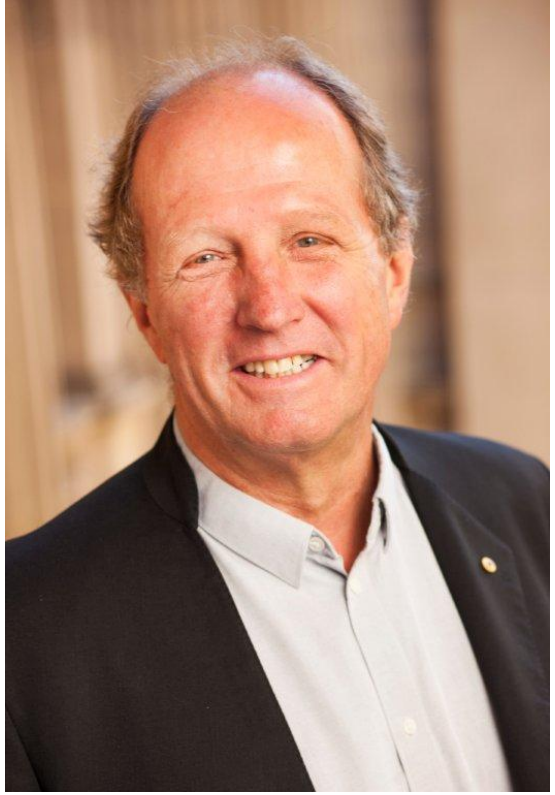
Sustainable Built Environment National Research Centre

Project 1.62: **Sustainable Centres of Tomorrow: People and Place or Trackless Trams (2)**

(October 2018 – March 2020)



Industry Steering Group Chair
Professor Rob Adams, AM
Chief Urban Designer City of Melbourne

Core Partners

aurecon

BGC
Australia's largest home builder

WESTERN AUSTRALIA

Roads & Maritime

Queensland Government

Curtin University

Griffith UNIVERSITY

RMIT UNIVERSITY

Project Partners

City of Townsville

proudly supported by wyndhamcity

LIVERPOOL CITY COUNCIL

Townsville Hospital and Health Service

JAMES COOK UNIVERSITY AUSTRALIA

City of Perth

City of Stirling
City of Choice

CITY OF CANNING

CITY OF VINCENT

TOWN OF VICTORIA PARK

Sustainable Built Environment National Research Centre

Curtin University

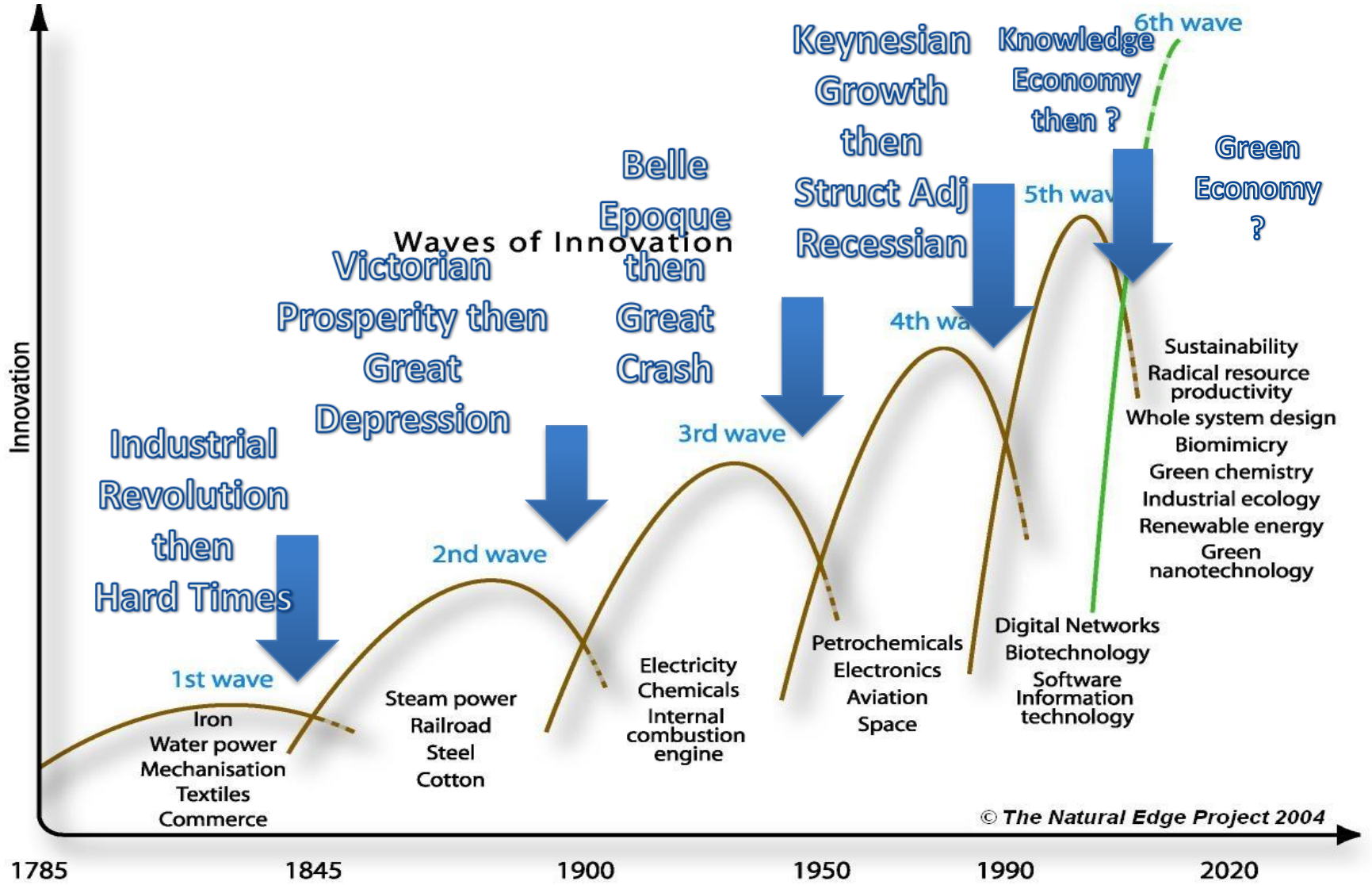
Griffith UNIVERSITY

RMIT University

VIDEO from 1.62 short version.

Economic waves of innovation theory: Kondratieff, Schumpeter, Freeman (SPRU)

BEFORE EACH EMERGING WAVE THERE IS A BIG DOWNTURN….

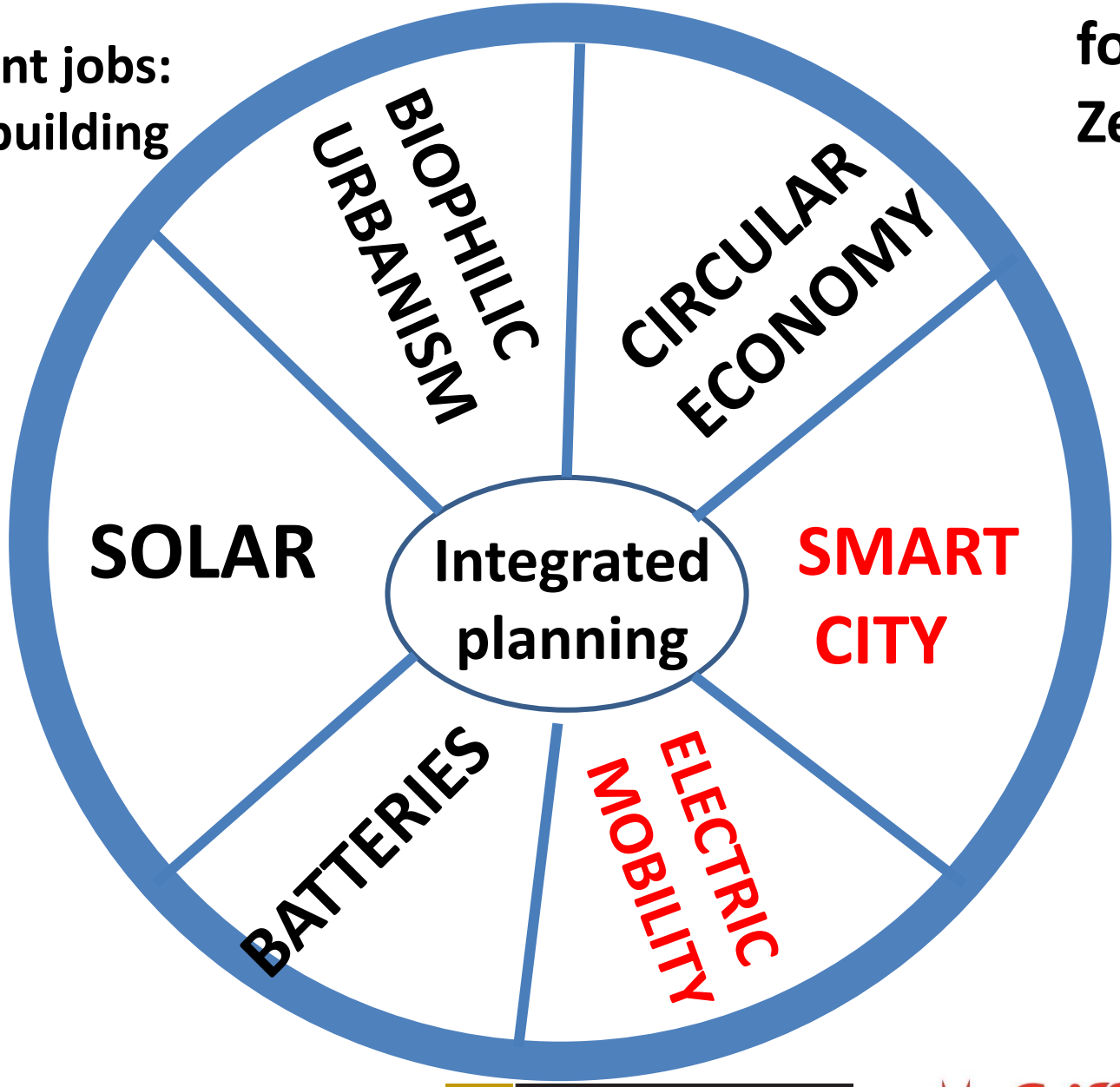


Hargroves 'The Natural Advantage of Nations' 2004

What are the emerging technologies of the sixth wave….?

Urban development jobs:
For every $1m in building creates
9 jobs directly
and 37 indirectly
in the city

The raw materials for a Zero Carbon Zero Poverty City



1.62

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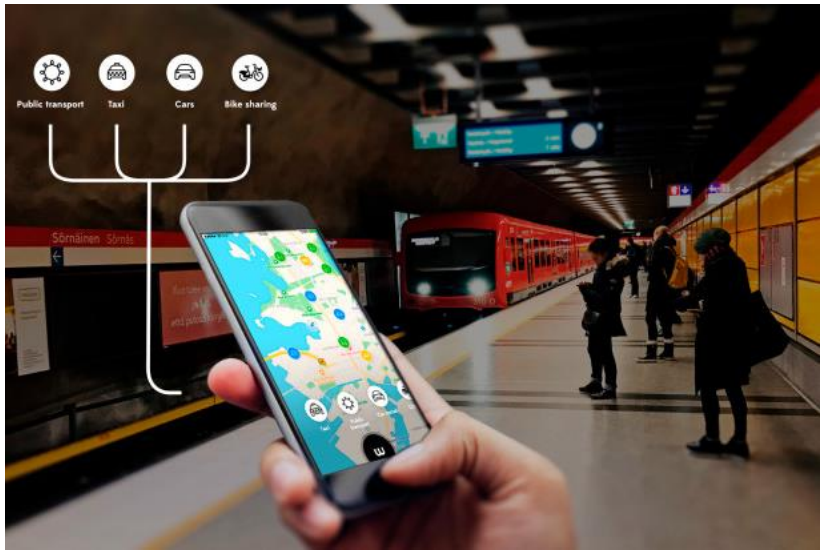
RMIT University

Smart city transit

1

2



3

5

4

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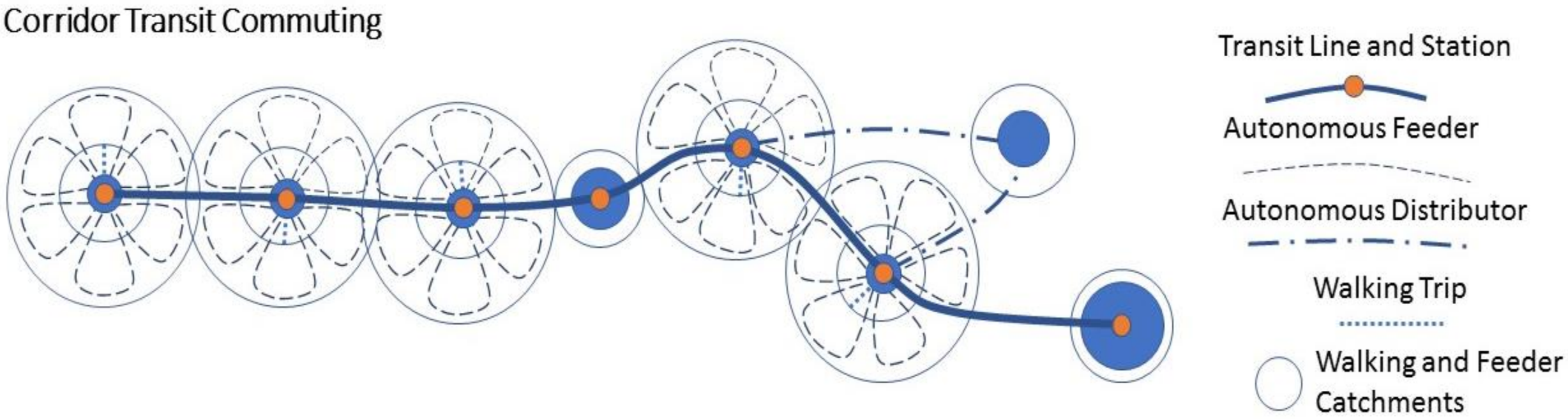
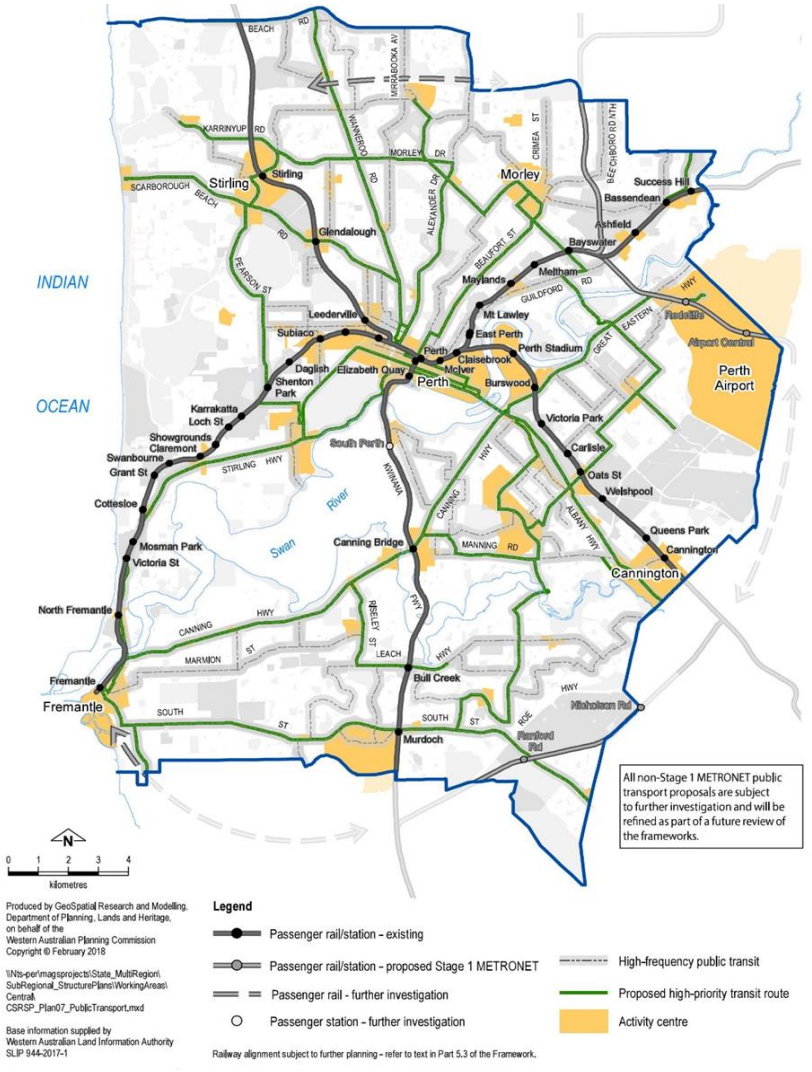
TT induces… TRANSIT ACTIVATED CORRIDORS - local shared mobility and rapid shared mobility…. 50 kph then 30 kph in station areas



Green routes…
Transit and Density priority…
Movement and Place Strategies



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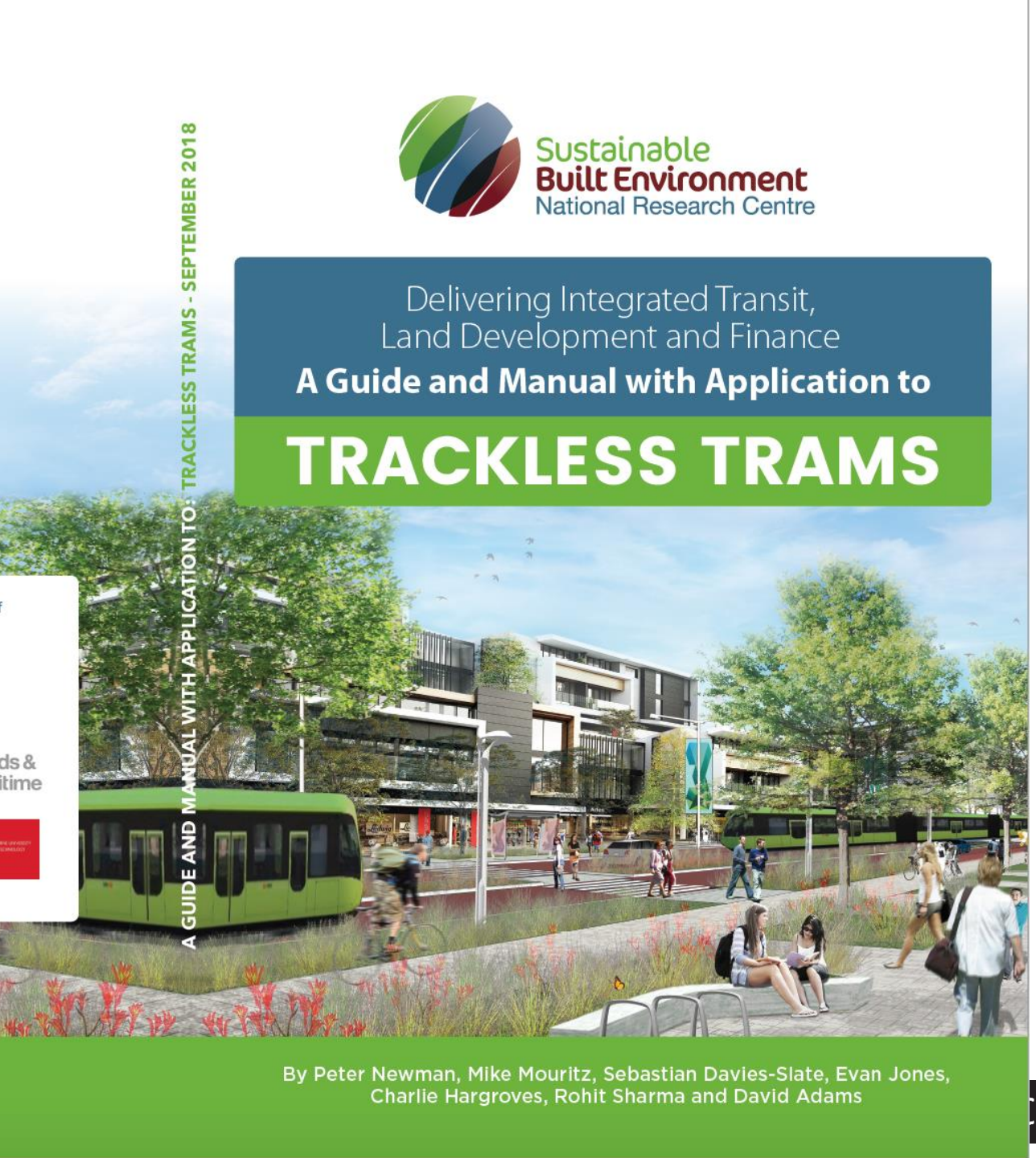

How to do as partnerships…

- SBEnrc.com.au
- Lots of You Tube films

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Project 1.63: The Potential for Blockchain and Artificial Intelligence to Enhance the Transport Sector

(October 2018 – March 2020)

Industry Steering Group Chair
Dr Ken Michael, AC
30th Governor of Western Australia
Western Australian Commissioner of Main Roads (1991-96)

Core Partners

aurecon

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WESTERN AUSTRALIA

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RMIT UNIVERSITY

Project Partner

FREMANTLE PORTS

Project Associates

hp

CSIRO DATA 61

Austroads

arrb
AUSTRALIAN ROAD RESEARCH BOARD

roads australia

BiTA
BLOCKCHAIN IN TRANSPORT ALLIANCE

NVIDIA

Project Overview

Advances in Artificial Intelligence and the emergence of Blockchain Technology stand to provide significant benefits to transport agencies, travellers and associated businesses, especially for those that move early.

This project is among the first to explore the potential for these revolutionary technologies to enhance the transport sector and allow well-informed early action.

Applied Research Methodology

1. Develop a clear working understanding of the functionality of Artificial Intelligence and Blockchain Technologies.
2. Investigate what potential there is for Artificial Intelligence and Blockchain technology to be used in the transport sector.
3. Select a short list of use cases and identify risks and rewards for the transport sector to identify deep dive use cases.
4. Undertake Deep Dive research and recommend strategic approaches to implementation by research partners.
5. Identify specific policies and mechanisms to support application.

How can Ai be applied to the Transport Sector?

What is Ai?

- Rule Based vs Machine Learning
- Predictive capacity

How can it be used in transport?

- Self-Driving Vehicles
- Traffic Management
- Vehicle Behaviour
- Traffic Signal Optimisation
- Vehicle Prioritisation
- Route Optimisation
- Traffic Risk Management
- Ride-Sharing
- Fare Evasion
- Drones Deployment

Preferred Use-Cases for Artificial Intelligence

1. Identification of Network Characteristics (*including vehicle data, engineering data, and hazards*).
2. Traffic Optimisation (*including management and Signalling, interruptions to flow, predictive congestion management, based on real time conditions*).
3. Vehicle Prioritisation (*including emergency vehicles and Mass Transit*).
4. Asset Management (*including vehicles, IoT devices, lights, communications infrastructure*).

Malaysia City Brain

城市事件感知与智能处理

City Event Perception and Intelligent Processing

日事件报警总数 09,931

视频感知总数 2,494

感知来源分布

事件类型分布

救护车绿灯优先通行

平均处理时长 58秒

优先通行次数 08次

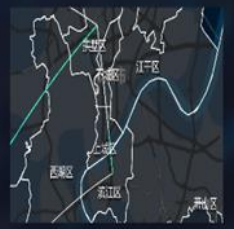
出警数 176次 交警铁骑 87辆 救护车 32辆 消防车 19辆

公众出行与运营车辆调度

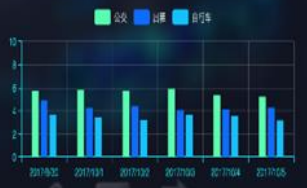
Public Travel and Operational Vehicle Scheduling

公交车 1,569辆 出租车 7,739辆 公共自行车 8.60万辆

区域交通流分析



公共交通分担率



公交畅行指数 7.3% 出租车实载率 57.9% 自行车可借率 50.5%

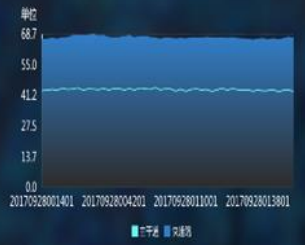
停车位总数 24.0万辆 地铁流量 1.76万人 医院门诊量 0.57万人

交通评价与信号灯优化

Traffic Situation Perception and Signal Light Optimization

主干道均速 ▲+6.13 43.4 KM/H

快速路均速 ▲+4.99 66.4 KM/H



拥堵路段排行

路口	评价指标
滨沙路	18.1
西溪路(外围)	18.1
古荡路	18.2
环城西路	18.3
文二西路	18.3

路口 / 匝道预警

路口	评价指标	报警
文晖路-莫干山路	0.16	报警
教工路-文一路	0.15	报警
文一路-莫干山路	0.02	报警
天目山路-环城北路-环城西路-莫干山路	0.24	报警
和睦路-大关路-赵伍路	0.14	报警

最近一次下发配时

莫干山路余杭塘路

社会治理与公共安全

Social Governance and Public Security

两客一危车辆数 8,920辆 闯禁识别数 132次

萧山 接管104个红绿灯，区域内通行速度提升15%，救护车到达时间缩短50%

苏州 试点线路公交出行人数增长17%

杭州 接管24个红绿灯，部分区域通行时间缩短15.3%；交通事故秒级自动报警；中河-上塘高架通行时间缩短4.6分钟

数据大屏技术支持：DATAV datav.aliyun.com

云栖社区 yq.aliyun.com

城市事件感知与智能处理
City Event Perception and Intelligent Processing
日事件报警总数
09,931
视频感知总数
2,494
救护车绿灯优先通行
感知来源分布
事件类型分布
31%
接警平台
6.29%
110
1.40%
119
21.68%
40.56%
30.07%
拥堵
平均处理时长
58秒
优先通行次数
08次
出警数 176次
交警铁骑 87辆
救护车 32辆
消防车 19辆
公众出行与运营车辆调度
Public Travel and Operational Vehicle Scheduling
公交车
1,569辆
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7,739辆
公共自行车
8.60万辆
区域交通流分析
公共交通分担率
公交
出租
自行车
公交畅行指数
7.3%
出租车实载率
57.9%
自行车可借率
50.5%
停车位总数
24.0万辆
地铁流量
1.76万人
医院门诊量
0.57万人
全市延误指数
1.96
+0.08
市区拥堵指数
7.34
+0.74
日交通量
46.03万辆
+0.67
景区日交通量
1.81万辆
+0.03
快速路日交通量
22.46万辆
+0.34
交通评价与信号灯优化
Traffic Situation Perception and Signal Light Optimization
主干道均速 +6.13
43.4 KM/H
快速路均速 +4.99
66.4 KM/H
拥堵路段排行
路口
评价指标
沪杭路
18.1
西溪路(外围)
18.1
古墩路
18.2
环城西路
18.3
文二西路
18.3
路口 / 匝道预警
最近一次下发配时
莫干山路余杭塘路
180秒
21.88%
27.50%
16.25%
16.88%
17.50%
萧山 接管104个红绿灯，区域内通行速度提升15%，救护车到达时间缩短50%
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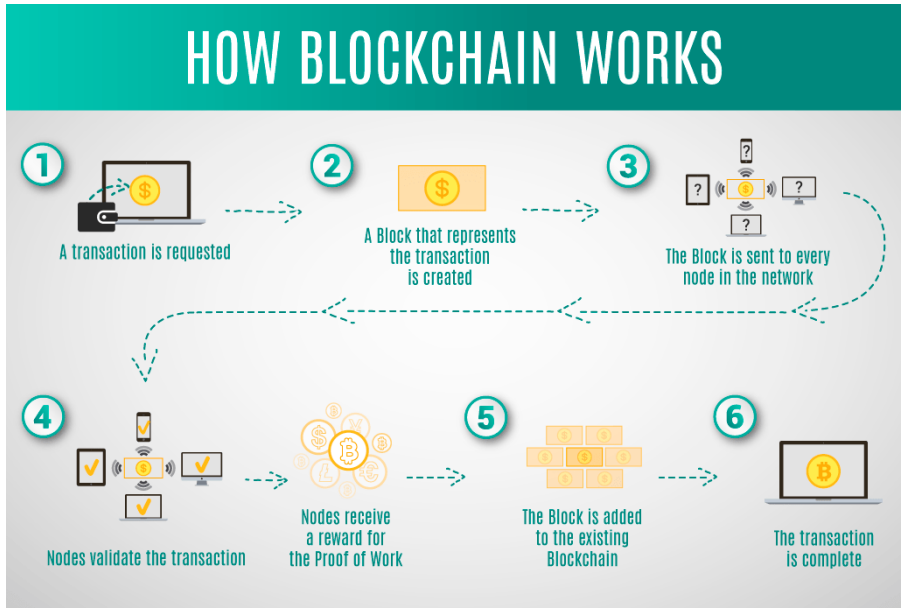
132次
社会治理与公共安全
Social Governance and Public Security
数据大屏技术支持：DATAV datav.aliyun.com
云栖社区 yq.aliyun.com

Malaysia City Brain

Created by Alibaba uses Artificial Intelligence to process data from 300 traffic lights, 500 CCTV cameras, public transport data systems to predict traffic conditions and make recommendations for emergency services routing. The 'City Brain' AI technology was deployed in Hangzhou China in September 2018 and has resulted in '*an average traffic speed increase of 15 percent, and reporting traffic violations with 92 percent accuracy*'.

How can Blockchain be applied to Transport?



- Decentralised Database
- Trust Protocol (Tamper Evident)

- Traffic Management
- Logistics Documentation
- Global Freight Tracking
- Supply Chain Transactions
- Identification (Drivers Licences)
- Establishing Provenance
- Establishing Authenticity

Port of Rotterdam

BlockLab

Preferred Use-Cases for Blockchain Technology

1. Real Time Road User Pricing (*including charging for time of day and road type usage*).
2. Establishing Identification (*including digital drivers' licences and vehicle ownership*).
3. Enhanced Freight Tracking and Authenticity (including r*eal time location and confirmation of delivery*).

Key Criteria for Use Case Selection

- Level of capitalisation, maturity and uptake of technology?
- Potential for quick wins with low expenditure to catalyse efforts?
- Level of difficulty and need for external support?
- Capital and operational expenditure requirements?
- Potential for early efforts to underpin future applications?
- Level of integration required across departments?
- Potential for multiple benefits for various users and departments?
- Prerequisites for data availability, format and intervals?

Deep Dive Use-Cases

1. The use of Artificial Intelligence to enhance Traffic Optimisation with a focus on traffic management and signalling.
2. The use of Blockchain Technology to enhance Freight Tracking and Authenticity, including real-time location and confirmation of origin and delivery.

AI + Blockchain – Road User Charging

Using the location of vehicles Artificial Intelligence could calculate real time road user charging based on use of specific elements of the transport network.

Once calculated a Blockchain technology could be used to collect small payments in real time from the vehicle (regardless of driver) to suppliant reduced revenue from vehicle electrification.

This system can be used to encourage or discourage vehicles entering peak congestion areas and use other preferred routes.

Project 1.63: The Potential for Blockchain and Artificial Intelligence to Enhance the Transport Sector *(October 2018 – March 2020)*

https://sbenrc.com.au/research-programs/1-63/

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