Biophilic Campus: Library Pilot

UNIVERSITY OF LIMERICK
OLLSCOIL LUIMNIGH

Mission Lab

This document has been co-created by **UL Centre for Sustainable Futures & Innovation** and **Glucksman Library**, in collaboration with our strategic partner **Studio Saol**. It was created through an open and participatory process, ensuring the diverse range of perspectives and disciplines within our university were included at each stage of development.

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01 Introduction & Context

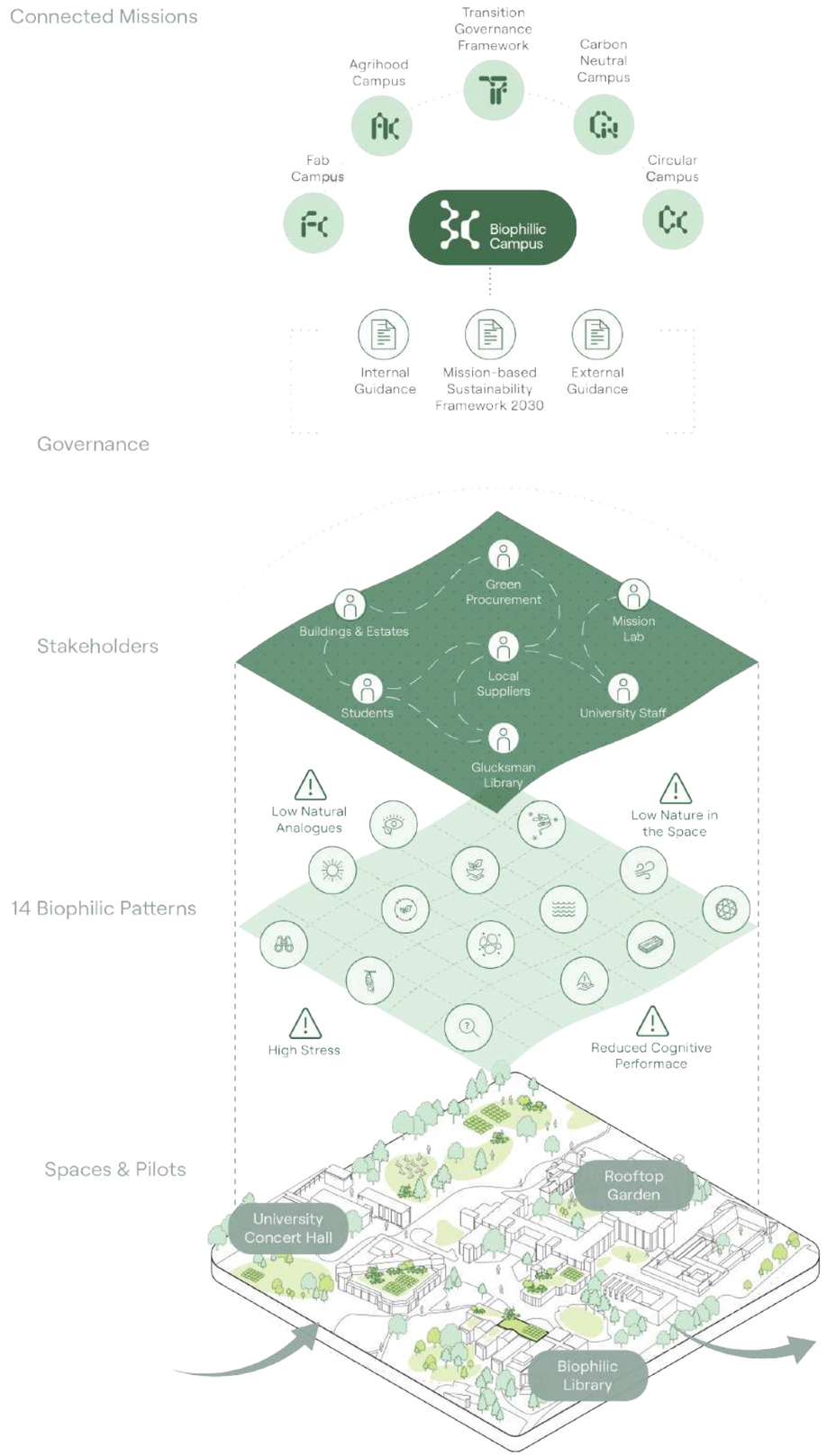
Biophilic Campus Mission

UL are committed to advancing the health and sustainability of our diverse campus community. How might we create tangible change within the spaces and environments that shape our wellbeing and impact on the natural world around us?

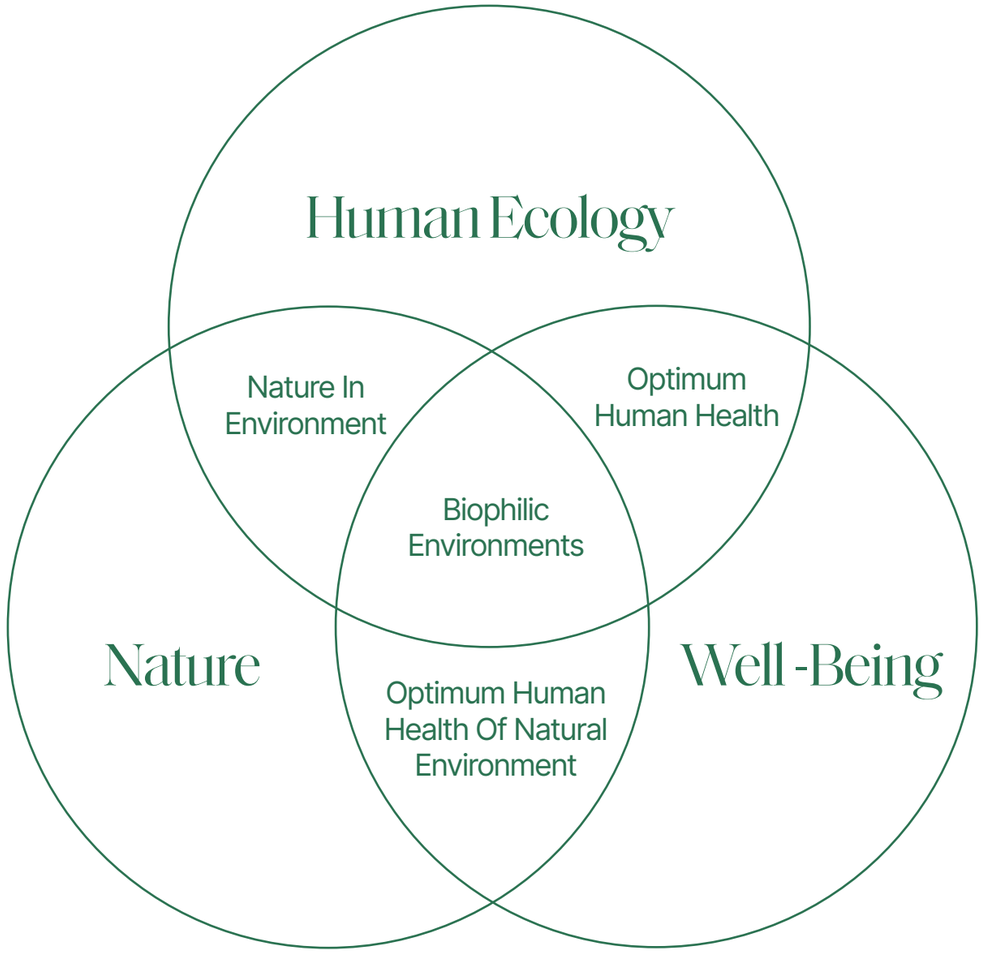
Biophilic Design offers a compelling approach to integrating health and sustainability by incorporating natural principles into our shared campus environments. The purpose of this document is to outline a proposal for a biophilic design pilot project in partnership with the Glucksman Library.

The “Biophilic Library Pilot” project aims to showcase the transformative power of biophilic design within a specific setting that plays an important role for a broad section of the campus community.

This document aims to answer the following:
What is Biophilic Design?
Why choose the Glucksman Library for the pilot?
What will the Biophilic Library Pilot deliver?
What resources and collaborators are required?



Biophilic Environments



A connection with nature is deeply nourishing for both our body and mind. This mission sees UL continue to strengthen the embodiment of biophilic design principles within the built environment on campus. In doing so, spending time within the diverse spaces on campus will positively impact ones mental and physical health.

Aligning with UL Mission-based Sustainability Framework 2030

The Biophilic Campus Mission is a key part of the university's Mission-based Sustainability Framework 2030, aiming to cultivate a sustainable and vibrant campus community. This mission aims to leverage biophilic design principles to enhance the wellbeing of our community members while also advancing the comprehensive sustainability objectives outlined in the framework. Our adoption of biophilic design underlines a comprehensive approach to sustainability that appreciates the interplay between environmental, social, and economic factors in forging a resilient and regenerative campus environment.

Furthermore, the principles of biophilic design inherently support other sustainability missions and activities taking place within the university. By incorporating natural elements into our built environment, we are reducing energy use, enhancing biodiversity, and bolstering ecological resilience. Biophilic design is also pivotal in promoting the health and wellness of students, faculty, and staff, thereby cultivating a campus ethos that prioritises holistic wellbeing. Additionally, the use of sustainable materials and methods in biophilic design aids the university's commitment to lowering its carbon footprint and alleviating the effects of climate change.

As the inaugural initiative under this mission, the Biophilic Library Pilot exemplifies our commitment to delivering impact through our university-wide sustainability missions. It aims to test and demonstrate the impact of biophilic design on health & wellbeing and sustainability across the campus.

The Biophilic Campus Mission thus acts as a driving force for advancing the university's sustainability agenda in a cohesive and integrated fashion. By adopting biophilic design principles, we are not only fostering healthier, more resilient campus environments, but also deepening our community's connection to nature. This connection encourages stewardship and enhances a sense of belonging among all community members. Through collaborative efforts and strategic implementation, we envision a sustainable campus that nurtures the wellbeing of current and future generations.

UL Sustainability Missions

- Mission Lab
- Transition Governance Framework
- Citiziens Mission Council
- Digital Campus Commons
- Fab Campus
- Mission Impact Hub
- Earth Guild
- Open Loop University
- Active Mobility Campus
- Campus Tribe
- Agrihood Campus
- Biophillic Campus
- Carbon Neutral Campus
- Mission Driven Learning
- Egalitarian University
- Self Powered Campus
- Student Livelearns
- Biodiverse Campus
- Circular Campus
- Revitalised River Shannon
- Clean Water Campus

02 Biophilic Design

What is Biophilic Design?

Biophilic design is an approach to architecture and interior design that seeks to incorporate elements of nature into built environments. It's all about fostering a strong connection between people and nature within the spaces where they live, work, and play. This design philosophy draws inspiration from natural forms, materials, and processes, aiming to create spaces that are not only aesthetically pleasing but also support human health and well-being. Biophilic design principles might include incorporating natural light, using organic shapes and textures, incorporating living plants, and providing views of nature. By bringing the outdoors in, biophilic design can enhance mood, productivity, and overall happiness, while also promoting sustainability and environmental stewardship.

Image 0: Maggie's Yorkshire, designed by Heatherwick Studio

Biophilic Patterns

Biophilic design is rooted in the idea that humans have an innate connection to nature, and incorporating elements of nature into our built environments can enhance our well-being. The 14 design principles of biophilic design serve as a framework for achieving this connection. These principles encompass various strategies for integrating nature into architecture and interior design, such as maximising natural light, incorporating natural materials, providing views of nature, and creating spaces that evoke the qualities of natural environments.

By implementing these principles in synergy, biophilic design aims to create environments that stimulate our senses, evoke positive emotional responses, and support our physical and psychological health.

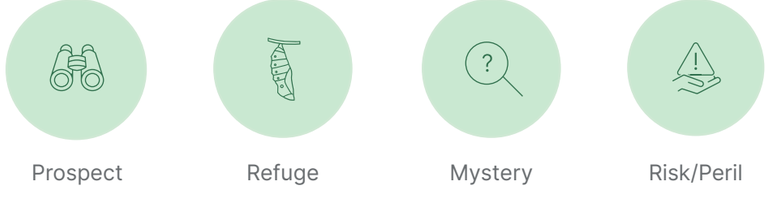
For example, exposure to natural light has been linked to improved mood and productivity, while incorporating natural materials like wood and stone can create a sense of warmth and comfort. Similarly, views of nature and access to outdoor spaces can reduce stress and promote relaxation.

Overall, the 14 design principles of biophilic design work together to create environments that engage our innate biophilic tendencies, fostering a deeper connection to nature even within urban settings. This approach not only enhances the quality of our built environments but also promotes sustainability and environmental stewardship by encouraging a harmonious relationship between humans and the natural world.

Nature in the Space

Natural Analogues

Nature of the Space



Visual Connection with Nature

Visual Connection with Nature is a view to elements of nature, living systems and natural processes.

PATTERN OVERVIEW

Visual Connection with Nature is a biophilic design principle that focuses on integrating views of the natural environment into built spaces to enhance the wellbeing of occupants. This pattern underscores the importance of direct sightlines to outdoor natural elements, such as plants, water, and landscapes, from within indoor spaces.

UNIVERSITY CONTEXT

Within a university setting, this pattern is experienced through the incorporation of large windows, glass walls, or strategically placed indoor plants that offer views or impressions of nature from classrooms, libraries, and communal areas. It ensures that students and staff have continuous visual access to the outdoor environment, enhancing their connection to the natural world while indoors.

Example #1:
INTERNAL PLANTING

Placement of indoor plants and greenery in locations where direct natural views are limited, such as interior classrooms or corridors.

Example #2:
GLAZED FACADES

Large glazed elements improve the quality and quantity of natural views available to building occupants, particularly in study areas and lounges.

Example #3:
ROOFTOP GARDENS

Architectural designs that incorporate glass facades or rooftop gardens, offering expansive and immersive natural vistas that transform the learning environment.

Image 1: Louisiana Museum of Modern Art, designed by Jørgen Bo and Wilhelm Wohlert

Non-Visual Connection with Nature

Non-Visual Connection with Nature is the auditory, haptic, olfactory, or gustatory stimuli that engender a deliberate and positive reference to nature, living systems or natural processes.

PATTERN OVERVIEW

Non-Visual Connection with Nature emphasises engaging the human senses beyond sight to foster a connection with the natural environment within built spaces. This biophilic design principle incorporates elements that can be experienced through touch, smell, hearing, and taste, thereby enriching the sensory environment and enhancing the well-being of building occupants.

UNIVERSITY CONTEXT

In a university context, students and staff experience this pattern through the presence of natural materials, textures, airflow, scents, and sounds within campus buildings. This could involve the tactile experience of natural flooring materials underfoot, the scent of plants in indoor gardens, the sound of water flowing in a courtyard fountain, or the taste of fresh produce in the cafeteria.

Example #1:
SOUNDSCAPE

A carefully crafted soundscape, incorporating natural sounds like birdsong or flowing water, can enhance biophilic design by creating a calming and immersive environment that connects occupants to nature.

Example #2:
SCENTED PLANTS

Use aromatic plants within spaces that can safely and subtly release natural scents into the air, like lavender for calmness or rosemary for focus.

Example #3:
SEASONAL SNACKS

Offer teas, juices, or snacks made with natural ingredients and flavoUrs that are indicative of the local environment or seasons.

EMOTION, MOOD & PREFERENCE
Perceived improvements in mental health and tranquility.

COGNITIVE PERFORMANCE
Positively impacted cognitive performance.

STRESS REDUCTION
Reduced systolic blood pressure and stress hormones

Image 2: Tamedia Office Building, designed by Shigeru Ban Architects

Non-Rythmic Sensory Stimuli

Non-Rhythmic Sensory Stimuli are stochastic and ephemeral connections with nature that may be analysed statistically but may not be predicted precisely.

PATTERN OVERVIEW

Non-Rhythmic Sensory Stimuli encompasses the design principle of introducing unpredictable, natural changes in the environment to capture attention and enhance the connection with nature. This pattern is based on the idea that exposure to random and variable sensory cues from nature, such as the rustling of leaves or the sudden flight of birds, can mimic the dynamic and spontaneous aspects of natural environments, promoting mindfulness and reducing stress.

UNIVERSITY CONTEXT

In a university setting, this can be experienced through elements that introduce unexpected natural movements or sounds, such as breezes through open windows, the varied chirping of birds in outdoor areas, or the shifting shadows of trees throughout the day. These stimuli provide a subtle, ever-changing backdrop to the academic environment, offering moments of surprise and engagement with the natural world.

Example #1:
AUTOMATED BLINDS

Program blinds or screens to adjust randomly or in response to environmental conditions outside, subtly altering the indoor lighting and creating a sense of natural variability.

Example #2:
KINETIC SCULPTURES

Install sculptures or mobiles that move with the airflow in the space, providing a visual representation of air movement.

Example #3:
LIGHT PLAY

Use architectural features like louvres, textured glass, or reflective water elements to create shifting patterns of light and shadow within the library. This mimics the dynamic light play seen in nature under trees or near water bodies.

COGNITIVE PERFORMANCE
Observed and quantified behavioural measures of attention and exploration.

STRESS REDUCTION
Positively impacted heart rate, systolic blood pressure and sympathetic nervous system activity.

Image 3: The Seattle Central Library, designed by OMA

Biophilic Patterns

Thermal / Airflow Variability

Subtle changes in air temperature, relative humidity, airflow across the skin, and surface temperatures that mimic natural environments.

PATTERN OVERVIEW

The Thermal & Airflow Variability pattern has developed from studies examining the impact of natural ventilation on temperature fluctuations, student productivity, and well-being. It also considers the influence of changing temperature and air movement on concentration, as well as the increasing dissatisfaction with traditional thermal design.

UNIVERSITY CONTEXT

In a university setting this can be achieved by incorporating operable windows, adjustable vents, and other features that allow for airflow variability. Thermal & airflow variability pattern can help create a more engaging and comfortable learning environment in a university setting, while also promoting sustainability and energy efficiency.

Example #1:
AUTOMATED VENTS

Install manual vents or automated systems that open and close based on carbon dioxide levels, occupancy, or time of day, providing fresh air and temperature control while still maintaining overall energy efficiency.

Example #2:
GREEN WALLS & ROOFS

Incorporate living walls or green roofs that naturally insulate the building, reducing temperature fluctuations. These features can be designed to allow user interaction, such as opening or closing sections to control shade and air quality.

Example #3:
INDIVIDUAL CONTROLS

Provide users with localized control over their immediate environment, such as adjustable air vents, personal fans, or even heated/cooled seating, allowing them to modify temperature and airflow to their preference.

Image 4: Gallery of Mechanics Hall, designed by Dominique Perrault Architects

Biophilic Patterns

Dynamic and Diffused Light

Provide varying intensities of light & shadow that change over time to create conditions that appear in nature.

PATTERN OVERVIEW

Lighting conditions have a great influence on the experiential qualities of a space and cognitive function of its occupants. Both changes in colour of light and light intensity variations mimic naturally occurring lighting conditions. Student performance in naturally lit educational spaces has been proven to increase by 5% to 14% compared to students studying in artificially lit spaces (Nicklas & Bailey, 1996).

UNIVERSITY CONTEXT

In a university setting this element of biophilic design can be achieved by allowing building users to control their own lighting conditions, both natural and unnatural. Placing work spaces near windows and natural light sources will improve productivity and academic performance. Increasing natural light levels to a room by upgrading windows.

Example #1:
DIFFUSED LIGHT FIXTURES

Incorporate light fixtures that diffuse light broadly, avoiding direct glare and creating a soft, ambient lighting condition that changes subtly, reflecting the variability found in nature.

Example #2:
REFLECTIVE SURFACES

Use light shelves and other reflective surfaces to bounce daylight into the library's interior, increasing the amount of natural light and enhancing its distribution

Example #3:
TASK LIGHTING

Provide individual task lighting options for users, allowing them to adjust their immediate lighting environment according to their needs or preferences, adding a personal dynamic component.

STRESS REDUCTION
Positively impacted circadian system functioning.

Image 5: The Louvre Abu Dhabi, designed by Jean Nouvel

Connection to Natural Systems

Awareness of natural processes, especially seasonal and temporal changes characteristics of a healthy ecosystem.

PATTERN OVERVIEW

A space that fosters sensory connections to natural systems helps building occupants establish a relationship with and an appreciation for the changing seasons and rhythms of the natural world. This connection also heightens awareness of environmental stewardship within the university's ecosystem. By promoting locational familiarity, people can feel a sense of belonging, which in turn improves comfort levels.

UNIVERSITY CONTEXT

The University of Limerick can enhance its connection to natural systems in several ways. For instance, it can integrate green spaces, natural light, and sustainable materials into its campus buildings and landscapes. Furthermore, the university can expand its course and program offerings in environmental education and sustainability, fostering a deeper understanding and appreciation of the natural world among its students, staff, and community.

Example #1:
INDOOR ECOSYSTEMS

Create indoor gardens or ecosystems that mimic those outside, such as a small indoor wetland or forest understorey, offering a direct link to the external natural environment.

Example #2:
ENVIRONMENTAL FEEDBACK

Use systems that provide real-time data on the natural environment around the library, such as weather conditions, the status of solar panels if any, rainwater collection levels, and even air quality readings.

Example #3:
SEASONAL DISPLAYS

Inside the library, create displays or installations that change with the seasons, highlighting local flora, fauna, and natural phenomena. This could include digital screens showing local natural landscapes in real-time or seasonal art installations.

EMOTION, MOOD & PREFERENCE
Enhanced positive health responses, shifted perception of environment

Image 6: The Eden Project, designed by Nicholas Grimshaw

Presence of Water

A condition that enhances the experience of a place through the seeing, hearing or touching of water.

PATTERN OVERVIEW

Research indicates that exposure to water elements can reduce stress, increase feelings of tranquillity, and lower heart rate and blood pressure. Furthermore, the pattern recognises the benefits of complex, naturally changing visual stimuli for improved concentration and memory restoration. The pattern also takes into account the enhanced perception and psychological and physiological responses that occur when multiple senses are stimulated simultaneously through the presence of water.

UNIVERSITY CONTEXT

The University of Limerick is in a unique position, situated on the banks of the river Shannon, it allows for visual connections to a natural water supply from several locations on campus. Natural water sources could be augmented throughout campus through the use of water features both internally and externally.

Example #1:
REFLECTIVE POOLS

Consider integrating small, shallow reflective pools in central areas or courtyards where they can be safely admired. These pools can reflect natural light and the surrounding architecture, enhancing spatial aesthetics.

Example #2:
AQUARIUMS

Introduce aquariums or fish tanks in certain areas of the library, such as children's sections or relaxation zones. Aquariums can be fascinating focal points and contribute to the overall sense of calm.

Example #3:
RAIN GARDENS

Create rain gardens in outdoor areas associated with the library. These not only manage stormwater sustainably but also allow users to observe the natural water cycle up close.

EMOTION, MOOD & PREFERENCE
Observed preferences and positive emotional responses.

STRESS REDUCTION
Reduced stress, increased feelings of tranquility, lower heart rate and blood pressure.

COGNITIVE PERFORMANCE
Improved concentration and memory restoration.

Image 7: The Kimbell Art Museum, designed by Louis Kahn

Biomorphic Forms and Patterns

Symbolic references to contours, patterns, textures or numerical arrangements that exist in nature.

PATTERN OVERVIEW

A space with biomorphic forms and patterns provides reduced stress levels for occupants and develops a contemplative and captivating space to work in. Biomorphic forms have been used for millennia in design utilizing the golden section. Humans have a visual preference for organic and biomorphic forms i.e. symbolic representations of organic life.

UNIVERSITY CONTEXT

In a university setting, staff and students can experience biomorphic forms and patterns as either a cosmetic decorative component of a larger design or as integral to the structural or functioning design. Installations and free standing sculptures can be a way to introduce biomorphic forms into a building.

Example #1:
FURNITURE AND FIXTURES

Choose furniture and light fixtures that mimic natural forms or patterns. Chairs might resemble the shapes of leaves or stones, and custom carpets or ceiling tiles could feature abstracted natural patterns like those found in leaves, waves, or cellular structures.

Example #2:
ART INSTALLATIONS

Commission or select art pieces for the library that reflect biomorphic forms and patterns. This can range from large-scale sculptures to detailed wall hangings or mosaics that draw the eye and engage the mind.

Example #3:
CURVILINEAR SHAPES

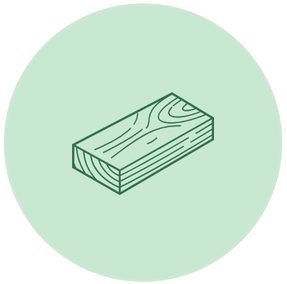
Incorporate curvilinear and organic shapes into the architecture, moving away from strictly rectilinear forms. This could manifest in the overall building shape, windows, doorways, or interior architectural elements.

EMOTION, MOOD & PREFERENCE
Observed view preference.

Image 8: Casa Batllo, designed by Antoni Gaudi

Biophilic Patterns

Material Connection to Nature



Materials and elements from nature that, through minimal processing, reflect the local ecology or geology to create a distinct sense of place.

PATTERN OVERVIEW

A space with a strong, positive material connection to nature evokes a sense of warmth and naturalness, integrating a wide range of organic materials and earthy colour tones. Research by Joye (2007) highlights the emotional bond humans have with natural elements, emphasising that contact with organic forms benefits both psychological and physiological well-being.

UNIVERSITY CONTEXT

Studies have shown that diastolic and systolic blood pressure levels can experience a notable reduction when an individual is exposed to natural materials and finishes. This connection to nature through materials can contribute to improved mental and physical health across campus.

Example #1:
MATERIALITY

Incorporate natural materials, like wood in structural elements, finishes, furniture, and decorative details. Use stone for floors, walls, or as part of the furniture. The visual and tactile qualities of stone can evoke a sense of solidity and permanence, grounding users in the space.

Example #2:
COLOURS FROM NATURE

Use color schemes in the library that reflect natural environments, focusing on earth tones, greens, blues, and the varied hues found in nature. This can create a subtle but effective reminder of the natural world.

Example #3:
HANDMADE ELEMENTS

Incorporate artisanal or crafted details in the library's design, such as handwoven textiles, handcrafted furniture, or custom metalwork. These elements can convey a sense of human connection to natural materials, celebrating traditional skills and craftsmanship.

EMOTION, MOOD & PREFERENCE
Improved comfort.

COGNITIVE PERFORMANCE
Decreased diastolic blood pressure. Improved creative performance.

Image 9: Oslo Opera House, designed by Snøhetta

Complexity and Order

Rich sensory information that adheres to a spatial hierarchy similar to those encountered in nature.

PATTERN OVERVIEW

The complexity and order pattern has evolved from research on fractal geometries and preferred views; the perceptual and physiological responses to the complexity of fractals in nature, art and architecture; and the predictability of the occurrence of design flows and patterns in nature. 1 A space with good complexity and order is both engaging and information rich. It finds a balance between complex and simple patterns.

UNIVERSITY CONTEXT

In a university setting this pattern could be duplicated across the campus through the display of artworks, incorporating rhythmic patterns or repetitive design elements, such as geometric paving patterns or modular seating arrangements.

Example #1:
INTEREST POINTS

Use design elements to create interest points and landmarks that help users navigate the space. This could be a distinctive piece of art, a unique architectural feature, or a beautifully designed reading nook.

Example #2:
COHESION AND VARIABILITY

Ensure that while spaces contain elements of complexity, the overall design feels cohesive and ordered. This balance between complexity and order is key to creating an environment that is engaging without being overwhelming.

Example #3:
DECORATIVE ELEMENTS

Incorporate fractal patterns that recur at different scales within the space. This could be through the use of wallpapers, lighting fixtures, flooring tiles, or façade elements that mimic patterns found in nature, such as the branching of trees or the structure of leaves.

Image 10: The Guggenheim Museum, designed by Frank Lloyd Wright

Prospect

An unblocked view over a distance for surveillance & planning.

PATTERN OVERVIEW

A space with a good Prospect condition offers a sense of openness and freedom, while also creating a feeling of safety and control, especially in situations where one is alone or in a new or unfamiliar environment. It offers the building user an important sense of time of day, weather and sense of place.

UNIVERSITY CONTEXT

In a university setting prospect can be used to enhance wayfinding. Additionally, a space with a good Prospect condition enables individuals to easily survey their surroundings, which aligns with the Savanna Hypothesis (Orians & Heerwagen, 1986 and 1992), which suggests that humans have a genetic predisposition to prefer environments that resemble the African savanna, where our ancestors evolved.

Example #1:
ELEVATED AREAS

Consider creating raised platforms or mezzanines that offer a vantage point over the interior of the library and, if possible, the exterior surroundings. This can fulfill the human desire for prospect, allowing users to see and be seen.

Example #2:
ZONE WITHOUT OBSTRUCTION

Use low partitions, bookshelves, or transparent barriers to define different areas within the library without significantly obstructing views. This maintains a sense of prospect while still providing necessary functional separations.

Example #3:
MAXIMISE VIEWS

Position windows to provide expansive views of the surrounding landscape, cityscape, or courtyard gardens. Place seating, reading nooks, and study areas near these windows to allow users to enjoy the views while engaging in their activities.

STRESS REDUCTION
Reduced stress.

EMOTION, MOOD & PREFERENCE
Improved comfort and perceived safety.

COGNITIVE PERFORMANCE
Reduced boredom, irritation, fatigue.

Image 11: Farnsworth House, designed by Mies van der Rohe

Refuge

A place for withdrawal, from environmental conditions or the main flow of activity, in which the individual is protected from behind and overhead.

PATTERN OVERVIEW

Whether alone or in small groups people will always strive to seek refuge. A good refuge space is distinct and separate from its surrounding environment, offering a contemplative, welcoming, and protective atmosphere without unnecessarily isolating individuals.

UNIVERSITY CONTEXT

In a university setting this can be achieved by creating individual study spaces, smaller tutorial spaces and choosing furnishings and fixtures which allow people to change spaces to suit their own needs.

Example #1:
PRIVATE STUDY BOOTHS

Offer individual study booths or pods that are soundproofed and designed to minimize visual distractions. These can be particularly valuable in busy or open-plan areas of the library.

Example #2:
USE OF TEXTILES

Enhance the sense of comfort and seclusion in refuge areas with the use of soft furnishings, plush seating, rugs, and draperies that absorb sound and create a cozy atmosphere.

Example #3:
WINDOW SEATS AND ALCOVES

Create window seats, alcoves, or reading nooks that are slightly removed from the main traffic flow. These spaces can offer both comfort and a sense of personal space, along with natural light and views.

COGNITIVE PERFORMANCE
Improved concentration, attention and perception of safety.

Image 12: Teshima Art Museum, designed by SANAA

Mystery

The promise of more information achieved through partially hidden views or other sensory devices that stimulate the individual to travel deeper into the environment.

PATTERN OVERVIEW

A space with a good mystery condition arouses curiosity and interest, creating a sense of anticipation that draws people in to explore further. It offers a balance of sensory stimulation and intrigue, inviting investigation without overwhelming or disengaging the user. The space provides a subtle interplay of sensory denial and reward, encouraging further exploration and discovery.

UNIVERSITY CONTEXT

In the university setting, a sense of mystery can be instilled upon the user by designing buildings with interconnected spaces that offer a variety of experiences and sensory stimuli, creating a sense of anticipation and intrigue as users move through the space.

Example #1:
INDIRECT ROUTES

Instead of straight, predictable paths, design walkways that curve or meander, obscuring the full view of what's ahead and encouraging exploration.

Example #2:
TRANSITIONS IN LIGHTING

Create areas of transition where the lighting subtly changes, leading visitors from brightly lit spaces to those with softer lighting, hinting at a change in atmosphere or function.

Example #3:
STORYTELLING

Use art, design elements, and materials that tell a story or hint at a narrative, encouraging visitors to uncover the story piece by piece as they move through the space.

EMOTION, MOOD & PREFERENCE
Induced strong pleasure response.

Image 13: The Brion Tomb, designed by Carlo Scarpa

Risk / Peril

A space with a good Risk/Peril condition evokes a sense of thrill and excitement, with a hint of potential danger. The space challenges users to engage with it, creating a sense of intrigue and fascination that may be difficult to resist.

PATTERN OVERVIEW

Risk and Peril can be authored whilst adhering to building safety standards. The primary difference between risk/Peril and fear is the level of perceived threat and perceived control (Rapee, 1997). Awareness of possible risks releases dopamine resulting in a a feeling of happiness and motivation. The aim of the risk/peril pattern is to stimulate attention and curiosity, and to reinvigorate memory and problem-solving abilities.

UNIVERSITY CONTEXT

In a university setting, a sense of Risk & Peril can be achieved through the introduction of cantilevered walkways or large floor to ceiling windows with views from a height.

Example #1:
MEZZANINES

Design elevated areas within the library that allow users to experience height and perspective, such as mezzanine levels or viewing platforms overlooking interior spaces or natural vistas outside. The key is to ensure robust safety features that make these high places exciting but secure.

Example #2:
HAMMOCKS

Introduce seating options that are suspended, like hanging pods, swings, or hammocks, offering a unique experience of leisure and study. These elements should be securely anchored and designed for ease of use to ensure safety.

Example #3:
TRANSPARENT ELEMENTS

Use glass floors or walkways in certain areas to create an illusion of walking over space. This can be particularly effective over interior gardens, art installations, or even book stacks, providing thrilling views while being completely safe.

EMOTION, MOOD & PREFERENCE
Resulted in strong dopamine or pleasure responses.

Image 14: UTEC Lima, designed by Grafton Architects

03 Pilot Project: Glucksman Library

Aims of the Glucksman Library Pilot Project

Introducing biophilic design principles to the university library marks a pivotal step in our campus's commitment to fostering student well-being and enhancing the overall academic experience.

As a central hub frequented by all members of our campus community, the library serves as an ideal pilot location for this innovative project. With its diverse spaces and high foot traffic, the library offers the ideal platform to experiment with various biophilic design patterns, transforming it into a sanctuary of natural tranquility and productivity.

Recognising the importance of supporting student concentration and well-being, a need has been identified to enhance the library environment.

By integrating biophilic elements such as natural light, greenery, and organic textures, our ambition is to create inviting and comfortable spaces that inspire relaxation, focus, and creativity. Our goal is to cultivate an atmosphere where students feel not only supported but empowered to thrive academically, with access to environments that promote a sense of calm and connection to nature.

The aim of this pilot is to create a library that serves as more than just a space for study, but as a nurturing environment that enriches the mind, body, and spirit of our campus community.

User Survey of the Current Library

A survey was conducted among individuals utilising the current library facilities, engaging them in discussions about their experiences regarding well-being, productivity, comfort, and connection to nature. Through direct interactions within the library space, participants shared valuable insights into their current user experience and expressed desires for potential improvements.

The survey findings revealed several key issues, ranging from concerns about concentration and stress levels to a desire for greater access to natural elements within the library environment. These insights serve as a foundation for the implementation of biophilic design principles, offering targeted solutions to address the identified needs and enhance the overall library experience.

Results of the Survey

On a scale of 1 to 5, how comfortable do you generally feel when studying in the library?

What impact does the library environment have on your productivity?

What positive or negative impact does the library environment have on your wellbeing?

Are there changes or additions that could be made to the Library that would improve your wellbeing?

On a scale of 1 to 5, how connected do you currently feel to nature or natural elements when studying in the library?

Positive

5
38%

4
50%

3
12%

More productive than being at home.

Less distracted and more focused on study. Silent spaces are helpful.

Seeing other people studying is helpful.

Lots of windows and sunlight

Able to meet people and happier as able to be more productive

Positive as the windows are nice and large and can feel connected to outside world

Positive impact on wellbeing as a space for productivity.

Does not contribute

Heating needs sorting, too variable and so has a negative impact

Stress of finding a seat

Stressed anxious and nervous

More small training rooms with screens

Very wooden environment needs more greenery - more greenery

More use of the dead space.

More control over the windows opening and closing

Better regulation of the heating in the rooms

More seats and space

5
14.1%

4
23.9%

3
37%

2
14.1%

1
10.9%

Negative

Mission Team and Approach

The Mission Team comprises dedicated members from various university departments, including the Library staff, the university's Centre for Sustainable Futures and Innovation, and UL Mission Lab. Together, they will collaborate closely with secondary stakeholders and the university's Buildings & Estates department to bring the pilot project to fruition.

This interdisciplinary team brings together expertise in library operations, sustainability research, innovation, and project management, ensuring a holistic approach to the implementation of biophilic design principles in the library. Through their collective efforts, the Mission Team is committed to realising the vision of creating a revitalised library space that prioritises student well-being, fosters connection to nature, and serves as a model for sustainable campus development.

The approach for the pilot project involves a thorough analysis of the current library spaces to identify opportunities for integrating biophilic design principles effectively. We will assess various spatial typologies found within the library, including study rooms, collaborative spaces, and circulation areas, to determine where the greatest potential for impact lies.

To aid in this process, we have developed a Biophilic Design card deck toolkit, which will facilitate ideation and exploration of how biophilic patterns can be introduced into different areas of the library.

The pilot project will serve as an exemplar for the wider campus community, demonstrating the transformative potential of biophilic design in enhancing student well-being and connection to nature. As biophilic design is rooted in creating an experiential connection, having a pilot space established on site will provide a tangible example for people to experience first-hand.

This will be essential in fostering wider campus adoption of the mission, as individuals can directly engage with the pilot space and witness its positive impact, thus catalysing broader support and implementation across the campus.

The Vision

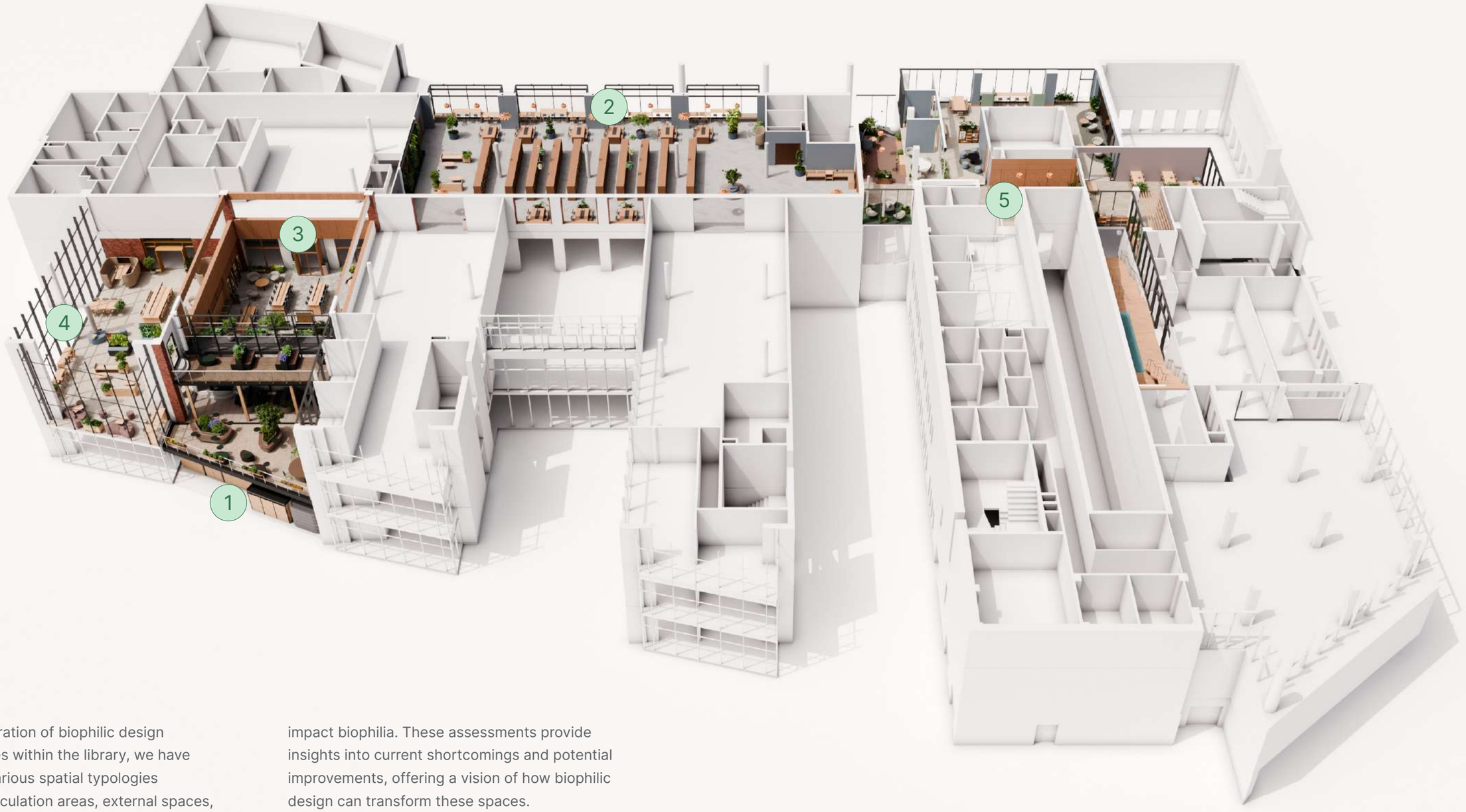
Our vision for this project is to enhance the library experience for students by incorporating biophilic design principles, with a focus on promoting wellness, comfort, and productivity. Through the thoughtful integration of natural elements, we aim to transform the library into a rejuvenating environment that supports the holistic well-being of all its users.

A recent user survey highlighted several key issues within the current library space, including a lack of greenery, thermal discomfort, and feelings of stress, anxiety, and nervousness. These insights underscore the need for a revitalised approach to the library's design.

The pilot project aims to address these concerns by introducing biophilic elements such as increased greenery, improved thermal regulation, and calming natural features. By resolving these issues, we aspire to create a library environment where students feel relaxed, comfortable, and inspired, ultimately enhancing their overall academic experience and well-being.

Through this project, we envision a library that not only meets the functional needs of its users but also serves as a sanctuary that nurtures the mind, body, and spirit, fostering a deeper connection to nature and a more enriching campus experience.

Spatial Typologies



In our exploration of biophilic design opportunities within the library, we have identified various spatial typologies including circulation areas, external spaces, collaborative rooms, book storage areas, and the atrium reading/events room. Each typology serves as an example of how biophilic design principles could be incorporated to enhance the library environment.

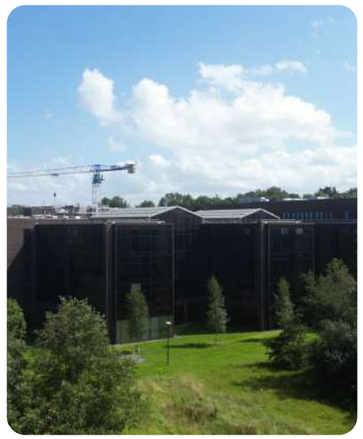
For each spatial typology, we present a 'before and after' analysis, highlighting elements that negatively and positively impact biophilia. These assessments provide insights into current shortcomings and potential improvements, offering a vision of how biophilic design can transform these spaces.

We have tagged new interventions as low, medium, or high-level interventions based on their implementation difficulty, helping to prioritise and plan the integration process. It is important to note that these are exploratory analyses rather than concrete design proposals, intended to inspire and inform the integration of biophilic elements across the library.

LEGEND

1. External Spaces
2. Book Storage Areas
3. Atriums
4. Study Rooms
5. Circulation Areas

External Spaces



Prospect

Visual Connection with Nature

Presence of Water

ELEVATED AREAS

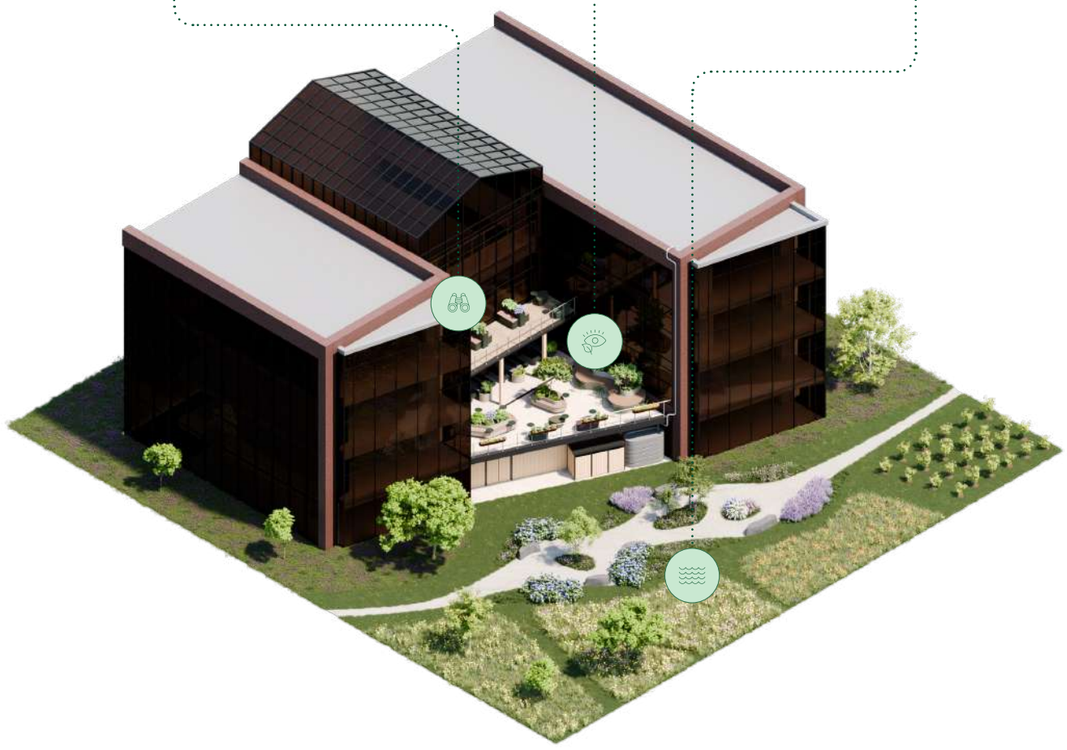
Raised platforms or mezzanines offer a vantage point over the interior of the library and, if possible, the exterior surroundings. This can fulfill the human desire for prospect, allowing users to see and be seen.

ROOFTOP GARDENS

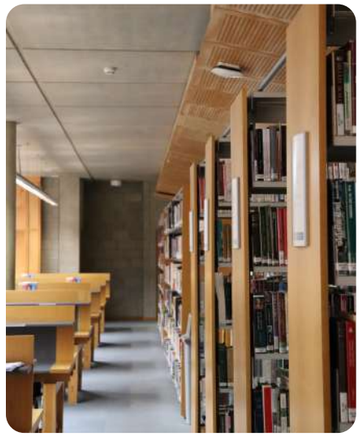
Architectural designs that incorporate glass facades or rooftop gardens, offering expansive and immersive natural vistas that transform the learning environment.

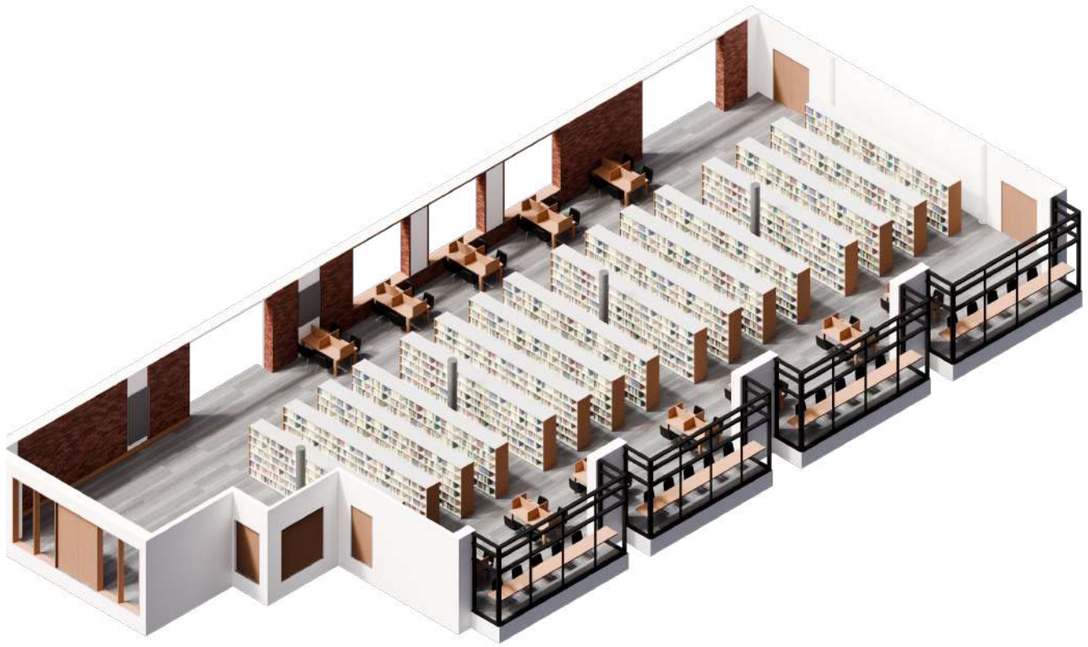
RAIN GARDENS

Create rain gardens in outdoor areas associated with the library. These not only manage stormwater sustainably but also allow users to observe the natural water cycle up close.



Book Storage Areas





Prospect

Refuge

Thermal/Airflow Variability

ZONE WITHOUT OBSTRUCTION

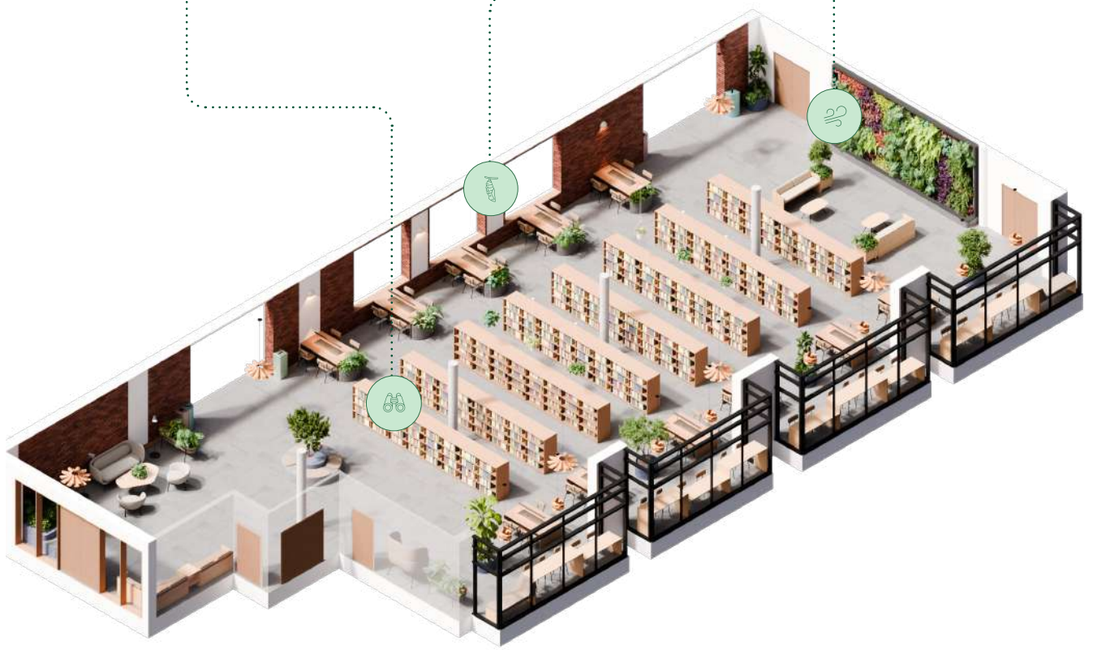
Use low bookshelves to define different areas within the library without significantly obstructing views. This maintains a sense of prospect while still providing necessary functional separations.

WINDOW SEATS

Create window seats, alcoves, or reading nooks that are slightly removed from the main traffic flow. These spaces can offer both comfort and a sense of personal space, along with natural light and views.

GREEN WALLS

Incorporate living walls that naturally insulate the building, reducing temperature fluctuations. These features can be designed to allow user interaction, such as opening or closing sections to control shade and air quality.



Atriums

Risk/Peril

Non-Visual Connection with Nature

Material Connection to Nature

MEZZANINES

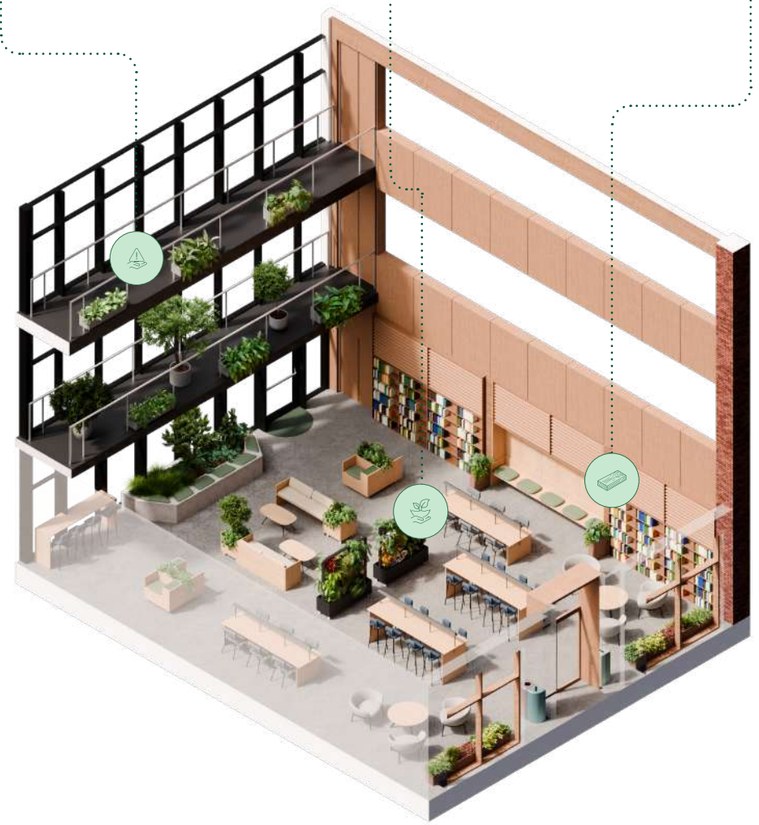
Design elevated areas within the library that allow users to experience height and perspective, such as mezzanine levels or viewing platforms overlooking interior spaces or natural vistas outside.

SCENTED PLANTS

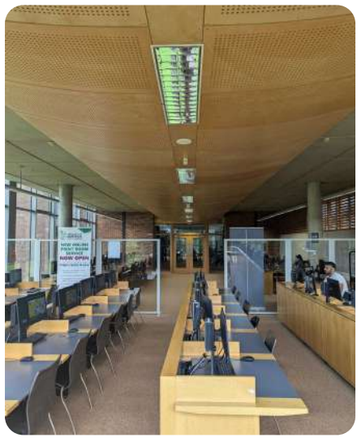
Use aromatic plants within spaces that can safely and subtly release natural scents into the air, like lavender for calmness or rosemary for focus.

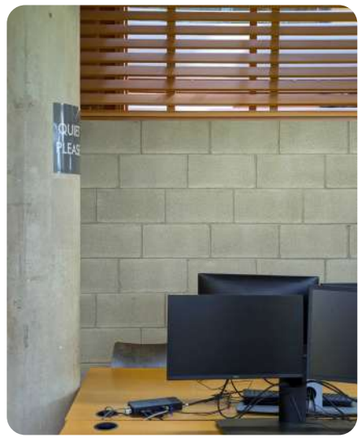
MATERIALITY

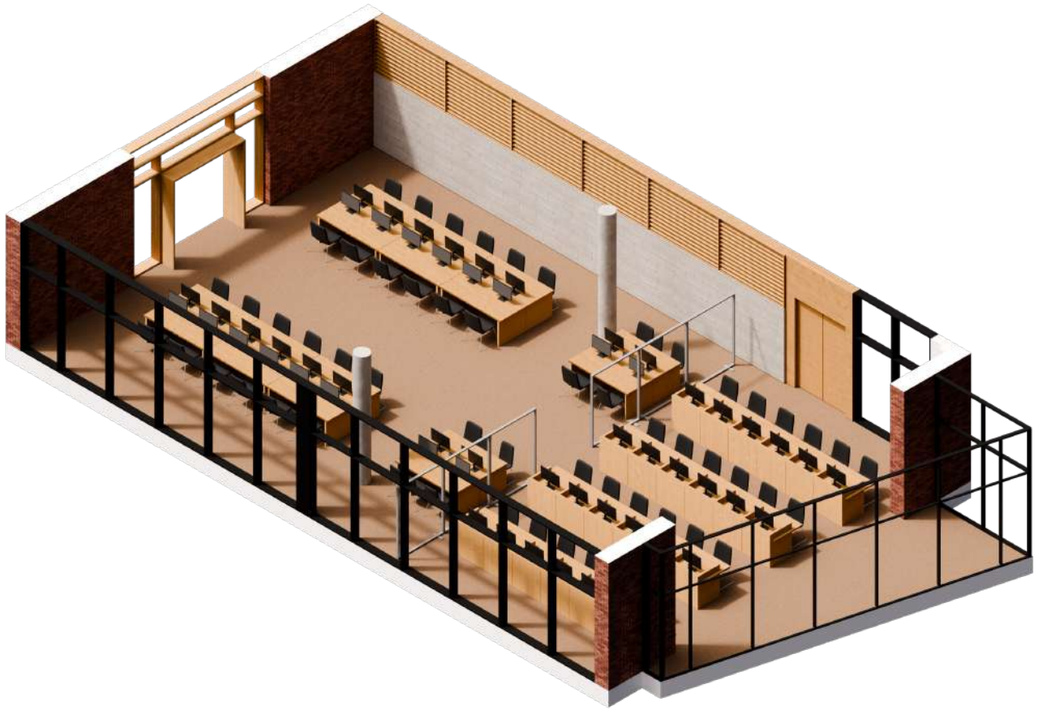
Incorporate natural materials, like wood in structural elements, finishes, furniture, and decorative details. The visual and tactile qualities of stone can evoke a sense of solidity and permanence, grounding users in the space.



Study Rooms







Connection to Natural Systems

Mystery

Biomorphic Forms and Patterns

ENVIRONMENTAL FEEDBACK

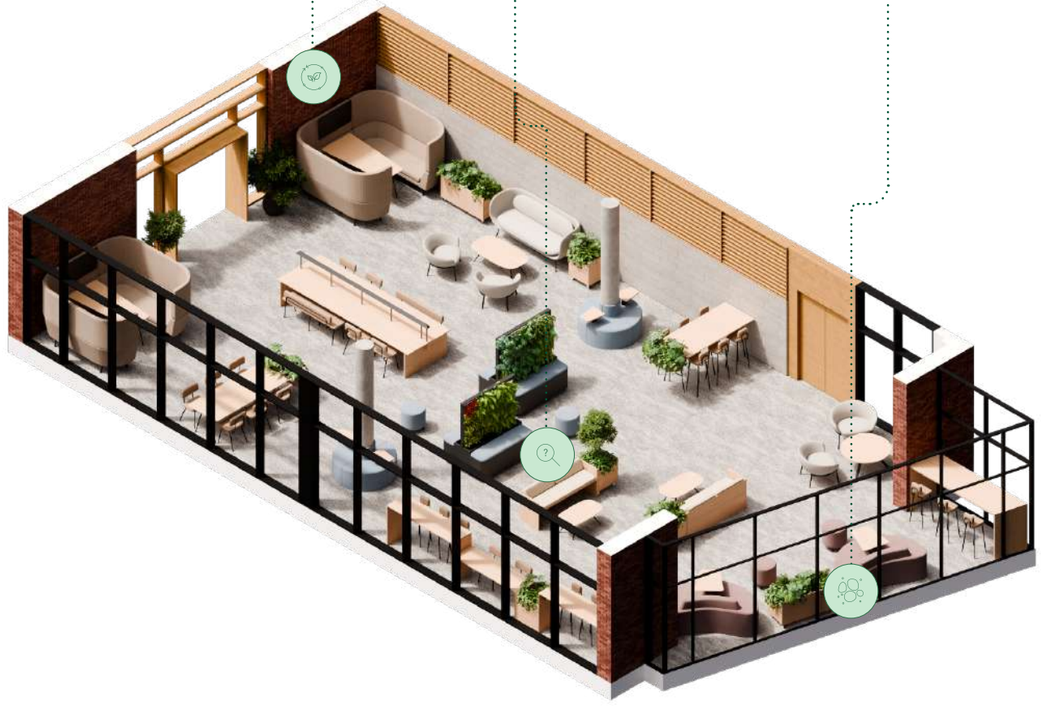
Use systems that provide real-time data on the natural environment around the library, such as weather conditions, rainwater collection levels, and even air quality readings.

INDIRECT ROUTES

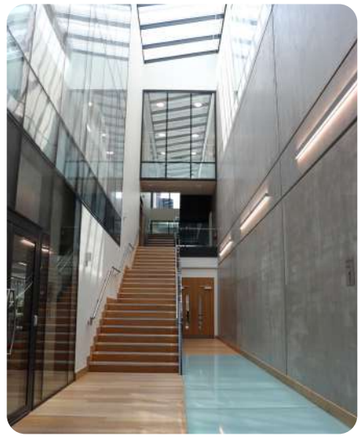
Instead of straight, predictable paths, design walkways that curve or meander, obscuring the full view of what's ahead and encouraging exploration.

CURVILINEAR SHAPES

Incorporate curvilinear and organic shapes into the architecture, moving away from strictly rectilinear forms. This could manifest in the overall building shape, windows, doorways, or interior architectural elements.



Circulation Areas



Biomorphic Forms and Patterns

Dynamic and Diffused Light

Complexity and Order

ART INSTALLATIONS

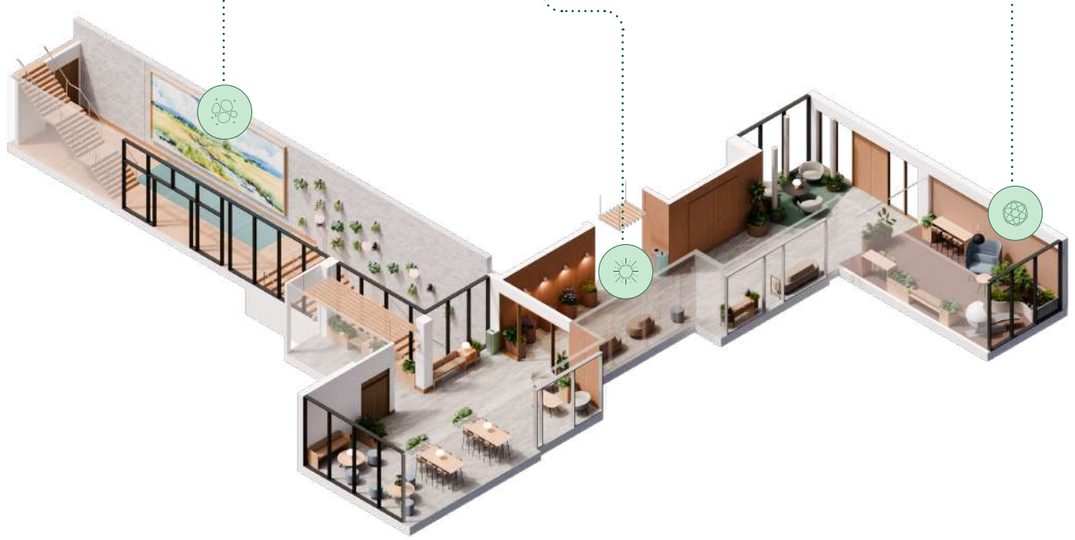
Commission or select art pieces for the library that reflect biomorphic forms and patterns. This can range from large-scale sculptures to detailed wall hangings or mosaics that draw the eye and engage the mind.

DIFFUSED LIGHT FIXTURES

Incorporate light fixtures that diffuse light broadly, avoiding direct glare and creating a soft, ambient lighting condition that changes subtly, reflecting the variability found in nature.

INTEREST POINTS

Use design elements to create interest points and landmarks that help users navigate the space. This could be a distinctive piece of art, a unique architectural feature, or a beautifully designed reading nook.

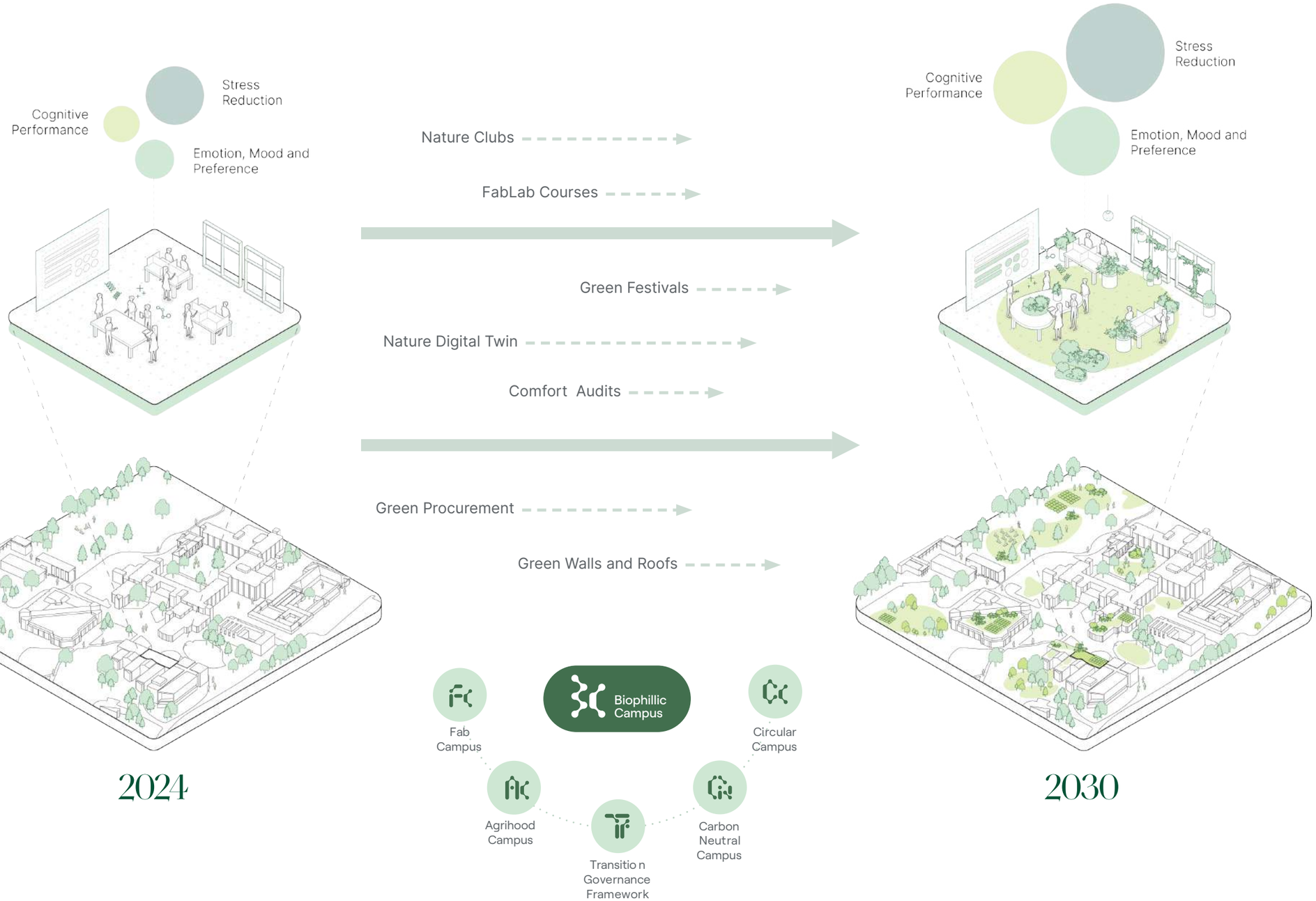


04 Enabling Implementation

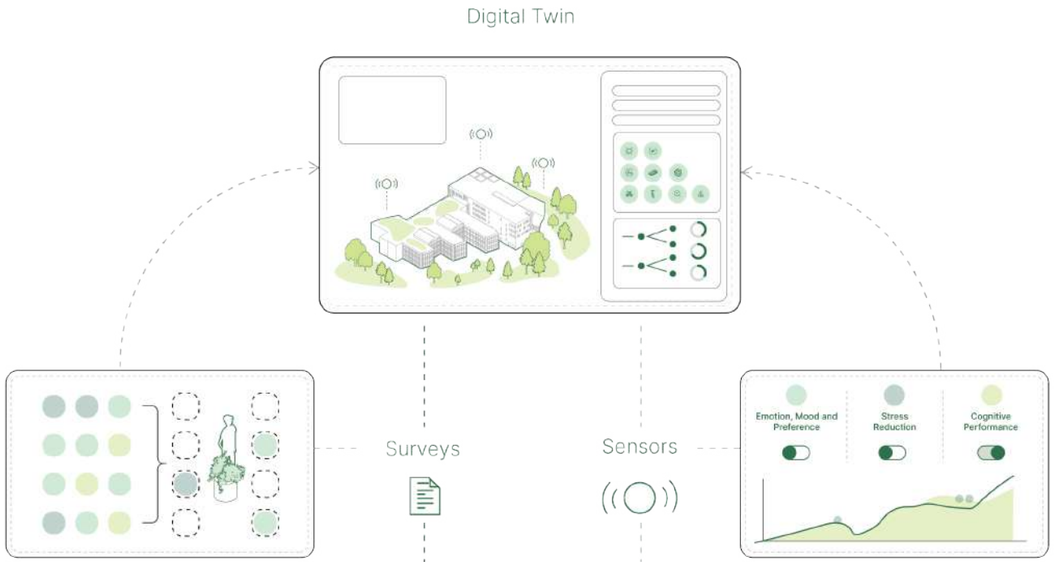
Adopting a Systems Approach to Campus-wide Change

Adopting a systems approach to campus-wide change means recognising the power of small interventions in existing spaces to drive significant, positive transformations across the entire university. By thoughtfully integrating biophilic design principles into both internal and external areas, we can create a cohesive and impactful shift towards a healthier, more connected campus environment.

The importance of these incremental changes lies in their cumulative effect on the campus community. Even modest improvements, such as adding greenery, enhancing natural light, or creating calming outdoor spaces, contribute to a larger goal of fostering well-being.



Monitoring & Assessment



To ensure the success and continuous improvement of the Biophilic Campus mission, we will integrate monitoring and assessment mechanisms in collaboration with another campus mission, 'Digital Campus Commons'. This initiative has established a campus digital twin, a virtual replica of the university, designed to measure the impact of various missions, including our biophilic design efforts.

For the Biophilic Campus mission, tangible data such as thermal comfort, air quality, and light levels will be monitored through an array of sensors strategically placed throughout the library and other campus spaces. This real-time data collection will provide objective insights into the environmental conditions that influence well-being and productivity.

In addition to these measurable parameters, we will assess changes in human experience and wellness through regular user surveys. These surveys will gather qualitative data on how biophilic interventions affect mood, stress levels, and overall satisfaction with the library environment.

All collected data, both quantitative and qualitative, will be integrated into the campus digital twin dashboard. This comprehensive platform will enable us to track progress, identify areas for improvement, and ensure that our interventions are effectively enhancing the campus experience.

Through ongoing monitoring and assessment, we aim to create a dynamic and responsive biophilic campus that continuously evolves to meet the needs of our community.

Call to Action

The library pilot project will serve as a demonstrator for other buildings interested in undertaking a biophilic campus project. By showcasing the tangible impact of biophilic interventions, the library will act as a living example where people can observe and experience the benefits firsthand.

The hope is that this pilot will inspire and motivate additional projects across campus, fostering a widespread adoption of biophilic design principles to enhance well-being and productivity throughout the university.

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