Systemleverancer og præfabrikation... det industrielle byggeri?

Hvorfor bygger vi som vi gør... og hvad kan vi gøre ved det?

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Challenges of Project based Production

Order
Disciplinary
Hierarchy
Standardized
Efficiency
Linear
Bureaucratic
Codifying
Repetition
Class
Degeneration

Chaos
Interdisciplinary
Network
Unique
Creativity
Iterative
Dynamic
Experimenting
Innovative
Individual
Stress
Indhold

☐ Byggeriets udvikling

☐ Samfundets udvikling

☐ Produktionsformer i byggeriet

☐ Præfabrikations rolle i byggeriet

☐ Er præfabrikation den rigtige strategi?
Innovative learning

Enter the site:
http://m.socrative.com

And join room LC2013
Socratic Question

What characterizes a building? Is it standardized or unique?
“If men define situations as real, they are real in their consequences”

William Isaac Thomas
The structuring myths of construction

“...a space of representation which bears no relation of continuity with the dominant 'structural objectivity'. Myth is thus a principle of reading of a given situation, whose terms are external to what is representable in the objective spatiality constituted by the given structure.” (Laclau 1990: 61)
Modern Construction
Standardized
Empire state building
Gellerup
Herlev sygehus
Production
Postmodern Construction

Unique
Bispebjerg bakke
# Timeschedule

<table>
<thead>
<tr>
<th>Task Description</th>
<th>Project Start</th>
<th>Actual Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1</td>
<td>2000-01-01</td>
<td>2000-01-02</td>
</tr>
<tr>
<td>Task 2</td>
<td>2000-02-01</td>
<td>2000-02-02</td>
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<tr>
<td>Task 3</td>
<td>2000-03-01</td>
<td>2000-03-02</td>
</tr>
<tr>
<td>Task 4</td>
<td>2000-04-01</td>
<td>2000-04-02</td>
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<tr>
<td>Task 5</td>
<td>2000-05-01</td>
<td>2000-05-02</td>
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<tr>
<td>Task 6</td>
<td>2000-06-01</td>
<td>2000-06-02</td>
</tr>
<tr>
<td>Task 7</td>
<td>2000-07-01</td>
<td>2000-07-02</td>
</tr>
<tr>
<td>Task 8</td>
<td>2000-08-01</td>
<td>2000-08-02</td>
</tr>
<tr>
<td>Task 9</td>
<td>2000-09-01</td>
<td>2000-09-02</td>
</tr>
<tr>
<td>Task 10</td>
<td>2000-10-01</td>
<td>2000-10-02</td>
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<td>Task 11</td>
<td>2000-11-01</td>
<td>2000-11-02</td>
</tr>
<tr>
<td>Task 12</td>
<td>2000-12-01</td>
<td>2000-12-02</td>
</tr>
</tbody>
</table>

Notes:
- Tasks 2, 4, 6, 8, 10, and 12 are completed as of the latest update.
- Task 1 remains in progress.
- Task 3 was delayed due to unforeseen circumstances.
Collaboration
Indhold

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Socrative Question

Are you similar or unique?
We are all unique... but also similar

Biologically

Cultural

we are all, regardless of race, genetically 99.9% the same
How unique are we?

...everyone else.
The book argues that those born after 1970 are more self-centered, more disrespectful of authority and more depressed than ever before... both as consumers and employees.

Some interesting quotes:

- "In the early 1950s, only 12% of teens aged 14 to 16 agreed with the statement 'I am an important person'. By the late 1980s, an incredible 80%, almost seven times as many, claimed they were important."
- "81,384 high school and college students ... completed questionnaires measuring what psychologists call 'agency': a personality trait involving assertiveness, dominance, independence, and self-promotion ... the average 1990s college student scored higher than 75% of college boomers from the 1970s."
- "Seventy percent of late-1990s high school students expected to work in professional jobs, compared to 42% in the 1960s ... In 1999, teens predicted they would be earning, on average, $75,000 by the age of thirty. The average income of a thirty-year-old that year? $27,000."
- Furthermore, Twenge shows, high self-esteem is _not_ correlated (or maybe it's negatively correlated) with achievement in school or at work. It is correlated with criminality, narcissism, and bad relationships, though.
Life is about creating yourself
Market development

Source: Stanley M. Davis, Future Perfect
The long tail
...a consequence of a more individualized society

Mass production ➔ Mass customization
The long tail and “production” paradigms

**Ford Model T**
- 1908 – 1927
- Sale more than 15,000,000
- Number of variations: 1

**Mercedes E-Class:**
- Introduced in 1993; currently on offer
- Sale more around 4,500,000 so far
- Number of variations: 3,347,807,348,000,000,000,000,000

**Aston Martin V8**
- 1969 - 1989
- Sales number 4,021
- Number of variations: hand crafted

Developed based on Anderson (2006)
The long tail and construction

Mass production  Mass customization  Individual customization

Traditional construction today
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Socratic Question

Is the management of construction significantly different from management of other project activities?

A | B | C | D | E
---|---|---|---|---
YES | YES&no | yes&no | yes&NO | NO
# Construction in the light of myths

<table>
<thead>
<tr>
<th></th>
<th>Standardized</th>
<th>Unique</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Societal frame</strong></td>
<td>Modern</td>
<td>Postmodern</td>
</tr>
<tr>
<td><strong>Timeframe</strong></td>
<td>1900 – 1970</td>
<td>1980 –?</td>
</tr>
<tr>
<td><strong>Driver of identity</strong></td>
<td>Classes</td>
<td>Individualism</td>
</tr>
<tr>
<td><strong>Architectural credo</strong></td>
<td>Form follows function</td>
<td>Form follows fiction</td>
</tr>
<tr>
<td><strong>Characteristic of the building process</strong></td>
<td>Complex - but known</td>
<td>Chaotic</td>
</tr>
<tr>
<td><strong>Production paradigm</strong></td>
<td>Mass Production</td>
<td>Individual Customization</td>
</tr>
<tr>
<td><strong>Value chain</strong></td>
<td>Integrated</td>
<td>Fragmented</td>
</tr>
<tr>
<td><strong>Vehicle for realization</strong></td>
<td>Prefabrication</td>
<td>In-situ</td>
</tr>
<tr>
<td><strong>Management paradigm</strong></td>
<td>Scientific Management</td>
<td>Project management</td>
</tr>
<tr>
<td><strong>Productivity</strong></td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Implementation of Lean</strong></td>
<td>Long term planning (Line of Balance)</td>
<td>Short term planning (Last Planer System)</td>
</tr>
</tbody>
</table>
Are we better off with unique buildings?

Its complexity playfully shifts between functionality and abstraction! It's a dream of the future and the past!

The inuits regretted hiring an postmodern architect

wulffmorgenthaler.com
... are buildings unique?

Ørestaden
Do we need to view them as being unique?

"If men define situations as real, they are real in their consequences"
What if we view buildings as both standardized and unique?

“Mass Customization = producing goods and services to meet individual customer's needs with near mass production efficiency". Tseng and Jiao (2001, p. 685)
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The rationality behind Mass Customization

- **Costs / willingness to pay**
- **Customer value**
- **Unit cost**
- **Diversity in range of products**

Mass production to Individual customization diagram with Cost, Customer value, and Unit cost axes.
Order decoupling points… and the long tail
Top-down vs bottom-up

**Building concepts (top-down)**
- Think in terms of holistic architectural and system solutions and develop re-usable solutions which can be re-used
- Address the market and not just the individual building project

**System products (bottom-up)**
- Producers of building materials develop (sub)systems which are intended to be a part of a building
- Specify interfaces and design rules, so as to achieve configuration rather than engineering
Installation shafts
Komplett vs. the German platform

<table>
<thead>
<tr>
<th>NCC Komplett</th>
<th>The German platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>90% Fabrication</td>
<td>90 % Insitu</td>
</tr>
<tr>
<td>High fixed costs, unable to control costs</td>
<td>Low fixed costs but still 30% cost reduction</td>
</tr>
<tr>
<td>Couldn’t compete with traditional construction practices</td>
<td>Established a new market – high quality and low cost</td>
</tr>
</tbody>
</table>
The German platform
Different markets – the same platform

Apartments 60%
Row houses 100%
Holiday immobiles 90%

The technical platform
The platform – a platform for growth

<table>
<thead>
<tr>
<th></th>
<th>Apartments</th>
<th>Single family houses</th>
<th>Holiday immobiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>High end product</td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
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<tr>
<td>Mid-range product</td>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
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<tr>
<td>Low end product</td>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
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</table>

Row houses
Platform development through incremental innovation

Construction costs

Accumulation of knowledge

>30%

Building with plane elements and prefabricated roofs

Standardization of house types

Optimization of house-types and methods

Strategic partnerships with subcontractors
Experiences

- Working with platforms is no rocket science, substantial benefits can be achieved by using existing construction practices and tools.
- No fancy IT-systems are needed for the implementation of platforms. The platform can be situated within a combination well defined skills and organizational culture.
- Implementation of platforms requires a strong commitment and loyalty from the whole organization.
- Important to have a specific customer focus (target costing).
- Platforms require incremental and systematic innovation with a clear separation between the continuous development of and the production based on the platform.
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Exercise:

How many figures can you build using 6, 2x4 blocks of the same color?

915,103,765

Source: http://www.math.ku.dk/~eilers/lego.html
What is modularization?
The anatomy of modularity

- Modularity is an attribute of a complex system that advocates designing structures based on
  - Minimizing interdependence between modules and
  - Maximizing interdependence within them

that can be mixed and matched in order to obtain new configurations without loss of the system’s functionality or performance (Baldwin and Clark 1997; Langlois 1992).

- Each module communicates and interacts with the others via standardized interfaces that allow modules’ decoupling

Source: Campagnolo & Camuffo 2009
Types of modularity

Source: Campagnolo & Camuffo 2009
Projekt

Aktører:
Virksomheder: Arkitekter, Rådgivere, Entreprenører, Håndværkere
Interesse Org: DB, FRI, Danske Ark, Tehniq, Muro

Markeder:
Nybyg, renovering Boliger, sygehuse, Erhverv Anlæg

Regulering:
Byggeloven, Bygningsreglementet Energimærkning

Forretningsmodel:
Licitation baseret, Engineer to order, Høje variable omkostninger

Aktører:
Energiselskaber (Gas, EL og Varme)
Vandværker
Renovation

Markeder:
Service (FM) Vand Varme EL

Regulering:
Krav om CO2 reduktion for energiselskaber

Forretningsmodel:
Service, abonnement Høje variable/faste omkostninger

Aktører:
Virksomheder: (producent af byggeomaterialer, grossister,)
Interesse Org.:
DI Byg, DB Byggeomaterialer,

Markeder:
Byggeomaterialer (beton, Vinduer, isolering,...) Distribution (Grossister, transport...)

Forretningsmodel:
Mass produktion, Høje faste omkostninger

Regulering:
Obligatorisk: BR (krav om styrke, brandsikkerhed og sundheden), DS (normer), MK, VA, ETA, CE mærkning
Frivillig: Betonvare Kontrollen, Dansk Murstenskontrol... FSC, svanemærkning

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