Development of Swedish Wooden Multi-storey Construction

from 1994 to today and prospects for 2025

Tomas Nord, Linköping university

Seminar: Deconstructing myth in WMC

University of Helsinki

2018 – 03- 12

LINKÖPINGS UNIVERSITET

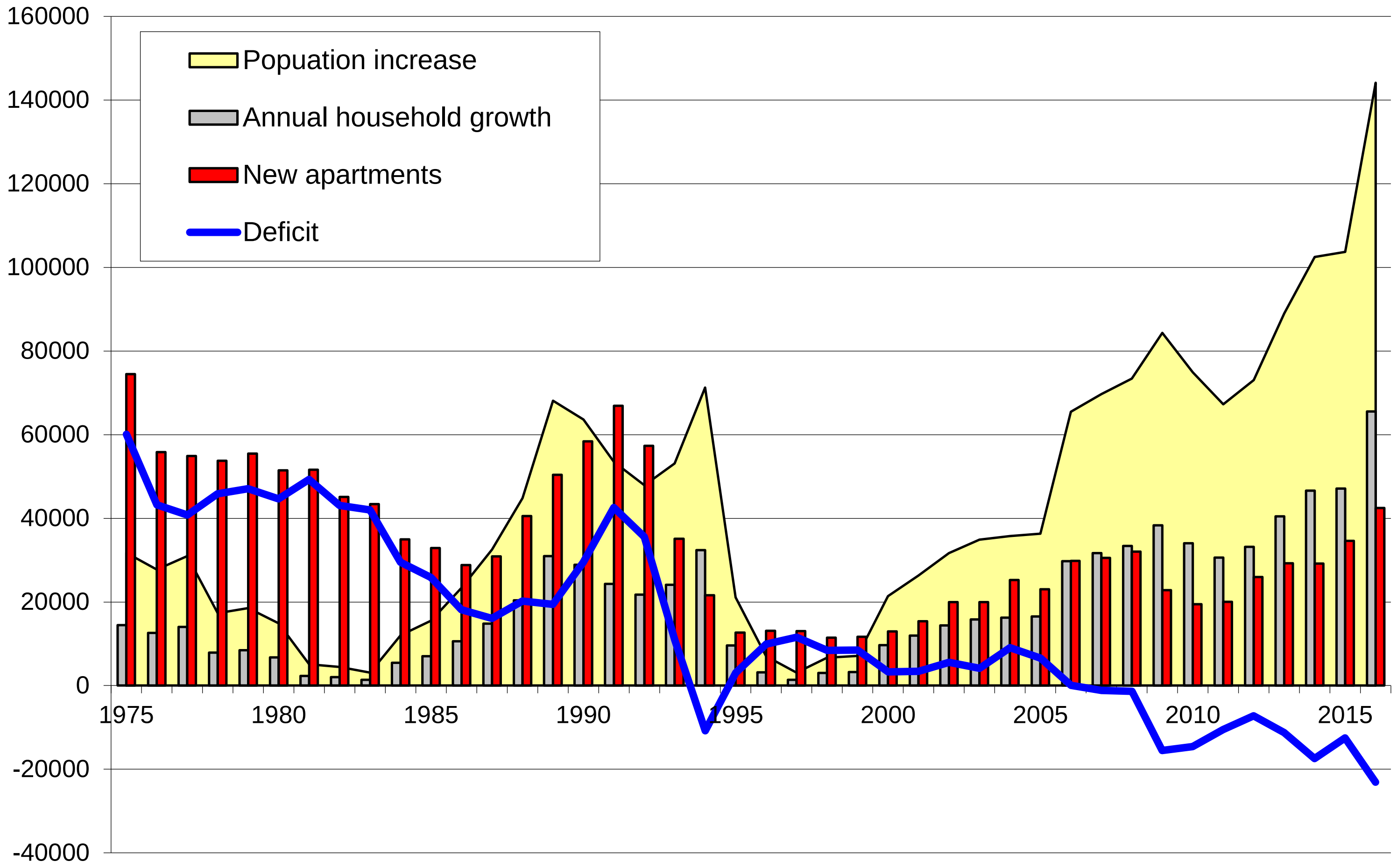
Content

- Development of WMC in Sweden from a triple-helix perspective

- 1994 – 2004
- 2004 – 2015
- 2015 – 2025

Initial conditions

- Changing role of government on construction market since 1990
- Functional rules vs industry norms
- Large contractors dominate
- Concrete framing

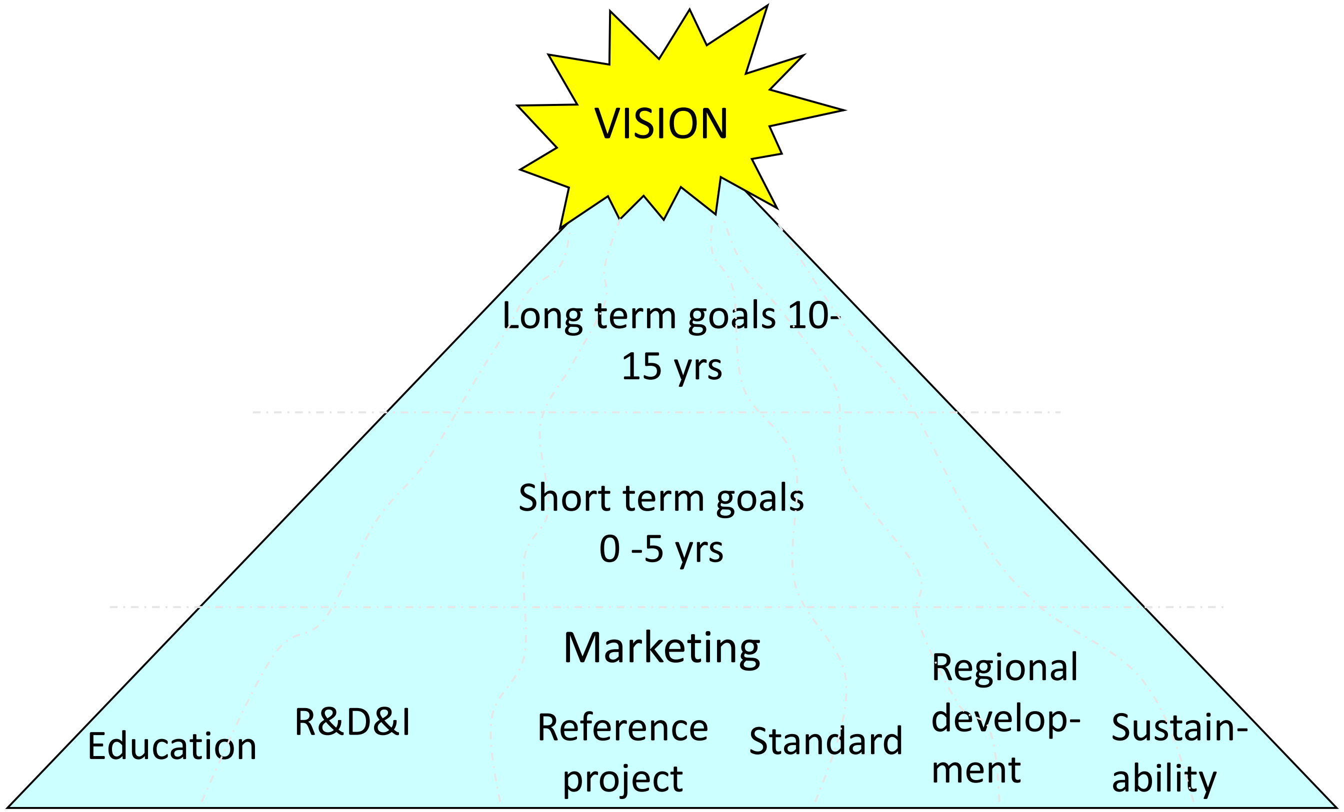


1994 – 2004 WMC starts and grows into niches

- Different construction methods
- Different actors
    - Learn market
    - Defend position
- Technical challenges
- No specific business models

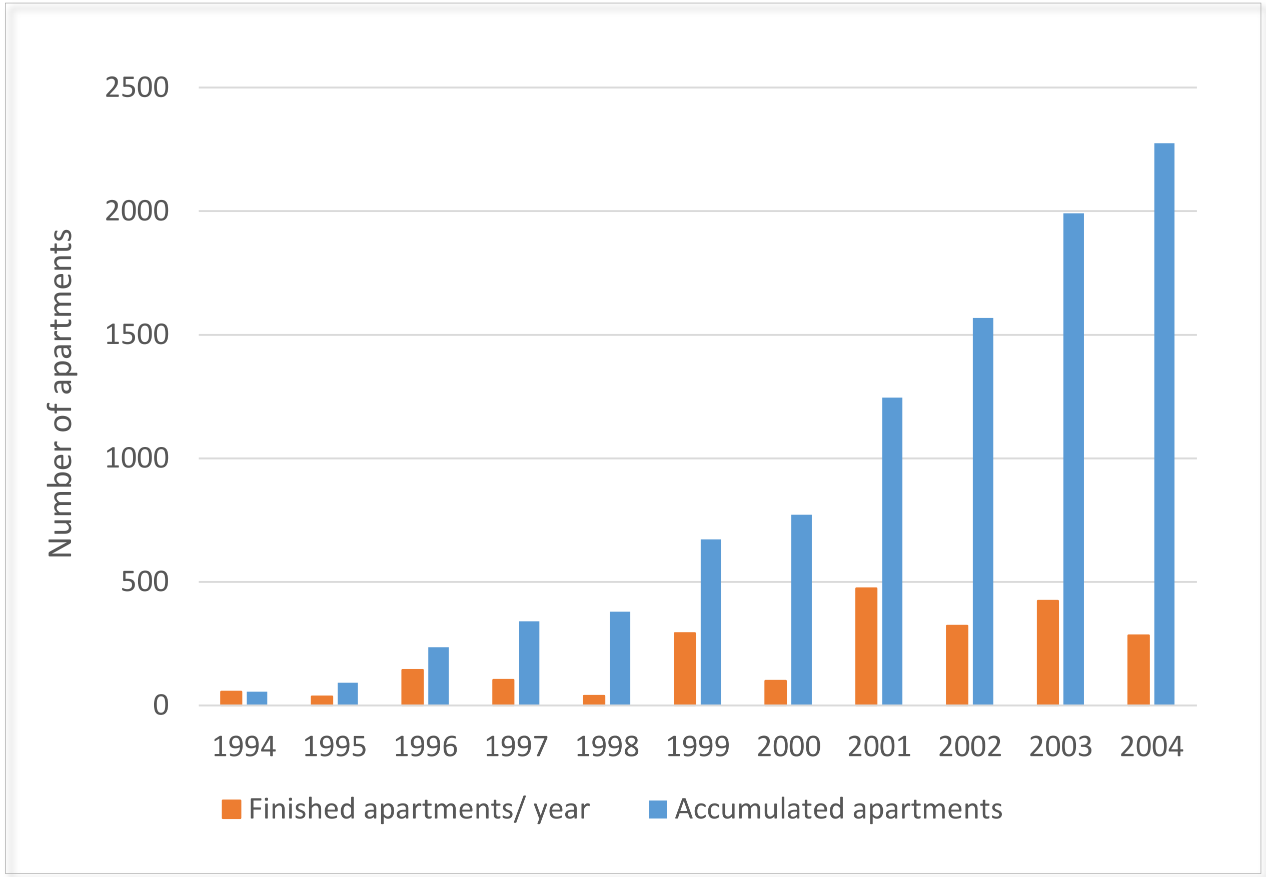
1994 – 2004 Political support to initiate industry development

- 1997 – Research program
- 2004 – National strategy to enhance wood in construction
- A few municipalities starts interest in WMC



1994 – 2004 From 0 percent to a few percent and in niche markets

- Focus on apartments for students and elderly
- Modules dominate as frame system
  - Trials on CLT



1994 – 2004 Development from an innovation standpoint

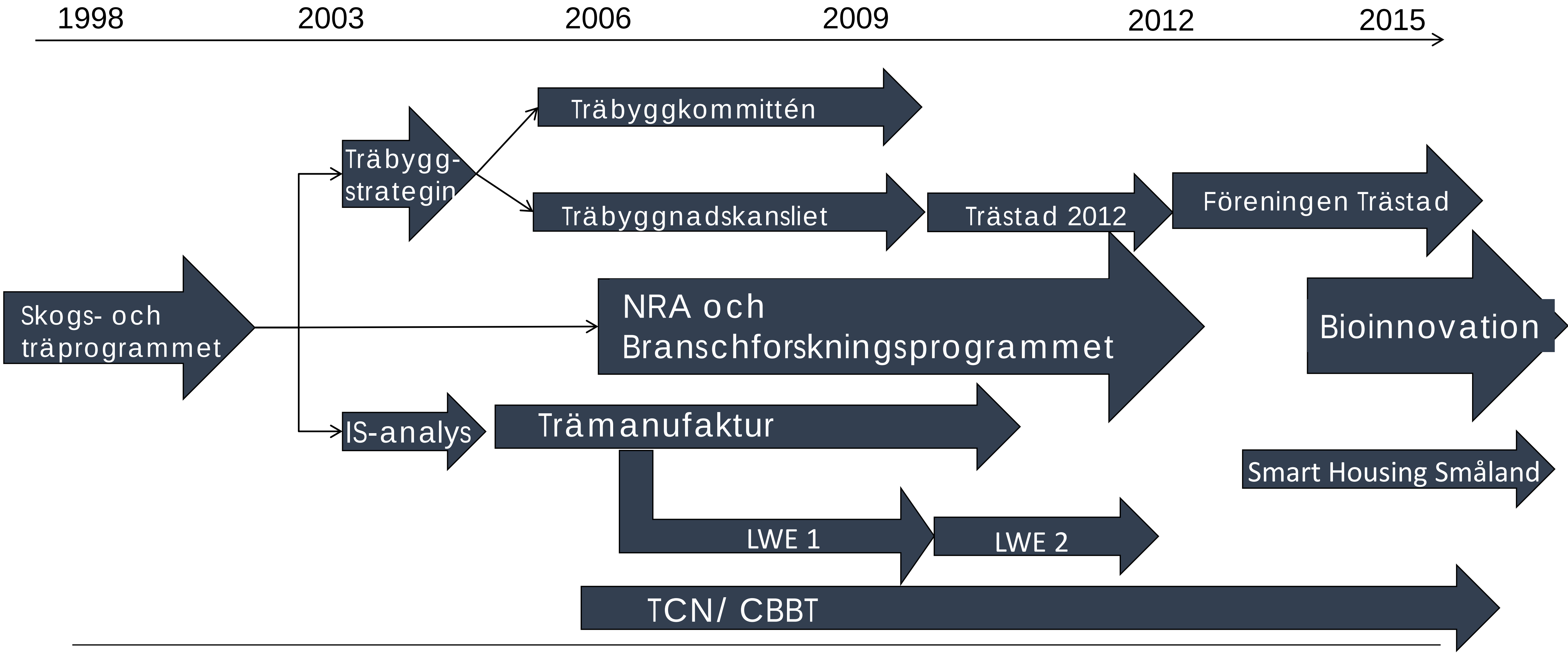
Concept & idea	Pilot-building	Strong niches	Mass market
Choice of technology and business platform	Technology verification leads to business development	Concept development and market consolidation	Concept development and Strategic expansion
			

Adapted from L. Stehn, presentation at Timber construction forum in Garmisch Partenkirchen, 2009

2004 - 2015 Industry and research in collaboration developing the market

- Technical issues solved – new success factors defined
- Competence develops in industry
- Clients in focus
- Industrial focused business models
    - More companies enter

1998 – 2015 Forest and Wood industry programs

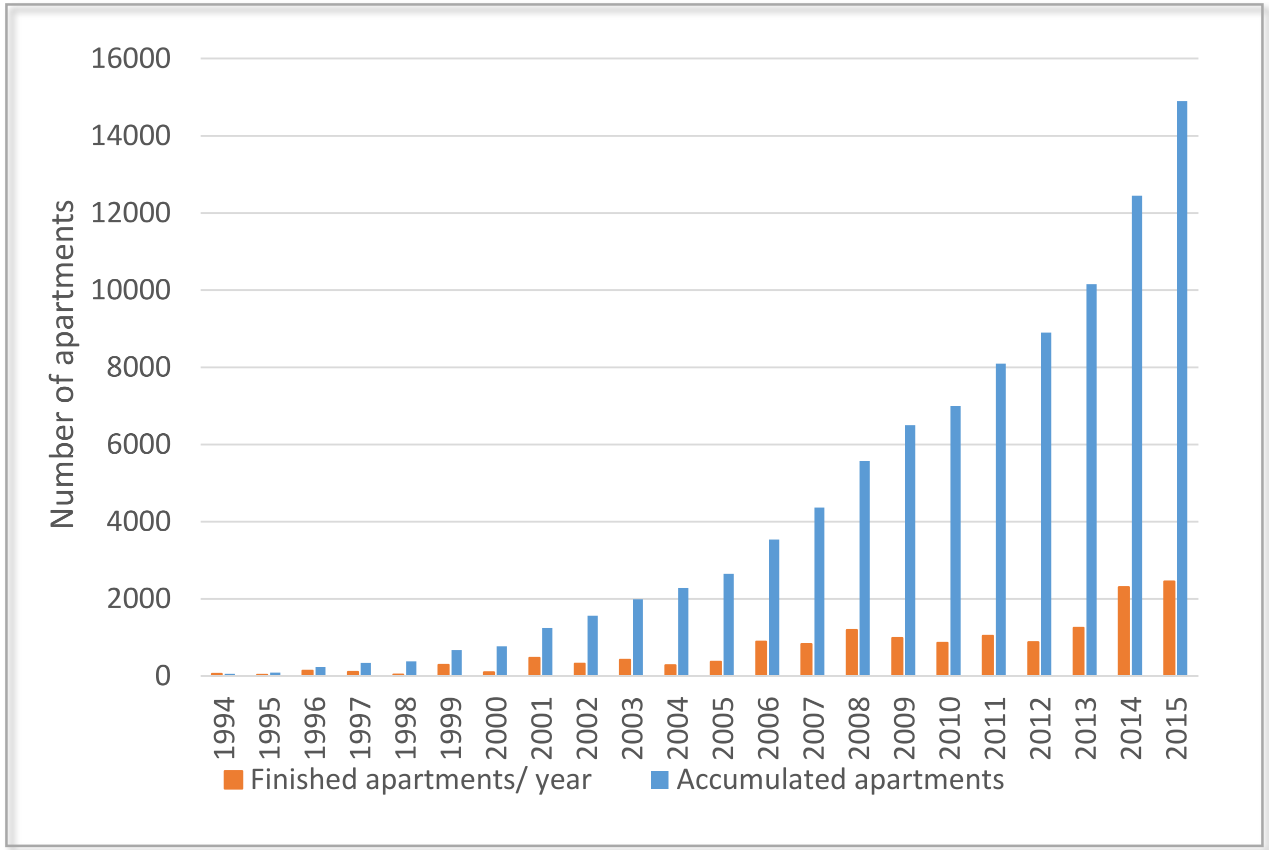


2004 - 2015 Municipalities increase their engagement in wood construction

- 2006-2009 – Realization of strategy
- Forest based research programs - in total 60 projects
  - Lean Wood Engineering
  - Ecobuild
- Regional activities
  - TCN/ CBBT

2004 - 2015 Stable share, 10 %, also when construction grew

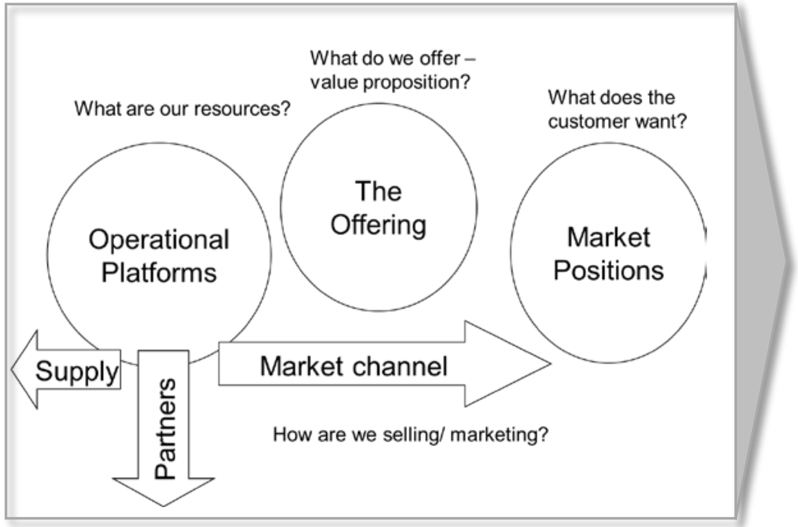
- Diversification to more markets
- Commercial buildings with CLT and gluelam
- Three dominant business models



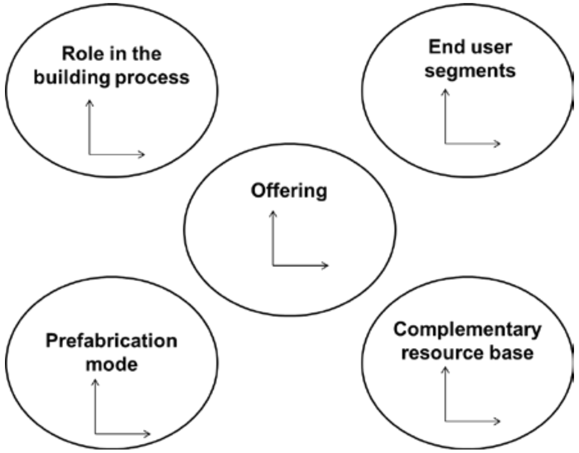
Source: Eriksson, Östman, Nord, 2015; TMF, 2017

Three dominant business models out of seven viable

Generic business model



Industrial timber frame business model



1. Systems supplier – turnkey
2. Inhouse developer and system supplier
3. Frame system supplier

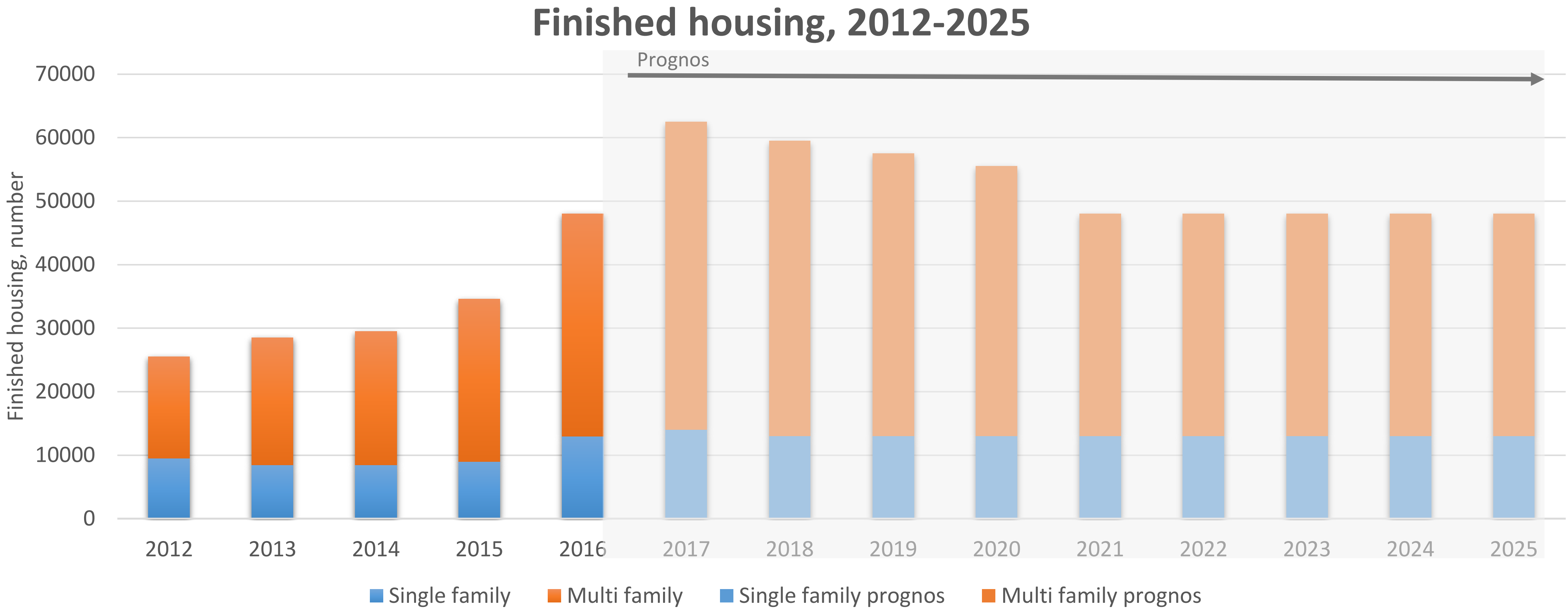
Source: Brege, Stehn and Nord, 2014

2004 - 2015 Development from an innovation standpoint

Concept & idea	Pilot-building	Strong niches	Mass market
Choice of technology and business platform	Technology verification leads to business development	Concept development and market consolidation	Concept development and Strategic expansion
			

Adapted from L. Stehn, presentation at Timber construction forum in Garmisch Partenkirchen, 2009

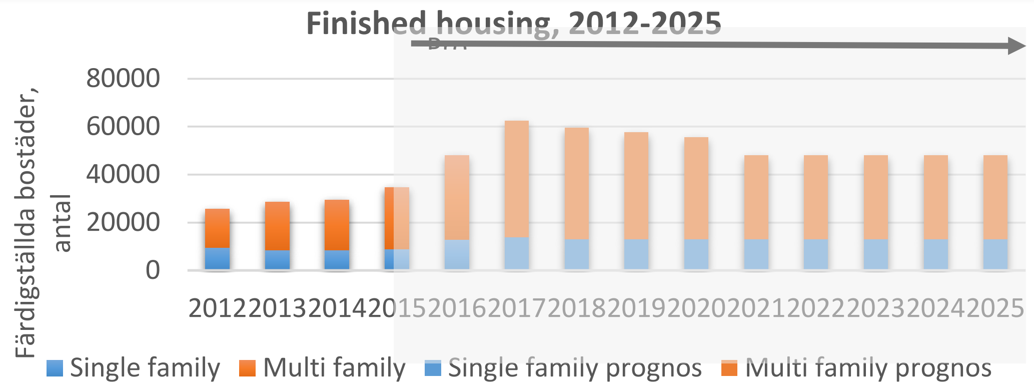
2015 – 2025 Housing construction is estimated to increase until 2020 and level out from 2021



Adapted from Brege, Nord and Stehn. 2017 Prognos för industriellt träbyggande

2015 -2025 Demand from society and proposal from government

- Deliver housing
- Deliver good housing
- Deliver good and climate smart housing
- Deliver good, climate smart and resource efficient housing



Political standpoints and issues

High demand of housing

75% is being built in larger cities

Wood has a role as climate change mitigator

Renewable material and shorter production and assembly time

WMC or industrial wood construction can meet all four demands

Capacity dependent

Climate mitigation

Employment

Resource efficiency

Prognosis to 2025

- 50 % multi family + 30-35% commercial buildings
- 15.000 apartments as WMC
- 8000 new jobs outside larger cities
- 6000 jobs from larger cities
- Substitution -40%; commercial -35- -40% in production phase (A1-A3)
- Minus 0,3-0,4 millon ton CO2 eqv (1% of target 2030)
- Minus 0,6-0,9 millon ton CO2 eqv is sequestration is included
- Efficient factories – less efficient at work site
- From carpenter to machine operator

Investment plans in wood construction industry

The industry has on-going or planned investments of up to 10.000 apartments until 2020

Prognosis to 2025

- 50 % multi family + 30-35% commercial buildings
- 15.000 apartments as WMC
- 8000 new jobs outside larger cities
- 6000 jobs from larger cities
- Substitution -40%; commercial -35- -40% in production phase (A1-A3)
- Minus 0,3-0,4 millon ton CO2 eqv (1% of target 2030)
- Minus 0,6-0,9 millon ton CO2 eqv is sequestration is included
- Efficient factories – less efficient at work site
- From carpenter to machine operator

From built on site to assembly on site → Project to process

- 85% in larger cities
- 85/15 – Factory/ site

Construction site
10,5 hrs/sqm

8,5 h/kvm

Industriell byggarbetsplats
7,5 timmar/kvm

- 6700 job opportunities

5000 job opportunities

1000 assembly jobs

Resource efficient work in factories

- Industrial building projects have lower ÄTA-costs,
- Share of material waste is lower
- Larger volumes -> more efficient processes.
- Improved integration of construction process
  - Sub-contractors and consultants
- Partnership relations.

- Different strategies at industrial wood construction firms in term of value creation and resource efficiency

3 prefab- strategies for growth

1. ”The circumventing strategy” – high prefab, own developer, fokus on segments Push-strategy

2a. ”Through center” in cooperation with larger real estate owners – From push to pull-strategy

2b. ”Through center” in cooperation with larger contractors – more like traditional construction From push to pull-strategy

3. ”Procurement of standard” – large clients contract medium sized contractors as sub-contractors Pull-strategy

In summary

Industrial WMC has

- Created mass market concepts
- Disrupted the market
  - New technologies
  - New business models
- Linked triple-helix actors
- Moved from production to process and from cost focus to customer value (climate and well-being)

Thank you for listening!

Comments?

Tomas.nord@liu.se