

ABSTRACT

Title of Thesis: CO-CREATION:
A MODEL FOR COLLABORATION +
CREATIVITY

Sophie Habib, Master of Architecture, 2018

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This thesis will explore a new building typology that will combine passive learning and active practice. The new building typology will foster creativity and collaboration and will benefit students, professionals, and community members. As a result, users can begin to share ideas, resources, and knowledge related to the creative process. The engagement of people and ideas are what help create new forms of knowledge and aid in the growth of the mind.

As humans, we must promote the mental and physical well-being of people by feeding the mind, body, and spirit. The built and natural environment aid in this process and serve as a model for creative synergy. This synergy will be demonstrated through the programmatic design of the new building typology within the urban context of Denver, Co. The site will be located at the confluence of South Platte River and Cherry Creek.

CO-CREATION:
A MODEL FOR COLLABORATION + CREATIVITY

by

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Dedication

To Jesus Christ.

To my family for all their love, patience, and support.

Acknowledgements

To my thesis committee,

Professor Julie Gabrielli, my thesis chair, thank you for your support and guidance throughout this creative process; research, design, and review. I couldn't have done it without you.

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To my loving family,

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Chapter 1: Creative Theory

Design Culture – Value of Creativity

DEFINING CREATIVITY

Creativity is about seeing patterns, formulating ideas, and creating connections to create positive outcomes. Creativity is “an increasingly important element by governments and industry for the social and economic wellbeing of societies worldwide,” yet it is not widely recognized or understood.¹ However, creativity is found in all aspects of life, whether it is in design, innovation, or collaboration. Initially, the concept of creativity begins within the ‘design process’ and results in a successful, or not so successful, design outcome. This process can map out motives and reasoning throughout the various design phases and can demonstrate the “complex nature of creativity.”² The effects of “risk, ambiguity, difference, challenge, change and making new meaning” are associated with overarching and complex ideas.³ Creativity is often feared, because it is not always understood or expected. It relies on a level of conformity to function and maintaining accepted norms.

So how does challenging the norm of creativity demonstrate both knowledge and process, simultaneously? To reflect on creative thinking in the built environment,

¹ Martin, Paul ed. *Making Space for Creativity*. Creativity Centre. University of Brighton, 2010. Page 13.

² Martin, *Making Space for Creativity*, Section II

³ Martin, *Making Space for Creativity*, Section II

this chapter will “explore and enhance creativity in learning, the facilitation of learning, and the knowledge and practice in the creative process.”⁴

When acceptance and conformity are required, it is important “to engage in creative inquiry.”⁵ It is only when we place ourselves in a creative state of mind that we are open to new possibilities, ones which can be achieved by being aware of the conditions in which the mind creates. Many psychologists and philosophers, refer to these conditions as “veils of perception.”⁶ Through existing knowledge, values, and beliefs, the awareness to suspend judgement separates the conscious issues from external objects.⁷

“Creative Inquiry” can be justified through the process of analyzing or synthesizing the ideas and problems revealed through design research. The perception of the idea becomes more apparent as knowledge grows and the design research goes through several iterations, even after numerous failed attempts. Often, the feeling of accomplishment occurs when questions are answered, ideas become a reality, and knowledge breaks boundaries.

⁴ Martin, *Making Space for Creativity*, 14.

⁵ Martin, *Making Space for Creativity*, 18.

⁶ Martin, *Making Space for Creativity*, 18.

⁷ Martin, *Making Space for Creativity*, 18.

ACCEPTING FAILURE

“Not all creative endeavors are successful and it is perhaps a willingness to risk failure that is a key feature of the creative process.”⁸ – Paul Martin

Failure can highlight issues that need attention and carefully thought out solutions. It is in those moments that one finds reason and justification throughout the design process. It can be a portal or spike in the timeline where creativity becomes a habit. Often, learning from failure can build resiliency and eliminate the perception of perfection. Perfection can prevent people from continuing to engage with the unknown and hence not knowing what they can achieve. In *Knowledge, Creativity, and Failure*, Dr. Christopher Hay, an Associate Lecturer at the National Institute of Dramatic Art (NIDA), states that the pedagogy of failure accounts for:

“..relationality as well as isolation— how all of the parts work on their own as well as how all of the parts work together, how these expectations are formed as well as how they are stretched or upset by the demands of contexts. Additionally, it would have to incorporate unpredictability and improvisation. And, a pedagogy of failure would have to foreground the felt experience of creative and intellectual work, the affective quality that causes failure to be noticed.”⁹

The experiences made by failure are likely to be the most memorable, the best explained, and generate numerous ideas for future design efforts. The learning taught by failure has a significant impact on the development of creative thinking and the design process.

⁸ Martin, *Making Space for Creativity*, 18.

⁹ Hay, Chris. *Knowledge, Creativity and Failure: A New Pedagogical Framework for Creative Arts*. Cham: Springer International Publishing, 2016. Accessed October 28, 2017. ProQuest Ebook Central. Page 89.

DESIGN: RESEARCH & PROCESS

Design has several deficiencies far from just the negative connotation behind failure. Often, it suggests that only the designer is creative, “it fails to recognize the creativity of others involved in the conception, production and experience of architecture (such as the builder or user), or it promotes the superiority of the intellect and denigrates the manual, material and experiential.”¹⁰ The opportunity to be creative can often depend on one’s need to either explore an idea or solve a problem. By looking to explore ideas gathered over time and obtained through experience, there is an important need to acknowledge the right design research needed and understand from the countless failed attempts. This process will support the growth of an idea into something tangible, or even intangible—like an experience.

In *Design Research in Architecture*, Murray Fraser, a Professor of Architecture and Global Culture at the Bartlett School of Architecture in London, states that ‘design’ is defined by the following (*Figure 1*):¹¹

¹⁰ Fraser, Murray, ed. *Design Research in Architecture: An Overview*. Design Research in Architecture. Farnham, Surrey: Ashgate, 2013. Page 22.

¹¹ Fraser, *Design Research in Architecture*, 24.

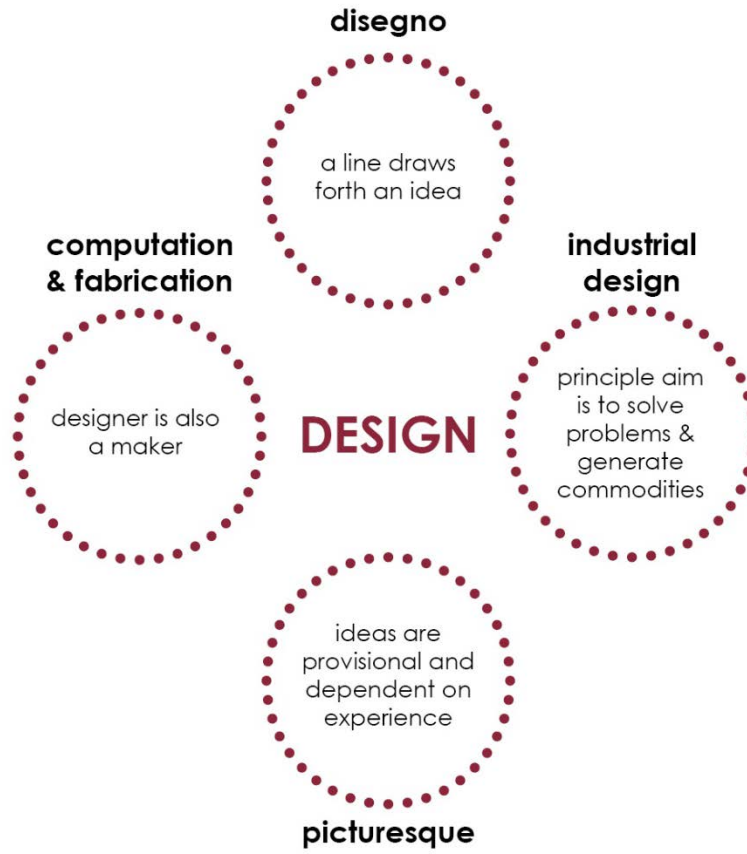


Figure 1: Types of Design (Source: Image by Author, based on text by Murray Fraser)

In reality, whether we work “as academics or as practitioners, we will combine these models because together they reflect the complexities of the architecture discipline.”¹² It is also just as important to realize these models, as leading principles, are not only in found in the built environment.

¹² Fraser, *Design Research in Architecture*, 24.

CREATIVE EXPRESSION

Expressing creativity often relies on the way we teach and how we learn. In *Making Space for Creativity*, Paul Martin, an academic manager at the Brighton Creativity Centre, outlines an approach to design process (*Figure 2*):¹³



Figure 2: Design Process (Source: Image by Author, based on text by Paul Martin)

While, this process often changes depending on the field of study, it still reflects the way we begin to develop our own design ideas. Our methods of approach and delivery are organized into a design pallet that contains a design logic that can be interpreted or shared. It becomes “a hybrid of intellectual and manual labor and digital and craft techniques.”¹⁴ With this in mind, it is important to understand what stimulates or limits creativity.

STIMULATING CREATIVITY

To stimulate creative expression, it is important to follow the general attributes associated with creative individuals. Identifying and developing these attributes will begin to enhance the likelihood of creative expression.¹⁵ In *Design*

¹³ Martin, *Making Space for Creativity*, 20.

¹⁴ Fraser, *Design Research in Architecture*, 24.

¹⁵ Roth, Bernard. *Design Process and Creativity*. University of Negev Mechanical Engineering Department, Beer Sheva, Israel. Stanford University, 1973. Page 9.

Process and Creativity, Bernard Roth, a founder of the Hasso Plattner Institute of Design at Stanford (the d.school), listed these attributes, in *Figure 3*.¹⁶ These attributes are particularly important when it comes to innovation and human-centered design. Even while stimulating creativity, it is important to realize that there are attributes that can depress or limit creativity.



Figure 3: Attributes for Stimulating Creativity

(Source: Image by Author, based on text by Bernard Roth)

DEPRESSING CREATIVITY

The beauty found in the built environment does not only exist because of the attributes that made it possible but by overcoming the blocks found in everyday life. New ideas are often conceptualized and lost. However, it is equally as important to

¹⁶ Roth, *Design Process and Creativity*, 9.

formulate new ideas in order to solve problems or address ‘blocks’. Roth mentions that “many people are creative because of so-called "road blocks" to creative behavior. If these are recognized in time, they can be counter-acted and continually guarded against.”¹⁷ A ‘road block’ can be identified as a ‘mental wall’ in conceptual design ideas. It tends to limit the people in finding solutions – in this case creative ones. Roth goes further to identify, “the primary cause of conceptual blocking is *mental inflexibility*.”¹⁸ It is not only important to understand the blockage, but to find the space and willingness to overcome it. Roth identifies these blocks, in *Figure 4*, as perceptual, environmental, emotional, imagination, intellectual, expressive, and cultural.¹⁹ Studies have shown that creative blocks can be addressed (to a degree) and prevented through collective sharing and collaboration. It brings a new level of discovery and can provide a platform for gathering ideas and finding new design solutions.

¹⁷ Roth, *Design Process and Creativity*, 9-10.

¹⁸ Roth, *Design Process and Creativity*, 9-10.

¹⁹ Roth, *Design Process and Creativity*, 9-10.

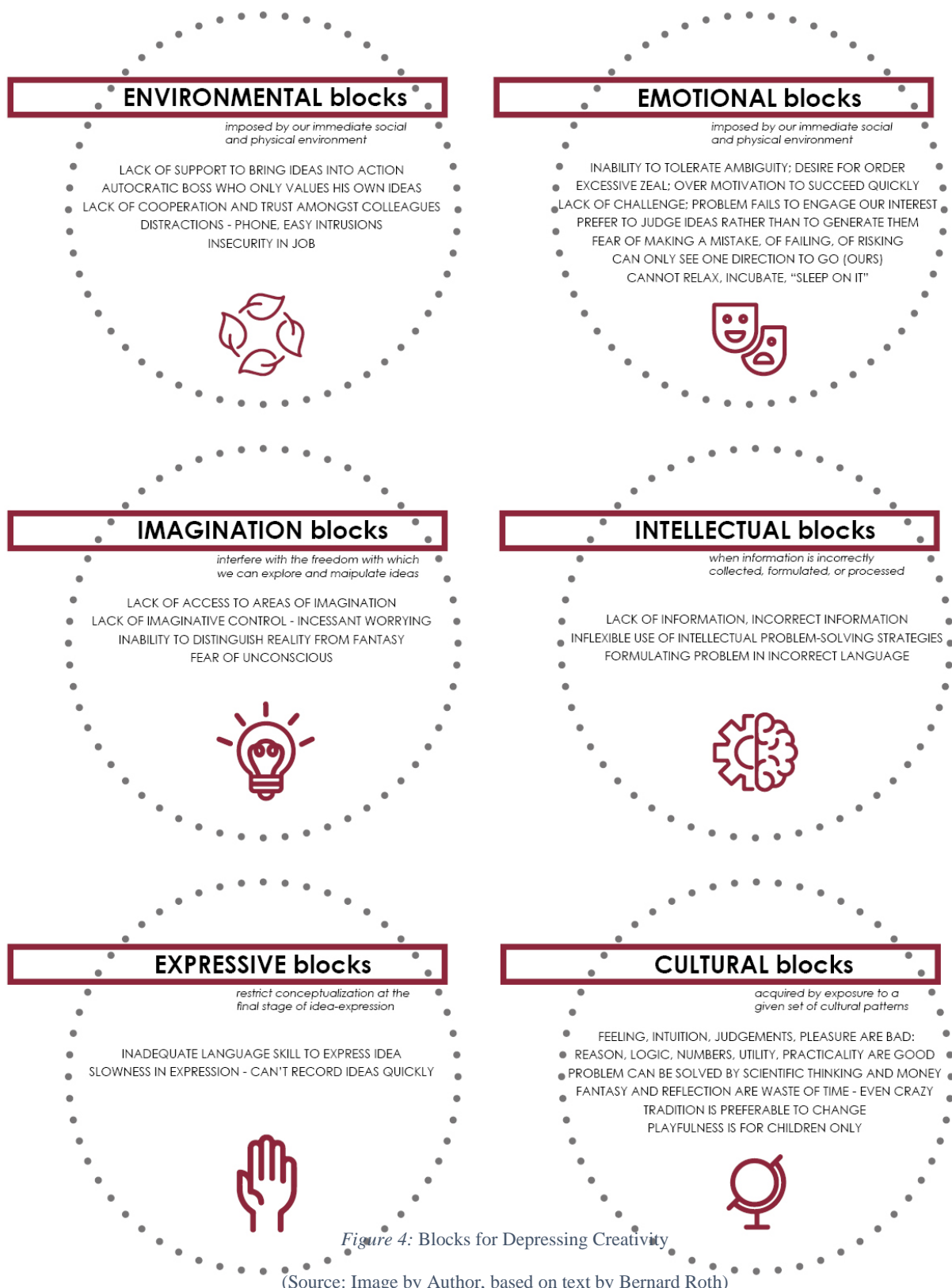


Figure 4: Blocks for Depressing Creativity

(Source: Image by Author, based on text by Bernard Roth)

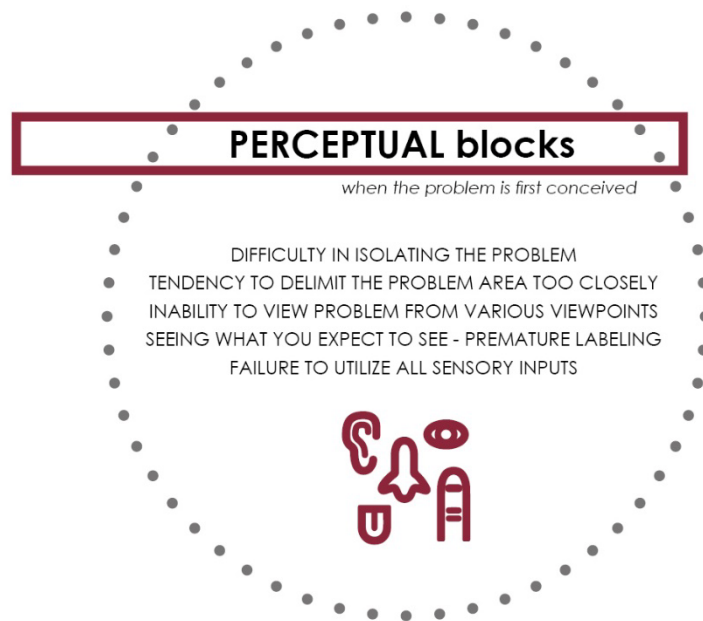


Figure 4: Blocks for Depressing Creativity

(Source: Image by Author, based on text by Bernard Roth)

Collaboration & Interdisciplinary Interaction

COLLABORATION

Collaboration can motivate people to share, learn, explore new ideas.

Unfortunately, “diverse course offerings are still separated from one another, with little opportunity for integrated techniques and innovative multidisciplinary collaborations.”²⁰ Professional degrees are designed to provide students with a set of skills for real-world applications. However, it is crucial that for the successful development of creative expressions, all disciplines engage in research,

²⁰ Kolarevic, Branko, and Kevin R Klinger. *Manufacturing Material Effects: Rethinking Design and Making Architecture*. New York: Routledge, 2008. Page 31.

experimentation, and collaboration; to blur the line with what is already known and what is yet to be explored. The engagement of people and ideas is what helps to create new forms of knowledge and aid in the growth of the mind.

Programs like the Solar Decathlon emphasize the need for interdisciplinary collaboration. A diverse set of disciplines helped ensure the success of the project. Most importantly, it gave students and professionals the opportunity to learn from each other. Spaces specifically designed to encourage many disciplines to collectively work together can foster creativity and revolutionize collaboration.

With the scope of the research focused on creativity and collaborative environments, the outreach and development are based on spaces that stimulate creativity and break through “creative block.” The strategies are centered around human interaction and collaboration to induce creative responses to the built environment.²¹ Actions that give people the opportunity to articulate without only having to put matter into words are an essential part of creativity. So, how does creativity, the taking of an idea(s), transform into reality or physical space?

²¹ Fraser, *Design Research in Architecture*, 198.

Chapter 2: Ideas into Physical Space

Learning by Doing

DESIGNER AS MAKER

“Have the roles of designers and makers changed in a way that we’ve not experienced before, and is a new approach to making architecture emerging?”²² – Bob Sheil

The art of making is about bringing implementation, discovery, and innovation to new ideas. How can the manifestation of new ideas transform into physical space? Bob Sheil, the Director of Technology and Computing at The Bartlett School of Architecture, University of College London, states that the alternative role of a designer could be one that “utilizes and transfers their highly developed and adaptive skills into the visual propositioning of space and form, and supplement their skills and tacit experiences of making and assembly.”²³ The new role defines the designer as “someone who is also a maker, and one that is directly engaged within the arena of production.”²⁴ The importance of taking ideas and transforming them into the physical space is a result of wanting to make an positive impact, solve a problem, or change what is being perceived. Architecture, and the built environment, is a great example of the visions designers once had or have for a place. The intimacy between “drawing and making is rare in the practice of architecture and that architectural drawing must therefore anticipate and understand the difference between the

²² Sheil, *Manufacturing the Bespoke*.

²³ Sheil, *Manufacturing the Bespoke*, 15.

²⁴ Sheil, *Manufacturing the Bespoke*, 15.

simulated and the actual and adapt accordingly.”²⁵ With the tools available today, creativity can rapidly expand into “materiality, craft, ornamentation, fit, uniqueness and the unrepeated.”²⁶ The ability to “approach design as a strategic act with novel outcomes,” can begin to improve the built environment. ²⁷

THE TOOL

“How can the new tools available to the architects bring people together - not only to inhabit, but to change, augment, and ultimately create the environment around them?”²⁸ – Carlo Ratti in *Open Source Architecture*

By giving people the tools and resources, it will encourage them to come together, and share knowledge and ideas. Neil Gershenfeld, the Director of MIT’s Center for Bits and Atoms, created a Fab Lab at the institute to encourage students to use the technology available with the purpose of creating something meaningful. Professor Gershenfeld believes in the idea of “construction as education,” and says that “‘Constructionism’ is grounded in the idea that people learn by actively constructing new knowledge rather than by having information ‘poured’ into their heads...people learn with particular effectiveness when they are engaged in constructing personally meaningful artifacts.”²⁹ With an open source movement, the use of the internet and production tools will begin to facilitate the model of open sharing. The available tools and/or equipment coincide with the required materials

²⁵ Sheil, *Manufacturing the Bespoke*, 9.

²⁶ Sheil, *Manufacturing the Bespoke*, 8.

²⁷ Sheil, *Manufacturing the Bespoke*, 9.

²⁸ Ratti, *Open Source Architecture*, 77.

²⁹ Ratti, *Open Source Architecture*, 79-80.

needed in the process of creating things of all scales and therefore making it essential to understand that a designer is also a maker.

THE MEDIUM

As designers become makers, the transformation is as important as the medium used to make the abstract tangible. The key element is in how “an intimate knowledge of materials and their performance in use, informs design and relates to its method.”³⁰ Brando Kolarevic, an Associate Professor at the University of Calgary Canada, and Kevin Klinger, an Associate Professor at the University of Indiana, stated, in *Manufacturing Material Effects Rethinking Design and Making in Architecture*, that “interrogating materiality is fundamental to new attitudes towards achieving design intent” and continued by stating, “architecture is fundamentally a material practice.”³¹ It is important to integrate materiality during the early stages of designs, when ideas are still being developed. Often, depending on what is currently available, this process can limit creativity and the will to explore new possibilities. By “manipulating material variables in composites for local performance criteria, entirely new material, tectonic, and ornamental possibilities open up.”³² Creativity begins to resonate when ideas are shared, resources are available, materials are integrated, and dialogue is exchanged within a collaborative environment made up of many disciplines; resulting in a total work of art.

³⁰ Sheil, *Manufacturing the Bespoke*, 9.

³¹ Kolarevic, *Manufacturing Material Effects Rethinking Design and Making in Architecture*, 7.

³² Kolarevic, *Manufacturing Material Effects Rethinking Design and Making in Architecture*, 6.

Total Work of Art: Gesamtkunstwerk

WALTER GROPIUS & THE BAUHUAS SCHOOL

Walter Gropius was an important architect in the 20th century for his modern architecture. Over the years, Gropius noticed that the arts were beginning to drift apart. He knew that,

“the idea of harmonizing an eclectic group of individual thinkers into a cohesive group mentality is not a discovery. The seed was planted as a Bauhuas idea where complementary relationships between various artistic fields were welcomed in response to Germany’s motivation to reunite creativity and manufacturing through rejuvenating design.”³³

The purpose of the Bauhuas was to design a place where people of all disciplines came together to form a total work of art, “Gesamtkunstwerk.” The only way to do that was to “embraced elements of art, architecture, and graphic design, interior design, industrial design, and typography in its design, development and production.”³⁴ Students could participate in all fields of study. They could work towards an interconnected, design environment by working collaboratively amongst other disciplines at the school. Gropius sought to “forge a new meaning for the architect of the future. All arts would come together as a single, elegant Gesamtkunstwerk, articulated through a top-down model of design.”³⁵ The school was able to spark a generation of visionaries compelled to seek creativity through the

³³ Gupta, *Interdisciplinary Practices in Architecture*.

³⁴ AD Editorial Team. *Spotlight: Walter Gropius*.

³⁵ Ratti, *Open Source Architecture*, 17.

natural and built environment.³⁶ Unlike the built environment, the natural environment has over a billion years of untold stories and in order to tap into topics like biomimicry, we need to collaborate with people of other disciplines, like biologist.

BIOMIMICRY & THE BIOLOGIST

Biomimicry is “innovation aspired by nature, looking to nature as a teacher.”³⁷ The emerging discipline is dedicated to the research and understanding of how humans are not just “looking to nature” to learn “about,” but to learn “from.”³⁸ Janine Benyus, is a biologist, author, and innovation consultant. In her article, *Biomimicry: What would nature do here?*, she agrees that designers need “biologist at the design table.”³⁹ Benyus admits by saying, “we are seeing more and more—companies and local governments inviting ‘biologist to the design table’ when creating buildings, transportation systems, products, manufacturing processes, and so on.”⁴⁰ By being “involved in any kind of design, whether a product, a process, or a policy,”⁴¹ it is important to ask the experts, who have a broader knowledge of the subject, to underline the benefits or issues that might occur; it might open a window to new discovery.

Similar to Walter Gropius’ Bauhaus, nature’s discoveries should be public for people of all disciplines, to have the ability to integrate these ideas into their

³⁶ Ratti, *Open Source Architecture*, 17.

³⁷ Ausubel, *Nature’s Operating Instructions: The True Biotechnologies*, 5.

³⁸ Ausubel, *Nature’s Operating Instructions: The True Biotechnologies*, 5.

³⁹ Ausubel, *Nature’s Operating Instructions: The True Biotechnologies*, 3.

⁴⁰ Ausubel, *Nature’s Operating Instructions: The True Biotechnologies*, 16.

⁴¹ Ausubel, *Nature’s Operating Instructions: The True Biotechnologies*, 16.

exploration. Right now, “engineering, architecture, and design students take no biology classes, so this would be a welcome change.”⁴² Wade Davis is an anthropologist, ethnobotanist, author, and an “explorer-in-residence” at the National Geographic Society. In his article, “A World Made of Stories, Saving the Web of Cultural Life”, shares

“every view of the world that fades away, every culture that disappears, diminishes life’s possibilities and reduces the human repertoire of adaptive responses to the problems that confront us all. Knowledge is lost, not only of the natural world but also of the spirit realms, intuitions about the meaning of the cosmos, insights into the very nature of existence. This is why it matters that we tell these stories and make these journeys.”⁴³

The knowledge one holds in a life time should not be lost, it should be shared and built upon. The growth cannot be done alone, it should be received by those who wish to discover this knowledge with a means to better themselves and the world. Unlike, the medieval model of master and apprentice, a top-down approach to learning, the sharing of knowledge should relate to the equal sharing of ideas from “person to person.”

⁴² Ausubel, *Nature’s Operating Instructions: The True Biotechnologies*, 16.

⁴³ Ausubel, *Nature’s Operating Instructions: The True Biotechnologies*, 226.

Making the Connections & Playing a Role

COMMON PURPOSE

“The creative process plays an important role in the arts, design, science, and the professions (medicine, engineering, law, and business). It has many analogues and synonyms.”⁴⁴ – Dubberly Design Office’s “The Creative Process” (refer to Figure 5)

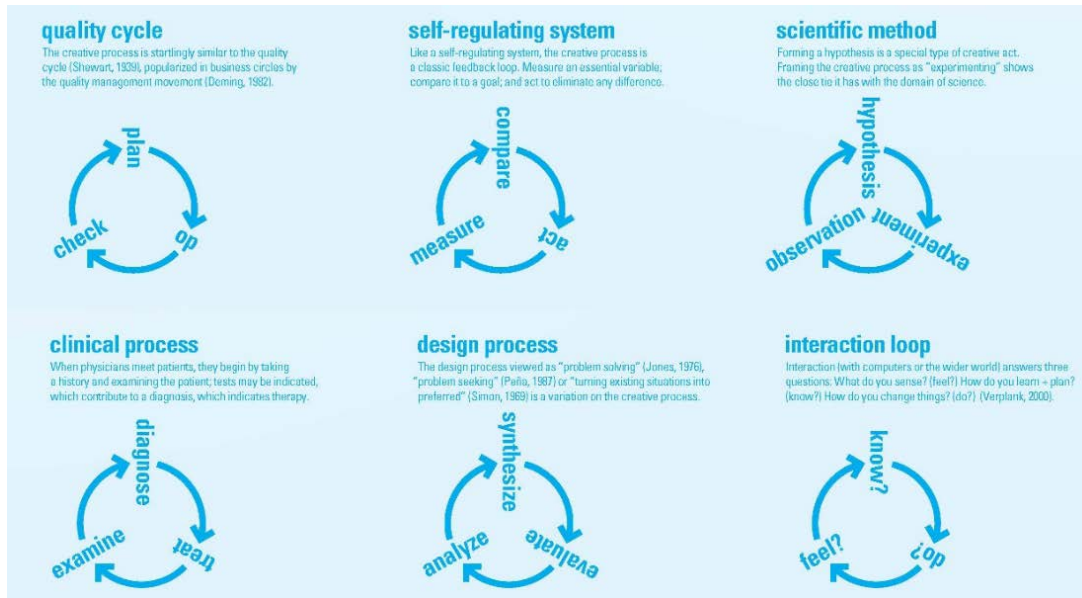


Figure 5: The Creative Process across disciplines. (Source: Image by Dubberly Design Office)

The creative process should be open, free, and accessible to everyone. However, “originality” and the “fear of being accused of imitative work or thinking” becomes a limiting factor in the creative process.⁴⁵ It is important that we eliminate this idea of “originality” and begin to look at it as not starting over but continuing to build upon what already exist. The “linear (dead end) distribution” has become an “accelerated feedback loop within a plural creative input – a plethora or projects are

⁴⁴ Chung, *A Model of The Creative Process*.

⁴⁵ Ratti, *Open Source Architecture*, 25.

emerging to bridge the gap” within disciplines.⁴⁶ When disciplines collaborate for a common purpose, “the magnetic energy of people coming together” becomes “viral, powerful, unconstrained force that accretes as accelerates, beyond the limits of top-down initiatives.”⁴⁷ Collaborative and shared design is the leading model for how we begin to make connections and see the patterns that will shape our future.

To create interaction and dialogue between disciplines, it is essential to promote creativity in both education and the profession. Companies like IDEO, Google, Steelcase, and many others have introduced creative environments in their offices and are beginning to push the boundaries when it comes to creating schools/campuses that encourage people to live, learn, and create. The future of the natural and built environment relies on interdisciplinary collaboration. The necessary changes to the curriculum can persuade people to think and express creativity in remarkable ways. Creativity doesn’t stop here, it is continuously evolving.

⁴⁶ Ratti, *Open Source Architecture*, 88.

⁴⁷ Ratti, *Open Source Architecture*, 82-83.

Chapter 3: Precedent

Companies Promoting Creativity

IDEO

IDEO is a “global design and innovation company committed to creating positive impact.”⁴⁸ IDEO has focused their efforts on human-centered design, and their company’s culture is based on collaborative environments and creativity. IDEO is made up of designers, entrepreneurs, engineers, teachers, and many other disciplines. IDEO provides networks to bring creativity and people together. Networks such as CoLab, IDEO U, IDEO Futures, Open IDEO, and many more. IDEO believes that “everyone is creative; creative organizations are more agile; complex problems are best solved collaboratively; innovation starts with people, technology moves fast; human needs change slowly; and venturing is R&D (research and design).”⁴⁹ The company is able to create extraordinary things because of their shared values and dynamic design thinking strategies and toolkits.

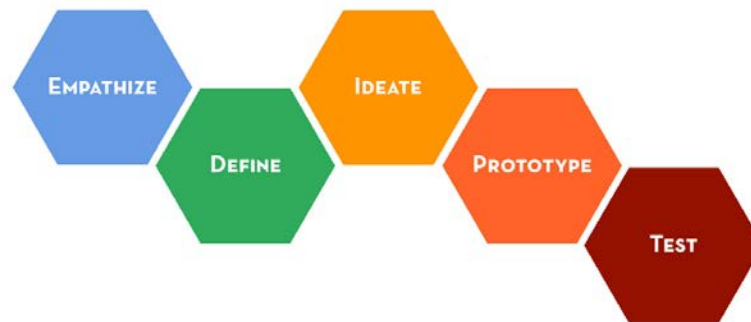


Figure 6: Design Process at IDEO. (Source: Image by IDEO).

⁴⁸ About IDEO.

⁴⁹ About IDEO.

GOOGLE

“We build community hubs, called Campuses, where entrepreneurs come to learn, share ideas, and launch great startups.”⁵⁰ – Google for Entrepreneurs

Google fosters communities of people with similar interest, dreams, and challenges. The “Campuses,” located all around the world, provide a network of spaces for the global community. The seven campus locations are Tel Aviv, London, Seoul, Madrid, Warsaw, Sao Paulo, and Berlin (coming soon). Google is able to provide people with the resources, classes, and connections they need to be successful.

Google’s main campus, Googleplex, is located in Mountain View, California. The campus is comprised of several buildings that create an outdoor communal space, as seen in Figure 7. The quality of the spaces within the buildings are based on the constraints and opportunities presented within the work spaces. The use and quality of the work settings, Figure 8, promote an open and creative learning environment for entrepreneurs to collaborate. The spaces that were frequently used are clubhouse, bakery/coffee shop, supper club, and library. They are often large spaces, where large numbers of people gather and eat; all spaces that employees use throughout the day. The spaces that are not as welcoming are workrooms, workstations, small huddle room, and closed meeting rooms. They are often small spaces that were little to no collaboration; often limiting creativity.

⁵⁰ *Google for Entrepreneurs.*

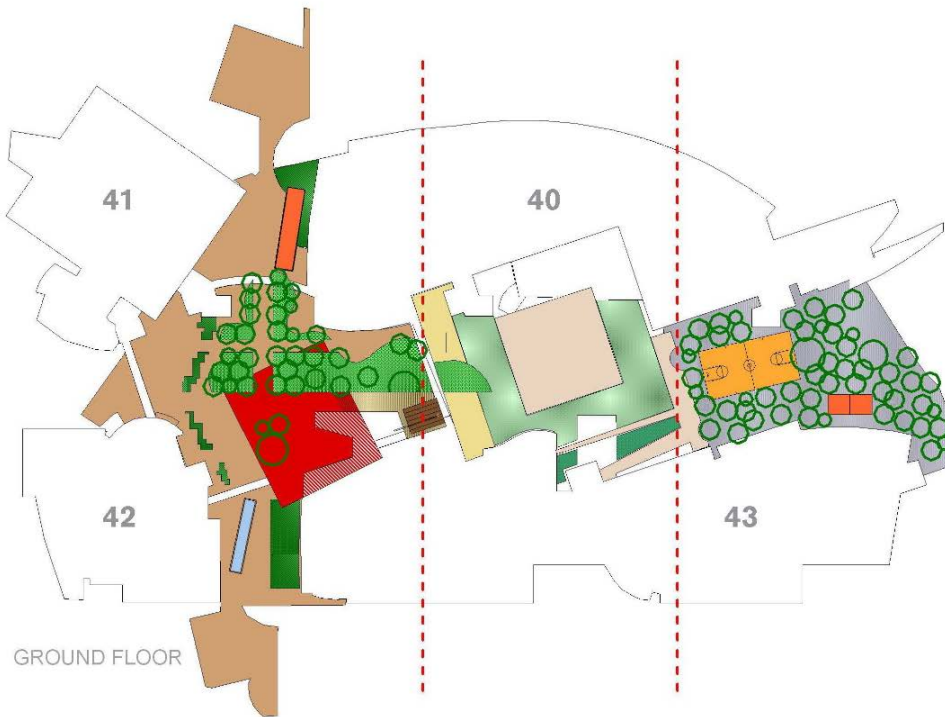


Figure 7: Connecting buildings & outdoor spaces at Googleplex. (Source: Image by Clive Wilkinson architects)

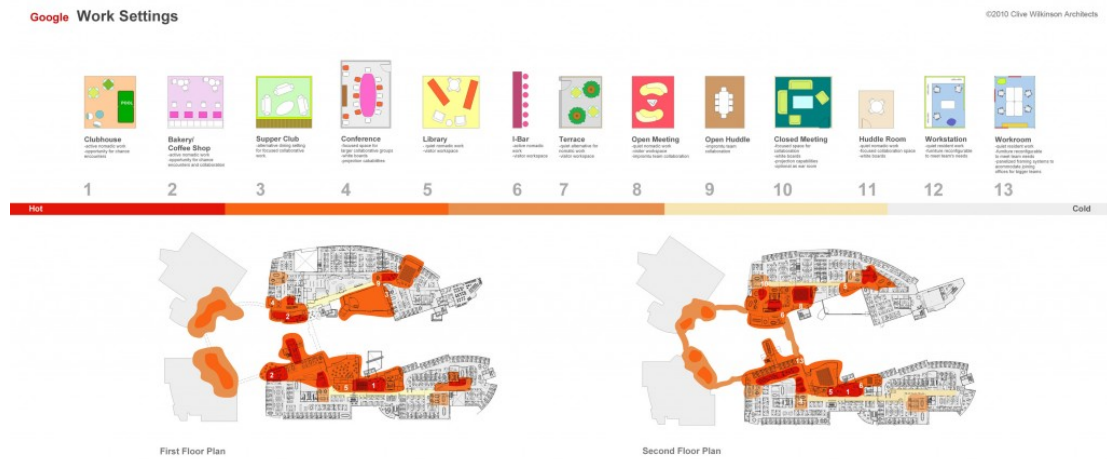


Figure 8: Rooms / spaces used frequently vs. less-frequently. (Source: Image by Clive Wilkinson architects)

Design Schools Promoting Creativity

D.SCHOOL

The Hasso Plattner Institute of Design at Stanford, known as the d.school, was founded in 2005 by David Kelley, who is the founder and chairman of IDEO (refer to subsection: *IDEO*) The d.school is a leader in human-centered design. The school “helps people develop their creative abilities.”⁵¹ It’s a “place, a community, and a mindset.”⁵² The school has 8 core abilities, as seen as Figure 9. The d.school was designed for people to express their cultural values because they valued innovation amongst their team in order to provide spaces for collaboration. The areas designated for a particular use “evolve throughout a space, absorbing different people, spaces, and perspectives,” stated David Kelley in the book *Make Space*.⁵³

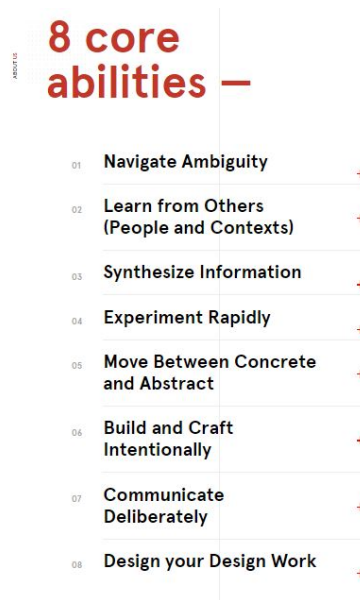


Figure 9: “8 Core Abilities” (Source: Image by d.school at <https://dschool.stanford.edu/about/>)

⁵¹ *A place for explorers & experimenters at Stanford University.*

⁵² *A place for explorers & experimenters at Stanford University.*

⁵³ Doorley, *Make Space*. 5.

The d.school is a dynamic place and has moved several times at Stanford. By “recognizing a tool for designing creative spaces is to create smart parameters that themselves stimulate mindful modification,” they could transform the space in accordance to “scale and the character of the building.”⁵⁴ The instant / shared studio is a shared space that can be used to display student work instantaneously. Open shelving and storage galleries work well in these types of spaces because work tends to fill spaces that are available. Spaces should be adaptable to changing needs. “Design for primate,” gives people the opportunity to “keep their bodies moving,”⁵⁵ and “design with multiple stations,” give people the flexibility to use the space for what it is not intended.⁵⁶

Now, here's our best advice.

- 1 Be radically student-centered
- 2 Embrace clashing perspectives
- 3 Show unfinished work
- 4 Focus on the how, not the what
- 5 Seek out fresh minds
- 6 Allow people to opt in
- 7 Build in room for change
- 8 Remember learning is a designed activity
- 9 Find a balance between chaos and control
- 10 Pay attention to team dynamics

Figure 10: "How to start a d.school -"

⁵⁴ Doorley, *Make Space*. 13.

⁵⁵ Doorley, *Make Space*. 23.

⁵⁶ Doorley, *Make Space*. 24.

(Source: Image by d.school at <https://dschool.stanford.edu/how-to-start-a-dschool>)

BAUHUAS - "SCHOOL OF BUILDING"

"With the Bauhuas building, Gropius thoughtfully laid out his notion of the building as a 'total work' of compositional architecture."⁵⁷ – Megan Sveiven on ArchDaily

The Bauhuas at Dessau contains spaces for teaching, housing for students and faculty members, laboratory, model rooms, auditorium, and offices. The layout of the building is comprised of wings, each with a function: student studio wing, workshop building, and technical school, with other programs nested between each wing such as offices, dining hall, library, auditorium, etc., as seen in Figure 11. The organization of the spaces in the building are based on the curriculum, in Figure 12 & 13, designed by Walter Gropius and other faculty members. The curriculum is comprised of the classes and workshops that give the students the opportunity to explore creativity, art, and the built environment. For more information, refer to Chapter 2, subsection *Walter Gropius & The Bauhuas*.

⁵⁷ Sveiven, *AD Classics: Dessau Bauhuas / Walter Gropius*.

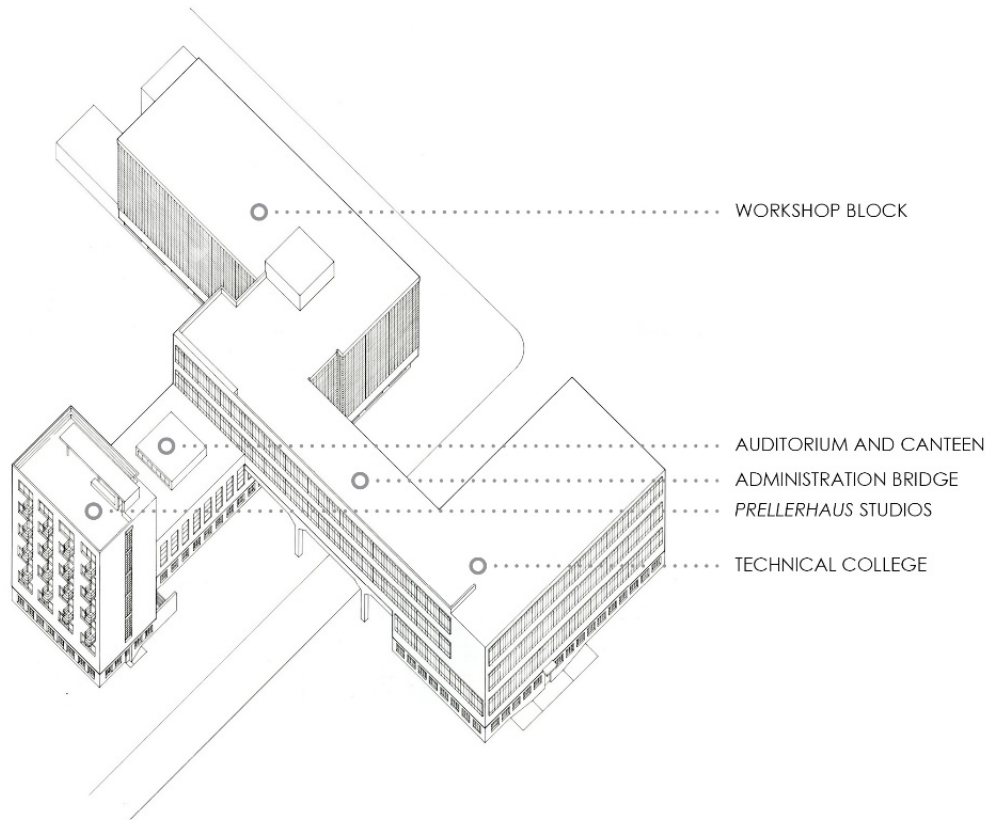


Figure 11: Axon of the Bauhuas (Source: Image by ArchDaily, Courtesy of Dennis Sharp)

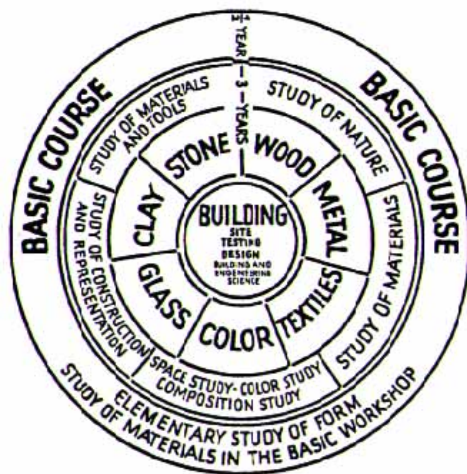


Figure 12: The Curriculum at the Bauhuas (Source: Image developed by Walter Gropius) – Left Image

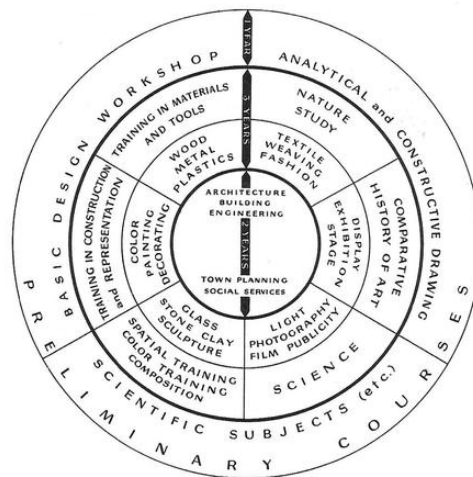


Figure 13: The Preliminary Courses at the Bauhuas (Source: Image developed by) – Right Image

Art Schools Promoting Creativity

UAL CAMPUS FOR CENTRAL SAINT MARTINS

Stanton Williams' design for the University of Arts London, new campus for the Central Saint Martins College of Arts and Design, aims "to stimulate creativity and student collaboration."⁵⁸ The design of campus is built on many acres of deserted land. The architects at Stanton Williams were interested in creating:

"a stage for transformation, a framework of flexible spaces that can be orchestrated and transformed over time by staff and students where **new interactions and interventions, chance and experimentation, can create that slip-stream between disciplines**, enhancing the student experience. The coming together of all the schools of Central Saint Martins will open up that potential."⁵⁹

The school was aiming to bring people together from different campus across London. The front of the building is the adaptively used Granary Building that faces a public square, Figure 14. The internal street, perpendicular to the Granary Building, is dynamic space for student life, with bridges linking the two wings, Figure 15 & 16. The campus is considered a "creative and cultural hub" for students and members of the community, via King's Cross Station and St. Pancras International.⁶⁰

⁵⁸ *New Campus for University of the Arts London / Stanton Williams*, ArchDaily.

⁵⁹ *New Campus for University of the Arts London / Stanton Williams*, ArchDaily.

⁶⁰ *New Campus for University of the Arts London / Stanton Williams*, ArchDaily.



Figure 14: Exterior View of the University of Art London (Source: Image by ArchDaily)

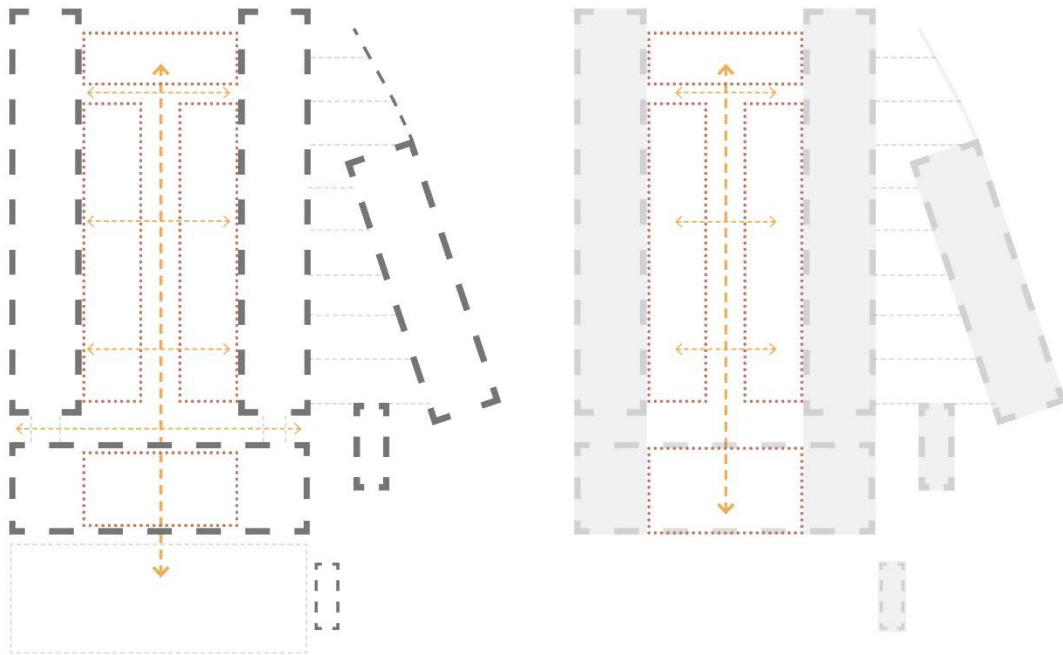


Figure 15: Spatial Diagrams of University of Arts London (Source: Image by Author)

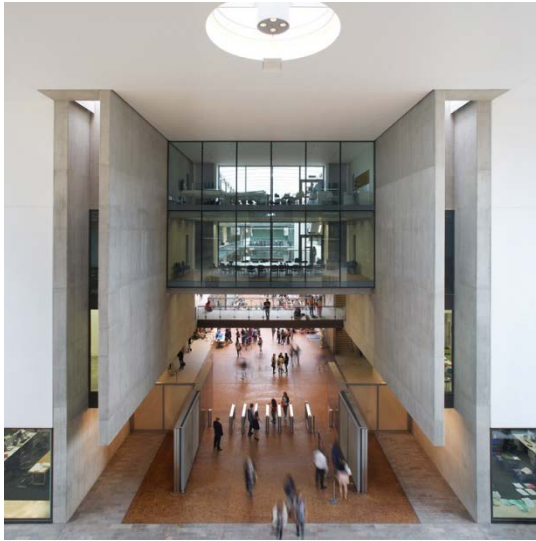


Figure 16: Interior Images of the University of Arts London (Source: Image by ArchDaily)

GLASGOW SCHOOL OF ART - SEONA REID BUILDING

Steven Holl Architects' Seona Reid Building in Glasgow is opposite Charles Rennie Mackintosh's 1909 Glasgow School of Art. The contrasting buildings "forge a symbolic relation in which each structure heightens the integral qualities of the other."⁶¹ The "driven voids of light" are vertical light shafts that integrate both structure and light with the building, Figure 17; similar to Mackintosh's "manipulation of the building section for light."⁶² The major spaces in the building are linked by a series of ramp-like stairs; lobby, exhibition space, project spaces, lecture theater, seminar rooms, studios, workshops, and green terraces for informal gatherings and exhibitions. The school "encourages the 'creative abrasion' across and between departments," and the "design embodies the school's aspirations in the city's fabric."⁶³



Figure 17: Spaces and Lighting in the School of Art (Source: Image by ArchDaily)

⁶¹ *Seona Reid Building / Steven Holl Architects*, ArchDaily.

⁶² *Seona Reid Building / Steven Holl Architects*, ArchDaily.

⁶³ *Seona Reid Building / Steven Holl Architects*, ArchDaily.

Science Laboratories

NREL'S ENERGY SYSTEMS INTEGRATION FACILITY (ESIF)

The Energy Systems Integration Facility (ESIF) is located at the National Renewable Energy Laboratory (NREL) in Golden Colorado and was designed by SmithGroupJJR. The three-story research complex is 182,500 square feet. The facility “creates a new home for scientists and engineers to collaborate on the development and delivery of renewable energy technologies.”⁶⁴ Through a collaborative environment, the researchers are able to produce emerging technologies in solar, wind, biofuel, and hydrogen. They incorporate “the best in energy efficiency, environmental performance, and advanced controls using a ‘whole building’ integrated design approach.”⁶⁵ When touring the private building, the viewing corridors within the building provide a level transparency and privacy throughout the space. The work on display is transforming the viewer’s outlook on renewable energy.



Figure 18: Exterior Views of ESIF (Source: Image by ArchDaily, Courtesy of Bill Timmerman)

⁶⁴ National Renewable Energy Laboratory / SmithGroupJJR.

⁶⁵ National Renewable Energy Laboratory / SmithGroupJJR.

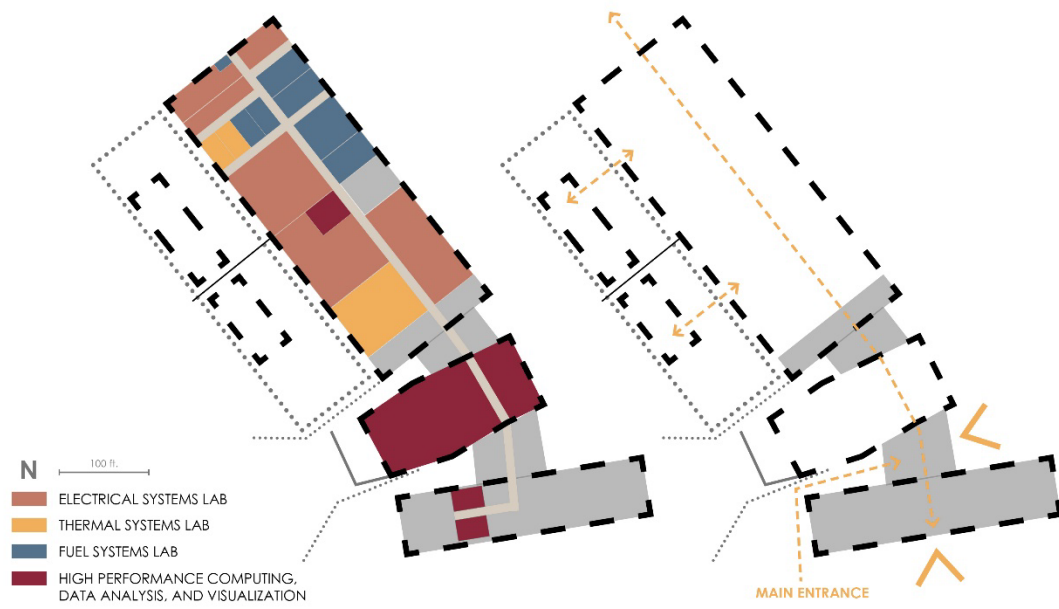


Figure 19: Programmatic and Spatial Diagrams of ESIF (Source: Image by Author)

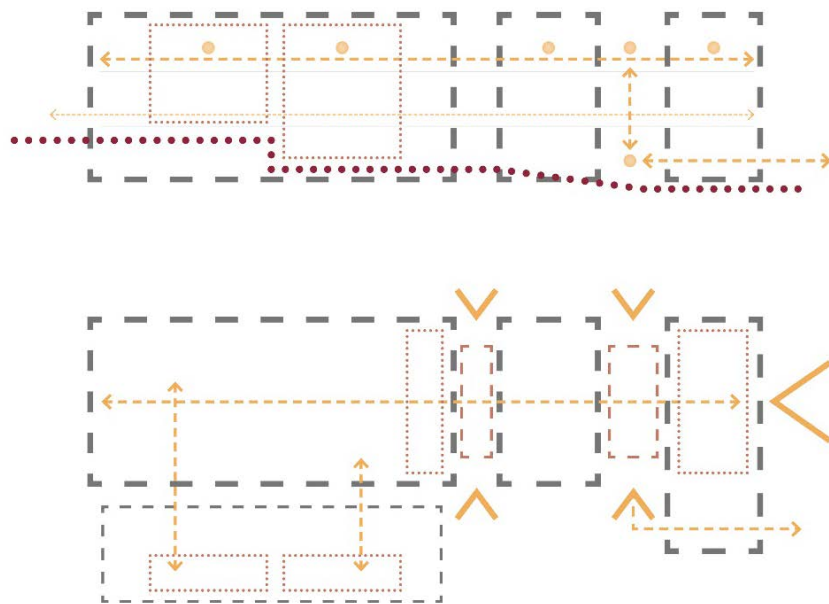


Figure 20: Circulation Diagram of the ESIF & Tour Path (Source: Image by Author)

NREL'S RESEARCH SUPPORT FACILITY (RSF)

The Research Support Facility (RSF) is located at the National Renewable Energy Laboratory (NREL) in Golden Colorado, and was designed by RNL Design. The RSF is the largest net-zero energy building in the country. The four-story research facility is 222,000 square feet and east-west oriented. The narrow building footprint incorporates passive design strategies with 60 feet deep office wings. The exterior walls are made of finished precast concrete panels and natural zinc panels.⁶⁶ The extension added to the building was improved on the lessons learned from the existing building. The research facility has evolved through several iterations and phases of design and construction; however, the results are well-adapted, Figure 21.



Figure 21: Images of the Research Support Facility (RSF)

⁶⁶ Research Support Facility.

Fabrication Labs / Maker Spaces

OPENWORKS

Baltimore Arts Realty Corp. (BARCO) renovated an 34,000 square-foot factory building into a makerspace called, Open Works. The facility provides “visual artist, photographers, graphic designers, sculptors, weavers, fiber artist, fashion designers, fine furniture makers, and small manufacturing companies,”⁶⁷ with the affordable working studios and the newest equipment. The amenities are 3D printing, digital fabrication, metal, wood, computer labs, textiles, digital media, and electronics, Figure 22. Open Works is a place for people to collaborate by using the resources available to create a business from the ground, up.

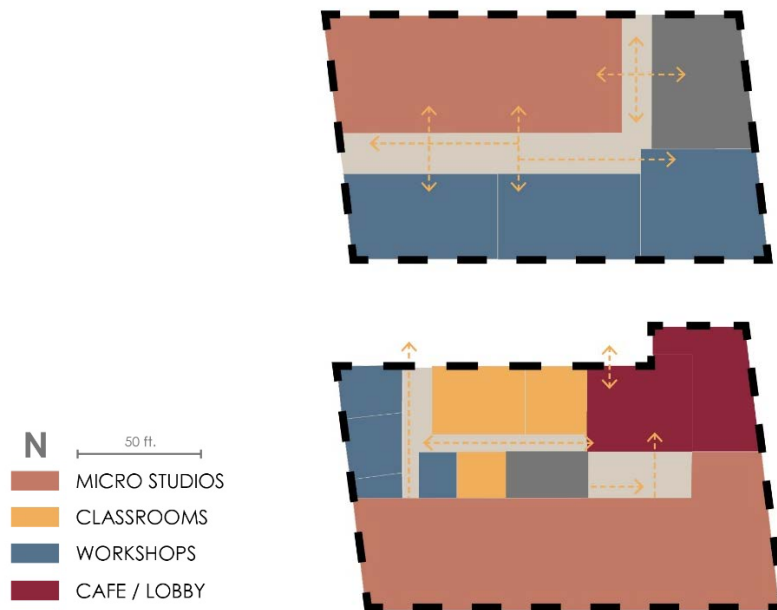


Figure 22: Programmatic Diagrams of OpenWorks (Source: Image by Author)

⁶⁷ *Open Works. Projects.*

Chapter 4: Program

Building Types

LABORATORY (ACADEMIC / RESEARCH)

A laboratory can be used for the purpose of research and teaching, often research labs are used in the private or government sector and teaching labs are used in the academic sector, such as K-12. However, both can be found in higher education. The types of spaces found in facilities with academic laboratories are as follows: dry laboratory, wet laboratory, conference, classrooms, auditorium, office, library, computer space, general storage, light industrial, and loading docks.⁶⁸

The classroom and conference rooms are no longer “passive, front-facing lecture/discussion room,” and are “yielding to the team-based interactive learning theatre,” this gives people the opportunity to see each other and hear everything.⁶⁹ Often, the furniture is no longer fixed in order to serve more dynamic team-based activities and can allow for different arrangements or functions. Depending on the size of the lab, that spaces can be organized into different arrangements, Figure 23, and can hold a wide variety of equipment. It is important to design for the future, especially as current needs and technologies are changing.

To make teaching and learning activities more effective, the ideal setting would include “flexible, changeable, attuned to the senses,” and transparent spaces

⁶⁸ Watch, *Academic Laboratory*.

⁶⁹ Watch, *Academic Laboratory*.

that “eliminate barrier and energize immediate and seamless collaboration.”⁷⁰ As disciplinary barriers are also dissipating, visualization and virtual reality are becoming more common, as well as personal digital devices that are connected to networks and other devices. It makes it easier to seamlessly access and share information with those around that are around or away. Also, design strategies are important when understanding the impact of day-lighting and artificial lighting, acoustic control, the use of materials (local, new or reusable), and waste management on the quality of the space.

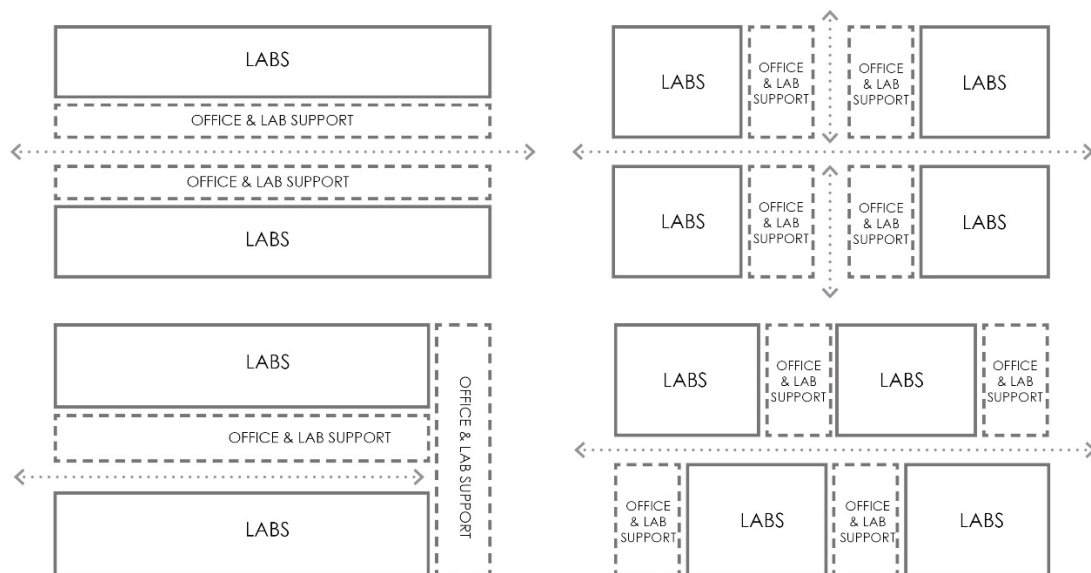


Figure 23: Lab Configurations (Source: Image by Author)

⁷⁰ Watch, *Academic Laboratory*.

LIBRARY (ACADEMIC)

A library, in an academic setting, is often a quiet place for research and study. Spaces that incorporate comfortable, quiet, and adequate space are highly sought-out. Libraries that hold a large collection of print material, including video, audio, and other forms of media, require compact shelving for growing collections and adequate seating.⁷¹ Bookshelves are often found along exterior walls or used to divide space and act as barriers, Figure 24. They are often not fixed to allow for new spatial rearrangements. The types of spaces found in academic libraries are collection space, electronic workstation space, multimedia workstation space, viewing rooms and listening rooms, seating space, staff work stations, meeting space, lecture space, special use space, and non-assignable space (including mechanical rooms).⁷²

As collections of books are growing, it is “recommended that floors be designed for 150 pounds per square foot (psf) live loads to allow the arrangement of standard full-height shelving anywhere in the library.”⁷³ While, “increasing the design load to 300 psf allows compact shelving, as opposed to standard shelving, to be placed anywhere.”⁷⁴ With an open floor plan (minimizing columns and load-bearing walls) can promote future expansion and should be considered in the design of the library. The floor to floor ceiling heights should range from 14 to 16-feet to accommodate for required mechanical, electrical, or plumbing (MEP).⁷⁵ For each person reading or studying, a requirement of 30 to 36 square feet is necessary.

⁷¹ WBDG Staff, *Academic Library*.

⁷² WBDG Staff, *Academic Library*.

⁷³ WBDG Staff, *Academic Library*.

⁷⁴ WBDG Staff, *Academic Library*.

⁷⁵ WBDG Staff, *Academic Library*.

Increasingly, “academic curricula are based on collaborative and group settings”, and “less on emphasis on individual study settings.”⁷⁶ Instead, academic libraries are including learning centers, which provide group study rooms, and resources.

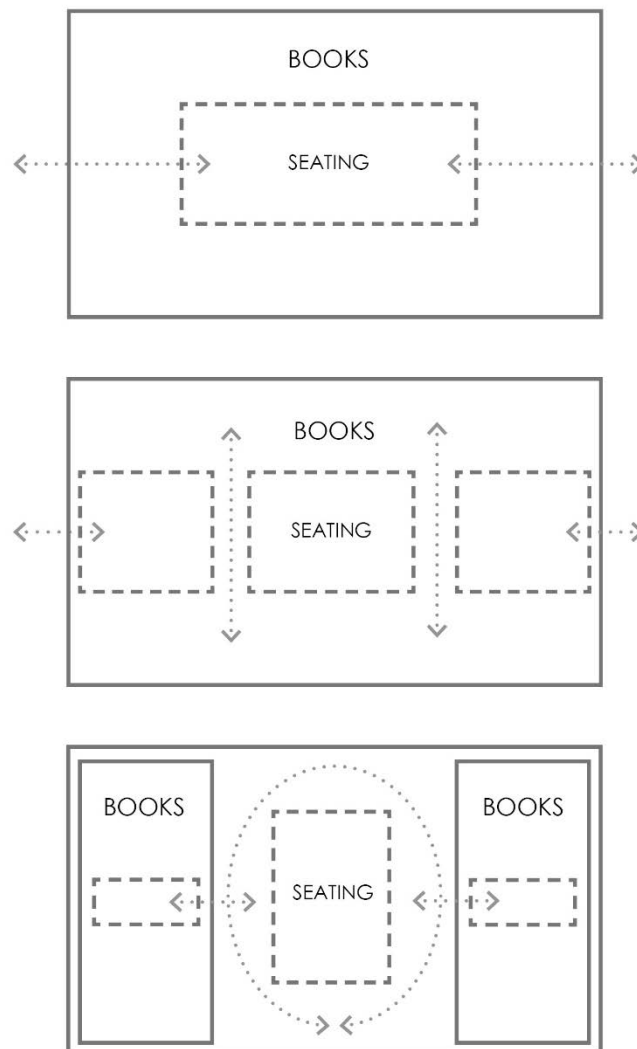


Figure 24: Library Configurations (Source: Image by Author)

⁷⁶ WBDG Staff, *Academic Library*.

WAREHOUSE

The purpose of a warehouse is to store material in an enclosure that is protected from the elements. It is important that a warehouse can accommodate the loads of the material, the handling equipment, and the trucking, Figure 25. When designing a warehouse, it is important to configure the space and facilitate changes in program or growth so that it can be “easily adapted to new functions such as office (on ground or upper levels), computer centers, or light industrial/fabrication.”⁷⁷ A warehouse should be durable and functional, energy-efficient, safe and secure for personnel and material, and healthy and comfortable. Increasingly, new “flex” warehouses are becoming the setting for new trends.

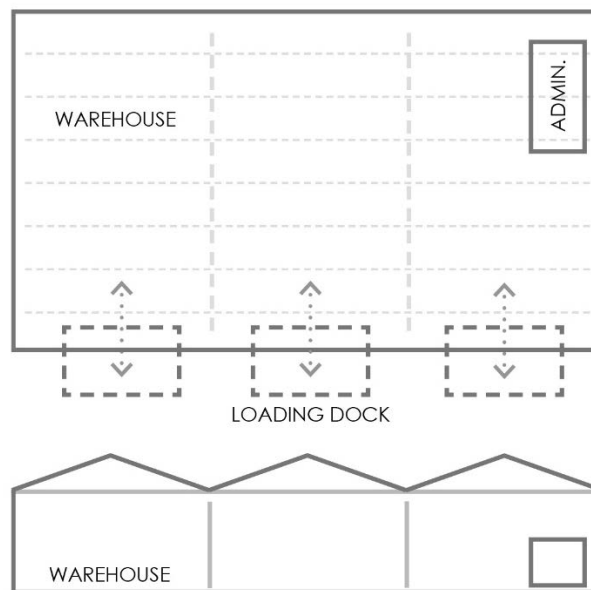


Figure 25: Warehouse Layout (Source: Image by Author)

⁷⁷ Acker, *Warehouse*.

FACTORY (MANUFACTURING & ASSEMBLY)

A factory is an industrial building that is used for manufacturing or assembling products or goods. A “factory” went from being “a building where people worked,” to a building to where “standardized goods were manufactured as contrasted with the shops of craftsmen” (during industrial revolution), to a “highly organized and automated, with specialized buildings and assembly lines designed specifically for the type of goods to be manufactured.”⁷⁸ A factory building can be classified into types of industry, whether heavy or light. Large products or processes including steel, ships, automobile, aircraft are considered heavy industry. Small products including electronics (telephones, televisions, computers, etc.), tools, paper, and food are considered light industry. It is important to note the involvement of the factory in either processing or assembly. If it is a processing industry, it relies on “changing natural materials into some other form, and including such activities as oil refining, papermaking, grain milling, and the like.”⁷⁹ However, if it’s an assembly industry, it relies on “combining natural and manufactured items into completely assembled products, and include textile, automobile, and baking plants.”⁸⁰

The major spaces in a factory are “the areas used for manufacturing or assembly, warehousing, research and control, administration, and employee facilities.”⁸¹ The design of a factory relies on the layout of the manufacturing and

⁷⁸ Hunt, *Encyclopedia of American Architecture*, 175.

⁷⁹ Hunt, *Encyclopedia of American Architecture*, 175.

⁸⁰ Hunt, *Encyclopedia of American Architecture*, 175.

⁸¹ Hunt, *Encyclopedia of American Architecture*, 175.

assembly space. For the space to be functional, the use of a “aid of flow diagram” are used to “indicate the sequence of all of the activities required from the receipt of the raw materials to the delivery of the finished products for transportation.”⁸² The design of this facility should focus on the “ease of operation, efficient flow of materials, flexibility, and good supervision.”⁸³ Also, space for warehouses, research and control areas (laboratories), administration areas. Administration areas include office spaces, meeting room, restrooms, lounges, cafeterias, and first aid stations. When designing a factory or similar building type, it is important to consider expansion (as changes to the facilities are made for production), natural or artificial lighting, and transportation (including parking and loading docks).

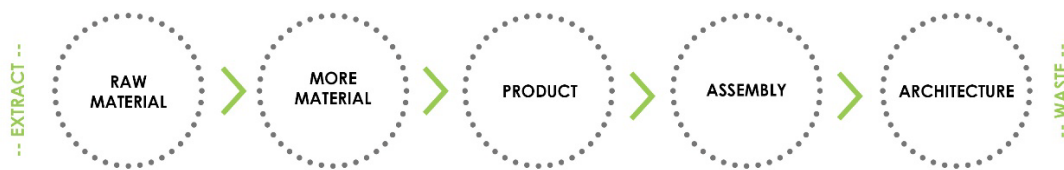


Figure 26: Manufacturing Process (Source: Image by Author)

⁸² Hunt, *Encyclopedia of American Architecture*, 175.

⁸³ Hunt, *Encyclopedia of American Architecture*, 175.

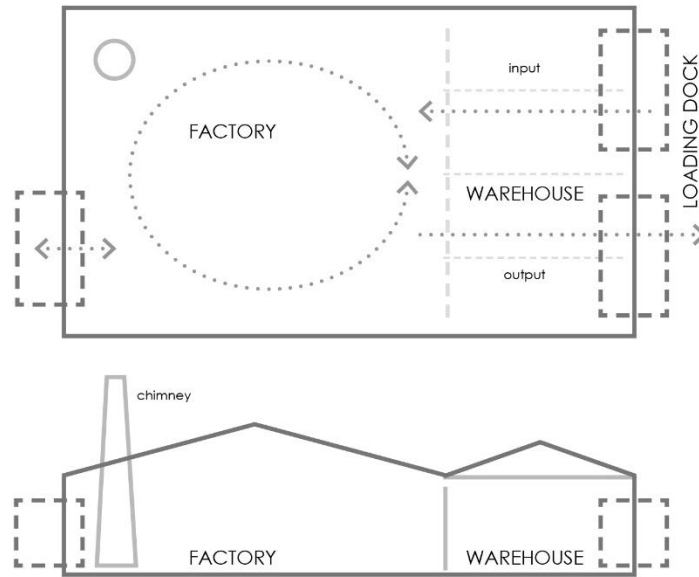


Figure 27: Factory Layout (Source: Image by Author)

WORLD EXPOSITION

Expositions (Expo) are “educational and usually festive exhibition, often called a fair, especially one of international scope.”⁸⁴ Expos and their buildings are often temporary, making it imperative to find a new location and site; if not they are either demolished or left standing. It is extraordinary how festivals of new and unique building influence people and architectural design., Figure 28. Expositions are “impossible to generalize about the design, since each is a unique event, with its plan, buildings, and content, subject to the inventiveness of its promoters, exhibitors, and architects.”⁸⁵ However, in each exposition there is often “structures of four major types:

- building for display of the arts, sciences, manufacturers, and so on;

⁸⁴ Hunt, *Encyclopedia of American Architecture*, 172.

⁸⁵ Hunt, *Encyclopedia of American Architecture*, 173.

- building and other structures for recreation, such as shows, rides, games, and the like;
- buildings for administration and maintenance;
- the structures that usually serve no other purpose than the symbolic.”⁸⁶

Most building are apparent in the design, whether it’s the scale, materiality, or function.

Expositions started in England during the 18th century. It all began during the Great Exposition (1851) in London. During the Great Exposition, Joseph Paxton (1801 – 1865) designed the famous Crystal Palace. It was built of cast iron and plate glass. With the use of cast iron, the palace was able to be prefabricated, built within six months, dismantled, and then rebuilt Sydenham, England when the exposition was over. Unfortunately, the Crystal Palace was later destroyed in a fire in 1936. Similarly, the Paris Exposition brought forth the Eiffel Tower in 1889, and it is still the most recognizable structures. Expositions are held all over the world and bring forth some of the world most amazing works.

⁸⁶ Hunt, *Encyclopedia of American Architecture*, 173.

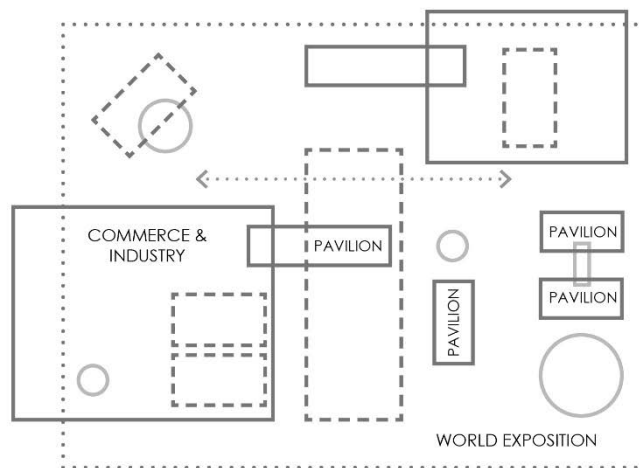
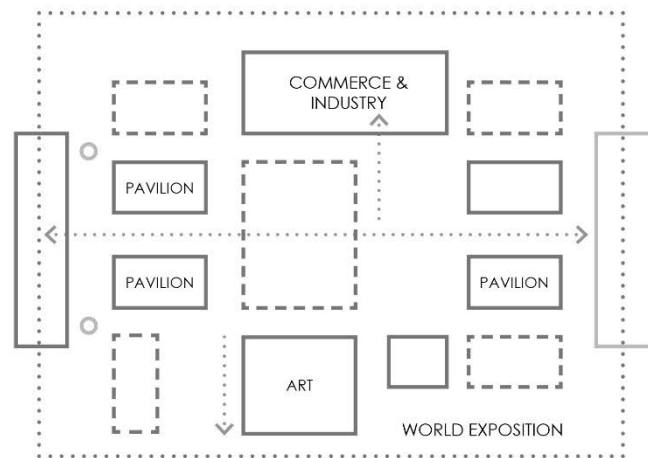


Figure 28: World Exposition: Orderly vs. Layered (Source: Image by Author)

Space Making

PROPOSED PROGRAM

Public Gathering (Showcase – Explore – Learn)

- **Lobby:** space for welcoming before proceeding into private realm
- **Lounge:** space for the public to wait and socialize before proceeding
- **Café / Restaurants:** space for to gather, talk, and eat
- **Exhibit Space:** space to showcase accomplishments, design, materials, fabricated work, etc.
- **Learning Lab:**
- **Play Lab:**
- **Park:** outdoor space to exhibit work

Collaboration (Design - Share): space allows people from all disciplines the opportunity to come together

- **Studio Space (Students):** space to keep work, personal items, and light materials
- **Administration Area (Faculty):** space for open offices
- **Workstations / Offices (Professionals):** space for enclosed offices
- **Display Space:** space to display inspirational work, illustrations, work in progress, etc.
- **Gathering Space (social):** space to collaborate with others
- **Meeting Room / Classroom:** space that is out-of-the-way and private

- **Computer Lab:** space for the use of electronics, includes computers, projectors, screens, etc.
- **Visualization Space:** space for recording videos, taking photos of projects, produce advertisement, and build-up communication skills
 - Photo Booth: for instant media production with camera/tripods, audio kit, lighting kit, backdrops
- **Auditorium:** space where people can gather in a circle to present or talk
- **“Extra” Space:**
 - **Think Pod:** space to work in solitude
 - **Hiding Space:** space to lie down and relax, with soft music or natural light
 - **Nap Station:** resting area for shut-eyes

Fabrication Lab (Design - Build): space for making with resources, materials, equipment, etc.

- **Work Stations:** space for keeping personal tools or equipment, models, parts, etc.
- **Workshops / Classrooms:** space to teach or give lessons
- **Fabrication Space (Make):** space to hold big machinery for woodworking, metalworking, CNC cutting, textiles, etc.
- **Assembly Space (Prototype):** space to cultivate “maker” culture
 - Small-Scale or Full-Scale Prototyping
- **Storage Space:** space to hide or expose work

- **Service:** space to load and retrieve materials, waste, etc.
- **Mechanical Room:** space to store and access mechanical, electrical, and plumbing systems

Library / “Living Lab” (Collect - Research - Learn): space to hold a collection of books & research

- **Collection Space:** space to hold collect, hold, or display books
- **Reading Space:** space used to read or relax
- **Research Space:** space for research and the use of electronics
- **Computer Space:** space for the use of electronics, includes computers, projectors, screens, etc.
- **Digital Media Space:**
- **Materials Library:** space for collecting samples to showcase
- **Model Making Space (3D Printing):**

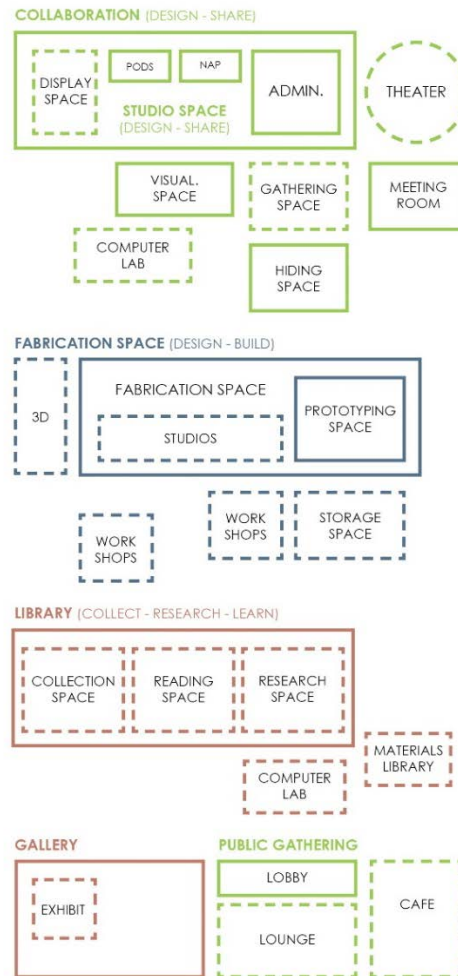


Figure 29: Proposed Program Spaces (Source: Image by Author)

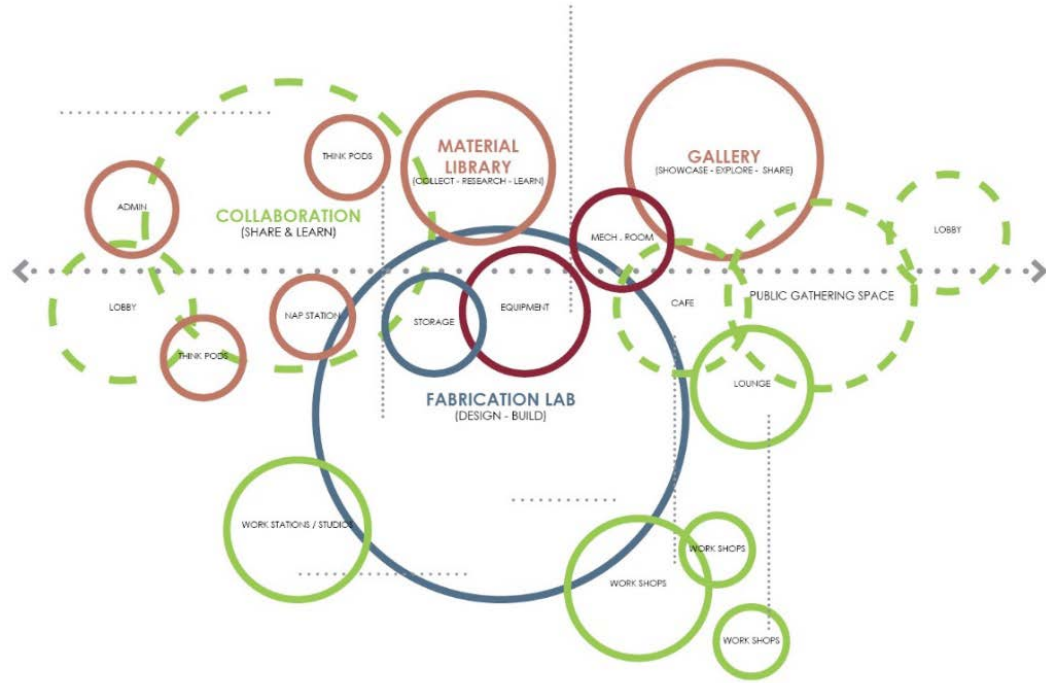


Figure 30: Bubble Diagram of Program (Innovation Lab) (Source: Image by Author)

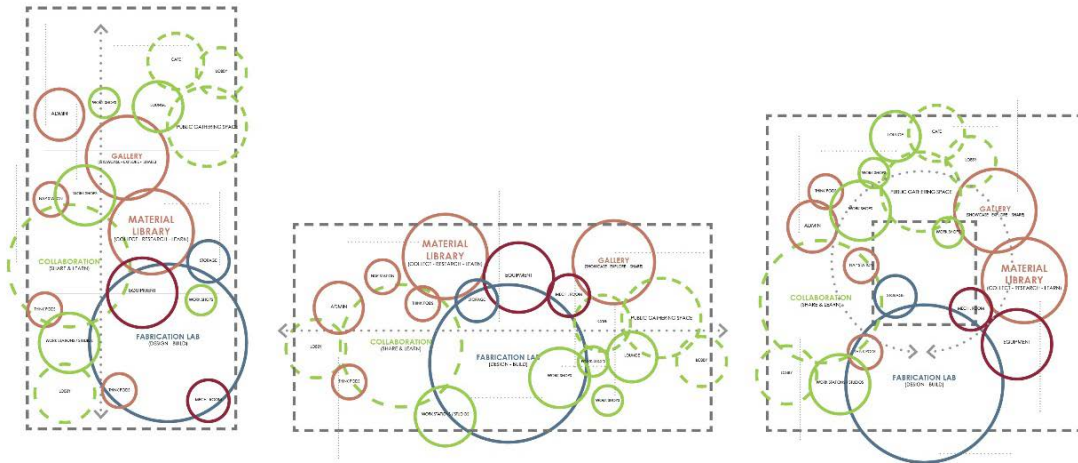


Figure 31: Building Plan: Tower, Bar, Courtyard (Source: Image by Author)

COURTYARD SCHEME

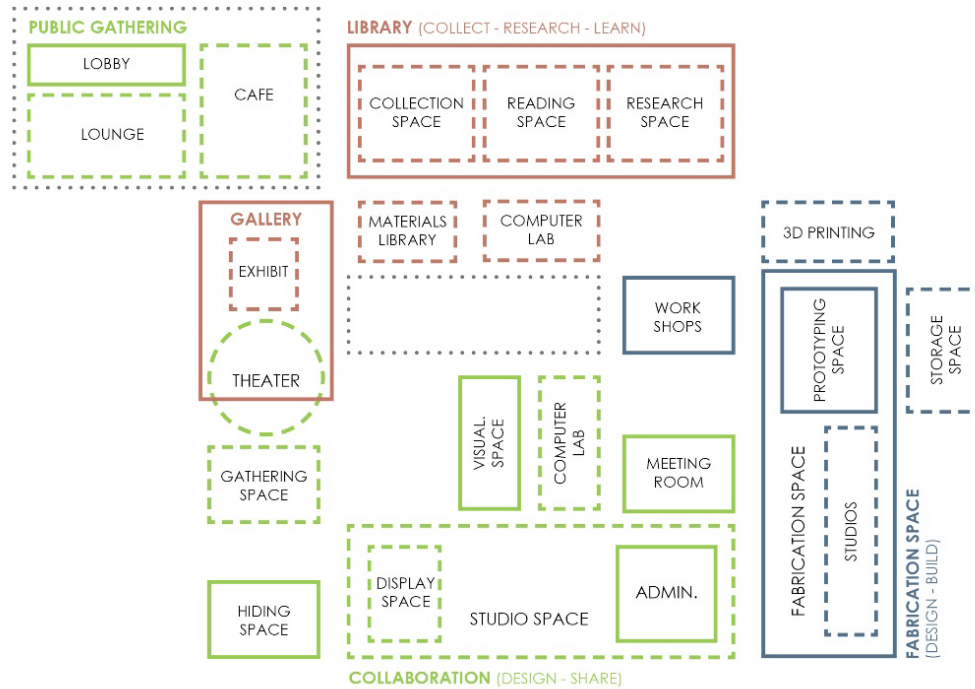


Figure 32: Courtyard Scheme (Source: Image by Author)

The Courtyard Scheme, Figure 32, is based on the courtyard plan, where major spaces revolve around a central core. The courtyard acts as a cloister, where there is a connection between the indoor and outdoor space. With an opening along its core, natural light can enter the spaces. The 3 major space, being the collaboration (often including public gathering space), fabrication space, and library (often including the gallery), create a pin wheel effect. The proximity of the library and fabrication space are important when it comes to moving work from a secure space into the public realm. It is important to make the public gathering space part of the

collaboration space to engage the public and encourage creativity through the built and natural environment.

BAR SCHEME

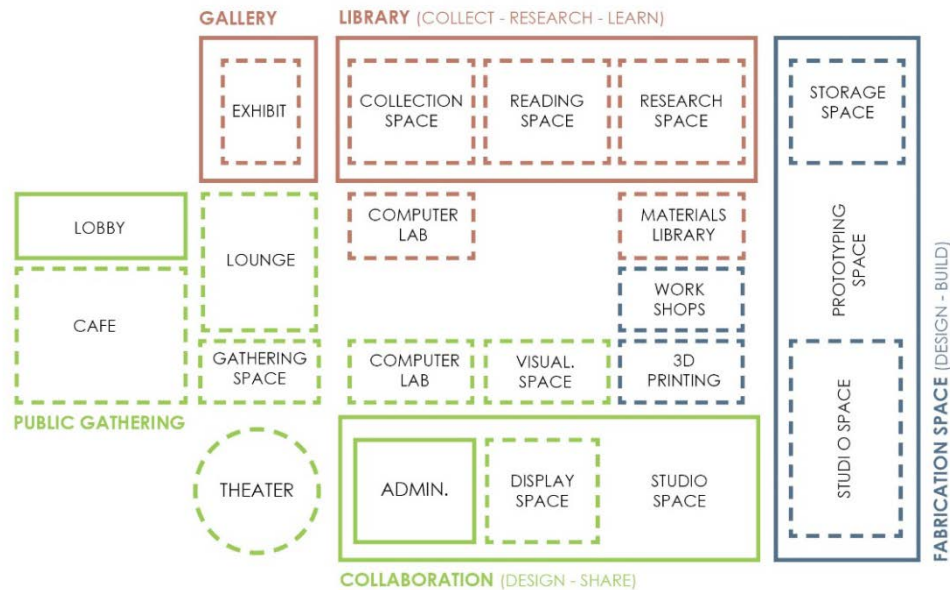


Figure 33: Bar Scheme (Source: Image by Author)

The Bar Scheme, Figure 33, is based on a bar plan, where the spaces are organized in a linear style. The central space is dedicated to smaller spaces that are interchangeable or shared among major spaces; considered “flex spaces.” The major spaces act as anchors to define the edge. Whereas, smaller flex spaces are in the center of the plan to be shared by the major spaces. The gallery and library are located on the north side for indirect lighting. The collaboration space is located on the south side to access outdoor spaces and natural lighting. The fabrication space is located on the end to for safety reasons and noise pollution. The public gathering

space is in close proximity to the theater, and gallery space for public exhibits. The bar scheme is most compact due to the proximity of spaces and the overlapping flex spaces, allowing for most opportunity for dialogue and interaction.

HEAD/TAIL SCHEME

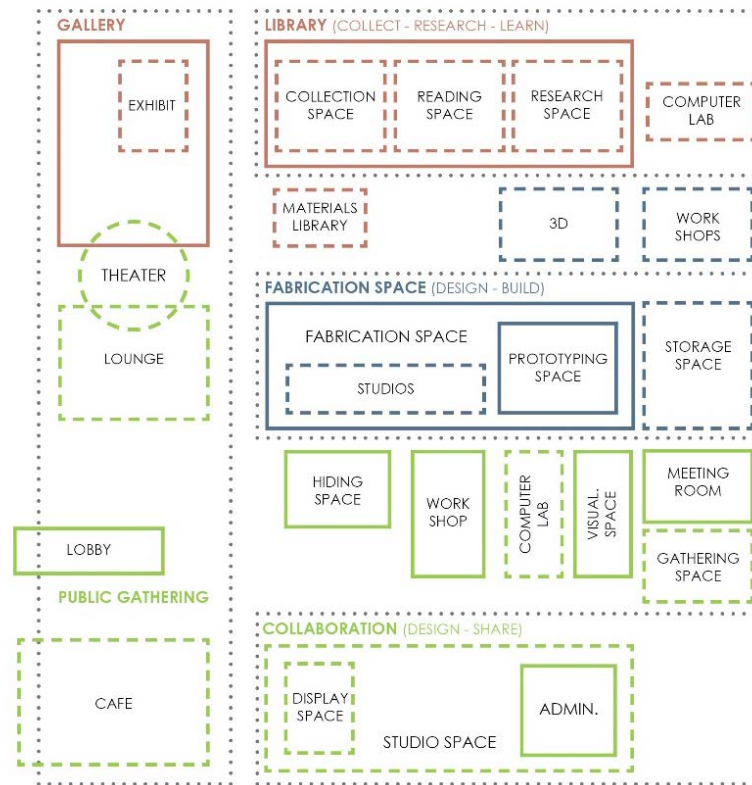


Figure 34: Head/Tail Scheme (Source: Image by Author)

The Head/Tail Scheme, Figure 34, is based on this idea of creating interstitial space between the 3 major spaces; collaboration space, fabrication space, and library. Each major space can be secured off from each other and can act as “separate building,” to allow for easy public access, safety, and security. The 3 separate bays connected to the major spaces would be multifunctional and adaptable. Each bay would serve the flanking wings, whether an enclosed space, outdoor public/private space or further expansion of the building(s). The long module would act as place for public gathering and clear transition into the wings. The head/tail scheme would create an atmosphere for exploration.

Chapter 5: Site

Site / Context / Place

SITE CRITERIA

The site selection criteria is based on a set of parameters that help highlight the attribute of a site or areas that need improvement with further design. The 3 main areas of focus are context/setting, proximity/accessibility, and resources.

- **Scale:** the site would be most effective in an urban context or suburban context near a city or academic institutions.
- **Climate:** the climate should allow for outdoor activity and natural daylight.
- **Topography:** a site with changing elevations/grading can benefit the design and layout of the facility (can allow for privacy, drainage, etc.).
- **Waterfront / View:** a site along the water or with views of the water can benefit the users and it can be integrated into the design of the facility.
- **Vegetation / Parks:** a site with vegetation or nearby parks can be incorporated into the design of the facility for the use of outdoor space.
- **Visibility:** a site that is visible and unobscured by other building to access views (both into and out from), and to allow light and air into building.
- **Walkability:** a site of an appropriate size and in an urban setting can promote walking and bicycling to the building.
- **Transportation / Access:** a site with accessible transportation can minimize energy consumption and the required parking, and promote a more transit-oriented community.

- **Infrastructure:** a site with access to available infrastructure can minimize the resources, materials, and energy required to sustain another facility.
- **Noise Pollution:** an existing site that is congested can make it difficult open indoor spaces to the outdoors in the proposed facility.
- **Diversity / Culture:** an existing site in a diverse area or with a sense of place can begin to engage the proposed facility.
- **Amenities:** an existing site with available amenities can bring about a sense of life and interaction amongst community members and potential users.
- **Material Resources:** an existing site with nearby resources can minimize energy consumption and maximize the use of local materials.
- **Waste Management:** an existing site in close proximity to waste management facilities or easy access to sustainable means of disposal with promote potential user to reduce and recycle any waste.
- **Safety Factors:** an existing site with “eyes on the street” can provide a sense of security.

The site matrix, Figure 35, is designed to measure the attributes found on existing sites. Each potential site is evaluated based on three rankings: the largest circle meaning that the attribute is available and very beneficial to the design of the new facility, whereas the smallest circle meaning that the attribute is unavailable or not sufficient enough. However, the outcome of matrix is not based on eliminating a site, but by highlighting attributes that may require more attention; to resolve and not hinder the potential site.

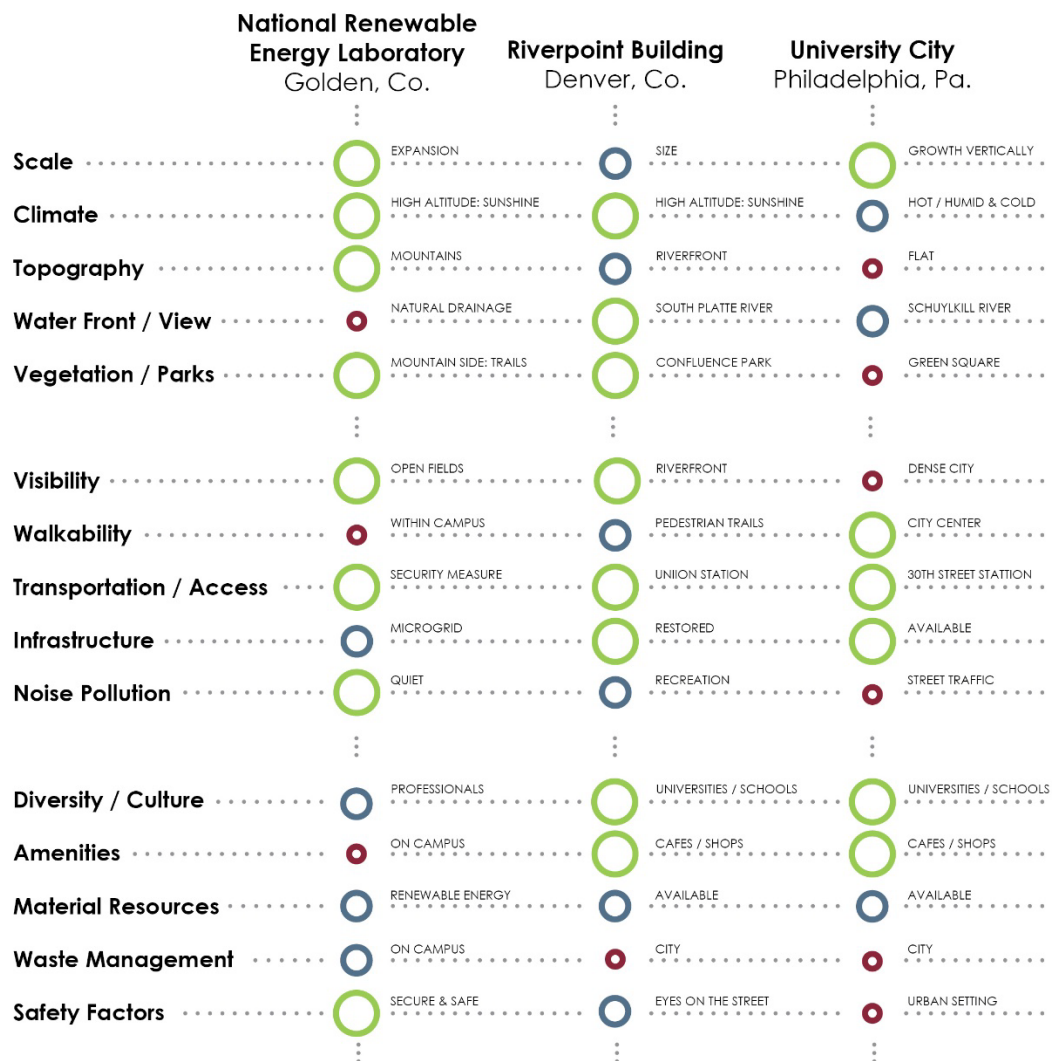


Figure 35: Site Selection Matrix (Source: Image by Author)

After filling out the Site Selection Matrix, Figure 35, and reviewing the site analysis, the Riverpoint site in Denver, Colorado showed the most potential for a community space where people of all discipline could come together and explore their creativity.

Potential Sites

UNIVERSITY CITY, PHILADELPHIA

The potential sites are within a two-block radius of Market Street Bridge. The sites are located on the edge of University City; Drexel University, the University of Pennsylvania, and the Art Institute of Philadelphia are within a 2-mile radius. The Innovation Neighborhood and other amenities are in walking distance from the site. The area is transforming into a transit hub, with many visitors arriving through 30th Street Station. Philadelphia is a thriving city with diverse and growing jobs. The prime locations are between University City and Center City, with recreational activities planned along the Schuylkill River. The ideas of an urban park network of park and trails along river edges would give life to the city. The neighborhoods along the river are unique in size and character; with urban universities and growing rate of millennials. The goal is to design a vibrant community where people can work, learn, live, and play.



Figure 36: Philadelphia, Pa. (Source: Diagram by Author)

NATIONAL RENEWABLE ENERGY LABORATORY (NREL), GOLDEN

National Renewable Energy Laboratory is “a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.”⁸⁷ The campus is located in Golden, Colorado and is in a 20-minute radius of Denver’s city center. The plan of the campus creates a framework for buildings with low energy use, alternative fuel consumption and transportation, waste management, storm water management, and overall quality of life. The campus is sustainable, secure, and safe, and it is considered a “living laboratory.”⁸⁸ The campus is design around a “student union” concept of common and share space focused on collaboration.

The campus is located along the valley of the South Table Mountain, with a conservation easement along the top of the mountain, and an environmentally restrictive area along the steepest edges leading down to the campus on the south side. The iconic facilities are LEED Platinum or Gold certified with high-performance building such as net zero. The related issues to the site include, circulation and public transportation, density and footprint, and storm water management. NREL’s design principles for the design of the campus are as listed below:

1. “Create an attractive, memorable and inspirational campus for employees and visitors by reinforcing unique natural characteristics on and near the campus.

⁸⁷ www.nrel.gov

⁸⁸ www.nrel.gov

2. Orient buildings along predominantly east-west axes in order to maximize solar access and daylighting.
3. Integrate open space network and landscape features with storm drainage and detention facilities.
4. Preserve the two dominant arroyos on the campus by establishing a development setback requirement and create two major open space quads that are visually and physically connected.
5. Provide a secure research environment by establishing campus and security perimeter beginning with multiple entrance gates.
6. Organize placement of buildings according to the interconnected processes of research and development.
7. Promote a pedestrian-oriented environment that is safe and easily navigable for employees and visitors.
8. Oriented and visually connect building entries to the pedestrian network, street system and open spaces.
9. Connect the pedestrian network to the existing trails located both on and adjacent to the campus.
10. Provide a campus shuttle to destinations throughout the site with stops associated with parking, building entries and major open spaces.”⁸⁹

The design principles are set to provide a basis for the overall planning of the campus; as new buildings are inserted into the fabric of the site the campus begins to form a holistic vision.

⁸⁹ www.nrel.gov



Figure 37: NREL - Approach & Site Boundaries (Source: Diagram by Author)

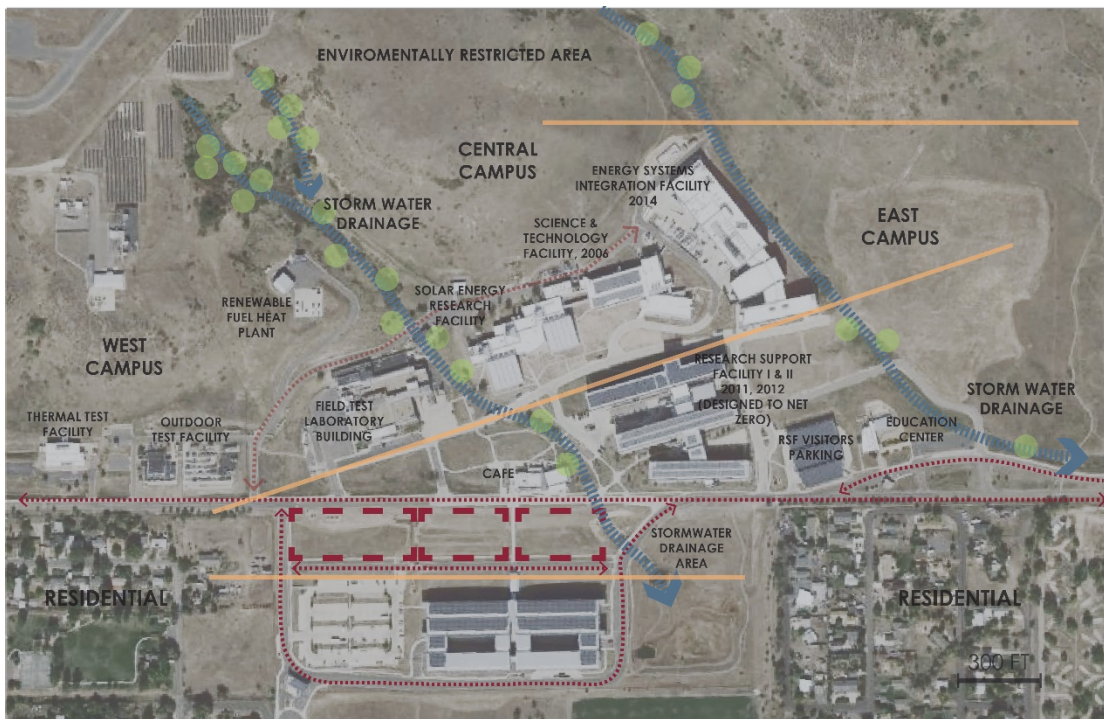


Figure 38: NREL – Campus (Source: Diagram by Author)

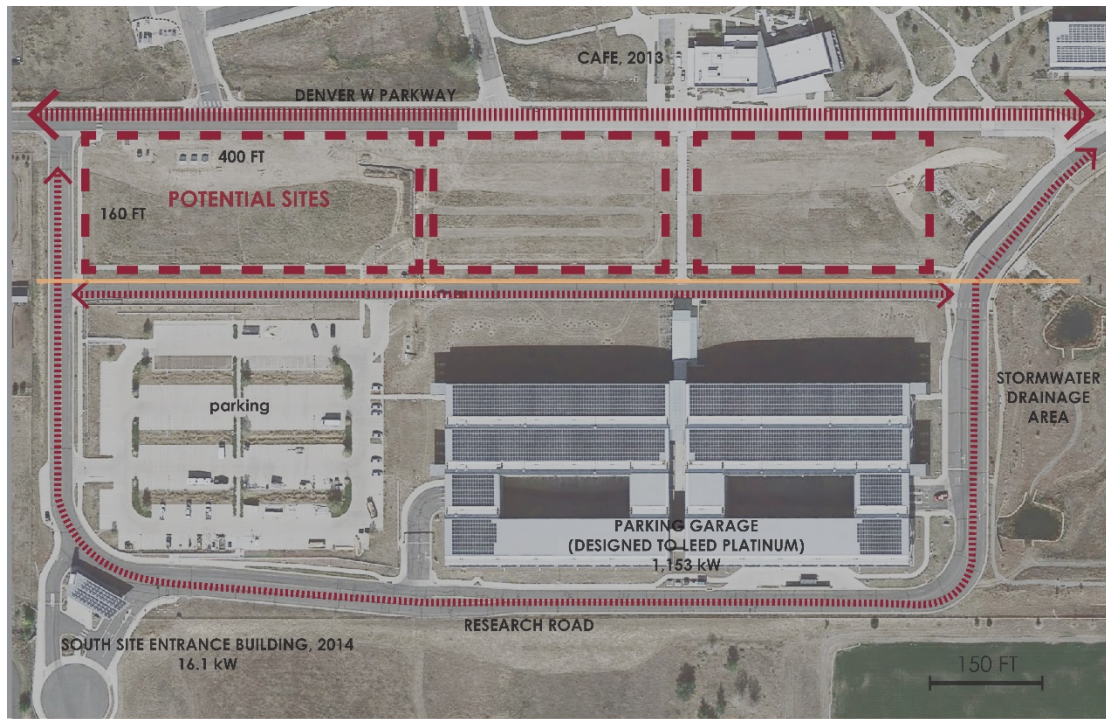


Figure 39: NREL – Selected Sites (Source: Diagram by Author)

Proposed Site

RIVERPOINT BUILDING, DENVER

The Riverpoint Building is located along Confluence Park's Shoemaker Plaza in Denver, Colorado. The site is found at the intersection of Cherry Creek and South Platte River. The renovation of Shoemaker Plaza was completed in October of 2017 and is Denver's historic birthplace. It has increased river access while being ADA compliant. It has improved bicycle and pedestrian flow along the river and it is now a new gathering space for the community. The promenade leads to overlooks, seating terraces, grade stairs, and landscape areas directly in front of the Riverpoint Building and the REI. The South Platte River went from a dumping ground (contained coal tar contaminants in soil) to a recreational oasis.

The site is the grounds of the Riverpoint Building and sits beside the REI building, which was the Denver Tramway Power Co. in 1801. The two buildings sit along the South Platte River along Confluence Park, which consist of the public path in front of the buildings, the river's edges, and directly opposite the river towards Cherry Creek. The site is near many parks, multi-use trails, bike routes, transit stations (Union Station), and destinations (Denver Aquarium, Children's Museum, Elitch Gardens, Pepsi Center, Skate Park, etc.). Most importantly, the partnerships with Metropolitan State University, of Denver, University of Colorado, and Community College of Denver are within a 2-mile radius. The new development and renovations that occurred in the past few years have made it very safe for community members to engage in outdoor activities. The plans for the site would include

adaptive reusing the Riverpoint Building or reusing materials to redesign a new building that would take place along the riverfront.

Creative potential can be found throughout the city. The idea is to create an active and safe space for members of the community. The outcome is not to design a building but to create a new energy within a site that radiates out into the city and in return attracts a stronger energy of people who fell excitement and a sense of belonging within the realm of this new facility. Like the National Renewable Energy Laboratory and Riverpoint building in Confluence Park, a site should bring forth its best traits, and the new creative endeavor should only inspire, lead, and drive people to unlocking their creative potential.

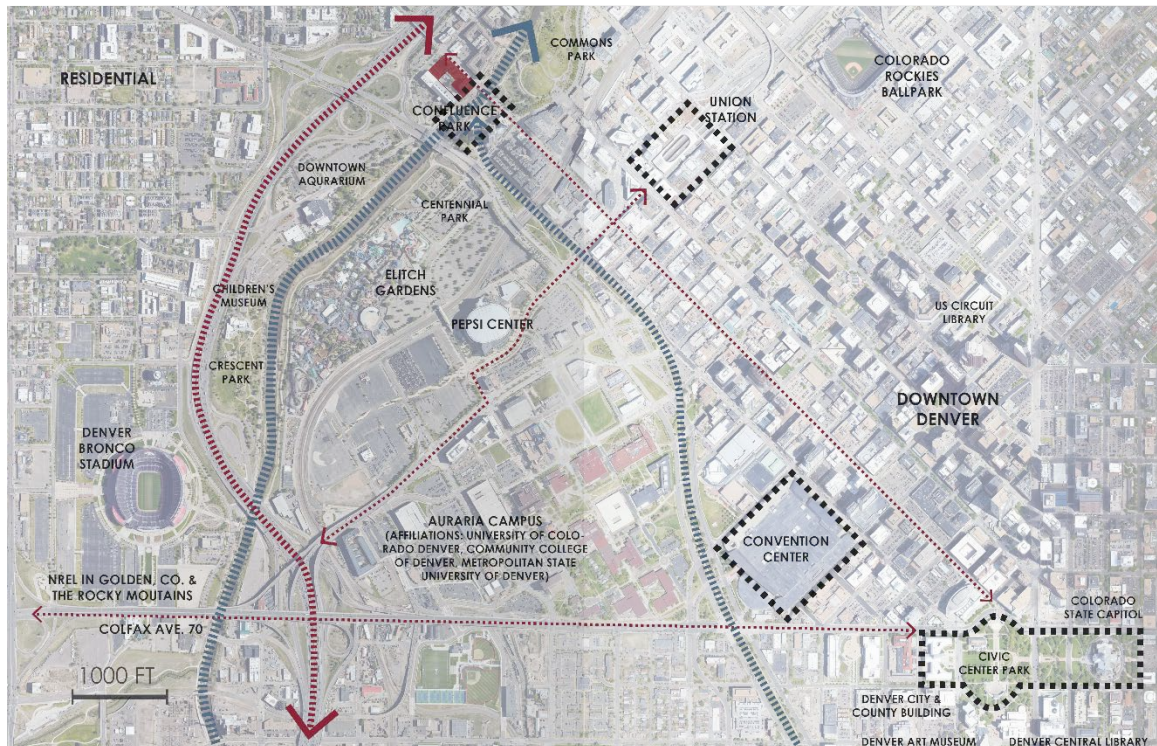


Figure 40: Denver, Co. (Source: Diagram by Author)

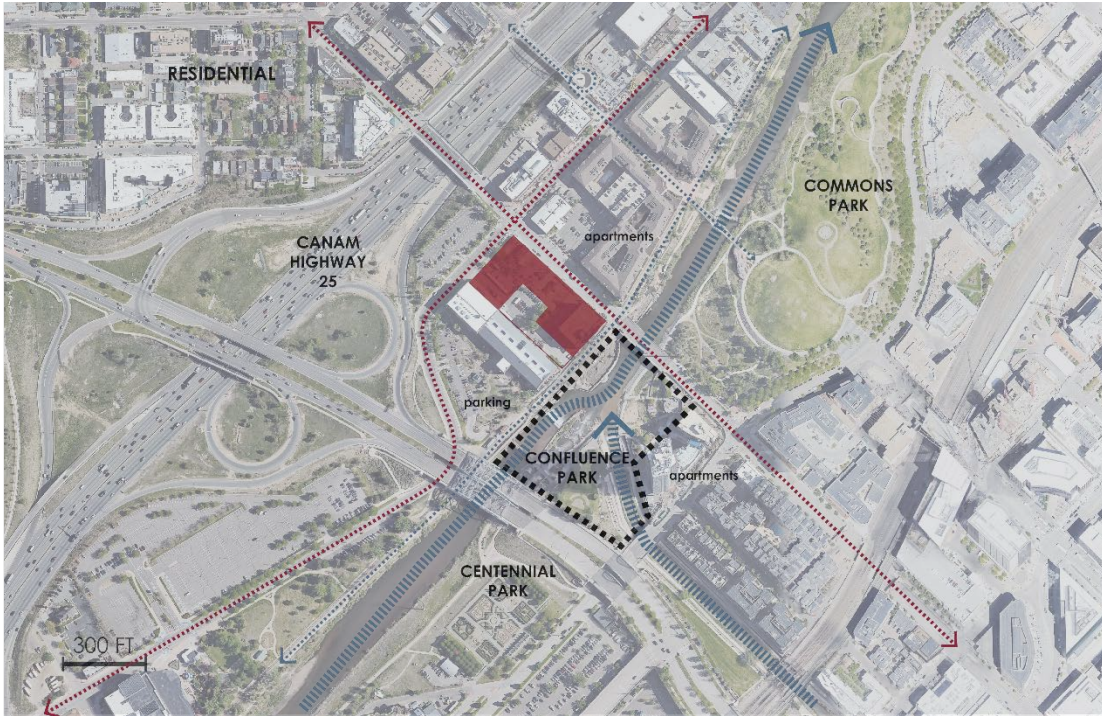


Figure 41: Site on Confluence Park (Source: Diagram by Author)



Figure 42: Selected Site (Source: Diagram by Author)

IMAGES OF SITE

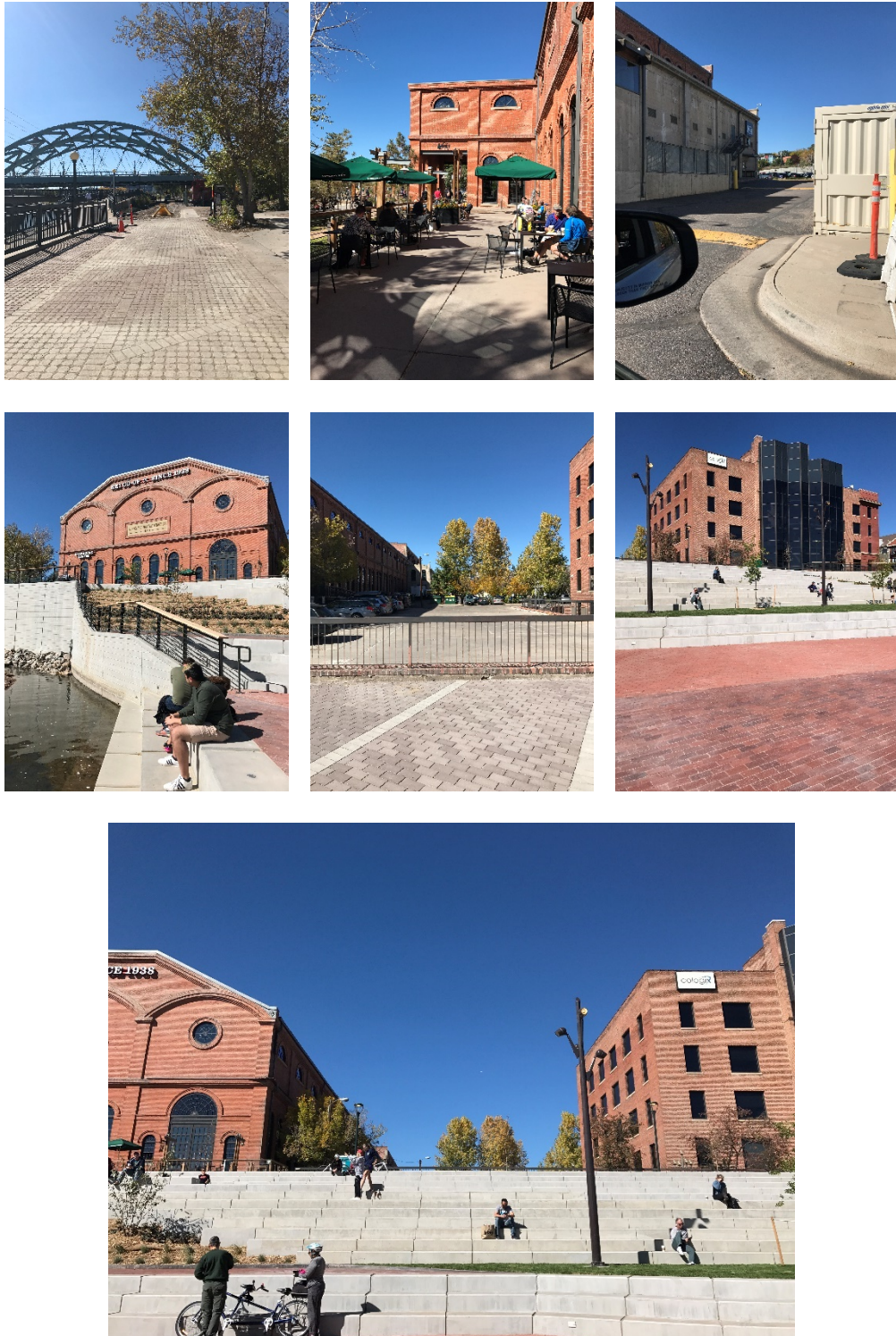


Figure 43: Images of Site (Source: Photographs by Author)

SITE ANALYSIS: DENVER, CO.



Figure 44: Denver, Colorado (Source: Image by Google Earth Pro)



Figure 45: Figure / Ground (Source: Diagram by Author)

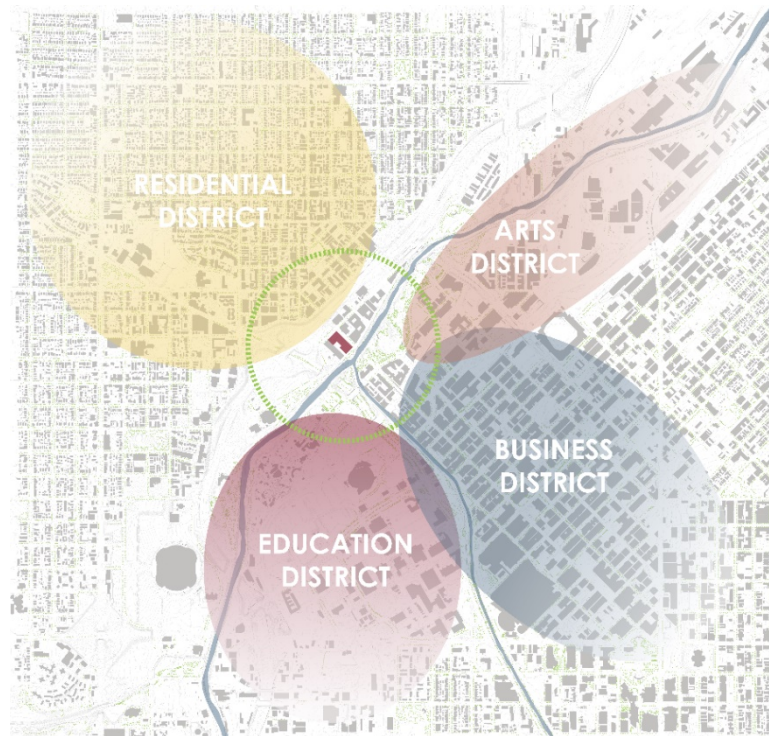


Figure 46: 4 Major Districts (Source: Diagram by Author)

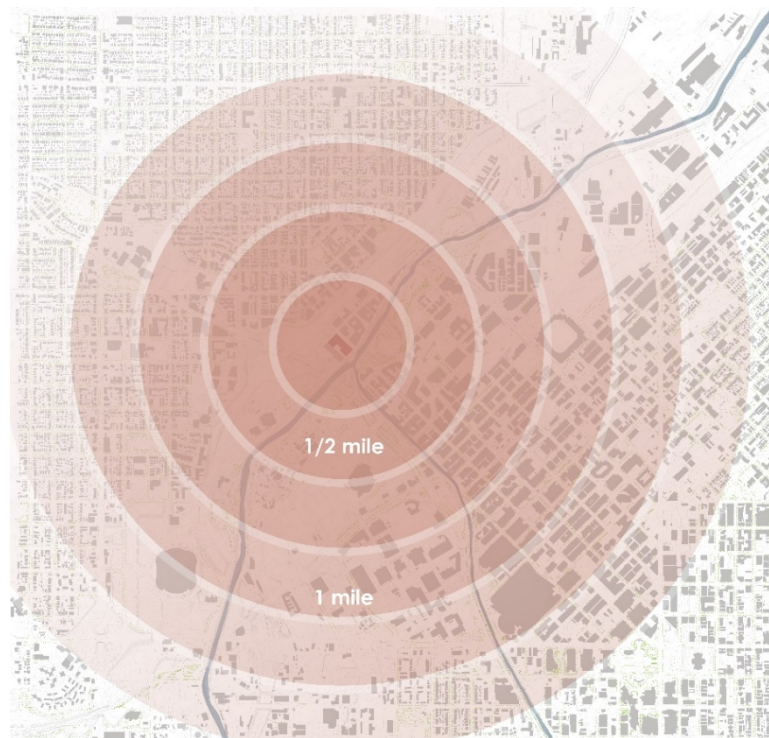


Figure 47: Mile Radius (Source: Diagram by Author)

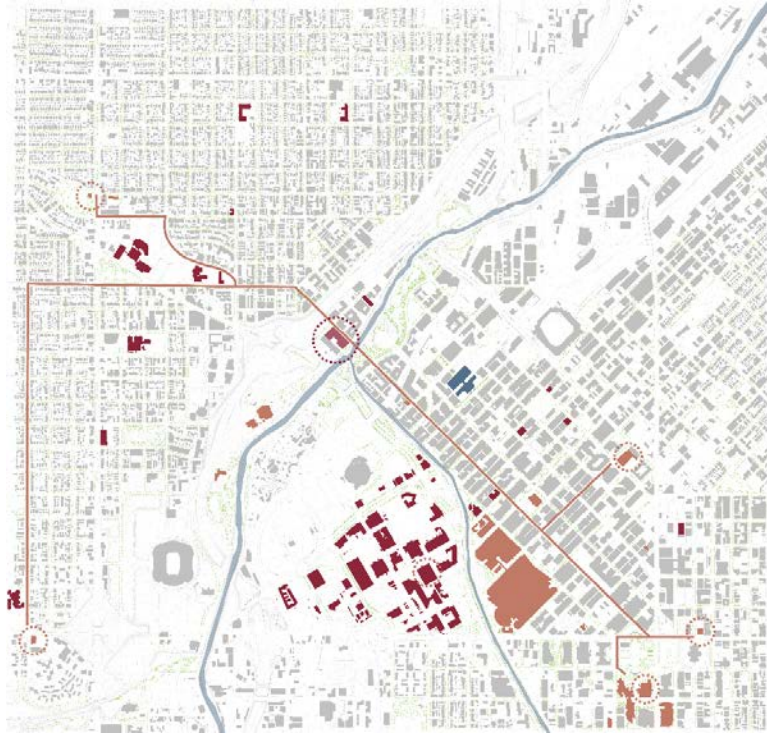


Figure 48: Public / Educational Buildings (Source: Diagram by Author)

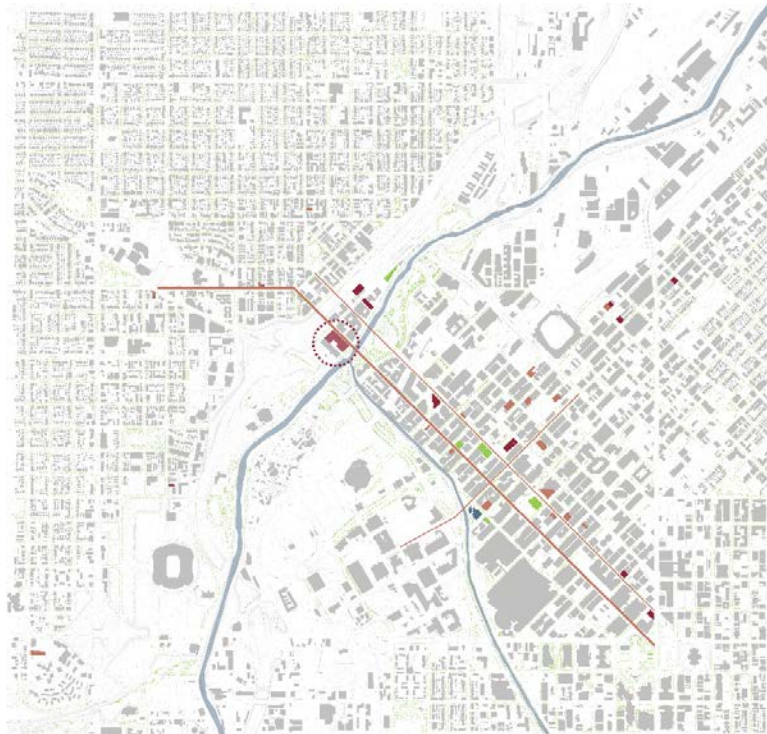


Figure 49: Design Services (Source: Diagram by Author)

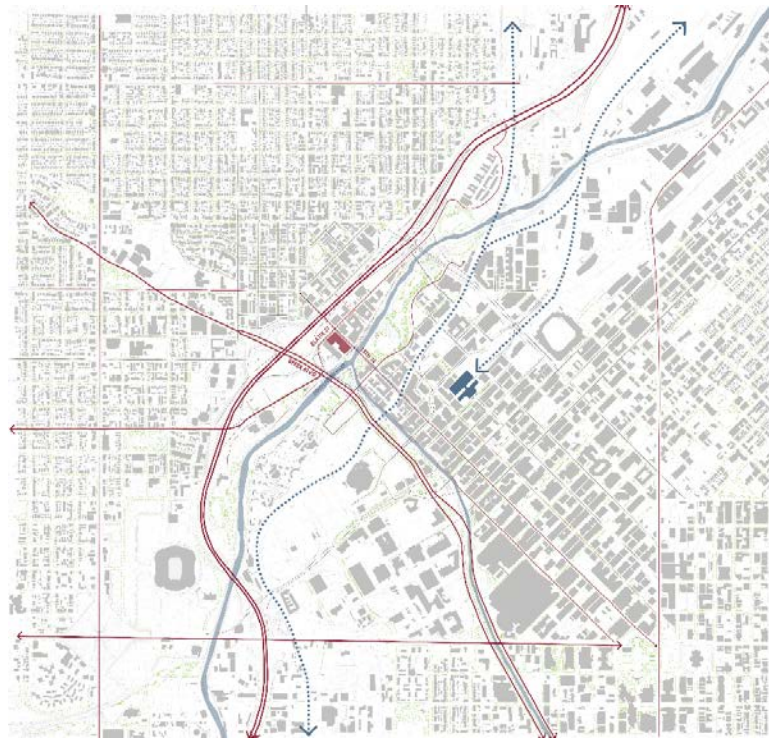


Figure 50: Mobility (Source: Diagram by Author)

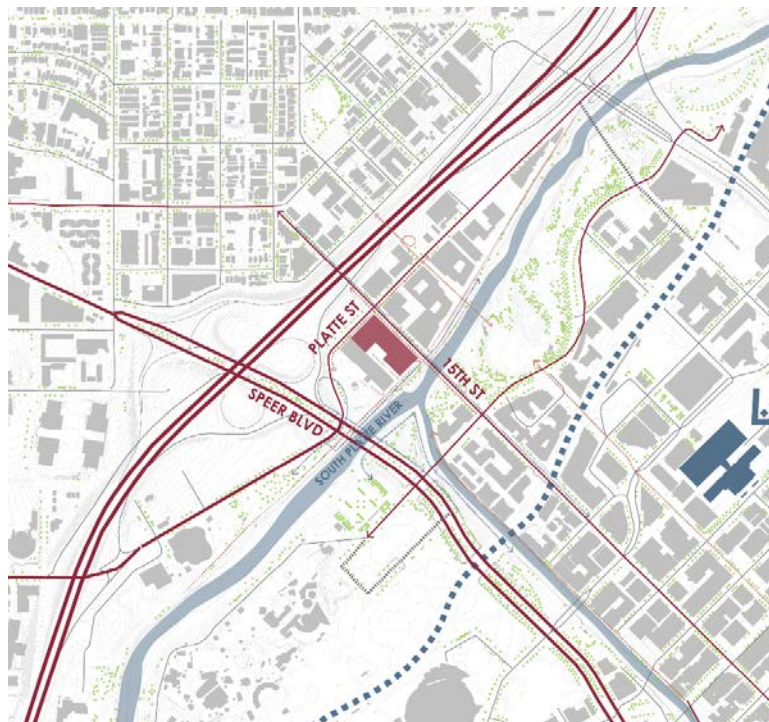


Figure 51: Street / River Edge (Source: Diagram by Author)

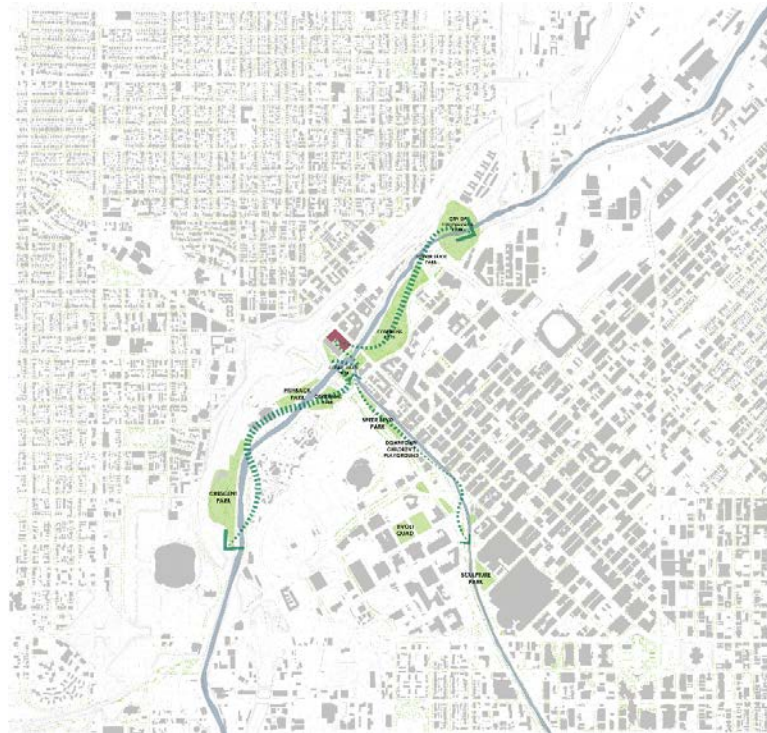


Figure 52: Parks (Source: Diagram by Author)

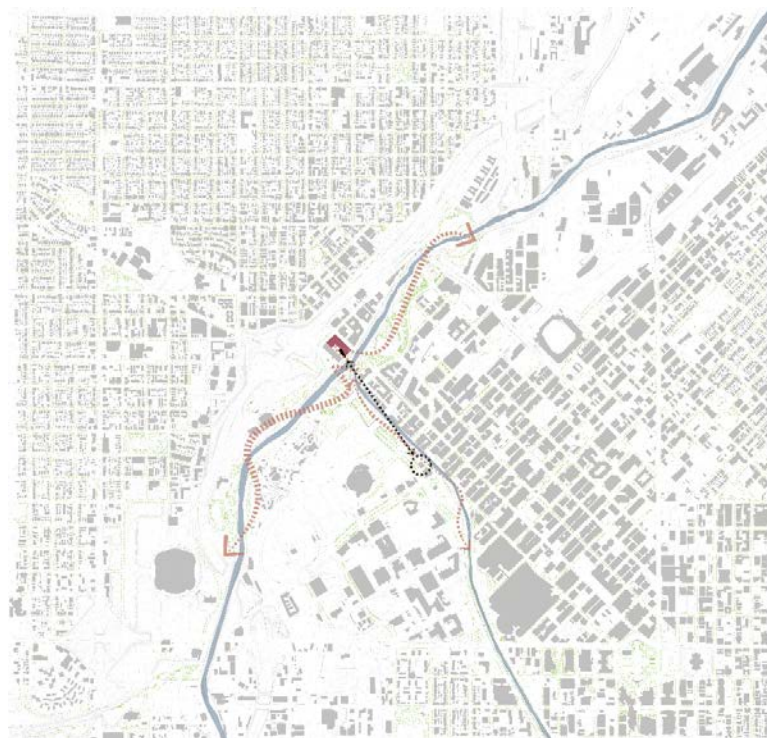


Figure 53: Connectivity (Source: Diagram by Author)

ARCHITECTURE HISTORY IN DENVER, CO.

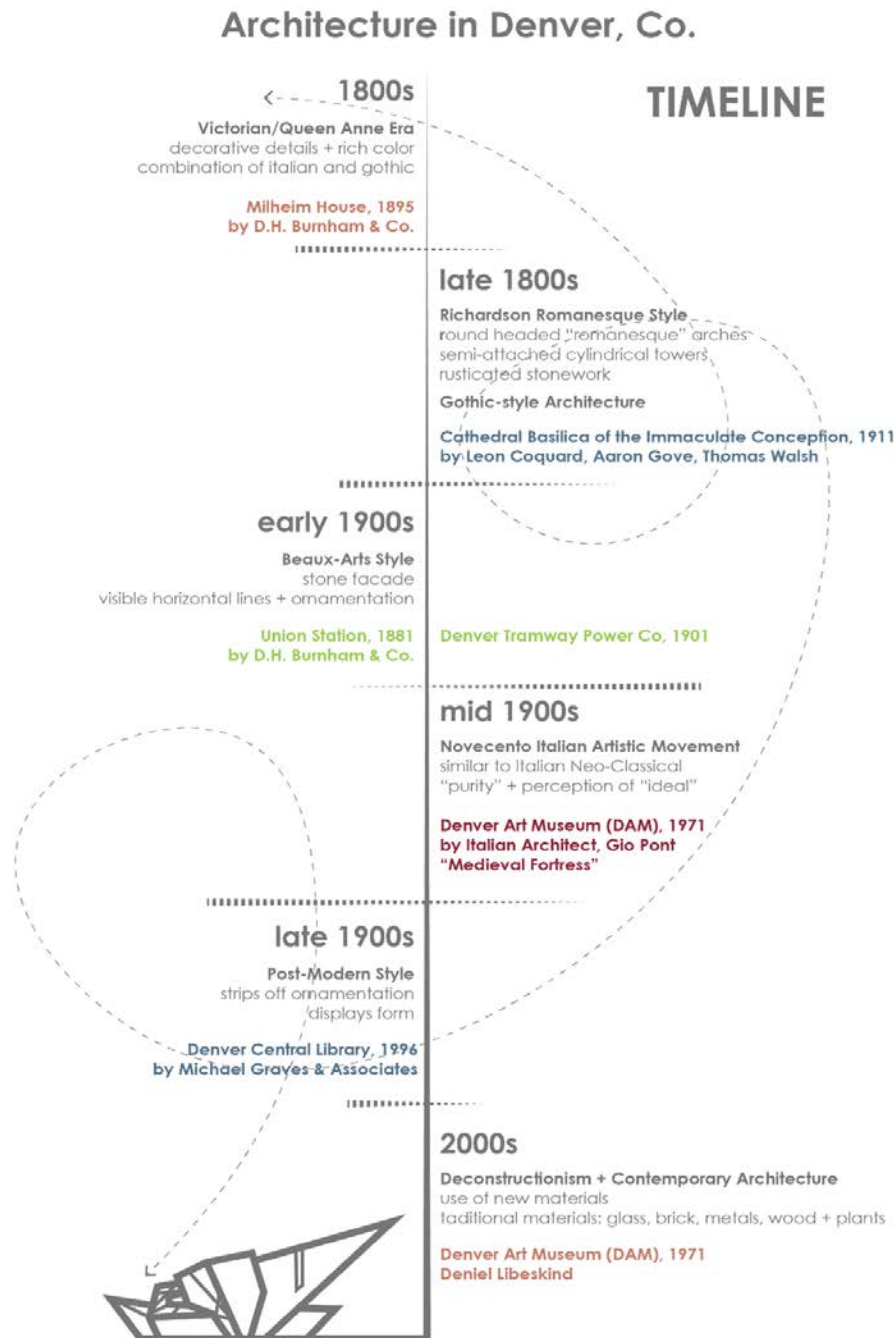


Figure 54: History of Architecture in Denver, Co. (Source: Diagram by Author)

MATERIALS: DENVER'S INDUSTRIAL PAST + RIVER FRONT



Figure 55: Materials from Denver's Industrial Past + River Front (Source: Diagram by Author)

Chapter 6: User Profiles

Ecosystem of People



Figure 56: User Groups (Source: Diagram by Author)

Community: a place for Public Interaction

Education: a place for Passive Learning

Profession: a place for Active Practice

University of Colorado Denver

COLORADO BUILDING WORKSHOP

Interview with Erik “Rick” Sommerfeld (Assistant Professor / Director):

Professor Sommerfeld is the Director of the Colorado Building Workshop, a design build program, at the University of Colorado Denver. The program is non-profit and its mission is to protect education, the environment, and the arts. The students and faculty value collaboration, not only within the studio environment but within professional practice too.

Graduate students in the Master of Architecture program can join the Colorado Building Workshop as part of their academic curriculum. Each project has about 16-28 students involved with about 4-5 teams working on different parts. For example, with 24 cabins being built and 28 students on the project, there would be 4 students per cabin.

The fabrication space they currently reside in on campus is used for quality control and small-scale prototyping. The floor-to-ceiling height is about 8 feet 6 inches which is not typically recommended for large-scale prototyping. Most of the work is done in conjunction with fabricators in-shop. The traditional construction tools used are hands-on, but the program is interested in using new technology, such as digital fabrication, and further research into façade design.

User Profiles

STUDENTS/FACULTY



Figure 57: Rebecca & Professor Conner - ages 24 & 77 (Source: Diagram by Author)

Rebecca is a UC Denver student in the Design Build Program. She works closely with Professor Conner in the Colorado Building Workshop. Together, they locate potential clients for the program. Clients care about protecting education, the environment, and the arts.



Figure 58: Alex - age 23 (Source: Diagram by Author)

Alex is a student at UC Denver and she is a part of the Design Build program. Her role is to work with other students in designing small scale prototypes in the model making space in the Living Lab, before creating large mock-ups in the Fabrication Lab.

FABRICATORS



Figure 59: John - age 32 (Source: Diagram by Author)

John is a fabricator, who assists UC Denver students in the Design Build Program. He rents out a workstation where he designs installations that he puts on display in the exhibit.

DESIGNERS



Figure 60: Stacy - age 27 (Source: Diagram by Author)

Stacy (age 27): Stacy is a designer and journalist. She publishes weekly stories about the wonderful events happening at the Design Build Center and the exciting creations being made. She works closely with George in the Living Lab.



Figure 61: George - age 30 (Source: Diagram by Author)

George (age 30): George is a digital media artist in the Living Lab. He creates biographies of the creative community in Denver. Voluntarily, he started creating time-lapse videos of the design build projects being assembled in the Fabrication Lab and puts his digital work on display in the exhibits.



Figure 62: Melanie & Angela - age 6 & 36 (Source: Diagram by Author)

Melanie + Angela (ages 6 + 36): Melanie is an Interior Architect. She rents office and retail space. In her spare time, she designs and sells furniture. She is the Alvar Aalto of our day. Melanie loves bringing her daughter Angela to work. They take classes in the Learning Lab and volunteer in the Play Lab.

Chapter 7: Design Proposal

Creative Synergy

PASSIVE LEARNING + ACTIVE PRACTICE

The proposed design is focused around the idea of “Creative Synergy.”

Creative Synergy is a place where community and inspiration collide. The relationship between ideation and creation; passive learning and active practice, users and visitors; and public and private spaces can begin to co-exist within the proposed design. Therefore, when creative minds and knowledge come together they form a dynamic space known as the Living Lab (Library).

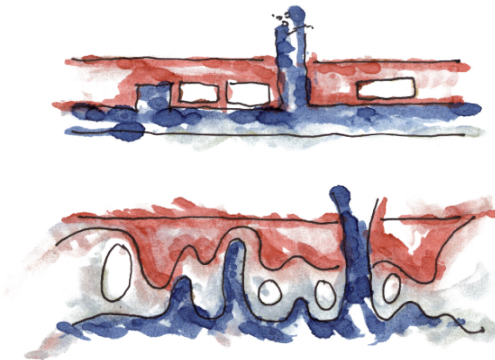


Figure 63: Creative Synergy - Abstract Diagram (Source: Diagram by Author)

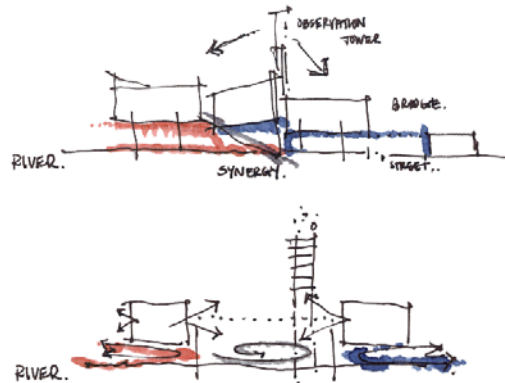


Figure 64: Creative Synergy - Parti (Source: Diagram by Author)

“LIVING LAB” (LIBRARY)

The library’s new role as a “Living Lab,” embodies the essence of creativity. A library is a place for the collection of books and “knowledge.” Today, a library is no longer collection-centered, but user & technology-centered, and therefore evolving into a multifunctional civic building. Libraries can transform learning environments into more social and collaborative environments. With the Living Lab acting as an anchor in the building; collective sharing of ideas, resources, and knowledge is encouraged.

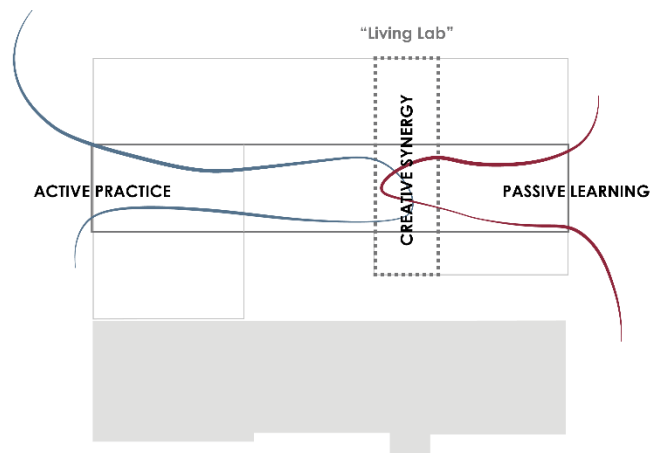


Figure 65: Creative Synergy – Plan Parti (Source: Diagram by Author)

PROGRAM

The 3 main zones in the proposed design are focused around research + design, design + build, and exhibit; with the Living Lab acting as the anchor.

- Research + Design zone: offices and workstations for professionals & studios for students and faculty
- Design + Build zone: fabrication space and service
- Exhibit zone: public gathering space and outdoor park

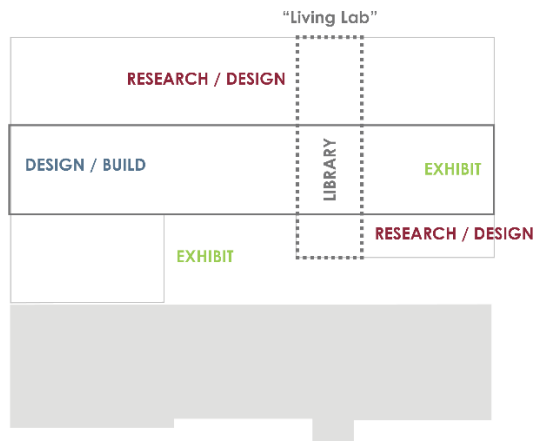


Figure 66: Zones (Source: Diagram by Author)

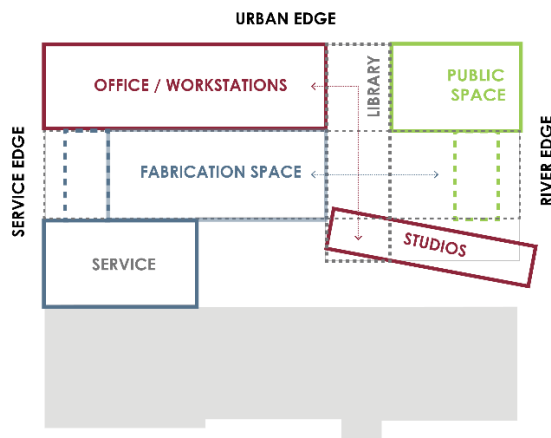


Figure 67: Program Diagram

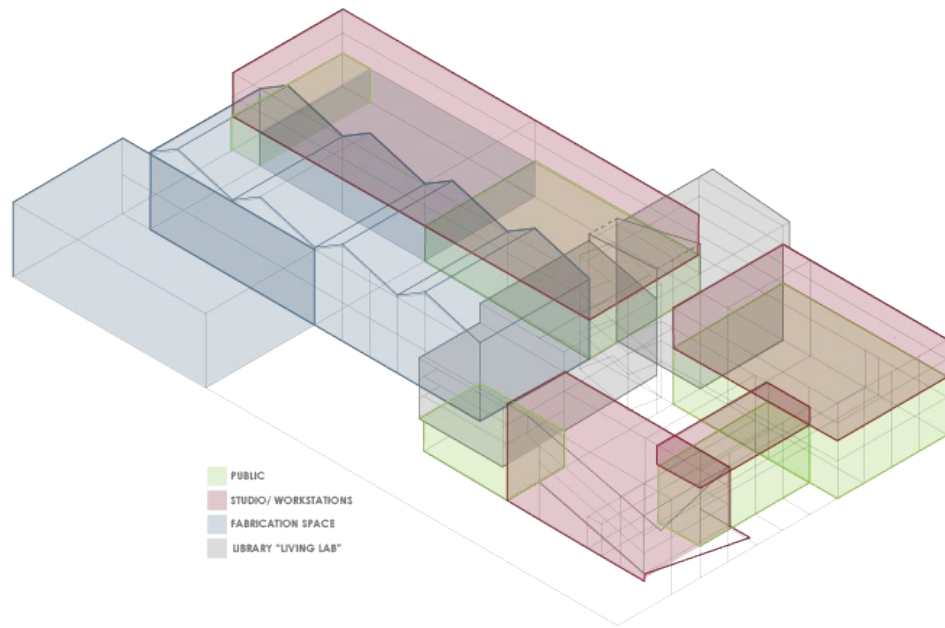


Figure 68: Program Axonometric (Source: Diagram by Author)



Figure 69: Ground Floor Plan (Source: Diagram by Author)



Figure 70: 1st Floor Plan (Source: Diagram by Author)



Figure 71: Mezzanine 1 Floor Plan (Source: Diagram by Author)

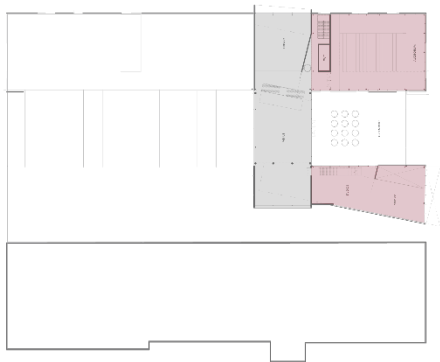


Figure 72: 2nd Floor Plan (Source: Diagram by Author)

Fostering Creativity

ECOSYSTEM OF SPACES

The ecosystem of spaces ranges from public to private/secure spaces. Spaces include social / common space, digital space, meeting space, studio / workstations, and resource space. Each spatial typology provides for a basis to the overall system in the proposed design. The outcome serves to promote both passive and active environments.

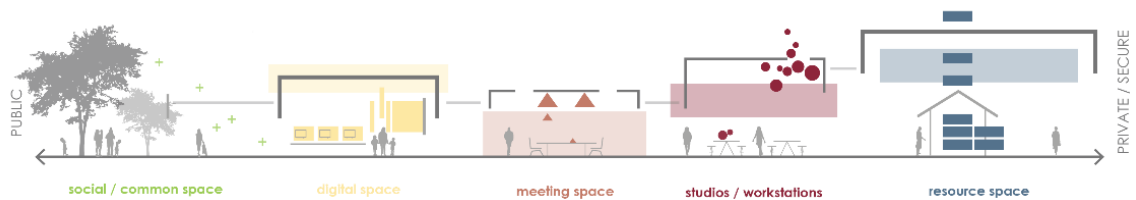


Figure 73: *Ecosystem of Spaces* (Source: Diagram by Author)

ELEMENTS FOSTERING CREATIVITY

The three major efforts that foster creativity are community, physical space, and inspiration. Community is for connecting people, physical space is for creating a sense of place, and inspiration is for the sharing of knowledge and resources.

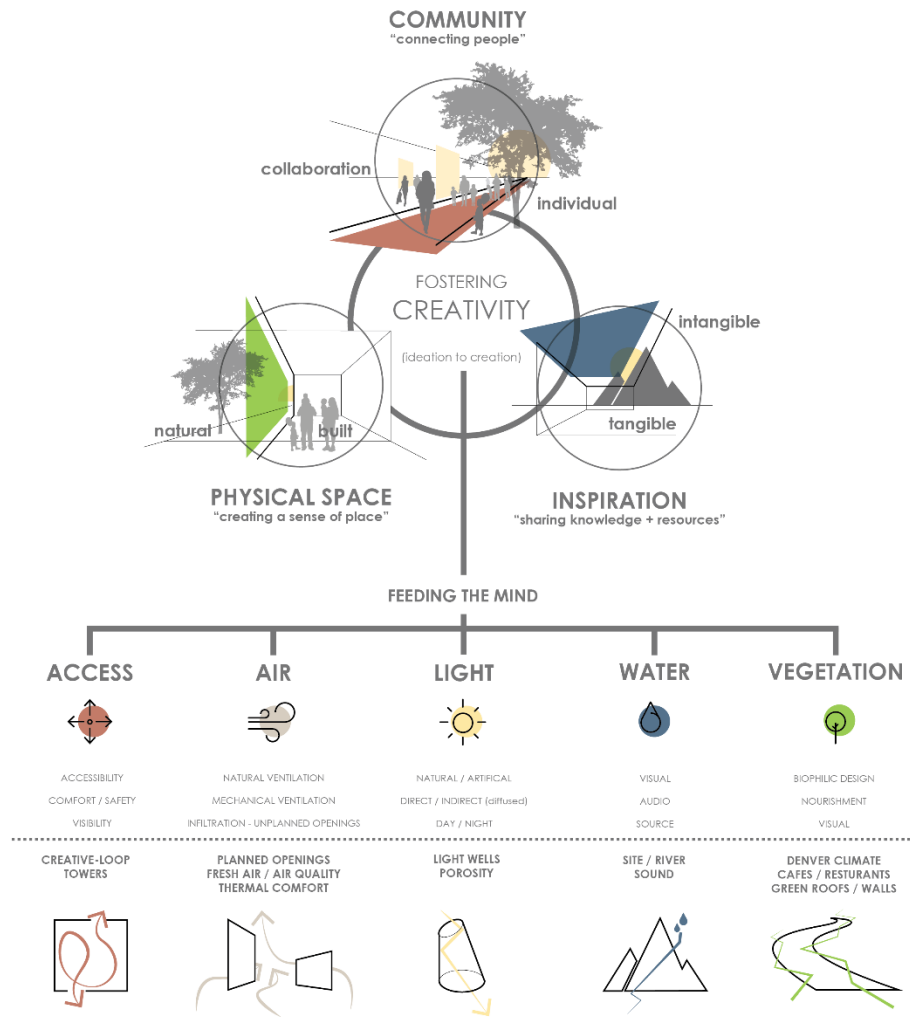


Figure 74: Fostering Creativity (Source: Diagram by Author)



Figure 75: Diagrams of Design Proposal (Source: Diagram by Author)

Feeding the Mind

VEGETATION

Parks and rivers enhance the physical and mental well-being of the community. With the design of the Creative Park, the site becomes a part of the network of green infrastructure and interconnected parks along South Platte River and Cherry Creek. Nature-based solutions, such as green roofs/walls/corridors and street trees, are introduced to the site. They help give the proposed design a sense of place along the river. The diagram (below) demonstrates the areas that incorporate vegetation throughout the building. It includes, green roofs accessed from the Stair Tower, and green walls along the river. Lastly, the creative park which is designed to display creative work made in the Fabrication Lab / Assembly Space. The entrance of the park is made up of a series of large multifunctional planter boxes that are angled like the building structure above. The planter pots have a hardedge for sitting and grass within the core.

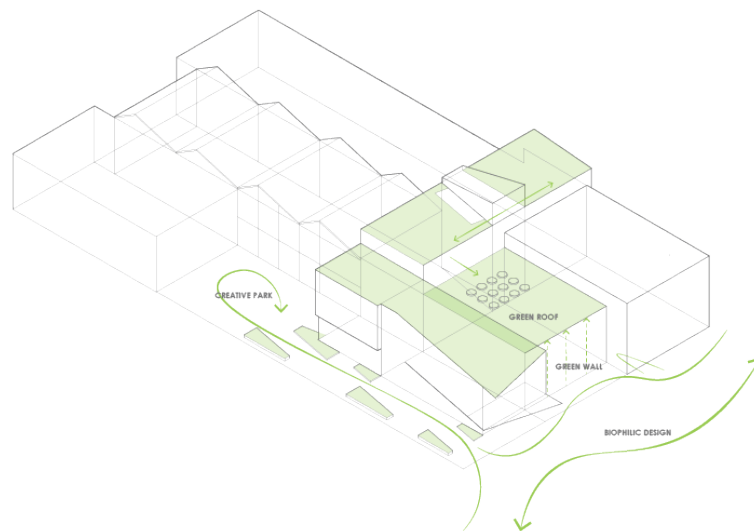


Figure 76: Vegetation (Source: Diagram by Author)

WATER

The site, located along the river, is a great source for recreational activities. Recreational activities, include hiking (with multi-use trails), biking (with bike routes), sport fishing, canoeing, flat-water kayaking, birdwatching, and much more. Also, the river can be used as an environmental learning laboratory. With the proposed design, visual and auditory senses are enhanced by the river. View corridors and sound waves of the river are beneficial to mental well-being.

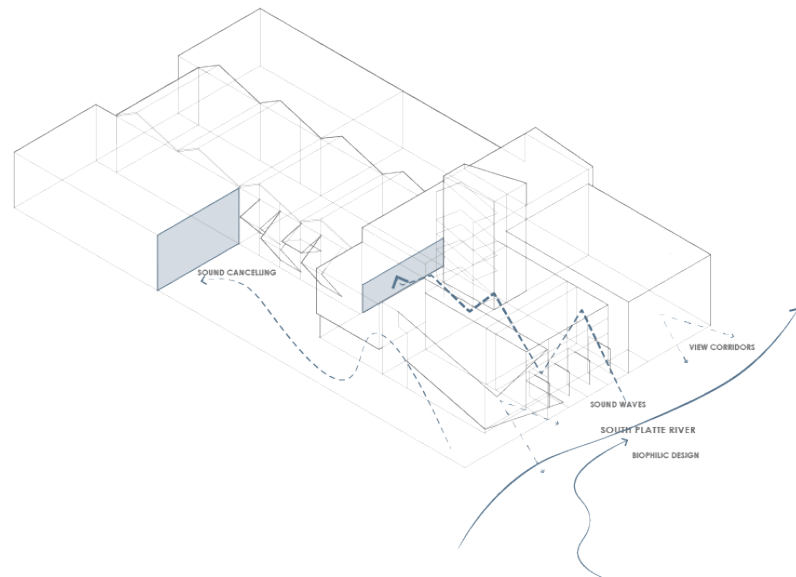


Figure 77: Water (Source: Diagram by Author)

LIGHT

Denver's grid is slanted 45 degrees to the cardinal directions, due to the river and Rocky Mountains. The REI building is located to the southwest of the site. The use of perforated panels, louvers, and other shading devices provide natural light within the building. The lightwells and skylights provide diffused light to deeper parts of the building like the Atrium and Living Lab (Library).

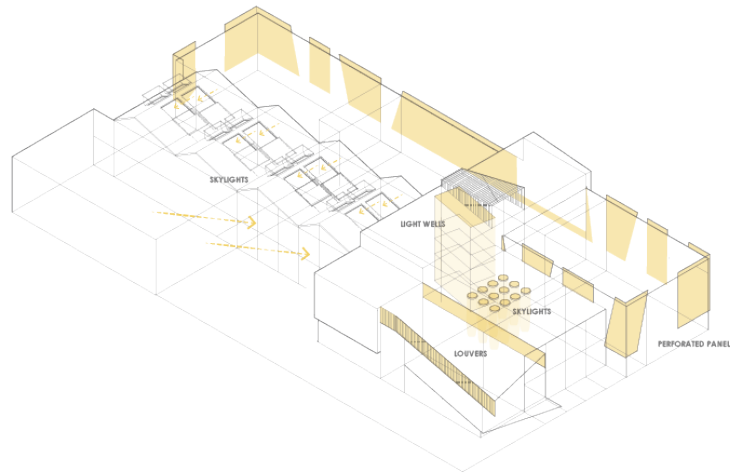


Figure 78: Light (Source: Diagram by Author)

AIR

The city of Denver is known as the “The Mile High City” because it is located a mile above sea level. The climate is mild and semi-arid. With the humidity levels being low, the opportunity for planned openings allow interior spaces to extend outdoors. As planned, several thresholds throughout the building can be opened. The openings to the Assemble Space would be used for natural ventilation when installations are moved outdoors for display, and the skylights in the Fabrication Lab / Assembly Space are opened for cross-ventilation.

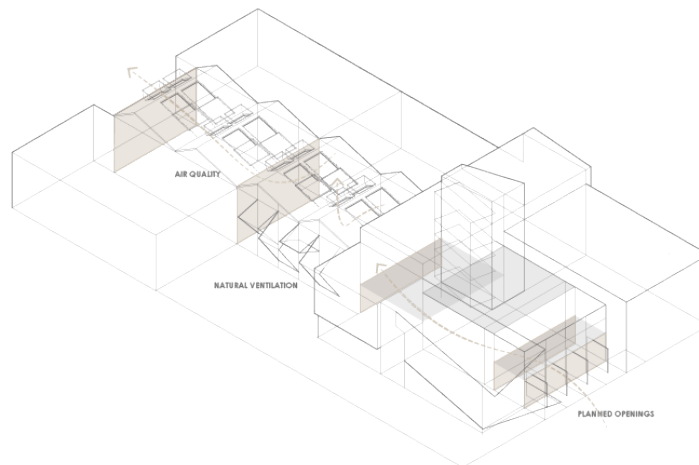


Figure 79: Air (Source: Diagram by Author)

ACCESS

When accessing the site, the main entrance is located along the river. Other smaller entrances include an entrance for the UC Denver students/faculty along the creative park, an entrance for the cafés, restaurants, retail and Living Lab (Library) along 15th Street, and service entrances along Platte Street. Innovative doors are incorporated throughout the design like pivot doors, overhead doors, garage doors, etc. Vertically, the proposed design includes a Creative Loop which allows visitors the opportunity to interact with people and engage in activity. Also, the Stair Tower gives users and visitor the opportunity to connect vertically between several floors.

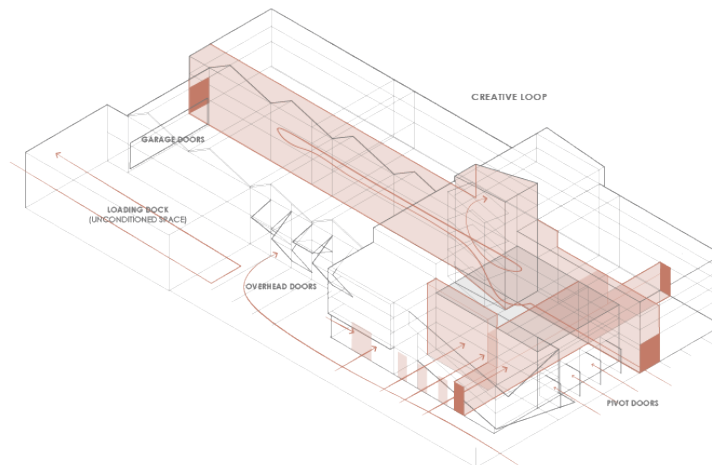


Figure 80: Access (Source: Diagram by Author)

Experiential Vignettes

BUILDING WITHIN SITE

The proposed design is situated adjacent to the existing REI Denver Flagship Store, with the main front facing Shoemaker Plaza and South Platte River. The site is 440 feet long and 240 feet wide. It is located along Confluence Park and acts as the termination point for Cherry Creek. The building engages the community with its presence along 15th Street (the urban edge), which connects the site back to the civic center. In addition, the design of the building was successful integrated into the network of green infrastructure along the river and becomes a part of the interconnected parks.

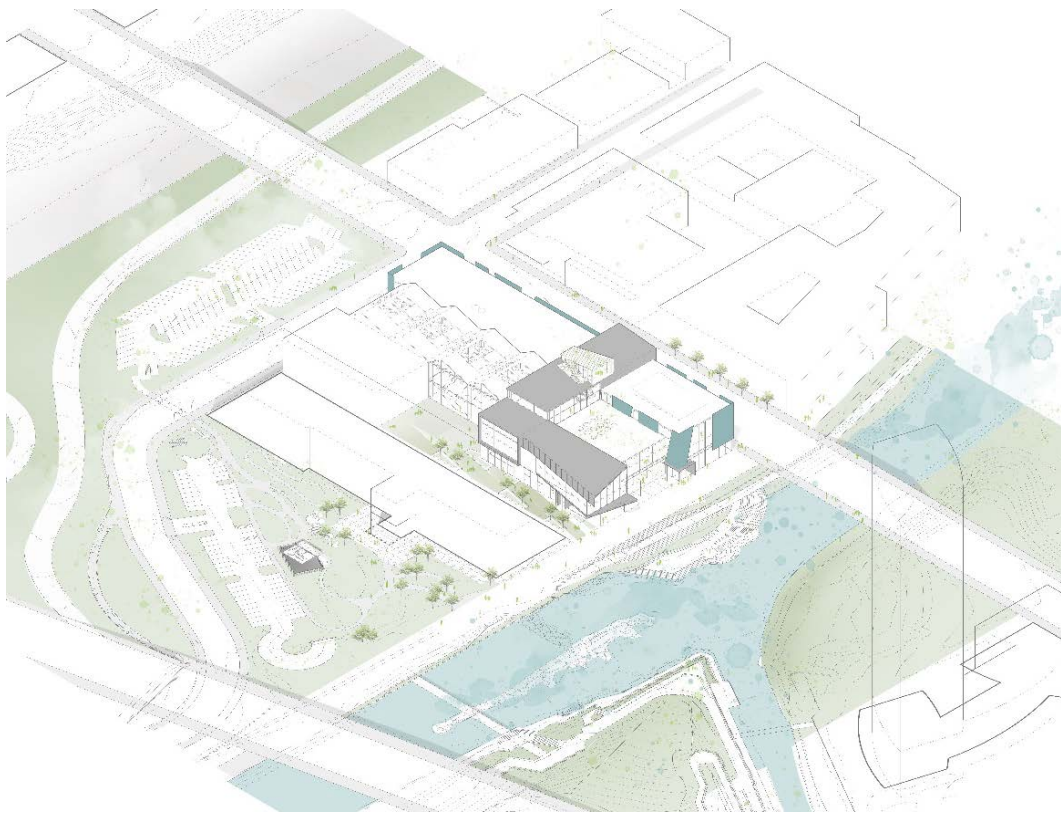


Figure 81: Axonometric of Design Proposal in Denver, Co. (Source: Drawing by Author)

The cross-section displays the arrival sequence from the parking garage located below ground to the proposed design. The pavilion is situated at the center of the parking garage and at the entrance of the REI building. The building proportions relate to the REI buildings floor to ceiling height and overall dimension of 60 feet.

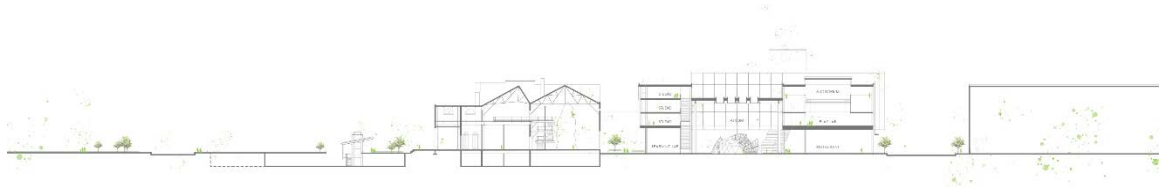


Figure 82: Cross-Section through REI & Design Proposal (Source: Diagram by Author)

The longitudinal section displays the arrival sequence from the riverfront up to the entrance of the building. The ground floor begins to expand for various programmatic uses such as exhibit space for small exhibit pieces to large installations, back to small exhibit pieces and then to the large assembly and fabrication space. The skylights/roof plane can be seen identifying the different spaces throughout the section.

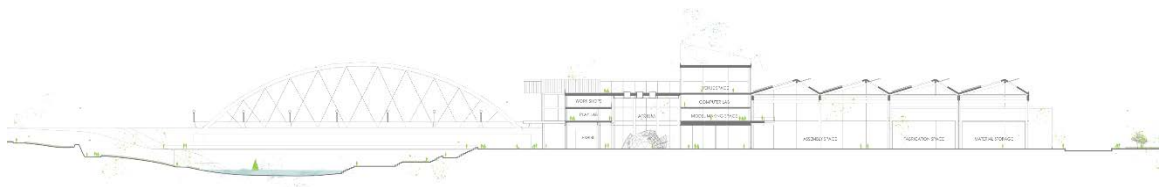


Figure 83: Longitudinal Section through South Platte River & Design Proposal (Source: Diagram by Author)

15TH STREET

The view is from 15th Street facing the Rocky Mountains. The exterior of the building is clad in a blue-toned perforated metal. The panels are removable and can be adjust over time. The pattern represents movement and directionality. The Living Lab (Library) penetrates the façade along street and presents itself as the anchor.



Figure 84: Approach from 15th Street (Source: Drawing by Author)

CREATIVE PARK

The Creative Park is nestled between the proposed design and the REI building. The park is used for outdoor gathering and exhibit space. The site currently displays UC Denver's design build project, called Lamar Urban Farming Classroom, built in 2015. The work put on display can be easily moved from the assembly space to the park by a series of tracks that are flush with the ground and overhead doors. The park includes seating areas and shade, in addition to the café which is located below the Living Lab. In the distance, you can see "The Confluence" which is located across the river and directly in front of the site.

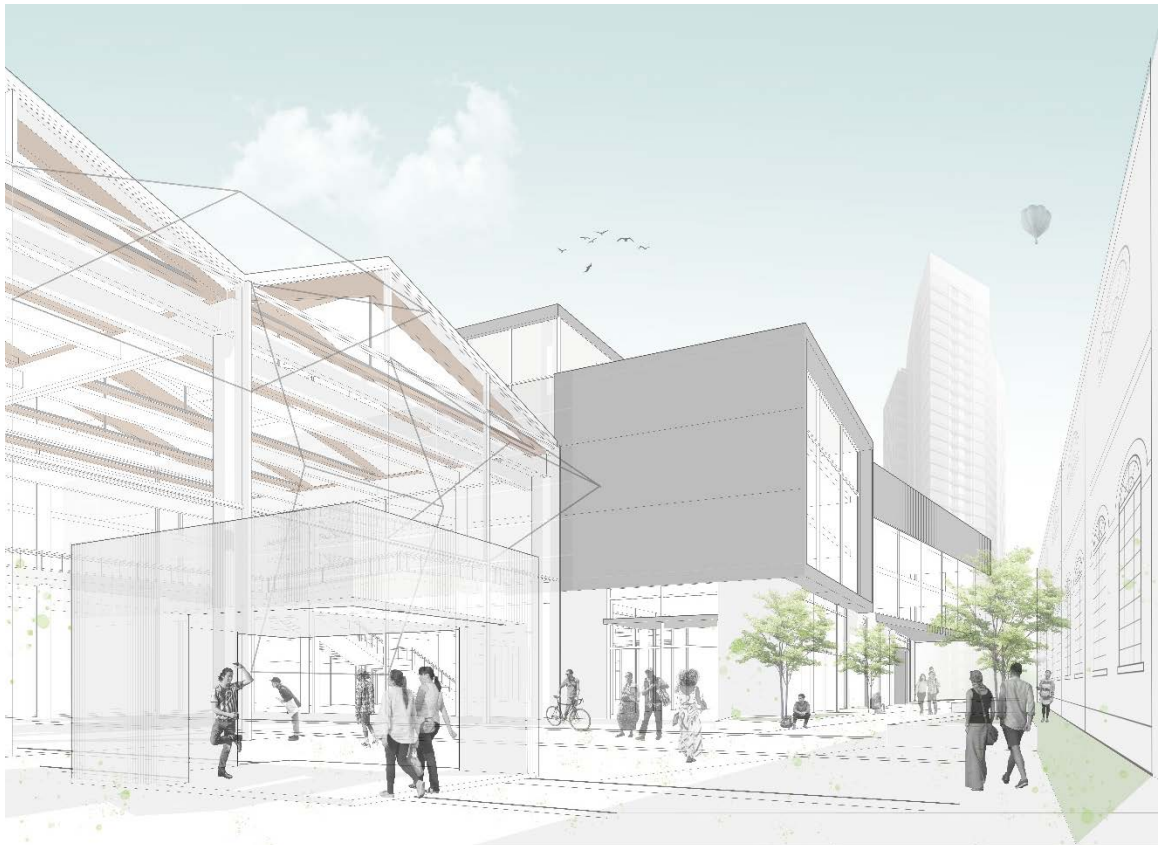


Figure 85: Creative Park (Source: Drawing by Author)

ATRIUM: FIBER ART INSTALLATION

The atrium is located along axis. The large exhibit space allows for significantly large installations to be put on display. The exhibit currently displays an fiber art installation, by Janet Echelman. The studio space for the UC Denver students are on the left, and the Creative Loop / corridor are on the right, with the Living Lab and Stair Tower in the distance.

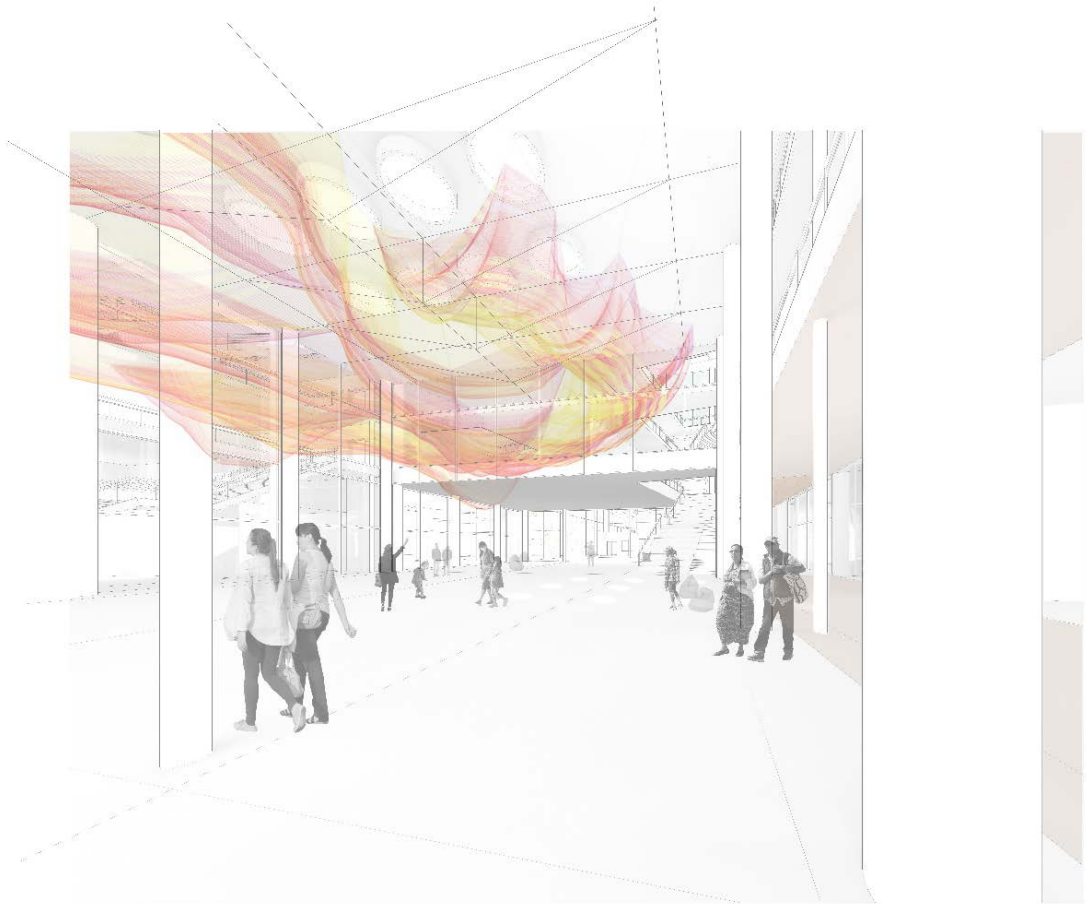


Figure 86: Atrium with Fiber Art Installation (Source: Drawing by Author)

STAIR TOWER

The Stair Tower connects all levels of the Living Lab. View corridors from the tower include the Assembly Space (and the Atrium.). The tower acts as a light well and lights up each floor. The ground floor of the stairs contains areas for seating and interactions.

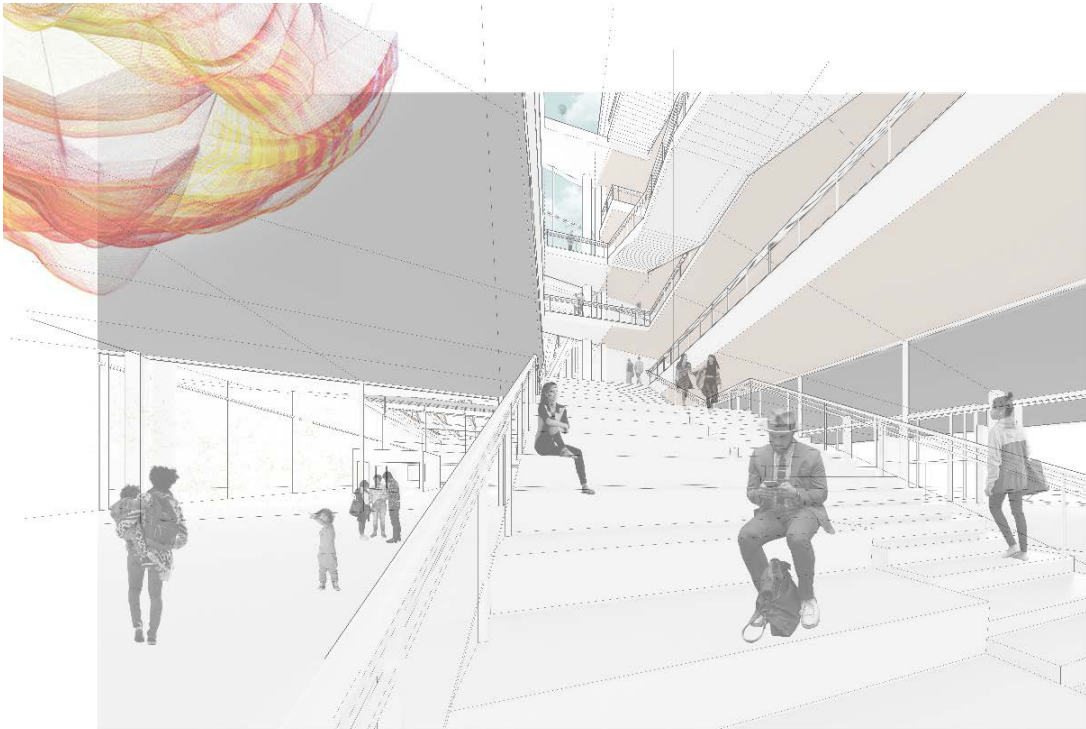


Figure 87: Stair Tower (Source: Drawing by Author)

FABRICATION LAB: VIEW OF OBSERVATION DECK

The view from the Observation Deck looking down into the Assembly Space is vast. The site currently displays UC Denver's design build project, called Redsand Cabins, built in 2014. The cabins are ready for the weathered steel exterior resembling red sand found in the Rocky Mountains. The gantry cranes above are used to move heavy object around or onto projects. Students are able make 3D print small moch-ups of their work in the Living Lab directly off the Observation Deck.

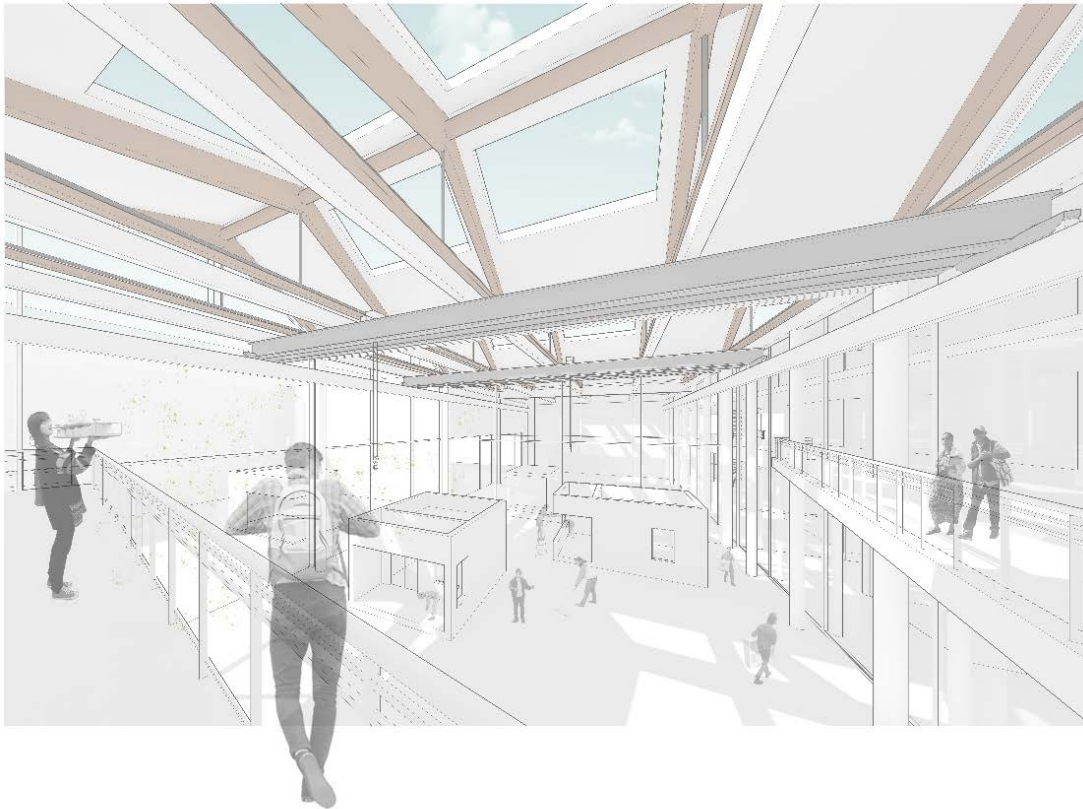


Figure 88: Fabrication Lab - View from Observation Deck (Source: Drawing by Author)

LIVING LAB: VIEW FROM VENUE TO CITY

The view from the Living Lab out symbolizes the cities accomplishments. The circular skylights displayed on the roof outside are located above the atrium. The Stair Tower opens to the sky allowing the staircase to act as a lightwell. The Venue Space is used to host events to celebrate achievements.

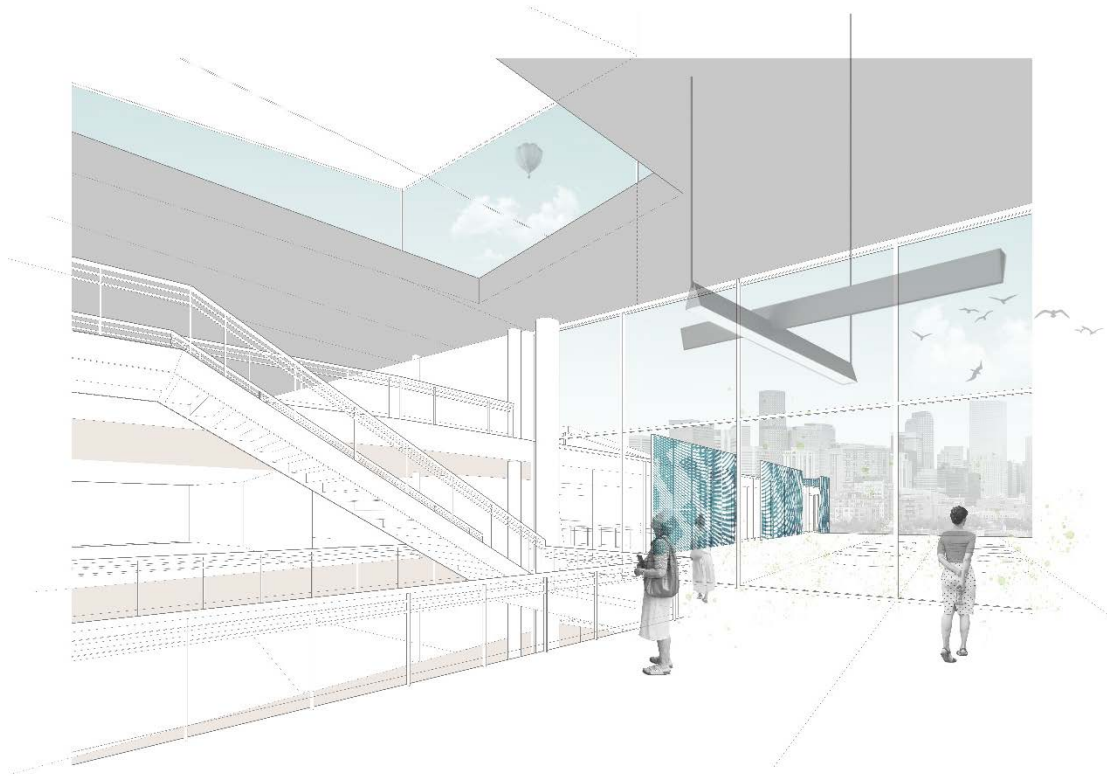


Figure 89: Living Lab - View from Venue (Source: Drawing by Author)

Chapter 8: Conclusion

Thesis Presentation

Co-Creation proved to be a valuable model for fostering creativity. It provides students, professional, and the community with a space to connect, share, learn, and create. The new building typology can begin to adapt as the growing needs change and vice versa. With the strong connection between the built and natural environment, creativity can begin to amplify human potential and promote the mental and physical well-being of our community.

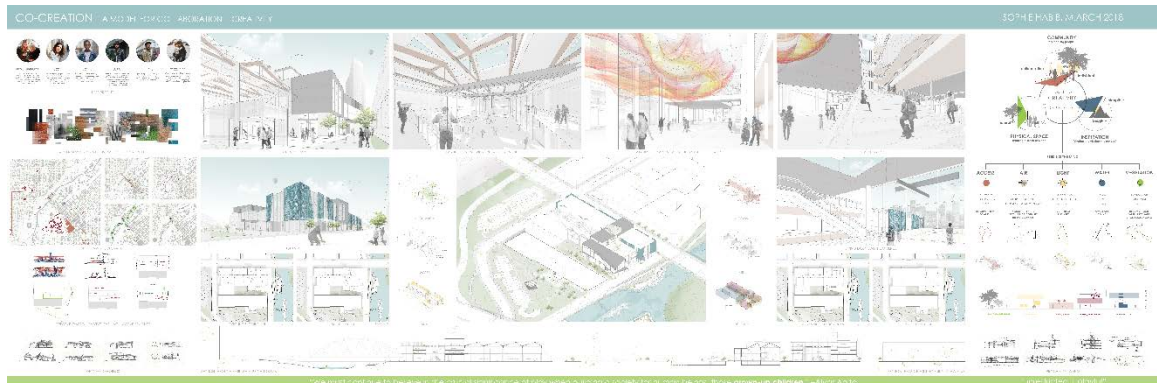


Figure 90: Thesis Boards / Presentation (Source: Drawings by Author)

unrestricted + playful

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