Making Innovation a Reality

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City of Greater Geelong

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What we will cover today

1. What is Innovation?
2. Barriers to Innovation
3. Local Government's Role in Innovation
4. Procurement for Innovation
5. Writing a Procurement for Innovation Specification
6. Our 100 year maintenance free bridge

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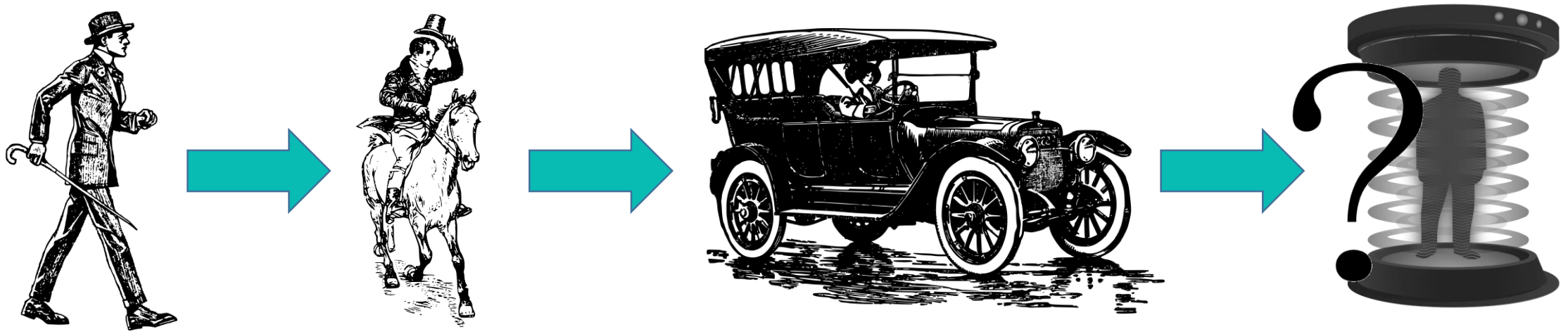
What is Innovation?

- **Innovation** is the introduction of new ideas, methods, or things. Collins Dictionary 2019



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Innovation

"I've always been attracted to the more revolutionary changes. I don't know why. Because they're harder. They're much more stressful emotionally. And you usually go through a period where everybody tells you that you've completely failed."

Steve Jobs 1955-2011

Apple Co-Founder

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Barriers to Innovation

- Fear of failure
- Lack of imagination time to develop new ideas and opportunities
- Focus on successes of the past rather than the challenges of the future
- Lack of confidence that there will be a market once the solution is proven

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Local Government's Place

Needs

- To deliver more with less funds
- To resolve an unmet need
- To address changing community expectations

Offers

- Purchasing power
- Networks and Connections
- Credibility

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What is Procurement for Innovation?

Procurement for Innovation is about bringing products or services to market that:

- Have Impact
- Are Strategic
- Are Replicable

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How is it different from standard procurement?

- Provides more time for the market to respond
- Provides more assistance in order for a solution to be developed
- Provides confidence that there will be a market once the solution is proven
- Provides certainty of future sales for the winning supplier
- Defines the challenge to be responded to, not the product to do it
- Has more steps associated with it…

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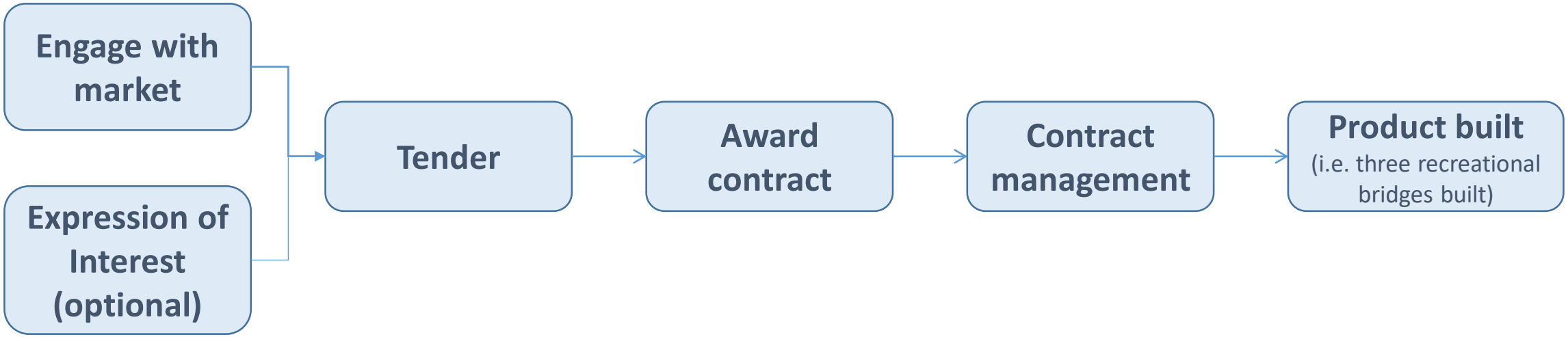
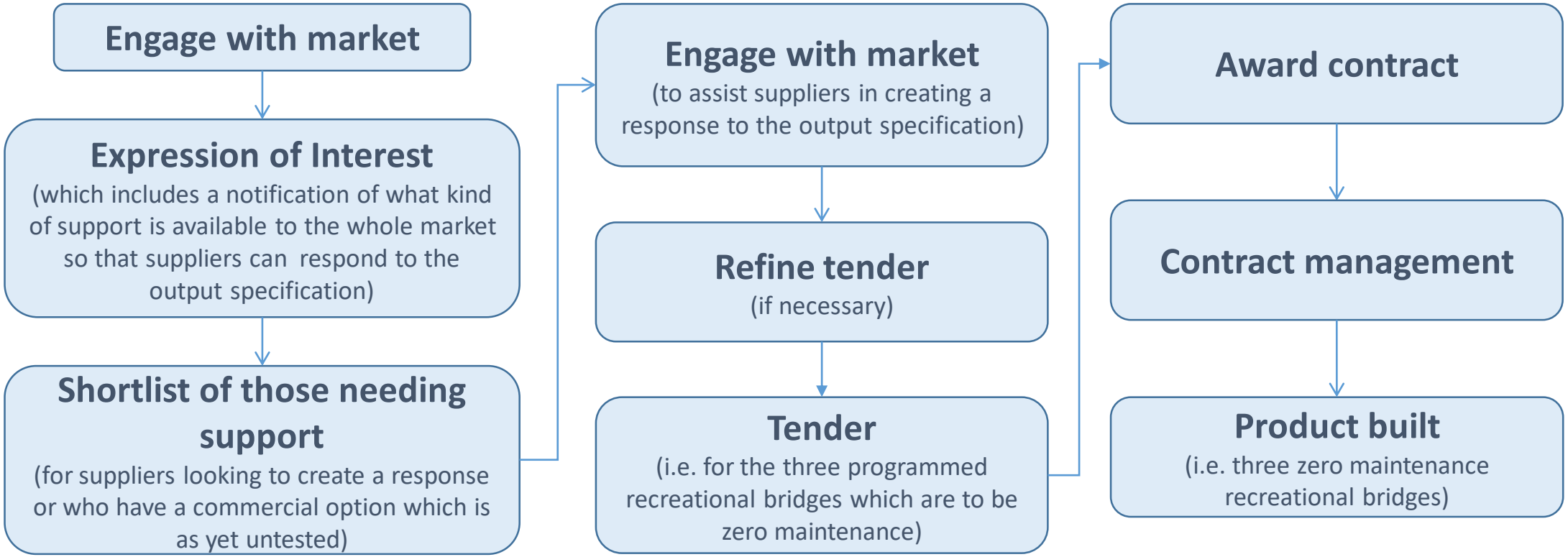
Traditional Procurement Process



Procurement for Innovation Process



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Writing the Specification/Need statement

- Identify and describe the unmet need (Aspiration)
- Keep asking:
  - 'what is the problem we are seeking to address?'
  - 'what is the need that is not yet being met?’
- Provide general details on outcomes required of the solution (i.e. size, performance criteria, etc)
- Avoid specifying the solution (i.e. choosing products before having really described the challenge being responded to)

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Our experience

- We have over 170 pedestrian bridges with ongoing annual growth via new subdivisions.
- High maintenance and replacement cost due to premature deterioration
- Constrained budget environment
- Need an alternative

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100 Year Maintenance Free Bridge

Aspiration:

- A bridge system which is maintenance free for the design life of the structure (100+ years) with all materials reusable or recyclable at end of life.

Details:

- Structure dimensions
  - Small Bridges: Single span <12.5m
  - Width of 2.5 – 3.5m clear trafficable area.
- The structure should be able to perform in the variety of environments and applications which may be expected within the City
- The structure shall provide an acceptable level of service over the duration of its design life without any need for structural maintenance.

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Clearing the Barriers to Innovation

- Engineers like to be in control and know the outcome...
- Traditional procurement is “safe” with limited unknowns
- Procurement for Innovation process is outside comfort zone
  - What would the outcome be? Would it fail? Would it be a success? Would it waste everyone’s time?
- Potential benefits of success outweighed the risk of failure

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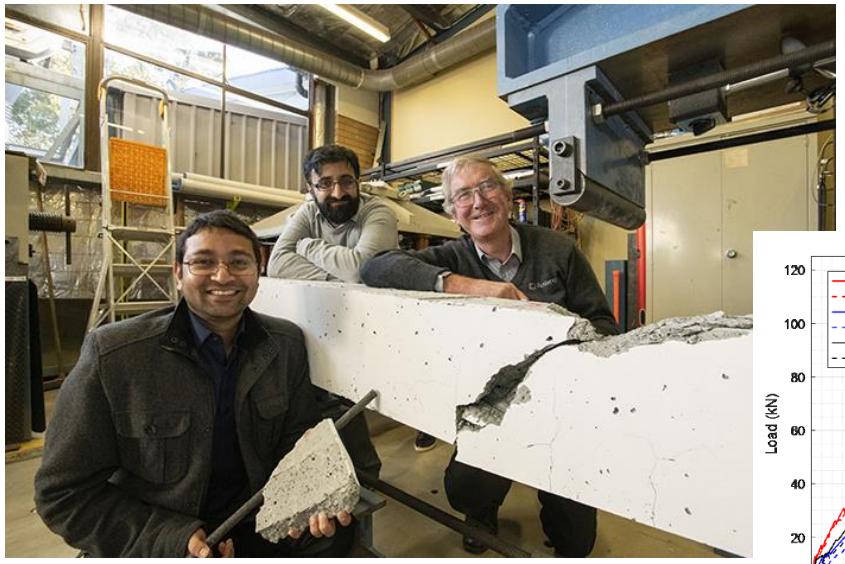
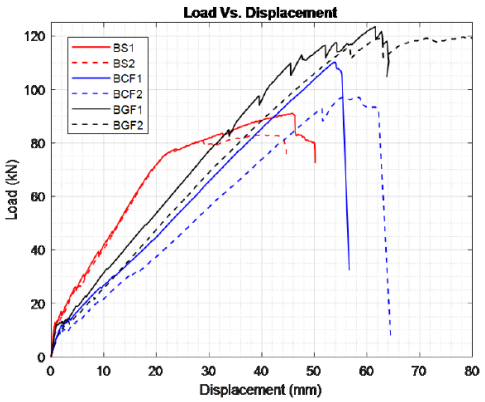
Our Outcome

- World First
- Patent design carbon fibre reinforced geo-polymer concrete bridge
- Local supplier (Austeng)
- New local partnerships – Deakin University, CSIRO Carbon Nexus, Austeng





DEAKIN UNIVERSITY

Austeng

CARBON nexus
carbon fibre & composite research

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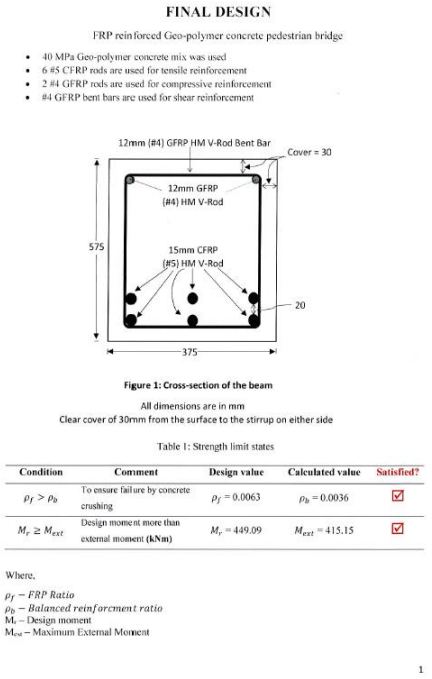
The Unintended Benefits

- Seeded further development:
  - Integrated graphene strain gauges which could lead to “smart bridges”
  - geo-polymer bonded carbon fibre in lieu of resin
  - Glass fibre reinforced geo-polymer concrete driven piles
  - Investigation into other novel reinforcement – basalt



FINAL DESIGN

FRP reinforced Geo-polymer concrete pedestrian bridge

- 40 MPa Geo-polymer concrete mix was used
- 6 #5 CFRP rods are used for tensile reinforcement
- 2 #4 GFRP rods are used for compressive reinforcement
- #4 GFRP bent bars are used for shear reinforcement

Figure 1: Cross-section of the beam

All dimensions are in mm
Clear cover of 30mm from the surface to the stirrup on either side

Table 1: Strength limit states

Condition	Comment	Design value	Calculated value	Satisfied?
$\rho_f > \rho_b$	To ensure failure by concrete crushing	$\rho_f = 0.0063$	$\rho_b = 0.0036$	☑
$M_r \geq M_{ext}$	Design moment more than external moment (kNm)	$M_r = 449.09$	$M_{ext} = 415.15$	☑

Where,

ρ_f – *FRP Ratio*
ρ_b – *Balanced reinforcment ratio*
M_r – Design moment
M_{ext} – Maximum External Moment

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Thanks to our Partner Organisations

GEELONG MANUFACTURING COUNCIL

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VICTORIA State Government

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“Innovation distinguishes between a leader and a follower”
Steve Jobs

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