Australian and New Zealand
Timber Research Strategic Planning Workshop Summary Document

Wednesday, 22nd of November, 2017
The University of Queensland

The document is a summary of the discussion which took place at The University of Queensland on the 22nd of November, 2017. The Strategic Planning Workshop was convened in parallel with the launch of the ARC Future Timber Hub with the goal of bringing together Australia and New Zealand's leading timber researchers to begin the process of establishing key research themes and identifying potential future collaborations.

The workshop was attended by 35 timber experts including representatives from the timber manufacturing industry, timber product/connector manufacturers, engineering/architectural/building firms, government agencies, academics from six universities and the current ARC Future Timber Hub project leaders. The session was facilitated by Professor Keith Crews in his role as an independent board member for the ARC Future Timber Hub.

The following information represents a summary of the workshop outcomes and is intended to serve as a catalyst for further discussion and development over the course of 2018 and 2019.

The next strategic planning workshop, to be held in Sydney from the 30th to the 31st of October 2018, will aim to prioritise these research themes with a strong focus on the emerging critical needs of industry. The ARC Future Timber Hub would like to request any feedback be sent to timber@civil.uq.edu.au. Feedback will be used to tailor the structure of this academically enabled workshop toward industry's needs. If you would like to attend the workshop please send an expression of interest to the above email address.

The workshop established 10 key research themes:

- Fire Performance
- Manufacturing /Digital Design and Prefab
- Material Properties – Anisotropy, heterogeneity and variability
- Structural Performance
- Durability
- Building Physics
- Construction Process
- Education
- Sustainability
- Building Compliance

These themes build upon the previous hub research themes. Potential future research questions / topics identified during the workshop were each assigned to one of these 10 themes.

The potential future research questions / topics presented here have not been edited and reflect as accurately as possible the original participant contributions.

Fire Performance

- Self-extinguishment of timber (spread/burnout)
- Performance of timber-based external walls (spread)
- Structural Performance
- Interconnected floors (spread)
- Design for self-extinguishment
- Façade performance
- Non-combustible time
- How much wood can be exposed
- Enhancing timber fire performance

Manufacturing /Digital Design and Prefab

- Develop new products
- Use of Australian resources
- Use of low grade material in new products

Material Properties – Anisotropy, heterogeneity and variability

- Match resources to Engineering Wood Products
- Effects of material properties on durability and chemical reactions
- Optimisation of timber durability and fire retardant treatments – improved timber products
- Consideration of aesthetic implications (improved colour)
- Termite resistant CLT
- Exploring Australian species properties and performance
- Long term performance in tropical environments
- Effect of material properties on durability and chemical reactions

Structural Performance

- Developing reliably-based models for timber structures (similar to JCSS models) but based on data from Australian context
- Investigation of human induced vibration in CLT floors

Structural Systems

- Function driven composite element / timber
- Using nanotechnology to improve element performance
- Using design to improve system performance
- Low-damage /self-centring lateral load system under seismic conditions and wind loads

Structural Optimisation

- Long term settlement and creep effect including moisture and movement (tall / large scale structures)
- Integrated design tools for multi objective optimisation (eg: fire / energy / structural)
- Expanding structural grids
- Band beams / columns / structural elements – efficiency through challenging properties and measuring real world performance

Design Guidance

- FE Modelling for CLT floors and walls
- CLT as deep beams
- CLT floor diaphragm performance

- Shear stiffness of CLT walls and stick frame bracing walls
- Floor vibration calculation methods

Hybrid Elements

- Interaction between timber and other materials (timber and steel / concrete composite)
- Structural performance of hybrid elements
- Fire performance of hybrid elements
- Durability issues or opportunities in relation to hybrid elements
- Impact of different timber species in hybrid elements
- High performance connections (high strength, high stiffness, high ductility)
- Framing connections
- Seismic
- Wind
- In situ monitoring

Durability

- Design Life
- Coatings
- Internal Decay
- In situ monitoring
- Maintenance system
- Cladding performance
- Can we apply the proper protection to buildings?

Building Physics

- Acoustics
- Cheaper reliable noise control systems – higher value solutions that compete with concrete
- Hydrothermal behaviour of CLT in tropics
- Airtightness of CLT panels and joints
- Acoustic and vibration of timber structures

Construction Process

- Growth / production / construction – vertical integration
- Safe and speedy lifting logistics – increased speed, maintain or improve safety
- Optimized constructability by material system selection
- Ways to construct – panelised modules

Education

- Communication of the benefits and opportunities of timber construction (and listening to what people want)
- Perception
- Commercial
- Designer Community
- Design tools
- Formal qualification/curriculum
- Vertical integration and communication between growers, processes and designers
- Marketing the material, ensuring there is an understanding of the feel and touch experience
- Road show / real structures

Sustainability

- Sustainable forestry – process such as selective logging of native forests, plantation forestry. Placement of trees in the landscape for environmental benefit
- Sustainable Processing and manufacturing
    - Reduction of waste
    - Reuse of waste into other products
    - More efficient processing systems
- Life cycle of timber buildings
    - Reuse/recycling + reconfigure + reuse
    - Design for construction, replacement and deconstruction
    - Operational energy benefits of using timber for energy efficiency, comfort, moisture control
- Marketing of timber benefit (to the consumers) building 'better' vs building cheaper

Building Compliance

- Verification methods
- New generation of intelligent timber
    - Structures (safer, comfortable, cost-effective on maintenance)
    - Self-adaptive / self-prognostic / self-rehabilitation
- In situ monitoring of:
    - Construction
    - Performance
    - Hazards
- Negative stiffness