



Academia - Industry collaboration is Sweden´s recipe for industrialized construction success

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Agenda

1. Historical review-
setting the scene
2. The cooperation
model
3. Recipe
considerations



Important to note – small market

- Population about 9,5 Million
- Average yearly production (1958-2014) of only 50 000 units in single and multi story dwellings
- Housing construction mainly national business and therefore highly sensible to fluctuations
- Stable political climate
- Innovative and technology driven development over many years





Industrialized building construction

- Large-scaled industrialization attempts during the 1960's, was based on prefabrication and standardized technology
- These early attempts resulted in increased housing and developed technologies





Industrialized building construction

Sweden beats the world hands down on prefab housing

- Industrialized house-building worldwide still mostly mass production based on a 1960:ies approach (Goodier and Gibb, 2007)
- About 84% of detached houses in Sweden, 15% in Japan and about 5% in the US; Australia and the UK use prefabricated timber elements

Temporary housing, UK
post war build-up



Sweden today



3 driving forces for Swedish development

- Manufacturing knowledge:
 - Single-family housing prefabrication dating back to the 1950:ties
- Demands for high living standards for all:
 - Focus on lower production costs and higher production quality
- Technology focus: R&D
 - Technical verifications to change and to conform with the building code



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So, this modern customer oriented Swedish version of industrialized housing construction

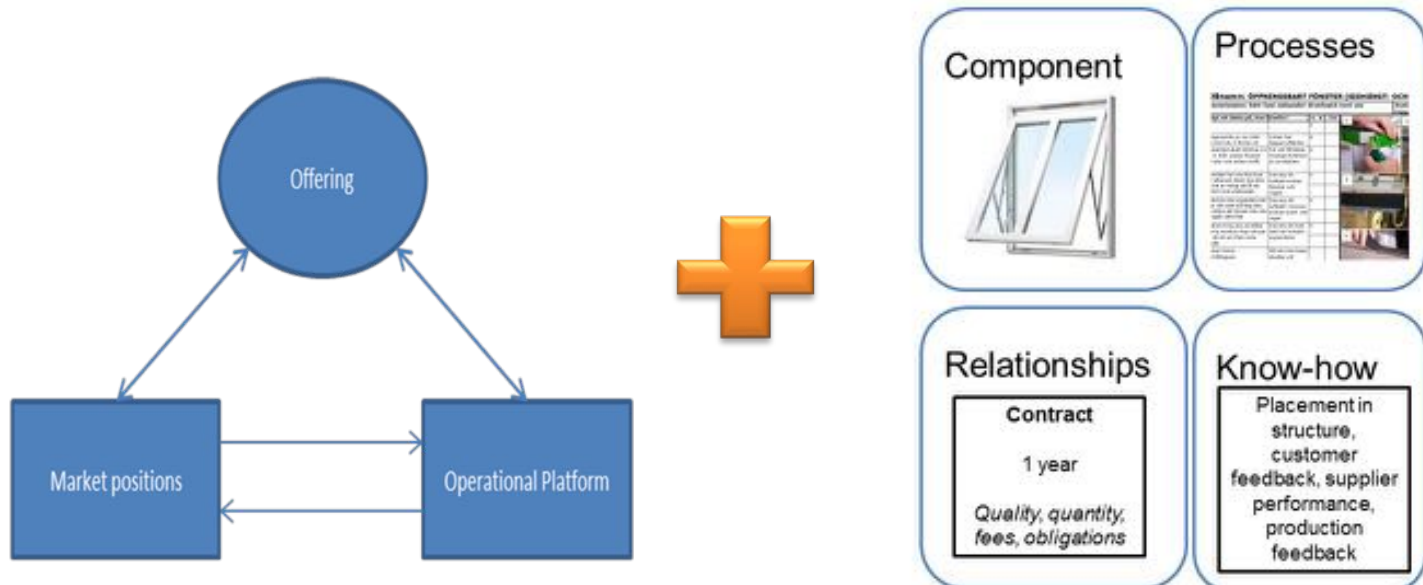
What is the recipe?



The recipe

Industrialized housing construction = business model + platform

- A platform collects all the components, processes, relationships, and knowledge attributed to a product family
- A business model illustrates how companies are built up and the way they operate their platform



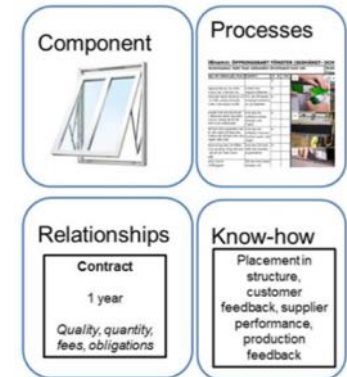


Integration to “control the means of production”

means of production

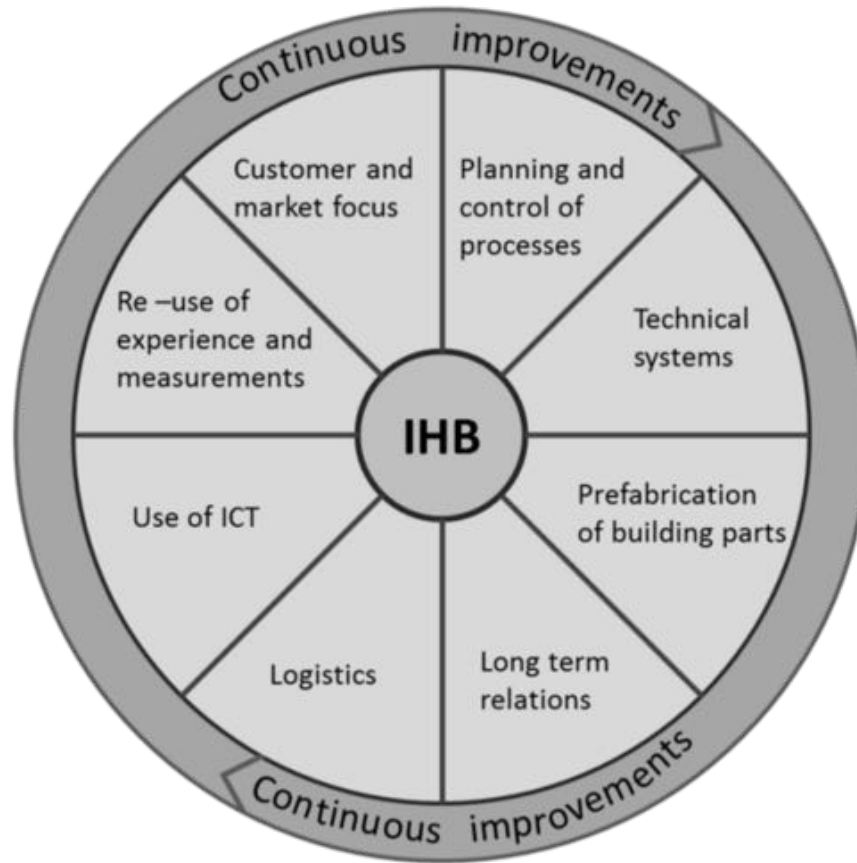
Industrialized housing construction involves defined production methods (like pre-assembly, automation etc.) but:

- is based on **who owns** “the means of production” (*the platform*)
and
- how to **integrate** “the means of production” (*managing the business model*)
- into a **controlled concept**.





A product platform conceptualization



Lessing et al. (2015)



Characteristics - key points

Sweden is a small, high cost market with less than 10 million inhabitants

Industrialized building construction according to the “Swedish recipe” imply

1. **Integration** of the constructs of the product platform to
2. **To own or to control** the means of production to be competitive



Characteristics - key points

- The level of Swedish industrialized construction
- An innovation development perspective

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
			





The Lean Wood Engineering cooperation model

How has academia helped industry?



The Swedish government raised two important questions

How can research contribute to timber housing industry:

Effectiveness (market performance: do the right things)

and

Efficiency (internal performance: do things right)



2004



2013



R&D program facts

- 11 to 21 companies from Wood manufacturing and Construction, 3 universities of technology
- About 60% of the companies were SMEs
- 9 years, more than 30 R&D projects, 70 active participants, 12 PhDs examined, 200 research publications
- Budget: € 1,9 Million per year.

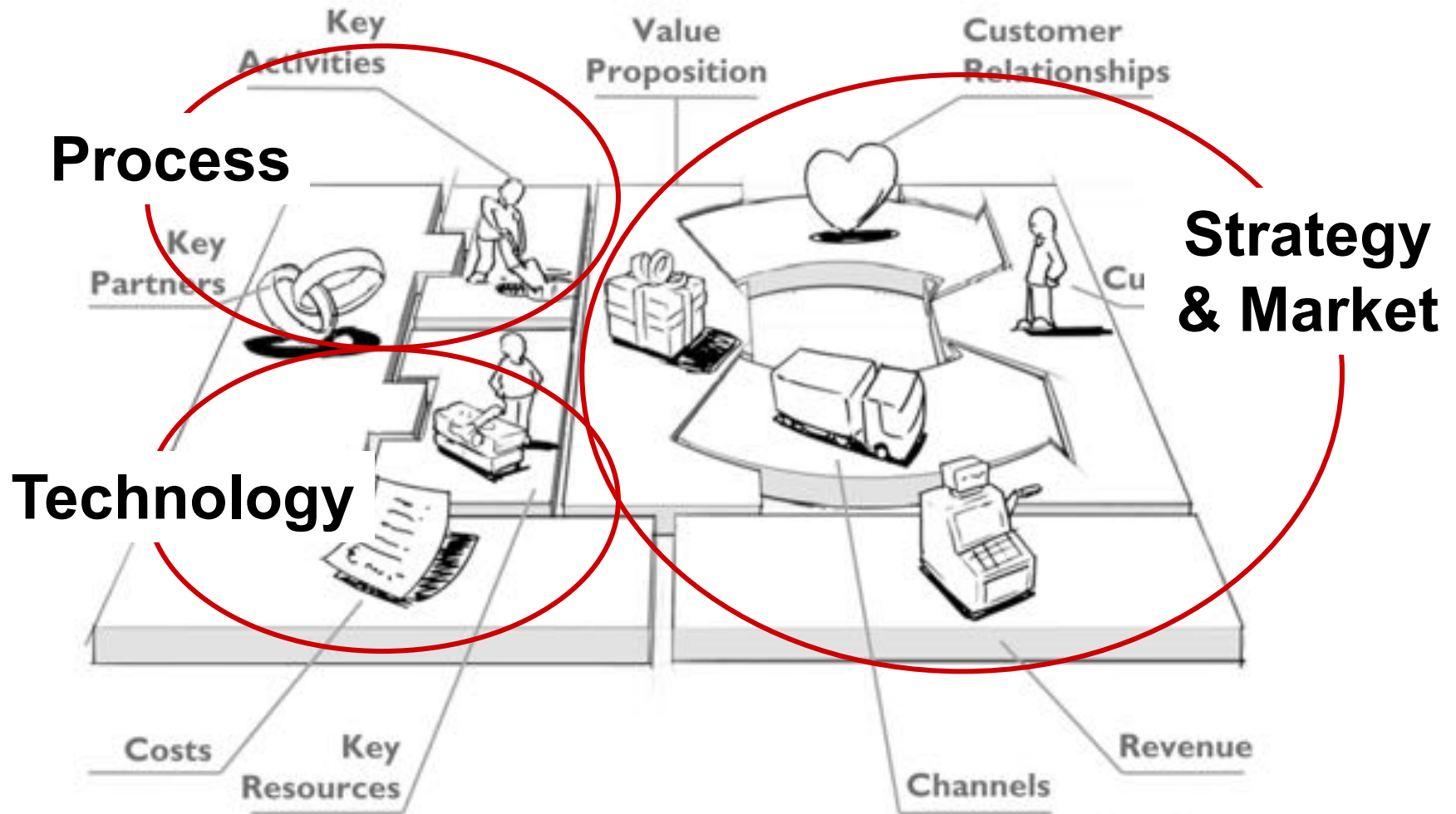


Why was the R&D programs established

- The task was to aid companies transformation to higher efficiency and effectiveness
 - To build firm-level resources and capabilities to formulate R&D projects to benefit from research
- The strategy employed was to concentrate on the development of the firms business model
- The fundamental scientific idea and contribution was therefore to integrate:
 - strategy/market,
 - process and
 - technology development



The business model elements



The cooperation model



1. R&D projects stems from company needs to facilitate transition
2. The integration of product, process and business development requires many types of solutions
3. Two different levels in the company require two different knowledge transfer activities.
4. Industrial PhD students.
5. An interdisciplinary research group that is capable of developing an applied research methodology



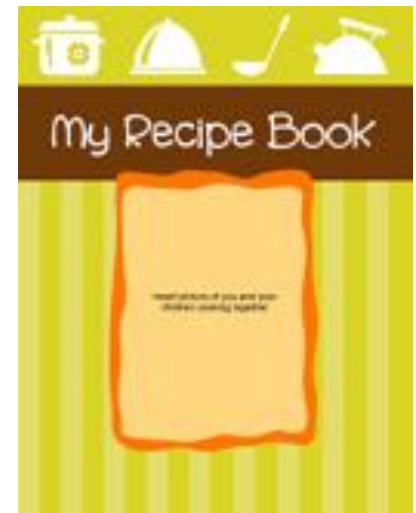
Recipe considerations



How to go on?

To utilize the Swedish recipe it is important to recognize that:

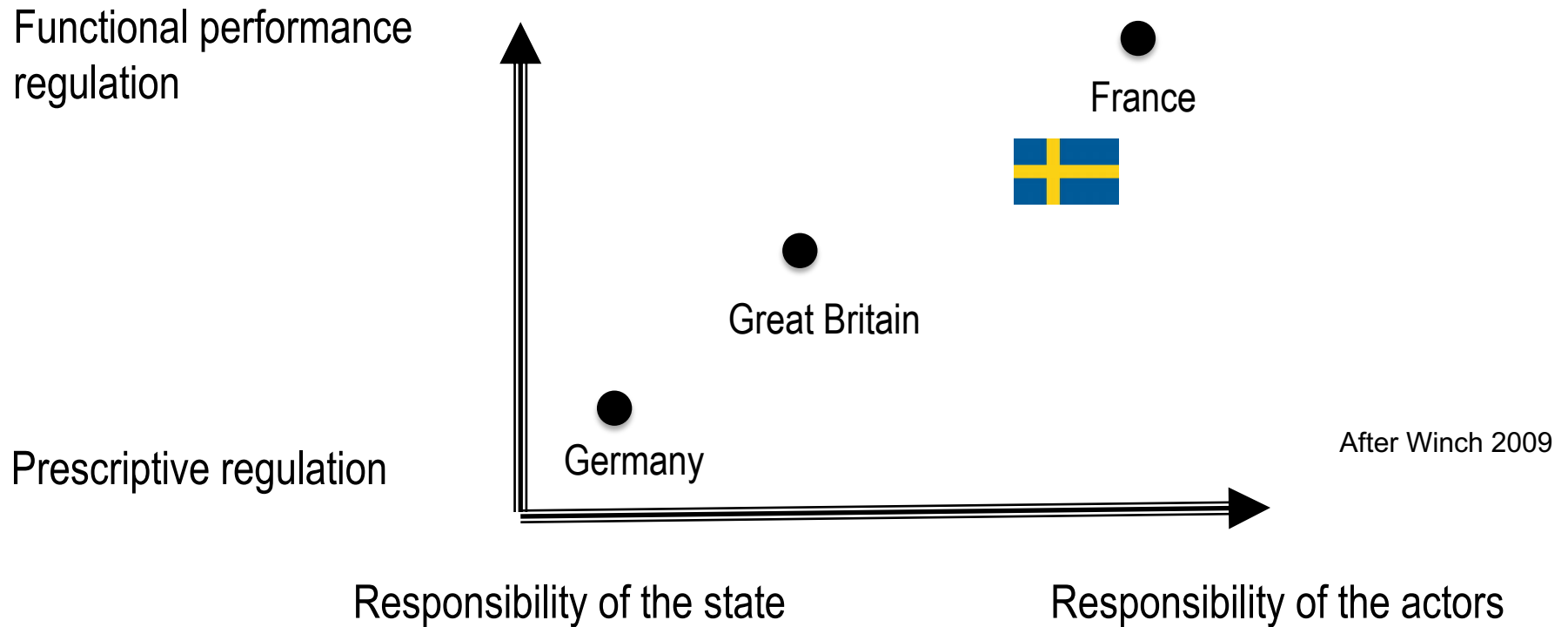
- Institutional factors of each region/country in terms of industry culture, regulatory context etc. sets the possibilities for:
 - Control of the building process to achieve industrialized building construction, and
 - Acceptance of industry-academia collaboration (what is good research vs. what is good company development)
- To transfer the Swedish experiences each context needs to be considered





A concluding comparison: the regulatory context

The European example of building performance regulations



Thank you for
your attention

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