



**PATREC**

Planning and Transport Research Centre (PATREC)

# **STRATEGIC PLAN**

## **2017-2019**

**Including Business Plan 2017**

<b>Prepared by</b>	<b>Professor Sharon Biermann</b>
<b>Date</b>	<b>13 December 2016</b>
<b>Version</b>	<b>FINAL</b>

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY</b>	<b>3</b>
<b>1 INTRODUCTION</b>	<b>4</b>
1.1 Background	4
1.2 Purpose and Structure	4
1.3 Plan Development Process	4
<b>2 ACHIEVEMENTS IN BRIEF 2013-2016</b>	<b>5</b>
<b>3 VALUE PROPOSITION</b>	<b>5</b>
<b>4 STRATEGIC DRIVERS</b>	<b>8</b>
4.1 PATREC Review	8
4.1.1 Terms of the New Collaborative Agreement	9
4.1.2 Establishment of a PATREC Research Advisory Committee (PRAC)	9
4.1.3 New KPIs	10
4.1.4 Attracting Skilled Academic Staff	10
4.2 iMOVE Cooperative Research Centre (CRC)	10
4.3 Release of New Land Use and Transport Plans	11
4.3.1 Draft Perth and Peel@3.5million	11
4.3.2 Transport@3.5million - Perth Transport Plan for 3.5 Million People and Beyond	12
4.4 Approved Core Research Projects for 2016/7	12
<b>5 RESEARCH FOCUS AREAS</b>	<b>14</b>
<b>6 DELIVERING ON THE FOCUS AREAS</b>	<b>17</b>
6.1 Human Resources	17
6.2 Financial Resources	19
6.3 Management and operations	20
6.3.1 PATREC Research Advisory Committee (PRAC)	20
6.3.2 Project selection process	20
6.3.3 Project Management	21
6.4 Key Performance Indicators	21
6.5 Risks in Delivering on the Plan	22
6.6 Independent Review of PATREC	22
<b>7 BUSINESS PLAN 2017</b>	<b>23</b>
7.1 Background	23
7.2 Outputs	23
7.3 Core Research Projects	23
7.4 External Research Projects 2017	24
7.4.1 ARC LIEF Urban Analytics Data Infrastructure (UADI) Project	24
7.4.2 iMOVE CRC-related project commencement	24
7.4.3 RAC Project	24
7.5 Budget 2017	24
7.6 Key Performance Indicator Targets 2017	26

---

## EXECUTIVE SUMMARY

Guided by the previous Strategic Business Plan 2013-2016, Australian Venture Consultants (AVC) who undertook the independent review of PATREC, submitted their final report on 12 October 2015 with the following key findings:

- There remains a strong need for planning and transport research in WA.
- There is a strong role for PATREC in meeting those needs.
- PATREC has set itself ambitious targets for its limited resources and relatively limited time of 'renewed' operation.
- PATREC has demonstrated strengths and achieved successes.

Building on these achievements and addressing some of the challenges also raised in the review, the purpose of this Strategic Plan 2017-2019 (the Plan) is to set out the broad strategic direction of PATREC for the three year period 2017-2019, also providing a more detailed action-focussed Business Plan for the inner year, 2017. The Plan will be 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 2013-2016, accounting for a number of subsequent changes in strategic and operational drivers, most importantly:

- findings and recommendations of an independent review of the operational sustainability of PATREC (2015);
- terms of the new collaboration agreement;
- new longer term strategic planning regime;
- establishment of the PATREC Research Advisory Committee (PRAC);
- areas of success in attracting research projects 2013-2016;
- project selection process and outcome (2016/17); and
- iMOVE CRC Bid process.

Within the updated mandate of "conducting collaborative, applied research and teaching in support of policy in the connected spaces of transport and land use planning", the research focus areas for the next three years have evolved as:

- Integrated land use and transport futures;
- Smarter travel decisions;
- Integrated freight system optimisation; and
- Emerging technology and network optimisation and intelligence

All these focus areas are underpinned by a supportive information and modelling platform. 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 for 2017:

- Completion of five core projects which commenced in late 2016 with final Technical Reports published and further stages with additional funding proposed if appropriate;
- Completion of the ARC LIEF project;
- Undertake RAC projects;
- Approval and commencement of Freight and Network Planning projects in alignment with iMOVE with freight industry funding secured;
- ARC Linkage/other research grant proposals submitted;
- PATREC Book, Planning Boomtown and Beyond, launched; and
- PATREC Research Forum held.

---

# 1 INTRODUCTION

## 1.1 Background

The last PATREC Strategic Business Plan was produced for the period 2013-2016 following an intensive stakeholder engagement process after the recommencement of PATREC at The University of Western Australia (UWA) under a new collaboration agreement in 2012. A more detailed Business Plan for the inner year, 2013, was incorporated as part of the Strategic Business Plan 2013-2016 with subsequent Business Plans for 2014, 2015 and 2016 produced individually in line with, but updating where necessary, the overarching Strategic Business Plan 2013-2016.

Following an independent review of the operational sustainability of PATREC in 2015 (the Review), a new collaboration agreement was drawn up and is in the final stages of execution. The 2016 Business Plan incorporated a strategic update in response to many of the recommendations of the Review, not least of which was the establishment of a PATREC Research Advisory Committee (PRAC). The PRAC together with a series of research project steering committees, has been instrumental in guiding the research direction presented in this revised Strategic Plan for the period 2017-2019, through the process of selecting five research projects. These five projects, all within the broad ambit of the still relevant research focus areas identified in the Strategic Business Plan 2013-2016, incorporated as part of the Business Plan 2016, commenced in late 2016 but will substantively be undertaken during 2017, forming the basis of the research activity envisaged in the Business Plan 2017.

The 2016 Business Plan in effect forms a bridge from the previous Strategic Business Plan 2013-2016, strongly informing this new Strategic Plan. The Strategic Plan for the period 2017-2019 incorporating a Business Plan for 2017, is presented to the PATREC Advisory Board at its last meeting of 2016, in accordance with the terms of the new PATREC Collaborative Agreement.

## 1.2 Purpose and Structure

The purpose of this Strategic Plan 2017-2019 (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, 2017. In line with the new agreement, the Plan will be revised every three years with any interim updates required, included as part of the annually prepared Business Plans.

The 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 2013 and a restatement of the value proposition of PATREC as presented in the previous Strategic Business Plan, 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 2017.

## 1.3 Plan Development Process

This Plan has been compiled on the basis of the following informants:

- Strategic Business Plan 2013-2016;
- Strategic update of the PATREC Business Plan 2016, including:
  - Independent review of the operational sustainability of PATREC (2015);
  - Terms of the new collaboration agreement;
  - PRAC establishment, project selection process and outcome (2016); and
  - iMOVE CRC Bid process.

---

## 2 ACHIEVEMENTS IN BRIEF 2013-2016

Australian Venture Consultants (AVC) who undertook the independent review of PATREC, submitted their final report on 12 October 2015 with the following key findings:

- There remains a strong need for planning and transport research in WA.
- There is a strong role for PATREC in meeting those needs.
- PATREC has set itself ambitious targets for its limited resources and relatively limited time of 'renewed' operation.
- PATREC has demonstrated strengths and achieved successes.

Guided by the last Strategic Business Plan 2013-2016, PATREC has successfully achieved outcomes across a range of performance areas, including:

- Research Projects
  - Commencement of 24 separate research projects (Annexure A);
  - Completion of 17 research projects with associated technical reports (Annexure A);
- Additional Resources
  - \$1,042,000 of additional funding sourced from non-subscription income (Annexure A);
- Higher degrees and Training
  - Four doctoral candidates on PATREC top-up scholarships;
- Knowledge Transfer & Information Dissemination
  - 22 seminars/events hosted by end 2016 with more than 600 attendees;
  - One Research Forum with more than 150 participants;
  - Five PATREC Perspectives published on the PATREC website to communicate research findings in an accessible format;
  - 26 conference papers presented at national and international conferences by end 2015;
  - 27 journal articles, peer-reviewed conference papers and book chapters, directly related to core PATREC activities, published by end 2015.
  - One publication-ready PATREC Book "Planning Boomtown and Beyond" including 28 peer-reviewed chapters from PATREC Associates.

In addition, a PATREC independent operational sustainability review undertaken.

---

## 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 2013-16 and can be stated as follows:

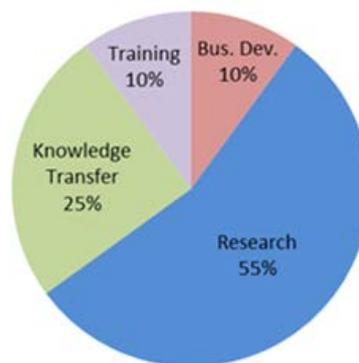
Capitalising on our extended [international] network of academic expertise and policy partners, our **value proposition** is to **broker and conduct** applied research and teaching in support of policy in the connected spaces of transport and land use planning through the following four key strategic 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

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

The relative importance of each of these activity areas remains consistent with the priorities set in the Strategic Business Plan 2013-2016, 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 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 STRATEGIC DRIVERS**

Building on the achievements of the last four years but accommodating the recommendations of the PATREC Review and other current strategic contextual drivers, this Strategic Business Plan 2017-2019 is intended to guide the operations of PATREC and its research program during that period. The release of the draft Perth and Peel@3.5million land use plan (WAPC, 2015) and the Perth Transport Plan (Department of Transport (DOT), Public Transport Authority (PTA) and Main Roads Western Australian (MRWA), 2016) and the bid for a new smart transport Cooperative Research Centre (CRC), iMOVE, intended as a ten year program, further influence the research activities for this period.

### **4.1 PATREC Review**

At the Advisory Board Meeting held on 12 March 2015 (#39), it was agreed that a review of arrangements for the continuing and sustainable operation of PATREC would be undertaken to facilitate continuous attraction and retention of high quality research staff, and to provide for more efficient forms of cross-institutional collaboration. Consultants were accordingly appointed to advise the Advisory Board on:

The effectiveness of the current inter-university ‘collaborative’ research model;

- The effectiveness of fixed-term renewable collaborative agreements;
- Appropriate models for research collaboration for the future of patrec after termination of the present agreement;
- Appropriate models for financial and academic resourcing for the future of patrec; and
- After consultation with the Chair of the Advisory Board, any other relevant matters.

Australian Venture Consultants (AVC) submitted their final report on 12 October 2015 with the following key findings:

- There remains a strong need for planning and transport research in WA.
- There is a strong role for PATREC in meeting those needs.
- PATREC has set itself ambitious targets for its limited resources and relatively limited time of ‘renewed’ operation.
- PATREC has demonstrated strengths and achieved successes.
- PATREC is facing some challenges, many relating to insufficient levels of staffing:
  - Attracting and retaining appropriately skilled academic staff from within partner universities and externally;
  - Developing a research capacity pipeline through teaching;
  - Reliance on existing public sector agency partners for major project funding;
  - Need for ‘thought leadership’ independent of the governance-oriented advisory board;
  - Perceived high administration levels;
  - Building public profile through media and engagement with industry partners;

- Role and responsibilities of the advisory board; and
- KPIs are too ambitious for the small scale of operation and not sufficiently outcome-oriented, addressing both academic and policy-relevant objectives.

After engagement with PATREC partners following the Review, the following key actions were agreed to address key challenges:

- A new Collaborative Agreement with current collaborating partners and a three-year rolling funding arrangement;
- Establishment of a PATREC Research Advisory Committee (PRAC);
- New set of KPIs – fewer/focussed, outcome-oriented, both academic and policy relevant; and
- Renewed impetus to attract skilled academic staff.

These are the key aspects that have directed the formulation and implementation of this Plan and are expanded on in subsequent sections.

#### **4.1.1 Terms of the New Collaborative Agreement**

These terms of agreement are based on the PATREC Review and subsequent feedback from and discussions with partners. The Advisory Board agreed that:

- The operating model to remain as a ‘collaborative research centre’, not transitioning to a single university centre.
- A rolling three-year financial regime, ie. an agreement by all parties that they will make financial contributions, according to an agreed scale, in each of three years, with the triennial end-date rolling forward annually by one year, subject to agreement by the Advisory Board (on behalf of their respective institutions).
- An exit clause to be included for participants to leave the collaboration after a notice period of one year.
- The Advisory Board to focus on high level, strategic matters, ensuring that expectations of all collaborating partners are being met and that the frequency of Advisory Board meetings is to be reduced from four to three times a year.
- PATREC to focus on conducting collaborative, applied research and teaching in support of policy in the connected spaces of transport and land use planning.
- A PATREC Research Advisory Committee (PRAC) to be established to (1) enhance collaboration amongst partners at the research project level; and (2) introduce an element of formality and rigour to the research project identification, selection, support, monitoring and dissemination. Comprising at least one senior representative from each partner organisation, chaired by one of the government partners and meeting three times per annum in advance of Advisory Board meetings, so as to be in a position to advise the Advisory Board on more detailed research project matters, allowing the Advisory Board to concentrate on strategic matters.

These intentions have been incorporated into a new Collaborative Agreement, currently being circulated to Advisory Board members with signatures of collaborating partners expected before the end of 2016.

#### **4.1.2 Establishment of a PATREC Research Advisory Committee (PRAC)**

The PATREC Review and feedback and discussion process which followed, highlighted the need for an element of formality and rigour to be introduced in the identification, selection, support, monitoring and dissemination of research projects.

At its meeting on the 21 April 2016 (#43), the Advisory Board agreed to the establishment of the PATREC Research Advisory Committee (PRAC) with the purpose of strengthening coordination amongst the PATREC partners in relation to the identification, planning, prioritisation, conducting, progress monitoring and promoting core funded applied research projects.

Comprising one to two senior representatives from each partner organisation, chaired by a nominated representative of one of the government partners, elected by the Advisory 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 Advisory Board on project level matters, allowing the Advisory Board to focus on strategic matters.

#### **4.1.3 New KPIs**

The Review suggested that in relation to the small administration with limited capacity, there may be too many targets being set and measured. It also suggested that consideration be given to whether what is being measured is driving the behaviours desired for the success of PATREC ie. indicators which measure the impact and quality of research outputs and stakeholder engagement efforts, as opposed to just the volume of those activities.

#### **4.1.4 Attracting Skilled Academic Staff**

Further to the benefits of a three year rolling agreement in terms of bringing more certainty into mid to longer term research activities with an enhanced ability to attract senior and experienced research academics, the approach initiated in 2016, and planned to continue, is to appoint PATREC coordinators to support university partner Advisory Board members and the Director to enable stronger levels of engagement and linkages with academic institutions ensuring clear working relationships and expectations and harnessing necessary skills and capacity to undertake PATREC research.

### **4.2 iMOVE Cooperative Research Centre (CRC)**

A Bid process commenced in 2016 for the iMOVE CRC (Intelligent MObility & Vehicle Evolution) with the Stage 1 submitted on 31 March resulting in the invitation to proceed to the Stage 2 submission on 20 October. After interviews with finalists in November, an announcement of the outcome is expected in January with commencement in mid-2017. On 21 April 2016, the PATREC Board agreed to contribute a total of \$150K per annum of Main Roads' and the Department of Transport's PATREC subscription to the iMOVE CRC, if it is successful. This will comprise the essential "industry" funding contribution to the CRC, resulting in a leveraging of at least a 1:1 ROI with additional research funds also committed by both Curtin and UWA. The intention is that PATREC would be the vehicle through which WA industry and researchers participate in and are represented through in the formal management structures of the iMOVE CRC and in as far as capability and capacity exists, WA research institutions will conduct the necessary research to address identified local WA industry research needs.

The proposed priority areas/themes and expected outcomes align well with some PATREC research focus areas and provides the opportunity in particular, to develop the freight research capacity and capability of PATREC (Table 1).

**Table 1: iMOVE CRC themes and anticipated outcomes**

Theme	Outcomes
<p>Theme 1: Intelligent Transport Systems &amp; Infrastructure</p> <p>Congestion is rapidly rising and building new infrastructure is placing an unsustainable drain on funding</p>	<p>1.01 Multi-modal information service and data framework</p> <p>1.02 Next generation traffic management software</p> <p>1.03 Roadmap of infrastructure requirements for future transport systems</p> <p>1.04 New Generation Traffic Models</p> <p>1.05 Analysis of driver behaviour to reduce accidents</p>
<p>Theme 2: Creating End-to-End Freight Solutions</p> <p>To address inefficiencies in the fresh produce and multimodal freight system that impact on their profitability</p>	<p>2.01 Integrated models and solutions</p> <p>2.02 Technologies for freight condition monitoring and communication</p> <p>2.03 Real time end-to-end risk management models</p> <p>2.04 Shared data protocols and structures</p>
<p>Theme 3: Enhanced personal mobility</p> <p>Australian cities are struggling to cope with the volume of traffic. However, the need for personal mobility is expanding.</p>	<p>3.01 Dynamic and intelligent tool for personalised travel needs</p> <p>3.02 Personal journey data protocols covering multiple modes of transport</p> <p>3.03 Data on Public acceptance and understanding of new technologies and services</p>

iMOVE CRC offers significant opportunities for PATREC leverage with the following benefits:

- Good alignment between WA transport research needs (and what PATREC is prioritising in any case) and themes outlined in the Bid Prospectus and Stage 1 submission – at least at a high level, with opportunity in Stage 2 to incorporate WA specific needs. Integrated land use and transport planning, scenario planning, modelling, big data, performance management, travel demand management, are all included currently;
- Strong alignment between objectives of CRC and PATREC - focus on applied research and outcomes to meet industry needs;
- Mobilise WA transport research within a broader national agenda;
- Give PATREC some necessary critical mass and scale – broadens transport research involvement – attracting other skills (maths, computer science, engineering) to be applied in solving transport problems;
- What we would have done anyway to respond to WA research needs but at more significant scale;
- Access to research networks, skills and industry across the country; and
- Associated education and training program.

## 4.3 Release of New Land Use and Transport Plans

### 4.3.1 Draft Perth and Peel@3.5million

The draft *Perth and Peel@3.5million* suite of strategic land use planning documents aiming to accommodate 3.5 million people by 2050 was released in May 2015 with the vision of:

*“a great, connected city that is globally competitive and technologically advanced; that is sustainable, resilient and respects its natural assets and heritage; that maximises the use of new and existing infrastructure; and that offers a mix of housing and lifestyle choices” (WAPC, 2015 p8).*

Some of the key challenges in managing the envisaged continuing high levels of population growth identified in the plan, offer significant scope for planning and transport research to inform policy development:

- Achieving residential infill target of 47 per cent by 2050;

- Ensuring as many new homes and jobs as possible are within existing activity centres, linked with efficient public transport routes;
- Reducing car dependency; and
- Maintaining liveability through managing the trade-offs between residential and employment location and infrastructure and service costs (WAPC, 2015 p16).

A connected city was identified as the preferred future growth pattern because it provides the best balance between urban infill and fringe development. There are planning and transport research opportunities in supporting agencies in their efforts in achieving a connected city in having:

- a strong central business district;
- a network of connected activity centres with high-quality public transport and road linkages;
- high-quality global and local infrastructure networks including roads, public transport and globally competitive, highly accessible airport and sea port infrastructure;
- urban form that maximises the use of existing infrastructure assets in parallel with extending infrastructure into the development areas of the outer sub-regions identified in the relevant draft sub-regional planning frameworks (WAPC, 2015 p21).

#### **4.3.2 Transport@3.5million - Perth Transport Plan for 3.5 Million People and Beyond**

To meet the transport planning challenges of changing land use patterns and employment distribution, low density development, congestion, improving network efficiency, adapting to technological advancements, and addressing physical inactivity and air quality, the objectives of the *Transport Plan*, released by the Government on 29 July 2016 are to:

- Optimise use of the existing network as it grows;
- Integrate with land use across the public transport, active transport and road networks;
- Deliver high frequency, 'turn up and go' mass rapid transit connected with effective public transport feeder services (the focus of the PATREC research report referred to above);
- Provide a safe, connected active transport network of primarily off-road cycleways and walkways; and
- Maintain a free-flowing freeway and arterial road network for the efficient distribution of people and freight (DOT, PTA & MRWA, 2016 p2).

The Plan offers an opportunity for planning and transport research in support of transport policy-makers in achieving an integrated network for 3.5 million people and beyond in the tasks of:

- Connecting major activity centres and encouraging transit orientated development that is well-served by all modes of transport for example trains, light rail, buses, on-demand transport services, cycling, walking and cars;
- Prioritising active and public transport to meet the significant increase in travel demand that population growth will generate;
- Complete the strategic road network and identify ways to use the network more efficiently; and
- Serve increasing freight demand with efficient links to ports, airports and intermodal hubs (DOT, PTA & MRWA 2016 p4).

#### **4.4 Approved Core Research Projects for 2016/7**

Through a process involving academic leads and teams, project steering committees, the PRAC and Advisory Board a set of five priority projects were developed and approved to commence in the second half of 2016 and continue through well into 2017. The approach was to use accumulated PATREC funds for these projects as a once-off strategy to utilise available funds.

Influenced by the policy research needs to support the newly released strategic and land use plans, the general **prioritisation principles** used by the PRAC to recommend projects for Board approval included:

- Avoid research areas currently highly politicised and where imminent change in the policy environment is expected (eg. value capture).
- Tools, data, models and new methodologies should not be the focus of a project but rather the means to answering certain policy-focussed questions.
- Should have a tangible bearing on specific policy, particular the suite of plans relating to the implementation of Perth and Peel@3.5million.
- Research which informs the Infrastructure Coordinating Committee (ICC) priorities is considered important.
- Research to inform planning and transport “aspirational” targets, eg. mode share targets, included in current strategic plans, was considered very important.
- Research which informs demand-side management and policy, ie. making the best use of current infrastructure deferring the need for more infrastructure, as opposed to supply-side solutions, was preferred.
- Research focussing on improving land use-transport interaction as part of the implementation of Perth and Peel@3.5million, without changing the overall chosen land use “scenario”, was highly prioritised.
- Research on long term city futures, depending on “more talk-shops” about possibilities which are “anybody’s guess” was not prioritised but possible alternative futures and their implications for travel demand and behaviour was considered more important.
- Research should build on what has already been done within the agencies and the detailed project plans should account for existing work and data, facilitated through project steering committees.

**Table 2: Approved Projects 2016/17**

Project	Research Questions and Policy Relevance
Project 1: Addressing Future Uncertainties of Perth at 3.5 million: What-if Scenarios for Mass Transit	<ul style="list-style-type: none"> <li>• Through a classification of station precincts, what is the appropriate infill response (land use mix and intensity) for different station typologies and what are the impacts on patronage?</li> <li>• What are the critical density, diversity, and patronage tipping points and threshold levels to inform where and at which stage land-use changes require additional infrastructure or support additional services and when the change is sufficient for viable patronage levels?</li> <li>• What are the investments/actions (land-use mix and intensity, infrastructure and non-infrastructure) required to maximise potential synergy (transit and place functions) at particular stations?</li> </ul> <p><i>Policy relevance:</i> Implementation of P&amp;P@3.5 million – LU mix and intensity at stations and AC to support 11% mode share target; ICC relevance; Inform business plans for investment in station precincts</p>
Project 2: Factors Affecting Travel Behaviour Change	<ul style="list-style-type: none"> <li>• What are the social-psychological motivators influencing travel attitudes and behaviours in different demographic groups which need to be accounted for in tailoring interventions for different demographic segments to change behaviour and reach mode share targets?</li> <li>• What are the social-psychological attitudes and potential travel behaviours in response to technical and social change?</li> </ul> <p><i>Policy relevance:</i> Will assist in targeting the most appropriate travel demand management interventions for different demographic groups to reach 11% aspirational mode share targets in the transport plan for P&amp;P@3.5.</p>
Project 3: An Appraisal of Travel Plans and Voluntary Transport Behaviour Projects	<ul style="list-style-type: none"> <li>• What standardised evidence-based method should be used to appraise specific travel plans for new developments and VTBC projects in order to prioritise TDM funding?</li> <li>• What are the benefits of travel plans for new developments and VTBC programs when included as a component of supply side projects including roads, railways and bike paths?</li> <li>• What standardised evidence-based method should be used to monitor and evaluate the impacts of travel plans and VTBC projects in order to justify TDM funding as well as make subsequent funding decisions?</li> </ul> <p><i>Policy relevance:</i> Will assist in the identification and appraisal of a targeted suite of TDM instruments that will be necessary in managing congestion. In particular, travel plans and DOT’s flagship voluntary travel behaviour change (VTBC) program, Your Move.</p>

Project	Research Questions and Policy Relevance
Project 4: Understanding Travel Behaviour Patterns and Trends	<ul style="list-style-type: none"> <li>• What are the spatial-temporal transport usage patterns as evident from SmartRider data in relation to socio-economic factors?</li> <li>• What are the origin-destination travel patterns as determined from SmartRider and other available data and how do they compare to modelled patterns?</li> <li>• Are there any new patterns of travel which can be discovered through data mining of SmartRider data?</li> </ul> <p><i>Policy relevance:</i> Performance monitoring in near real time – could feed into the Directions/P&amp;P@3.5 Annual Report Card; PT OD matrix validation, improve strategic modelling assumptions; inform PARTS survey sample frame, supporting evidence-based policy formulation.</p>
Project 5: Understanding Road Freight Demand Generation Patterns Per Industry Type – Perth Road Freight Analysis	<ul style="list-style-type: none"> <li>• What are the freight patterns generated by different types of industrial activity in metropolitan Perth?</li> <li>• What is the freight generating potential of businesses specialising in warehousing, distribution and logistics, in strategic areas such as Kewdale-Forrestfield-Hazelmere and the port precincts?</li> <li>• Why do businesses of various types locate in particular areas, and what are the barriers and costs associated with relocation to other areas, including new industrial zones, which might offer economic benefits?</li> <li>• What is the potential for improved use of rail for metropolitan freight by the various sector activities?</li> </ul> <p><i>Policy relevance:</i> Will provide much-needed data on road freight activity (scale, nature, origin-destination pattern and growth trends) and support planning for economic clusters</p>

Most of these priority projects have the potential to be developed further in subsequent phases beyond 2017 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.

## 5 RESEARCH FOCUS AREAS

Largely retaining the focus areas identified in the Strategic Business Plan 2013-16 process but with a slight change in emphasis and structure in response to current strategic drivers and policy priorities as determined through a process involving the PRAC, the research focus areas for 2017 to 2019 are:

- Integrated land use and transport futures;
- Smarter travel decisions;
- Integrated freight system optimisation; and
- Emerging technology and network optimisation and intelligence.

All these focus areas are underpinned by a supportive information and modelling platform (Figure 2). Externally-supported projects completed to date are mapped against focus areas as an indication of interest and research need. Where there has been in the past or there is currently, collaboration on projects with other local research groups, this has also been indicated (Figure 2). A process will be undertaken with the PRAC to further strategise about how best to engage with each of these groups including strengthening existing alliances, managing potentially competing relationships, establishing PATREC as a thought leader in some niche areas and building new relationships.

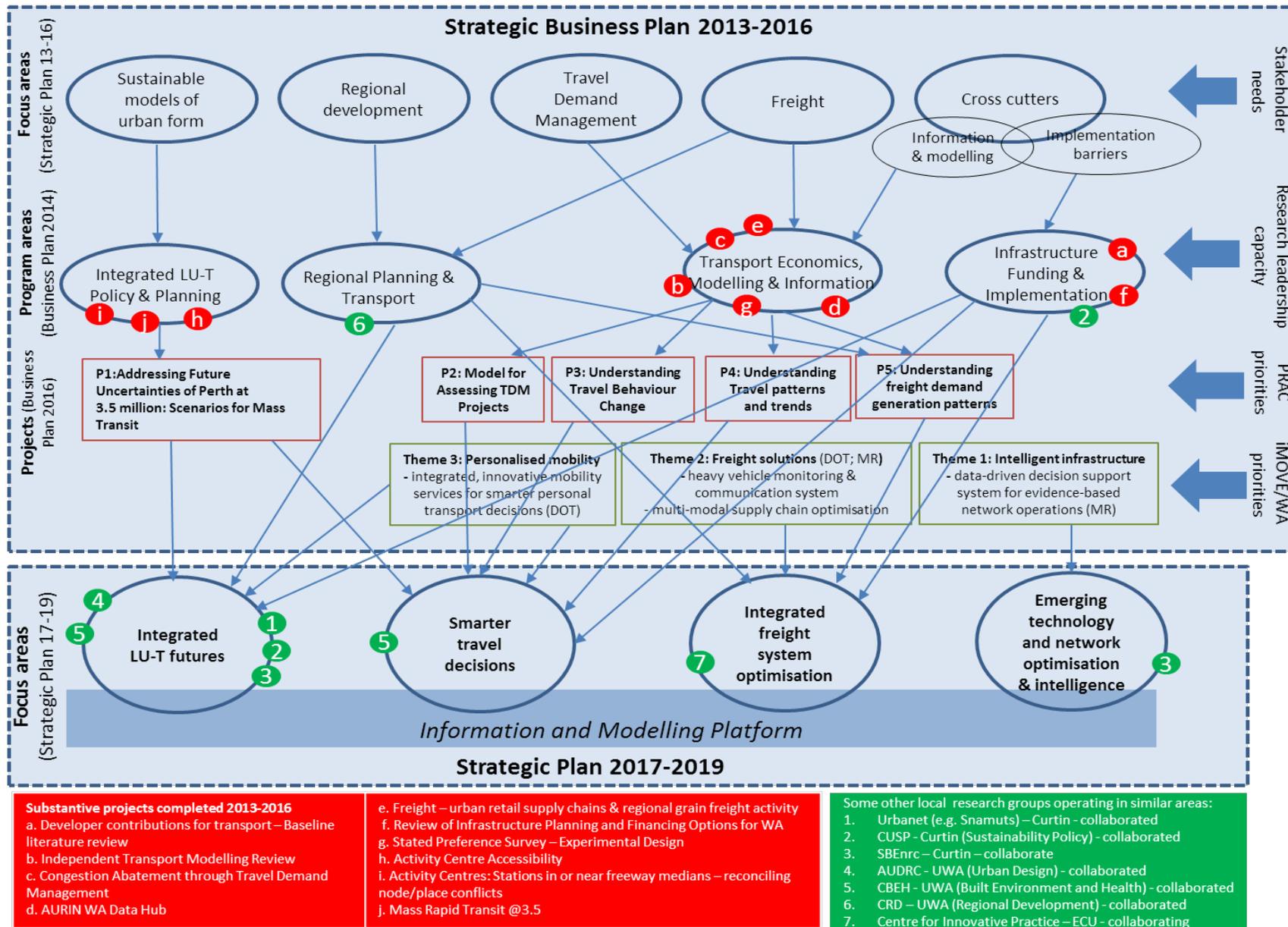


Figure 2: Evolution of PATREC strategic research focus areas

The **Integrated Land Use-Transport Futures** focus area for 2017-2019 is intended to inform the implementation of Perth & Peel@3.5 million and the associated Transport@3.5 plans through the development and application of advanced technologies to enhance feedback between urban land use and transport systems. Well-integrated land use and transport systems are key in achieving more efficient and sustainable travel patterns, leading to enhanced economic, social and environmental outcomes for urban futures. It developed from Sustainable Models of Urban Form (Strategic Business Plan 2013-2016), incorporated into the program area of Integrated Land Use-Transport Policy and Planning primarily for the purpose of academic leadership delegation (Business Plan 2014). Three substantive projects were completed in this area during the period 2013-2016 and a priority project (P1) approved by PRAC and the Board for 2016/17 (Business Plan 2016). It broadly involves improving land use and transport integration now and into the future, using a systems-based, scenario-oriented approach to longer term strategic forecasting and evaluation, depending on and informing, integrated LU-T modelling. The dynamics of specifically sub-regional employment in relation to employment type and transport systems interactions will be a particular focus of research to inform emerging land use and transport policy challenges in relation to achieving employment self-sufficiency outcomes.

**Smarter Travel Decisions** is concerned with understanding (1) current travel patterns and trends and (2) the human factors involved in travel choices in order to better manage travel demand. The research scope includes a focus on the potential for deployment and integration of technology to enable more intelligent and connected transport choices and help Australian cities use resources more efficiently and defer the need for new infrastructure (i.e. the 'smart cities' concept – <http://smartamerica.org/teams/smart-cities-us>). Understanding travel patterns and trends which relates to the spatio-temporal analysis of travel patterns in relation to socio-economic and policy drivers, can be traced back to the originally identified cross-cutting focus area of Information, necessarily underpinning research across all focus areas. Incorporated into the program area of Transport Economics, Information and Management for academic leadership purposes (Business Plan 2014), the area was reinforced by the securing of the substantial AURIN WA Data Hub project. In recognition of the importance of having a good understanding of spatial and temporal changes in travel patterns in relation to socio-economic and policy drivers, a priority projects (P4) in this area was approved by PRAC and the Board for 2016/17 (Business Plan 2016).

Understanding the human factors involved in travel choices relates to the intertwining of social-psychology and economics responsiveness to changing technology and TDM interventions and emanates from the Travel Demand Management focus area (Strategic Business Plan 2013-2016), assigned to the program area Transport Economics, Information and Management for academic leadership purposes (Business Plan 2014), with a TDM literature review project completed during 2013-2016. Two priority projects (P2 and P3) in this area have been approved by PRAC and the Board for 2016/17 (Business Plan 2016) and Theme 3 of the iMOVE CRC has relevance. Theme 3 - Enhancing Personal Mobility - will support Policy, Planning and Investment's (PPI) vision - to of have the best integrated and intelligent transport services available to the state. The development of a dynamic and intelligent tool for transport systems and personal journeys, as well as the development of data protocols covering multiple modes of transport, will inform the backbone of integrated innovative services that enable travellers to make smarter transport decisions. Improved evidence of the public's readiness to embrace new and innovative transport technologies will inform ongoing reviews of the Transport@3.5 Plan and improve the travel behaviour assumptions as inputs to the State's integrated transport models.

**Integrated Freight System Optimisation** - Freight research has been on the PATREC agenda since its inception and was a focus area in the Strategic Business Plan 2013-2016 and assigned to the Transport Economics, Information and Management program because the view was that freight information was the priority on which to base subsequent research. Due to a lack of capacity in the university sector to drive this program, a consultant was engaged to initially undertake two small, core funded pilot projects followed by a further roll-out project (P5) approved by PRAC and the Board for 2016/17 (Business Plan 2016). There has been no additional impetus provided by any external funding in this area however Theme 2 of the iMOVE CRC opens up a significant opportunity to develop this area beyond simply information. Through the provision of valuable data, information, solutions and tools, the Integrated Freight System Optimisation

research focus area will improve freight transport efficiency and effectiveness and support the planning for economic clusters by providing a comprehensive overview of the freight patterns generated by industrial activities of varying types in metropolitan Perth. It involves multi-modal supply chain optimisation, through amongst others, the development of methods and technologies for the heavy vehicle real-time monitoring throughout the network and to assist transport operators identify appropriate tasks by providing a platform to connect customers with the operators, minimising disruptions at the point of loading where there is often a load and vehicle mismatch.

In parallel and integrated with the iMOVE Bid submission process, during the latter half of 2016, a seed project has been undertaken to determine priority freight industry research questions in WA through consultation with a range of freight industry leaders and government partners. Integrated road, rail and port operational, pricing and investment solutions are required to ensure that freight is handled optimally. Three potential areas being considered for modelling application are:

- potential for an inland port to determine the optimal way to connect incoming and outgoing goods flows to the Port of Fremantle, the East-West railway and the regional and metropolitan road and rail networks;
- modelling to determine the efficient handling of export product (grain and mineral) movements and goods distribution to regional centres and mines; and
- fresh food export freight and logistics.

**Emerging Technology, and Network Optimisation and Intelligence** will develop a data-driven decision support system for optimising road network operations which will:

- incorporate heterogeneous datasets with various nature and quality;
- filter out noises and give accurate real time information of the traffic conditions;
- automatically analyse historical trends and identify reoccurring patterns to help form optimal intervention strategies; and
- in the longer term, dynamically feed data into constantly self-adjusting traffic and Artificial Intelligence based models of traffic with combinations of CAVs (Connected Autonomous Vehicles) and traditional vehicles that have sufficient predictive power to support applications ranging from short-term incidents management to long-term strategic planning.

This research focus areas has been informed through the activity of another seed project undertaken in tandem with the iMOVE Bid submission process and in consultation with Main Roads Network Operations, to identify key research need in the network operations area. Other potential research areas emerging from this process include research in the rapidly developing area of technology change and its implications on travel including the inevitable implications of autonomous and connected vehicles.

In the case of these last two research focus areas, even if the iMOVE CRC Bid is not successful, the research needs identified in consultation with WA stakeholders in tandem with the Bid process, remain relevant and will be pursued in relation to other funding opportunities also being explored as part of the two seed business development projects.

---

## **6 DELIVERING ON THE FOCUS AREAS**

### **6.1 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 broader if required.

**Table 3: Research Administration, Development, Coordination and Management**

PATREC Office		
Sharon Biermann	0.4 FTE	Director
Dawn Woods	0.8 FTE	Centre Administrator
Research Development, Coordination and Management		
Sharon Biermann (PATREC)	0.6 FTE	Director
Yuchao Sun (PATREC)	0.4 FTE	PATREC@UWA
Mike Ridout (Curtin)	0.4 FTE	PATREC@Curtin
Catherine Ferguson (ECU)	0.2 FTE	PATREC@ECU

**Table 4: PATREC Project Research Associates**

PATREC Research Assoc.	Faculty/School/Centre	Uni.	PATREC Research Assoc.	Faculty, Dept, School	Uni.
Mike Ridout	Spatial Sciences	Curtin	Dr Wei Liu	Computer Science	UWA
Dr Ulanbek Turdukulov	Spatial Sciences	Curtin	Dr Jianxin Li	Computer Science	UWA
Dr Simon Moncrieff	Spatial Sciences	Curtin	Tim Perkins	Centre for Planning	ECU
Tristan Reed	Spatial Sciences	Curtin	Dr Cath Ferguson	Business and Law	ECU
Dr S Zhang Nau	Information Systems	Curtin	Dr David Lamb	Business and Law	ECU
E/Prof Geoff West	Spatial Sciences	Curtin	Prof Craig Standing	Business and Law	ECU
Jake Schapper	Planning & Geog.	Curtin	Dr Susan Standing	Business and Law	ECU
Dr Courtney Babb	Planning & Geog.	UWA	A/Prof Trudi Cooper	Arts and Humanities	ECU
Dr Chao Sun	Geography & Env. Sc.	UWA	Dr David Blake	Science	ECU
A/Prof Doina Olaru	Business School	UWA	Gary McCarney	Hon Research Fellow	UWA
Dr Brett Smith	Business School	UWA	Laura Gladstone	Consultant	-
Ying Huang	Business School	UWA	Tim Hoffman	THAdvisory	-
Hendrik Braun	Business School	UWA	Paul McLeod	Adj Prof UWA	UWA
A/Prof Paul Bergey	Business School	UWA	John Taplin	E/Prof UWA	UWA
A/Prof Rachel Cardell-Oliver	Computer Science	UWA	Darryl Patterson	ARUP	-

**Table 5: PATREC PhD Top-up Scholarships**

Name and institution	Status	Topic
James McIntosh (Curtin)	Completed	Infrastructure Funding
Sai Kumar (Curtin)	Final year	Infrastructure Funding
Daniel McDonald (ECU)	Withdrew	Accessibility/Vampire Index
Hendrik Braun (UWA)	Second year	Freight

**Table 6: Project Steering Committee participation**

Agency	Project 1	Project 2	Project 3	Project 4	Project 5
DoP	Craig Shepherd	Tom Pacy	Craig Shepherd	Damien Martin	Craig Shepherd
	Damien Martin				
DoT	Renlong Han	Simon Grieve	Sue Hellyer	Renlong Han	Anne-Marie Brits
	Sue Hellyer	Renlong Han	Alison Bunbury	Sue Hellyer	Caroline Elliott
			Andrew Wilkinson		
PTA	Louise Howells		Simon Cox	Tom Pacy/	
	Jamie Mullins		Louise Howells	Martin White	
MR		Kamal Weeratunga	Mehdi Langroudi	Wes Soet	Wes Soet
Treasury	Coan Harvey		Coan Harvey	Laura Cook	
			Vivian Pinter		

## 6.2 Financial Resources

The new PATREC Collaborative Research Agreement (2016) commits 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, a change to the subscription for the year starting 1 January 2020 (outer year) can be agreed to. In the three year budget (Table 7), no change has been made to the subscription amounts.

**Table 7: Three-year budget estimate**

<b>PATREC Budget Item</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
<b>INCOME</b>			
WA Government Grants	240,000	240,000	240,000
Partner universities sponsorship	180,000	180,000	180,000
Other Research Grants & Contracts	400,000	500,000	600,000
Accrued Interest	25,000	20,000	15,000
<b>Total Income</b>	<b>845,000</b>	<b>940,000</b>	<b>1,040,000</b>
<b>EXPENDITURE</b>			
<b>PATREC OFFICE</b>	<b>204,178</b>	<b>209,079</b>	<b>214,127</b>
Director (0.4)	89,198	91,874	94,630
Administrative Officer (0.8)	74,160	76,385	78,676
General office costs	17,500	17,500	17,500
Advisory Board Chair Stipend	23,320	23,320	23,320
<b>RESEARCH</b>	<b>869,118</b>	<b>893,042</b>	<b>917,158</b>
Research co-ordination & management	214,118	220,542	227,158
Project research	500,000	500,000	500,000
PhD scholarship top-up	40,000	40,000	40,000
Research Communication	45,000	45,000	45,000
Infrastructure Charges	70,000	87,500	105,000
<b>Total Expenditure</b>	<b>1,073,296</b>	<b>1,102,120</b>	<b>1,131,284</b>
Balance brought forward from previous year	<b>488,265</b>	<b>259,969</b>	<b>97,849</b>
<b>CLOSING BALANCE (incl Balance B/F)</b>	<b>259,969</b>	<b>97,849</b>	<b>1,564</b>

Other research grants and contracts have been budgeted to increase from \$400K in 2017, to \$500K in 2018 and to \$600K in 2019. These are the minimum levels of additional funding required to support the expenditure patterns as reflected in the budget estimate if subscription remain unchanged. Even then the indicative closing balance at the end of 2019 is close to break-even. These are considered achievable on the basis of past achievements but come nowhere close to the expectation from one of the research partners of a 3 plus 1 return on investment. Achievement of such returns will require successful leveraging with proposals to be submitted to external funding agencies and partners. These external funds will be sought in relation to the iMOVE CRC focus areas, ie. freight industry, network operations and the PTA in relation to enhanced passenger mobility. It is anticipated that the explicit requirement out of each core-funded project is grant funding applications and it is expected that this will yield at least some grant income in the next three years.

The two main expenditure items for PATREC are the PATREC office and PATREC research coordination, conducting and communication. For the purposes of this three-year budget, expenditure is estimated to occur at a similar level to that of 2016 with human resources involvement remaining broadly as indicated in Section 6.

## 6.3 Management and Operations

### 6.3.1 PATREC Research Advisory Committee (PRAC)

The newly established PRAC will be instrumental in 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 Advisory Board on project level matters, allowing the Advisory Board to focus on strategic matters.

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

Comprising one to two senior representatives from each partner organisation, PRAC members will be nominated by each of the six partner Advisory Board members in consultation with the PATREC Director. The PRAC Chair will be appointed on an annual basis by unanimous agreement by members of the Advisory Board. The Chair shall be an ex-officio member of the Advisory Board.

It is anticipated that the PRAC will meet three times a year, each time at least three weeks in advance of an Advisory Board meeting. More frequent interim meetings may also be held to ensure continuity in communication.

### 6.3.2 Project selection process

The project approval process established in relation to the PRAC advising the Board, will be continued with for projects which are funded wholly or in part by PATREC core funds, taken to the PRAC and Board for approval (Table 8). A formal project selection process will be conducted each year, commencing in October, to inform the annual Business Plan to be presented to the Board at its last meeting of each year.

**Table 8: Formal annual project selection process**

Tasks	Oversight and Decisions	Date
Research needs/potential project possibilities identification	Annual Stakeholder workshop to discuss the research needs for the coming period and call for short proposals/EOI circulated.	Annual Mid-October
Researchers prepare short proposals in response to needs (Expressions of Interest)	PRAC considers EOIs (1 pagers) submitted by researchers in response to the research needs.	End October
Proposal prioritisation	PRAC prioritise EOIs according to principles and make recommendations to Board and allocate Steering Committee	Mid-November
Recommendations on project priorities as part of Strategic Plan	Board approval	December Board meeting
Researchers prepare detailed Project Plans and assemble project teams	Project Plans refined with Steering Committees	Mid-February

Tasks	Oversight and Decisions	Date
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		

Although the formal project selection process conducted annually as outlined in Table 8 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

### 6.3.3 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.

## 6.4 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 9).

It has further been suggested that other than the value of external research funding secured, it is not necessary to target specific academic indicators but rather to report on such achievements in the annual reports. This is predicated on the understanding that PATREC has been set up to with the primary purpose of applied research for policy impact and that academic outcomes are secondary.

**Table 9: Key Performance Indicators**

<b>Key Performance Indicators</b>	
<b>Academic Performance Indicators</b>	
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 top-up sponsored PhD graduated	
Value (\$) of [direct] external research funding secured (through PATREC account)	
Value (\$) of [indirect] external research funding secured (through individual partner university account)	
<b>Policy Impact Performance Indicators</b>	
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	
<b>Stakeholder (academic and policy) satisfaction indicator (qualitative)</b>	
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

## 6.5 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.

## 6.6 Independent Review of PATREC

It is intended that some form of independent review of PATREC be undertaken after three years, ie. at the end of 2019.

## 7 BUSINESS PLAN 2017

### 7.1 Background

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

The Business Plan 2016 was compiled well into 2016, approved by the Advisory Board at their August 2016 meeting. Much of the Plan for 2016 rolls over into 2017 and thus this Business Plan for 2017 is very similar to that of 2016, updating sections only where there have been developments since August 2016.

### 7.2 Outputs

Key outputs for 2017:

- Completion of five core projects which commenced in late 2016 with final Technical Reports published and further stages with additional funding proposed if appropriate;
- Completion of the ARC LIEF project;
- Undertake RAC projects;
- Approval and commencement of Freight and Network Planning projects in alignment with iMOVE with freight industry funding secured;
- ARC Linkage/other research grant proposals submitted;
- PATREC Book, Planning Boomtown and Beyond, launched; and
- PATREC Research Forum held.

### 7.3 Core Research Projects

Complete approved five core funded projects which commenced in 2016 (Table 10).

**Table 10: Projects and Budgets, 2016-17**

Project Number	Title	Project Lead	Champion/ Agencies	Budget Estimate and Allocation (\$000)				
				TOTAL	UWA	Curtin	ECU	Other
Project 1	Addressing Future Uncertainties of Perth at 3.5 million: What-if Scenarios for Mass Transit	Doina Olaru (UWA)	Craig Shepherd DoP, PTA, DOT, Treas.	125	50	60	0	15
Project 2	Understanding Travel Behaviour Change	Cath Ferguson (ECU)	Simon Grieve DoP, MR, DOT	100	20	0	70	10
Project 3	A Strategic Merit and Rapid Appraisal Model for Assessing Transport Demand Management Projects	Brett Smith (UWA)	Sue Hellyer DoP, PTA, DOT, MR, Treasury	55	55	0	0	0
Project 4	Understanding Travel Behaviour Patterns and Trends	Mike Ridout (Curtin)	Damien Martin DoP, PTA, DOT, MR, Treasury	195	75	120	0	0
Project 5	Understanding Road Freight Demand Generation Patterns Per Industry Type	Tim Hoffman (Consultant)	Craig Shepherd DoP, DOT, MR	105	10	30	0	65
<b>TOTAL</b>				<b>580</b>	<b>210</b>	<b>210</b>	<b>70</b>	<b>90</b>

## 7.4 External Research Projects 2017

While the primary focus in 2017 will be on undertaking five priority projects funded using accumulated PATREC funds, the ARC LIEF project initiated in 2016, with external funding, will be completed in 2017. New projects in relation to the iMOVE CRC are expected to commence. If the iMOVE CRC is not successful, similar projects but possibly at a smaller scale and with local industry funding, in the areas of freight and network operations, is expected to occur. A further RAC project is also expected.

### 7.4.1 ARC LIEF Urban Analytics Data Infrastructure (UADI) Project

After a prolonged grant application process, this year-long project, officially commencing in July 2016 and extending until June 2017, led by Prof Abbas Rajabifard (University of Melbourne, Centre for Spatial Data Infrastructures and Land Administration) in collaboration with 11 other investigators from five other Australian universities, aims to develop an urban analytics data infrastructure that builds on the Australian Urban Research Infrastructure Network (AURIN).

PATREC's role is to 1) develop and implement a fundamental technical framework for Urban Transport infrastructure, modes, quantity and quality and 2) develop an open API and necessary web-services related to Urban Transport domain.

### 7.4.2 iMOVE CRC-related Project Commencement

At least one freight project is expected to commence dealing with integrated road, rail and port operational, pricing and investment solutions to ensure that freight is handled optimally. Potential areas being considered for modelling application are:

- potential for an inland port to determine the optimal way to connect incoming and outgoing goods flows to the Port of Fremantle, the East-West railway and the regional and metropolitan road and rail networks;
- modelling to determine the efficient handling of export product (grain and mineral) movements and goods distribution to regional centres and mines; and
- fresh food export freight and logistics.

At least one Network Intelligence project is expected to commence in relation to developing a data-driven decision support system for optimising road network operations involving:

- incorporation of heterogeneous datasets with various nature and quality;
- effectively filtering out noises and giving accurate real time information of the traffic conditions;
- automatically analysing historical trends and identifying reoccurring patterns to help form optimal intervention strategies; and
- in the longer term, dynamically feeding data into constantly self-adjusting traffic and Artificial Intelligence based models of traffic with combinations of CAVs (Connected Autonomous Vehicles) and traditional vehicles that have sufficient predictive power to support applications ranging from short-term incidents management to long-term strategic planning.

### 7.4.3 RAC Project

Following a process of project prioritisation with the RAC in 2016, at least one project is expected.

## 7.5 Budget 2017

No change in subscriptions is assumed for 2017, most project activity in 2017 will still be conducted using accumulated core funds. However, \$400K of additional funding from partners and industry has been budgeted (Table 11).

It is anticipated that these funds will be related to the iMOVE CRC which is successful, will commence in mid-2017 with at least an additional \$150K of CRC funds accruing to PATREC. It is further expected that the parallel business development processes undertaken in 2016 with the freight industry and network operations colleagues in Main Roads will yield further income. A further draw-down of RAC funds is also expected.

Research coordination expenditure includes 0.6 FTE (Director), 0.4 FTE Curtin (Mike Ridout) and 0.2 ECU (Cath Ferguson) for 12 months. Project research costs reflect half of the estimated project costs relating of the core funded projects, with the first half being reflected in the 2016 budget. It is unlikely that half of the core-funded project costs will be expended in 2016 and will be carried forward into 2017. Costs relating the ARC LIEF project and expected RAC and iMOVE CRC-related new projects are included as project costs. The costs of a Research Forum have been included in research communication costs in addition to ongoing seminars and other smaller events.

With expected expenditure greater than income, by the end of 2017, it is expected that a significant amount of accumulated core funds will have been expended. With total income estimated at \$848,000 and total expenditure at \$1,073,296, accounting for the expected balance brought forward from 2016 at \$488,265, the closing balance as at 31 December 2017 is budgeted at \$262,969.

**Table 11: Budget 2017**

<b>PATREC Budget Item</b>	<b>2017</b>
<b>INCOME</b>	
WA Government Grants	240,000
Partner universities sponsorship	180,000
Other Research Grants & Contracts	400,000
Accrued Interest	25,000
<b>Total Income</b>	<b>845,000</b>
<b>EXPENDITURE</b>	
<b>PATREC OFFICE</b>	<b>204,178</b>
Director (0.4)	89,198
Administrative Officer (0.8)	74,160
General office costs	17,500
Advisory Board Chair Stipend	23,320
<b>RESEARCH</b>	<b>869,118</b>
Research coordination & management	214,118
Project research	500,000
PhD scholarship top-up	40,000
Research Communication	45,000
Infrastructure Charges	70,000
<b>Total Expenditure</b>	<b>1,073,296</b>
Balance brought forward from previous year	<b>488,265</b>
<b>CLOSING BALANCE (incl Balance B/F)</b>	<b>259,969</b>

## 7.6 Key Performance Indicator Targets 2017

In accordance with the PATREC Review, performance indicators have been considerably reduced to essential academic and policy impact indicators with focus on outputs and outcomes rather than inputs.

**Table 12: Key Performance Indicator Targets 2017**

Performance Indicator	Target 2017
<b>Academic Performance Indicators</b>	
Number of journal papers published	3
Number of peer-reviewed book chapters published	10
Number of peer-reviewed conference papers published in proceedings	7
Number of peer-reviewed books published	1
Number of top-up sponsored PhD graduated	1
Value (\$) of [direct] external research funding secured (through PATREC account)	\$400K*
Value (\$) of [indirect] external research funding secured (through individual partner university account)	\$0
<b>Policy Impact Performance Indicators</b>	
Number of high impact, policy-informing projects completed	5
Number of substantive Technical Reports/Working Papers published	5
Number of PATREC Perspectives published on PATREC website	3
Number of presentations at PATREC and other connection events	5
Number of connection events arranged and held	5
Number of short courses, unit contributions presented	2
<b>Stakeholder (academic and policy) satisfaction indicator (qualitative)</b>	<b>80%</b>

\*Includes iMOVE

## ANNEXURE A: Achievement 2013-2016

Project	Funding Sources and \$	Status
Developer contributions for transport – Baseline literature review	14K – Non-core (RAC)	Completed
Independent Transport Modelling Review	56K - Core funds 72K - Non-Core (MRWA)	Completed
Congestion Abatement through Travel Demand Management	64K - Core funds	Completed
AURIN WA Data Hub	200K - Non-core	Completed
WA Freight Studies - Stage 1 – Research opportunities	13K - Core funds 10K – Non-core (Freight Logistics Council)	Completed
WA Freight Studies – Stage 2 <ul style="list-style-type: none"> <li>Urban - PILOT - Retail Supply Chains - Freight Vehicle Usage of Perth Metropolitan Roads</li> <li>Regional - Grain Freight Activity on Southern Wheatbelt Roads</li> </ul>	\$55,250 – Core funds	Completed
Review of Infrastructure Planning and Financing Options for WA	35K - Core funds	Completed
Infrastructure Funding Research Priorities and Project Planning	\$30,000 - Core funds	Completed
Stated Preference Survey – Experimental Design	\$68,700 – Core funds	Completed
Activity Centre Accessibility	\$70,000 - Non-core (RAC)	Completed
Activity Centres: Making Land Use and Transport Work - Stations in or near freeway medians – reconciling node/place conflicts	\$185,000 (\$80,000 - Core funds; \$105,000 – Main Roads)	Completed
Mass Rapid Transit @3.5	\$466,600 (\$385,600 - Non-core funds: Dept of Transport; \$81,000 - Core funds)	Completed
Seed Projects: <ul style="list-style-type: none"> <li>Use of Mobile Fitness Application Data to Model Bicycle Usage Patterns (\$5K)</li> <li>Suburbs Research for Australian Cities (\$7.5K)</li> <li>Transport Technology Futures (\$5K)</li> <li>Travel Behaviour Change(\$4.5K)</li> <li>Employment self-sufficiency (\$5K)</li> </ul>	\$25,000 - Core funds	Completed
ARC LIEF – Urban Analytics Data Infrastructure	\$90K (\$70K Non-core funds: \$50K ARC; \$20K UWA; \$20K Core funds)	Commenced
Project 1: Addressing Future Uncertainties of Perth at 3.5 million: What-if Scenarios for Mass Transit	\$125K Core funds	Commenced
Project 2: Factors Affecting Travel Behaviour Change	\$100K Core funds	Commenced
Project 3: An Appraisal of Travel Plans and Voluntary Transport Behaviour Projects	\$55K Core funds	Commenced
Project 4: Understanding Travel Behaviour Patterns and Trends	\$195K Core funds	Commenced
Project 5: Understanding Road Freight Demand Generation Patterns Per Industry Type – Perth Road Freight Analysis	\$105K Core funds	Commenced
iMOVE Bid-related seed projects: <ul style="list-style-type: none"> <li>Network operations research needs</li> <li>Freight industry research needs</li> </ul>	\$25K Core funds \$25K Core funds	Commenced