

# What is Open Building?

***Open Building*** — Open Building (OB) is an innovative approach to design and construction that enhances the efficiency of the building process, while increasing the variety, flexibility and quality of the product. In the OB perspective, the building is viewed as a well-organized combination of systems and sub-systems, each of which can be carefully coordinated to ensure a better process and product for the homeowner and a parallel positive outcome for the building professionals. The major systems include the building site, the structural envelope, the division of space inside the building, the plumbing, wiring, heating/cooling, and the cabinets, furniture and other stuff that people put inside the building. By disentangling the systems and sub-systems from each other, opportunities are increased for better organization, increased consistency, quality and more control and flexibility for the homeowner.

***Open-Built®*** — A design and construction system, with distinct processes and building elements, which have been derived from Open Building principles and developed by Bensonwood Homes for residential timberframe homes.

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For as long as humans have lived in dwellings of permanence, they have also been constantly remodeling, renovating, changing, and otherwise updating these living spaces. Most old houses have multiple layers of wallpaper or paint, new additions, altered floor plans, whole new kitchens and baths and modernized mechanical systems. Occupants display much about their constantly changing lives in their homes. Open Building is a contemporary design and building method that specifically addresses the radically changing social and technical environment in which we live and work.

In a speech Tedd Benson gave in Japan in 1996 he explained that “...in the 100 years from about 1850 to 1950 there were more technological improvements and more inventions than in the previous 2000 years. And then in the last 45 years from 1950 until this day it can also be said that there has been more technological change than in the previous 100 years, and the pace of change is increasing. It is a basic fact of our modern world that no industry is thriving that is not also quickly changing and adapting to the modern world.(Benson, p.23)

Yet, the conventional building methodology inherently complicates and thwarts homeowners from efficiently making changes to their houses. The design and construction industry in the United States needs to adapt. It must be accepted that buildings being built now will be altered and upgraded—US Department of Commerce data show that investments in remodeling and repairs equal or exceed the value of new construction each year. We should be making buildings to accommodate, rather than complicate, this natural requirement. Open Building is a new approach to the building and remodeling process which acknowledges the human need to constantly alter and upgrade our living environments. Bensonwood’s Open-Built system began with research into the writings about the architectural field called Open Building theory/practice and eventually led to extensive travel and direct consultation with Open Building pioneers, John Habraken, Stephen Kendall and others. We have also been inspired by the work of Stewart Brand, especially his groundbreaking book, *How Buildings Learn*.

Open Building was conceived to address problems in the mass housing industry. Although some of the general theories of Open Building do not directly correlate with the work that is done at Bensonwood, which builds middle to high-end residential homes, Bensonwood’s current building methods are directly descended from the original Open Building theories and practices. The following writing is intended to be a basic introduction to Open Building, and to explain the basis of our Open-Built process.

# Disentangling a Home



If mechanicals are unplanned, poorly designed, or haphazardly installed, they can get seriously entangled. This makes repairs or upgrades difficult. (photo by Stephen Kendall)

In Open Building, the building is seen as a potentially well organized combination of available systems and subsystems. But in conventional building types, this is not the case and whether multi-family or detached, wood frame or concrete, the technical and organizational entanglement of American residential buildings has reached a critical state. (Kendall, pg.1). Entanglement, in this context, is the “unbelievably confused array of installed pipes of varying types and sizes for supplying and carrying away fluids, air ducts of several shapes for moving air, thousands of feet of wires for electric power and communications, and in some jurisdictions and some building types, sprinkler lines for fire suppression.”(Kendall, pg.1) When homes are constructed today, mechanical systems are installed after the structure is almost completed, usually with no definition of where and how the installation is to take place. The wall cavities usually provide space for the mechanical systems, but there is no specific design as to how they should be inserted. Often the location and method of installing

plumbing, wiring and ducts is simply determined by which person arrives at the site first.

The effort to achieve disentanglement in homebuilding accomplishes several desirable outcomes at once. The design of the home comes closer to its inherent goal of determining how the home will actually work over its life. By carefully planning where the electrical, plumbing and heating systems will be installed, fewer mistakes and changes will be made on site. This can reduce the potentially difficult scheduling, waste, and jurisdictional conflict burdens for both builders and homeowners, all of which go to the bottom line cost. In a more organized process, more of the components can be pre-manufactured and quickly installed. Currently there is too much time spent on site cutting, shaping and retrofitting basic commodity products as well as more costly subsystems such as the mechanical systems. The volume of waste from site-work—



Open webs between the floor and ceiling for electrical, plumbing, and heating ducts make installation and later renovations relatively simple.

including lumber, plastic piping, cabling, insulation, sheetrock, and so on—is both massive and environmentally irresponsible. These are some of the issues that adoption of Open Building attempts to solve.

## The Organization of Open Building

The problem of entanglement lies not only in the home itself, but also in the history and habits of an industry that doesn't tend to evolve its processes as quickly as the buildings it constructs tend to take on added elements and complexity. The issues in homebuilding are not divorced from the organizational and social ambiance of the constellation of people and players that make it happen. As Stephen Kendall points out, the many legions of businesses and institutions—manufacturers, designers, constructors, regulators, and users—is likewise enmeshed, producing conditions ripe for poor quality, higher costs, disputes, and loss of decision flexibility.”(Kendall, pg. 2)

One of the most important aspects of any organization is its communication structure. Good communica-

tion among a team of architects and builders who have clearly defined roles is a rarity in the building industry today. The person who designs a building often never meets the electrician or plumber with the result that each piece of a home is built without considering the whole picture. In the building industry good communication has remained difficult to achieve because of the fractured nature of both the industry and any given project.



John Habraken stresses the importance of an “unambiguous communication structure” which is crucial for a building process to go as smoothly as possible. An architect who designs without knowing who the builder will be, or how that builder works, cannot determine exactly how the implementation process will be undertaken with any certainty. All the facts are not known and the risks involved cannot always be determined. Varying styles and methods of communication can further complicate the process, and leave the finished product more vulnerable to error or disappointment. From an owner’s perspective, it can be beneficial to work with a closely linked team of architects and builders. When many different people are making decisions about a person’s future living space at different stages of a project, it is critical that these decision-makers have a common methodology in making choices. This methodology should be based on strong values that are shared by the current owner. (Habraken, “Involving People205” pg. 3) The homeowner must be involved from the beginning of the building process to ensure his needs and desires are met. The owner/occupant must be certain that his requirements and values will be represented throughout the building process.

## Residential Open Building in a Timber Frame Home

Timber framing is the perfect medium for Open Building because the spaces are open, the fit-out and partitioning are non-structural and the timberframe itself is intended to last centuries, not decades. “Timber frame assures a 300-year structure because of its massiveness and because the building’s endoskeleton is well protected from the weather outside and exposed for inspection inside. It is adaptable, recyclable, and beautiful,(Brand, p.195) says Stewart Brand in *How Buildings Learn*. Structural soundness is an important component of an Open Building. The combination of the timberframe structure built to last well into the future, along with Open-Built wall and floor systems creates a building that can be lived in, loved, and adapted for many generations of use. The way that timber frames are designed is also appropriate for Open Building. Timber frames do not require load bearing walls in the way that conventional stud-frame construction does; therefore, as Benson asserts “[t]he building has columns and beams that serve as an organizing grid for the layout of rooms and spaces.”(Benson, p.27) Room configuration and partition location in these homes can be relatively easily modified over time, as occupants’ needs change.



## The Open Building Difference

Efficient and cost-effective solutions are often reduced to mass production in the modern world. “McMansions” line up on one side of town, while row after row of housing projects line up on the other. By removing individual needs and desires from the home design, the building industry is able to quickly and cheaply house everybody. “Man no longer houses himself. He is housed,”(Habraken, Supports, p.9) states Habraken. Open Building tackles the housing needs from a totally different perspective. The individual is put into the center of the equation, rather than removed from it. Decisions having to do with the lifestyle and preferences of the occupant are clearly distinguished from decisions that are more public and concerned with local politics, zoning, geo-technical issues and the climate. People naturally tend to customize their home to suit their needs

and express their values, but do so in the context of the society at large with its conventions and regulations. Open Building allows for this distinction between the individual and the larger community, and also makes provisions for future changes.

Stewart Brand's *How Buildings Learn* explains the inevitability of change in buildings. The architect's original intent is forgotten over a building's life span. A building learns from its owners, Brand maintains. Those who will live in a space need to be involved in its planning, and the building needs to be able to accommodate what cannot be foreseen, states Habraken. (Habraken, *Supports*, p. 42) Builders of mass housing projects and more traditional buildings consider the finished product to be a fixed entity, severed from the owners. Each building exists on its own, with or without occupants. In Open Building the owner, and future occupants and owners, are considered in every step of the building process.

## Residential Open Building and the Future

"To build is to serve," is an ancient adage, but is more relevant than ever. Mass housing occupants—whether in dwellings built by a market-rate builder or by a government agency - are not served well, if at all. These homes often require expensive and extensive projects for minor remodeling jobs. The building industry is extremely wasteful of time and materials. Open Building is a theory that addresses the need to serve present and future occupants, while making the work of designing and building a home easier and more interesting for the planners and builders.

Residential Open Building combines a theory (a description of how things work) with specific methods and practices. To date, the theory, practices, and hundreds of implemented projects that have resulted, are largely unknown, even within the building industry. It has been a long and frustrating process for the founders and early adopters of Open Building. They have had to be politicians, philosophers, and writers as well as architects and builders. Those working in Open Building today are tenacious in spreading these new design and building ideas, and look forward to the time when the basic concepts are widely implemented in the building industry.

## Key Open Building Proponents

### John Habraken

John Habraken is Emeritus Professor at the Massachusetts Institute of Technology, where he served as Chair of the Department of Architecture from 1975-81. He later taught and conducted research there before moving back to the Netherlands. In 1963, he was asked to become the founding director of the SAR (Stichting Architecten Research--Foundation for Architect's Research) in the Netherlands (see *Housing the Millions*), and served as the first Chairman of the Faculty of Architecture at Eindhoven Technical the Netherlands. His work and the work of the SAR set the stage for what came to be called Open Building. In association with other colleagues around the world and in the Netherlands including Professor Age van Randen, Emeritus Professor at the Delft University of Technology, he has been at the center of efforts to advance Open Building principles and practices across the world.

Habraken is the author of a number of books including *Supports: An Alternative to Mass Housing*, *Variations: The Systematic Design of Supports*, and *The Structure of the Ordinary: Form and Control in the Built Environment*. He was co-inventor of the Matura Infill System, a JIT product bundle for use in rapidly fitting-out the interiors of residential units on a fully customized basis exactly suited to resident preferences. He has also been a consultant to Bensonwood Homes.

### Stephen H. Kendall, PhD, AIA, CIB

Stephen Kendall is an Associate Professor of Architecture at Ball State University in Indiana, and director

of the Housing Futures Institute there. (<http://www.bsu.edu/cap/programs/hfi/hfi.html>) Since leaving architectural practice in the early 1980's, he has dedicated his career to teaching and research in architecture, and has been the most prolific American writer on Open Building. He has helped to study and advocate the adaptation of Habraken's work to match the conditions of housing and design in the United States. After receiving his B.S and M.A. in Architecture, Kendall went on to receive his Ph.D from MIT in 1987, writing his thesis "Control of Parts: Parts Making in the Building Industry," under Habraken.

In more recent years, Kendall has been involved in numerous research projects, organized conferences, and written books and many articles on Open Building and sustainable architecture. He has also done private consulting for organizations such as General Electric, Japan's Ministry of International Trade and Industry, Nippon Steel and Bensonwood Homes. He is working on a number of fronts in an effort to bring to a selected US market the Matura Infill System, developed in the Netherlands, and has led Ball State University to acquire an exclusive license for the product for Canada and the US. He lectures nationally and internationally and is the author of more than 30 papers on the subject of Open Building. He is the coordinator of an international commission (within CIB—The International Council for Research and Innovation in Building and Construction). This commission—CIB W104 Open Building Implementation has 40 members from 17 countries in Europe, North and Central America and Asia. His recently co-authored book *Residential Open Building* is the basic international primer on the subject and showcases 25 case studies and a dozen infill / fit-out systems from around the world.

## Stewart Brand

Stewart Brand, the author of *How Buildings Learn*, has very diverse interests. His influence has been great not only in the building industry, but in many other disciplines. Much of his work has been based on a deep concern for the way humans today tend to look only at the very near future. He encourages us to look at our individual impacts on the world and our society, not just today, but for generations and even millennia to come.

In 1968 Brand founded, edited, and published the original Whole Earth Catalog, a renowned publication with information and tools for addressing environmental problems and important social issues. Brand was also one of the founders of The WELL (Whole Earth 221Electronic Link), a computer teleconference system for the San Francisco Bay Area, which now has 11,000 active users worldwide and is considered a bellwether of the genre. He was a co-founder of Global Business Network in 1988, that explores global futures and business strategy for 90 multinationals such as Lucent, IBM, Kodak, Monsanto, Disney/ABC, and Daimler-Benz. Brand had vast experiences and information to draw from, when, in 1994 he wrote the award winning, *How Buildings Learn: What Happens After They're Built*. This book encourages owners and builders to look at the long-term impact of what they are creating and has helped to shape the thinking and actions of many in the housing industry today. More recently, Brand has been looking at the future more generally; in 1995 Brand helped to found the Long Now Foundation to foster long-term responsibility. *The Clock of the Long Now: Time and Responsibility*, written in 1999, is a mosaic of essays exploring the meaning and uses of a 10,000-year "now."

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