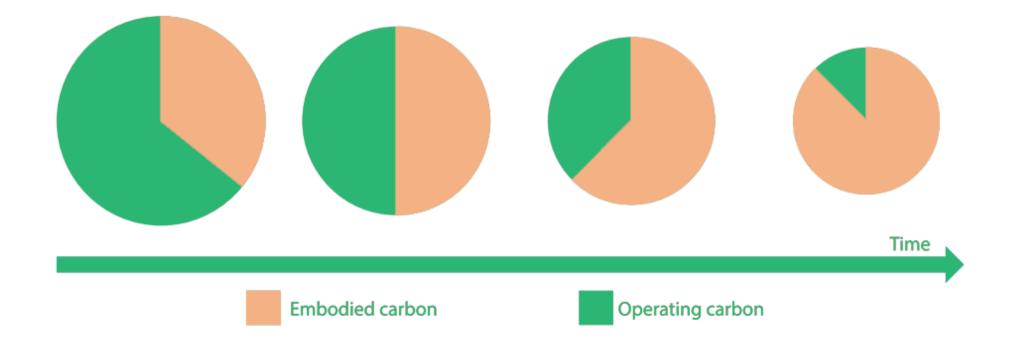


### Driving Efficiencies With Software Tools and Automated Design

June 2023











cefc

Australian buildings and infrastructure: Opportunities for cutting embodied carbon

Industry report





25 King: Cred Lendlease



Latrobe St: Cred TTW

 75% Reduction on BAU (biogenic included)

 74% Reduction on BAU (biogenic included)



# Biophilia



### Biophilia





s.com.au/wood-at-work

by Andrew Knex,

Howard Parry-Husbands Pollinate\*\* February 2018



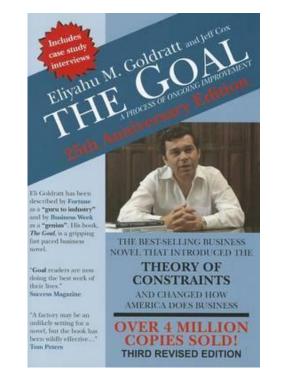
### **Ethics Isn't Enough**



# Driving Cost Efficiencies



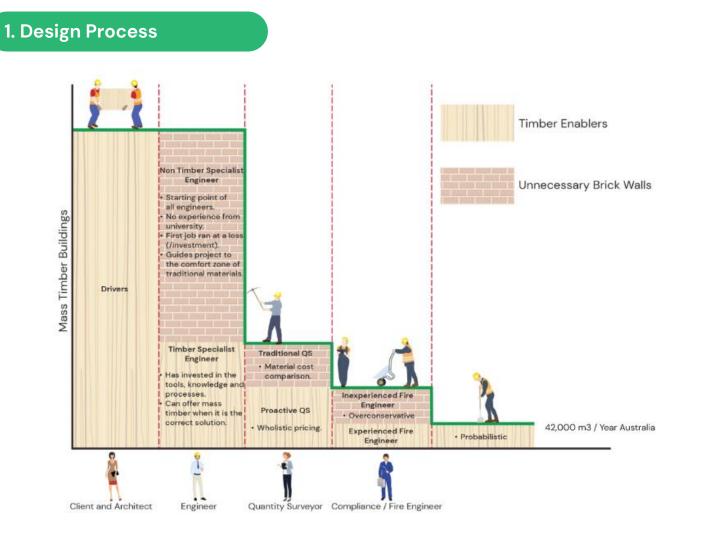
### **Bottlenecks = Key To Efficiency**







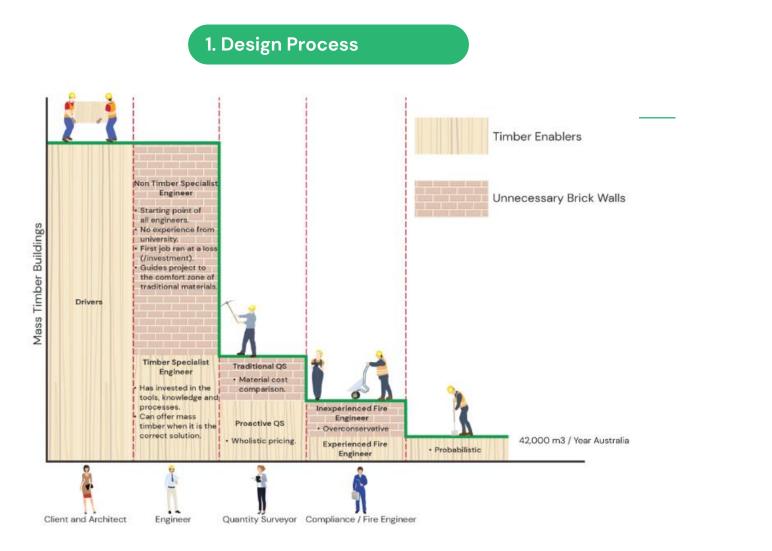
### Professionals



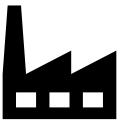
11



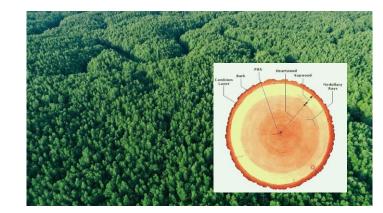
### Professionals



#### 2. Supply Chain Capacities

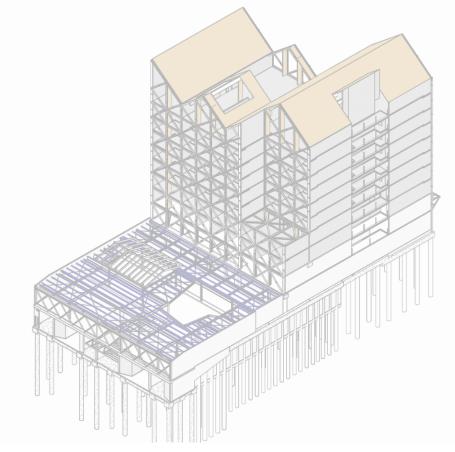


#### 3. Land and Forest Utilisation



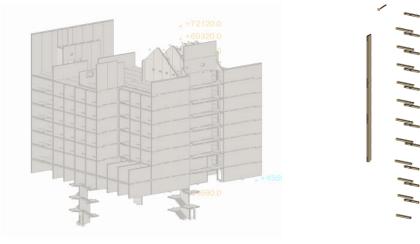


### **Co-ordination and Shop Drawing**

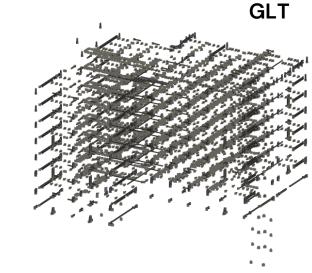


Building

Auckland City Mission Image Credit: XLam



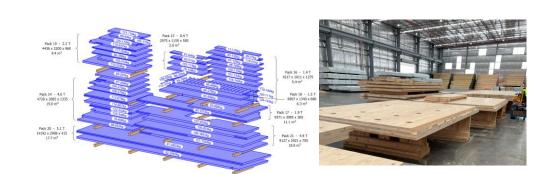
CLT

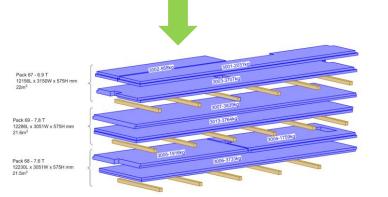




### DfMA

#### Design for Manufacture

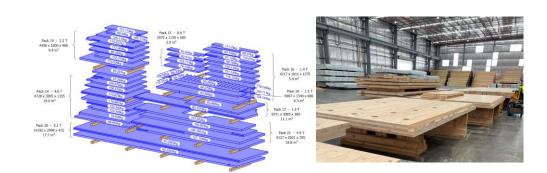


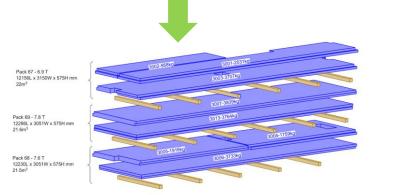




### DfMA

#### Design for Manufacture





# Design for Assembly

15



Level 1 – The Shoehorn Approach

Design paradigm of concrete construction





#### Level 1 - The Shoehorn Approach

Design paradigm of concrete construction

#### Level 2 – Designing With Components

- Grids conducive for mass timber
- Square peg in a square hole
- Function follows form





#### Level 1 – The Shoehorn Approach

Design paradigm of concrete construction

#### Level 2 – Designing With Components

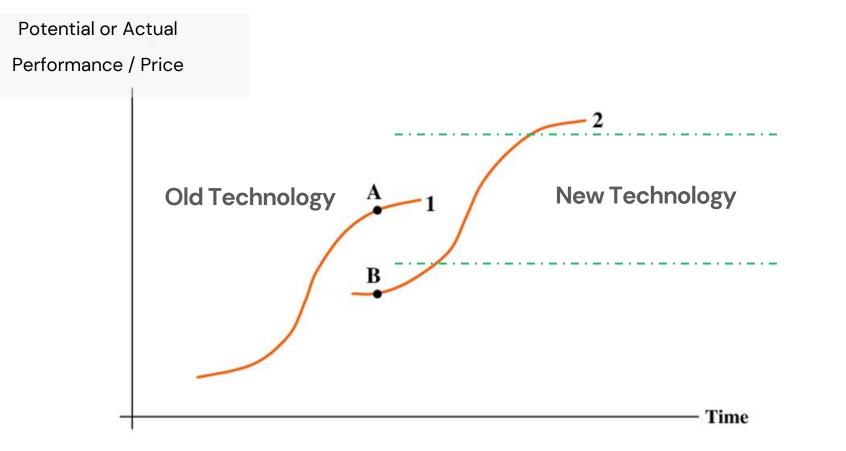
- Grids conducive for mass timber
- Square peg in a square hole
- Function follows form

#### Level 3 – Designing with Scalability

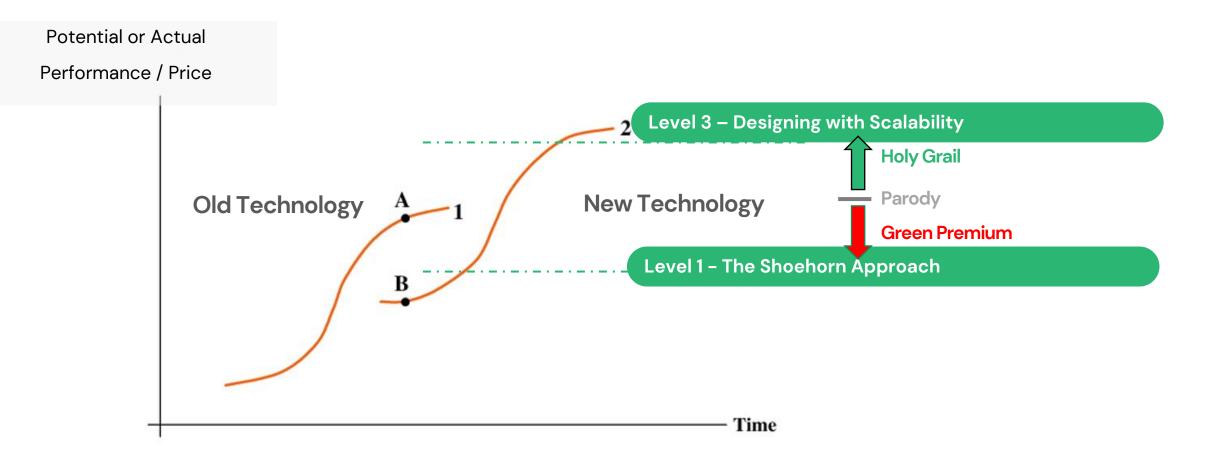
- Designing with constraints in supply chain to alleviate bottlenecks
- Improves processes and most cost effective
- Replication eliminated in the supply chain













# Designing With Scalability



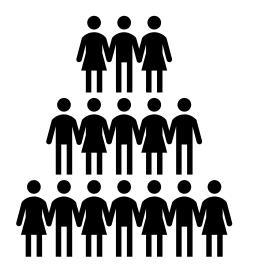
Foreward by TIM FERRISS THE ALMANACK OF NAVAL RAVIKANT A guide to wealth and happiness

ERIC JORGENSON



### Leverage

People



Henry Ford

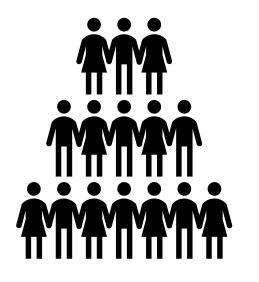
Ray Croc

Sam Walton



Leverage

People



**Henry Ford** 

Ray Croc

Sam Walton

Money

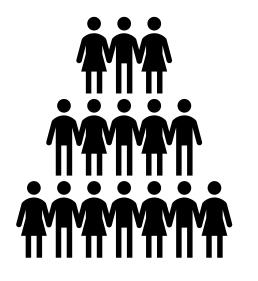


Warren Buffet George Soros Carl Icahn



### Leverage

People



Henry Ford

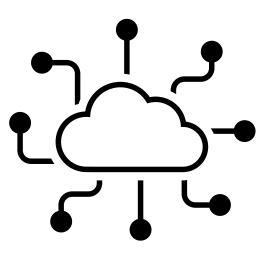
Ray Croc

Sam Walton

Money



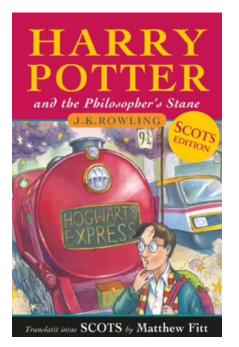
Warren Buffet George Soros Carl Icahn Zero Marginal Cost of Replication



Mark Zuckerberg Larry Page / Sergey Brin Reid Hoffman



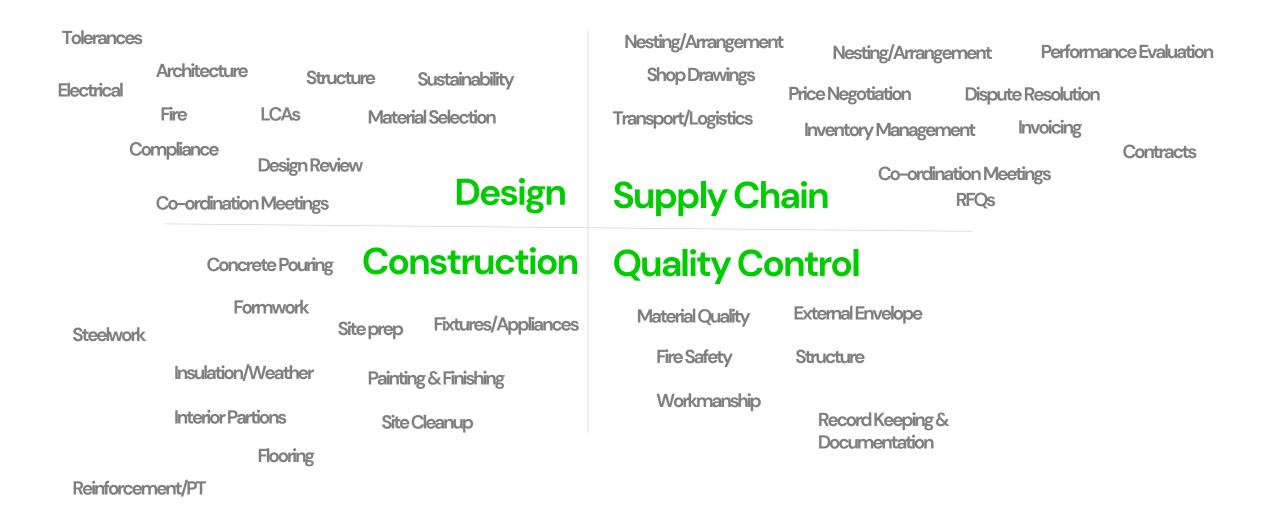
### **Zero Costs of Replication**







### **Replication Costs in Construction**









### Today





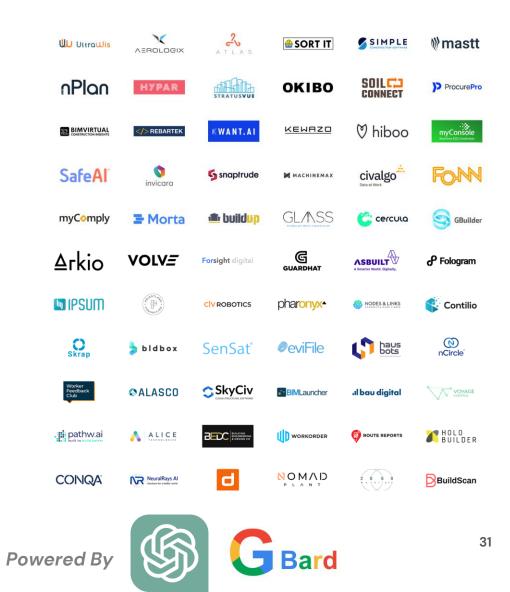
### **Tomorrow?**



**Deliberate Strategies** 

**Emergent Strategies** 









# Our Bit

### **Timber Demand Infrastructure**

- Approx 1/300 Engineers Are Mass Timber Specialists
- It is difficult to become a mass timber specialist.

#### Problem 1

This isn't taught at university. We need to provide the best education on the job.

#### Problem 2

Timber Specialist Engineer Has invested in the tools, knowledge and processes. Can offer mass timber when it is the correct solution.

0

Engineer

Non Timber Specialist Engineer Starting point of all engineers.

No experience from university. First job ran at a los

(/investment). Guides project to the comfort zone of traditional materials

Engineers are reinventing the wheel doing the same tasks. We can provide the industry infrastructure to make it cheaper for engineer's on the job, and reduce project design fees.

### **Timber Demand Infrastructure**

	Approach	Design Tools Development (Hours)	Design Learning (Hours)	Geelong - Post and Beam	240 Vic St - CLT Wall / CLT Floor	Pheonix Apartments
CLT Floor (Ambient)	Excel	26.7	21.3	0	0	0
CLT Floor (Fire)	Excel	17.3	21.3	٢	0	0
CLT Wall (Ambient)	Excel	26.7	21.3	0	0	0
CLT Wall (Fire)	Excel	16.O	21.3	0	٢	0
Mass Timber Beam (Ambient)	Excel	23.3	4.7	0	0	0
Mass Timber Beam (Fire)	Excel	2.7	4.7	0	0	0
Mass Timber Beam Penetration and Reinforcement	Excel	10.0	4.0	0	0	0
Mass Timber Column (Ambient)	Excel	9.0	8.7	٥	0	0
Mass Timber Column (Fire)	Excel	6.7	6.0	0	0	0
Mass Timber K-brace (Stability)	Excel	1.3	5.3	٢	0	0
CLT Floor Point Load (Ambient)	Excel	4.0	7.3	۲	0	0
CLT Floor Point Load (Fire)	Excel	2.0	6.7	0	0	0
CLT Lintel Design	Excel	9.3	8.O	0	0	0
CLT In-plane Strength (Shear Wall / Diaphragm)	Excel	11.3	13.3	0	0	0



**Post and Beam** 



Light-frame Walls / Mas Timber



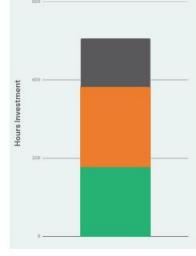
**CLT Wall and CLT Floor** 



### **Timber Demand Infrastructure**

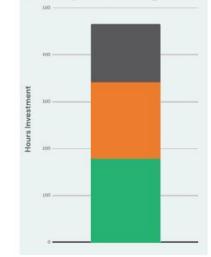


506 Unpaid Learning Hours



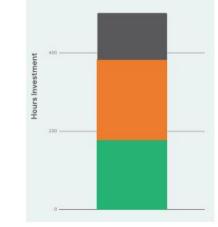


466 Unpaid Learning Hours





505 Unpaid Learning Hours



	Cost	Design Fee	Net Profit
Full Journey	\$160,100	-	
Geelong - Post and Beam	\$101,300	\$80,000	-\$21,300
240 Vic Street	\$101,000	\$40,000	-\$61,000
Phoenix Apartments	\$93,200	\$60,000	-\$33,200

Table 5



# **CLT Floor Fire Calculator.**



1. Overview.



2. Insert variables.



3. Review Calculations and Export.



### Team













### **Partnerships**







**Suppliers** 





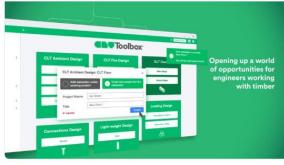
•••

New to mass timber structures or the provisions or provision of the new timber standard NZS AS 1720.1? We are happy to announce a collaboration between TDS, Timber Design Centre and SESOC with CLT Toolbox to provide technical su ...see more



+ Follow

The Timber Design Centre (TDC), New Zealand Timber Design Society (TDS) and Structural Engineering Society (SESOC), are all collaborating to provide technical advice and validation of the new design tools developed by CLT Toolbox ...see more



CC Marco Arcolini and 33 others











**Investors** 



### Partnerships

Jan 23 Feb 23 Mar 23 Apr 23	May 23 Jun 23 Jul 23 Aug 23 S	ep 23 Oct 23 Nov 23 Dec 23 Jan 2
Release One: Mass Timber Central.	Release Two: TBC. Release	Three: TBC.Release Four: TBC.
Release One. Mass Timber.	Release Option. Light-Frame.	Release Option. Connections. (Mass Timber)
<ul> <li>CLT Floor Ambient</li> <li>CLT Floor Fire</li> <li>Beam</li> <li>Column</li> <li>CLT Wall Ambient</li> <li>CLT Wall Fire</li> <li>Loading Wall</li> </ul>	<ul> <li>Stud Design</li> <li>Floor Design (Joists / Floor Trusses Etc)</li> <li>Shear Wall Design</li> <li>Diaphragm Design</li> <li>Light-Frame Crushing</li> <li>Tolerances Design</li> <li>Beam Design</li> </ul>	<ul> <li>Full Connection Library Including:</li> <li>Screw Design (EC5/NZS)</li> <li>Brackets</li> <li>Beam / Column Proprietary Connections.</li> <li>Shear</li> </ul>
<ul> <li>Loading Column</li> <li>Beam Penetration &amp; Strengthening</li> <li>Lintel</li> <li>CLT Shear Wall/Diaphragm</li> </ul>	Stud Loading     Release Option.	Release Option. Connections. (Light-Frame)
<ul> <li>CLT Floor Point Load Ambient</li> <li>CLT Floor Point Load Fire</li> <li>Tolerances</li> <li>Crushing</li> </ul>	<ul> <li>Hybrid.</li> <li>Steel Beam &amp; Steel Column.</li> <li>Timber Concrete Composites.</li> </ul>	<ul> <li>Full Connection Library Including:</li> <li>Drag Straps</li> <li>Brackets</li> <li>Screw Design</li> </ul>



# Thanks ③