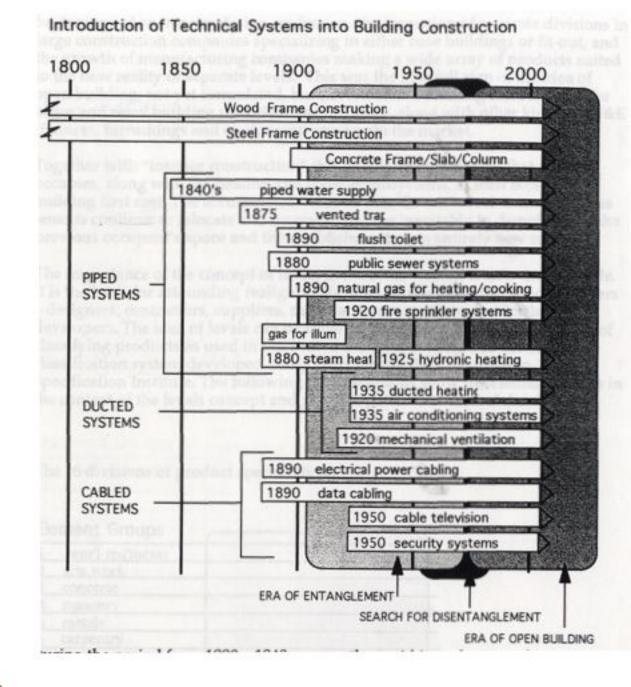


What is Open Building?

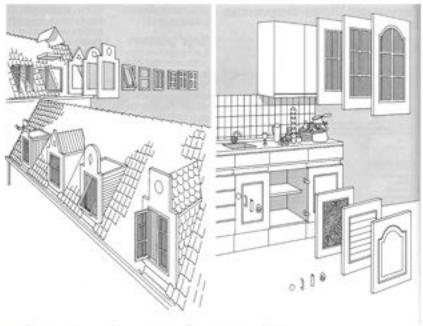
A technical way of explaining..

...buildings are composed of many thousands of parts...



Avoiding the entanglement in this picture is important

Interface conditions should allow alternative products to replace one another...



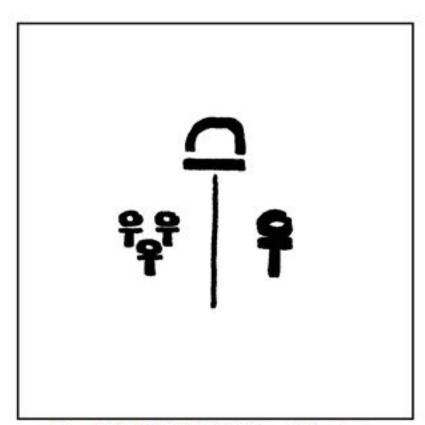
This is the technical or "flexibility" aspect of open building...

The second point concerns distribution of responsibility...

CONTROL is always distributed... ... but who controls which parts?

INDIVIDUAL USERS must be able to exercise control... but of what parts and spaces?

COMMUNITY is responsible for....what parts and spaces?



From HABRAKEN: "ABC's of Housing"

Control also has a lot to do with the control of space...

...territorial control....

This is important to human beings' sense of belonging and personal responsibility..



Open building is also about

PERMANENCE and CHANGE

The city is permanent to the neighborhood

The neighborhood is permanent to the building

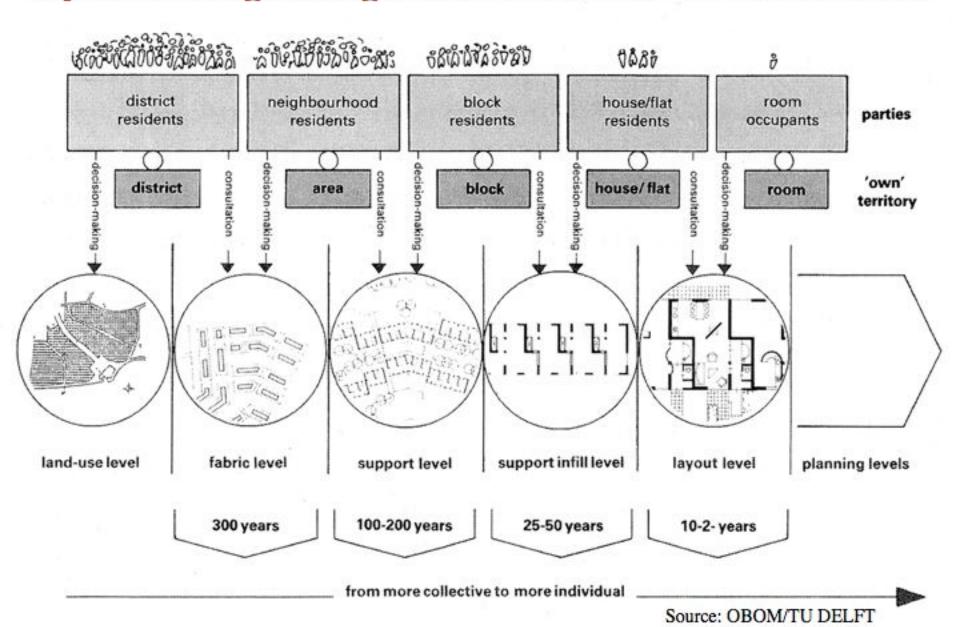
The building is permanent to the room

The room is permanent to the furniture...



...the built environment is never finished....

Open building distinguishes "LEVELS" of intervention



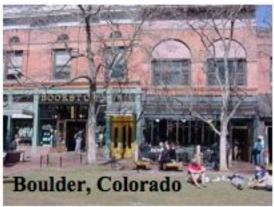
For example

Shopping centers have always balanced permanence change and distribu

The base building is designed by one firm

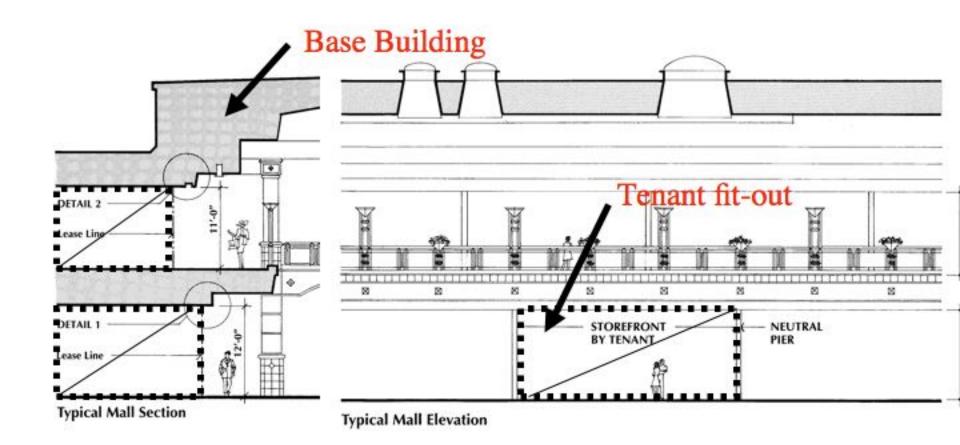
Shops are designed by specialized interior designers

And are installed by specialized fit-out contractors





Shopping centers are handled in very conventional ways...



Modern office buildings, designed by the best architects.....

- · are built for "churn"....
- Inside, tenants have their leased spaces designed by their own architects...
- and finished by specialized fit-out contractors





Hospitals on the Time-Axis

5 years

25 years

Long Lifetime (50 -100 years)

UNCHANGABLE

Site development
Supporting structure
Building envelope

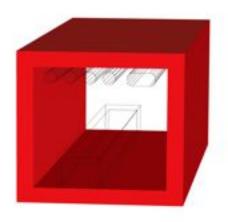
Medium Lifetime (15 - 50 years)

ADJUSTABLE

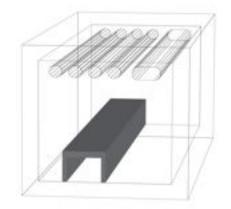
Inner walls, ceilings and floors, fixed installations (extensions) Short Lifetime (5 -15 years)

CHANGABLE

Devices, equipment, furnishings

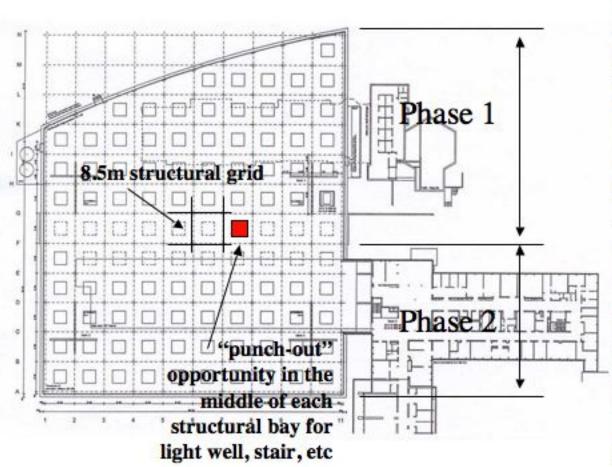






The Inspital (INO) Project

Bern, Switzerland





Roof of Phase 1

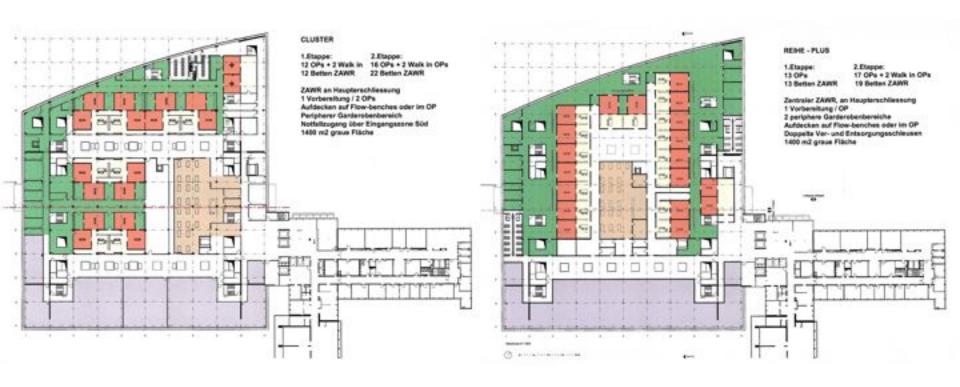


Inside Phase 1 Primary System

The INO Hospital

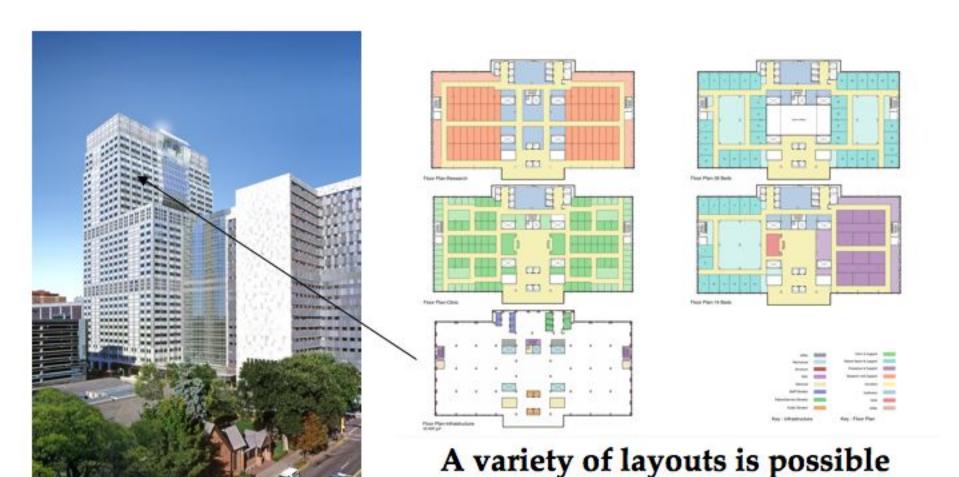
Bern, Switzerland

Two alternative layouts of a surgery suite in the base building...



Gonda Building / Mayo Clinic

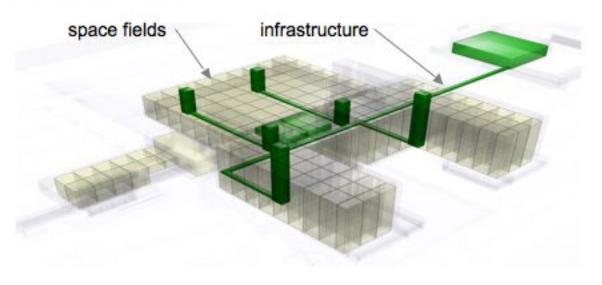
Architects: Ellerbe Becket



Banner Estrella / Phoenix

NBBJ Architects





Permanent infrastructure relative to space fields



CASES OF RESIDENTIAL OPEN BUILDING...among many hundreds...





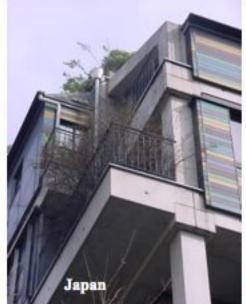


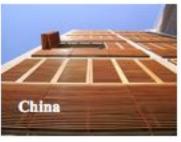










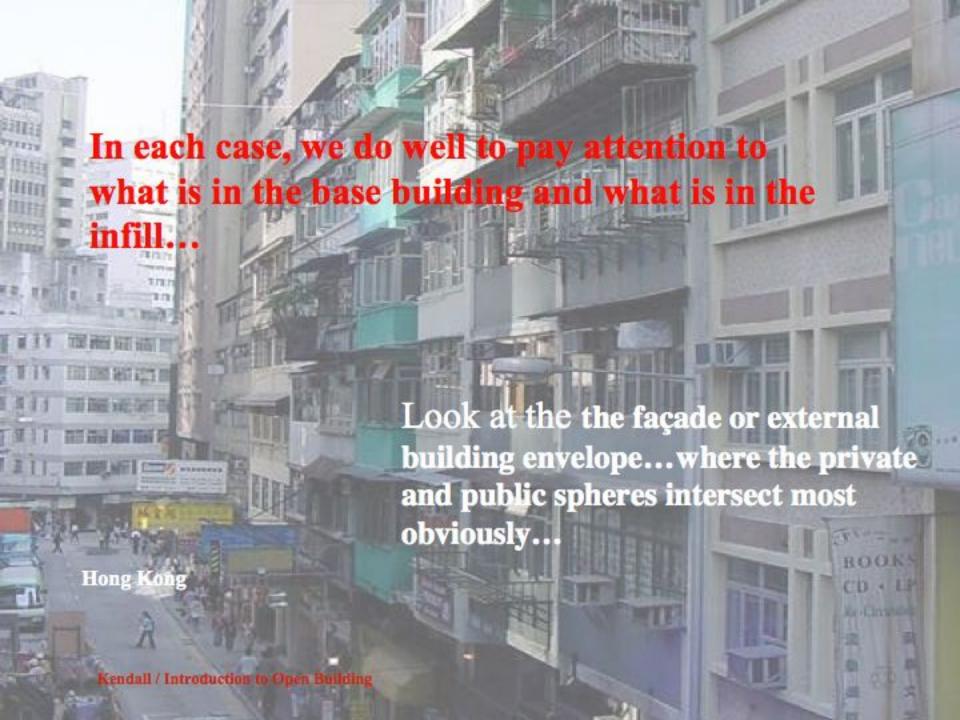












The Banner Building

In Seattle, Washington, a developer hired an architect to design an open building for sale.



The Banner Building

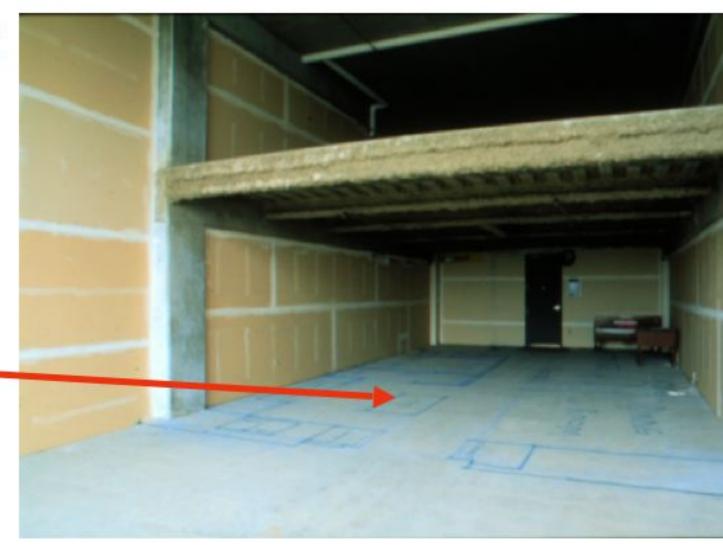
Each of the 16
units in the
building is sold
empty...its interior
is designed by an
architect or interior
designer selected
by the occupant...



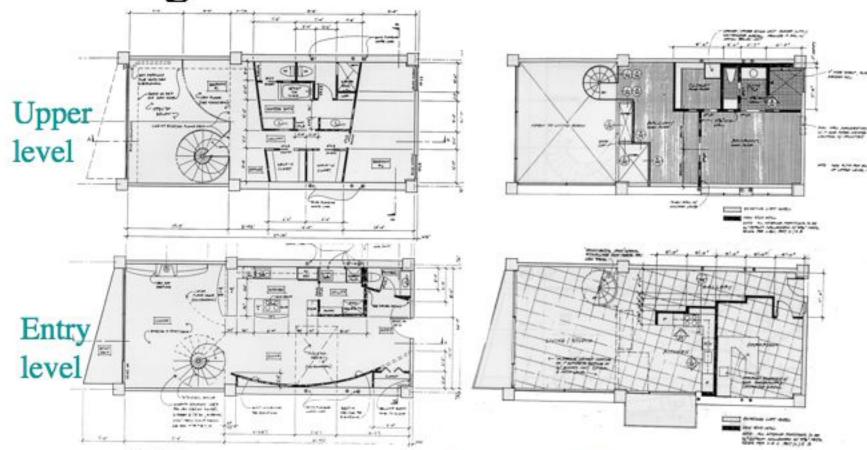
The Banner

Building

the empty interior with the layout drawn on the floor...



The Banner Building



two of the custom designed dwellings



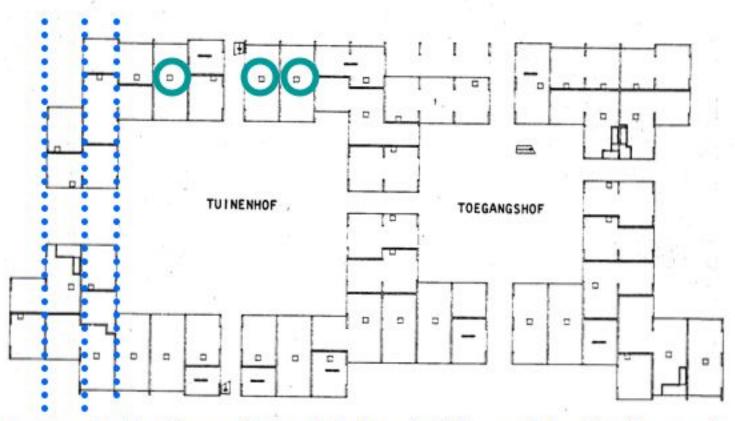
One of the first large housing projects of this kind was built in Papendrecht, near Rotterdam. It was built in 1977.....



123 dwelling units, several offices and shops, and a kindergarten



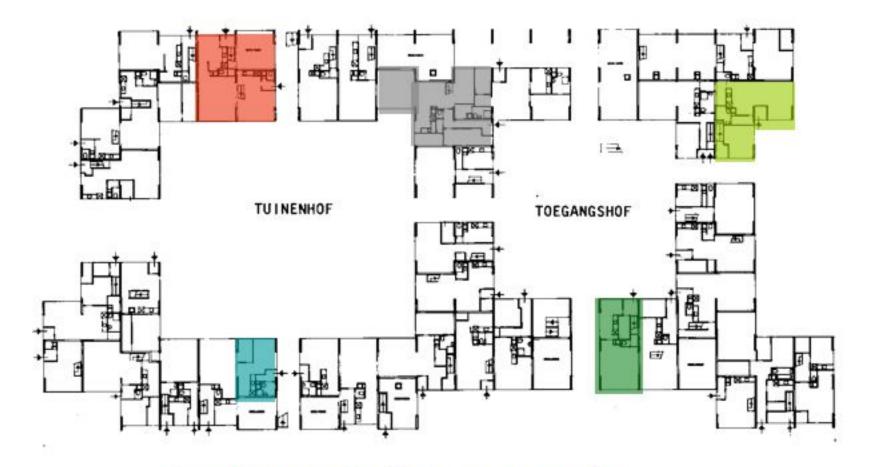
SUPPORT STRUCTURE GROUND LEVEL (east side)



a drawing showing the regularity of the base building and the plumbing stacks



Tunnel form construction of the base building... and prefabricated façade panels

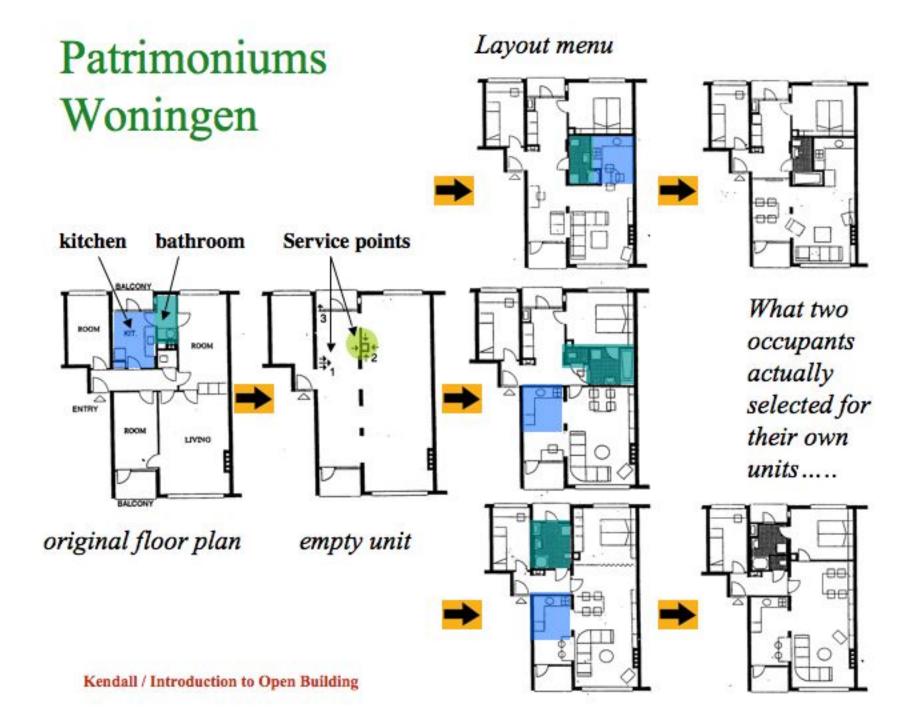


the wide variety of dwellings ... no two are alike



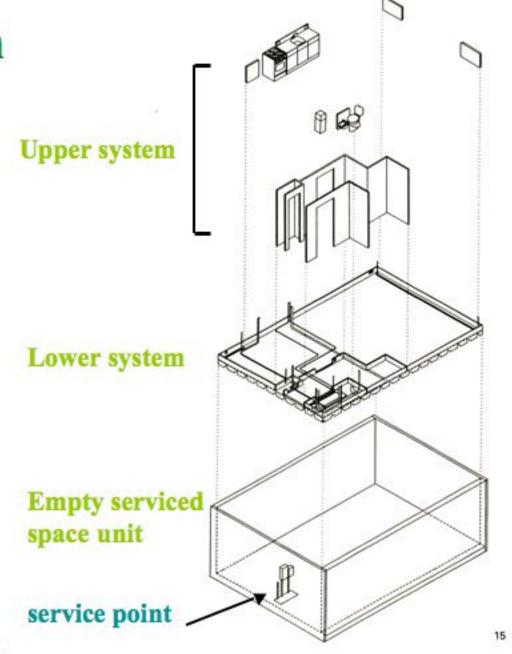
Kendall / Introduction to Open Building





Patrimonium Woningen

Matura Infill
Systems, a
company
specializing in
delivering
customized
interiors in a JIT
fashion....



Patrimoniums Woningen



the tenants in their future home, making decisions

Patrimoniums Woningen



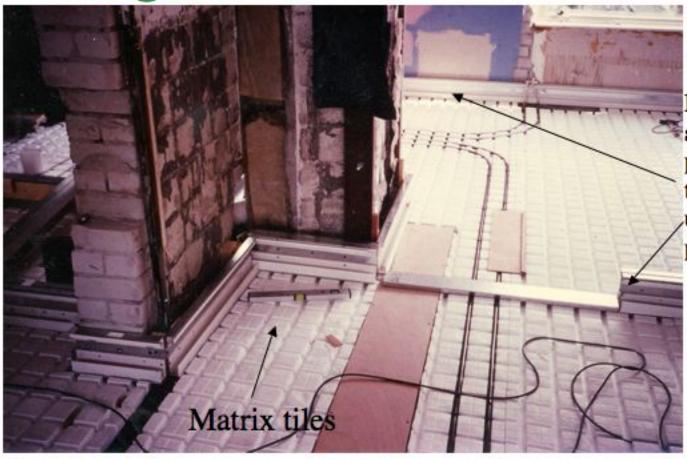
the Matura fabrication and distribution facility

Patrimoniums Woningen



Matura containers being delivered to the site, with everything for one dwelling unit's fit-out, including the worker's on-site work room....

Patrimoniums Woningen



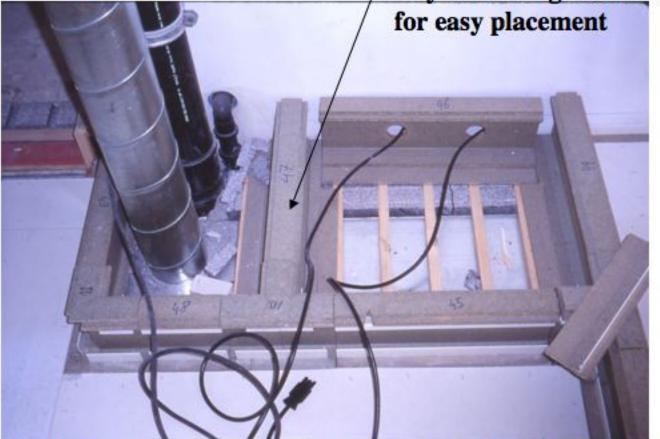
Base profiles around the perimeter of the space and under each partition wall

"matrix tiles" for managing the distribution of piping, as well as to accurately and quickly position the "base profiles" for partitions...

Patrimoniums

Woningen

Base profiles also provide a raceway for wiring..each is numbered



the "base profiles" on which partitions are placed are precut to exact lengths. WIELAND pre-terminated cabling runs in the base profiles....

Patrimoniums Woningen

Matrix tiles are covered, ready for final floor finishes; door frames are hung; partitions painted...



Patrimoniums Woningen



one finished dwelling, a month after the old unit was vacated...

Patrimoniums

Woningen



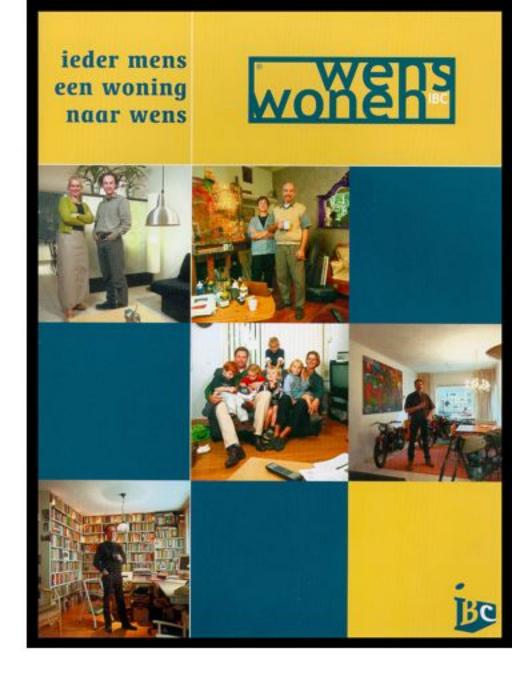
The base building was upgraded....

Patrimoniums Woningen

The building continues to undergo gradual improvement.



This project was completed in 2002. It's a good example of a private development company wanting to do an open building project.



...a townhouse development....buyers can choose the volume, façade, floor plans, equipment and finishes of their dwelling.

A custom-designed software system supports this. At each step, the buyer knows the cost.



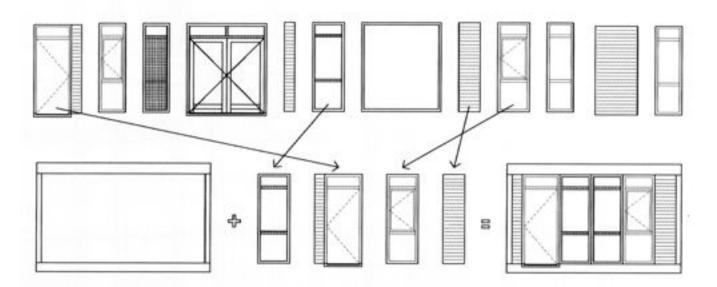


Decisions about dwelling volume include the possibility of adding a room at the back....



The architects also designed a "library" of façade elements.

Buyers could make their façade design suited to their chosen floor plan...



Variatiemogelijkheden in de gevelindeling







Kendall / Introduction to Open Building



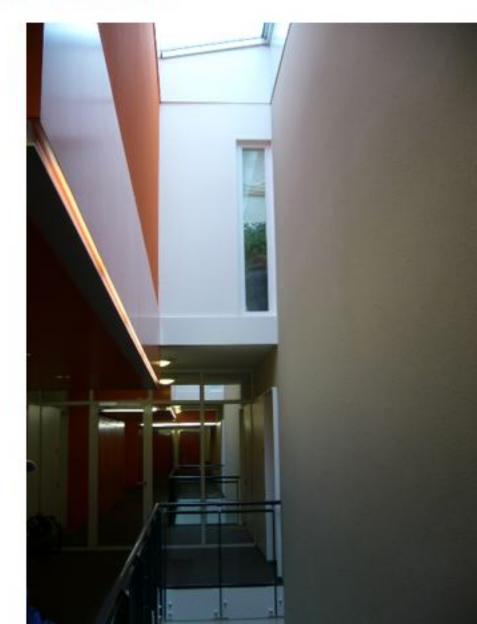
The developer wanted a multifunctional building...



Already, the building's "openness" has proved useful, allowing changes of function without delays or extra costs.



The developer is happy because the added capacity of the base building added less than 5% to the total cost of the project.





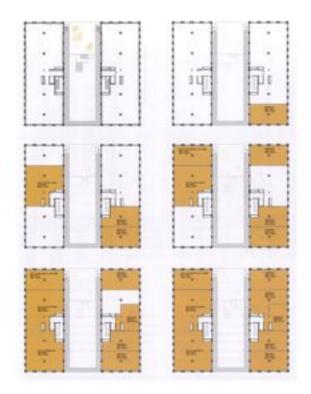




THE SOLIDS

Diagram of base building installation services 1. Energy supplier installation 2. Base build power/heating/cooling installation 3. Power/heating/cooling distribution to individual units 4. Vertical shafts for sewage and cool water supply 101 5. Vertical shafts with excess space for future services

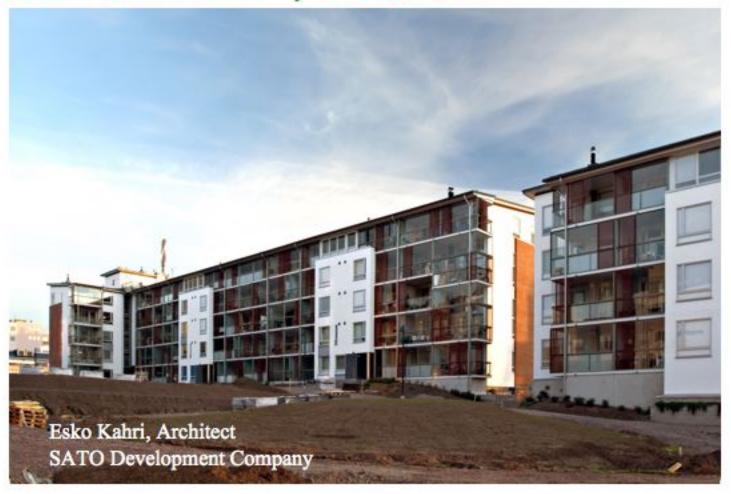
Several SOLIDS project are planned for construction in the coming year, in Amsterdam....users can lease as much space as they like for what use they choose...



Finland

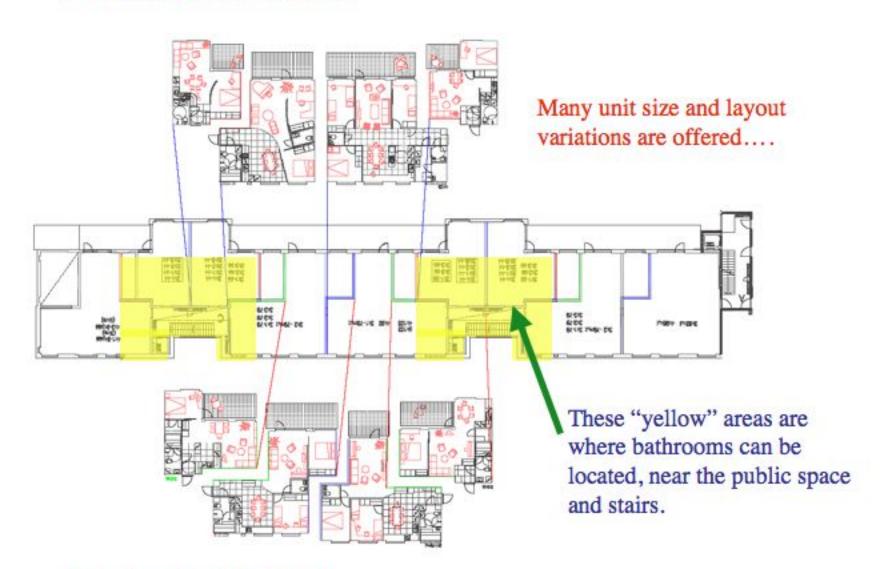


Arabianranta, Helsinki



This is an early example of a PLUS HOME project

Arabianranta



Arabianranta

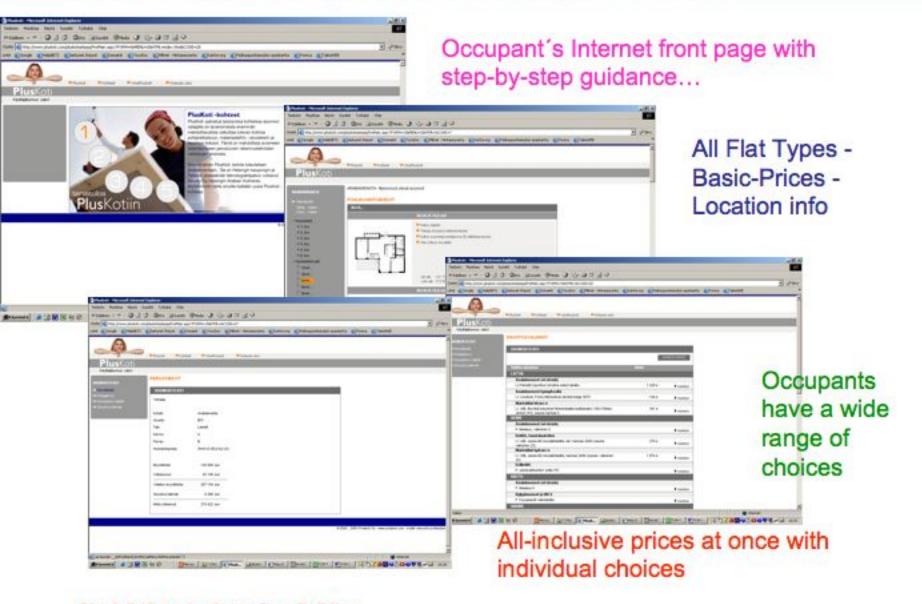


The floors are constructed to provide a large "wet zone"....



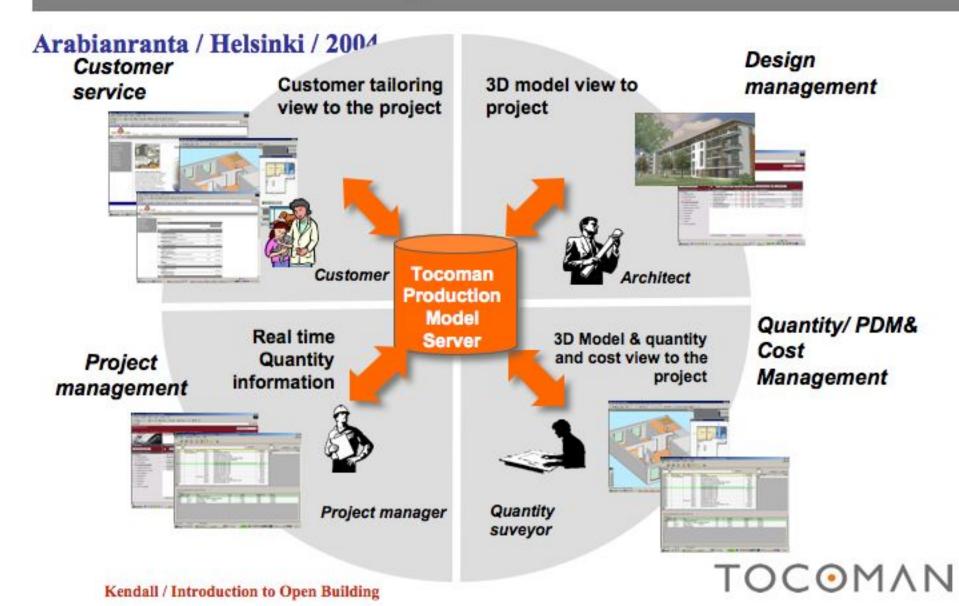
Occupant's Internet Services

PlusHome - Concept with wide occupants choices





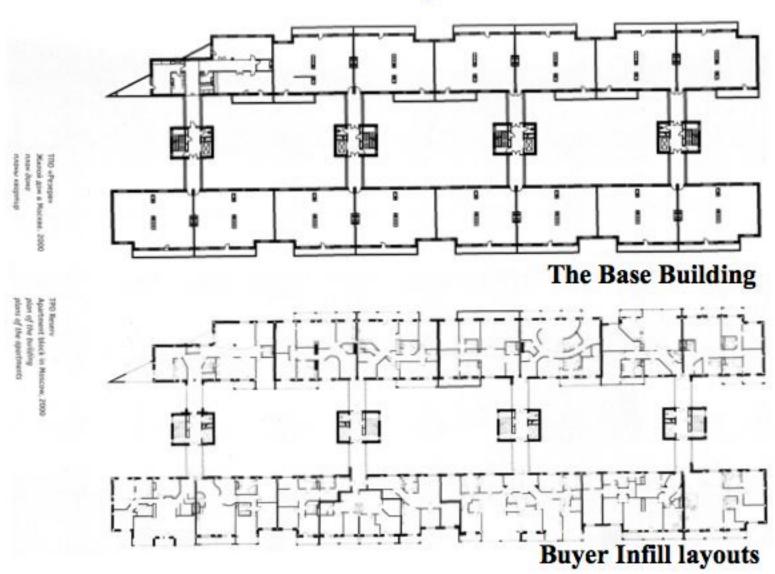
Total IT process



Russia



Catamaran House, Moscow



Catamaran House, Moscow



Vladimir Plotkin, Reserve Architects

Catamaran House, Moscow



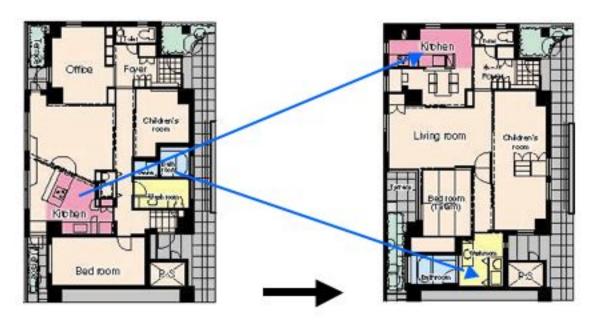
Hundreds of such "free plan" buildings are being constructed in Moscow...downtown and around the periphery...of high quality...

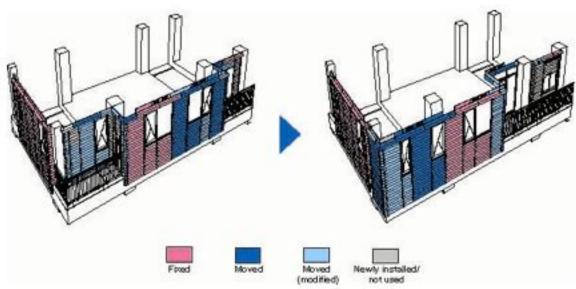




Next 21

Several dwelling units have been modified...





NEXT INFILL / Sekisui Heim



A new product entering the market for renovating the old housing stock..with a few new products, and many from the open market...

NEXT INFILL / Sekisui Heim



Kendall / Introduction to Open Building

China



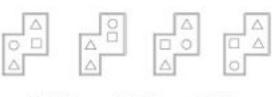










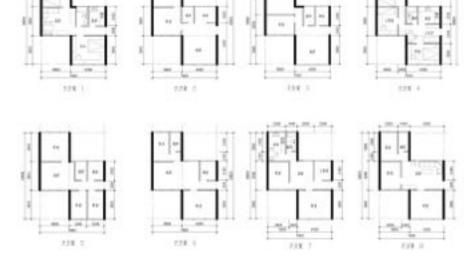






Support Housing in **WUXI**

Architect: Bao Jiasheng 1988



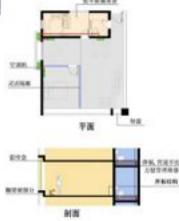
"Support" Housing

Wuxi, China, 1988 Bao Jiasheng

The design of the project targeted on three phases of construction: the construction of the structure, the production and detachable infill elements, and the interior layout by the residents using the infill elements. The three phases of construction were carried out by three bodies. The structure was built by a construction company. The Infill elements were made by a special producer aimed at general market. The Interior fittings were Installed either by the residents themselves, or neighborhood ser-







Chang Faming Hua Yuan Cheng Estate

Shenghen, China 2004 Yue Ziqing, Shan Hao, Ying Xiaoshuari

There is a growing demand on small apatiments in housing manes of Shengmen. The two breef buildings were apacificative to the property of the

apartment. The two apartments can be combined to risate a larger apartment. They can be soid as separate two apartments or as separate two apartments or as separate two apartments or acceptage apartment of accommodate a variety of residents or changing of needs, from home office, turnly with two couples, to leasing on apartment and occupying the other under single ownership, etc. Thunks to the sheer-wall structure and thick from to make a street and those from to make a sale, open, and beam-thee space, a sarriety of interior layout were achieved.

應性・

CHOICE	- VER	HO
Dwelling sale		
Congress true year		
Flori plan scrapt believon		
Coupries printer, bett. etc.		
Faceda (high sherients)		
Facada (hirle sherrants)		

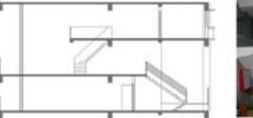


Chang Faming Hua Yuan

Cheng Estate, Shenzhen, China, 2004 Architect: Yue Ziqing, Shan Hao, Ying Xiachuan









House-Golden Age. private housing complex

Chongging, China 2006 Li Haile, Tang Ning

This massive housing comprex built with 6 m × 6 m concrete framework structure consists of duprex apartments, multiple sky streets and say gardens, which serves as neighborhood gathering spaces. Each sity street connect ing the apartments on every three levers to 3.5m wide, with inner half of the width used as garden and buffer zone of kitchens on the street level. The apartments are varied not only in size, but also in type, because of flexibility im-piled in the building structure. The

仗宅採用了"棚準單元"似的初 有否于推廣廣力案执社戶應擇。 交通組織採用了外走網模式、每 層之前服務工業機所・第一層 住宅(在最高"標準率元"中: 也可辨違三層作爲一素供吃締 各-成均屬三層的併聚)。由於 結構體系採用8余×8余社網的框 **架體系、所有所限的開閉器具** 4米、連種的尺寸既可能與棄也 可数害魔。同時每一核的勞開同 走道都有相同的警察・因此可以 要化出多额多键的拼架磁台。指 了位置传递高量建築中缺乏交往

potential uses can have a choice from single story apartments, du-plex apartments, and if needed. three story working apartments. In each type, a certain variety in layout and partition are also provided to accommodate diversity of accommodation. The partition walls were constructed with lightweight and hollow concrete blocks (700kg/qubic meter) in 200mm frickriess.

空間的状況 - 我們獨外走鄉級 計為3.6未寬期層標高的空中街 速、其中外側的1.8米形於交通 政府、内側的1.8米作為小直線 化管理·在依据"包袱"种化等 作的词称 · 激成為第一層性电影 共前的一 質問権等・保険区別表 性・在指揮走进的轉換處理設置 了股大的邮车"空間花園"。這 樣的"亞中斯湖"不但其有交通 攻続・自計区良好的指土通風舞 **乔以及童龄舒通的尺度、蓬纳鸡** 位戶提供- 保安人的交往空間。 会域地震逐步機能型的開催时期 項容數700kg/k0的開始空心轉。 厚度200m · HŒ孔。



CHOICE	16.8	MO
Dwift's son		
Congrete foor pier:		
Free plan extent batterons		
Equipment bitchen, beth etcl		
Facots (major elements)		
Faciale (minor elements)		





































House Golden Age (private housing complex)

Chongqing, China, 2006

Architects: Li Halle, Tang Ning

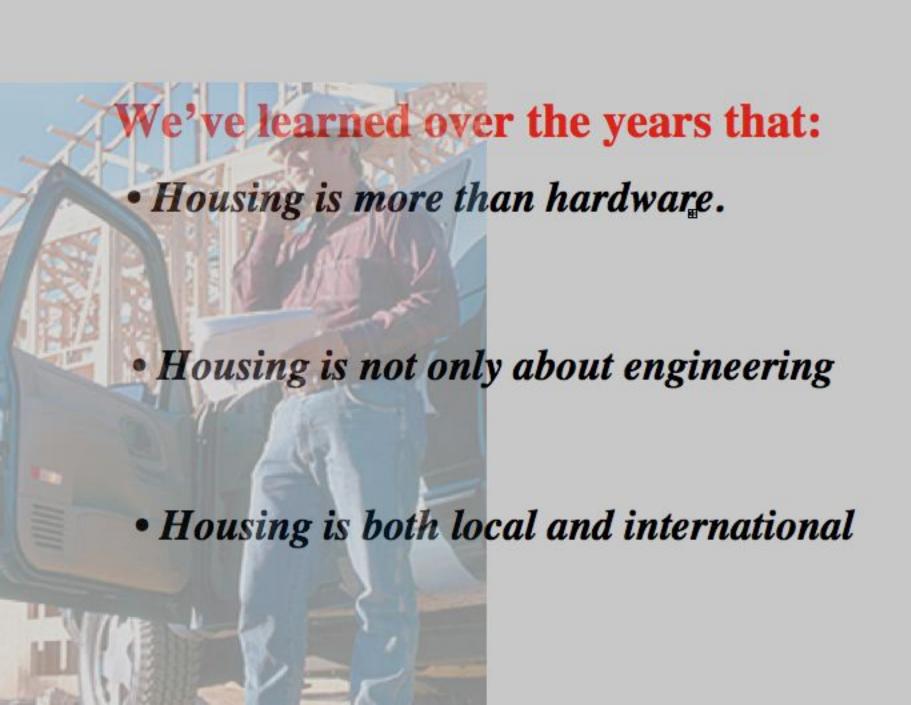
In Summary

How I see the potential of industrial processes to support the kind of projects I've shown.

The main point I want to make is:

The housing industry should meet both individual demands and social needs...

... as effectively as the automobile industry





New directions for research....

We should re-focus on industrialization studies in

The layer of public oversight

The layer of consumer preferences

Housing needs these two areas of action....

Action must be taken in both...

Housing needs both coherence and variety....

For optimum effectiveness these two arenas need to be clearly distinguished.

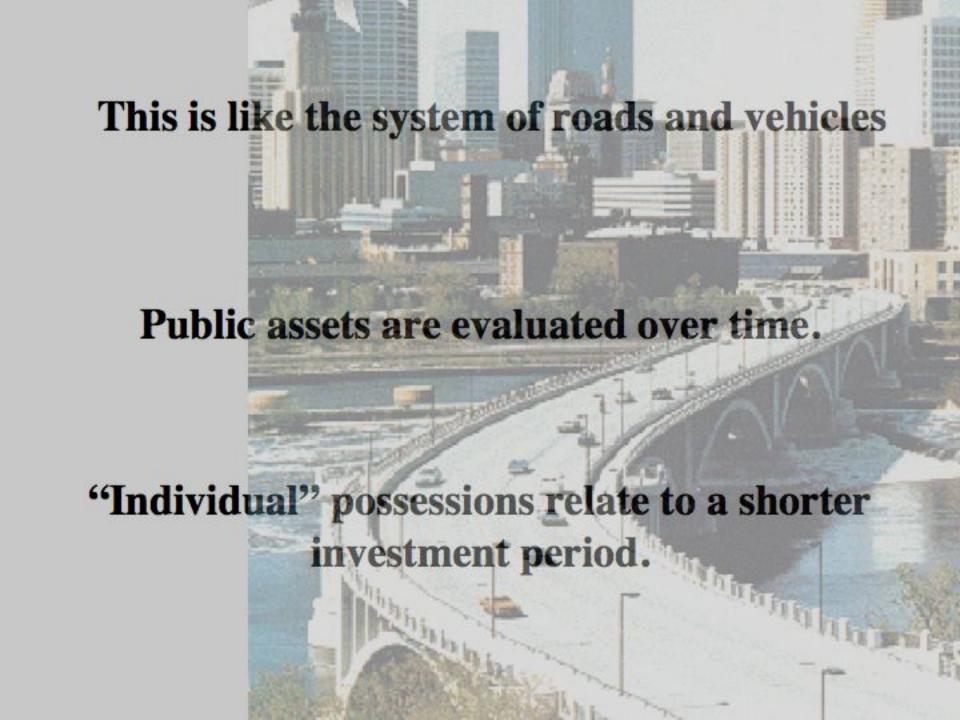
Then, they need to be supported by two distinct but closely related production processes.



These two processes represent two kinds of markets.

Studies of how these two markets work in housing is essential....

...to harness industrialization for housing, the two arenas must be "disentangled".



We need research in new construction and industrial production methods in both:

the decision layer controlled by local political forces



and the decision layer supporting individual choices...



Political forces push us to long term interests and to meet "social" conditions.

This process cannot listen to individual preferences.

But it sets the constraints and the "capacity" for individual preferences to be expressed.

This can be called the BASE BUILDING or SERVICED SHELL of a house.

Consumer choice is interested in variety at a range of prices

Households want maximum freedom.

We can call this part of the house the **FIT-OUT** or **INFILL**.

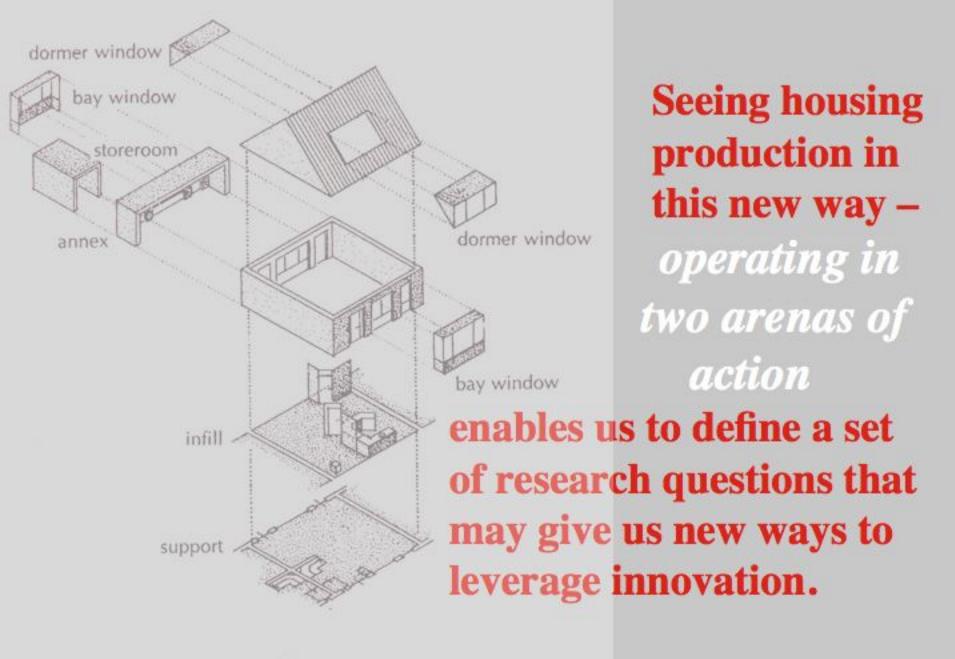
When the two markets are not clearly "disentangled" both are inhibited.

Entanglement hinders industrialization.

When housing production does not distinguish these two decision processes and their respective production and management operations, we cannot achieve optimum production effectiveness or drive industrialization forward.

This is my understanding of the literature in housing production, industrialization and innovation to date.

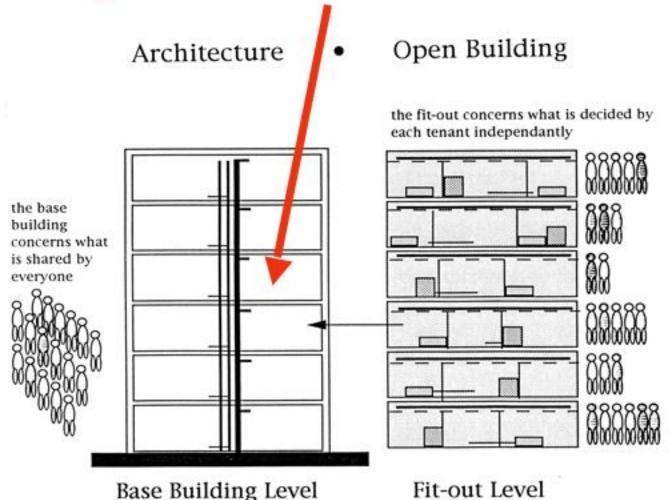




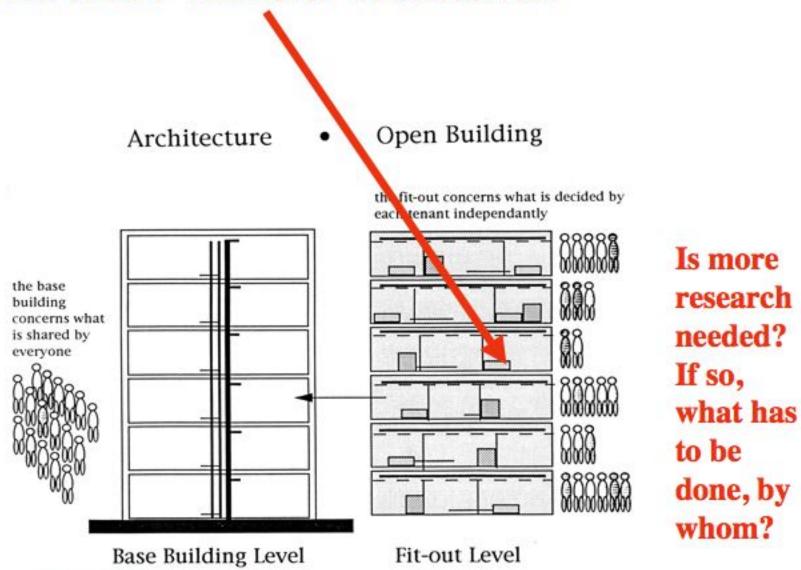
Let me summarize...

Improved ways of making BASE BUILDINGS are needed...

Is more research needed, better teaching in the university, improved development practices...?



How can the "infill level" be best served?



Kendall / Introduction to Open Building

I am convinced that a new INFILL INDUSTRY is needed













...harnessing building information modeling, advanced logistics and multi-skilled work teams...

The BUILDING FUTURES INSTITUTE:

www.bsu.edu/bfi

For up-to-date reports on residential open building and for reports on open building in hospital design.

And also see the website of the CIB W104 Open Building Implementation:

www.open-building.org

