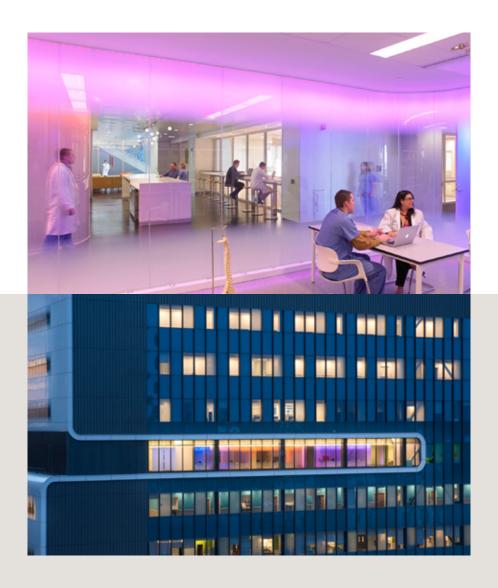
# CONVERGENCE



Science + Design

**CANNONDESIGN** 

# How did the 1957 launch of Sputnik, a lunch between two American scientists, and their boss's interest in the Navy help get you to your destination on time?

The origin story of the Global Positioning System (GPS) is a fascinating look at how the convergence of some of the greatest scientific minds of the day—including those from the Navy, MIT, Johns Hopkins Applied Physics Laboratory and others—came together to problem solve, innovate and create an incredibly complex piece of technology.

In order to advance modern scientific discovery, we can no longer rely on serendipitous meetings like we did 50 years ago. We must be intentional in bringing together the right minds to push scientific progress forward.

# CATALYZING

## CONVERGENCE





Convergence Research emphasizes sharing scientific methods and ideas across a broad range of varied disciplines. At CannonDesign, we believe designing spaces where this research can thrive is the best way\* to catalyze scientific discovery.

Creating convergence-focused research environments for our clients has led to world-wide recognition for scientific design and innovation.

↓ PRESTIGIOUS AWARDS	↓ HUMBLE RECOGNITION	↓ ESTEEMED PARTNERS
3 <b>Lab of the Year</b> award- winning projects in the past 10 years	Fast Company's 10 Most Innovative Architecture Firms in the world, 2017 and 2019	60% of Tier 1 Research Institutions are our clients

<sup>\*</sup>Don't just take our word for it. The National Science Foundation (NSF) has identified convergence research as one of its "10 Big Ideas."

### We're CannonDesign.

We leverage the heart, passion and intelligence of our more than 1,000 creative thinkers to develop solutions for some of the greatest challenges facing our clients and society. Guided by Living-Centered Design\* and a diversity of interdisciplinary expertise and thought leadership, we assist educators, corporations, governments and healers in discovering and creating the products, services and solutions of tomorrow. Our clients' success has helped us become a top 10 global leader for science and technology design, according to *World Architecture*.

\*Living-Centered Design is our design approach. It helps us address the complex interdependencies that exist between people, businesses, communities, society and the environment. Taking this systems-based approach allows us to help scientific organizations not only make improvements to their current states, but catalyze widespread, systemic change.

Health Education Science+Technology Sports+Recreation Commercial Civic Hospitality

Offices Ann Arbor Baltimore Boston Buffalo Chicago Columbus Dallas Denver Houston Irvine Los Angeles

Mumbai New York City Pittsburgh San Diego San Francisco St. Louis Toronto Washington DC

Markets









### Converging

### **Advanced Research**

**Environments** 

Some of the most groundbreaking advancements in health, science and technology are happening within research facilities. With an ever-expanding emphasis on the importance of scientific exploration, we assist university- and government-affiliated research institutions to conceive transformational systems, strategies, products, environments and experiences that not only benefit these institutions and their communities, but also lead to breakthrough research of global significance.

These organizations strive to recruit and retain the most brilliant minds who are pushing the boundaries of human knowledge. Our methodology focuses on how design can help catalyze this innovation through our integrated experience in workplace strategy, optimized laboratory planning, health and well-being, engineering systems and sustainability solutions.



### Safeguarding our nation's security and advancing the frontiers of space.

The Johns Hopkins University Applied Physics
Laboratory (APL) is the nation's largest universityaffiliated research center. Its scientists, engineers, and
analysts serve as trusted advisors and technical experts
to the government, ensuring the reliability of complex
technologies that safeguard our nation's security and
advance the frontiers of space.

Previous to this project, the APL was dispersed throughout 20 major buildings across 453 acres, in addition to facilities on a nearby satellite campus. Recognizing the important role removing physical boundaries plays in innovation, the APL partnered with us to design an interdisciplinary research building where its Research and Exploratory Development Department (REDD) can innovate in flexible, highly collaborative, silo-free workplace environments.



The design of the new building is best characterized as a microcity filled with different work settings, circulation routes and destinations aimed at bringing people together. The heart of the building is a four-story atrium that functions much like a town square with large and small open and enclosed meeting areas adjacent to each other. Laboratories supporting electrical engineering, mechanical engineering, biological sciences/

engineering, microelectronics/microsystems and multifunctional materials and nanostructures are organized in a non-departmental, shared facility plan around the atrium. Within this town square, everyone will be aware of the work other teams are doing, and whenever something interesting happens that calls for gathering, everyone will know where to go.















#### Expanding an "Only One" culture of health and happiness for researchers

CJ Corporation
CJ Blossom Park

Suwon, South Korea

2018 Lab of the Year Award
—R&D Magazine

The building consolidates CJ Corporation's previously disparate pharmaceutical, biotechnology, and food products businesses into a single location, enabling it to create industry-defining product strategies and increase its global competitiveness.

#### → Catalyzing the development of life-saving cancer treatments

The design concepts implemented in the center have increased program efficiency by 25%, doubled process efficiency, maximized daylighting, and increased communication and collaboration between researchers.

Novartis-Penn, Center for Advanced Cellular Therapies

Philadelphia, PA

2017 International Society for Pharmaceutical Engineering, Facility of the Year Award



2017 Fast Company Innovation by Design Award Honorable Mention

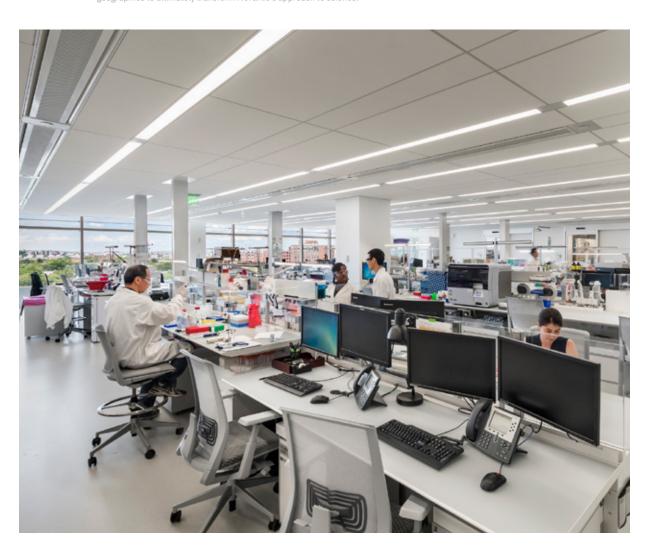
### **↓** Transforming the practice of biomedical research

The dynamic workplace breaks down walls between disciplines, blurs the boundaries between discovery and commercialization, and bridges geographies to ultimately transform Novartis's approach to science.

Novartis Institutes for Biomedical Research

Cambridge, MA

2017 Lab of the Year Award, Specia Recognition —R&D Magazine







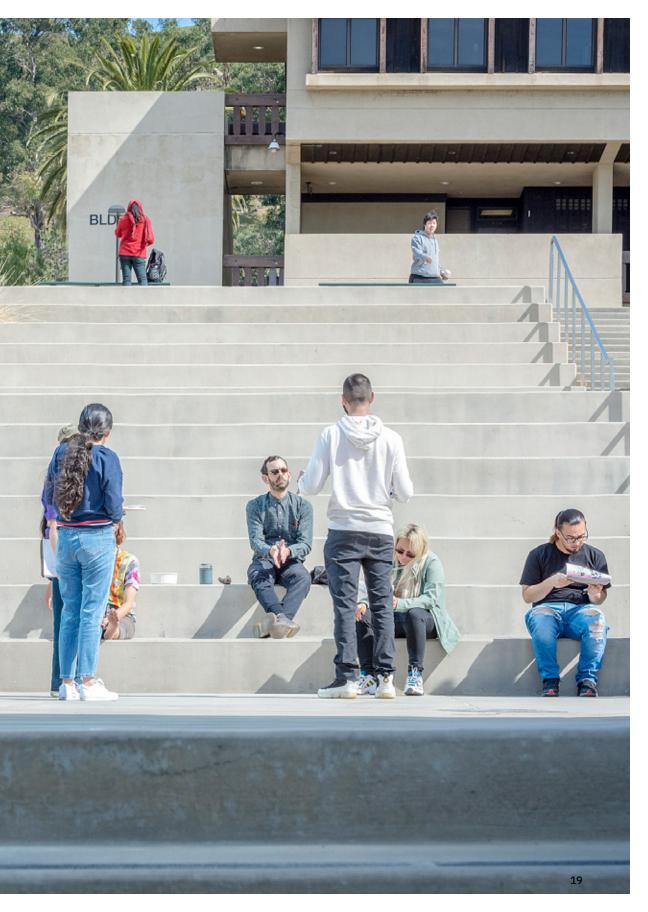
### Converging

### **Academic Learning**

Centers

With new technologies, greater interconnectedness, and incentive grants, there has been no better time to take established notions of interdisciplinary science and advance the concept even further.

Moving beyond the baseline of integrating science and non-science curricula within the same building, we encourage students to learn at an entirely new level. By embracing a truly interdisciplinary environment, we can spur collaborative learning and research across non-traditional disciplines and departments.



### Opportunities to explore and excel in the current regional job market.

Healthcare is the dominant employment sector in the greater St. Louis area, followed by aerospace and defense manufacturing. These high-paying, technical fields are in desperate need of qualified candidates, and colleges and universities are pushing to create curricula and space that meet the needs of these growing fields. To better prepare students for the region's booming healthcare and technical industries, Webster University responded to that need in the form of Browning Hall—a destination interdisciplinary science center. Historically known as an artsfocused institution, Browning Hall tripled the number of labs on campus and brought science studies out of a cramped and windowless basement to provide students the best opportunities to explore and excel in the current regional job market.



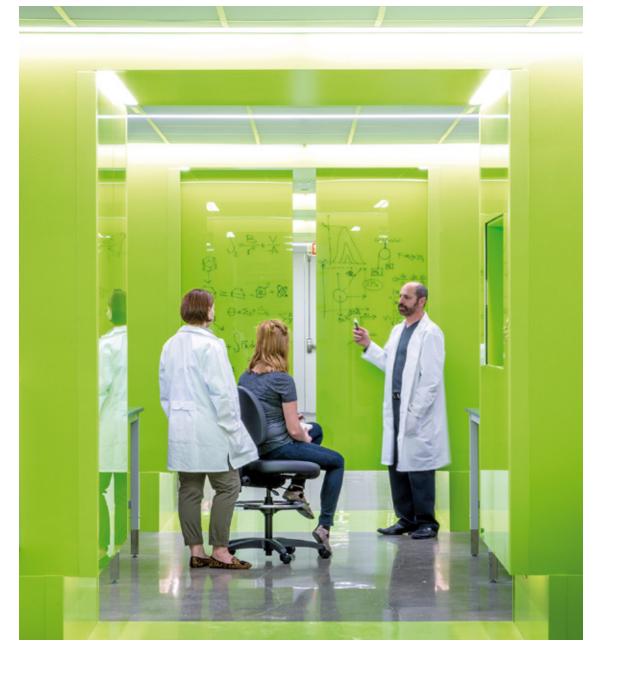
Challenging the traditional notions of what an interdisciplinary building can integrate, Browning Hall merges 10 different disciplines, from the natural sciences, to social sciences, to humanities to medical sciences. By merging these traditionally separated disciplines, the building encourages broader thinking and shared research methods that support this new, unfettered approach to learning.

Flexible and modular design gives faculty the ability to teach multiple disciplines in the same space and also allows for future learning opportunities. For example, the teaching kitchen is used by both the International Languages & Cultures Department for a culinary class and also the Chemistry Department for a class in food science. Another stand-out feature is an open-access student research lab at the main building entry for visibility to science and non-science students, faculty and people passing by.









Maximizing resources for a leading university Rice University New Emerging Science & Technology Center





### A cross-disciplinary science building designed to function as an economic generator for the region

The placement of biology and nursing skills labs adjacent to public spaces provides non-science-focused students a glimpse into the study of science, putting science on display to foster campus-wide excitement about the two programs.

Purdue University
Northwest Biosciences Building

Hammond, IN

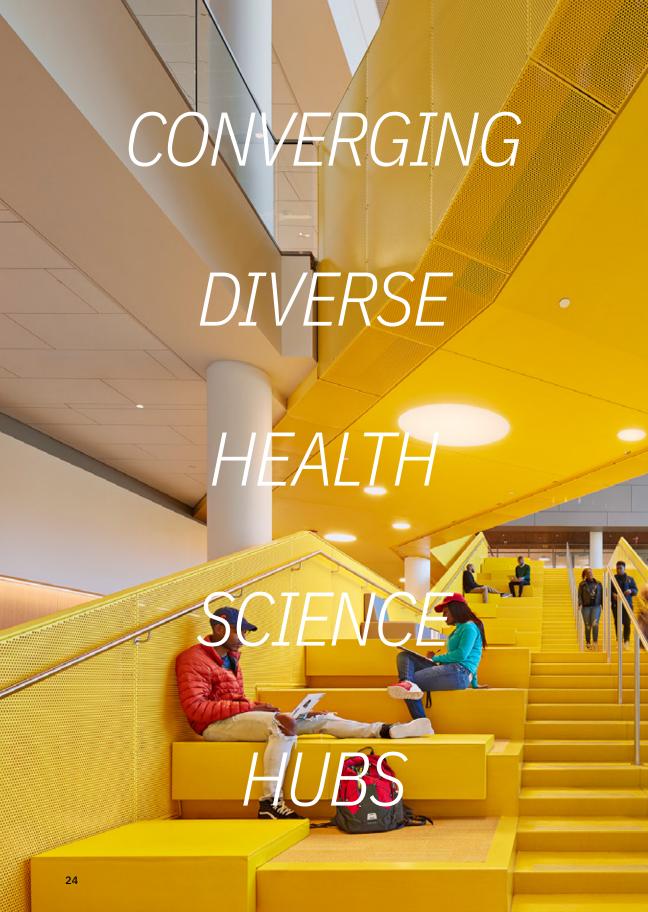
#### Upholding a university's commitment to science excellence and sustainability

The geothermal system reduces the building's carbon emissions by 200 metric tons per year.

SUNY Oswego Richard S. Shineman Center for Science, Engineering & Innovation

Oswego, NY







### Converging

#### **Diverse Health Science**

Hubs

The demand for allied health practitioners continues to rise across the country and educational institutions are extremely focused on developing students to rise up and meet that demand. Often, the challenge does not lie in the lack of qualified applicants to schools; instead, it is that existing academic programs lack enough classrooms and faculty to move students through the educational pipeline quickly enough.

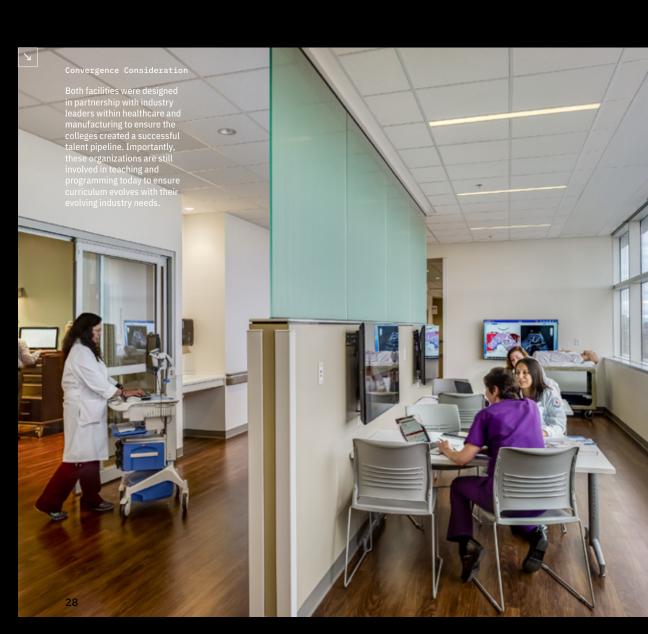
We need to look at schools of Allied Health and Sciences and think differently about the programs, facilities and amenities that both increase student recruitment and retention and set students up for success in these high-demand fields.



### Preparing students for the influx of jobs coming to the region.

Helping low-income students turn their lives around through education is central to the mission of the City Colleges of Chicago. This mission is also important to organizations and innovation districts seeking to address the shortage of skilled and specialized workers.

Over the last decade, the City Colleges of Chicago has completely reinvented itself by creating partnerships with local businesses, industries and institutions to build a more equitable and just economy. Its "College to Careers" initiative aligns each of its colleges with a high-demand career sector and brings together faculty and staff with leading employers and four-year universities.



We've worked with the City Colleges of Chicago on a number of transformative projects, including two of its newest and most impactful buildings: Malcolm X College and the Advanced Manufacturing Center at Richard J. Daley College. Malcolm X College was created in direct response to the gap between the current market of qualified healthcare professionals and the projected 84,000 healthcare jobs set to come online in the Chicago region over the next decade. Graduation rates have tripled since 2015, and health science programs are at a pass rate of 90 percent or better.









#### → Integrating dental health with physical wellness

The dental research space is colocated next to the gait analysis lab to spur collaboration between these seemingly disparate disciplines.

Old Dominion University, Health Sciences Building

Norfolk, VA



- Real-world settings
- → facilitate student education, research and treatment

Missouri State University O'Reilly Clinical Health Sciences Center

Springfield, MO

An outpatient clinic located in an otherwise private academic building is designed to support the community at large while providing real-world clinical experience for students.







#### Preparing medical practitioners through simulation

Expands the college's medical simulation capability with a wide range of high-fidelity simulation labs that provide students with a virtual clinical experience.

Texas Christian University School of Allied Health

Fort Worth, TX





### Converging

### **Industry with Learning**

For decades, universities and industries have worked to foster symbiotic relationships. Industries rely on universities to deliver a pipeline of innovative and entrepreneurial employees, and as funding and resources tighten, universities are looking to industries to partner with them to help prepare the future workforce.

Designing convergent spaces is essential to foster these relationships, which can drive economic growth for a region, stabilize an entire generation of innovative workers, fuel innovative breakthroughs and foster a spirit of entrepreneurship.

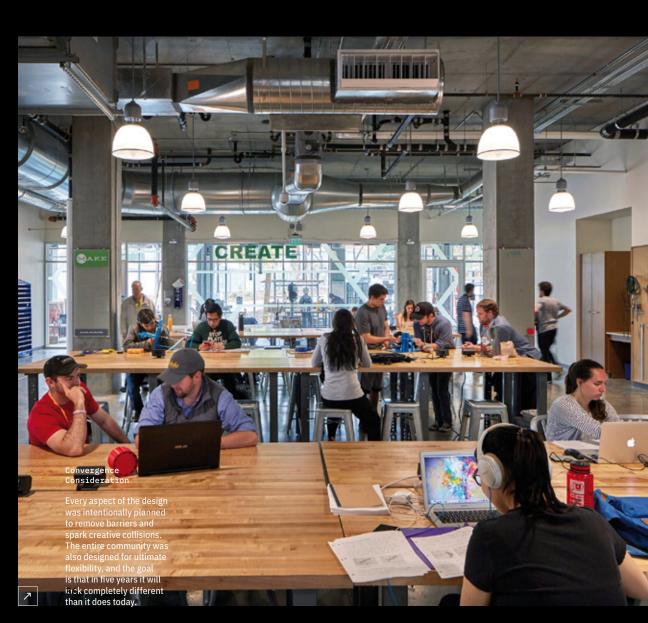


### Redefining entrepreneurial education by blending learning and living.

The University of Utah describes its innovation ecosystem as a mountain range with numerous innovation centers, institutes and functions forming individual mountain peaks, but all overlapping and interconnected through collaborations and partnerships to form a range.

The highest mountain peak at the university is Lassonde Studios—a first-of-its-kind building redefining entrepreneurial education by radically blending learning, making and living.

The innovative building creates an immersive environment for innovation, uniting 400 student residences across four floors over of a 20,000-sf entrepreneurial garage where any student on campus can build a prototype, attend an event or



launch a company. The building is filled with all the tools, resources and spaces needed to create and test new ideas—3D printers, tool rentals, meeting rooms, a wood shop, café, lounge areas, coworking spaces and offices for student-run businesses—as well as living accommodations that help make innovation a 24/7, anytime endeavor.

The results of this innovation community speak for themselves. Since Lassonde Studios opened in 2016, the number of startup teams formed on campus has quintupled to 504. In its inaugural rankings for top business schools, *Bloomberg Businessweek* ranked the university's full-time MBA program the second best in the nation for entrepreneurship—right behind Stanford but ahead of UC Berkeley and MIT. Its success has also earned it Learn X Design Honors from SXSWedu and extensive media coverage from *The New York Times, Fast Company, Bloomberg, Business Insider, Entrepreneur* and more.











### Bridging between higher education and industry with hands-on learning

Includes engineering labs, maker spaces, project labs, classrooms, and office spaces for the mechanical and civil engineering programs.

Colorado Mesa University Confluence Hall Engineering Building

Grand Junction, CO

### A destination for the next generation of entrepreneurs and innovators

Seven corporations and private spin-off companies have expressed interest in colocating, collaborating and contracting with researchers at ETEC.

State University of New York at Albany Emerging Technology and Entrepreneurship Complex (ETEC)

Albany, NY





## Inspiring the next generation of energy and environmental learning

Open laboratory concepts enable team-based research and develop new connections to industry while supporting inspiration for the next generation of students and discovery.

University of Kansas Earth, Energy and Environment Center

Lawrence, KS





# Converging

# **Medical Research**

from Bench to Bedside

Healthcare advances are largely driven by the speed at which organizations can translate scientific discoveries into applications that benefit patients and communities. Whereas this process has traditionally been slow and cumbersome, today's organizations are rethinking their business models and environments to ensure they support each other and generate faster and better outcomes. But simply putting researchers and clinicians in the same building with hopes that serendipitous collaborations will ensue does not often yield the outcomes organizations seek.

We have found that success often depends on building an open innovation ecosystem—a living lab that integrates concurrent research and innovation processes with patient care. This approach takes traditional translational health science environments to new levels by making them more permeable to better capitalize on inter- and intra-disciplinary interaction. These ecosystems are optimized to support not only health and research collaborations, but also partnerships with academia, foundations, pharmaceutical companies, biotech firms, start-ups and more.



# New culture of knowledge sharing to accelerate discoveries.

Both Kaleida Health and the University at Buffalo recognized that increasing multidisciplinary collaboration and accelerating the bench-to-bedside cycles for medical breakthroughs would require a fundamental change in culture. In collaboration with these organizations, we undertook in-depth research looking at how design could foster radical new levels of knowledge sharing to accelerate discoveries for both entities.

The result is a one-of-a-kind facility planned as the cornerstone of a world-class academic medical center and innovation district in downtown Buffalo.

The facility fosters collaboration by stacking a translational research building over a clinical vascular institute. Sandwiched between the two is a two-level collaborative core—the binder that connects doctors and researchers from varying specialties to meet in a variety of dynamic



situations to accelerate medical discoveries. The core also houses a medical innovation center focused on accelerating device development in vascular medicine.

In addition to functioning as its own innovation community, the building fuels knowledge sharing with the rest of the medical center through

physical bridges that encourage back-and-forth engagement. It has also played an important role in engaging with the surrounding community; it has revived a once-neglected part of the city and sparked a new cluster of development focused on healthcare, research and education.









† Translating neuroscience research into advanced patient care Indiana University Health Neuroscience Center for Excellence

Indianapolis, IN

Combines the neuroscience resources of longtime partners IU Health and Indiana University School of Medicine, resulting in an integrated approach to comprehensive neurological patient care.

Developing champions in sports, science and life University of Maryland Center for Sports Medicine, Health and Human Performance

College Park, MD

Brings together leading researchers from UM Baltimore and UM College Park to lead advanced studies focused on concussion and traumatic brain injury, genomics, brain imaging and other fields related to injury prevention and rehabilitation.





We realize every project is distinct and has its own needs. We're able to understand these intricacies by combining our expertise in nearly every design realm with our in-house experts in architecture, engineering, construction, research, economics, resilience, strategy, change and more. This diversity of expertise allows us to unearth new opportunities that go far beyond a singular designed solution.

ARCHITECTURE			ENGINEERING
Consulting & Planning	Construction Delivery Services		Commissioning
Change Management Equipment Planning Procurement Experiential Design Master Planning Operations Design Predictive Analytics Space Planning and Functional Programming Transition Planning Workplace Strategy	<ul> <li>→ Construction Management</li> <li>→ Cost Estimating</li> <li>→ In-house Design-Build</li> <li>→ Modular Design and Construction</li> <li>→ Pre-construction Services</li> <li>→ Program Management</li> <li>→ Public-private Partnership         <ul> <li>(P3) Consulting</li> </ul> </li> </ul>		Electrical Mechanical Structural Plumbing Technology
ENVIRONMENTAL GRAPHICS  FACILITY OPTIMIZATION		INTERIOR DESIGN  LIGHTING DESIGN	
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#### **PEOPLE**

We employ more than 1,000 diverse Living-**Centered Designers** driven by a shared passion. We want to improve the world.

#### **BUSINESS**

100+

We've been around for more than a centuryand we're just getting started.



#### **GEOGRAPHIC** REACH

Global offices

500+

Science and Technology projects completed

40M +

and Technology

#### **CONVERGENCE** OF MARKETS

We believe bold ideas emerge from crossmarket collaboration.

----- Health --------- Education ------ Science+Technology -- Sports+Recreation ----- Commercial ---------- Civic ---------- Hospitality -----

#### COMMUNITY

We help communities support and nurture their citizens by bringing more resilient, sustainable and equitable solutions to life.

Volunteer hours benefiting nonprofit organizations during our 2019 Community Service Day



#### **ENVIRONMENT**

We've taken a leadership role when it comes to sustainability, collaborating with the AIA, DOE and EPA to champion the AIA 2030 Commitment.



#### RECOGNITION FOR INNOVATION

We're recognized by our peers and the press alike as an organization committed to action, playing a positive role in shaping our society. Here's a look at some of our recent recognition:

One of the 10 **Most Innovative Architecture Firms in** the world -Fast Company 2017, 2019

One of the Most **Important Design** Companies in the world -Fast Company 2019

One of nine World-**Changing Companies** -Fast Company 2019

Winner of six Innovation by Design Awards -Fast Company 2019

Top Science + Technology Firm -World Architecture

**Top Architecture Firm** –Architectural Record, Top Architecture Firms

Top Design Firm -Architect 50

Top US Engineering Firm -Consulting-Specifying Engineer

Winner of two SXSW Learn by Design **Awards** -SXSW

#3 US Education Design Firm -Building Design + Construction

Square feet of Science facilities designed

#### AMONG OUR CLIENTS

Our work benefits from the creativity and passion of our teams and decades of working side-by-side with some of the top academic research institutions, companies, healthcare providers and federal agencies in the nation. Below is a look at a few:

# Academic Teaching + Research Clients

Baylor College of Medicine - Boston College - Boston University - Brown
University - California Institute of Technology - Carnegie Mellon University Columbia University - Cornell University - Georgetown University - Johns Hopkins
University - Massachusetts Institute of Technology - Northwestern University Pennsylvania State University - Princeton University - Rice University - Stanford
University - Texas A&M University - Texas Christian University - Texas Tech
University - The Ohio State University - Tufts University - University of California University of Chicago - University of Houston - University of Maryland - University
of Michigan - University of Pennsylvania - University of Southern California University of Virginia - University of Washington - Yale University

#### **Commercial Clients**

AT&T • Atlassian • Cboe • Google • LinkedIn • MilliporeSigma • Novartis • Showtime • Square • Walt Disney Company

#### **Health Clients**

Ascension • BJC HealthCare System • Cedars-Sinai Medical Center • Cleveland Clinic • Dignity Health • Froedtert Health • Johns Hopkins University • Kaiser Permanente • Mount Sinai • NYU Langone Health • Northwell Health • Northwestern Memorial HealthCare • Ohio Health Corporation • The University of Texas MD Anderson Cancer Center • University of California San Diego Health University of Kansas Health System • University of Minnesota Health

#### **Federal Clients**

Argonne National Laboratory - Battelle - Centers for Disease Control & Prevention - Department of Veterans Affairs - Fermi National Accelerator Laboratory - Lawrence Berkeley National Laboratory - National Institutes of Health - National Institute of Standards and Technology - Oak Ridge National Laboratory - U.S. Army Corps of Engineers - U.S. Department of Agriculture - U.S. Environmental Protection Agency - Wright-Patterson Air Force Base -









# Interested in learning more? Let's talk.

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