the collaborating partners to the same subscription amounts as per the 2012 agreement (\$420,000.00 per year) for the three year “initial period” (from commencement to 31 December 2019). At the end of 2017 and 2018, the Agreement was extended by a further year each time with CPI increases to the subscription payments. Accordingly, in the three year budget (Table 5), these increases are reflected in the subscription amounts for WA government grants and University sponsorships. iMOVE CRC income is project income and remains fixed per annum. iMOVE UWA income is the additional contribution to iMOVE made by UWA as a iMOVE participant. ECU participant funding is not included here as it is paid directly to iMOVE CRC and does not flow through the PATREC accounts (only a nominal \$5K/annum). iMOVE additional funds are those committed by government partners as additional support when iMOVE projects are extended to provide valuable additional benefits. Other research income is for external projects. It is higher for 2020 due to the income received for the post-doctoral economics researcher to DOT. With this exception, total income is budgeted at between \$1,28 million - \$1,29 million per annum.

PATREC office expenditure is kept low at \$209K - \$215K per annum, with most costs incurred on research projects. Total expenditure per annum is slightly higher than income but the expected carry over from 2019 due to delayed expenditure will result in positive annual balances.

Table 5: Three-year budget estimate (2020-2022)

| PATREC Income and Expenditure | Budget 2020 | Budget 2021 | Budget 2022 |
|---|--------------------|--------------------|--------------------|
| INCOME | | | |
| WA Government Grants | 280,000 | 285,320 | 290,170 |
| Universities Sponsorship | 202,000 | 205,838 | 209,337 |
| iMOVE Commonwealth | 300,000 | 300,000 | 300,000 |
| iMOVE UWA | 70,000 | 70,000 | 70,000 |
| iMOVE ECU | 0 | 0 | 0 |
| iMOVE additional gov/industry | 104,000 | 100,000 | 100,000 |
| Smart Cities and Suburbs | 0 | 0 | 0 |
| Other Research Grants & Contracts | 350,000 | 320,000 | 320,000 |
| Accrued Interest | 0 | 0 | 0 |
| Total Income | 1,306,000 | 1,281,158 | 1,289,507 |
| EXPENDITURE | | | |
| PATREC OFFICE | 209,086 | 211,768 | 214,804 |
| Director (0.4) | 91,324 | 93,497 | 96,069 |
| Administrative support | 76,000 | 76,000 | 76,000 |
| General Office Costs incl. web services | 15,000 | 15,000 | 15,000 |
| Board Chair Stipend | 26,762 | 27,271 | 27,735 |
| RESEARCH PROJECTS | 1,198,974 | 1,062,324 | 1,097,877 |
| Research Co-ordination (Dir. 0.6) | 136,986 | 140,246 | 144,104 |
| iMOVE participation | 220,000 | 220,000 | 220,000 |
| PATREC Research Fellows | 541,988 | 402,078 | 433,773 |
| Researcher Assistants, Consultants, Expenses | 300,000 | 300,000 | 300,000 |
| Total Expenditure | 1,408,061 | 1,274,092 | 1,312,681 |
| YTD BALANCE | -102,061 | 7,066 | -23,174 |
| Balance Brought Forward from 2018-2022 | 171,557 | 69,496 | 76,562 |
| CLOSING BALANCE (incl Balance B/F) | 69,496 | 76,562 | 53,389 |

8.3. Management and Operations

8.3.1. PATREC Research Advisory Committee (PRAC)

The PRAC will continue to be the vehicle for strengthening coordination amongst the PATREC partners in relation to the identification, planning, prioritisation, conducting, progress monitoring and promotion of core funded applied research projects. The objectives as encapsulated in the Terms of Reference are to:

- introduce an element of formality and rigour to the research project identification, selection, support, monitoring and dissemination process;
- enhance communication amongst partners; and
- advise the Board on project level matters, allowing the Board to focus on strategic matters.

Further, PRAC members will continue to support the Director in the activities of research project planning, execution and progress monitoring and communication.

The PRAC will continue to meet three times a year, each time two weeks in advance of a Board meeting.

More frequent interim meetings may also be held to ensure continuity in communication.

Agency Partner Members

- Steve Atkinson, Chair, Main Roads WA
- Kamal Weeratunga, Main Roads WA
- Doug Morgan, Main Roads WA (alternate: Flori Mihai)
- Damien Martin, Dep. Chair, DPLH
- John Chortis, DPLH (alternate: Simon Zheng)
- Justin McKirdy, DOT (alternates: Claire Thompson, Martin Keen)
- Catherine Wallace, DOT (alternates: Alizanne Cheetham, Graeme O’Neill, Anne-Marie Brits)
- Martin White, PTA (alternate: Brendan Lumbers)

University Partner Members

- Doina Olaru, UWA
- Brett Smith, UWA
- Rebecca Lange, Curtin
- Greg Morrison, Curtin
- Hadrian Djajadikerta, ECU
- Ferry Jie, ECU
- Sharon Biermann, PATREC

8.3.2. Project selection process

The project approval process established in relation to the PRAC advising the Board, will be continued for projects which are funded wholly or in part by PATREC core funds, taken to the PRAC and Board for approval (Table 6). A formal project selection process will be conducted every second year, commencing in July, to inform the annual Business Plan to be presented to the Board at its last meeting of the year. The process has been slightly amended to reinforce the importance of the prioritisation of research needs by government members in the first task.

Table 6: Formal core project selection process (every two years)

| Tasks | Oversight and Decisions | Due Date |
|--|--|--|
| Process and timeline agreed | PRAC agrees to process and timeframe | July PRAC meeting (2020, 2022 etc) |
| Research needs/potential project possibilities, identification, prioritisation, call for EOI/concept proposals | Agencies submit project ideas in response to a call; process and/or workshop to prioritise research projects; PRAC agrees to list of research projects to be circulated to researchers for EOI/concept proposals | End September (out of session) |
| EOI/concept proposals prepared and submitted in response to call | Researchers | End October |
| Proposal prioritisation | PRAC considers EOI/concept proposals submitted by researchers; PRAC prioritises EOIs according to principles and make recommendations to Board and identifies Steering Committee members | Mid-November |
| Recommendations on project priorities as part of Business Plan | Board approval of priority projects and indicative budgets | Late November Board meeting |
| Researchers prepare detailed Project Plans and assemble project teams | Project Plans refined with Steering Committees | Mid-February |
| Researchers incorporate Steering Committee inputs and submit final plans to PRAC | Agreed Project Plans presented to PRAC for recommendation to Board on basis of policy relevant research questions, scope and value for money. [Chair Steering Committee must sign off on the document] | Early April – PRAC meeting preceding Board meeting |
| Recommended Project Plans and budgets to Board for approval | Board approval of Project Plans and budgets and Steering Committee | April Board meeting |
| Contracting and project start-up | | July 2021, 2022 etc |

Although the formal project selection process conducted annually as outlined in Table 6 has the advantage of predictability, it is not sufficiently flexible to encourage responsiveness to new ideas and agile adoption of opportunities as they emerge. Therefore, in addition to the formalised annual process, unsolicited short project proposals/EOI will be accepted at any time of the year after which the same process will be followed as outlined in Table 8 but not the set dates. Rather, the EOI will be taken to the next PRAC meeting to start the process, whenever that may be. Both PRAC and the Board would have as a standing agenda item “Consideration of any submitted proposals”.

The selection criteria to be applied in the case of both solicited and unsolicited projects are as follows:

- Alignment with the Strategic Plan
- Policy relevance
- Fit with the current portfolio of PATREC activities
- Contribution to PATREC KPIs
- Level of co-contribution from funding sources (either PATREC partner or external)
- End-user pull
- Steering Committee endorsement
- Balance of researcher and of end-user engagements, commensurate with their respective inputs
- No duplication of research or what has already been done within agencies

8.3.3. Project Management

Once projects are underway, Leaders will report three times a year on progress against milestones to PRAC and the Board. The reporting requirements will not be onerous but will be sufficient to enable the Director and PRAC to identify whether the project is on track or if there are issues requiring attention. A reporting template comprising 3-4 questions on progress will be provided and the need for quarterly reporting will be included as a requirement in the project plan or contract.

8.3.4. Key Performance Indicators

The PATREC Review recommended that fewer KPI’s be set and that more qualitative indicators be included. At the August 2016 Board meeting, the introduction of a short, on-line stakeholder satisfaction survey was agreed to in addition to a shortened list of indicators, presented initially in the 2016 Business Plan (Table 7). Since then, the survey is conducted annually in January/February and the results reported in the Annual Report.

Table 7: Key Performance Indicators

| Key Performance Indicators | |
|--|---|
| <i>Academic Performance Indicators</i> | |
| Number of journal papers published | |
| Number of peer-reviewed book chapters published | |
| Number of peer-reviewed conference papers published in proceedings | |
| Number of peer-reviewed books published | |
| Number of PhD candidates attracted and graduated | |
| Value (\$) of [direct] external research funding secured (through PATREC account) | |
| Value (\$) of [indirect] external research funding secured (through individual partner university account) | |
| <i>Policy Impact Performance Indicators</i> | |
| Number of high impact, policy-informing projects completed | |
| Number of substantive Technical Reports/Working Papers published | |
| Number of PATREC Perspectives published | |
| Number of presentations at PATREC and other connection events | |
| Number of connection events arranged and held | |
| Number of short courses, unit contributions presented | |
| <i>Stakeholder (academic and policy) satisfaction indicator (qualitative)</i> | |
| 1 | PATREC research outcomes are useful for my work needs |
| 2 | In general communications between PATREC researchers and industry partners are good |
| 3 | The research results provided by PATREC activities will provide value for money |
| 4 | PATREC partners and researchers understand each other’s needs |
| 5 | Working with PATREC partners allows academics to undertake innovative research |
| 6 | I expect greater interaction between PATREC partners and researchers |
| 7 | Overall I am satisfied with my work with PATREC |

8.4. Risks in Delivering on the Plan

The major risks identified in delivering on the plan are:

- Human resource availability;
- Human resource capability;
- Designing and implementing a viable financial model to ensure sustainable funding flows back into PATREC; and
- Maintaining active engagement of industry partners.

9. BUSINESS PLAN 2020

9.1. Background

According to the 2016 Collaborative Agreement, Business Plans will be presented to the Board at the last meeting of each calendar year to direct business for the following year.

9.2. Outputs achieved in relation to previous Plan (2019)

Key outputs for 2019:

- New core projects commence (see PRAC Item paper)
 - iMOVE 3 Managing transport system investment risk comprising 4 sub-projects
 - AV shuttle trial commences at retirement village near Curtin – increasing older people’s acceptance of shared, automated and electric vehicles
 - Land use and freight generation in Perth – generating freight volume estimates for containerised trade and use of the road network in servicing this freight task
- iMOVE 4 - agreement under development for early 2020 commencement
- iMOVE 1 and 2 completed:
 - iMOVE 1-003 Enhanced short and longer term network performance prediction capabilities through data-driven analytics and simulation
 - iMOVE 2-001 Planning intermodal and general logistics infrastructure for the future needs of Perth
- Smart Cities and Suburbs grant (RailSmart Planning Wanneroo) acquitted and audited – fully paid out
- 2 external projects completed:
 - Pulse of Perth: Visualising Public Transport Data Study
 - Incident prediction
- 200 people attended PATREC’s Cost-Benefit Analysis Seminar Series on Cost-Benefit Analysis for Transport Infrastructure
- 3 seminars held
- Australian Research Data Commons proposal submitted with AURIN as lead

9.3. Core research projects (2019-2021)

Complete or substantially complete approved nine core funded projects commencing in 2019 and 2020 (Table 8).

Table 8: Projects and Budgets, 2019-21

| Project 2019-2021 (2 years) | Proposer | UWA | Curtin | ECU | PATREC Mng+con sulting | Budget |
|--|-----------|----------------|----------------|---------------|------------------------------|----------------|
| iMOVE 4: Travel demand and risk management (1 Sept 2019 start) | | | | | | |
| 1. Optimising travel behaviour: short term | DOT | 74,000 | 56,000 | | 14,000 | 144,000 |
| 10. Journey Planner tool assessment | DOT/ PTA | | 27,000 | | 3,000 | 30,000 |
| 3a. Investment risk of emerging technology: Strategic Asset Management | MRWA | | 15,000 | 69,000 | 9,000 | 93,000 |
| 3b. Investment risk of emerging technology: Appraisal | DOT | 54,720 | | | 6,000 | 60,720 |
| TOTAL | | 128,720 | 98,000 | 69,000 | 32,000 | 327,720 |
| iMOVE 3: ITS plus modelling (1 Nov 2019 start) | | | | | | |
| 4. Enhanced vehicle detection | MRWA | 85,400 | | | 10,000 | 95,400 |
| 5. AV Simulation (input to 1 and 3 and iMOVE ITS continued) | DOT/ MRWA | 90,000 | | | 10,000 | 100,000 |
| 6. LU -T integration - Cubeland support | DPLH | 65,000 | | | 7,000 | 72,000 |
| Adjustment to get to 600K iMOVE | | | | | 4,880 | 4,880 |
| TOTAL | | 240,400 | | | 31,880 | 272,280 |
| 7. Freight generation – transport demand – industrial land | DOT | 45,000 | | | 22,120 | 67,120 |
| 2a. Public confidence in the use and roll-out of SAEV - older population - trial | DOT | | 129,000 | | 14,000 | 143,000 |
| TOTAL | | 414,120 | 227,000 | 69,000 | 100,000 | 810,120 |

9.4. External research projects 2020

PATREC will continue to pursue external project opportunities ie. those projects which do not receive any PATREC core funds. The external projects can be funded by PATREC collaborating partners but contributing additional funds (to subscription payments) and/or by other external funding agencies including the Commonwealth. Some opportunities to continue exploring include:

- RailSmart applications – Development WA; Metronet etc
- LU-T modelling with UQ as part of future iMOVE project - discussion to be held with UQ on 5 December 2019
- Australian Research Data Commons (ARDC)- Australian Transport Research Cloud (Lead: AURIN) – 3 year proposal submitted
- Australian Urban Research Infrastructure Network (AURIN) WA Node – to be pursued after outcome of ARDC proposal known
- Cyber-security, network operations and freight tracking with ECU/WA AustCyber Innovation Hub – potential for iMOVE project and/or ultimately part of an ARC Industrial Transformation Research Hub/Training Centre proposal
- PTA - Building on Pulse of Perth to create train incident management system
- ARC Linkage – mathematical prediction of traffic prediction (building on outcomes of iMOVE ITS)

External projects already secured for 2020 will be completed, including:

- Main Roads Drone Video Analytics (\$85,000; 1 May 2019 – 31 March 2020)
- Multi-Objective Genetic Algorithm Optimisation For Network Widening and Maintenance Scheduling (\$120,000, Main Roads; 1 November 2019 – 31 August 2020)

9.5. Budget 2020

Increased subscription payment 2020 as per signed variation agreement have been included in the budget (Table 9).

Table 9: Budget 2020

| PATREC Income and Expenditure | Budget 2020 |
|---|--------------------|
| INCOME | |
| WA Government Grants | 280,000 |
| Universities Sponsorship | 202,000 |
| iMOVE Commonwealth | 300,000 |
| iMOVE UWA | 70,000 |
| iMOVE ECU | 0 |
| iMOVE additional gov/industry | 104,000 |
| Other Research Grants & Contracts | 350,000 |
| Accrued Interest | 0 |
| Total Income | 1,306,000 |
| EXPENDITURE | |
| PATREC OFFICE | 209,086 |
| Director (0.4) | 91,324 |
| Administrative support | 76,000 |
| General Office Costs incl. web services | 15,000 |
| Board Chair Stipend | 26,762 |
| RESEARCH PROJECTS | 1,198,974 |
| Research Co-ordination (Dir. 0.6) | 136,986 |
| iMOVE participation | 220,000 |
| PATREC Research Fellows | 541,988 |
| Researcher Assistants, Consultants, Expenses | 300,000 |
| Total Expenditure | 1,408,061 |
| YTD BALANCE | -102,061 |
| Balance Brought Forward from 2018-2022 | 171,557 |
| CLOSING BALANCE (incl Balance B/F) | 69,496 |

9.6. Key Performance Indicator Targets 2020

Performance indicators include essential academic and policy impact indicators with focus on outputs and outcomes rather than inputs.

Table 10: Key Performance Indicator Targets 2020

| Performance Indicator | Target 2020 |
|--|-------------|
| <i>Academic Performance Indicators</i> | |
| Number of journal papers published | 5 |
| Number of peer-reviewed book chapters published | 2 |
| Number of peer-reviewed conference papers published in proceedings | 7 |
| Number of peer-reviewed books published | |
| Number of PhD attracted (and graduated) | 1 |
| Value (\$) of [direct] external research funding secured (through PATREC account) | |
| Value (\$) of [indirect] external research funding secured (through individual partner university account) | \$0 |
| <i>Policy Impact Performance Indicators</i> | |
| Number of high impact, policy-informing projects/sub-projects completed | 6 |
| Number of substantive Technical Reports/Working Papers published | 6 |
| Number of PATREC Perspectives published on PATREC website | 6 |
| Number of presentations at PATREC and other connection events | 10 |
| Number of connection events arranged and held | 5 |
| Number of short courses, unit contributions presented | 5 |
| <i>Stakeholder (academic and policy) satisfaction indicator (qualitative)</i> | 80% |

ANNEXURE A: ACHIEVEMENTS 2017-2019

| Project | Funding Sources and \$ | Status |
|---|--|--------------------------------|
| Project 1: Addressing Future Uncertainties of Perth at 3.5 Million: What-If Scenarios for Mass Transit | Core funded (\$125,000) | Completed (2017) |
| Project 2: Factors Affecting Travel Behaviour Choice | Core funded (\$100,000) | Completed (2017) |
| Project 3: An Appraisal of Travel Plans and Voluntary Transport Behaviour Projects | Core funded (\$55,000) | Completed (2017) |
| Project 4.1: Understanding Travel Behaviour Patterns and Trends – macro analysis | Core funded (\$195,000) | Completed (2017) |
| Project 4.2: Understanding Travel Behaviour Patterns and Trends – micro analysis | | Completed (2017) |
| Project 5: Understanding Freight Demand Generation Patterns in Perth | Core funded (\$105,000) | Completed (2017) |
| Urban Analytics Data Infrastructure – Accessibility Tool (ADAPT) | Externally funded - ARC LIEF (\$90,000) | Completed (2017) |
| iMOVE 2-001 Supplementary research (Freight) | \$75K (DOT, Fremantle Ports, Arc Infrastructure) | Completed (2018) |
| Your Move Station Options Analysis – Infographics | \$20K (DOT) | Completed (2018) |
| iMOVE 1-003 Enhanced short and longer term network performance prediction capabilities through data-driven analytics and simulation | \$280,000 (PATREC/iMOVE/UWA/ECU) | Completed (2019) |
| iMOVE 2-001 Planning intermodal and general logistics infrastructure for the future needs of Perth | \$320,000 (PATREC/iMOVE/UWA/ECU) | Completed (2019) |
| iMOVE 1-003 Supplementary research (ITS - Data fusion, AV simulation (agent-based)) | \$200K (Main Roads WA) | Substantially completed (2019) |
| RailSmart Planning Wanneroo | \$1million (Smart Cities and Suburbs grant, City of Wanneroo, DOT, UWA, ECU) | Completed (2019) |
| Pulse of Perth: Visualising Public Transport Data Study | \$70K (RAC) | Completed (2019) |
| Incident prediction | \$32,000 (Main Roads WA) | Completed (2019) |