FLEXXX
A STUDY OF FLEXIBILITY IN OUTPATIENT SETTINGS
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A FOLLOW-UP TO THE CLINIC 20XX SERIES
The Challenge
The Shifting Healthcare Landscape

Venue

- Volume-based
- Hospital-Based
- One-size fits all

Team

- Physician-centered

Treatment

- Performance-based
- Integrated/Outpatient/Home/Cloud
- Personalized
- Team of teams with AI support
How do we design for change—without a crystal ball?

Clinic 20XX: Designing for an Ever-Changing Present
01 | SYSTEM
more access.
more accountability.

02 | PATIENT
chronic conditions,
consumer expectations.

03 | PROVIDER
physician shortage,
extender/team increase.

04 | FIELD
advanced diagnostics, precise &
precision medicine.

05 | TECHNOLOGY
technology boom, big data and
sophisticated construction

06 | DISASTER PREPAREDNESS?

DRIVING CHANGE
mHealth/Telehealth: health at hand, remote access

Care Coordination: coordination between patients, providers and systems for efficient patient care and workflow

Population Health: community-based, whole person health with regional health goals

Retail Health: demand-focused, choice-based health for extensive and immediate reach

+ Home Health

RESPONDING TO CHANGE
Three Tenets of 20XX

**Connectivity**

Clinics have to be positioned to have connectivity regionally to their constituents and systemically to the larger health information systems.

**Flexibility**

Flexibility to adapt has to be considered at multiple scales ranging from site and building planning to wall systems and furniture.

**Sense of Place**

A sense of place that promotes health and wellbeing, and is inclusive of different physical abilities and generational preferences can be a differentiator. Spending time knowing the people we are designing for is key.
Research Objectives

To develop a framework to address flexibility in outpatient clinic settings, by looking beyond the healthcare context, in order to create change-ready facilities.
Methodology
What does the literature tell us?
Lifespans

BUILDING LIFESPAN AND SYSTEMS

PRIMARY
LIFESPAN | >100 YEARS
Base of the building with longest lasting components

SECONDARY
LIFESPAN | 20 YEARS
Infill of building with frequently changing parts

TERTIARY
LIFESPAN | 5-10 YEARS
Infill of building with frequently changing parts

Information Source: Kendall [10]
Building Systems
Strategies

1. Master planning for future expansion
2. Loose-fit design promoting extra sq. ft. for future changes
3. Adaptable flexibility for multiple functions
4. Convertible flexibility for a new permanent use
5. Robust utilities having extra capacities for the future
6. Plug-and-play infrastructure to minimize interruption during future construction

## Frameworks

<table>
<thead>
<tr>
<th>PERSPECTIVE</th>
<th>DEFINITION</th>
<th>CITATION</th>
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</thead>
<tbody>
<tr>
<td>Attributes</td>
<td>The different attributes of flexibility such as Fluidity, Versatility, Modifiability, Convertibility, and Scalability.</td>
<td>Monahan, 2002</td>
</tr>
<tr>
<td>Soft / Hard</td>
<td>Hard space has limited change options from the design. Soft space has open options for the user.</td>
<td>Pressler, 2006</td>
</tr>
<tr>
<td>Temporal</td>
<td>The lifespan of building components such as short and long as well as: Primary (100 years), Secondary (20 years), and Tertiary (5-10 years).</td>
<td>Kendall, 2005</td>
</tr>
<tr>
<td></td>
<td>Operational - day-to-day; fast change</td>
<td>de Neufville, et al., 2008</td>
</tr>
<tr>
<td></td>
<td>Tactical - months away; slow change</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategic - years away; infrastructural change</td>
<td></td>
</tr>
<tr>
<td>Base/Infill</td>
<td>Primary purpose is differentiating the main macro systems of a building as the base building and the micro systems within it as the infill.</td>
<td>Kendall, 2000, 2011</td>
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<td>Capolongo, 2016</td>
</tr>
<tr>
<td>Building Layers</td>
<td>Specific layers that make up the building. Referred to as shearing layers such as: Social, Stuff, Space Planning, Services, Skin, Structure, Site, Surrounding</td>
<td>Shuchi, 2012</td>
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<td></td>
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<td>Adaptable Futures, 2017</td>
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</tbody>
</table>
Keeping it Simple: Four Attributes

- **Versatility**: immediate multifunctional use
- **Modifiability**: speedy reconfiguration
- **Convertibility**: ease of re-design in the future
- **Scalability**: ease of expansion or contraction
- **Fluidity**: flow of information, gaze, sound, etc.

*Information Source: Monahan [14]*
Seven Layers
Versatility

“I can do different things in it”

Versatility in a building is defined as the ability or intention for a space to be used for multiple and different functions with limited or zero change to tangible building attributes, where the user has agency.
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Crown Hall

(Mies Van Der Rohe)

Column free space supported by a suspended roof structure; designed for multiple uses - exhibitions, studios, lectures and events.
Versatility
Surroundings

U.S. Bank Stadium

Designed as a multi-purpose venue and surrounding site, aims to enhance landscape and culture of the community

Image Courtesy of HKS, Inc.
VERSATILITY
ALLOWS MULTIPLE USES

<table>
<thead>
<tr>
<th>BUILDING LAYER</th>
<th>EXEMPLAR</th>
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</table>
| Social
  People, Flow | Muggare Centres
  Focused on social connection and community building |
| Staff
  Furniture, fixtures, equipment | Embrace
  Designed for clinical needs - its approachable, refined design makes it applicable to other spaces as well |
| Space Planning | Texas Scottish Rite Hospital for Children North Campus
  Standardized patient rooms and core work spaces that are equipped for any clinic’s needs |
| Services
  MEP | Dell Seton Medical Center at the University of Texas
  Multifloor equipment serving patient rooms installed in corridor for interruption free maintenance and room layout changes |
| Skin
  Building envelope | Marisol Dea Gonzales Hospital
  Double skinned facade helps clean polluted air and is a solar gain blocker |
| Structure
  Column Grid | Crown Hall
  Column free space supported by a suspended roof structure, designed for multiple uses - exhibitions, studios, lectures and events |
| Site | UCSD North Torrey Pines Living and Learning Neighborhood
  Open, green space allowing for various outdoor activities, prominently located on site |
| Surroundings
  Master planning | U.S. Bank Stadium
  Designed as a multi-purpose venue and surrounding site, aims to enhance landscape and culture of the community |

Multi-purpose, Elevated Platform
Large furniture piece carved for different functions, like studying, with large steps offering auditorium seating

Open, Event Space
Offers space for events hosted by the library or additional study space

Individualized Study Spaces
Anthropometric desk spaces carved into platform to work for people of varying heights

Adapted from MPdL studio
Modifiability

“I can change it”

Modifiability in a building is an attribute that welcomes interaction from the user to physically change to a desired function within the space.
Modifiability

“I can change it”

Modifiability in a building is an attribute that welcomes interaction from the user to physically change to a desired function within the space.
Modifiability
“‘I can change it’”

“All I Own House”

By PKMN Architectures
Modifiability
Stuff

Norton Women’s & Kosair Children’s Hospital (NICU)
Mobile walls for desired privacy

Image Courtesy of HKS, Inc.
Modifiability
Skin

Al Bahr Towers

(architect: AHR)

Computer-controlled, dynamic screen system, responding to the movement of the sun to avoid solar gain and glare

*Image Source: Getty Images*
Modifiability

Site

ProMedica Corporate Headquarters

This campus has an open, adjacent, green space that can host farmer's markets, festivals, temporary art installations, and movies in the park.

Image Courtesy of HKS, Inc.
Convertibility

“It can change”

Convertibility in a building is defined as the ability to replace the infill, while keeping the base building the same, in order to adapt for a new purpose.
Convertibility

“It can change”

Convertibility in a building is defined as the ability to replace the infill, while keeping the base building the same, in order to adapt for a new purpose.
Convertibility

“It can change”

Phoenix Children’s Hospital Administration Building

Design by HKS, Inc.

VIA Wall System by Steelcase
Convertibility

Modular casework installed on a rail system, allowing cabinetry to be moved, changed, and reconfigured with minimal dust and disruption.

*Image Courtesy of Steelcase
Convey by Steelcase*
Convertibility
Space Planning

Children’s Hospital of Richmond

Clinic modules are zoned with a consistent layout, allowing for various specialty clinics with little construction.

Image Courtesy of HKS, Inc.
Convertibility
Services

AirFRAME by SLD Technology

Prefabircated, modular OR ceiling, integrating air diffusion and lighting, allowing for changing light and boom layouts

*Image Courtesy of SLD Technology*
Convertibility
Structure

UT Center for BrainHealth
Existing, vacant building gutted to
Reinvent to the Center for Brain Health

Image Courtesy of HKS, Inc.
Scalability

“It can grow or shrink”

Scalability is defined as the attribute that allows a building to expand or contract according to changing demands.
Scalability

“It can grow or shrink”

Scalability is defined as the attribute that allows a building to expand or contract according to changing demands.
Scalability

“It can grow or shrink”

Children’s Hospital of Richmond Pavilion

By HKS, Inc.
Scalability
Structure

University of Texas MD Anderson Cancer Center Alkek Tower

Oversized columns allowed for eight floor vertical expansion; expanded floorplates

*Image Courtesy of HKS, Inc.*
Scalability

Field Hospital (Level III) by Weatherhaven

Portable, medical shelters linked to interconnector kits, which link to a central corridor to create larger facilities

*Image Courtesy of Weatherhaven*
FleXX Framework
But what do stakeholders think?

Health Administrators
Nurse Managers
Facility Managers
About the Survey

143 Total Responses

- 37 Facilities Managers
- 40 Health Administrators
- 51 Nurse Managers
- 24 Final
- 13 Contents
- 25 Final
- 15 Contents
- 15 Final
- 15 Contents

Other
How do stakeholders define flexibility?
Are flexibility and adaptability interchangeable?

The majority of survey respondents, 81%, felt that flexibility and adaptability were interchangeable.

"To me flexibility is synonymous with adaptability as they both represent the ability to be fluid."

"Yes, you have to be flexible to be able to adapt.

"It is very similar and works out the same so we are able to use the space in a very efficient way for multiple uses."

"In terms of space, they can be interchangeable."

"A flexible area has the ability to adapt to a different use."

Several respondents felt that the difference between the two were space or system specific; flexibility addresses change in a space and its function while adaptability considers if individuals or systems are able to implement change.

"Flexibility is to change function. Adaptability is the stuff/people conforming to change."

"Flexibility gives you choices whereas (with) adaptability you must work with what you have."

Others built on this idea and specified that the relationship between the two was more hierarchical, with flexibility serving adaptability.

"A flexible area has the ability to adapt to a different use."
How do nurse managers define flexibility?

"Having staff that are multifunctional, that can work in dual roles, allows for greater staff flexibility, and cost savings."

-Nurse Manager

"Flexibility is the ability to do what is needed to successfully adapt to needs or changing situations."

-Nurse Manager

"Flexibility would let me be a mother and a career woman without compromise."

-Nurse Manager

Operations. Culture.
How do health administrators define flexibility?

Organizational.
Strategic.
How do facilities managers define flexibility?

"Being flexible to me means being able to adapt our system and culture to changing demands of our customers and the ability to integrate new technologies into our business."

-Facilities Manager

"Buildings are expensive, we must sweat the asset through more efficient usage."

-Facilities Manager

"Ability to adapt new technologies, best practices, and changes in healthcare, with minimal capital expenditure."

-Facilities Manager

"Flexibility in facility planning means that the spaces we plan will be multi-purpose and serve multiple functions."

-Facilities Manager

"If it can change, it will change. Plan accordingly."

-Facilities Manager

Spatial.
Planned.
“Be” Flexible “To” Adapt
Importance of Attributes of Flexibility

- **Versatility**: 77%
  - of stakeholders have places in their clinics that serve more than one purpose (e.g., multi-purpose lounges for waiting, education, etc.).

- **Modifiability**: 58%
  - of stakeholders have places in their clinics that can be modified rapidly, with needing any facility intervention (e.g., universal patient rooms, rotating clinics serviced by different carts, etc.).

- **Convertibility**: 68%
  - of stakeholders have places in their clinics that can be converted rapidly, as needed, with minor renovations (e.g., exam rooms converting to procedure rooms).

- **Scalability**: 49%
  - of stakeholders have clinics that can scale by either growing or shrinking, horizontally or vertically, as demands change in the market.
What drives the need for flexibility?
Does flexibility have to cost more?

Some respondents suggested that having a budget constraint actually promotes using flexibility in solutions as it promotes creative thinking when designing space.

“Not if planned right from the beginning. Measure twice cut once.”

“Thinking ahead and preparing should not be at a premium.”

“Flexibility doesn’t have to cost more because that may be a roadblock for getting a project approved. Flexibility means thinking outside the box when designing space use.”

However, others pointed out that while this additional initial effort may not mean more for the overall building cost, it does increase the time and effort to validate decisions around flexibility.

“I think flexibility can be studied through realistic mockups of space before construction.”

“I think flexibility always has a cost, even if it’s the time you spend, since your time is valuable.”

Some respondents suggested that the added cost to include flexibility could save more in the long term. Typically, the approach to flexibility expanded past space to include hiring practices and resources.

“Flexibility can often cost more, but if so, cutting waste in other areas would balance this out.”

“There are many ways to cut costs like finding the right people and materials that will add up to substantial savings in the long run.”
When is flexibility expected to be used during a building’s life?

- Early Life of a Building: 35%
- Mid Life of a Building: 42%
- Late Life of a Building: 23%
How is ROI for flexibility investments recognized?
Over what period of time?
Can we “over-invest” in flexibility?

Many felt that they may have under-invested:

“I have always ‘under’ invested, and now I am running out of room as business grows, that is my regret.”

HKS
When has flexibility been successful?
When has flexibility NOT been successful?
When do successful and unsuccessful instances of flexibility compare?

“We created split shifts within the department to cover heavy patient loads and lunch breaks.”
-Health Administrator

“I established a new position called ‘flow nurse’ to increase patient and staff satisfaction with the workflow.”
-Nurse Manager

“Removed existing office cubicles to create a flexible ‘big room’ that can handle large planning meetings and flex to provide hoteling spaces.”
-Facilities Manager

“Our outpatient clinical modules are identically provisioned, making each module ‘agnostic’ to the specialty using it.”
-Nurse Manager

“Our organization implemented an on-call system that required nurses to be on-call for a full weekend at a time and it was too overwhelming.”
-Nurse Manager

“Attempting to have staff change responsibilities day to day, they did better when responsibilities don’t change routinely.”
-Internal Manager

“We tried to ‘share’ space with two other disciplines - did not work well. Complains from nursing/providers.”
-Health Administrator

“Same sized exam room, offices and support spaces. Unfortunately, this requires more space overall, increasing operational cost and staff walking time”
-Facilities Manager
Do stakeholders use standards?

- Yes, and standards improve operational flexibility: 48%
- Yes, and standards reduce operational flexibility: 27%
- Yes, and standards have no effect on operational flexibility: 13%
- No, but would like to: 10%
- No, and do not intend to: 2%

88% have standards.
How are modular solutions used?
How important are disaster and climate change preparedness?
Flexibility beyond buildings

- **TIME FLEX**: Related to flexibility in scheduling, hours of operation and staffing.
- **ROLE FLEX**: Related to flexibility in roles and responsibilities of staff.
- **RESOURCE FLEX**: Related to using resources - such as equipment, furniture, supplies, amenities, and even space - flexibly.
Illustrating flexibility in practice

**TIME**
- + Shared rooms
- + Flex hours
- + Split-shifts
- + Self-scheduling
- + Cross-trained staff

**ROLE**
- + Supervisory roles for more employees
- + Cross trained staff

**RESOURCE**
- + Multi-functional equipment
- + Smaller/mobile equipment
- + Leasing instead of buying equipment
Illustrating flexibility in practice

**VERSATILITY**

+ Open hall spaces
+ Multi-use spaces
+ Flex lab spaces
+ Shared spaces
+ Grouping of specialties
+ Removing partitions

**MODIFIABILITY**

+ Supervisory roles for more
+ Movable partitions
+ Rotating check-in spaces
+ Modular furniture
+ Ability to add beds
+ Standardization

**CONVERTIBILITY**

+ Hybrid OR
+ Modular walls
+ Storeroom to pathology lab
+ Early MEP planning

**SCALABILITY**

+ Shell space
+ “Blow out” walls
+ Oversized structural members
+ Early MEP planning
Buildings must “be” flexible in order “to” adapt.

FleXX

to adapt by being flexible

Flexible environments enable operational, functional, demographic, climate, and market changes over time with optimal capital expenditure, allowing the building to be used as a strategic asset.
Mobilizing Flexibility needs a Strategic Plan

- **Clinic Departments**
  - Pediatrics
  - OB/GYN
  - Specialty

- **New Conditions**
  - New department
  - Increased demand
  - Staff minimally expanded

- **New Conditions**
  - New departments
  - Stretched staff
  - Wellness focus increase
  - Less need for exam rooms

**0 YEARS**

- **Clinic Design**
  - 3 exam modules (10 rooms)
  - 1 adjacent office module
  - Consult space
  - Versatile waiting space

- **FlexXX 1**
  - Existing offices convert to new exam rooms
  - Versatile waiting space adds community/work kitchen
  - Shell space partially filled with new offices

**5 YEARS**

- **FlexXX 2**
  - Shell spaces filled with dental specialty
  - One clinic module converts to vision
  - Newer offices convert to shared offices
  - Flow nurse added to manage flex schedules

**10 YEARS**

**XX YEARS**

Continuous re-evaluation every 1-2 years as needed
Flexibility must be systemic - and go beyond space
FULL REPORT CAN BE DOWNLOADED AT:

http://www.cadreresearch.org/flexx
Q&A
Request for examples and critique

http://www.cadreresearch.org/flexx