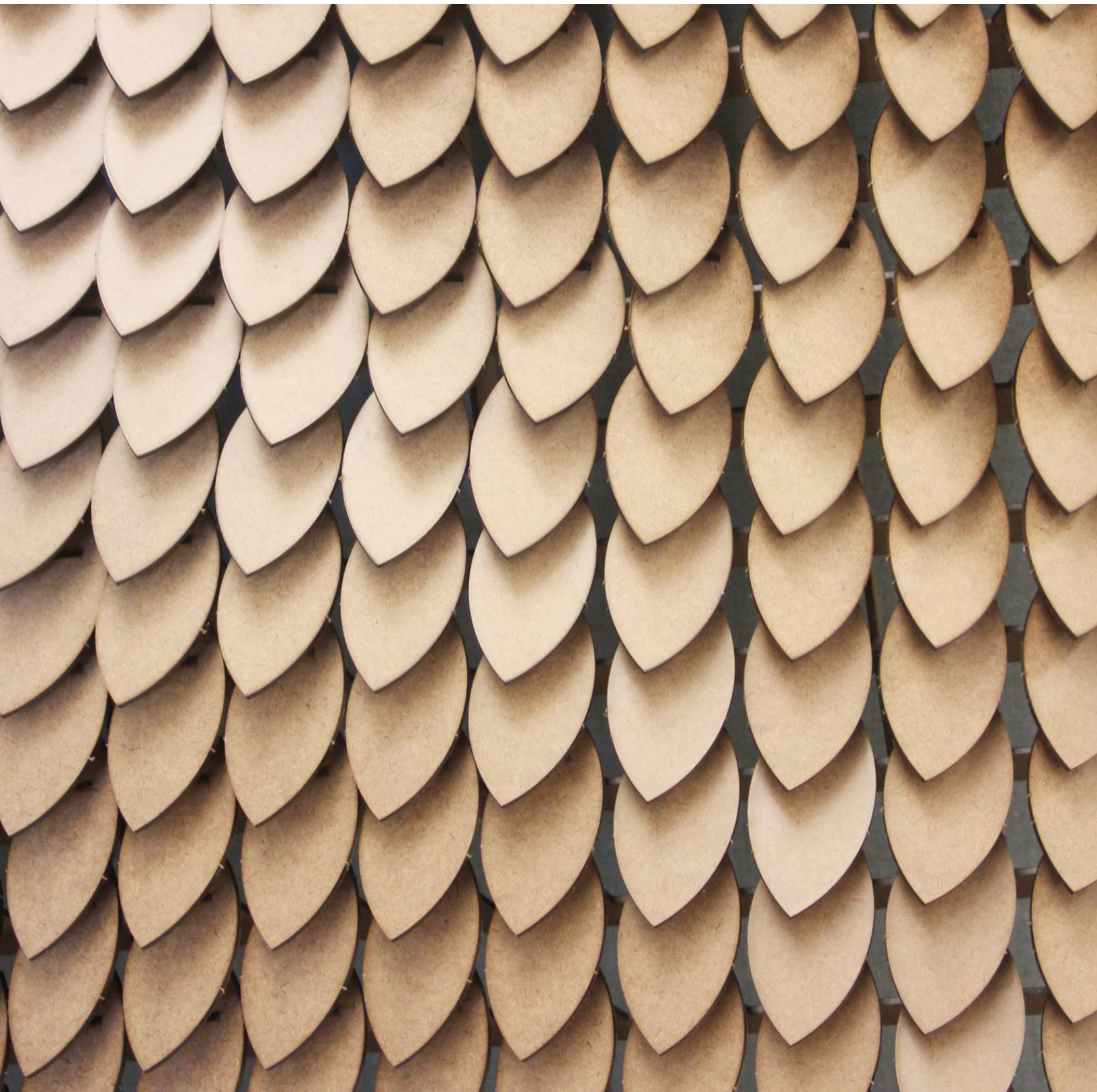
Perkins&Will

Research Journal

2011 / VOL 03.02



02.
uPOD: A MODULAR LIVING ENVIRONMENT FOR STUDENTS:
The Case for Today's Community

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ABSTRACT
Institutions have prioritized the development of new residence halls that respond to incoming student classes who expect more privacy, social space, technology and fewer boundaries than any previous generation. To address the difference between student expectations with the current built norm, we have envisioned a new living model that can be implemented in new or existing structures, challenging preconceived notions by creating a flexible and transformable living environment for students. In this space, privacy and communal lines can be easily blurred and re-formed to suit students' group and individual needs. It is a repositionable modular system of parts and reinterpreting the essential program of needs in residential life: a place to socialize, study, store belongings and sleep.

KEYWORDS: mobility, flexibility, modularity, loft-style living, Living-Learning communities, plug-ability, compactness

1.0 INTRODUCTION
Life on college and university campuses in the 21st century will be influenced by an integrally connected global community, increased advances in personal technologies and less separation between living and learning environments in higher education as the current trends indicate. Students are embracing a mobile lifestyle. Single digital devices contain much of what yesterday's students would store in bookcases, desktop computers and backpacks; all which required a great deal of space and limited mobility. Current residence halls are very static, composed of a uniform grouping of rooms. This rigid layout not only requires significant energy to reconfigure, but also decreases the opportunity for a student to shape their personal and community space. It is our premise that the next generation of students will be searching for a more flexible and reconfigurable environment that allows for personal adaptation. Our investigation into a new mobile and transformable living environment challenges the current student living norms. We recognize that educational institutions often prefer to provide a variety of living experiences and that this flexible living environment may have specific applications. One example is to apply the concept to Living-Learning programs, where key advantages relate to programmatic and spatial flexibility and swing beds for peaks in student enrollment growth. Another implementation relates to institutions that have adaptive reuse projects with minimal investments to the existing structure. A third application is to institutions that are committed to pushing the concept of living environments to gain broader diversity in their residential portfolio.

This investigation tests the boundaries of current student living situations in college and university housing by creating an environment with no traditional fixed-wall boundaries for bedrooms, study or lounge space within suites or apartments. It envisions a true loft-style living. We are proposing a personal living unit, the uPOD, that can be moved to combine or separate small student communities in order to share common interest or special friendships. In this new living style, a student may decide to move within the floor of the building or to another building taking their desk, bed, bookcase, dresser and technology with him or her by disconnecting from his current community, a true 21st century student no-

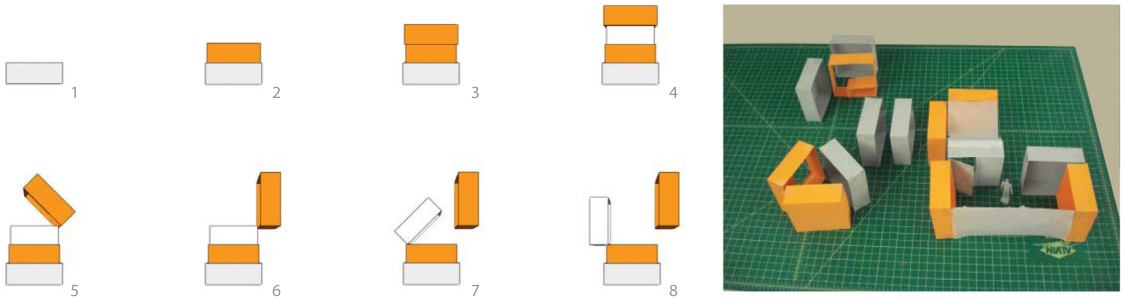


Figure 1: uPOD initial study model of deployment and possible spatial arrangements.

mad, forming communities, breaking away, then re-forming new communities (Figure 1).

The following investigation looks to the future of the uPOD lifestyle and how the next generation of students may re-invent student housing in the 21st century.

1.1 Project Description

Since the 1960s, architectural history and theory have featured the emergence of pod-like architecture: capsule-like designs with individual controls for comfort and entertainment. These capsules were not flexible or reconfigurable, but static. We have taken the concept of pod architecture further and applied it to a new student residential living style. We envision a modular system of parts that form a pod-like space, which can be adaptable, reusable, flexible and mobile. Within a fixed space, a student could use the uPOD system to create and edit his or her space at will. Roommates could manipulate the uPOD so that one sleeps while the other hosts a study group and then rearrange it again to accommodate a movie night with other students on their floor.

Inherent in the flexibility and potential of an "open plan" is the technical solution of visual and acoustical privacy. We have explored privacy needs by developing architectural and acoustical strategies that delineate degrees of visual and aural privacy. For example, a variety of open and enclosed spatial configurations may be possible through uPOD parts that slide, fold, collapse or swivel. Gauging the success of these configurations depends largely on understanding the acoustical properties of the material and geometry. The research process questioned preconceived threshold conditions between spaces, reconsidering the traditional programmatic elements common to bedrooms versus living rooms, and bathrooms versus kitchens.

Concepts that integrate technology in the uPODs were carefully studied with consulting experts framing several key issues. Should computer monitors or television screens be embedded in folding panels? Can energy-efficient equipment be used? Can light fixtures be folded or reconfigured to accommodate a refolded wall that splits a dining room into a study carrel and a TV lounge? Where can electrical and data outlets be integrated and to what degree could lighting, sound and media be accessed wirelessly? Preliminary material finishes considered sustainability, performance, durability and capacity to absorb or reflect sound. Ideas regarding the acoustic properties of the uPOD geometry, arrangement within the loft and potential materials were conceived in consultation with Acentech. Life safety concerns were addressed by Rolf Jensen & Associates, Fire Protection consultants. Conclusions on materials, their acoustical performance and fire protection strategies are still in development, but preliminary recommendations are presented in this article.

2.0 A FLEXIBLE LIFESTYLE

Traditionally, residence halls provide defined and inflexible boundaries between spaces. Students live, work and socialize within the spatial limitations of their rooms, their halls and their study lounges. Even the most recent residence hall models advertise a "new" living style, but often deliver a traditional dormitory that is simply augmented with additional communal spaces. We believe a loft space will allow for maximum flexibility. This concept is applicable to adaptive reuse projects such as urban warehouses, office spaces and campus classroom buildings. This new living environment also lends itself to Living-Learning communities where academic or student-interest programs and initiatives necessitate diverse spatial reconfigurations. In addition to these strategies, an open loft approach pushes the boundaries for a more sustainable vision, as it requires

minimal wall partitions and less construction material. The focus on sustainability has great importance that aligns with a shift in how the next generations live and shape their environment through a sustainable lens.

We studied nomadic living and the importance of the ability for individuals to break away and re-form communities. Throughout history, shelter for nomadic communities has been designed to accommodate the regional climate and to use local materials. These materials are assembled in very specific ways in order to maximize comfort and survival. The ability to dismantle and move these structures greatly depends on the weight and size of their parts. In some cases, a modular-based shelter is constructed then abandoned after a season of hunting as in the case of the igloo structures on Igloolik Island, Nunavut, Canada[1]. In other cases, shelters are deconstructed and taken along when the community moves on. For these nomadic communities (including those in Kenya, Ethiopia and Somalia), lightweight mobility is important as they depend on camels and donkeys to transport the deconstructed shelter parts. A flexible lifestyle permits change and provides adaptability on demand. Today, this lightweight mobility is possible with the technological advances that allow built components to be more compact.

Modern temporary shelters were studied to better diagnose their typical characteristics of compactness, minimalism and space optimization. The material selection for temporary shelters depends on many aspects including durability, weight, transportability, sustainability and programmatic purpose. Examples that were investigated included campers, boats, eco pods built by architecture students, shipping containers, the now-demolished Capsule Hotel, the 1960's Archigram explorations, a Yurt with photovoltaic panels and the Dubai Airport Sleep Box serving transient visitors. In studying each of these precedents, we researched strategies that address ventilation, electricity and water needs. While these strategies vary depending on mobility, many involve a plug approach where the shelter can move and be plugged into designed server hubs. The plug-ability concept became a key part of our uPOD vision.

2.1 Student Life Trends

Residence halls have seen a slow, steady plan evolution despite the rapid evolution of students' expectations and needs. No longer referred to as "dormitories", the nature of residence halls has changed in the amenities they provide, the residential image expected by students (similar to what they experienced at homes) and the fact that schools use them as marketing for recruiting students[i].

In the 1950s, there was an increase in the construction of dormitories in campuses across the country, which has provided the framework infrastructure for much of the living environments. The plan configuration of these traditional dormitories mainly included a series of bedrooms on a double-loaded corridor, most likely double- or triple-occupancy with community bathrooms and little to no social spaces for the community. There were, of course, exceptions to this format. For example, MIT's Baker House (1946) by architect Alvar Aalto created an undulating, single-loaded floor plan with 43 bedrooms and 22 different room shapes that overlooked the Charles River. The building was characterized by a variety of public spaces for students to study, lounge and dine. The single loaded corridor was designed with a generous width where the community could formally and informally interact.

More recent traditional plan residence hall models include semi-suites (double-occupancy bedrooms sharing one bathroom), a series of single bedrooms sharing bathrooms and living rooms or combinations of both. There has also been an emphasis on providing more community spaces for different levels of interaction: increase of study spaces and lounges per floor and more robust community programs at ground level. Double height spaces or vertical connections between floors are also valued as successful strategies to bring part of the see-and-be-seen concepts in student centers directly into the residential communities. For example, at MIT's Simmons Hall (2001) by architect Steven Hall, vertical connectivity among floors was designed to foster interaction between students and create a sense of community.

[i] Residence halls have become a recruitment tool, here are two examples of how institutions deal with students and parents demands: 1) This fall St. Mary's College of Maryland placed students in a cruise ship while they renovate a sick Residence Hall ("Moldy Dorms Ship Students Off to Sea", de Vise, Daniel, Washington Post report, Retrieved on 10/26/2011 from http://www.washingtonpost.com/local/education/mold-plagued-st-marys-college-students-to-live-on-cruise-ship/2011/10/26/gIQAMCN3JM_story.html), 2) A private company in Denver operates The Regency Student Housing Community, offering students with Resort style amenities while providing a Residential Hall experience (Retrieved on 10/27/2001 from http://www.regencystudenthousing.com).

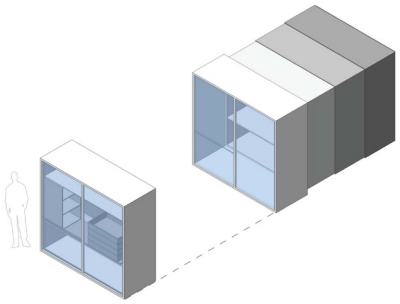


Figure 2: uPOD compacted and deployed.

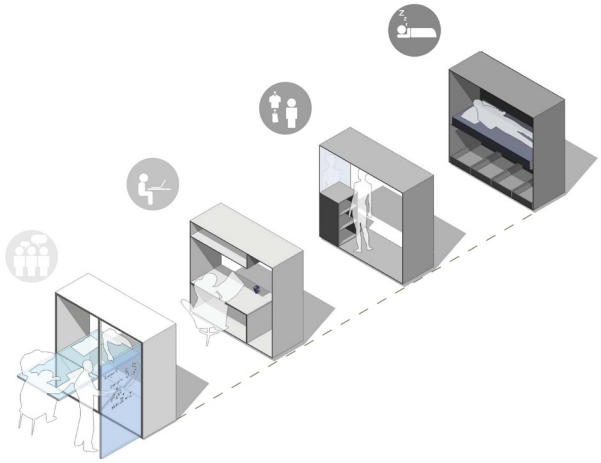
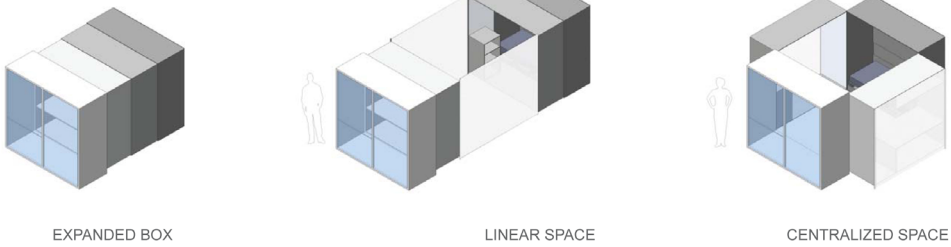


Figure 3: uPOD's rings are programmed from more public activities to more private activities.



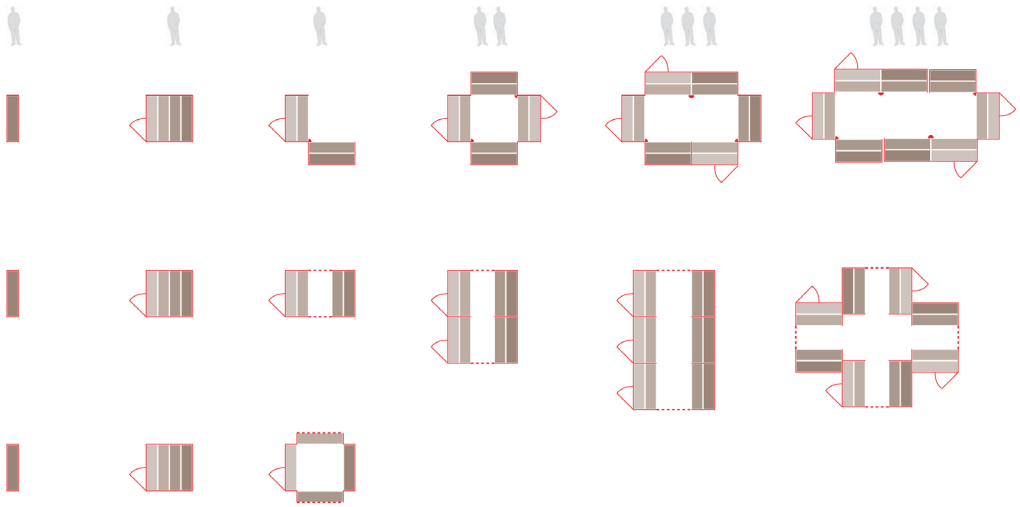


Figure 4: Examples of spatial configurations.

In general, the traditional plan is not adaptable to changes in program and does not allow for versatility in spatial arrangement. Technological advancements have shifted the way in which students interact and collaborate to study and share information. But, the basic needs of the individual remain constant: privacy, security and a pleasant living space. As a response to these student interaction shifts, the flexible living environment of the uPOD focuses on the pod's modular form and spatial flexibility and possible configurations including the parts' positions and mobility. The key programmatic elements are also considered: a place to socialize, study, store belongings and sleep.

2.2 The uPOD

What if the concept of a residence hall is transformed and the student's room is a uPOD on wheels that can easily be transported through a door (Figure 2)? We are proposing a compact living unit that transforms into a loft style space, resulting in a single occupancy room of about 90 square feet when fully deployed. The unit is composed of four rings of framed spaces that expand and become a living uPOD. The uPOD can deploy beyond its enclosed configuration, extending the living space. Each of the four rings of the uPOD is programmed from more public activities to more private activities (Figure 3):

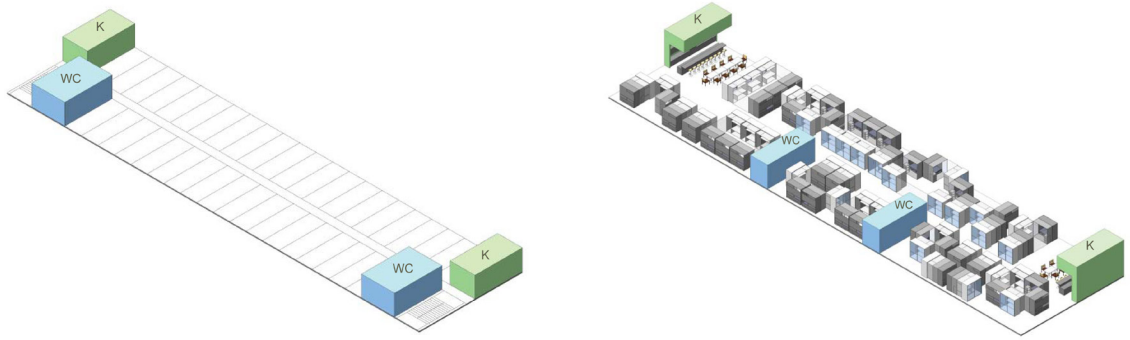
1. *Ring 1: Social Interaction*
   Characteristics: This ring provides a translucent pivoting door that doubles as a writable surface. A pivoting translucent table or work surface allows communal studying or meeting with friends.
2. *Ring 2: Individual Study*
   Characteristics: This ring provides a desk surface and a shelf that folds down, but can also be kept unfolded for more floor area.
3. *Ring 3: Personal Belongings*
   Characteristics: This ring provides a demountable tube that can be used as a closet hanging rod or a privacy curtain. Mirror surfaces and shelves act as a vanity or a dressing area.
4. *Ring 4: Sleeping / Relaxing*
   Characteristics: This ring provides a low bed position that can be used as a sofa and a high bed position that allows for more closet space below the bed platform.

The direct application for directors of residence life at colleges and universities would be to assign each student a uPOD for the duration of the academic year. On move-in day, uPODs are moved into an open plan space where students arrange them adjoining other uPODs to form suites of small communities following different organizational patterns (Figure 4). The uPOD is then plugged into the ceiling or floor for power and data. This process is as follows:

1. Step 1 Move-in: Wheel the uPOD to the pre-assigned location, lock it in and plug it into electrical, data and mechanical connections.
2. Step 2 Expand: Expand each segment of the uPOD into a defined area, a habitable space.
3. Step 3 Deploy: Create community by deploying the box in a variety of spatial arrangements.

2.3 Traditional Plan vs. uPOD Plan

A community of 40 students at a floor level was studied, comparing a traditional residential hall with private bedrooms with an open loft space without walls (Figure 5). The study maintained the same floor plan dimensions (50' x 200'), but the loft version assumed egress stairs occurred outside of the space assumed for the uPODs. The purpose of the comparison was to prove that by



TRADITIONAL DORMITORY: 40 STUDENTS IN SINGLE BEDROOMS

CASE STUDY: 40 STUDENTS IN A LOFT COMMUNITY

Figure 5: Case study comparison for a population of 40 students in a traditional dormitory versus a loft community with uPODs.

Figure 6: Sectional perspective illustrating private living spaces.

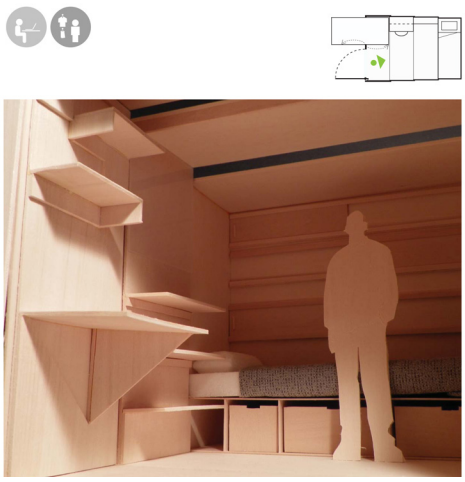


Figure 7: Conceptual model photo illustrating scale and interior amenities.

Figure 8: View of community kitchen/lounge area.

Figure 9: View of community lounges and study areas.

removing the rigid walls of a typical residential floor, greater flexibility would be achieved for uPODs to be arranged in a variety of configurations (Figure 6). The amount of required area of a typical single bedroom occupancy and the uPOD is comparable, about 90 net square feet. However, more tangible differences are the uPOD's mobility, the interior components' versatility and the ability to reconfigure interior and exterior community space (Figure 7).

In this comparison, the wet cores for both bathrooms (WC) and kitchens (K) are maintained as defined in separate volumes. The main difference is that in a traditional residence hall the wet cores are enclosed rooms, but, in the loft style community, kitchens are open spaces envisioned as social magnets (Figure 8). In the uPOD, the bathroom cores are located in such a way that the floor can be zoned into smaller communities, creating community lounges and study areas (Figure 9).

2.4 Living-Learning Communities Case Studies

A Living-Learning community is a group of students who share common interests and live together. In higher education institutions, these groups usually form around an academic interest. Students in these communities strive academically because of the sense of membership, personal connections and the educational events that extend the learning experience outside the classroom[2]. This Living-Learning model takes different shapes depending on the institution's goals, the space available (existing or new) and the curricular connections to the program. Following are four case studies offering very different accommodations for Living-Learning communities.

University of Tennessee at Chattanooga, Chattanooga, Tennessee (2011) – Through a housing master plan process, Living-Learning communities were developed as part of the future vision for existing and new residence halls. The existing condition option considered a minimal retrofit of two existing residence halls. These residence halls currently have inefficient space usage mostly through classrooms, meetings rooms, lounge, activity room and a community kitchen (Figure 10). When considering new residence halls with Living-Learning communities, the design concept was based on a semi-suite configuration with a centralized project room and lounge/kitchen area (Figure 11). Within each concept, students will be able to receive faculty visits for informal discussion.

Roger William University, Bristol, Rhode Island (2009) – Designed to accommodate a mix of seven suite and apartment types, one of the project goals was to expand the Living-Learning communities on campus. One of the seven residential units was purposely designed as a 10-person suite for these Living-Learning groups (Figure 12). The Living-Learning program on campus is based on student interest groups that are formed for a semester or longer. Within the suite, the large living room is also used as a project room.

Appalachian State University, Boone, North Carolina (2012) – The Living-Learning community is programmed for honor students and is integrated with academic space. The classrooms and offices are in a 3-story L-shaped building, forming the south and east sides of the exterior courtyard. This courtyard provides the focal point of the project development focusing living and learning on a common platform. The lower level contains a series of classrooms and lounges that connect to the outdoor space (Figure 13). The upper levels of the Living-Learning housing are organized in semi-suites (36 students per level) with central and corner lounges.

Bridgewater State University, Bridgewater, Massachusetts (2013) – The 500-bed residence hall integrates an exterior courtyard between Living-Learning communities and 4-bed and 6-bed student suites (Figures 14 and 15). To further physically differentiate the Living-Learning communities, they are dynamically expressed on the exterior façade with projecting project rooms that represent the core learning spaces. Three students share a semi-suite configuration and groups of 12 students share two types of shared spaces. One of those shared spaces is the project room, the other is a common area within the public corridor. By having these shared spaces, the design intent is to promote cross-pollination within the Living-Learning community. The Living-Learning communities are designed along single-loaded corridors to create internal transparency on the courtyard side of the building.

uPOD Living-Learning - Several specific, organizational patterns were studied for Living-Learning communities at the scale of a floor community: circular, bar, linear, circular hybrid, loop and village. These patterns illustrate spatial arrangements where students may choose to live for specific collaborative learning experiences. Living-Learning communities of 14 students may share a smaller floor plate or suite loft:

1. Circular plan (Figure 16) is based on two circular spaces formed by seven students, each sharing a common kitchen area and two bathroom cores.
2. Circular hybrid plan (Figure 17) is based on a modification to the circular plan, illustrating how two smaller circular groups could be rearranged into a single unifying space.

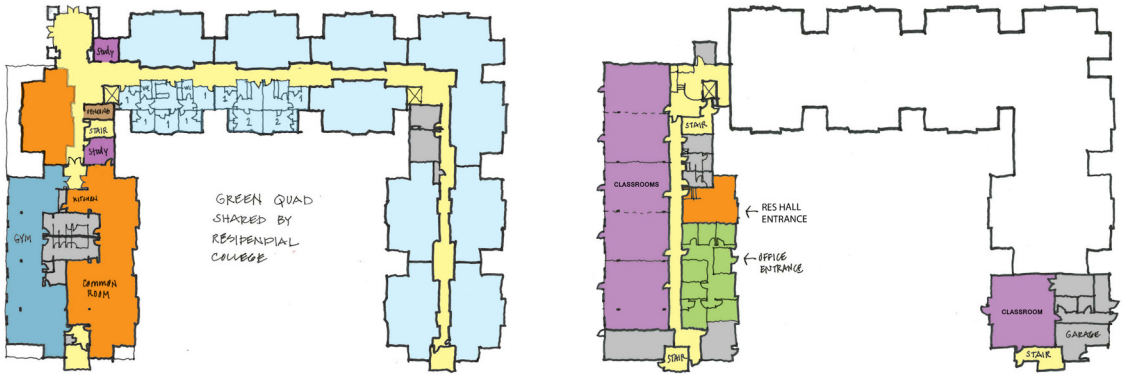


Figure 10: Lower and ground level of a Living-Learning study consisting of minimal retrofits in two existing residence halls, University of Tennessee at Chattanooga, Chattanooga, Tennessee, Housing Master Plan (2011).

Figure 11: Plan study for a new Living-Learning community, University of Tennessee at Chattanooga, Chattanooga, Tennessee, Housing Master Plan (2011).

Figure 12: A 10-person Living-Learning suite at the North Campus Residence Hall, Roger Williams University, Bristol, Rhode Island (2009).

Figure 13: Ground and typical plan of the Honor's Living-Learning community at Appalachian State University, Boone, North Carolina (2012).

Figure 14: Typical floor plan and community/population diagram of the Living-Learning wing illustrating ratio of students per Living-Learning suite as project rooms shift along the single loaded corridor, new residence hall at Bridgewater State University, Bridgewater, Massachusetts (2013).

Figure 15: Interior and exterior views of the Living-Learning project rooms in the new residence hall at Bridgewater State University, Bridgewater, Massachusetts (2013).

Figure 16: Circular organization pattern of a uPOD Living-Learning community.

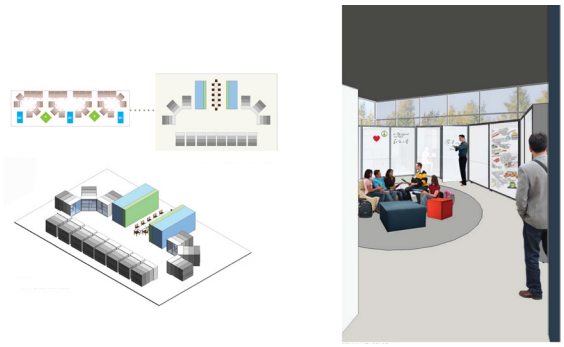


Figure 17: Circular-hybrid organization pattern of a uPOD Living-Learning community.

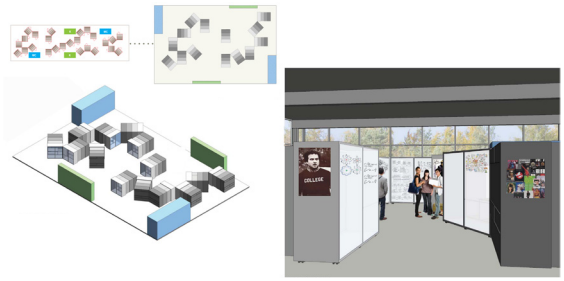


Figure 18: Village organization pattern of a uPOD Living-Learning community.

3. Village plan (Figure 18) is based on an ad-hoc or organic organization of linked boxes with perimeter kitchen and bathroom cores. This approach suggests two types of informal community spaces that are captured between the boxes or "winding streets." Others are located in front of the kitchen and bathroom areas.

2.5 Materials and Construction Technology: Concept Development

A series of strategies are being studied for the uPOD materiality and construction. The design vision is one of simplicity and clean lines where "less is more" and tectonics follow a pragmatic, yet minimal approach (Figure 19).

Materials: Sustainable principles are one of the main drivers in material research and important factors include low carbon, recyclability potential and post-consumer recycled content. Honeycomb wood and wood laminates, formed plastic and fiberglass have been studied due to their thin, strong characteristics. The core material for the uPOD must be lightweight and the exterior material needs to be durable.

Structural Stability: The ring segments of the uPOD will be stabilized with bracing members. The most stable rings are 1 and 4 (see section 2.2). Inner rings 2 and 3 have a top horizontal bracing member at one side. Since the rings are relatively thin (1.5 to 3in.) interior reinforcement will be required. Attention to corner connections will allow seamless transitions with imbedded structural reinforcing angles.

Compactness and Versatility: Ring 2 contains a desk with book shelves; Ring 3 contains a vanity with storage shelves. Foldable and thin shelving systems have been

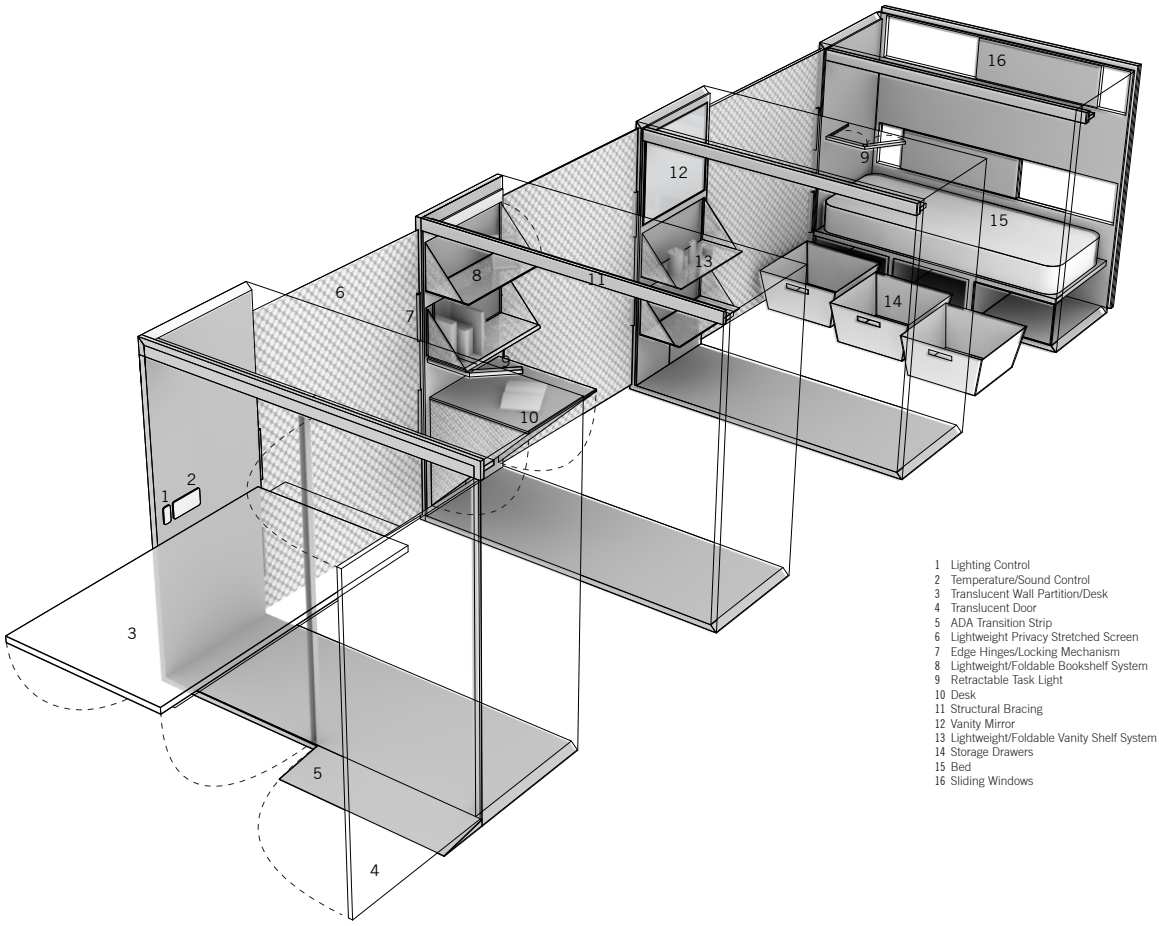


Figure 19: Exploded perspective of the uPOD illustrating material and construction strategies.

studied for these inner rings to provide an "accordion" movement, or a "Russian doll" effect. When the uPOD is fully compacted or deployed, the interior surfaces must be free of protruding elements. In general, collapsible and retractable elements are important for space optimization and programmatic versatility. Minimal moving elements and ease in handling the parts is also important for user durability.

Mobility: The integration of lightweight materials, demountability, size and compactness facilitate mobility. Transporting the uPOD in its most compact form will require retractable wheels, such as wheel mechanics of an ambulance stretcher. Once in place, ball bearing sliders technology coupled with felt strips will allow each ring to telescope easily.

Deployment: The telescoping concept described above provides ultimate flexibility once the independent rings can be configured in different and purposeful spatial configurations. When the uPOD is deployed as an enclosed room there is complete security through the entry door and with the ring's side edges that have an interior locking mechanism. When the uPOD is deployed beyond the room configuration the sense of security is compromised to an extent because the ceiling is open. On the sides, a strong privacy stretch fabric can be unrolled and locked into the ring edges.

Ergonomics: Human proportions, comfort and ADA accessibility were analyzed and incorporated into the design. The weight of the moving parts considered unfolding, pivoting, moving and lifting actions. Transition strips can

be incorporated into the uPOD entry door and in other floor transition edges. The interior of the uPOD room has more than five feet of a free radius. The design and location of task lights, thermostats, light and white noise controls are ergonomic and ADA compliant. In terms of life safety, strobe lights could be incorporated in the uPOD for the hearing impaired.

2.6 Acoustics, MEP Systems and Life Safety Considerations

Degrees of physical and acoustical privacy were studied with a single-occupancy uPOD configuration[ii]. Variations of privacy levels are illustrated in Figure 20 and are based on order of magnitude, ranging from most private to most public. The most private spatial configuration provides the most acoustical separation. On the opposite side of the spectrum, the most open and public spatial configuration provides the least acoustical value. Strategies studied and considered for sound attenuation included a partial stretched fabric on top of the uPOD. The fabric can be backed with a solid material with sound masking qualities. For added visual privacy on the sides of the unit, a lightweight privacy stretched fabric can be used when the uPOD is deployed. Other sound attenuation techniques include a flexible gasket along the upper seams to prevent high sound transmission when the uPod is in enclosed configuration. A sound masking device would give the user the ability to control volume/intensity to mitigate noise levels from the loft environment.

Integration of mechanical, electrical and plumbing systems were studied in two different scenarios, both assuming the uPOD is located within a loft space where HVAC, sprinklers and general lighting are provided for the overall space. Both scenarios also assume that the uPOD has integrated energy efficient lighting; temperature, lighting and sound controls; and smoke detectors. The loft space will be equipped with infrastructure system hook-ups arranged in a grid pattern (both in the ground and ceiling). UPODs can be stationed at any of these points.

A “Flush Floor” scenario (Figure 21) would have a flexible mechanical duct and sprinkler hose line feed from the main branches on the ceiling. In this scenario a certified professional would have to connect the sprinkler and mechanical lines, which might reduce the possibility of moving the uPOD frequently. However, direct sprinkler line connections will likely be required only when the uPOD is in its compact, enclosed form. If the uPOD is fully deployed with each ring separated, the overall sprinkler system of the loft space is sufficient for fire suppression[iii]. The uPOD can be plugged into electrical and data outlets located on the floor.

A “Raised Floor” scenario (Figure 21) will not require mechanical lines coming from the ceiling, instead the air will be supplied from a raised floor. The uPOD floor surface will have a floor diffuser. To get air circulating inside the uPOD, users can align the location of the raised floor diffusers with the uPOD diffuser. In this scenario,

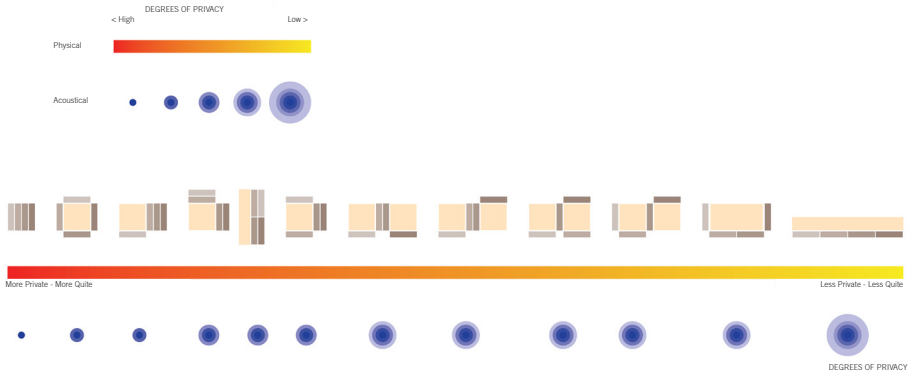


Figure 20: Diagram illustrating degrees of acoustical and physical privacy depending of spatial arrangement of the uPOD’s rings.

[ii] Acoustical strategies were discussed with Rose Mary Su from Acentech Inc., acoustic consultants, http://www.acentech.com/
[iii] When the uPOD is in its enclosed position forming a room, life safety, mechanical and electrical strategies need to be compliant with all codes that apply to a bedroom design. When the uPOD is deployed in space, since each ring is less than 4’ wide, the ceiling sprinkler system might be sufficient.

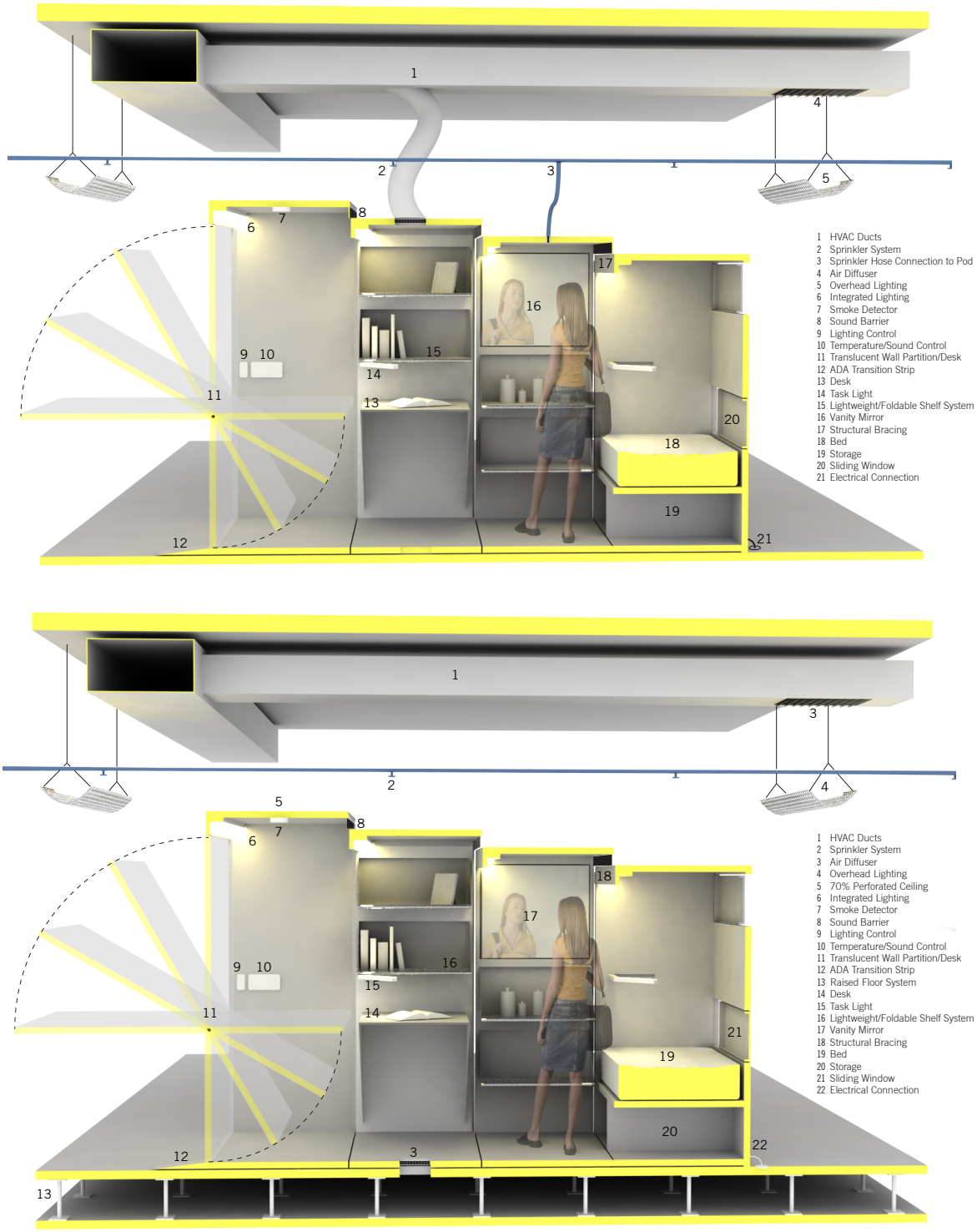


Figure 21: Illustration of the uPOD room as flush and raised floor scenarios with systems interaction.

direct sprinkler hose feeds are not required if the uPOD ceiling is 70% perforated as per NFPA 13[iv]. Electrical and data outlets will also be accessible from the raised floor. This scenario liberates the uPOD from mechanical duct and sprinkler connections and maximizes mobility on demand making it truly mobile. Acoustical performance might be compromised due to the open ceiling, but sound masking devices might mitigate noise concerns.

Fire suppression and related life safety issues were studied for the uPOD as an individual unit and for floor communities[v]. Unobstructed fire egress paths would need to be maintained in floor communities. The enforcement of clear egress paths in larger loft spaces or floor plates can be partially solved by establishing clear demarcation paths with either low wall partitions or other elements. Enforcing maximum occupancy load for large spaces will be necessary to ensure that the assembly use group will not change within floor plates, particularly given the possibility that students could relocate all of the uPODs on a floor to a central location. This concern has the greatest life safety issues.

3.0 CONCLUSION: VISION FOR THE NEXT GENERATION

Students share many essential needs, physical and social, despite specific generational characteristics. Residence halls have been able to fulfill those basic needs through evolution of units within fixed walls and the creative programming. However, the true challenge with future developments will be the ability to create spaces that have enough flexibility to evolve with future generations. Institutions have already housed the Millennials (born between 1981-1991), the generation characterized as tenacious and tech-savvy multi-taskers. What does this mean for our current generation?[3] The lessons learned from Millenials will be applied and advanced as we think about this next generation – and beyond to the Digital Natives (born between 2000-2009), who are connected, consumer-oriented, globalized and more instant minded. Evolving technologies will allow small, compact, mobile living with a focus on sustainable materials and reducing our carbon footprint, this is the vision of the uPOD.

ACKNOWLEDGMENTS

The authors would like to acknowledge several people who contributed to the project at various stages. From the Perkins and Will Boston office: David Damon, Higher Education Market Sector Leader, for his constructive criticism and proof reading this article; Jeff Lewis, Technical Director, for his input on constructability, materials and technical solutions; designer Ed Dudley for creating two beautiful illustrations (Figures 19 and 21); and architect Patrick Cunningham for insightful critiques at key moments of development. We also like to acknowledge two key research resources: Rose Mary Su, Acoustical consultant at Acentech and Ron Melucci, Fire Protection consultant at Rolf Jensen & Associates. Finally, we would like to thank Tony Montefusco, Executive Director of University Housing Operations and Planning from Roger Williams University, for providing practical advice and Living-Learning application ideas.

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