The Housing We Need

The Evolutionary Housing System

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Arpita Agrawal, Michael Davis-Burchat, SoYoung Lee, Kris Marich, Stephen Palumbo, Rachel Serlin-Egan, Soungmin Yoo

For a full exposition see the report at http://id.iit.edu/profile/gallery/evolutionary_housing/

What if a house could…

employ new utilities based on their technological merit rather than on the politics of regulations

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increase self-sufficiency and protect precious resources

be built in a day

be reconfigured to accommodate the changing needs of its inhabitants

Welcome to the Future of Housing

Relevant Trends

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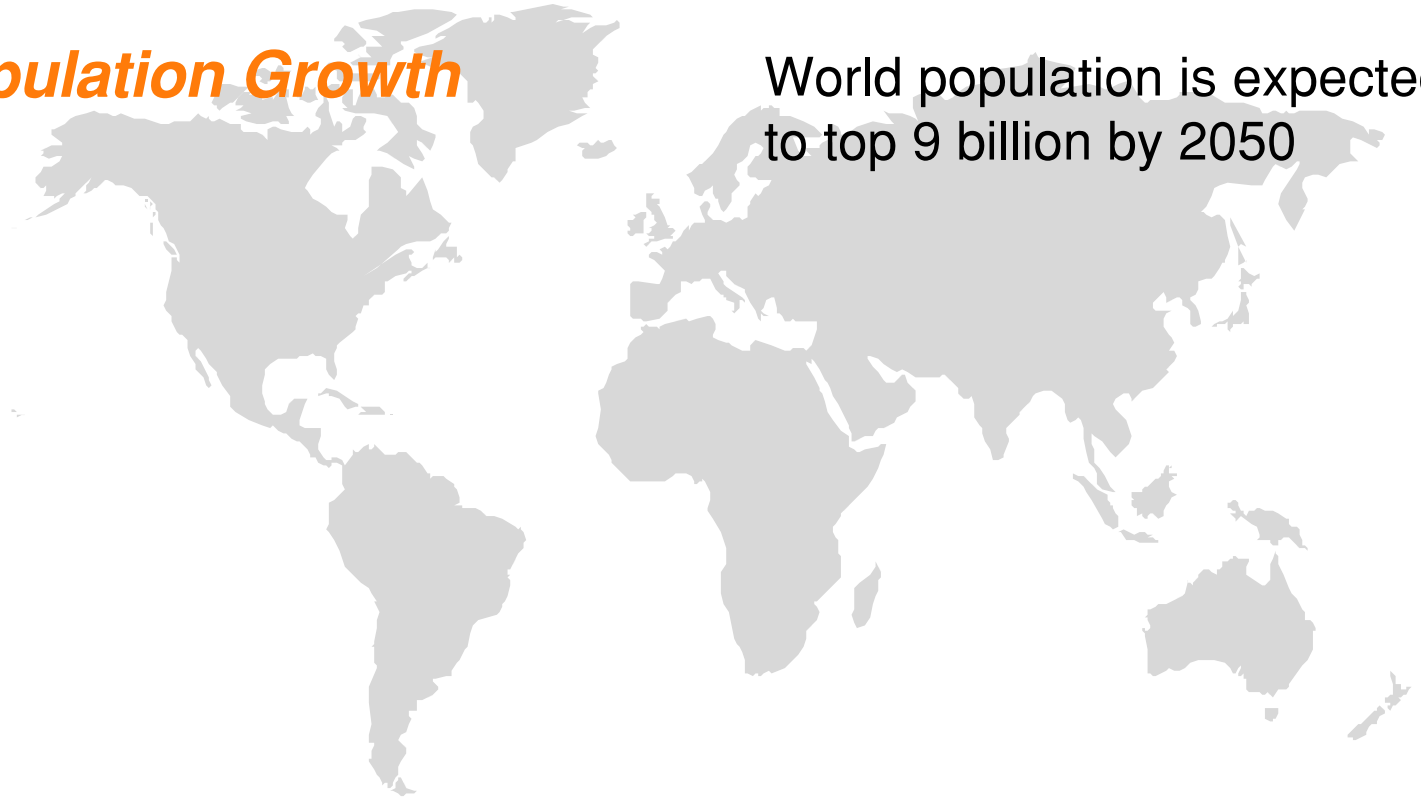
Relevant Trends

Population Growth



World population is expected to top 9 billion by 2050

Arpita Agrawal, Michael Davis-Burchat, SoYoung Lee, Kris Marich, Stephen Palumbo, Rachel Serlin-Egan, Soungmin Yoo

Relevant Trends

Population Growth

Scarce Resources

Population growth is putting heavy demands on available resources. The world's oil and water resources are becoming increasingly scarce.

Arpita Agrawal, Michael Davis-Burchat, SoYoung Lee, Kris Marich, Stephen Palumbo, Rachel Serlin-Egan, Soungmin Yoo

Relevant Trends

Population Growth

Scarce Resources

Global Warming

Global warming is effecting weather around the world. Hurricanes, tornadoes, floods, and other natural disasters that destroy housing are on the rise.

Arpita Agrawal, Michael Davis-Burchat, SoYoung Lee, Kris Marich, Stephen Palumbo, Rachel Serlin-Egan, Soungmin Yoo

Relevant Trends

Population Growth

Scarce Resources

Global Warming

Emerging Technologies & Increasing Expectations

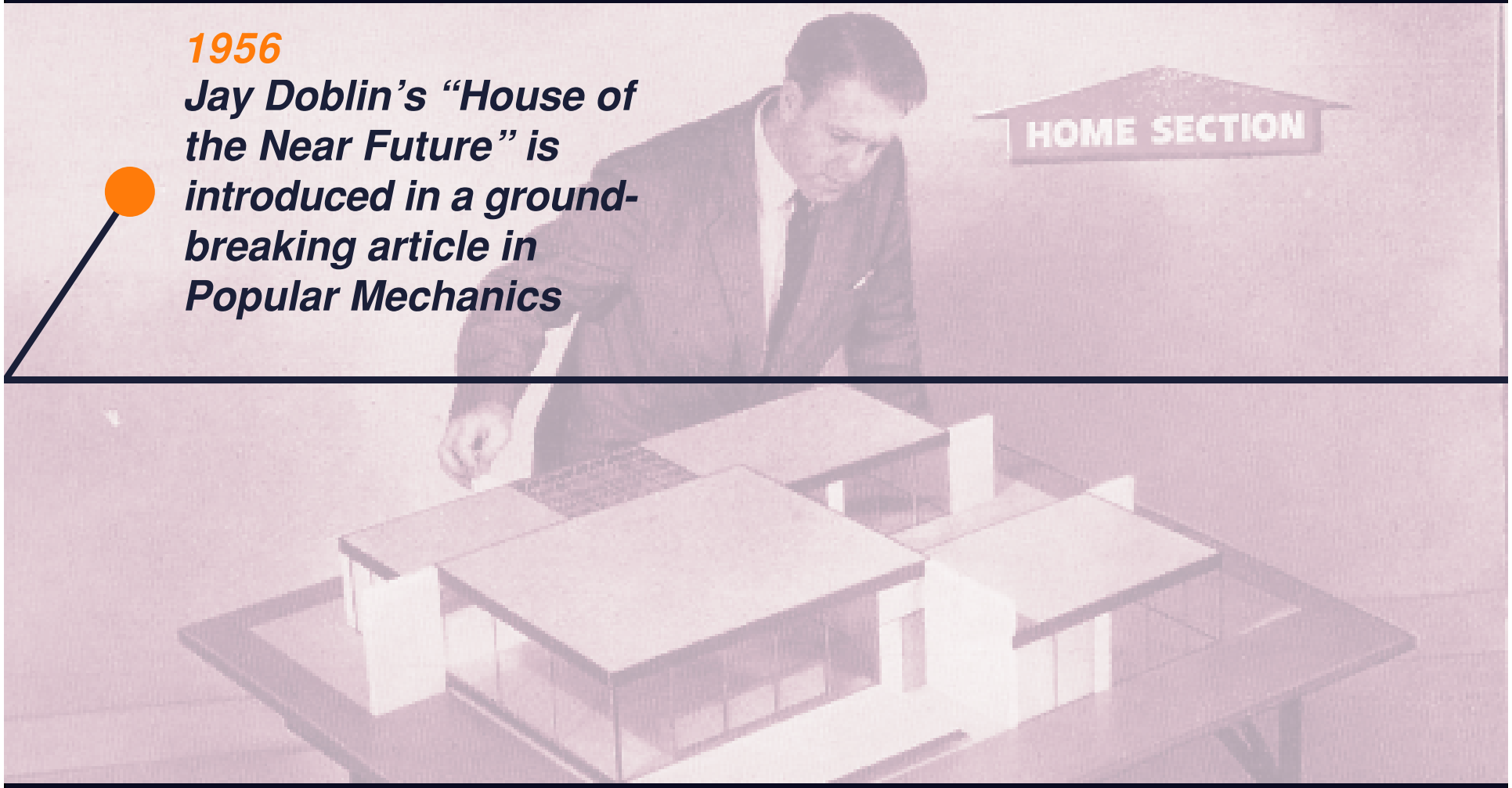
Technological advances and the growing availability of television in remote areas are fueling demand for improved lifestyle.

Arpita Agrawal, Michael Davis-Burchat, SoYoung Lee, Kris Marich, Stephen Palumbo, Rachel Serlin-Egan, Soungmin Yoo

Precursors

1956

Jay Doblin's "House of the Near Future" is introduced in a ground-breaking article in Popular Mechanics



Popular Mechanics • October 1956

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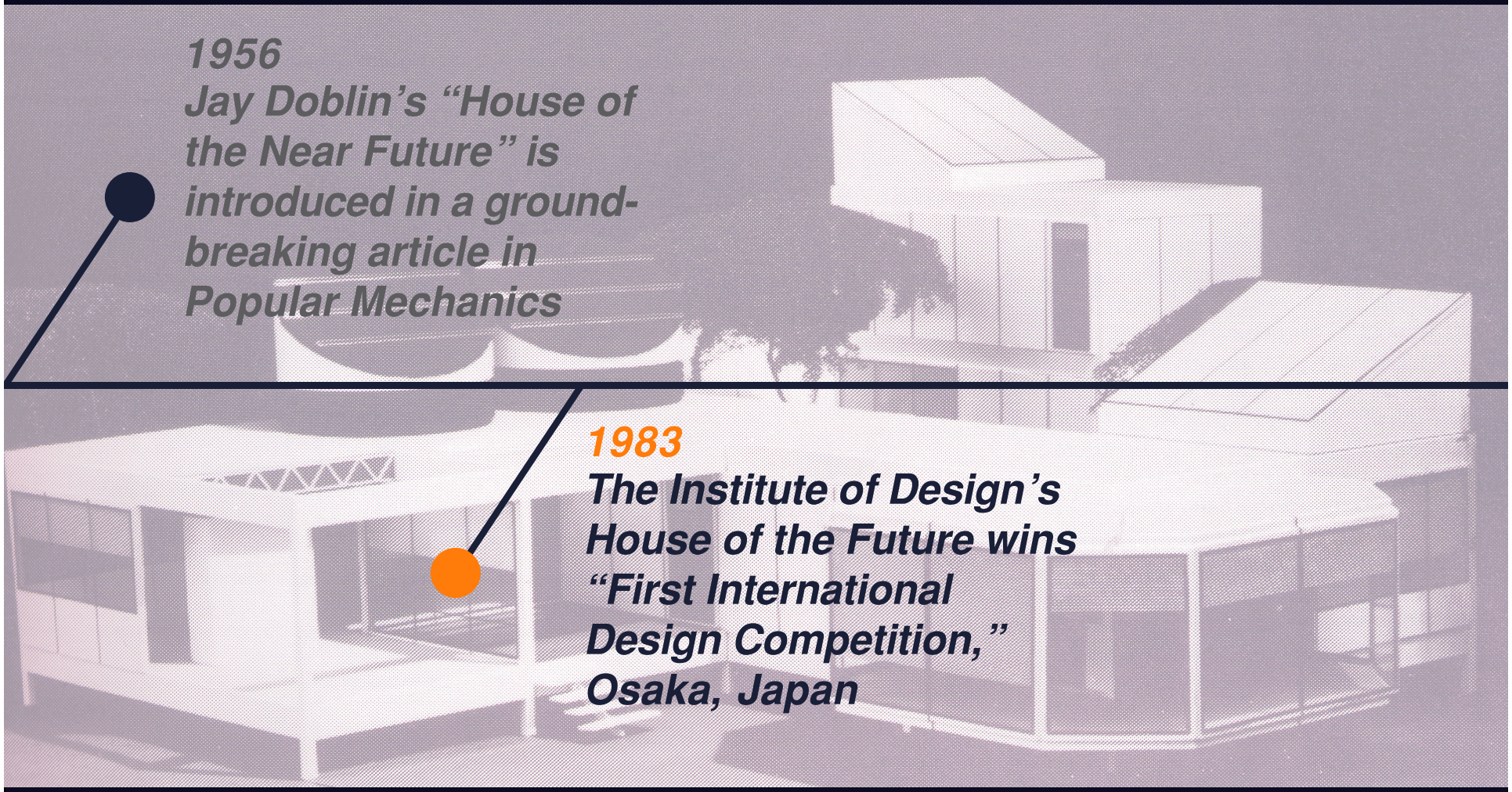
Precursors



1956
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1983
The Institute of Design's House of the Future wins "First International Design Competition," Osaka, Japan

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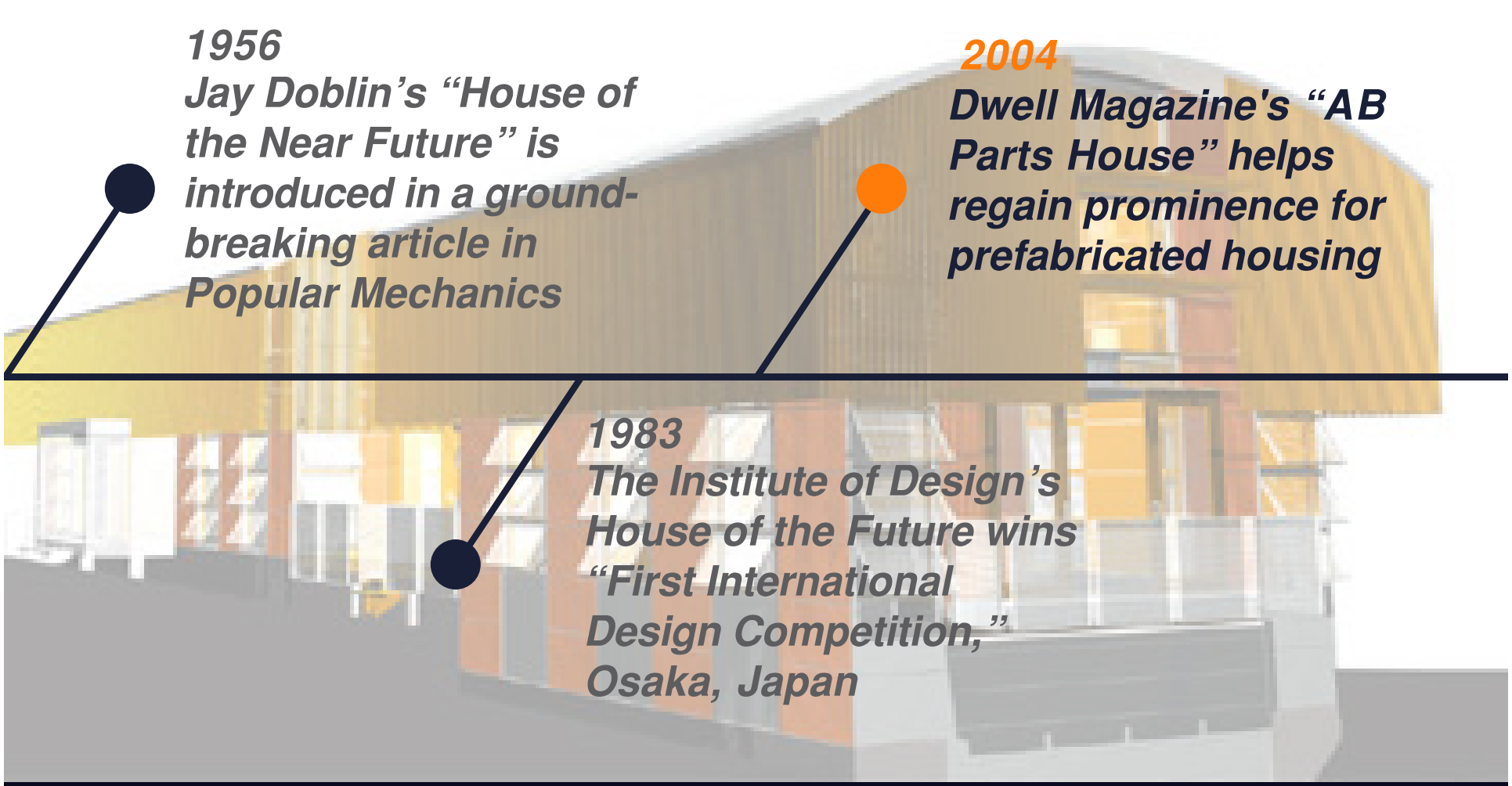
Precursors



1956
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1983
The Institute of Design's House of the Future wins "First International Design Competition," Osaka, Japan

2004
Dwell Magazine's "AB Parts House" helps regain prominence for prefabricated housing

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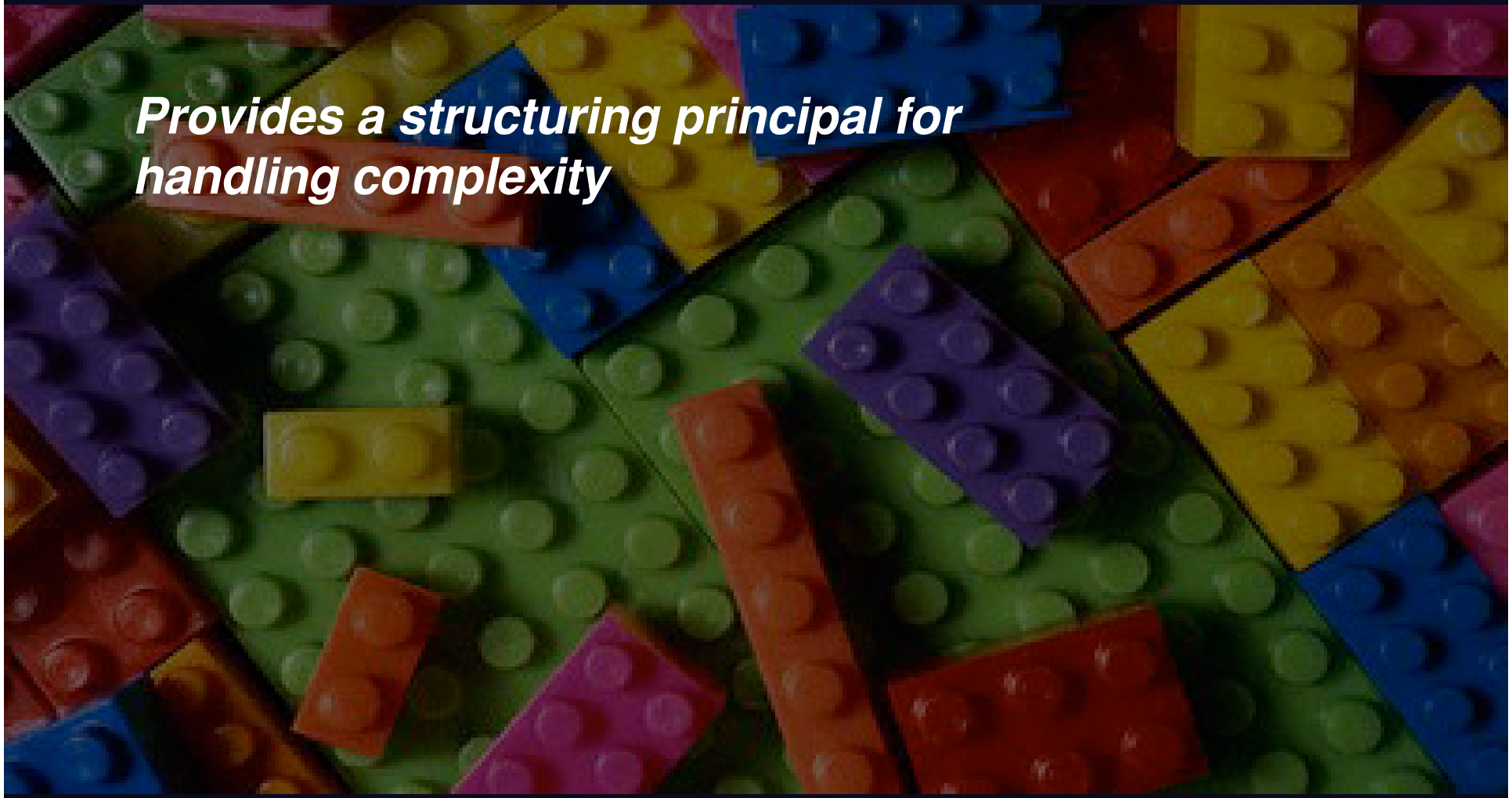
Evolutionary Housing Principles: Grid System



Provides a structuring principal for handling complexity

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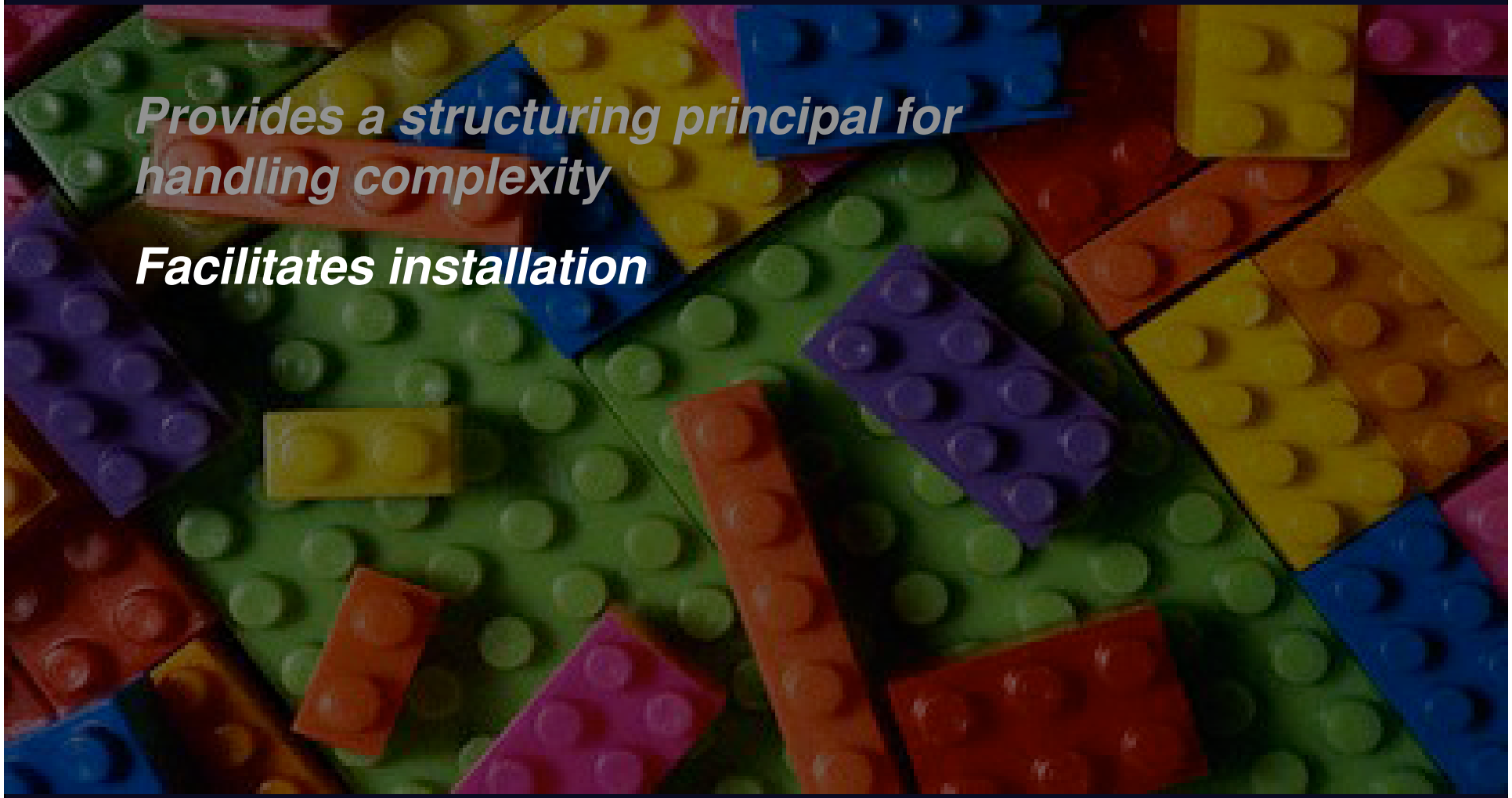
Evolutionary Housing Principles: Grid System



Provides a structuring principal for handling complexity

Facilitates installation

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Evolutionary Housing Principles: Grid System

Provides a structuring principal for handling complexity

Facilitates installation

Allows for easy renovation and additions

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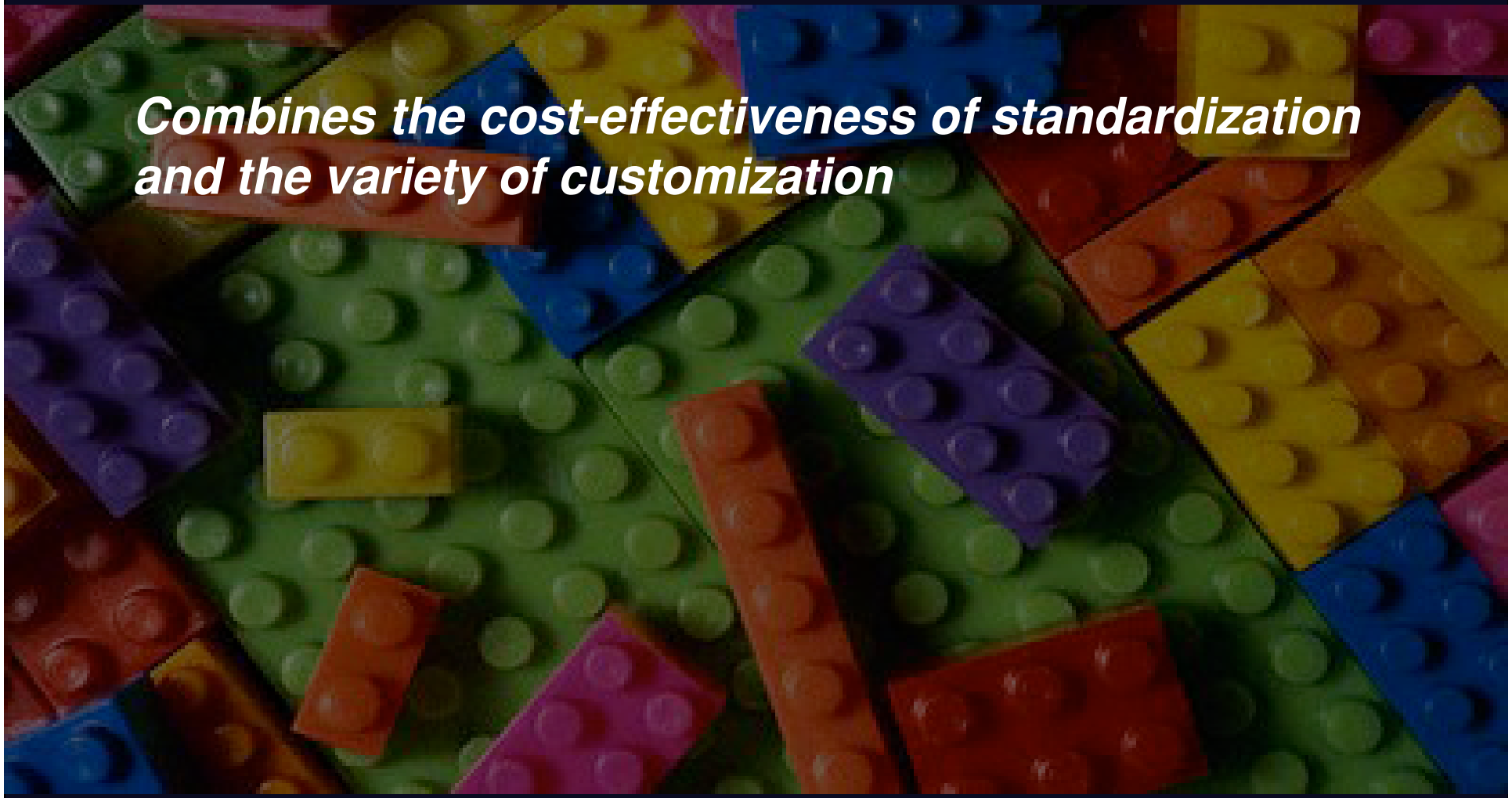
Evolutionary Housing Principles: Modularity



Combines the cost-effectiveness of standardization and the variety of customization

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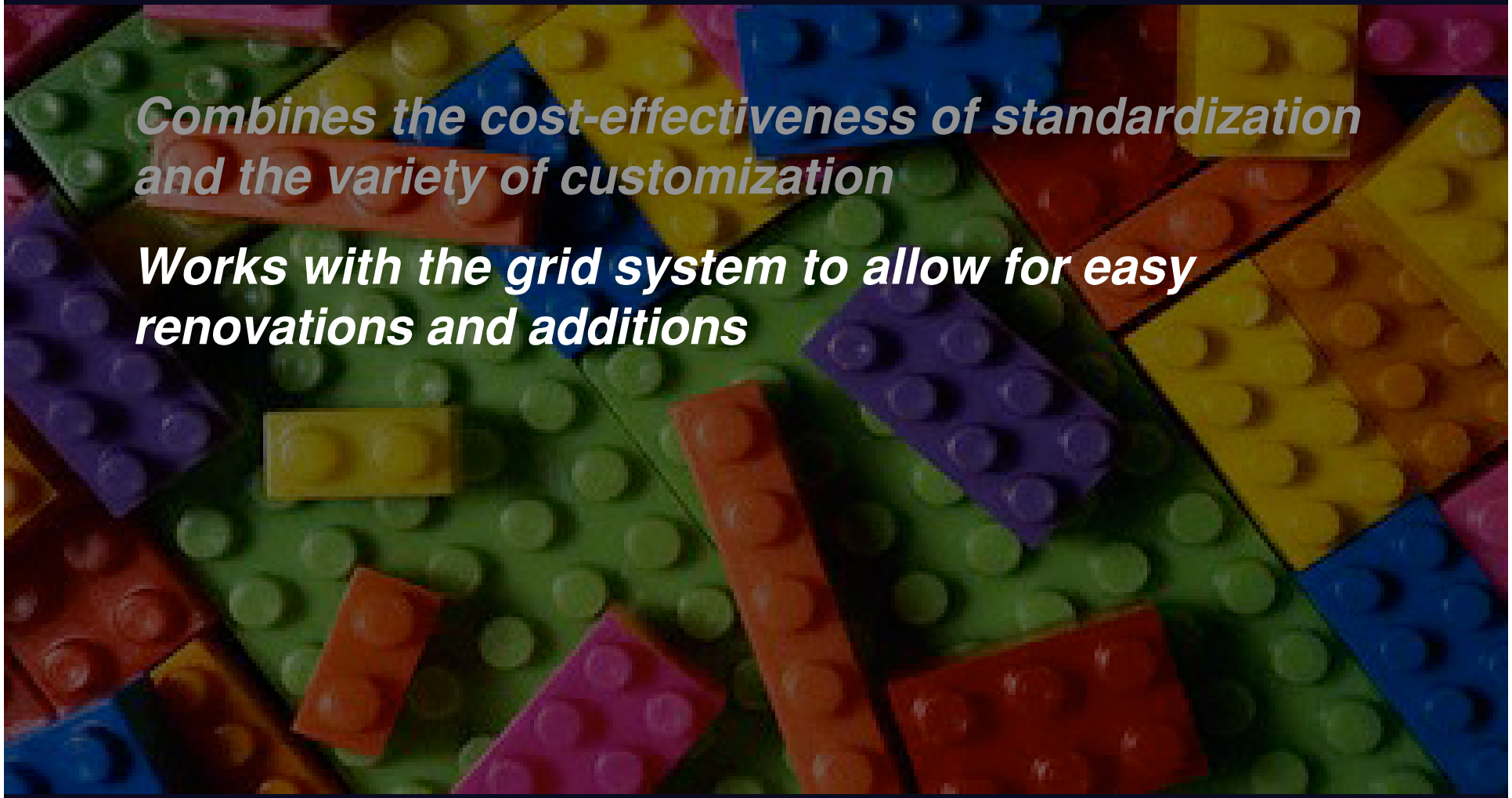
Evolutionary Housing Principles: Modularity



Combines the cost-effectiveness of standardization and the variety of customization

Works with the grid system to allow for easy renovations and additions

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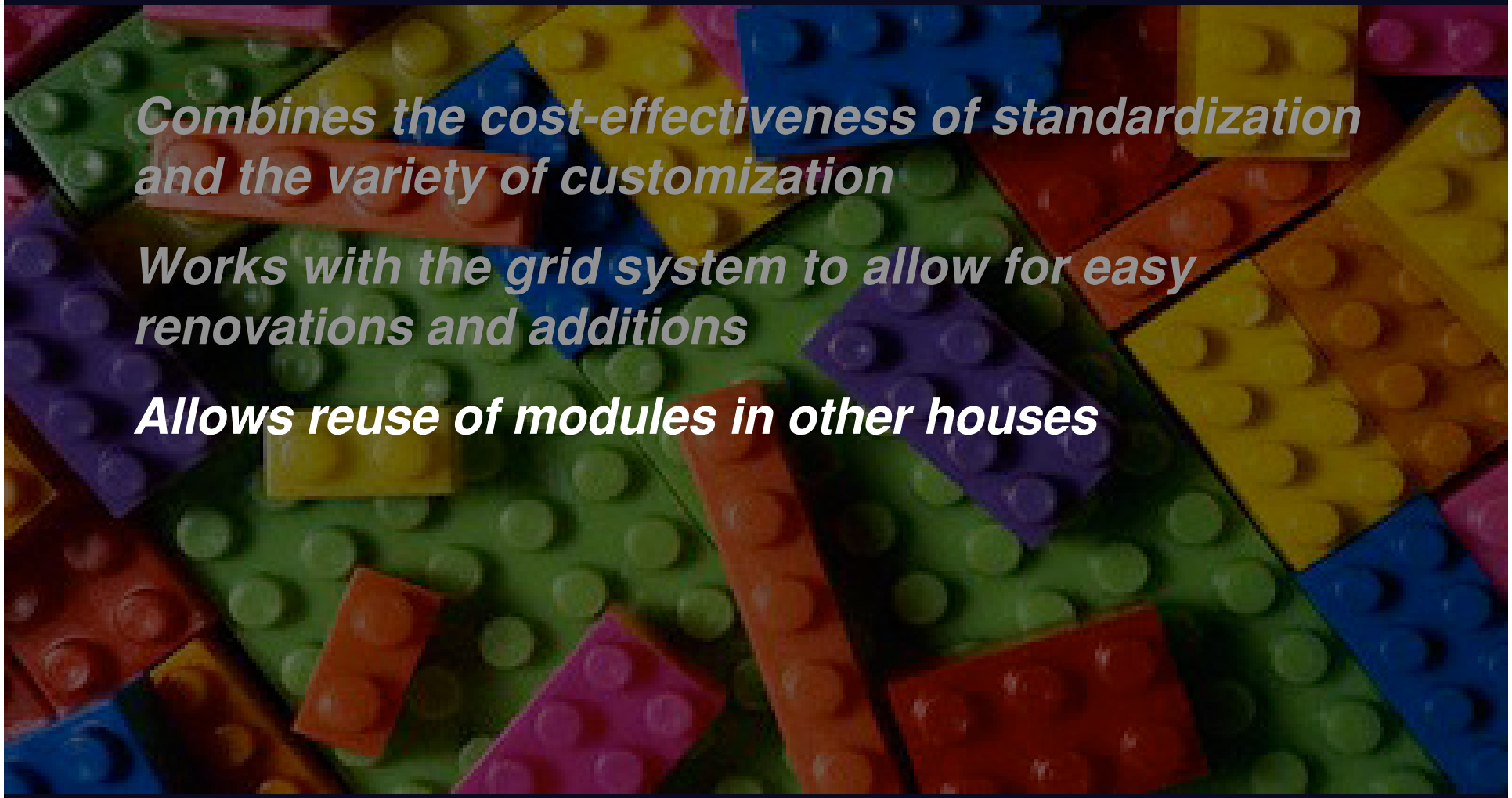
Evolutionary Housing Principles: Modularity



Combines the cost-effectiveness of standardization and the variety of customization

Works with the grid system to allow for easy renovations and additions

Allows reuse of modules in other houses

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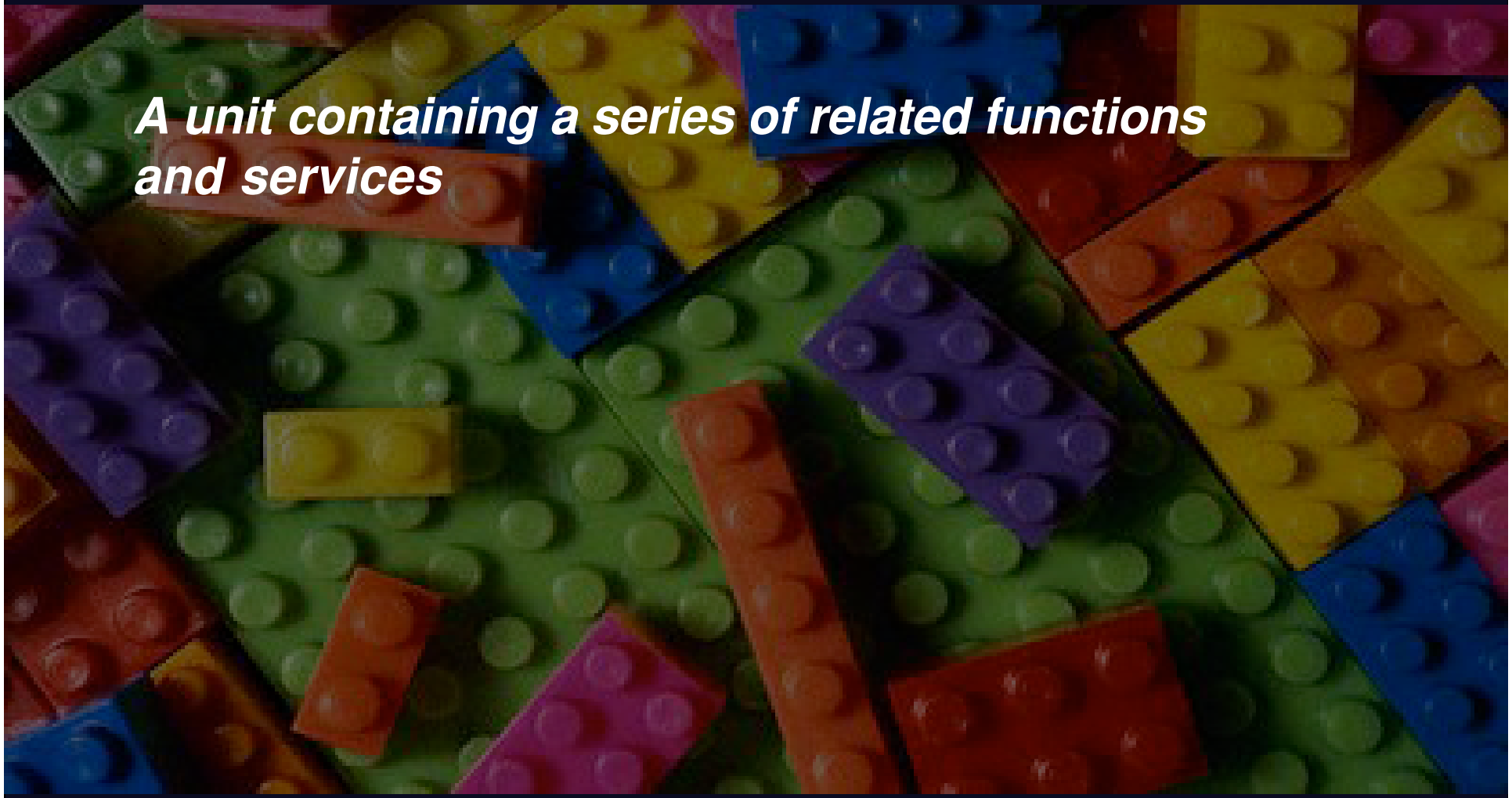
Evolutionary Housing Principles: Cores



A unit containing a series of related functions and services

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Evolutionary Housing Principles: Cores

A unit containing a series of related functions and services

A collection of services and functions customized to user needs

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Evolutionary Housing Principles: Cores

A unit containing a series of related functions and services

A collection of services and functions customized to user needs

Preassembled in a factory for installation on-site

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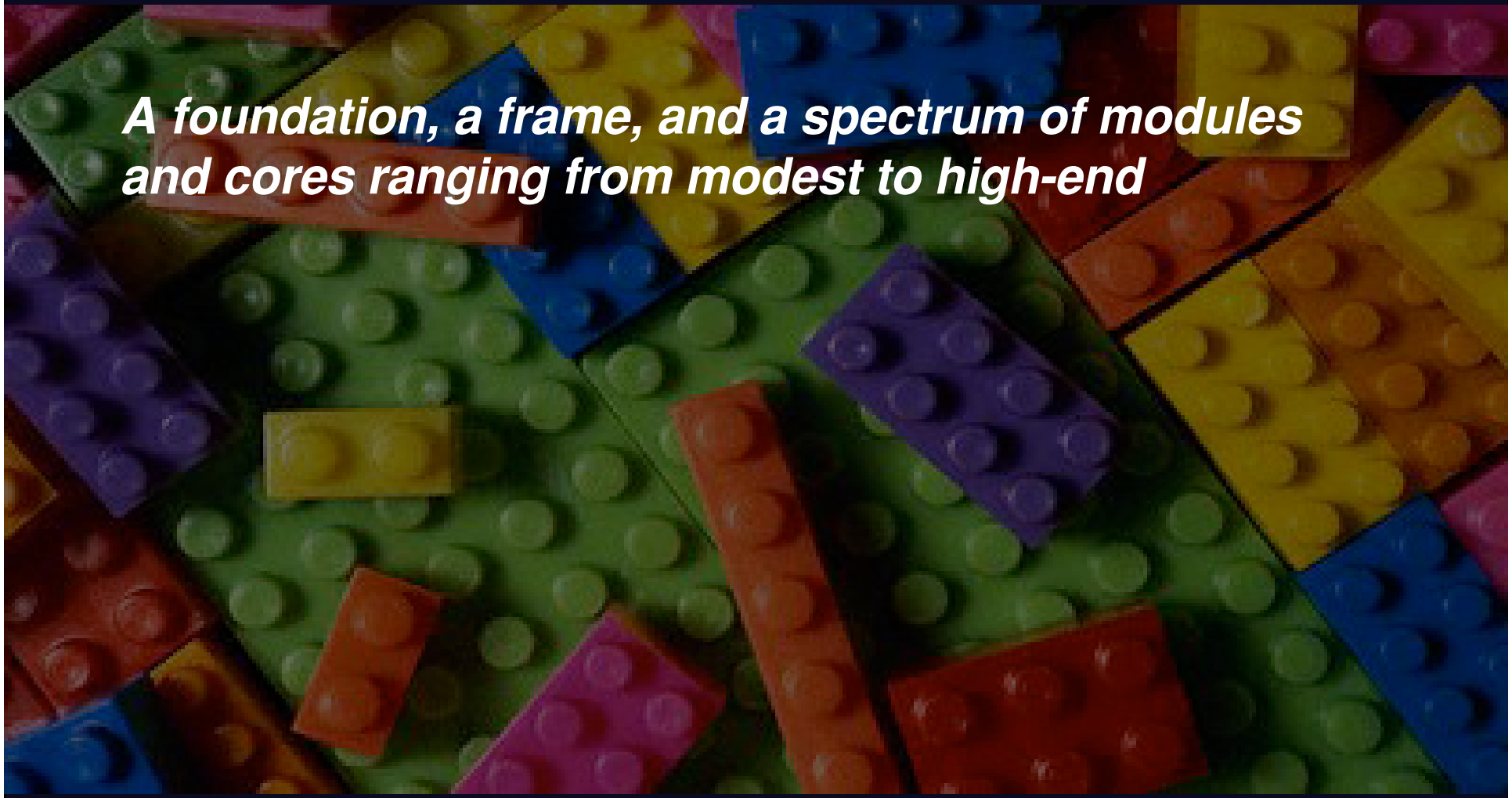
Evolutionary Housing Principles: Kit of Parts



A foundation, a frame, and a spectrum of modules and cores ranging from modest to high-end

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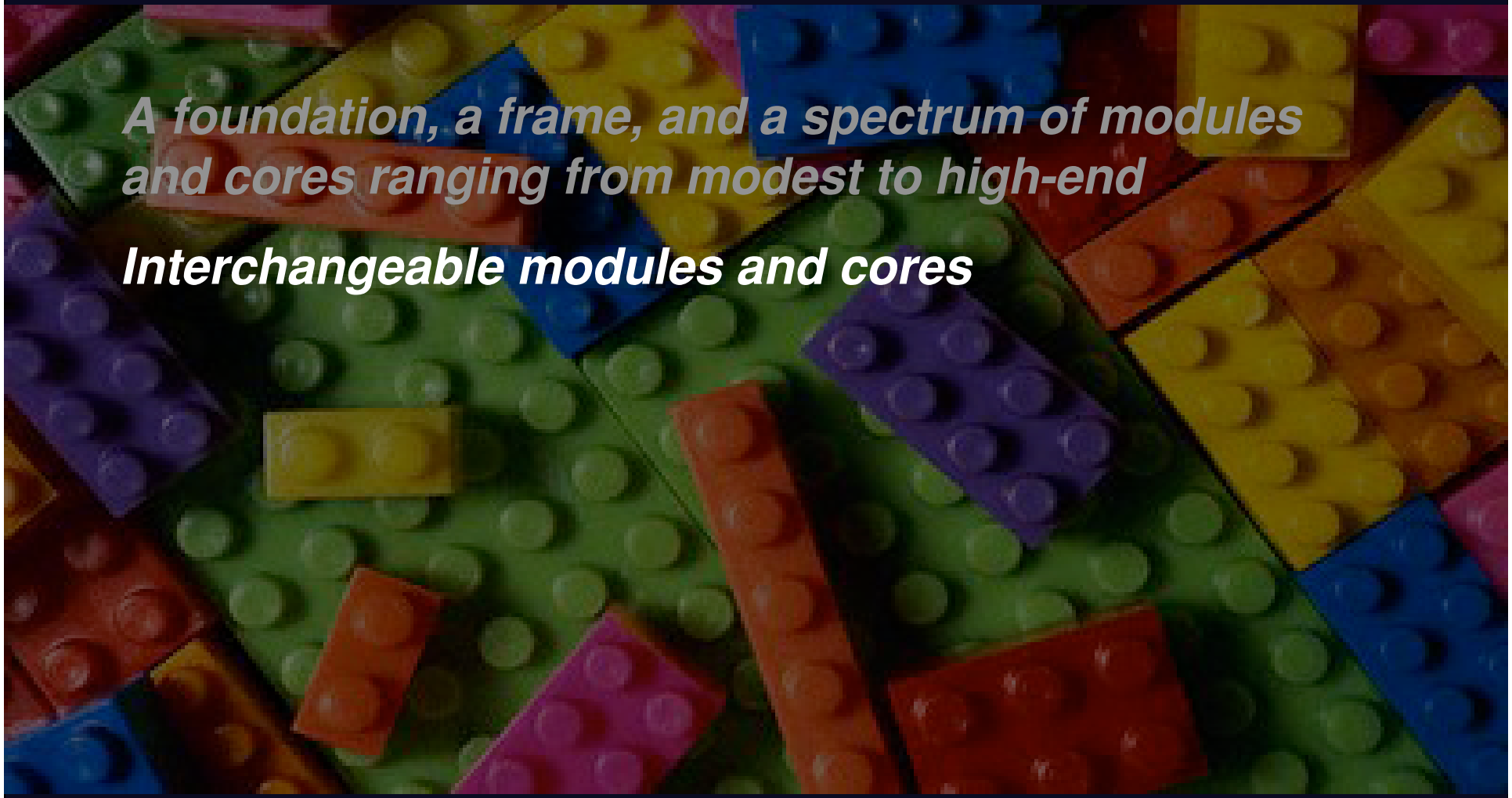

A foundation, a frame, and a spectrum of modules and cores ranging from modest to high-end

Interchangeable modules and cores

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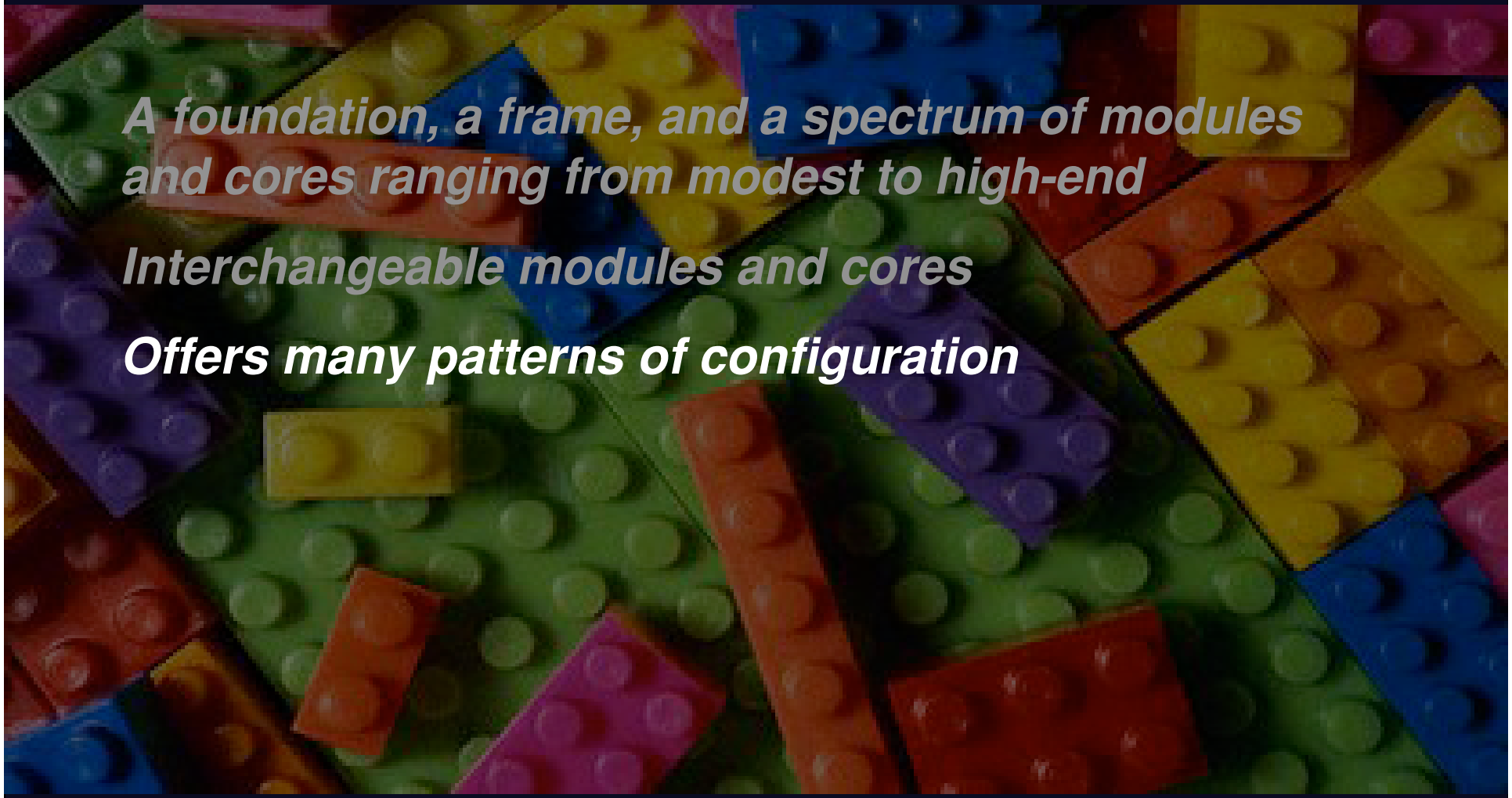

A foundation, a frame, and a spectrum of modules and cores ranging from modest to high-end

Interchangeable modules and cores

Offers many patterns of configuration

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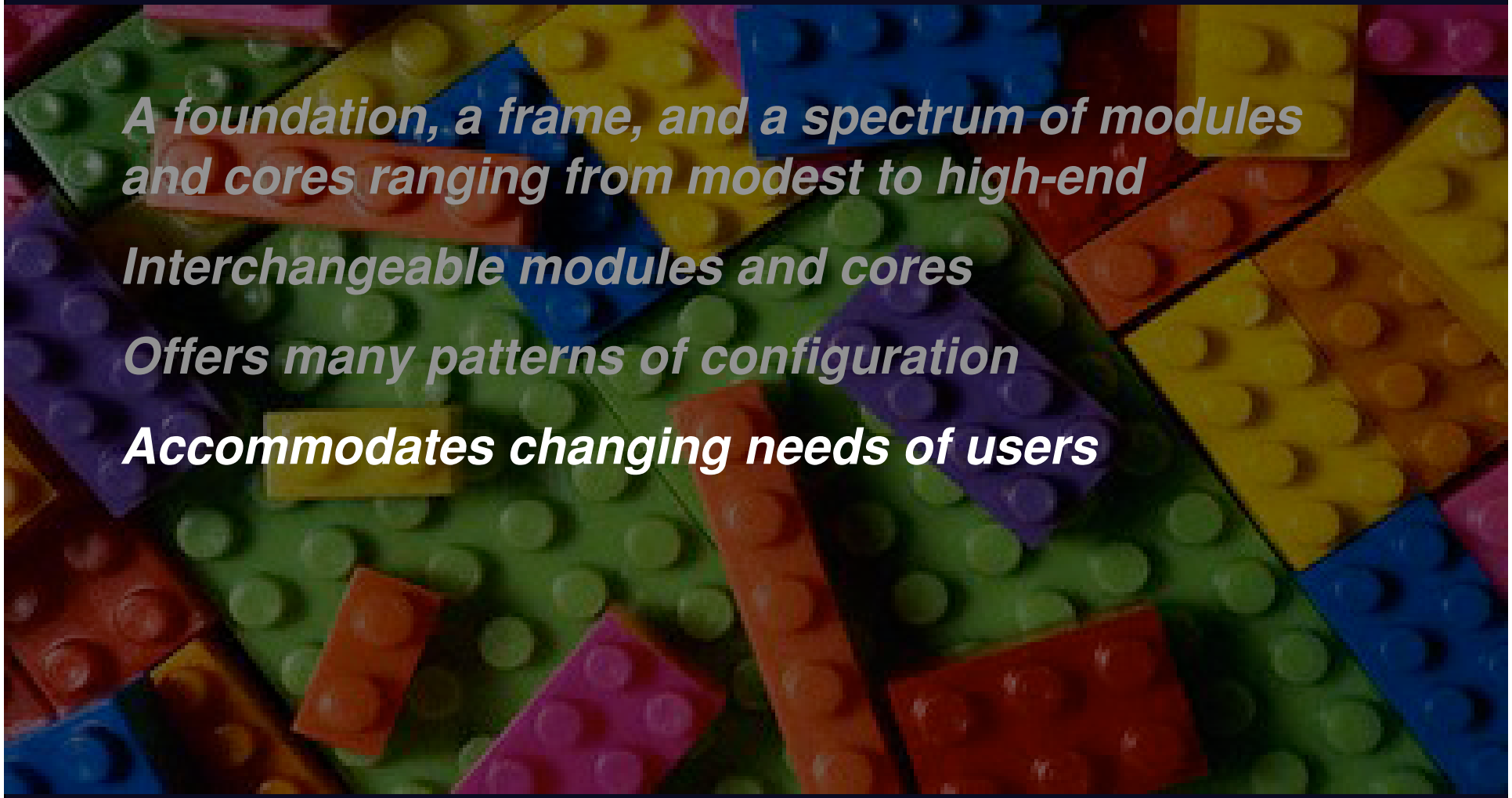

A foundation, a frame, and a spectrum of modules and cores ranging from modest to high-end

Interchangeable modules and cores

Offers many patterns of configuration

Accommodates changing needs of users

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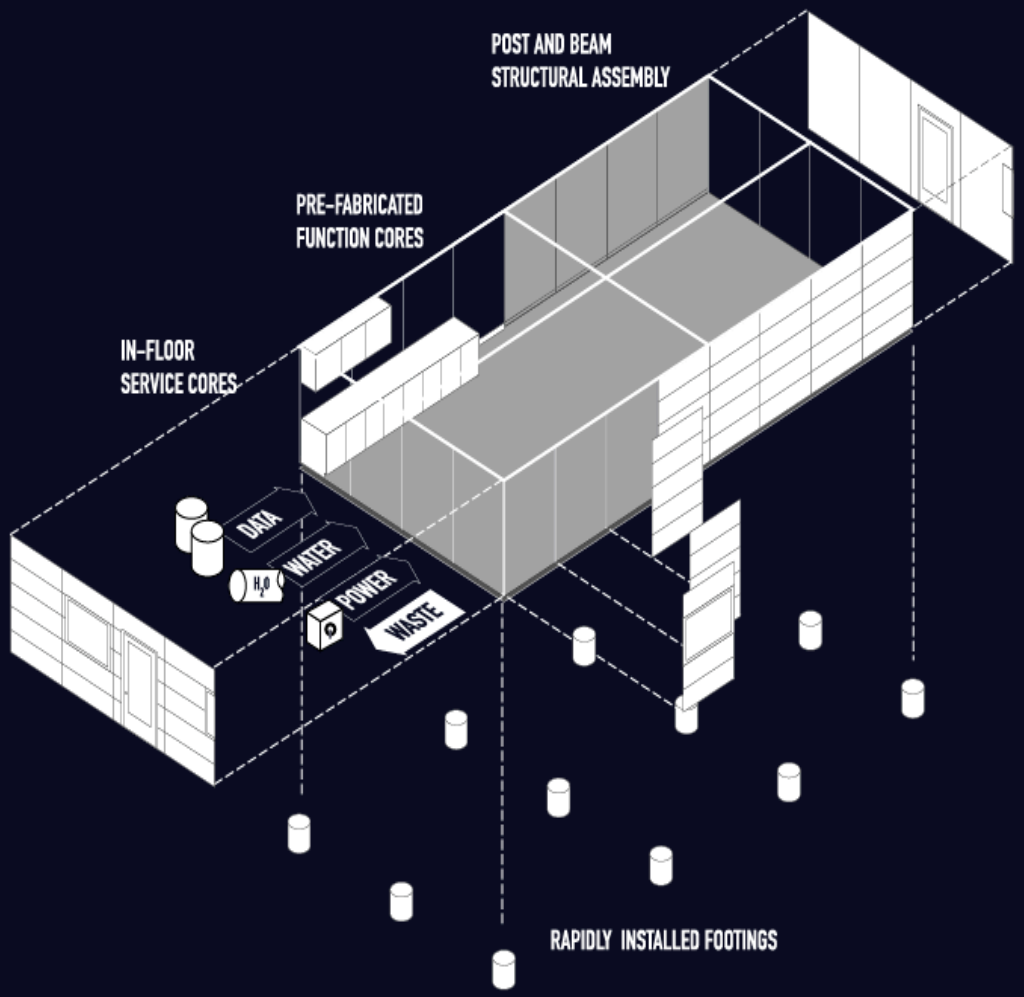
Evolutionary Housing: The Model



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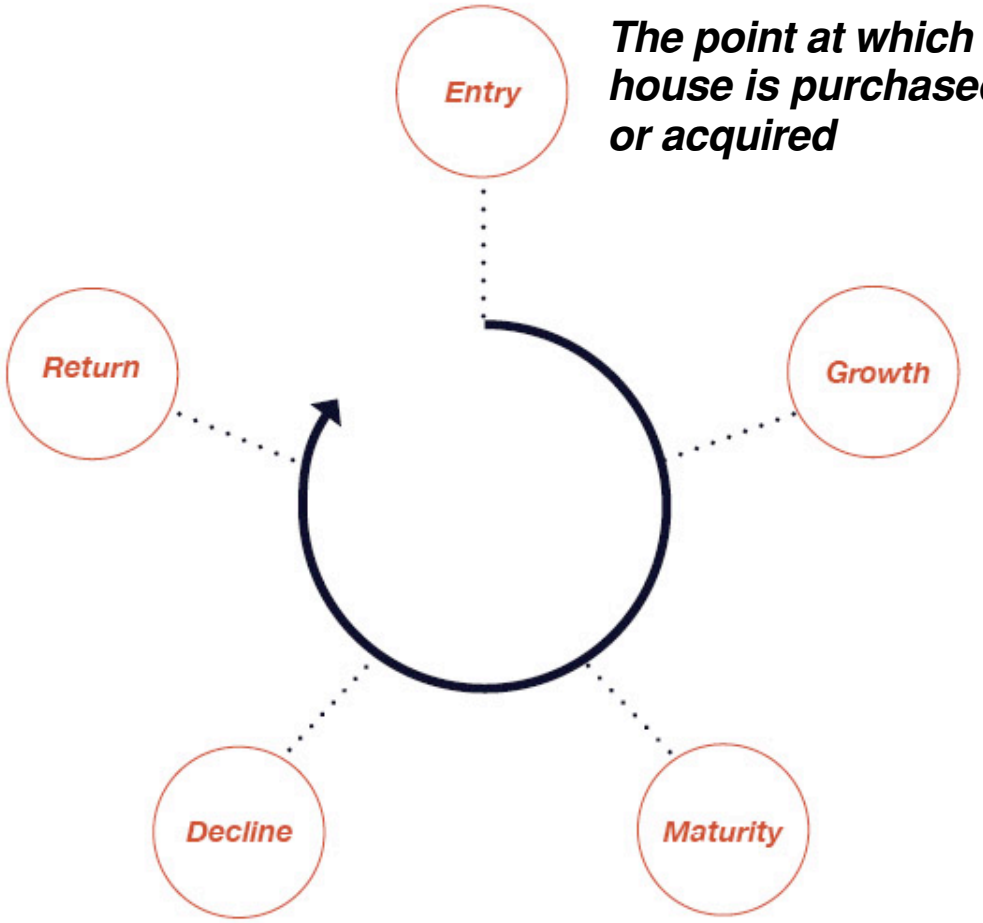
Housing System Lifecycle



The point at which a house is purchased or acquired

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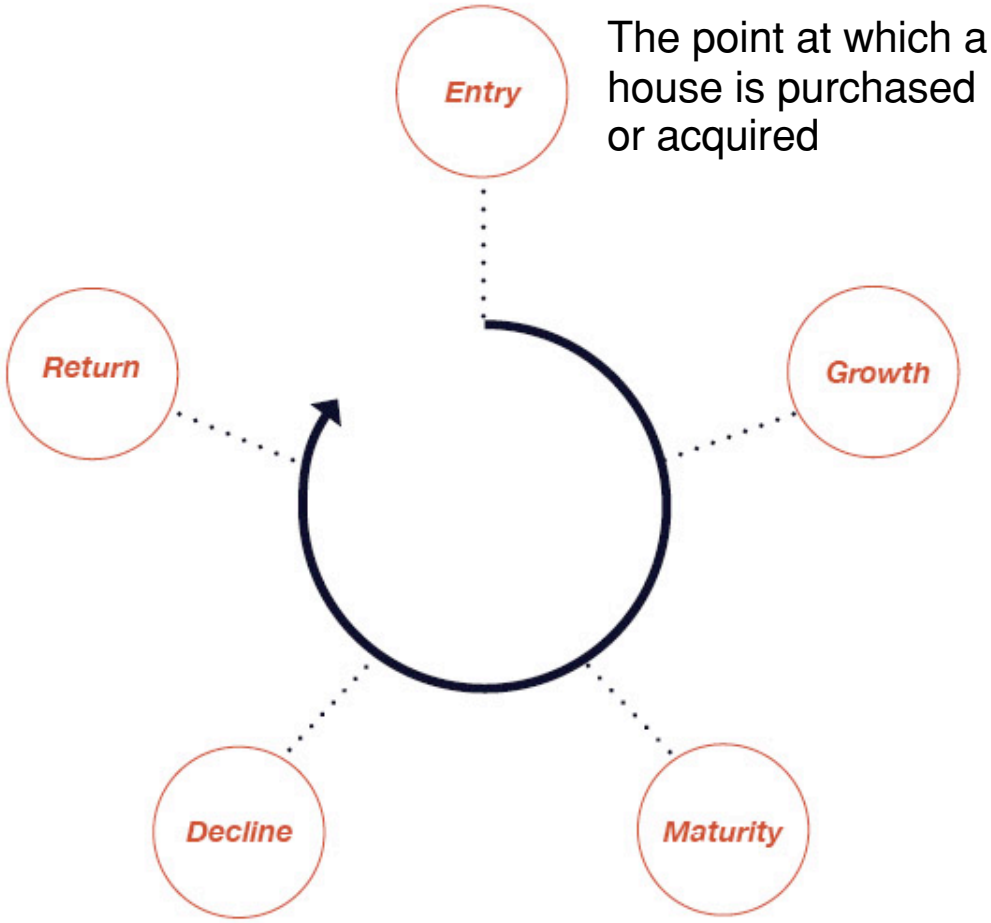
Housing System Lifecycle



The point at which a house is purchased or acquired

The stage during which a family is most likely to expand

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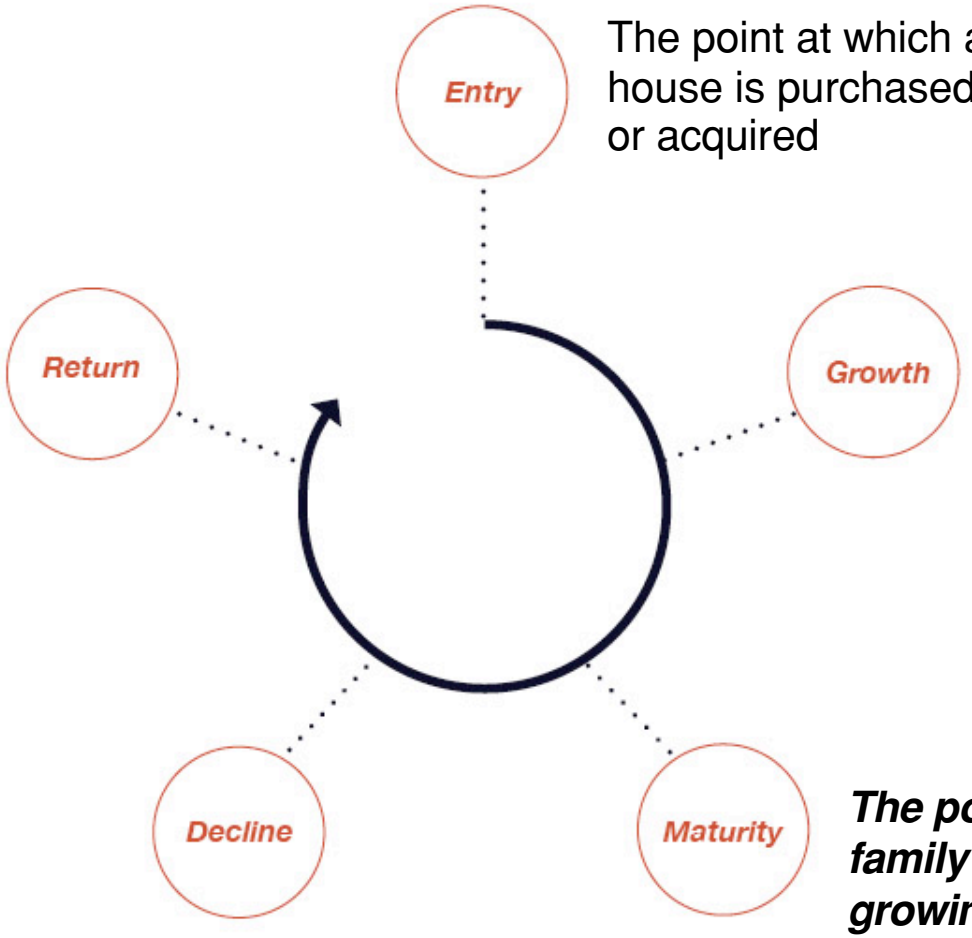
Housing System Lifecycle



The point at which a house is purchased or acquired

The stage during which a family is most likely to expand

The point at which a family's needs stop growing

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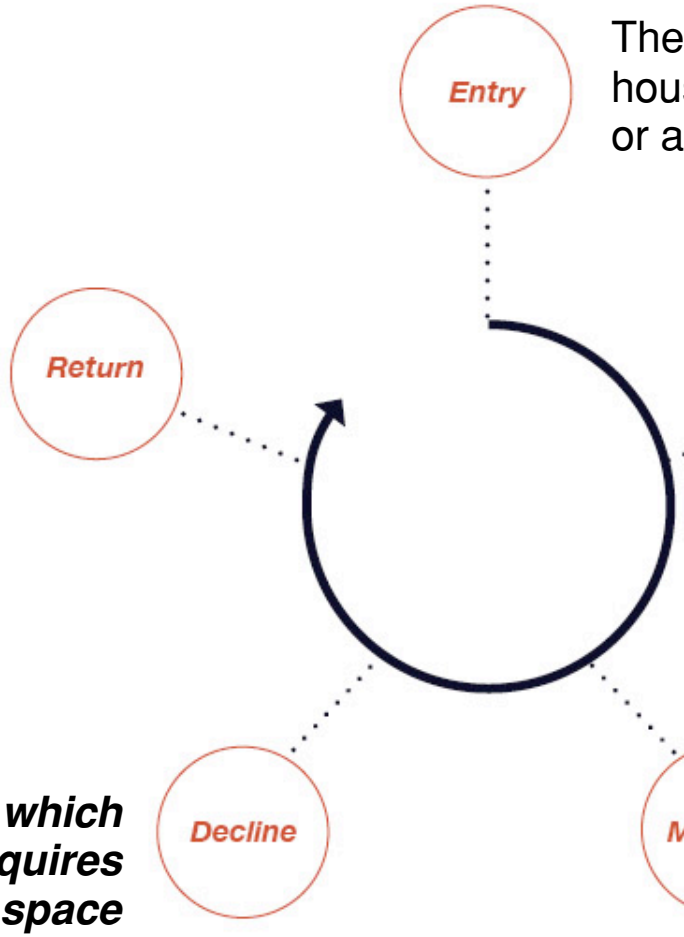
Housing System Lifecycle



The point at which a house is purchased or acquired

The stage during which a family is most likely to expand

The point at which a family's needs stop growing

The stage at which a family requires less space

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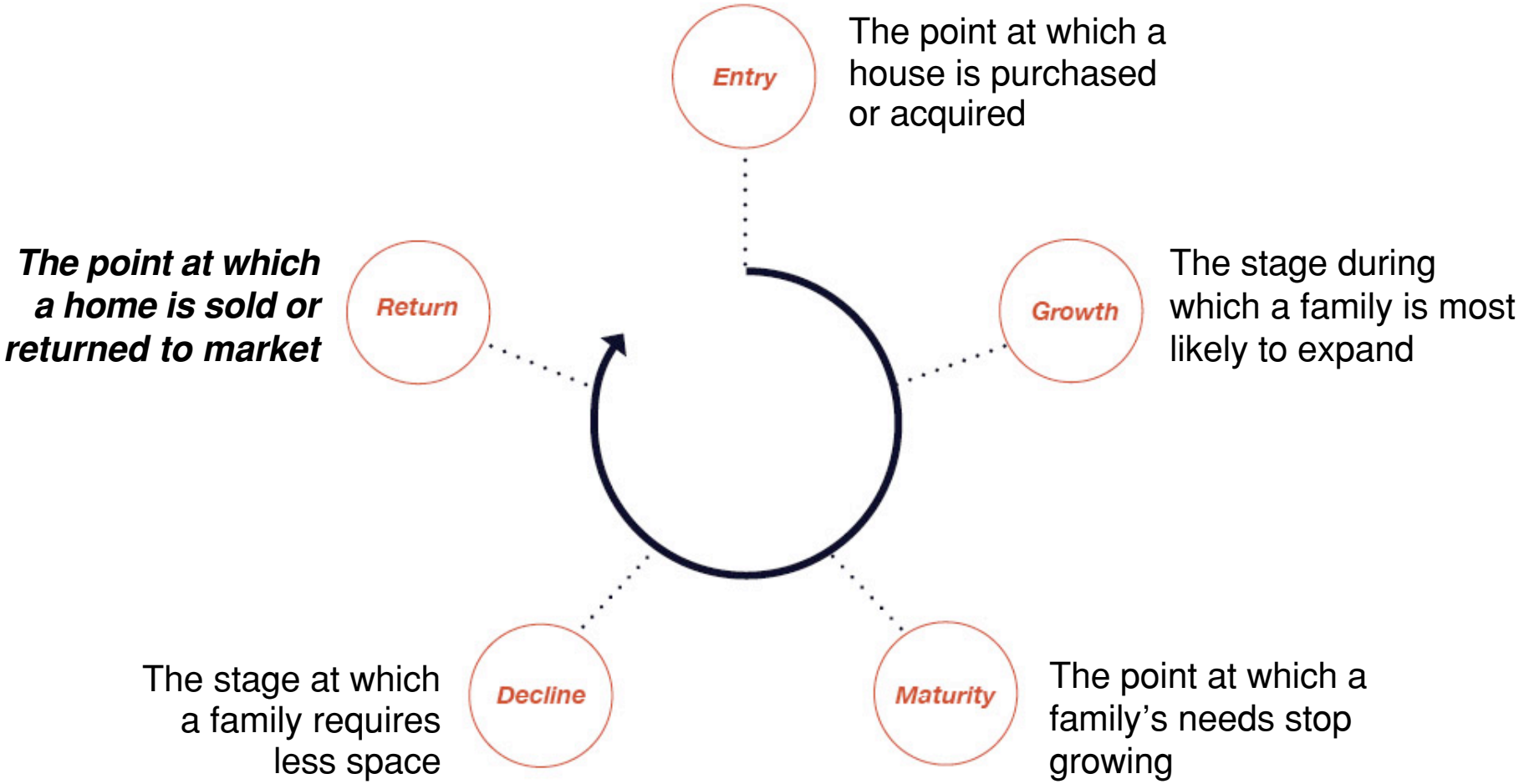
Housing System Lifecycle



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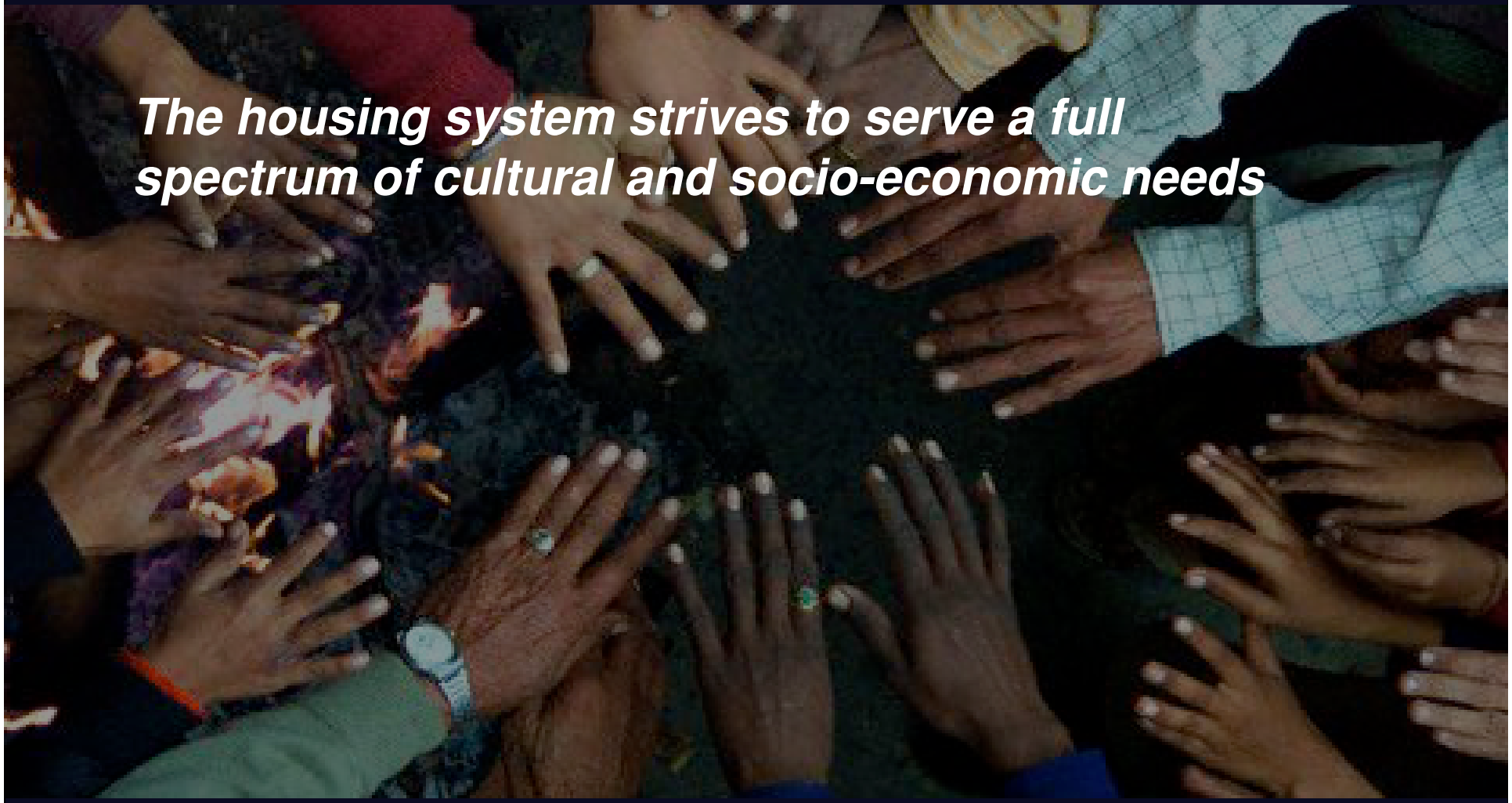
Global Reach



The housing system strives to serve a full spectrum of cultural and socio-economic needs

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Global Reach

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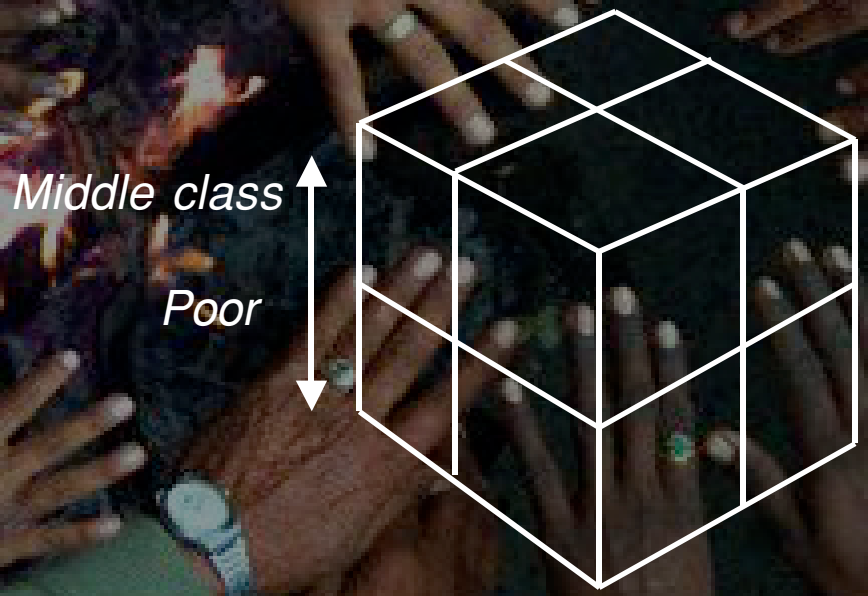

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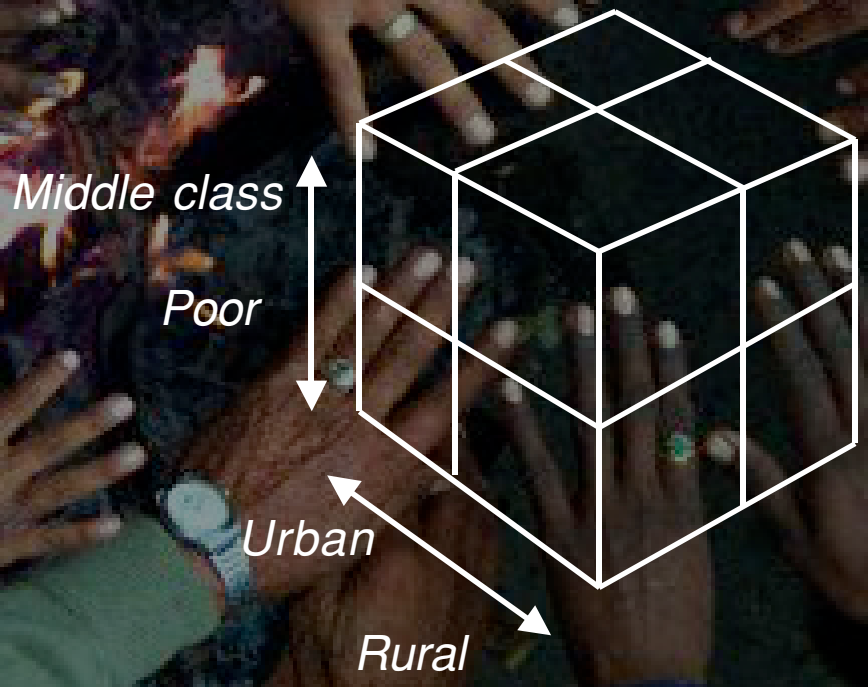

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Global Reach

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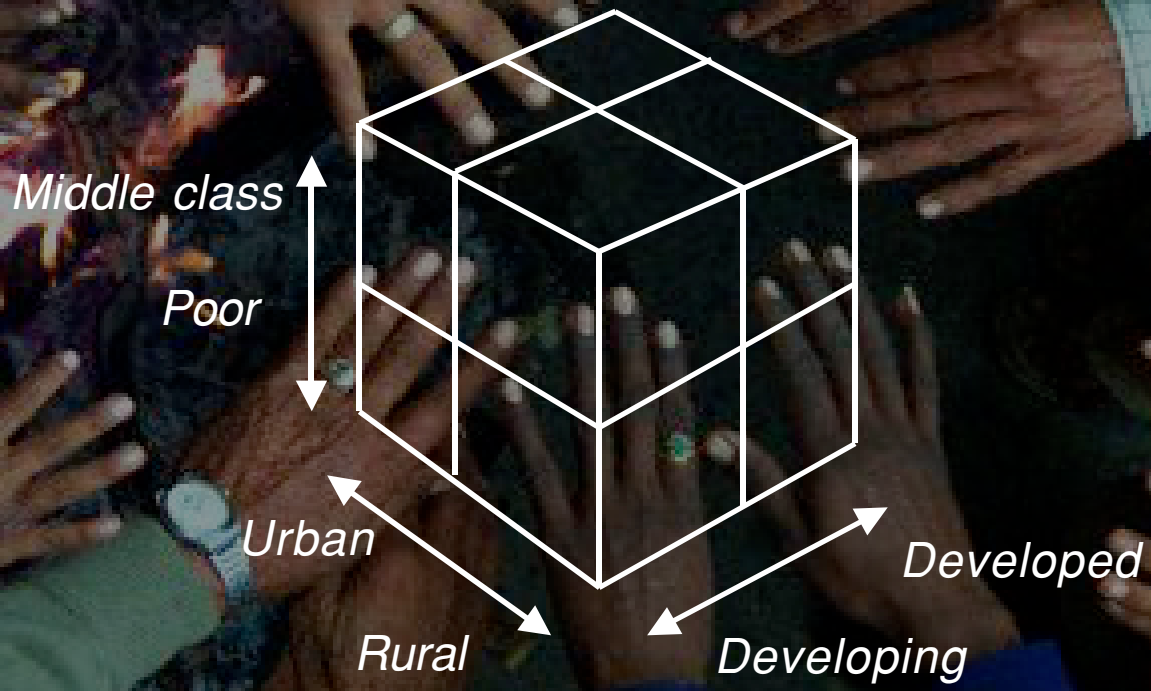

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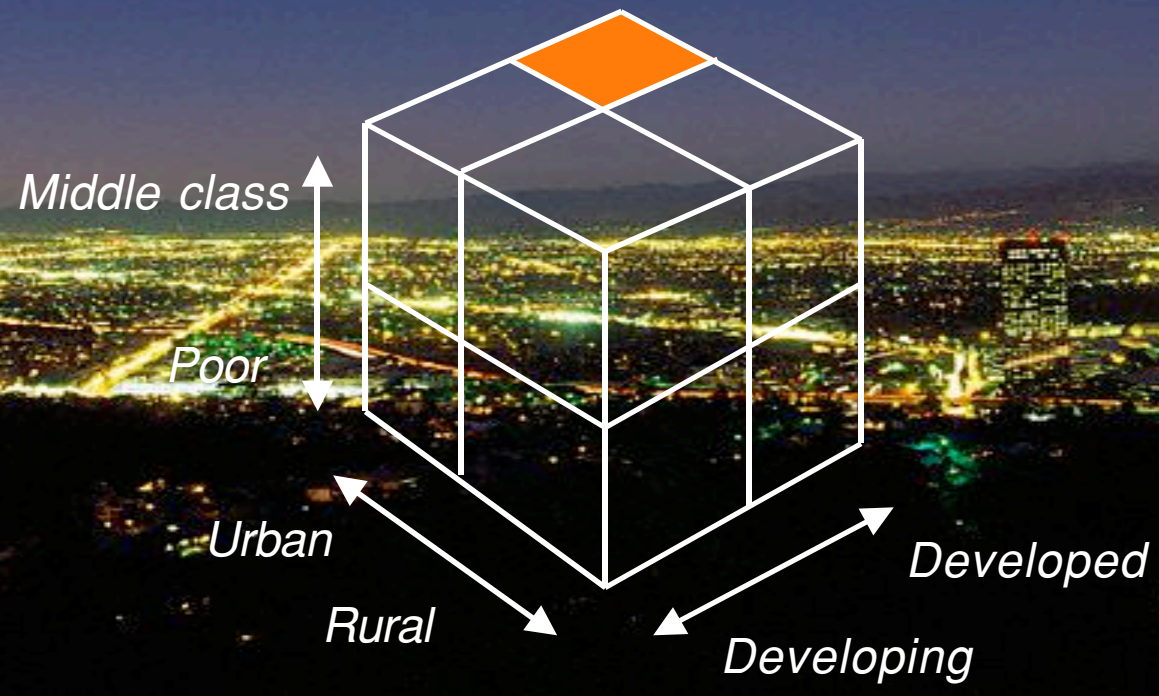
Global Reach

The following examples take you through the housing lifecycle in a middle class, urban, developed context.



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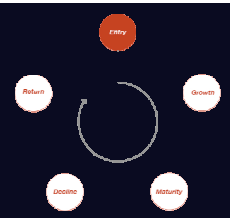
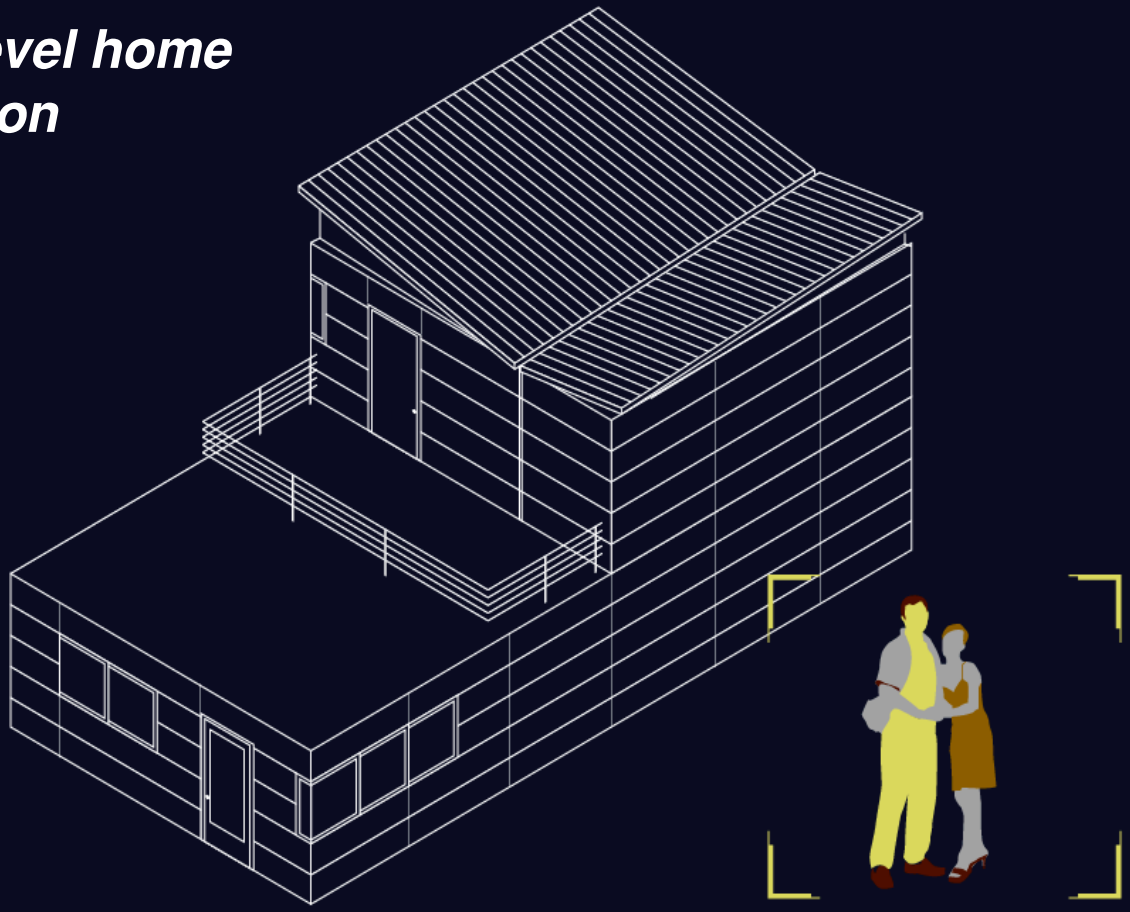


Entry

An entry level home configuration



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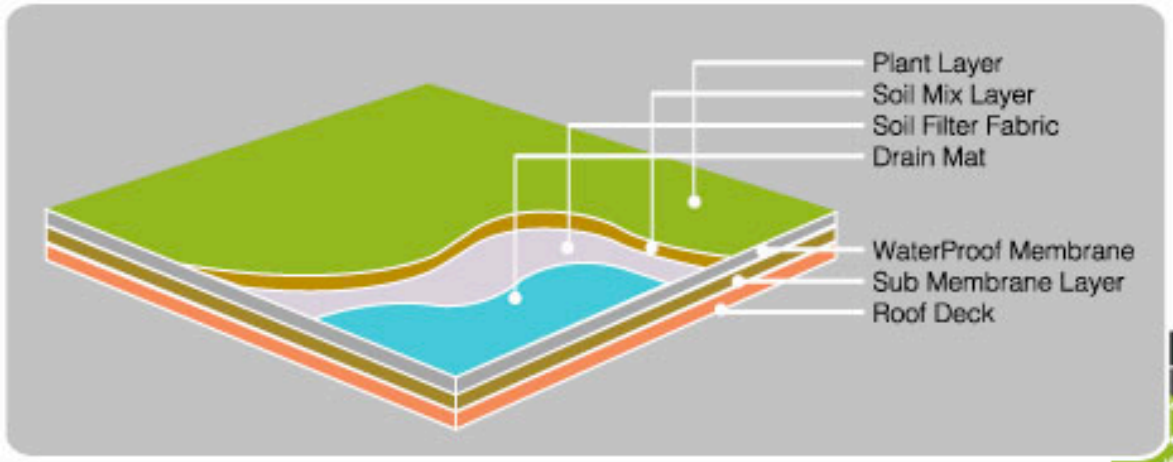
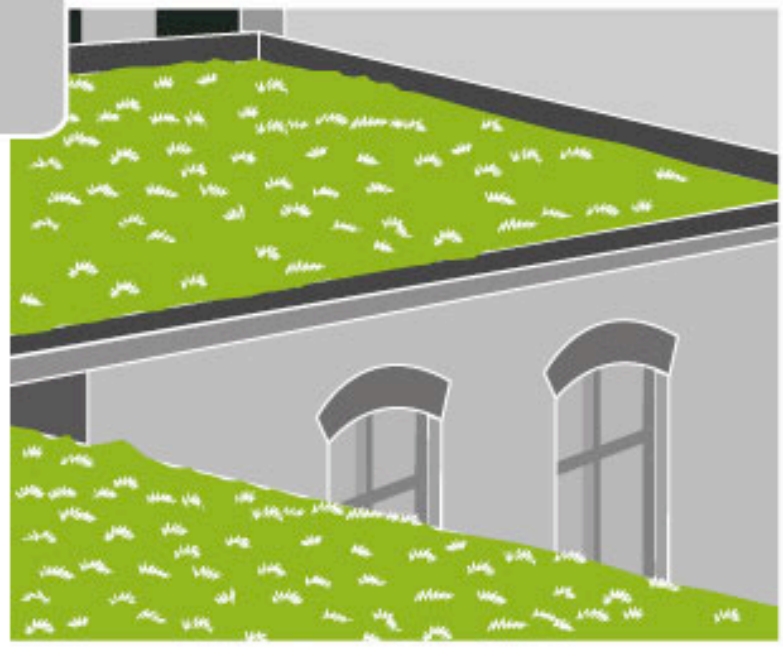
Green Grid Roofing System





Structural Element

A part of the Grid System, Green Grid Roofing is a live-plant roof cladding that arrives at the home planted and ready for installation. The modules, backed with recycled plastics, can be placed directly on an existing roof surface membrane or any other surface braced to handle their weight.

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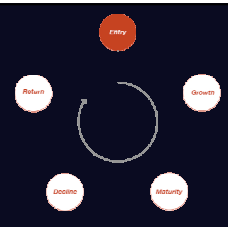
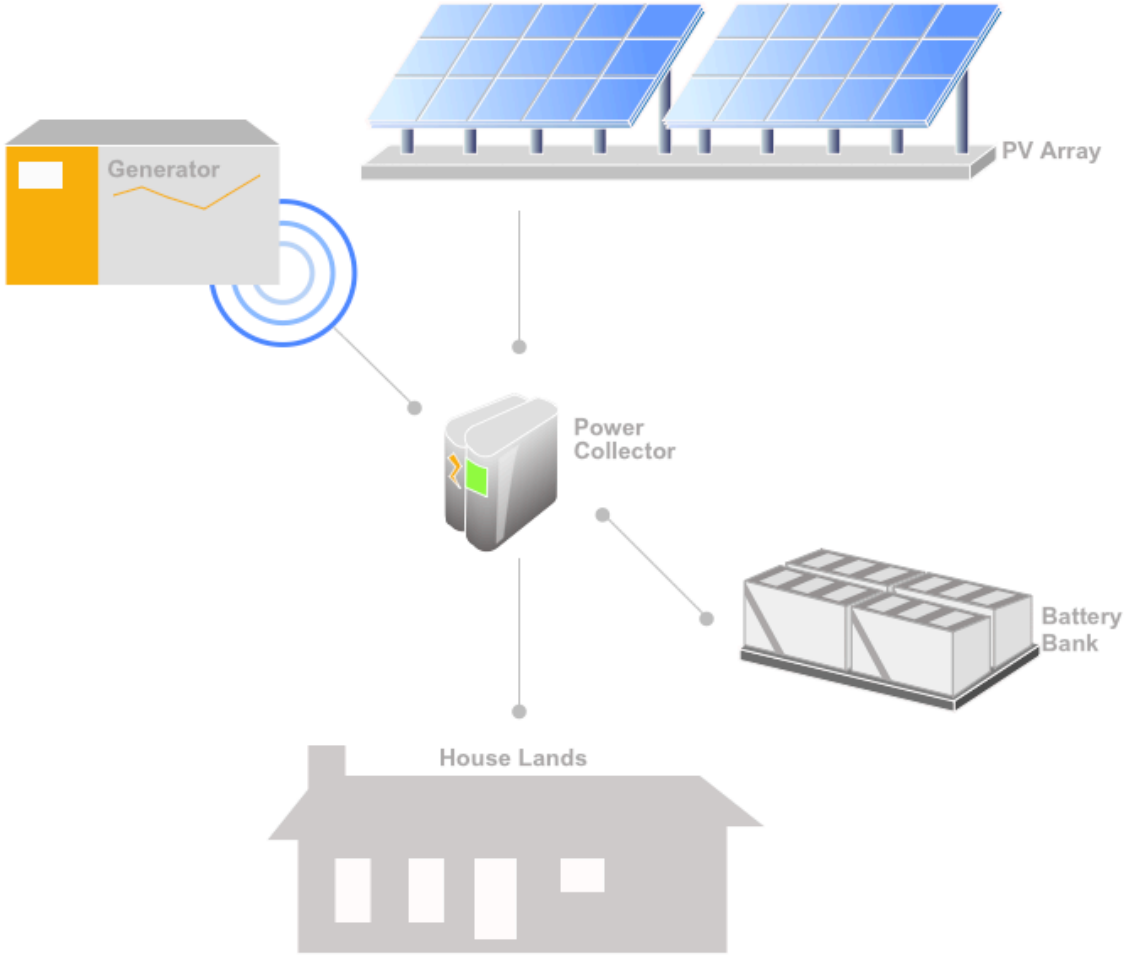
Photovoltaic Energy System





Structural Element

This system, which uses lead-free PV modules, provides power to the house and allows excess energy to be stored for later use, used by others in the community, or sold back to the power company.

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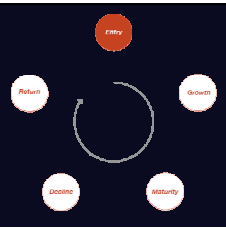
Zig Bee Node



Functional Element

A part of the Environmental Core, the Zig Bee Node is a low-power, wireless controller for the home. It can be mounted in multiple locations in walls anywhere in the home to facilitate smooth operation of lighting, heating, cooling, and many special activities. New activities for control can be readily added with software updates.

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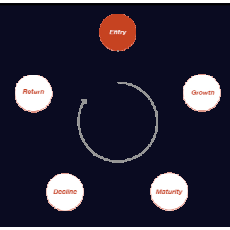
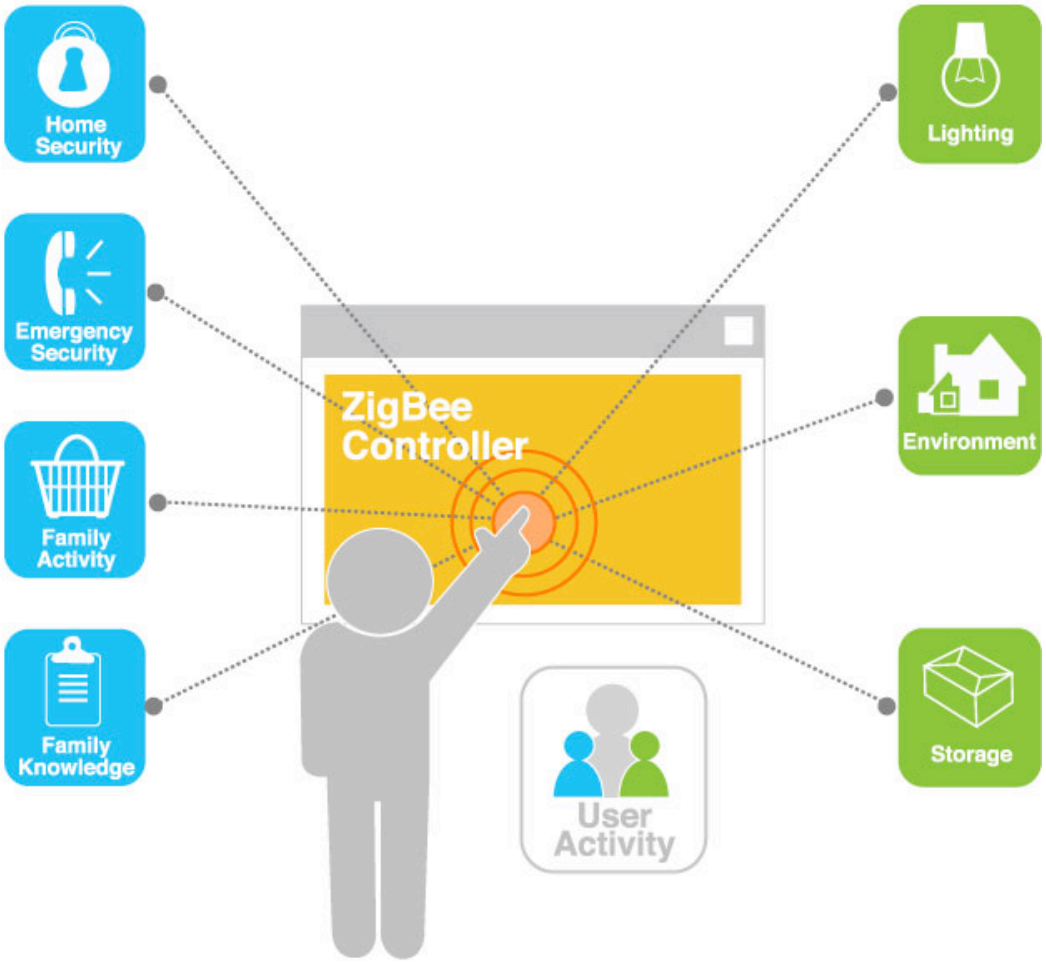
Zig Bee Node





The figure at right depicts Zig Bee in use. Touch pads throughout the home create a fully distributed control system.

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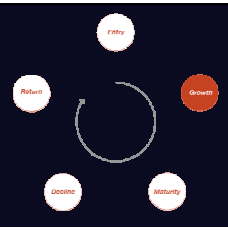
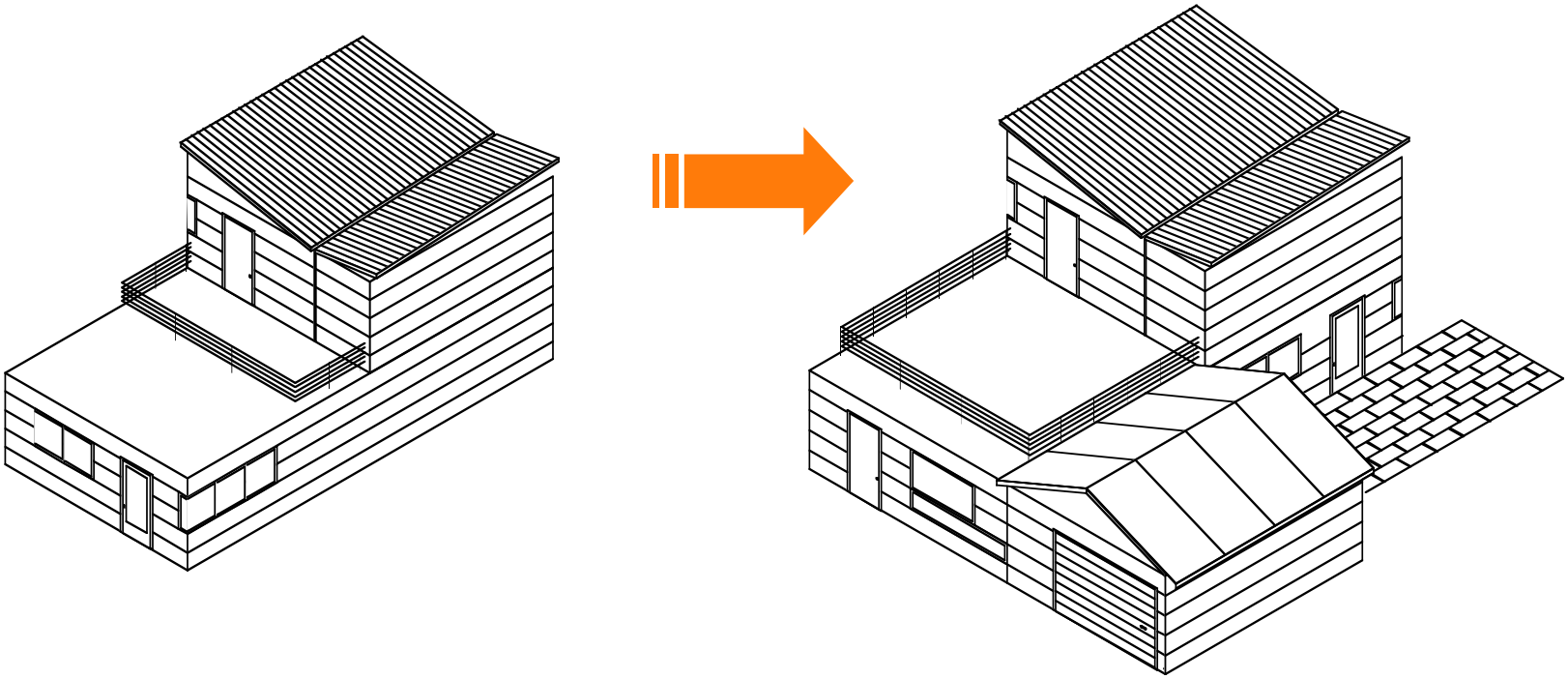
Growth





From the entry phase, a patio is added, the second floor deck is expanded and a garage is added.

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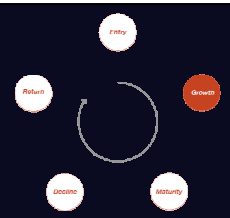
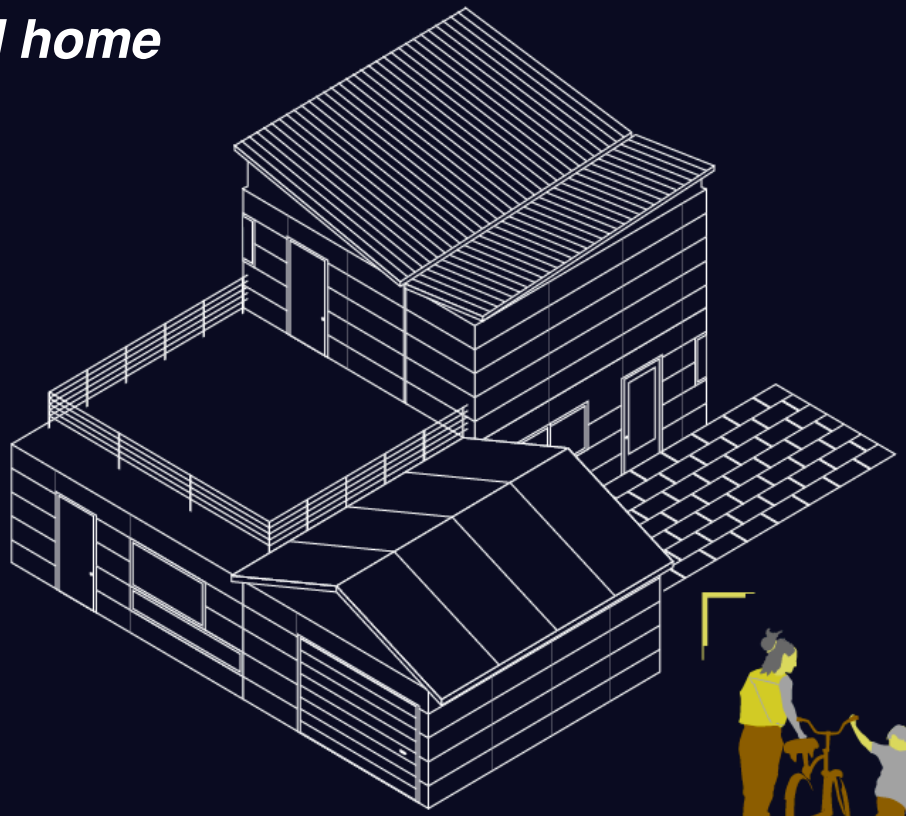


Growth

A growth level home configuration



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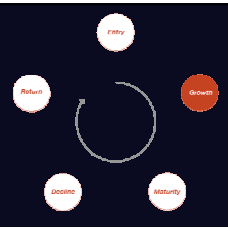
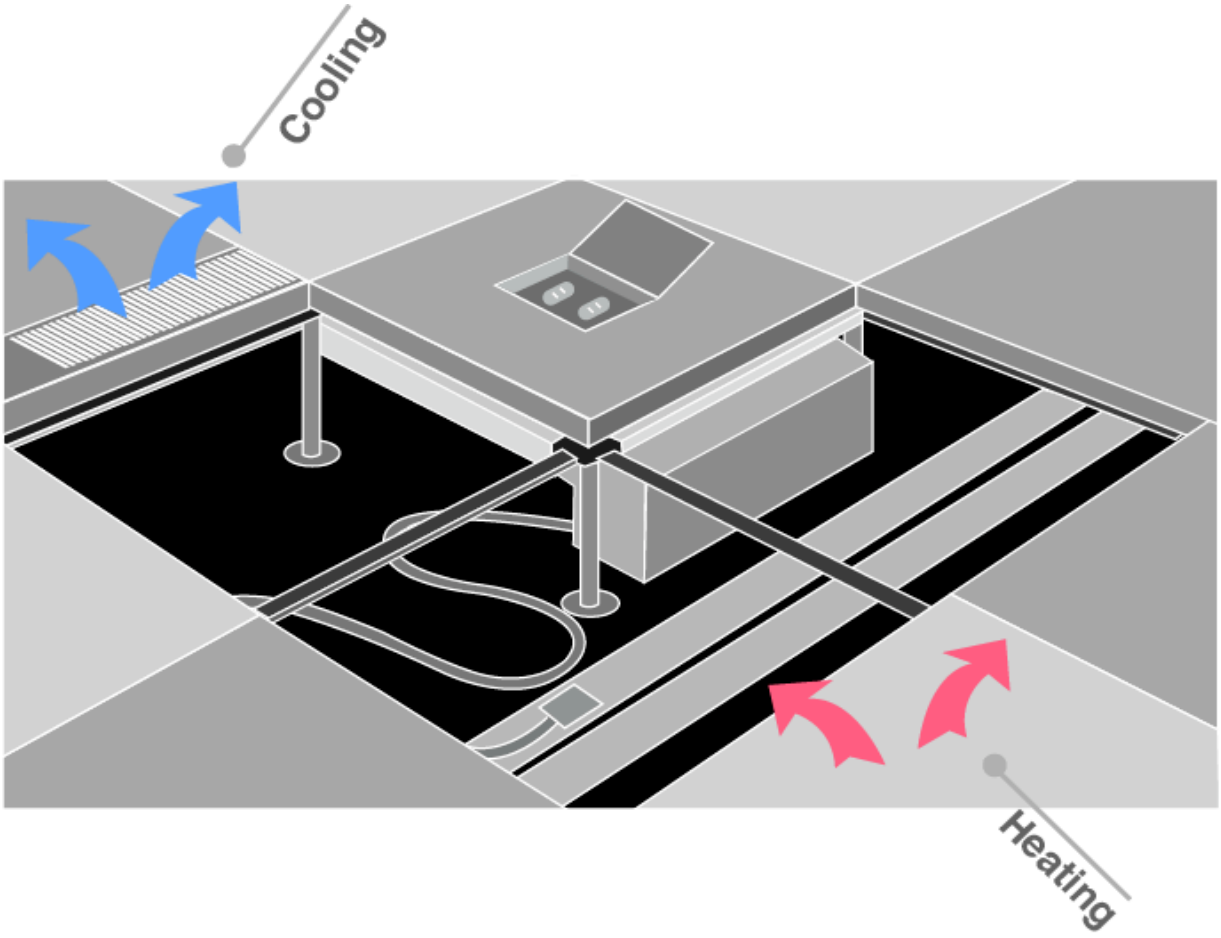
Ceiling and Floor Modules



Functional Element

The Ceiling and Floor Modules are part of the Environmental Core. They permit rapid access and efficient maintenance operations without the need for masonry work. Panels contain interface connectors for utilities in the home. Heating vents are in floor modules, cooling vents in ceiling modules. Modularity allows utilities to be repositioned easily when room layouts are changed.



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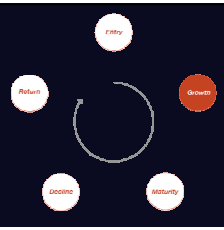
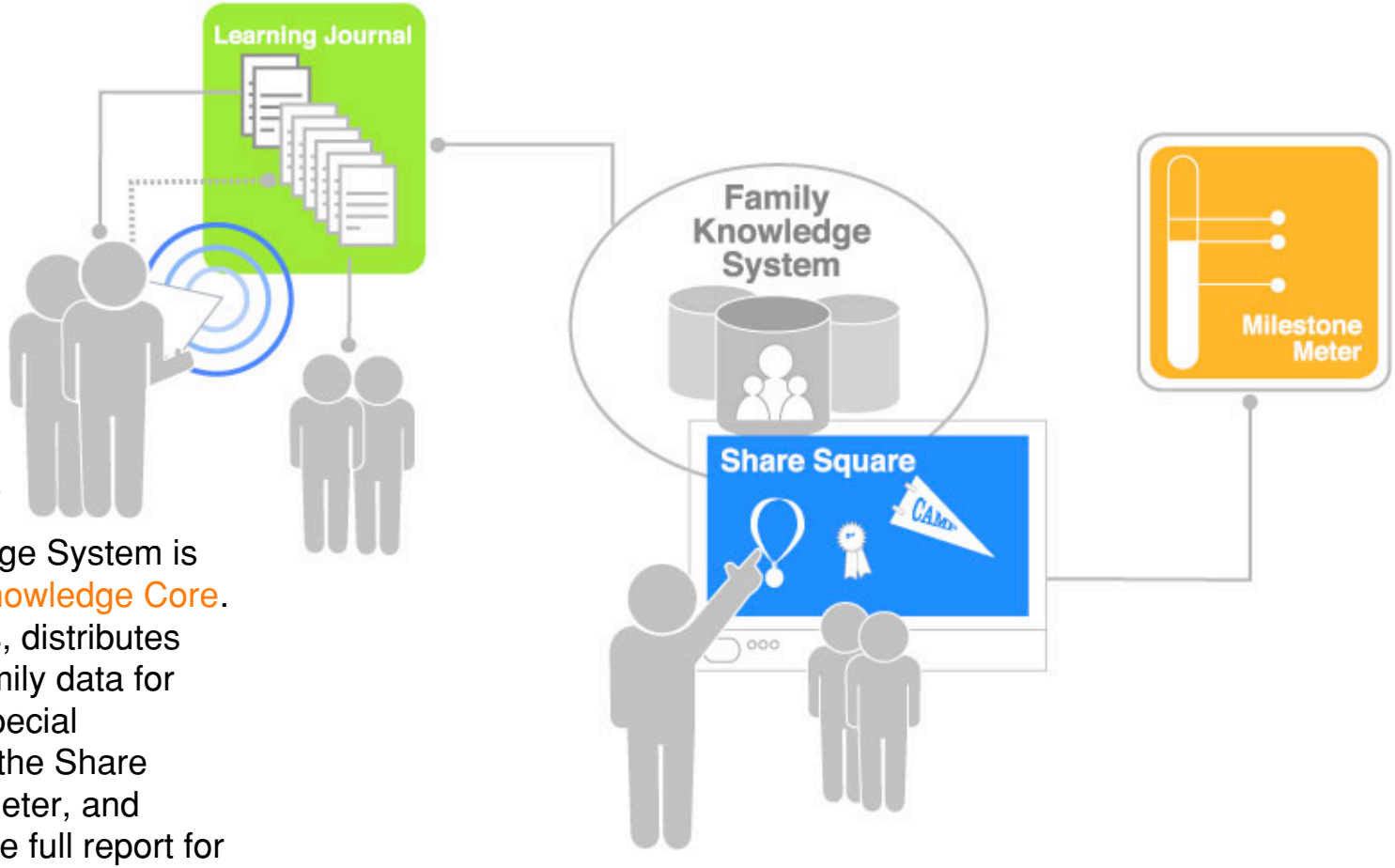
Family Knowledge System





Functional Element

The Family Knowledge System is part of the Family Knowledge Core. The system archives, distributes and reassociates family data for special purposes. Special applications include the Share Square, Milestone Meter, and Learning Journal (see full report for more detail).

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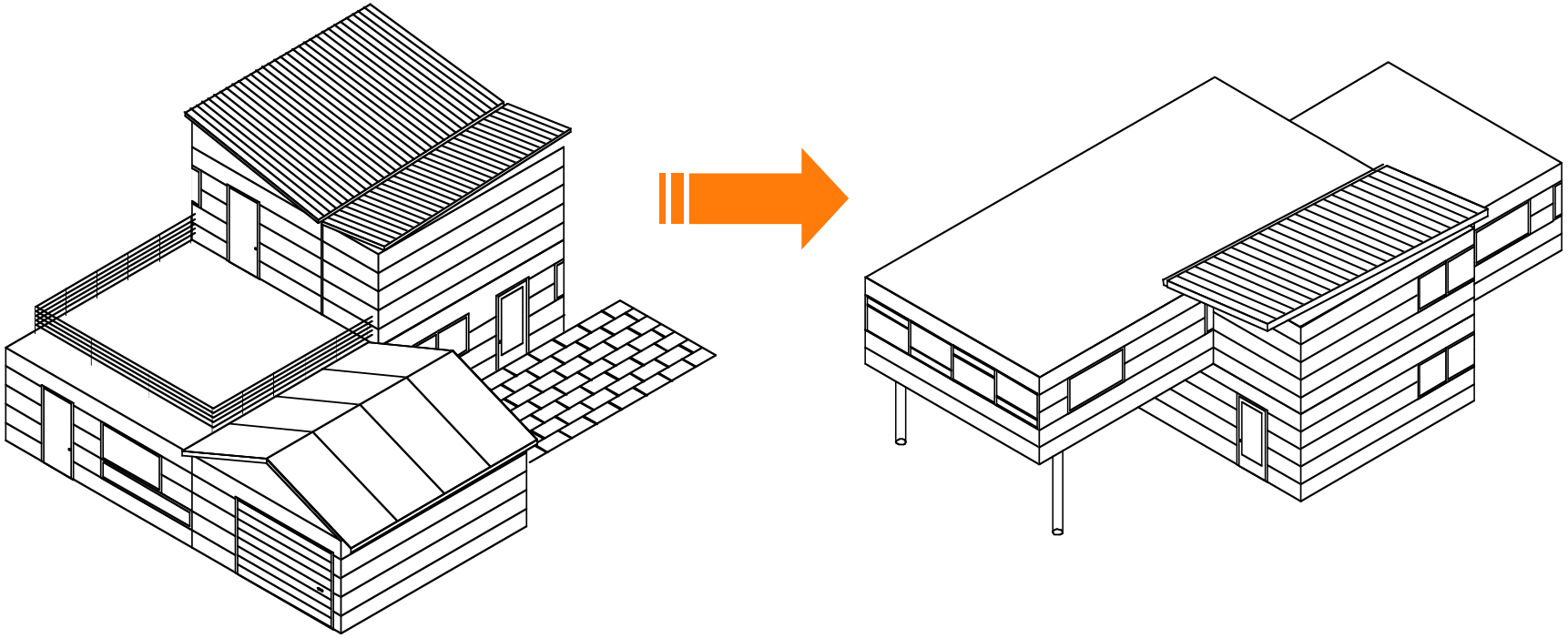
Maturity



From the growth phase, a maturity phase home is configured.
Components are exchanged for other more appropriate ones.

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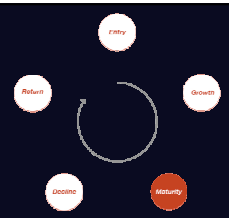
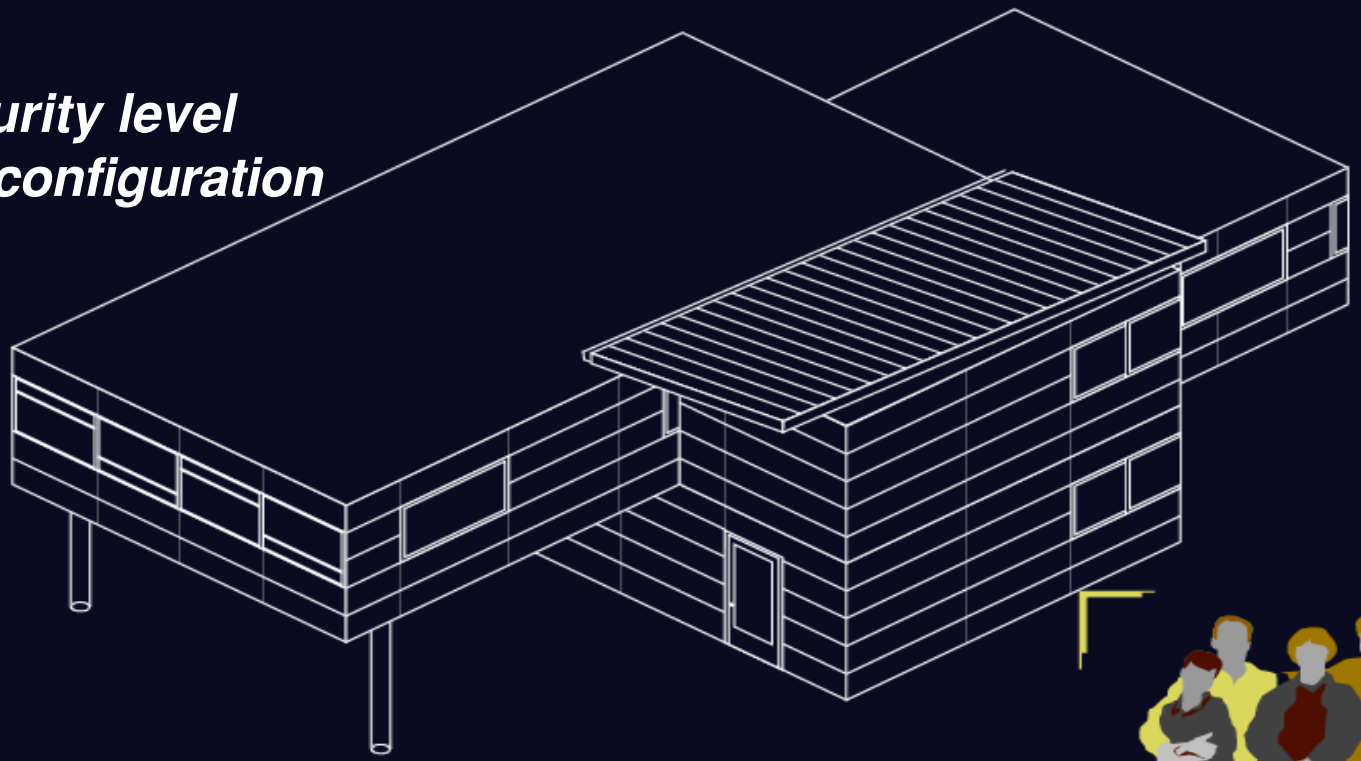
Maturity



A maturity level home configuration



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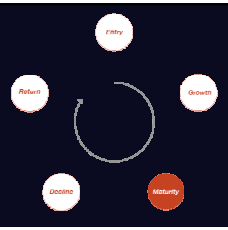
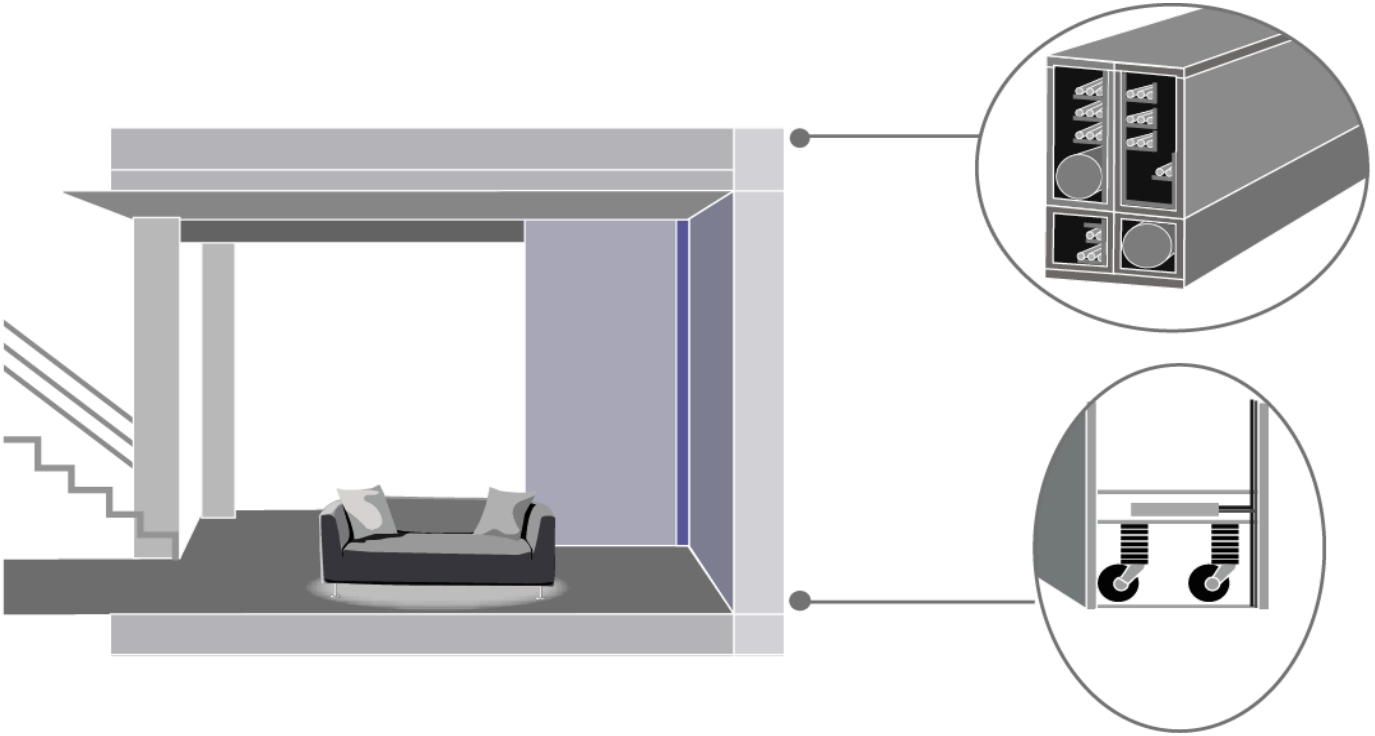
S.I. Wall





Functional Element

The SI Wall is a movable interior wall unit. Channels at the top transfer utilities. Extendable wheels at the bottom enable it to be repositioned within the home.

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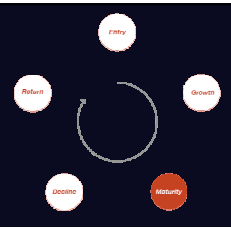
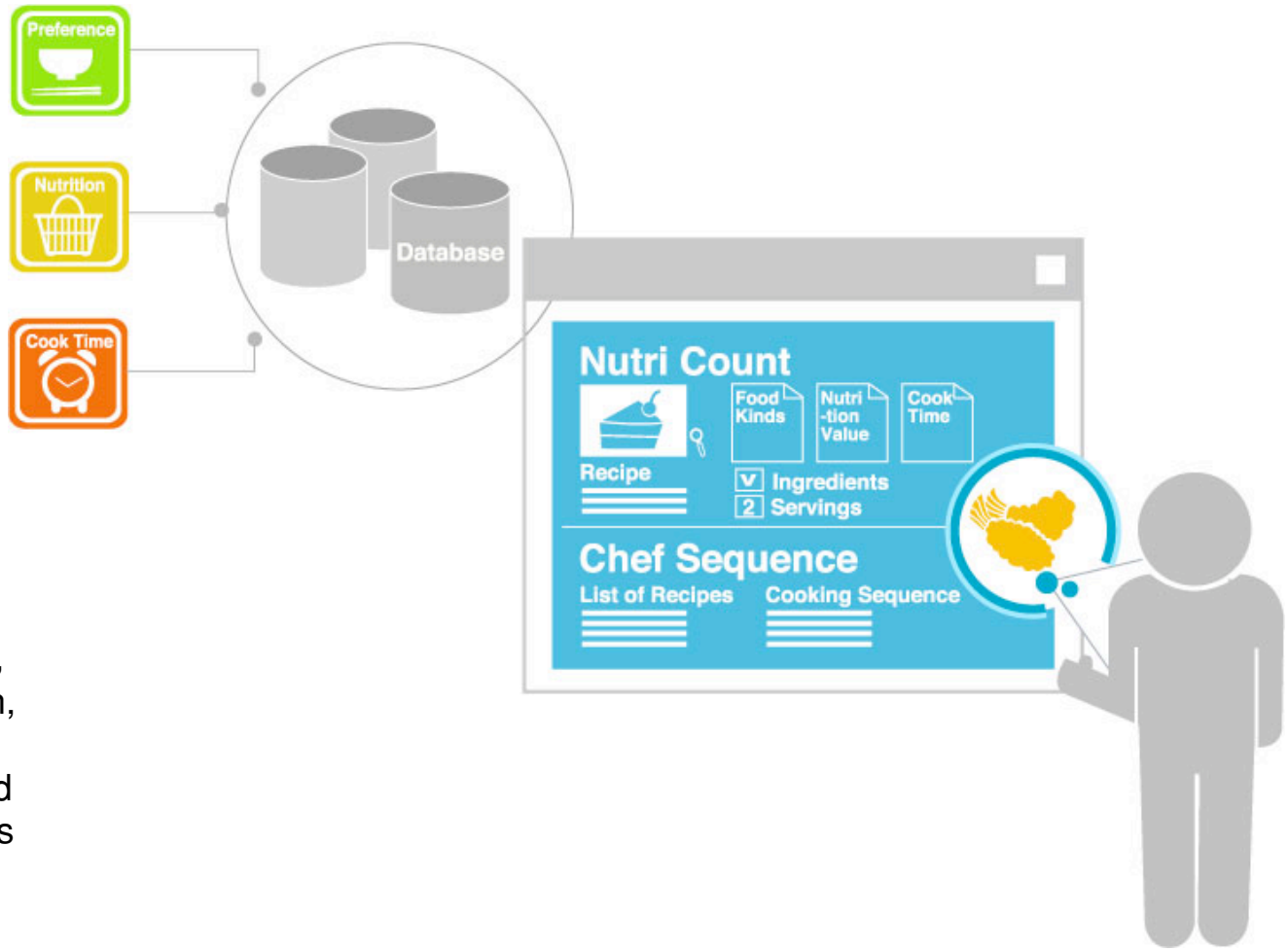
Nutri-Count Chef Sequencer





Functional Element

The Nutri-Count Chef Sequencer is a component of the Food Core. It helps to manage the food preparation process, keep track of recipes, maintain nutritional information, calculate food serving needs, control cooking processes, and organize the sequence of tasks to save time and effort.

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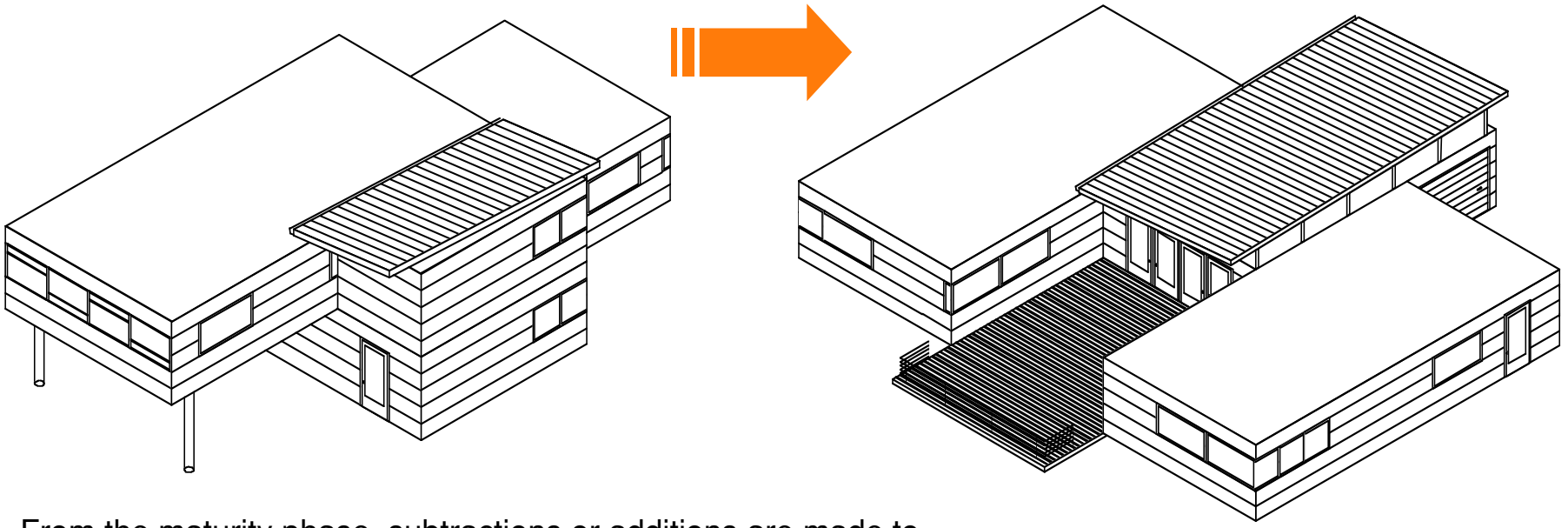
Decline



From the maturity phase, subtractions or additions are made to accommodate the departure of children and changes in resources, interests, and aspirations. Houses may expand or contract in the Decline phase.

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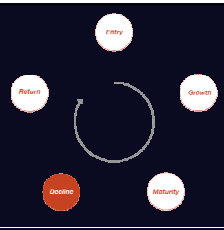
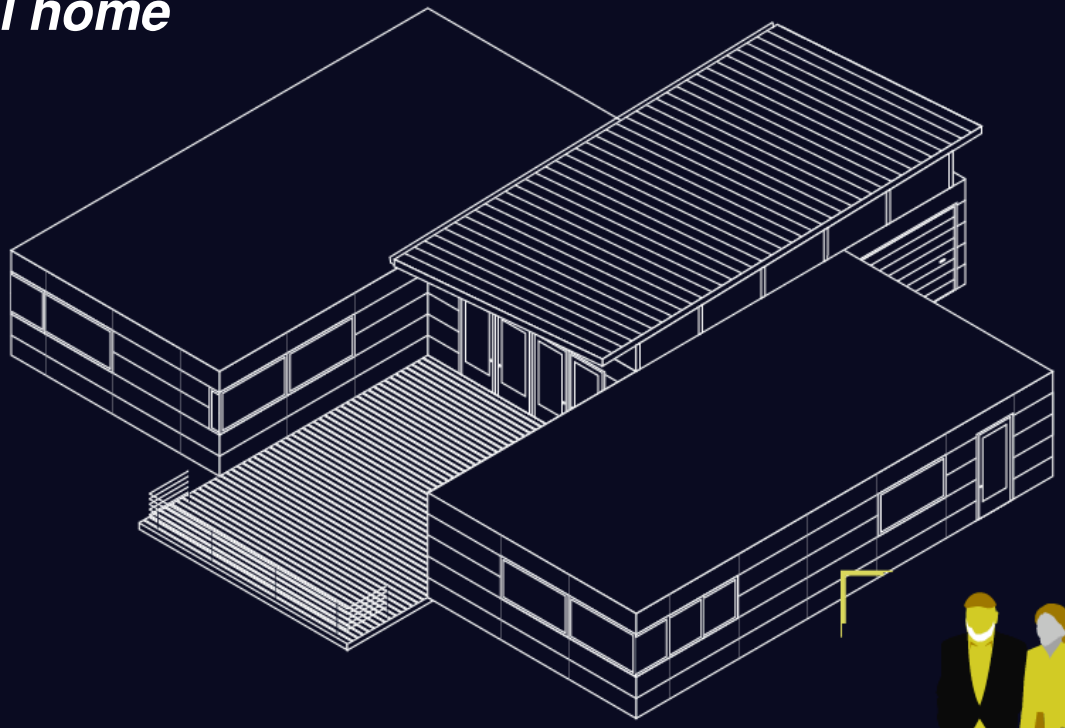
Decline



A decline level home configuration



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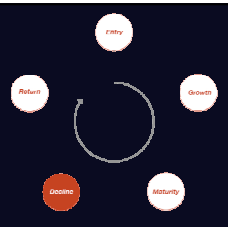
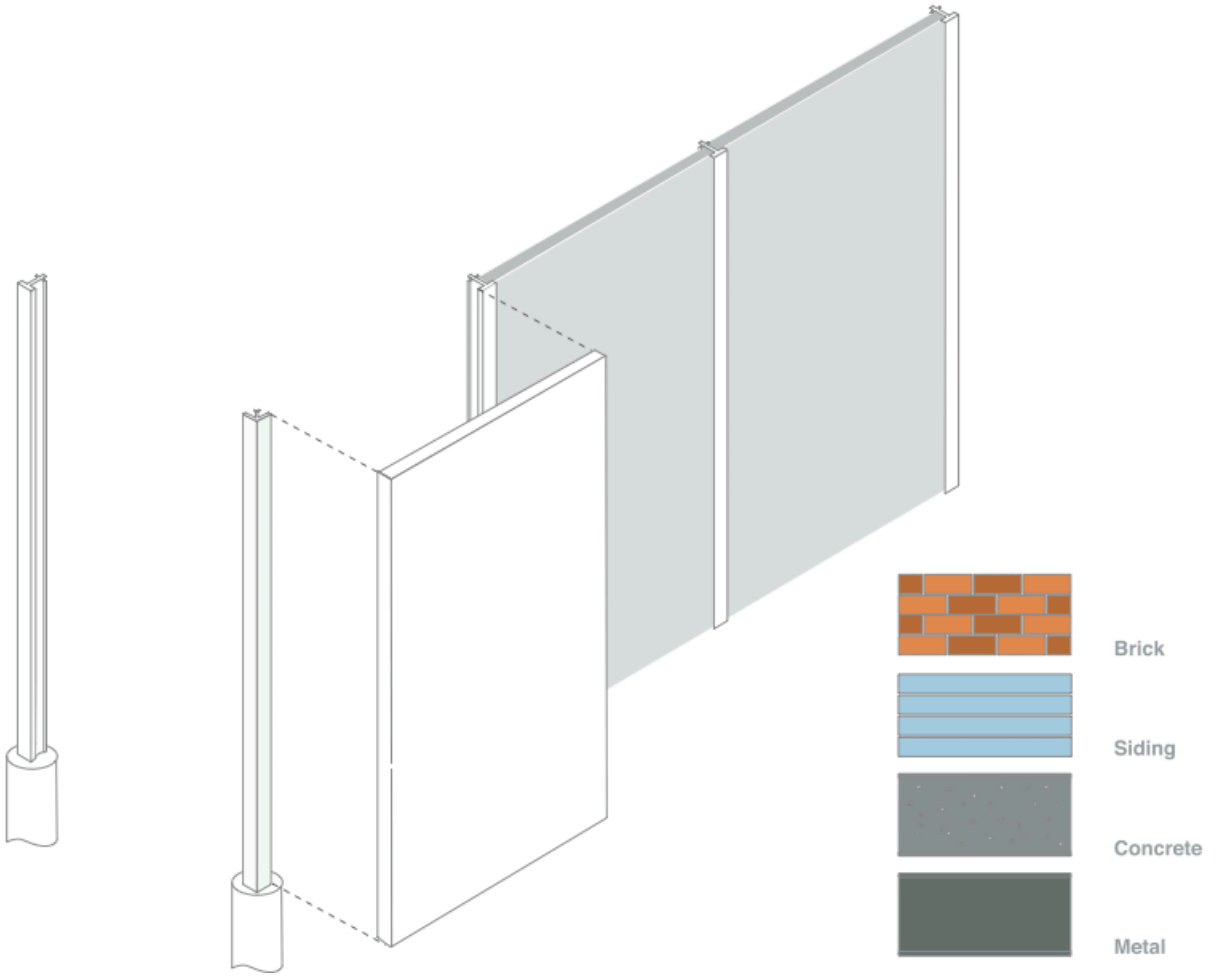
CEX Exterior Surfaces



Structural Element

CEX Surfaces system is an exterior wall panel cladding system that permits users to select surface textures that both provide environmental protection and fit the aesthetic surroundings of the community. Modular component sizes allow ready fits to window and door panels; Simplex Connects technology makes assembly to panels and frame structure easy.



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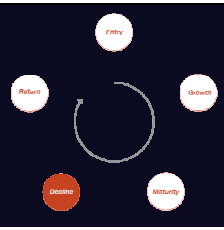
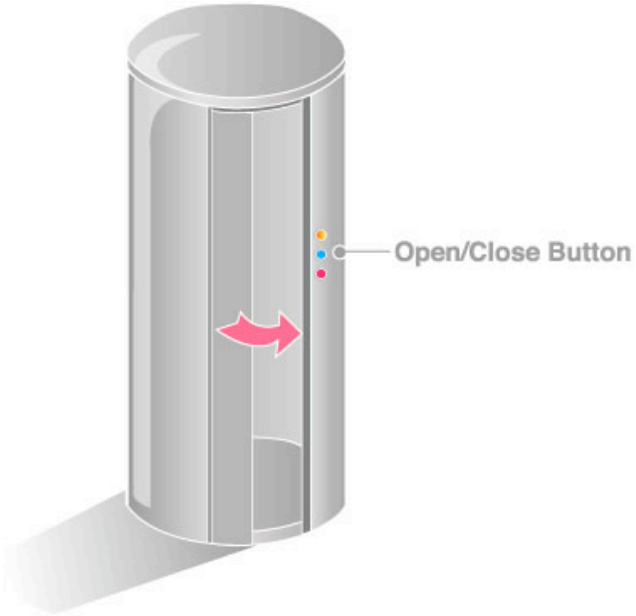
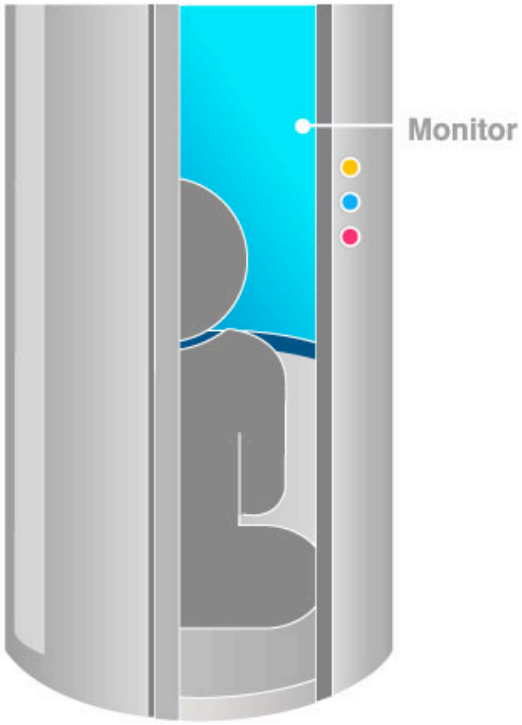
Personal Chamber







Functional Element

The Personal Chamber is a component of the Rest Core. As a personal study and relaxation area, it is especially useful for homes with limited personal space for family members. Besides a restful seating area, the Personal Chamber has a viewing monitor and an option for white noise.

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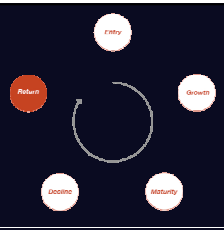

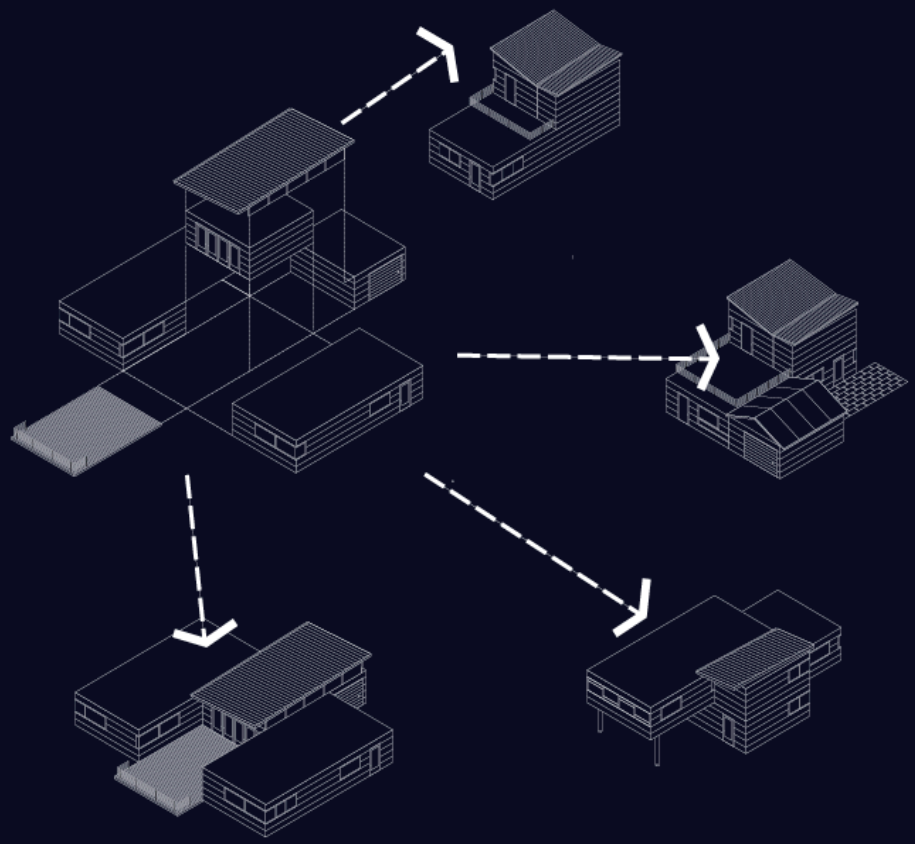

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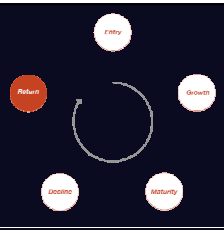

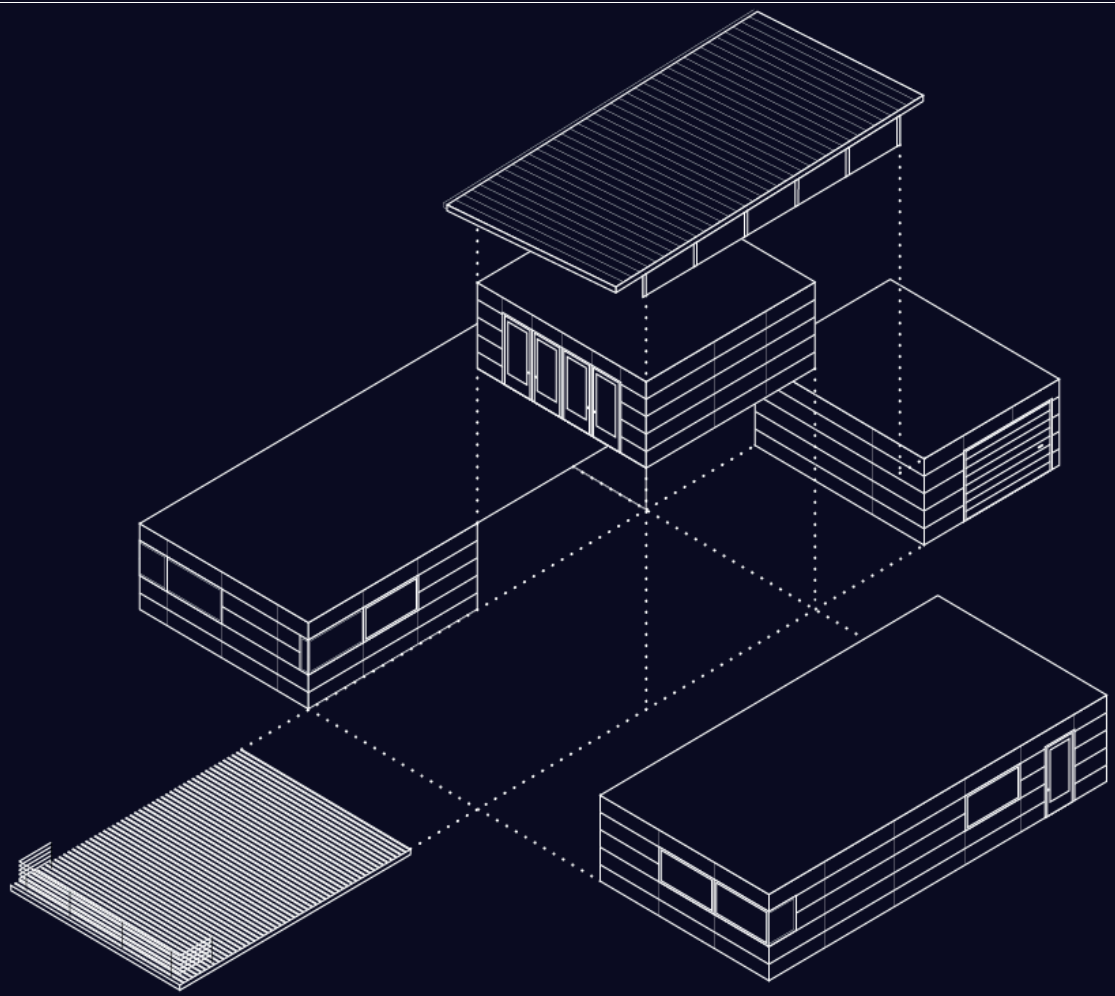

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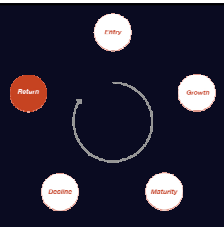

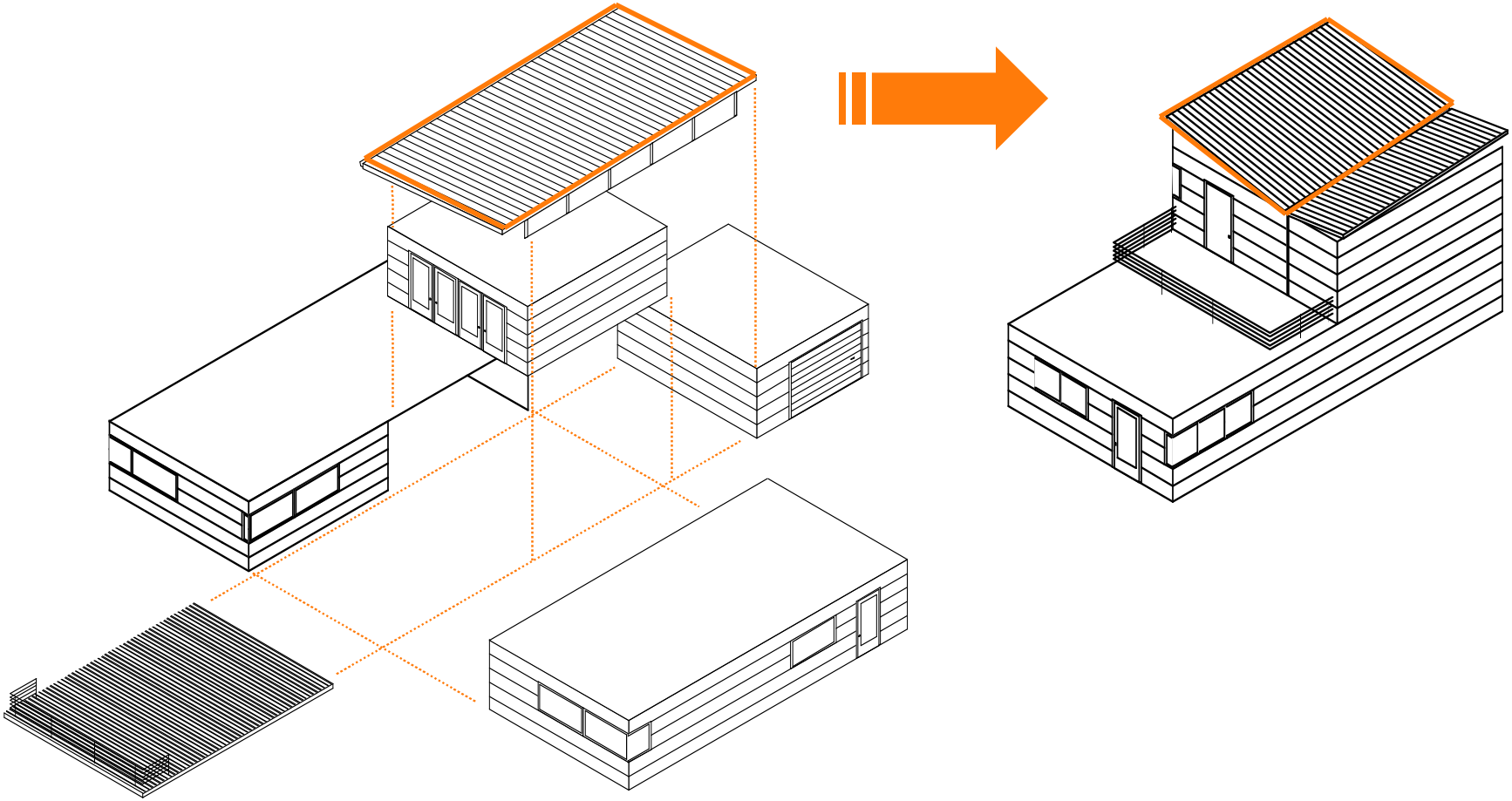

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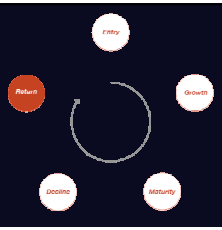

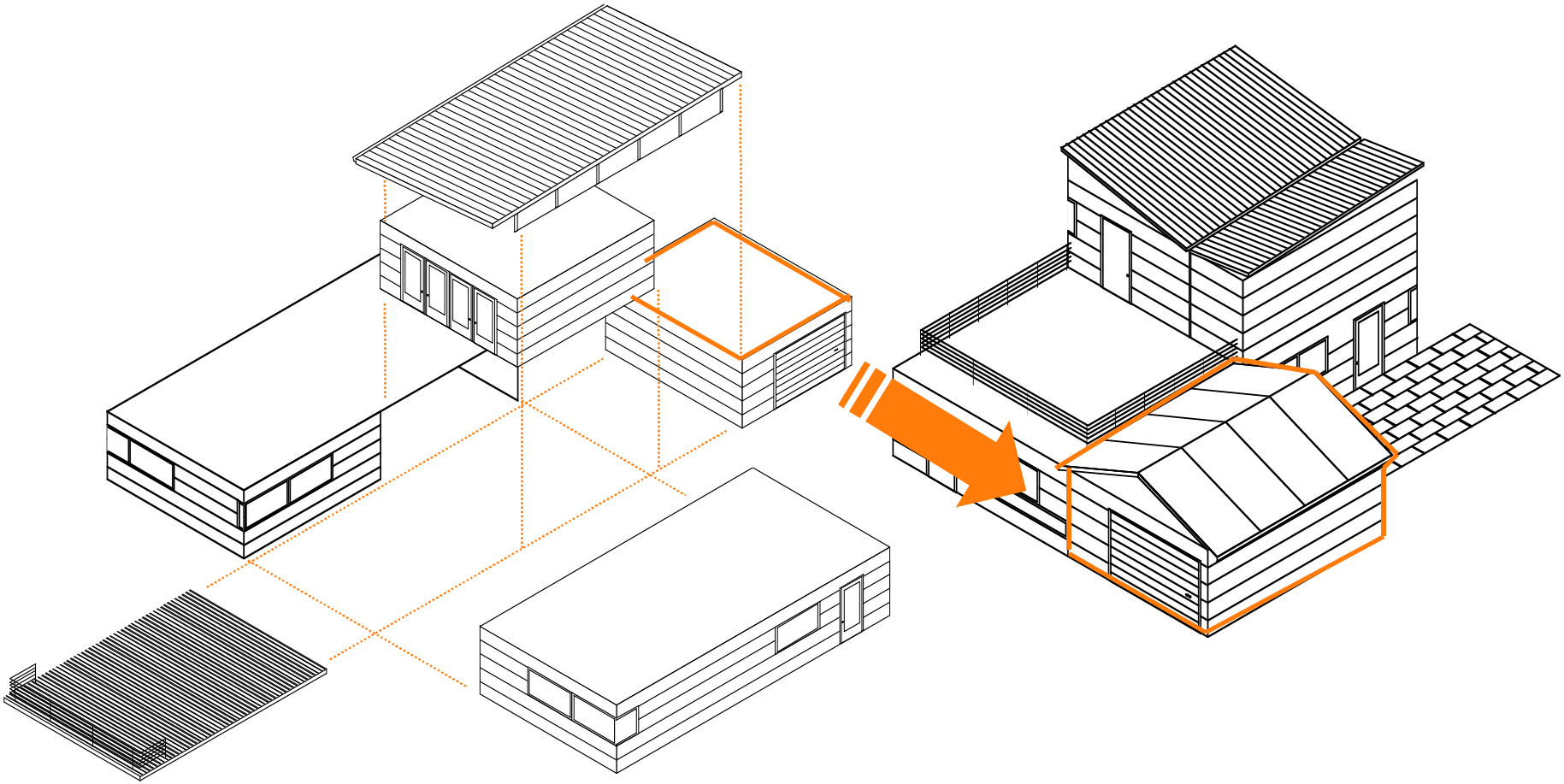

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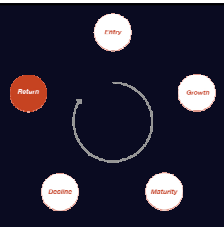

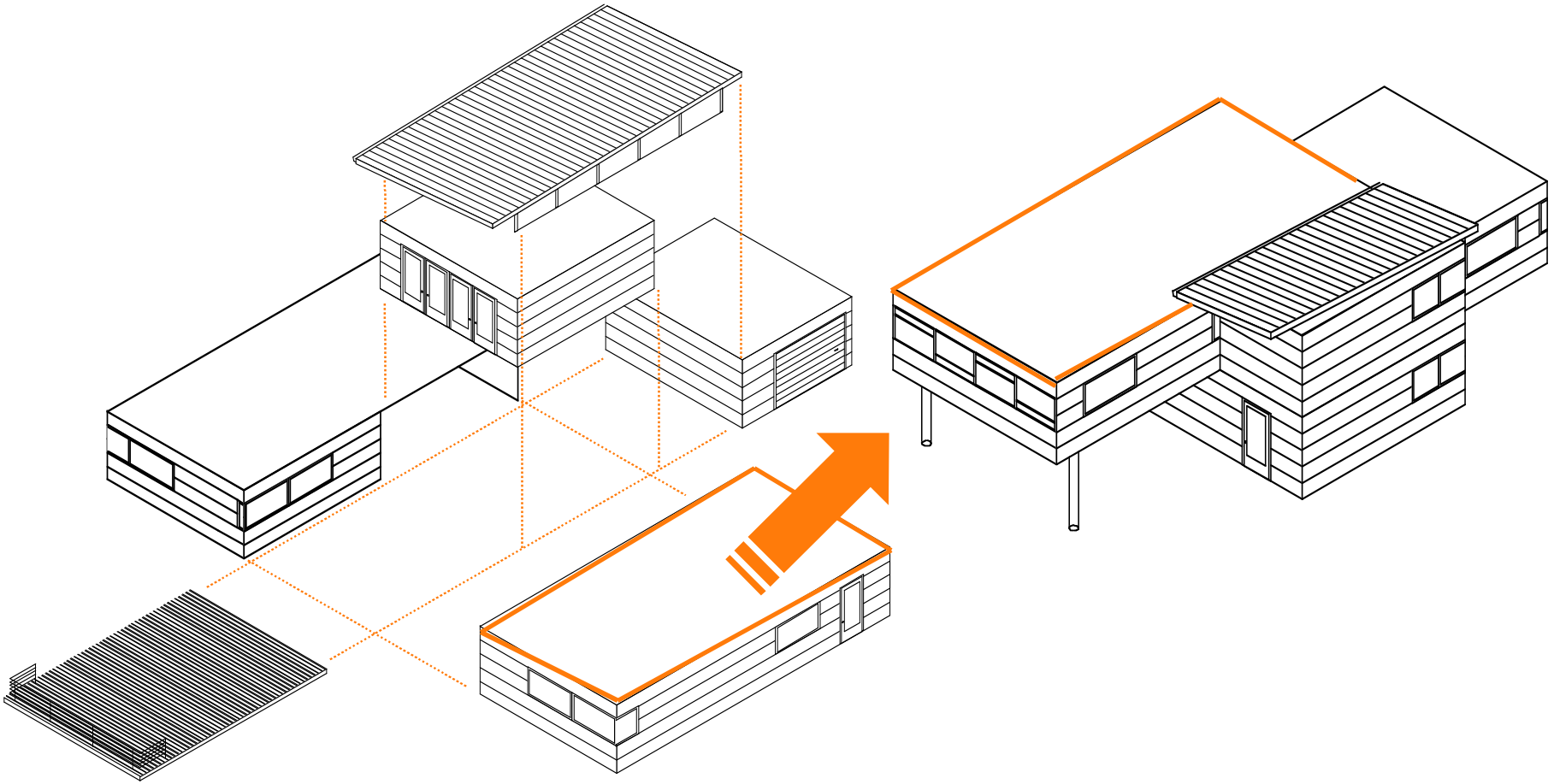

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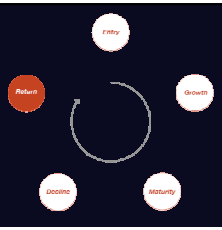

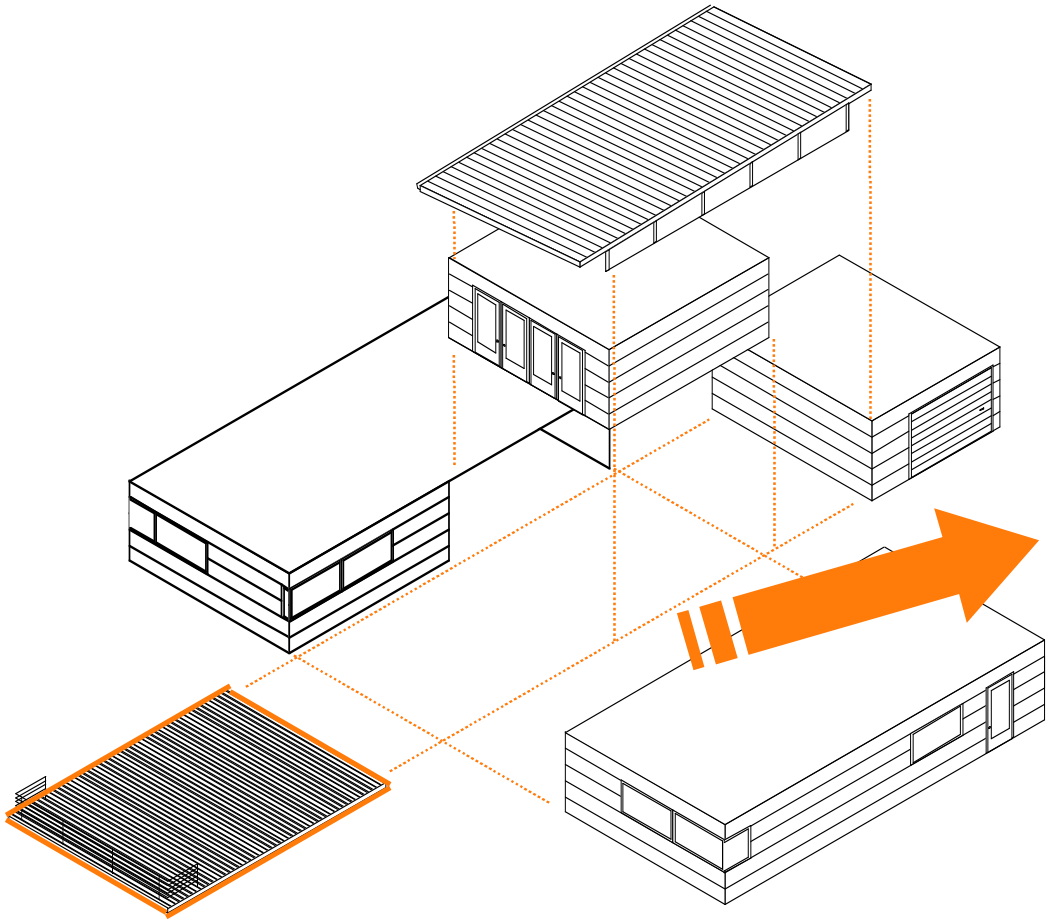

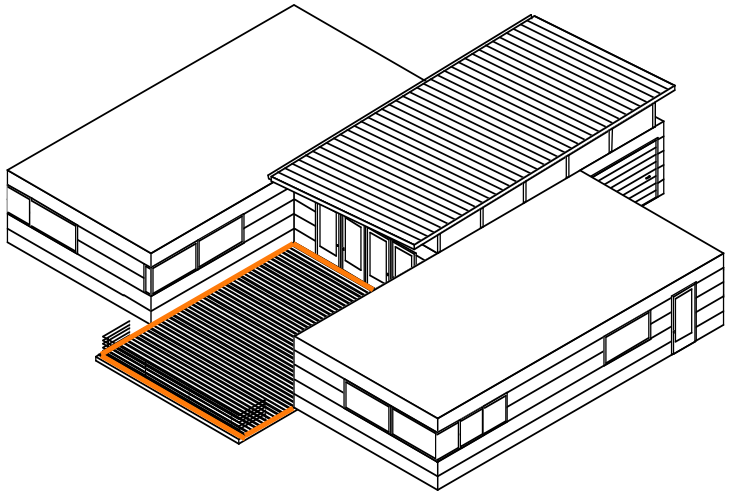

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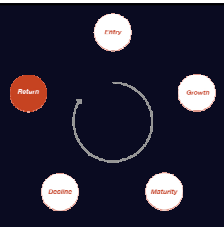
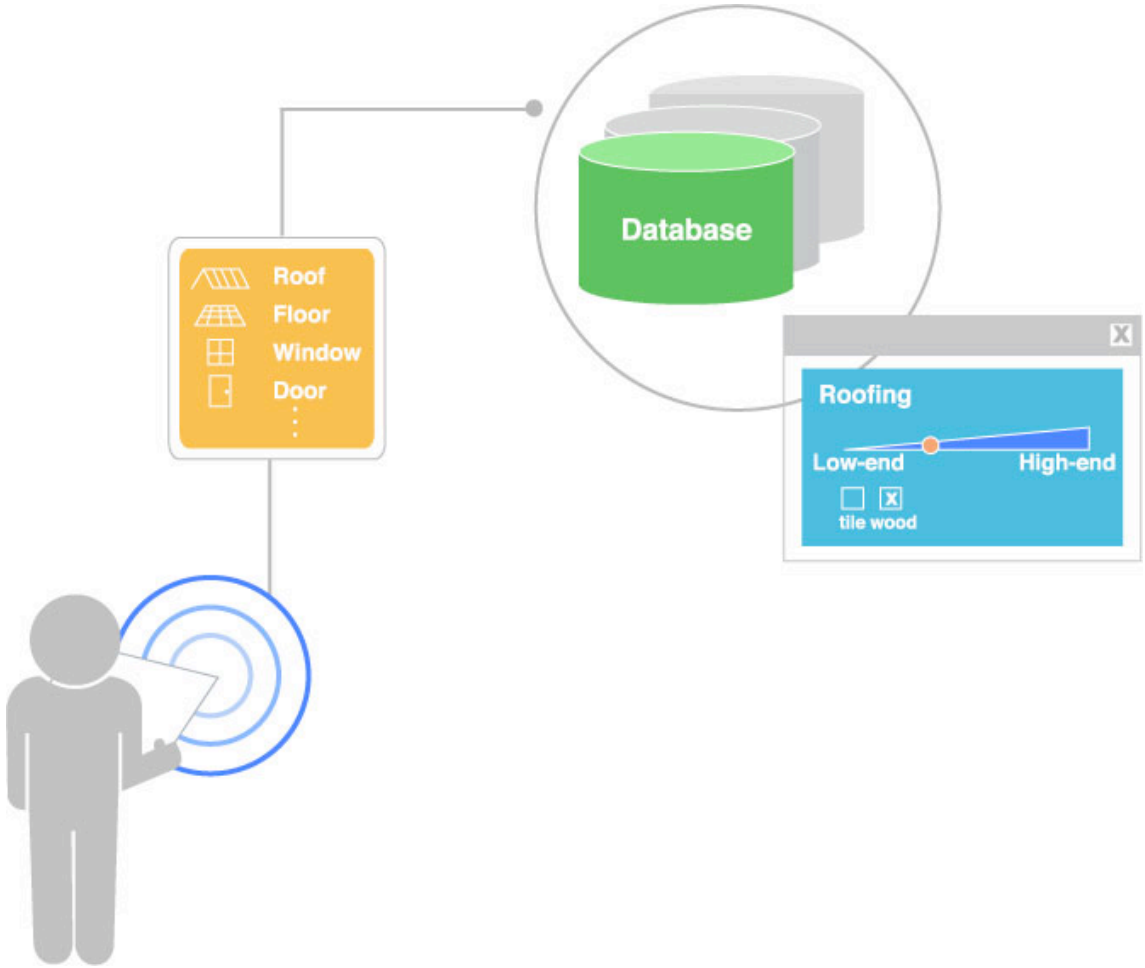
Central Control Database





Functional Element

The centralized database incorporates elements from national and international sources. It aggregates construction information and specific data for entities that are related to the architectural process.

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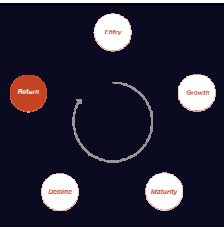
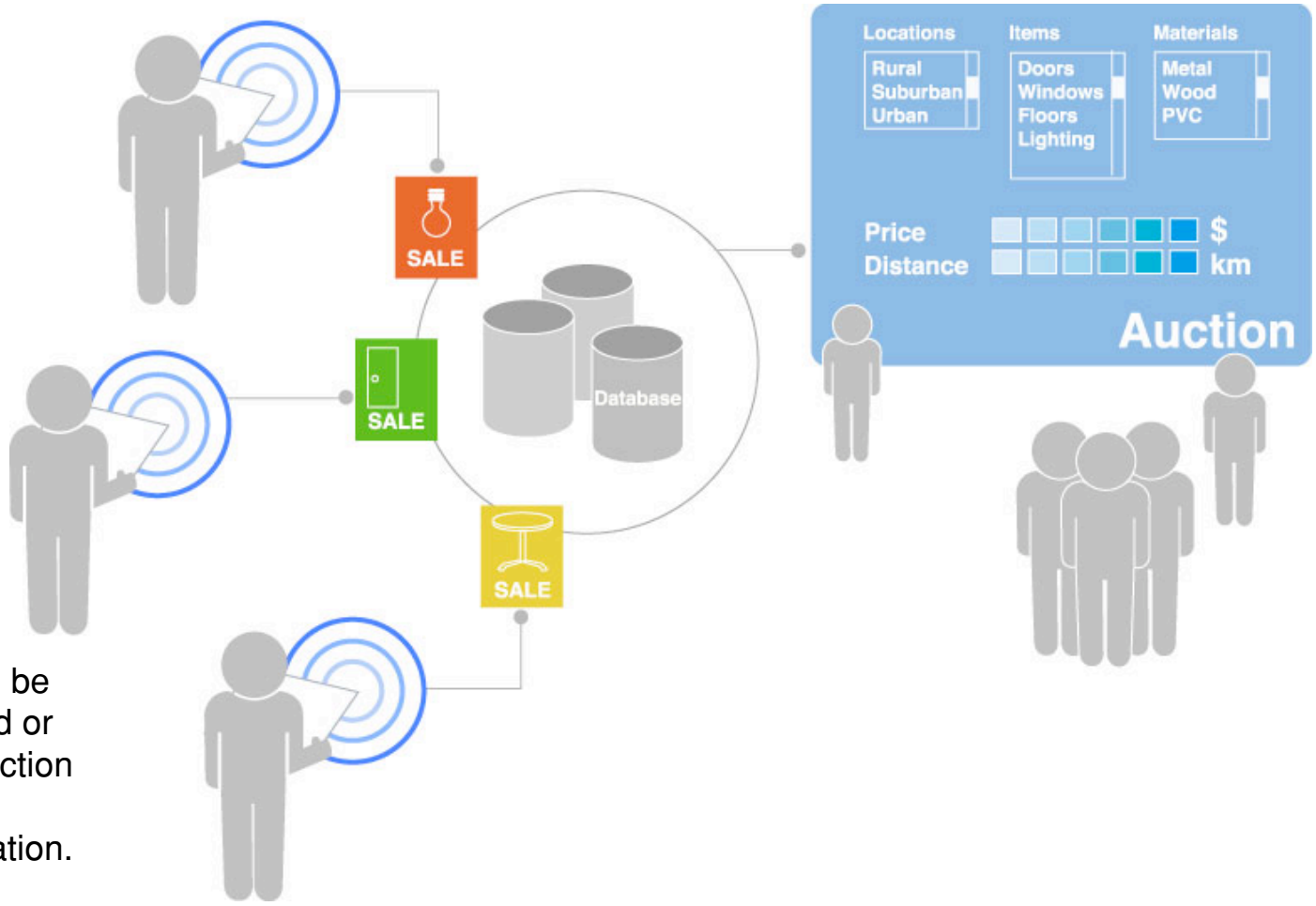
De-part Auction Center





Functional Element

The De-part Auction is a database of housing components. Objects can be searched for and obtained or sold through an online auction center. Searches can be organized by price or location.

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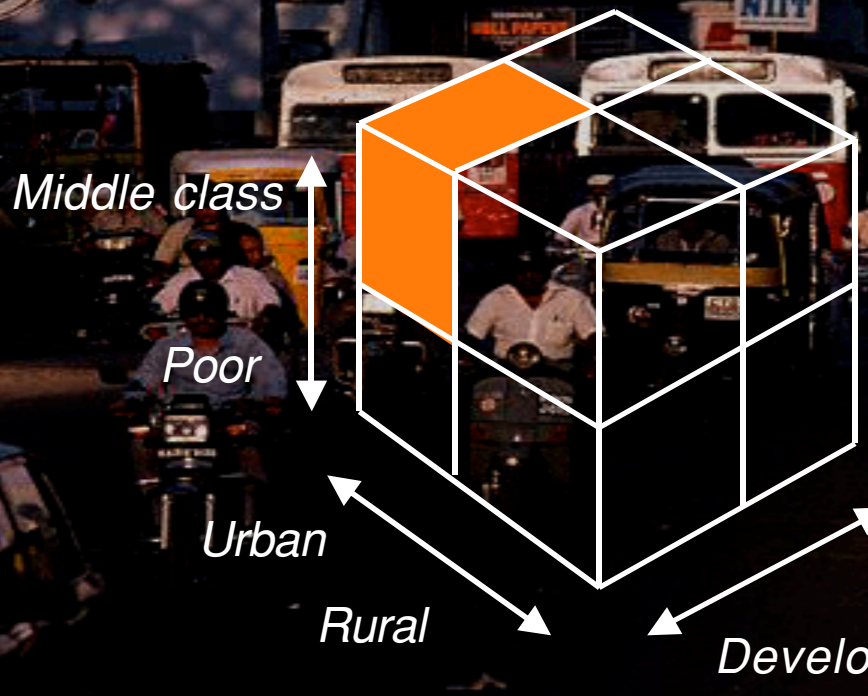
Global Reach

The following is a middle class, urban, developing example in the entry phase



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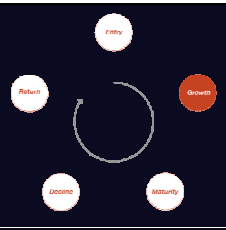
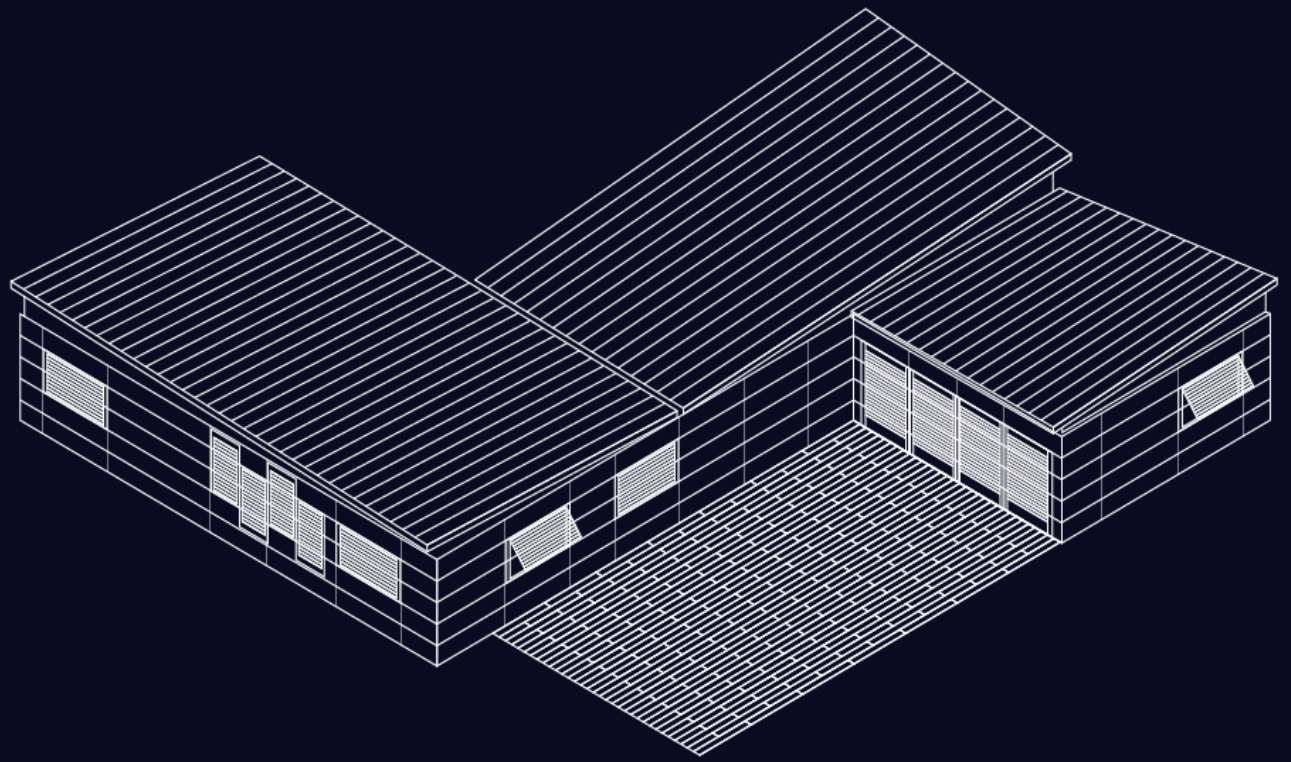
Bangalore





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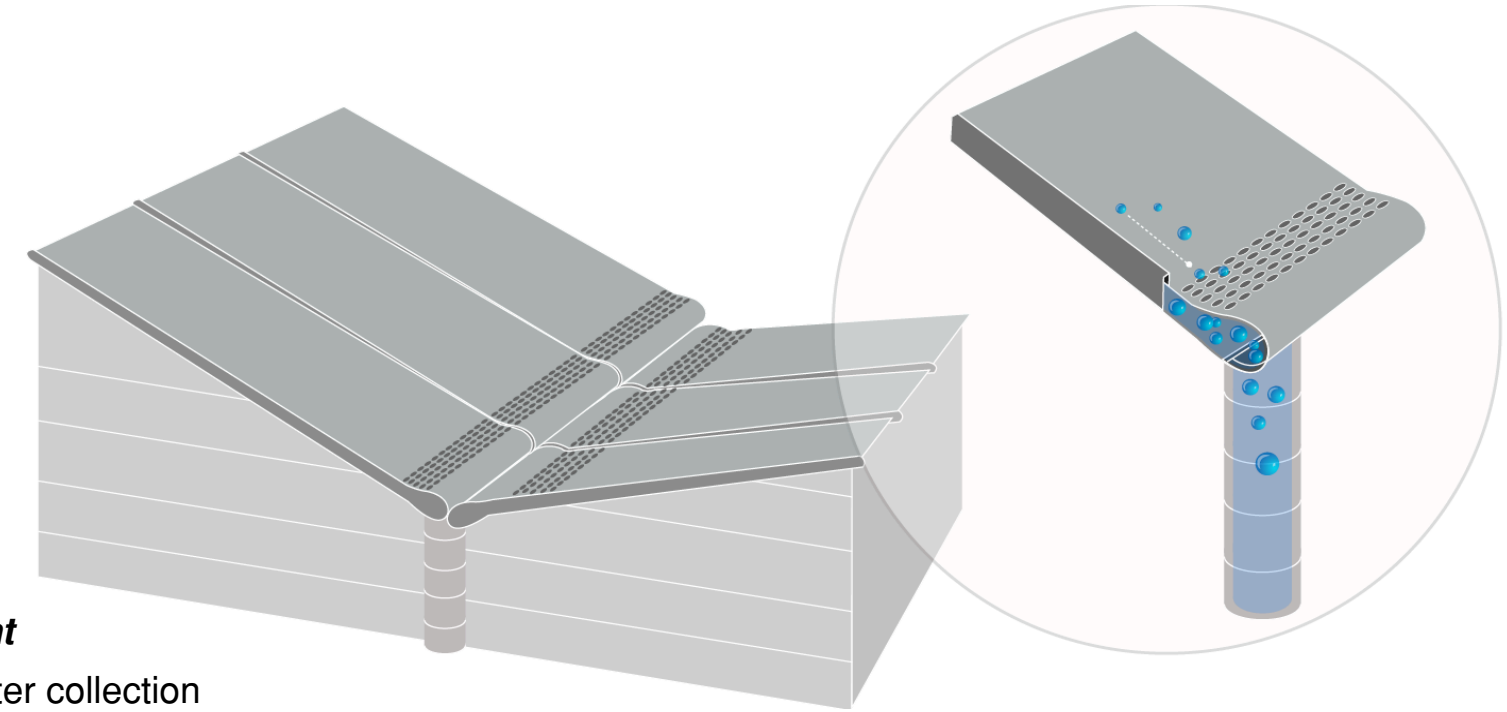
Filt Roofing



Functional Element

Filt Roofing is a water collection and integrated filtration system. Filtration tiles can be interlocked to create various size roofs. Panels can be used for flat, gabled or lean-to styles.

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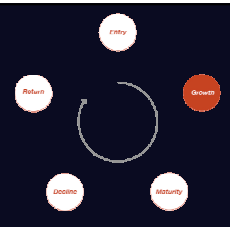
Dreamz



Functional Element

Dreamz is a component of the Interaction Core. It is software and an interface that helps users to freely imagine, plan, and record their goals, aspirations, and achievements.

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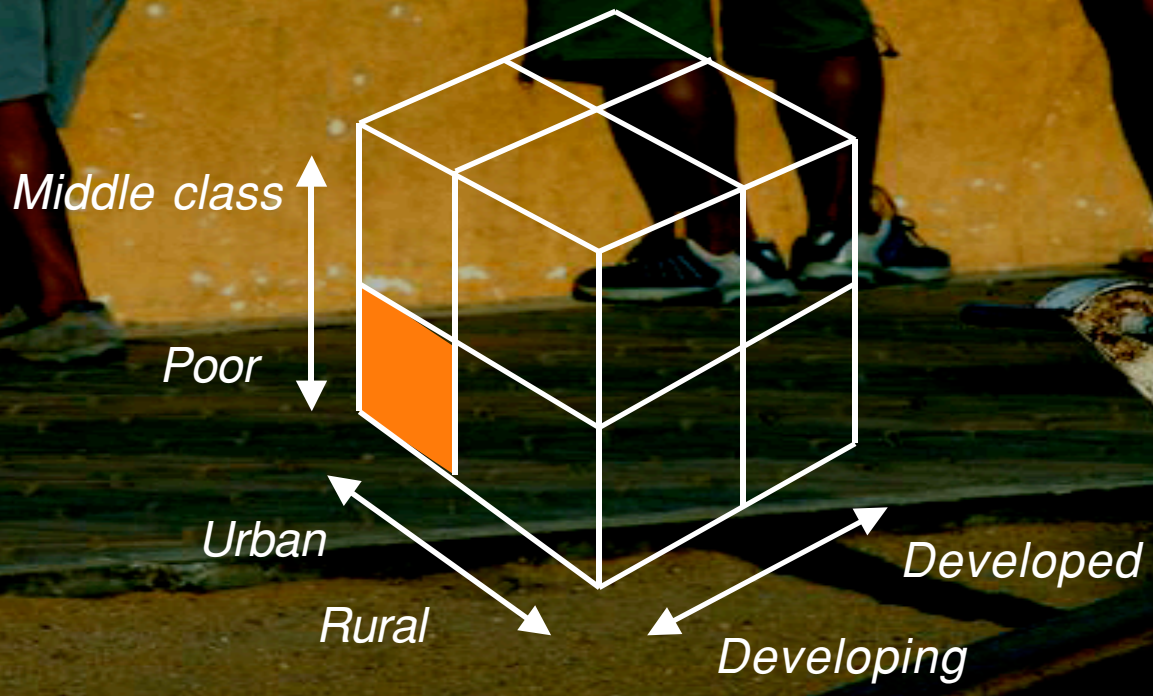
Global Reach

The following is a poor, urban, developing example in the entry phase



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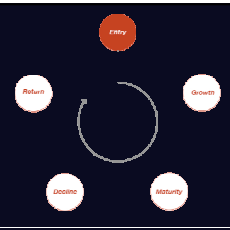
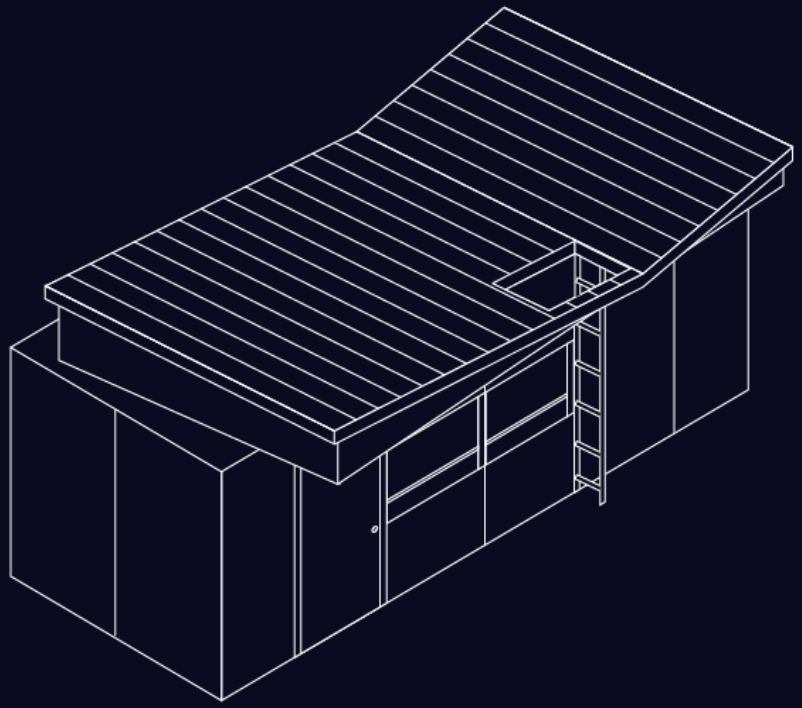
Sao Paulo





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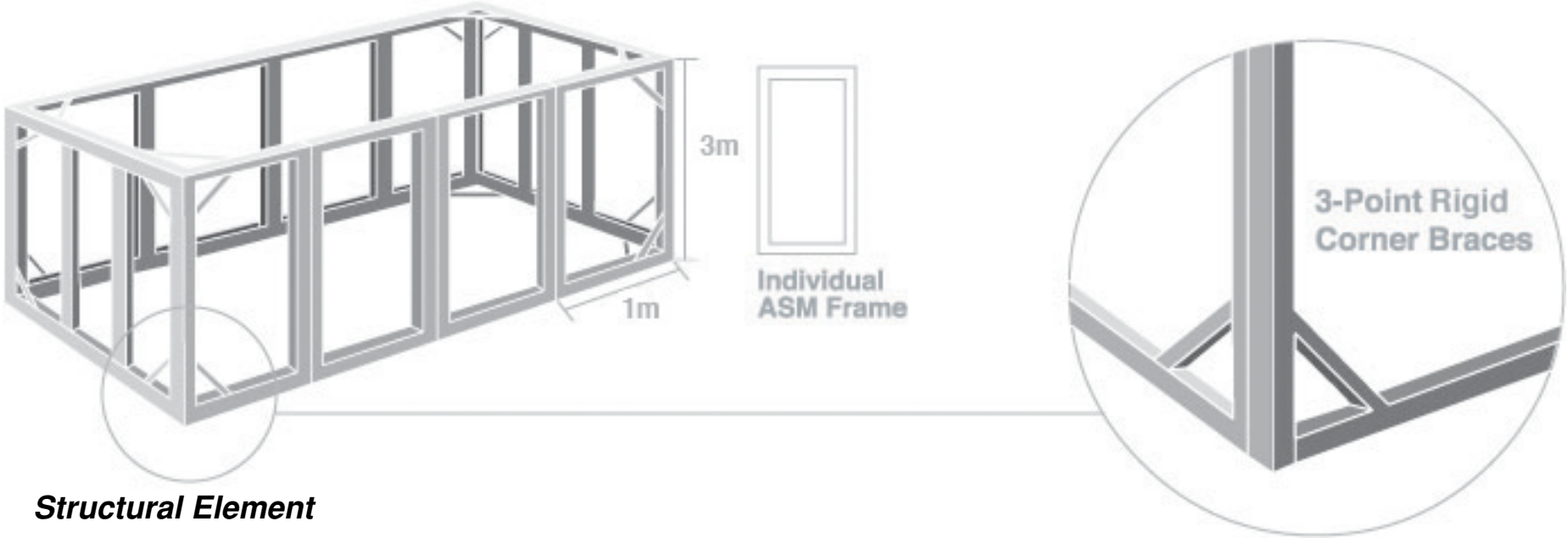
ASM Framing



Structural Element

ASM Framing consists of individual prefabricated structural elements that are assembled to form the skeleton of a house. Much like the structural skeletons for high-rise buildings, Evolutionary Housing is created with ASM Framing bolted together in single-level or multi-level units. Because it is modular, each house can be customized to user desires and plans. The strength of steal and the rigidity of triangulation greatly enhances its structural stability.

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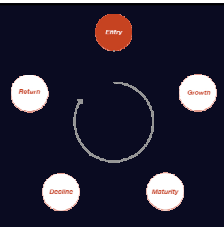
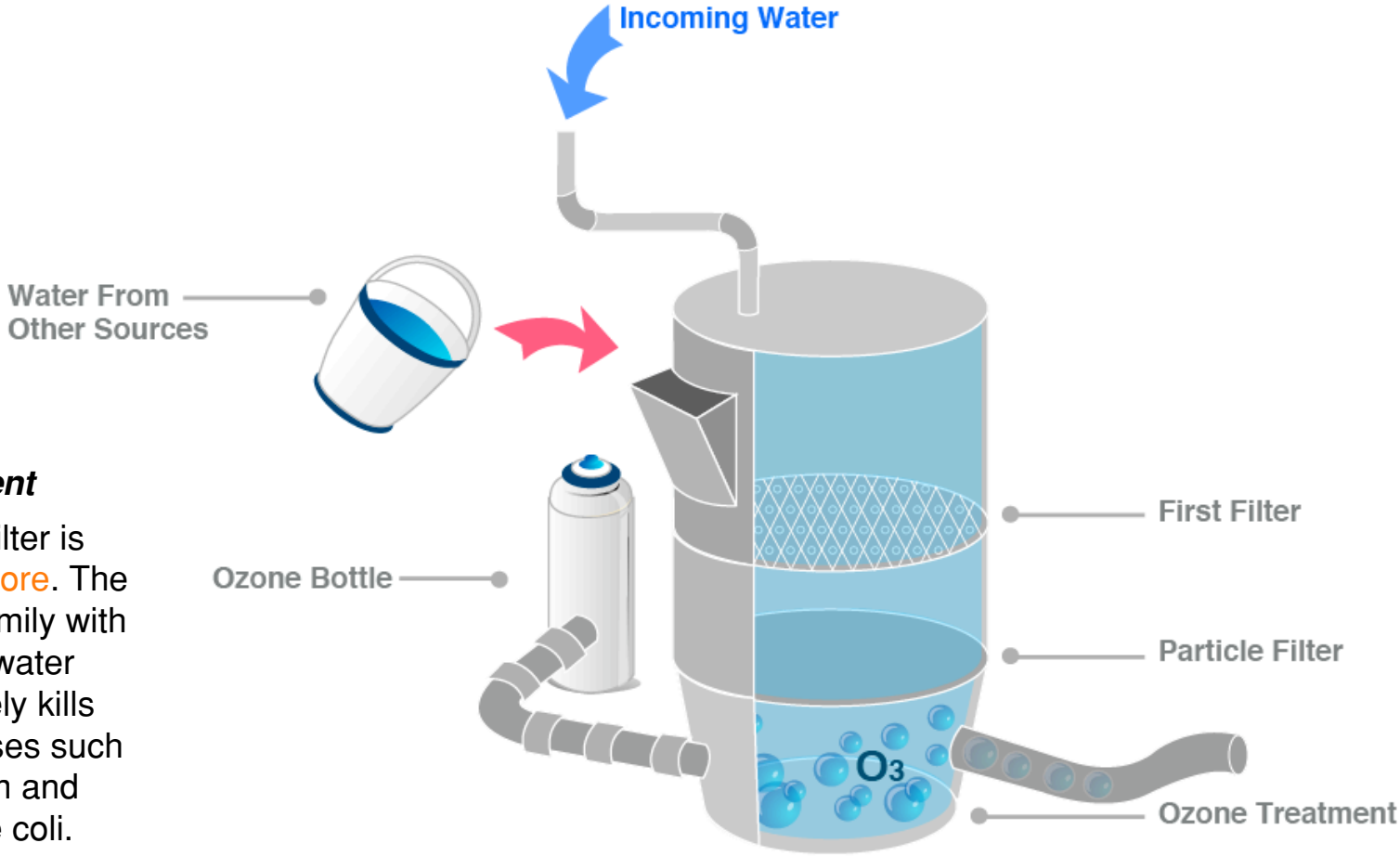
Safe Water Filter





Functional Element

The Safe Water Filter is part of the Food Core. The filter provides a family with an ozone treated water source. It effectively kills waterborne diseases such as cryptosporidium and bacteria such as e coli.

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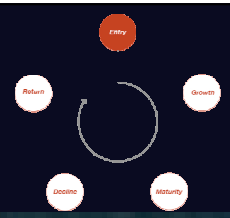
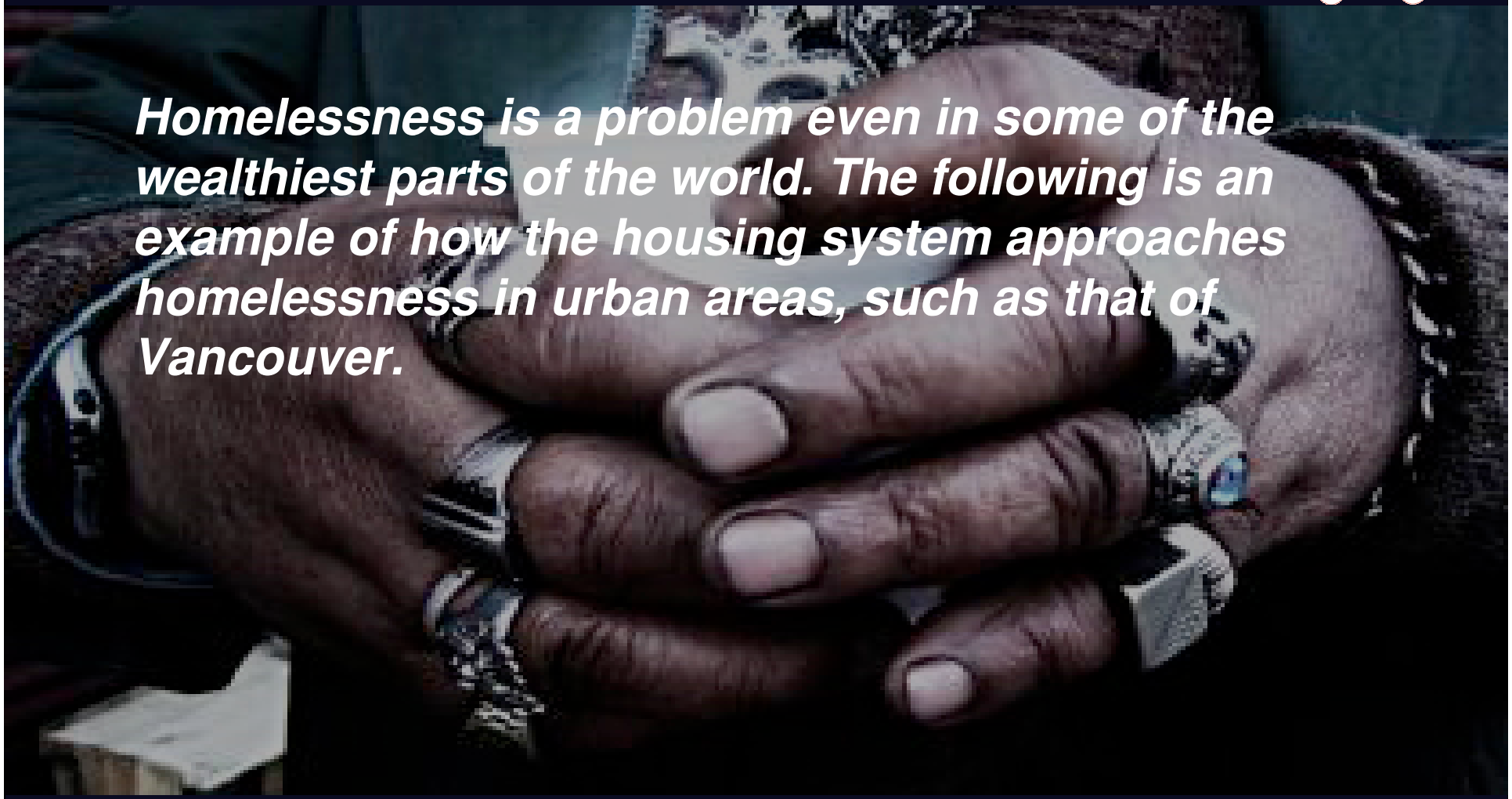
Vancouver





Homelessness is a problem even in some of the wealthiest parts of the world. The following is an example of how the housing system approaches homelessness in urban areas, such as that of Vancouver.

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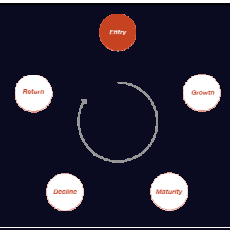
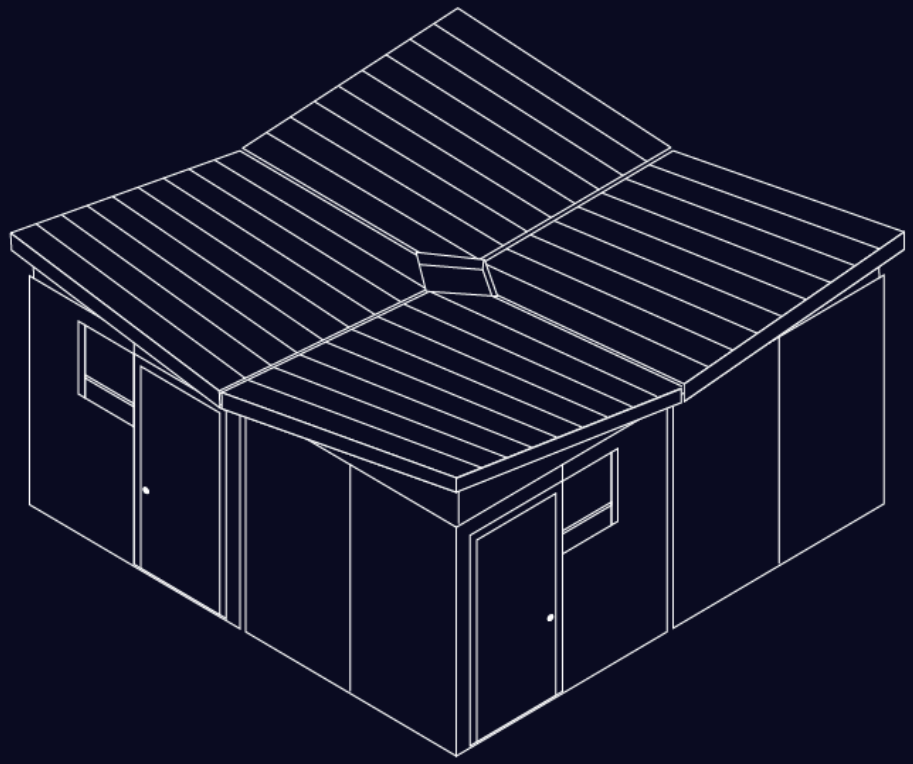
Walk-in Shelter





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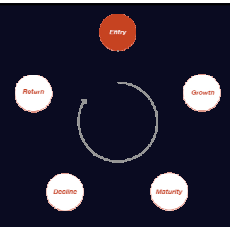
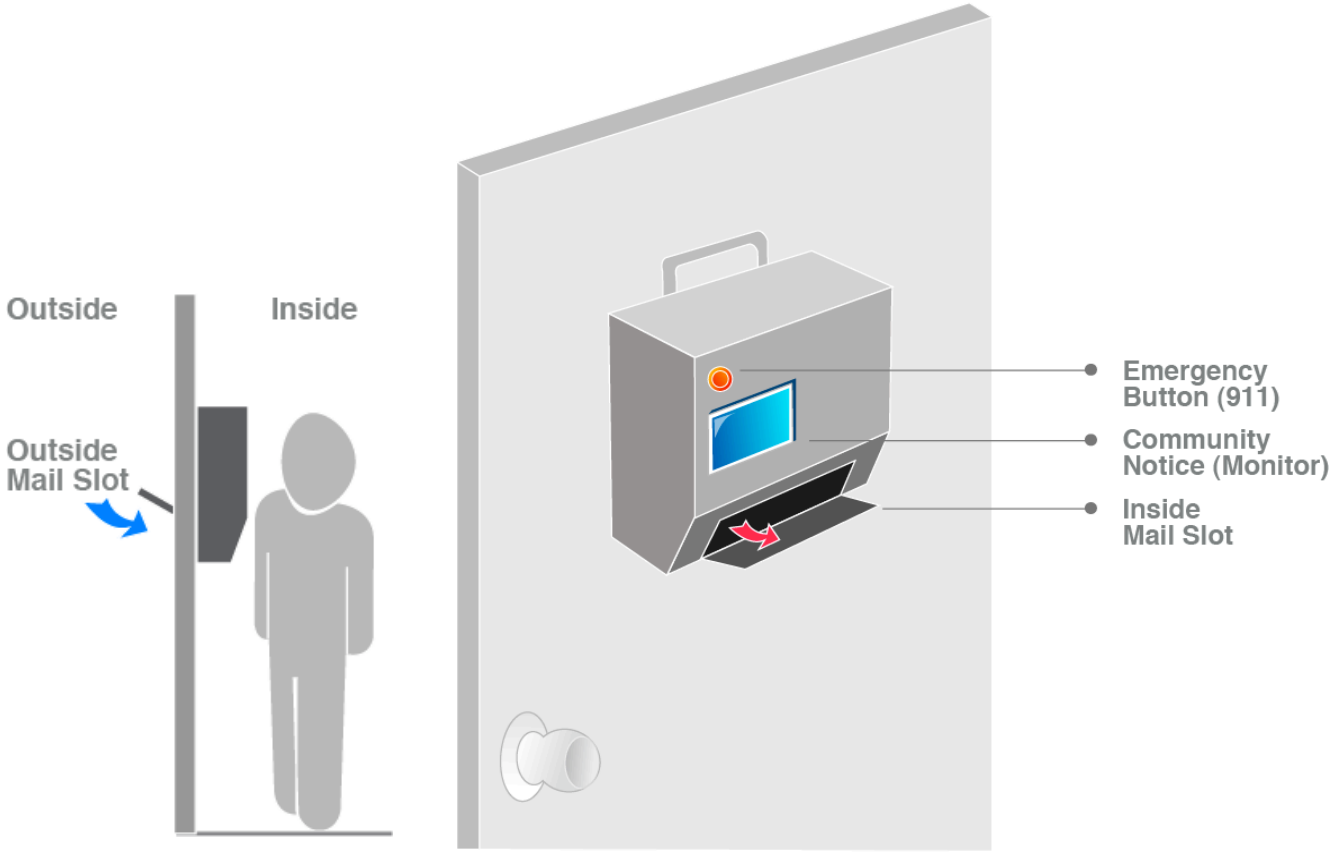
Fixed Address Module



Functional Element

The Fixed Address Module is a movable box that keeps records of personal, medical and municipal data on individuals who have “no fixed address.” The box is outfitted with a wireless receiver/transmitter combination that allows its user to call for emergency assistance, obtain mail and participate in municipal services. The location of the box is established by GPS.



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The Evolutionary Housing System…

employs new utilities based on their technological merit rather than on the politics of regulations

increases self-sufficiency and protects precious resources

can be built in a day

can be reconfigured to accommodate the changing needs of its inhabitants

The Future is Here

For a full exposition see the report at http://id.iit.edu/profile/gallery/evolutionary_housing/