



ANNUAL BUSINESS PLAN 2021

FINAL

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Prepared by

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Version control

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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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1. INTRODUCTION

1.1 About this Plan

1.1.1 Contractual requirement

According to the Collaborative Agreement executed on 8 December 2016, annual business plans will be presented to the Board at the last meeting of each calendar year for approval and will direct business for the following year. They should include a description of the program of research to be undertaken by PATREC during that year, a budget for that year, planned targets for agreed financial and non-financial key performance indicators, and any update of the Strategic Plan for that year.

Annual business plans are prepared in the context of the prevailing strategic plan which is revised every three years. The current strategic plan is valid for the three-year period 2020-2022 and was approved by the Board on 12 December 2019. Any interim strategic updates are included as part of the annually prepared business plans.

1.1.2 Purpose

The purpose of this Business Plan 2021 is to:

- update the strategic drivers impacting on PATREC's research plan for 2021;
- outline the research project program for 2021;
- provide a working budget for 2021;
- outline human resources plan for 2021; and
- set key performance indicator targets.

1.2 About PATREC

1.2.1 Agreement

PATREC was initially formed in 2002 but is most recently governed by the Collaborative Research Agreement signed in 2016 by six core partners:

- University of Western Australia
- Curtin University
- Edith Cowan University
- Department of Transport
- Main Roads Western Australia
- Western Australian Planning Commission.

The 2016 agreement includes a three-year rolling funding arrangement to provide a greater level of continuity.

The Western Australian Local Government Association joined the collaboration as a non-paying core partner in 2018.

1.2.2 Purpose

To conduct collaborative, applied research and teaching in support of policy in the connected spaces of transport and land use planning.

1.2.3 Governance

PATREC is governed by a Board representing its sponsoring universities and the Government of Western Australia. The role of the Board is to provide leadership and strategic direction to the Centre

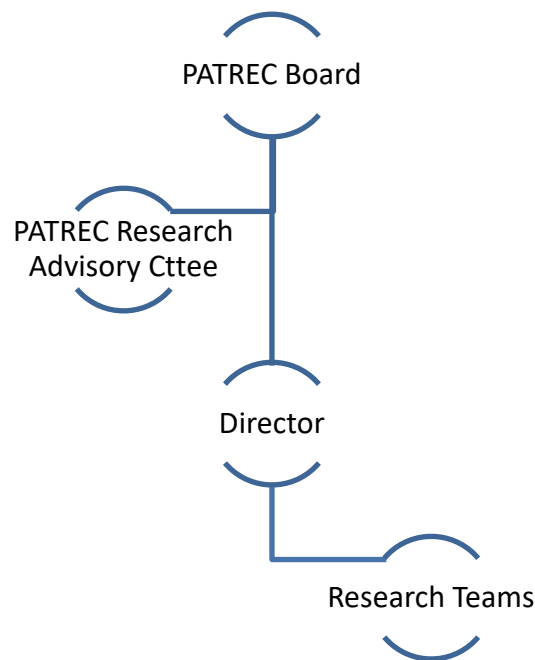
and to promote cooperation and collaboration between all parties involved. It has an independent chairman and meets three times per year. The following are the current Board members.

- Adj Prof Reece Waldock Independent Chairman
- Prof Alan Dench Curtin University
- Prof Kerry Brown Edith Cowan University
- Prof Andrew Page University of Western Australia
- Mr Steve Beyer Department of Transport
- Mr Peter Woronzow Main Roads Western Australia
- Adj Prof David Caddy Western Australian Planning Commission
- Mr Ian Duncan WA Local Government Association

PATREC is led by its Director Professor Sharon Biermann and supported by two Research Fellows.

The PATREC Research Advisory Committee (PRAC) was established in 2016 and comprises senior representatives from each partner organisation, chaired by a nominated representative elected by the Board. The objectives of PRAC 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.

The following diagram represents the hierarchal governance structure underpinning PATREC



1.2.4 Relationships and Stakeholders

Beyond the seven core partners the work of the Centre could not be completed without forging strong relationships within our academic, research and policy community but also amongst private industry with consulting and independent research agencies.

2. STRATEGIC DIRECTION

The most recent Strategic Plan, including a Business Plan for 2020, was approved by the Board on 12 December 2019 and sets out the direction of the Centre from 2020 to 2022. It is reviewed every three years with updates included in annual business plans.

2.1 Value Proposition

Capitalising on its extended [international] network of academic expertise and policy partners, PATRECs 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 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
4. attracting additional research funds through business development.

in order to advance the knowledge base and forge new and innovative evidence-based solutions for effectively planning and managing Western Australia’s future.

2.2 Research Focus Areas

PATREC has established five research programs to undertake research and deliver high-impact outcomes, although collaboration between programs is expected and required. These programs were developed in response to the research needs and questions arising from the stakeholder-informed strategic planning process, the research competence base across the three collaborating universities and emerging external funding opportunities.

<p style="text-align: center;">Integrated land use and transport futures</p> <p>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</p>
<p style="text-align: center;">Smarter travel decisions</p> <p>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</p>
<p style="text-align: center;">Integrated freight system optimisation</p> <p>Planning intermodal and general logistics infrastructure for the future needs of Perth</p>
<p style="text-align: center;">Emerging technology and network optimisation and intelligence</p> <p>Developing a data- and simulation-driven decision support system for optimising road network operations</p>
<p style="text-align: center;">Transport infrastructure investment risk management</p> <p>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</p>

2.3 Strategic Drivers Update

The strategic drivers presented in the Strategic Plan 2020 – 2022, remain relevant in relation to this Business Plan. Westport and Metronet remain the key government priorities affecting planning and transport in Western Australia. Participation of PATREC in the iMOVE CRC (until 2027) and in the Australian Urban Research Infrastructure Network (AURIN) through the Australian Transport Research Cloud project (until December 2023) provide a medium to longer term, national backbone to PATREC research.

The COVID-19 pandemic and associated restrictions have seen significant changes to inhabitants' activity and mobility patterns, brought about by swift changes to national and State regulations. There has been an unprecedented level of individuals' experience with working from home (WFH), as well as increased participation in online learning, shopping and services (e.g. medical). Although not as dramatic as in other countries and cities, the result of various levels of lockdown saw a significant drop in public transport patronage and traffic flows (by private car) and increases in walking and cycling (for transport and for recreation/health), as well as freight journeys (the latter considered an essential service).

This disruptive episode has highlighted, amongst others, a lack of in-depth knowledge on the spatial incidence of home-working, the extent of travel reduction, and the use of local facilities (such as co-worker spaces) whilst WFH. The lockdown period thus provides a unique opportunity (natural experiment) for PATREC to build new knowledge on these issues, on the back of actual experience, and develop approaches to perpetuate and mainstream some of the more positive behaviours and outcomes, in particular for employers, employees, transport infrastructure provision and macro-economic benefits.

3. LAST YEAR'S PERFORMANCE

Key outputs for 2020:

- Identification of new PATREC core research program (2021-2023) comprising 7 projects scheduled to commence July 2021
- PATREC core research program (2019-2021)
 - 5 projects/sub-projects substantially **completed** with Final Reports accepted and dissemination undertaken:
 - Managing transport system investment risk:
 - Sub-project 1: Understanding systematic factors driving patronage shifts
 - Sub-project 2: Determining digital journey planning impacts on patronage
 - Sub-project 3: Adapting strategic asset management practice to account for the uncertainty of CAVs
 - Sub-project 4: Maximising prioritisation of infrastructure investment proposals in the face of uncertainty
 - Increasing older people's acceptance of shared, automated and electric vehicles
 - 2 projects delivered key **interim milestones**:
 - Enhanced Vehicle Detection at Traffic Signals and on Smart Freeways – Report accepted: Literature review, technology assessment & experimental design guidelines
 - Enhanced land use inputs to strategic transport models through advanced econometrics – Training and training package delivered
 - Final project of program **commenced**:
 - Modelling perimeter controls based on macroscopic fundamental diagrams
- External projects completed
 - Main Roads projects

- Drone video analytics
- Multi-Objective genetic algorithm Optimisation for network widening and maintenance scheduling
- Supplementary ITS (iMOVE) – data fusion; SILO agent-based LU simulation
- Parameters for roundabout modelling
- External projects agreed and commencing
 - iMOVE
 - Smart Transport Technology Roadmap Project (RAC, UWA)
 - Working from Home: Changes in Transport Demand (DOT, TNSW, UWA, Curtin)
 - AI-assisted Model Calibration for Real-time Traffic Simulation (Main Roads WA, Aimsun, UWA)
 - AURIN/Australian Research Data Commons
 - Australian Transport Research Cloud
 - ARC Linkage participation
 - Map My Say
 - Main Roads and Department of Transport:
 - Extension to Drone Video Analytics (MRWA)
 - Travel behaviour change economic appraisal tool (DOT)
- ARC Linkage proposal submitted: Data driven approach to improve intersection modelling using video content analytics (Main Roads WA, Aimsun)
- 10 peer-reviewed journals published - exceeded target by 100%

4. 2019-2021 CORE PROJECT COMPLETION

In 2021, the remaining projects in the program will be completed with the exception of two project which will extend into 2022 and 2023 due to a late start (Modelling perimeter controls based on macroscopic fundamental diagrams) and sensor acquisition and installation by Main Roads WA (Enhanced Vehicle Detection). Key project activities for 2021 are outline in Table 1.

Table 1: Activities for 2021 in completing 2019-2021 core program of projects

Project	Activity
Managing transport system investment risk (4 sub-projects)	Wider dissemination through PATREC seminar and iMOVE dissemination opportunities. Academic publication.
Increasing older people’s acceptance of shared, automated and electric vehicles	Wider dissemination through PATREC seminar and iMOVE dissemination opportunities. Academic publication.
Enhanced Vehicle Detection at Traffic Signals and on Smart Freeways	Main Roads WA to acquire and install sensors at analysis sites at traffic intersection and on smart freeway
Enhanced land use inputs to strategic transport models through advanced econometrics	Best practice literature review and international user survey completed. Academic publication.
Modelling perimeter controls based on macroscopic fundamental diagrams	Interim milestone delivered - implemented MFD controls in the Aimsun Live model (as an offline model)

5. 2021-2023 CORE PROJECT COMMENCEMENT

A sub-committee of the PATREC Research Advisory Committee (PRAC) was convened to run the process to select a new round of projects commencing July 2021 with \$714k of core funding. A new program was recommended to PRAC and agreed on (Table 2). The Board subsequently approved PRAC's recommendations. These projects will be further developed from concept proposal to full contractual agreement in collaboration with project steering committees during the first 6 months of 2021.

Table 2: Core projects as part of the PATREC core project package (2021-2023)

Research ideas prioritised				Concept proposals selected			PRAC decision 12/11/20	
CP no.	Project Title	Proposer	Key Agency	Submitted by	Uni/s	Budget (\$)	Adjusted budget (\$) - excl. infra	Decision
10	Working from home travel impacts - DPLH component	Sharon/Damian	DPLH	Sharon Biermann	Curtin/UWA	30,000	30,000	Agreed
4.2	Transport Environment and Kids... 10 Years On	Michelle Prior	DoT/DPLH	Gina Trapp	UWA	135,000	100,000	Agreed
5.1	Identifying opportunities to address transport disadvantage in Perth	Claire Thompson	DoT	Sae Chi et al	PATREC, UWA, Curtin	99,594	99,594	Agreed
9	Integrated freight system optimisation for Western Australian Context	Reza Kiani Mavi	DoT/DPLH	Reza Kiani Mavi	ECU	99,918	84,930	Agreed* subject to rescope
3.3	Integrating AI and IoT based Bridge Health Monitoring with MRWA BMS for Smart Freight Management	Raquib Hossain	Main Roads	Jun Li, Chao Sun	Curtin, UWA	204,500	179,476	Agreed - include IoT - AM
6.1	A Value Driver Model for Traffic Signals	Chris Scholte	Main Roads	Chao Sun, Mark Reynolds	PATREC/UWA	120,000	120,000	Agreed
8	Develop machine learning models for road maintenance investment decision making	Chao Sun	Main Roads	Chao Sun	PATREC	100,000	100,000	Agreed
TOTAL						789,012	714,000	

6. EXTERNAL PROJECTS 2021

PATREC will continue to pursue external project opportunities as they arise ie. those projects which do not receive any PATREC core funds. 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.

There are already, however, a number of external projects signed-up and commencing which will absorb significant PATREC resources during 2021. Half of these projects have been initiated by the iMOVE CRC through the process of calling for EOI to which PATREC has responded and been successful with. As part of AURIN's collaborative ATRC, funded by the Australian Research Data Commons, PATREC is the lead for the WA Hub which will bring in secure funding over 3 years. The remaining external projects are those with PATREC partners, Main Roads WA and DoT.

Table 3: External projects secured for 2021

Project	Source/Status	Lead and participants	Funding/Duration
Smart Transport Technology Roadmap	PATREC-iMOVE-RACWA – signed and commenced	Sae Chi (UWA, Curtin)	\$200k/1 year
Working from home – changes in transport demand (most PATREC partners involved)	PATREC-iMOVE – signed	Sharon Biermann (UWA, Curtin)	\$240k/18 months
AI-assisted Model Calibration for Real-time Traffic Simulation (Main Roads WA, Aimsun, UWA)	PATREC-iMOVE-Aimsun – under negotiation	Chao Sun (UWA)	\$400k/18 months
Australian Transport Research Cloud – WA component	AURIN/ARDC - signed	Sharon Biermann (UWA, Curtin)	\$450k/3 yrs
Extension to Drones	MRWA - agreement in process	Chao Sun (UWA)	\$40k/6 months
Travel behaviour change economic appraisal tool	Agreement in process (DoT)	Sae Chi	\$20k/2 months
Data driven approach to improve intersection modelling using video content analytics	ARC Linkage application – rejoinder submitted (MRWA, UWA, Aimsun) If unsuccessful, Main Roads will still support a project in this space	Chao Sun (UWA)	\$180-400k/ 1-3 years

7. BUDGET 2021

Increased subscription payment 2021 as per signed variation agreement have been included in the budget estimate (Table 4), together with expected income from external projects. The budget for 2021 as included in the prevailing three-year Strategic Plan 2020-2022 is included for comparison purposes. The main difference to the budget included in the Strategic Plan is as a result of "External" iMOVE project activity which attracts additional funding from partners and others (some of which flows through PATREC as in-out), together with additional Commonwealth funding from iMOVE. The other difference is that the iMOVE UWA funds are now used as required additional research contribution to External iMOVE projects which involves UWA researchers while the increased subscription replaces the UWA funding as the core research contribution to iMOVE core projects (as per Board decision on 30 July 2020).

The estimated 2021 budget has been updated since the draft with the actual year end (31 December 2020) closing balance of \$102,687.85.

Table 4: Estimated Budget 2021

PATREC Income and Expenditure	Budget 2021 (Strat Plan)	Budget 2021
INCOME		
WA Government Grants	285,320	285,320
Universities Sponsorship	205,838	205,838
iMOVE Commonwealth core	300,000	300,000
iMOVE UWA - for external projects	70,000	70,000
External - additional gov/industry/uni (non-iMOVE)	100,000	150,000
External - partner contributions for iMOVE (if through PATREC)		30,000
Other Research Grants & Contracts (incl. External iMOVE projects)	320,000	550,000
Accrued Interest	0	0
Total Income	1,281,158	1,591,158
EXPENDITURE		
PATREC OFFICE	211,768	135,768
Director (0.4)	93,497	93,497
Administrative support	76,000	0
General Office Costs incl. web services	15,000	15,000
Board Chair Stipend	27,271	27,271
RESEARCH PROJECTS	1,062,324	1,430,246
Research Co-ordination (Dir. 0.6)	140,246	140,246
iMOVE participation	220,000	220,000
iMOVE external project contributions	0	100,000
PATREC Research Fellows	402,078	420,000
Researcher Assistants, Consultants, Expenses	300,000	550,000
Total Expenditure	1,274,092	1,566,013
YTD BALANCE	7,066	25,145
Balance Brought Forward	69,496	102,688
CLOSING BALANCE (incl Balance B/F)	76,562	127,832

8. 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 more widely as required.

The research team is broadly consistent with that presented in the Strategic Plan with extensions to expiring fixed-term and casual contracts taking place in late 2020 to ensure resourcing is secured to deliver on concluding and commencing core projects and external projects (Table 5). PATREC participants in the new round of PATREC projects (2021-2023) and external projects, have been included in the list (Table 5).

Table 5: Research Administration, Development, Coordination and Management

PATREC Office		
Sharon Biermann	0.4 FTE	Director
Vacant	0.8 FTE	Centre Administrator – funding re-allocated to research
Research Team		
Sharon Biermann	0.6 FTE	Director – ongoing, contingent on funding
Yuchao Sun	1.0 FTE	PATREC Senior Research Fellow (traffic engineering); fixed-term (to Dec 2022)
Sae Chi	1.0 FTE	PATREC Research Fellow (transport economics); fixed-term (extended to Dec 2022)
Tristan Reed	0.8 FTE	PATREC Research Assistant, Curtin (extending to June 2022)
Haiyan Liu	1.0 FTE	PATREC Research Fellow (economics, transport modelling), seconded to and paid by DOT (to March 2021); negotiating with DoT for extension
Level D/E academic	0.5FTE	Opportunity under investigation, not fully budgeted
Sergio Matias	1.0 FTE	PATREC Research Assistant to Chao Sun (computer science); casual contract (extended to Dec 2021)
Yan Ji	1.0 FTE	PATREC Research Assistant to Chao Sun (software development); fixed-term (extended to Dec 2022)
Rachel Cardell-Oliver	In-kind	Research Associate, UWA Computer Science
Mark Reynolds	In-kind	Research Associate, UWA Computer Science
Doina Olaru	In-kind	Research Associate, UWA Business School
Kirsten Martinus	In-kind	Research Associate, UWA Geography and Planning
Brett Smith	In-kind	Research Associate, UWA Business School
Cate Patterson		Research Assistant, UWA Business School
Julie Lee	In-kind	Research Associate, UWA Business School
Ken Clements	In-kind	Research Associate, UWA Business School
Tim French	In-kind	Research Associate, UWA Computer Science
Lyndon Whyte	In-kind	Research Associate, UWA Computer Science
Thomas Stemler	In-kind	Research Associate, UWA Mathematics
Atif Mansoor	In-kind	Research Associate, UWA Computer Science and Software Engineering
Farid Boussaid	In-kind	Research Associate, UWA Electrical, Electronic & Computer Engineering
Mohammed Bennamoun	In-kind	Research Associate, UWA Electrical, Electronic & Computer Engineering

Lynn Meuleners	In-kind	Research Associate, WA Centre for Road Safety Research, UWA
Gina Trapp	In-kind	Research Associate, Telethon Kids, UWA
Paula Hooper	In-kind	Research Associate, AUDRC, UWA
Simone Pettigrew	In-kind	Research Associate, Curtin
Jun Li	In-kind	Research Associate, Curtin
Carey Curtis	In-kind	Research Associate, Curtin
Caroline Knight	In-kind	Senior Research Fellow, CTWD, Curtin
Sharon Parker	In-kind	Director, CTWD, Curtin
Kerry Brown	In-kind	Research Associate, ECU
Subha Parida		Research Assistant, ECU
Reza Kaini Mavi	In-kind	Research Associate, ECU
Ferry Jie	In-kind	Research Associate, ECU
Hadrian Djajadikerta	In-kind	Research Associate, ECU

9. KEY PERFORMANCE INDICATOR TARGETS 2021

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

Table 5: Key Performance Indicator Targets 2021

Performance Indicator	Target 2021
<i>Academic Performance Indicators</i>	
Number of journal papers published	8
Number of peer-reviewed book chapters published	1
Number of peer-reviewed conference papers published in proceedings	0
Number of peer-reviewed books published	0
Number of post graduate research students attracted (and graduated)	2
Value (\$) of [direct] external research funding secured (through PATREC account)	\$1,100,000
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	3
Number of substantive Technical Reports/Working Papers accepted/published	3
Number of PATREC Perspectives published on PATREC website	3
Number of presentations at PATREC and other connection events	10
Number of connection events arranged and held	3
Number of short courses, unit contributions presented	3
<i>Stakeholder (academic and policy) satisfaction indicator (qualitative)</i>	85%