



DESIGNING COLLABORATIVE RESEARCH PARTNERSHIPS:

Design Considerations for Successful Academic-Industry Research Partnerships

P+W Innovation Incubator

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Research today is in a critical state of transition. Over the past few years, government funding for science has become increasingly uncertain and unreliable, putting a new series of pressures on academic research institutions to find alternate sources of funding for blue-sky, discovery research. At the same time, with the decline in basic research conducted by private R&D labs, there is renewed interest in the evolution and development of discovery science into marketable products, as private industry is looking more and more to academia to provide basic research and development to fuel applied science. This combination of needs is creating a unique opportunity for mutually beneficial arrangements between private industry and academia, providing the funding and research both sides need to a shared benefit.

According to an R&D Magazine study¹ forecasting research trends for 2014, collaborative research partnerships with academia today are among the most common form of partnerships in the world. This trend is expected to continue to increase over the coming years as federal funding remains in question and universities and industry partners continue to see the benefits from these arrangements. Though increasingly common, many would agree that these types of partnerships are still in their infancy, and that we have not yet realized the full potential of these arrangements in the scientific community. As the number of partnerships continues to increase over time and teams diversify with new players, we can expect that the dynamics and characteristics of them will continue to evolve, improving the overall experience and benefit with each new collaboration.

While there are many guides and references available which describe the nature of these partnerships, and offer guidance for structure, process, funding, and intellectual property, there are virtually no resources which highlight the specific considerations that actually enable and support people working together. Drawing on existing information on success factors for research partnerships, as well as interviews and tours with participants working in academic-industry collaborations, the objective of this report is to identify the unique design constraints inherent with these types of arrangements and provide a guide to creating optimal space for partnered research.

1. "2014 Global R&D Funding Forecast", Batelle & R&D Magazine, December 2013, p31-65.

BACKGROUND

Research Partnerships 101

There are many resources on how to structure partnerships and navigate the waters of intellectual property and research funding, so this is not intended to be an exhaustive description of the ins and outs of research partnerships. The following offers some basic background and observation on the nature of collaborative research and the primary motivations and resources involved in their creation as a background to discussing space needs.

In simple terms, academic-industry partnerships are shared research arrangements with the goal of providing real, tangible benefits to both discovery and the partners involved. Partnerships present a unique opportunity to provide necessary funding and resources for research, while also allowing industry and academia to tackle more complex issues in order to remain competitive as research and development leaders². These types of arrangements take on many forms based on the complexity of the idea or question being studied, but typically rely on funding and resources provided by private industry to an academic institution in order to advance or develop research on a particular subject.

The overall goal of research partnerships is to provide a faster means of translating ideas into the marketplace, but the benefits to both parties extend beyond the research study itself. For academics, research partnerships provide a unique opportunity for PI's and students to gain exposure to the realities of applied research and provide hands on, real world experience for academic scientists. This exposure plays a key role in developing the skills future scientists need to be more collaborative and innovative scientists, which in turn benefits private industry as these students will become part of a new, well-rounded work force for them to tap into for expertise. Beyond the research itself, partnership arrangements often create unique opportunities for teaching and outreach on both sides, strengthening the link between academia and industry.



MIT Center for Continuous Manufacturing (Image: D Hickey & Perkins+Will)

While the types of partnerships vary wildly, there are three basic categories which most research partnerships fall into. The first and most common is direct academic-industry collaboration, where a private company contributes funding and resources to a University laboratory to conduct research designed to solve a specific problem. These arrangements can take on the form of sponsored research, or a more hands on collaboration between both groups, but relies on shared knowledge and resources between the two groups³. The second form which is becoming increasingly common is the development of a University based research consortium. Consortia models rely on multiple companies and institutions all contributing funding and resources to the development of research, with the results made available to all parties for further development and commercialization⁴. The third type of collaborative research revolves around the creation of university based start-ups, where ideas created by faculty or students

2. "Research Universities and the Future of America: 10 breakthrough actions vital to our nation's prosperity and security", National Academy of Sciences, 2012

3. "Building Bridges: Between academic institutions, Businesses, and Government to Bring Innovation to the Marketplace", New Jersey Policy Research Foundation, July 2010

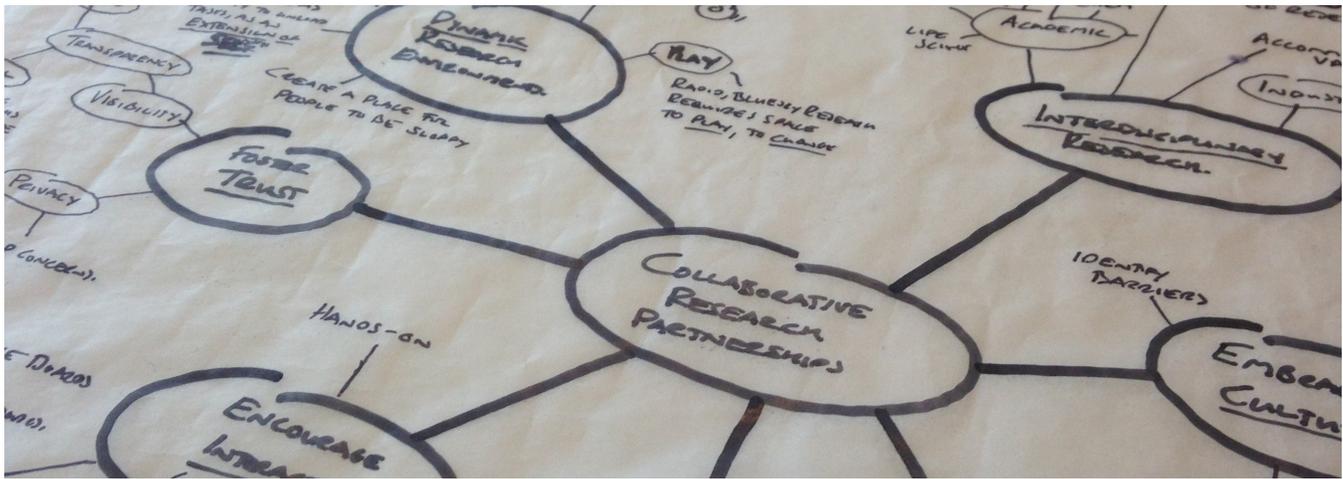
4. "Government-Industry Partnerships for the Development of New Technologies", C. Wessner, Editor. National Council of the National Academies, 2003.

are incubated on campus into viable products. All three of these models vary on a case by case basis, yet the basic tenants and goals of commercialization and hands-on experience are still common themes.



InterOperability Laboratory at UNH (Image: UNH IOP)

As academic-industry partnerships become increasingly common, the resources available to support their development are becoming an integral part of the academic campus. Most universities today have developed a tech transfer office, or innovation group aimed at advertising research findings available for commercialization, and working to pair industry partners with campus research groups to develop collaborative partnerships. These groups provide the necessary services to help bridge the gaps between the two parties, helping navigate the structure of research arrangements and set a common approach to intellectual property, publication rights, and commercialization strategies. Whether the research is developed at the university looking to transition into market, or initiated by private industry looking to solve a particular problem, these organizations are a vital conduit which helps establish and structure the relationship in a meaningful way. In addition to support organizations, over the last ten years there have been a variety of other resources and studies developed aimed at understanding the challenges of structuring partnerships and offering guidance on their value and best practices, and a list of suggested resources is included at the end of this report.



**CRITICAL SPACE CONSIDERATIONS:
Design Approaches for Constructing
Research Partnerships**

While intellectual property, funding, and the goals of research create a layer of complexity for research partnerships, space also has the ability to hinder or support collaboration, and has an immediate effect on the success or failure of partnerships. Just as there is no one-size-fits-all solution⁵ to creating the perfect research partnership, there is no single way to create an ideal setting for collaborative research. There are however, common themes which contribute to successful settings for research, which can be used as a guide for enabling research partnerships. By evaluating existing models of partnerships and discussing the critical success factors with their users, seven common principles emerge which all have a direct impact on physical space and how researchers interact to reach a common goal. The following pages will discuss these principles, as well as their importance in creating successful partnerships, and illustrate how they can be applied to the design of a research setting in order to foster stronger collaborative research.

1. Create a Strong Research Community
2. Enable Interdisciplinary Research
3. Encourage Interaction and Communication
4. Develop a Collaborative Structure
5. Create Dynamic Research Environments
6. Embrace Cultural Differences
7. Foster Trust

5. "University-Private Sector Research Partnerships in the Innovation Ecosystem", Report of the President's Council of Advisors on Science and Technology, November 2008.

Create a Strong Research Community

One of the greatest benefits of engaging in a collaborative research partnership is that it embraces the abilities, creativity, and unique mindset on both sides of the table and applies them to a mutual benefit⁶. Research partnerships work because they build upon the strengths of their participants and allow for a unique transfer of information and skill sets that enhances the experience for both sides. For academics, participation is a way to understand the complexity of the commercialization of research and how discovery research can be applied to benefit of society, while offering experience in marketing, development, and implementation of an idea. The process allows researchers to take a step back from their individual work, and refresh their overall view of modern science, giving them a better understanding of current problems and issues to help them better calibrate the relevancy of their personal studies⁷. Industry partners gain a powerful collaborator, offering an uninhibited outlook on a very specific goal that challenges the way they develop and direct a particular product. They also have the added benefit of drawing on existing research and development and working with the authors of a discovery to translate ideas to market. Both groups advance their individual knowledge and interests while creating a grounded and integrated research community.

The benefits of a research partnership can extend well beyond the impact to participants alone and can help to create a strong scientific community if constructed right. The very nature of the work in most cases is outreach - developing research that helps meet the realistic needs of society - so there is inherently a tremendous potential for benefit beyond the primary partnership. For most, research partnerships represent an ideal balance for science, strengthening a link between blue-sky research and application, yet most partnerships tend to exist in research parks, confined labs, or incubators and are often removed from the activity of a scientific community. There is an untapped potential to inspire others, especially students, at no additional work to the partnership, by proximity and interaction alone. In order to really embrace this potential for inspiration, partnerships should be located in the heart of a socially charged, interdisciplinary location on an academic campus. While pressures for privacy and intellectual property will inevitably create challenges, the benefits to exposure in this way create a stronger potential for involvement and ideas from interdisciplinary collaborators, and helps increase the profile of both the industry partner as well as the research on campus.



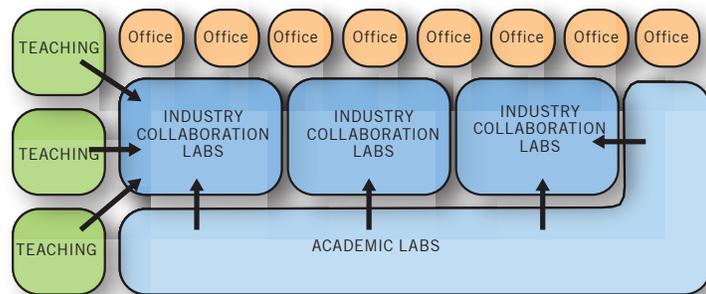
University of Calgary - Energy, Environment, and Experiential Learning (Image: T. Arban and Perkins+Will)

Taking the idea a step further, there is a great potential for academia in carefully collocating settings for teaching, interdisciplinary blue-sky research, and applied research partnerships within the same facility. On various scales, this type of arrangement is already being implemented on campuses across the country, where

6. "Making Industry-University Partnerships Work: Lessons from Successful Collaborations", Science Business Board Publication, 2012

7. Interview with Marc Sedam, Executive Director of UNH Innovation, April 24, 2014.

traditional academic research buildings are starting to make room for industry partners with the hope of inspiring teaming. Through the combination of teaching, discovery, and applied research, these types of buildings focus on convening groups of students, academics, and industry partners and have the potential to inspire further unique overlaps between industry and the academy. In order to build the most diverse community, industry participants should be visibly collocated with academic populations to the greatest extent possible in order to create meaningful opportunities for academics and private researchers to interact. This type of arrangement can also help simplify the process of incubating applied research as the building can be designed to offer a transitional setting that develops research and provides a setting for that research to grow and develop between discovery and application.



Zoning diagram illustrating a concept for integrating collaborative labs into the academic research community.

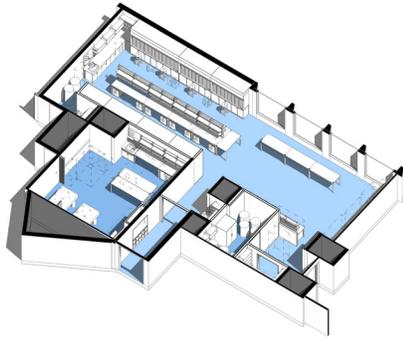
Using research partnerships to help strengthen the academic research community is a critical step that helps ensure that collaborative research can truly be a strategic investment of resources for academia. By focusing on exposure, and creating opportunities for interaction within and outside of the partnership, schools can broaden the effect of collaborative research, adding value to the students while at the same time providing inspiration for further development.

Enable Interdisciplinary Research

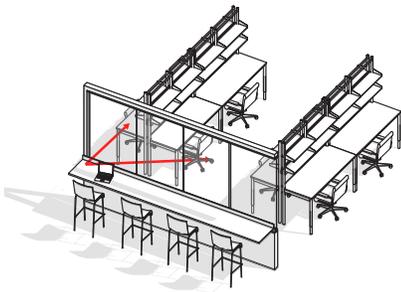
The traditional academic department structure in many ways works to provide direction for education and research, but can also lead to the siloing of various disciplines and inhibit the transfer of knowledge between them. The last few years have seen a strong focus on the integration of various arms of science, most notable with the development of STEM facilities which combine science, technology, engineering, and mathematics related work under the same roof to reinforce robust basic science education, but individual research programs still remain largely independent from one another. In 2003 the National Research Council observed that “the growing complexity of research problems [will] require the integration of both people and new knowledge across a range of disciplines”⁸, underscoring the importance and need for greater multi-disciplinary approaches to enable applied research.

Research partnerships are typically assembled around solving complex problems, or the translation and application of a certain discovery for public benefit, requiring many viewpoints and backgrounds to achieve their goals. On both the academic and industry side, researchers tend to come from a multitude of backgrounds in the physical and life sciences, combining engineers alongside chemists in the same working conditions. The challenge for successful interdisciplinary partnerships is to find and encourage ways to share research among participants, and create provisions for individuals from each different discipline to make a contribution within the same space. This is no easy task, as the settings

8. “Government-Industry Partnerships for the Development of New Technologies”, C. Wessner, Editor. National Council of the National Academies, 2003.



Interdisciplinary laboratory space with hood and bench based research areas on the left, and open flexible space on the left for prototyping

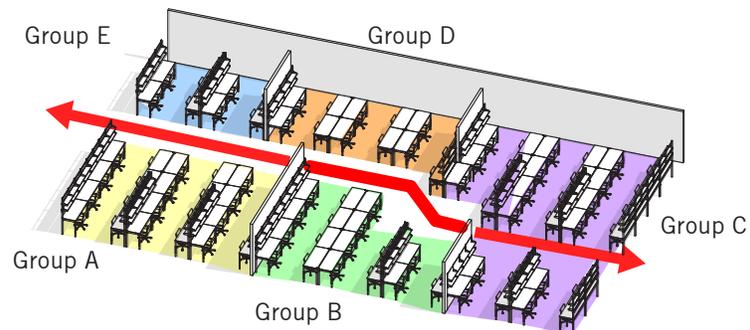


Cafe space located adjacent to research lab providing a setting for non-research partners to connect with the research activity

for physical sciences and life sciences are inherently different, with competing requirements addressing contamination, working space, equipment, and utility requirements. The key to establishing a meaningful setting for interdisciplinary research is to create a multi-faceted space that builds upon the shared needs of the different disciplines as the foundation for the primary spaces of the lab, and supplement that space as needed by areas for specific controlled research. The objective is to collocate as many of the disciplines within the same space that serves as their primary work space, allowing interaction and collaboration among researchers from various backgrounds, creating unlikely pairings that can lead to innovation. Bench or hood based research, prototyping space, and small scale production work are examples of activities that take place in large open spaces and are prime candidates to begin to collocate researchers from various backgrounds. Modularity and flexibility are critical considerations which help enable space to be reconfigured as needed to support different research applications which will be discussed in greater detail below.

The term “interdisciplinary” also takes on an expanded definition in academic-industry partnerships, as the players involved in many cases extend beyond the traditional disciplines of research. As teams become more diverse and integrated, vendors, investors, businesspeople, and management all play roles in applied research and may require special accommodations as a part of the project team. Increased visibility, and the location of non-lab work spaces with a view to the research can be invaluable in accommodating these players, and allowing them to contribute opinions to the research team and expand the capacity of research partnerships.

Locating a series of interdisciplinary research groups in close proximity to one another can also be advantageous to each single research partnership. Consortia models of research partnerships for example, are one type of arrangement where participants benefit from the involvement of many individual research organizations working together, all of whom have their own specific research interests⁹. In a consortium arrangement, multiple research organizations will all contribute resources to the development of research, with the results made available to all parties for further development and commercialization. These models, like the Inter-Operability Lab at UNH, thrive on individuals from multiple backgrounds all contributing to the research without a specific agenda. A similar idea can be applied to any research environment, by collocating research teams of various sizes and backgrounds in close proximity to one another, and establishing a setting that is inherently conducive to interaction. The goal is to increase interdisciplinary communication, but also to encourage “spillover”⁹ of research ideas, where ideas generated or processes explored in one research group, might inspire a new direction in the work of an unrelated discipline.



Interdisciplinary Research laboratory groups co-located within the same space, adjacent to a common path of travel.

9. “Government-Industry Partnerships for the Development of New Technologies”, C. Wessner, Editor. National Council of the National Academies, 2003.

Encourage Interaction and Communication

The success of collaborative research relies heavily on the people involved and how well they are able to work with one another. Research partnerships truly are a “contact sport”, where interaction and communication are vital to creating a shared awareness of the direction of research, yet communication is often cited as the biggest hurdle for teams to overcome¹⁰, and a lack of interaction can unravel even the most carefully crafted partnership. For most people involved, a research partnership is not their primary focus, and individuals have to levy their involvement on top of a regular full time research position. As a result many teams are rarely in the same place at any given time, even though they might be working on related tasks. To add further complexity, in many of the cases explored, academics and their industry counterparts rarely interact about the research, meeting only to report on activity and share results. All of these factors underscore the importance of creating a setting that encourages interaction, enabling both direct, interpersonal communication and surrogate interactions.



Open lab space with limited visual barriers for enhanced communication (Image: J. Horner and Perkins+Will)

With the combination of industry and academic personalities, the role of communication is often seen as a more formal activity, used to describe meetings and correspondence about a project, but repeated, casual, interpersonal connections are critical to any collaborative venture. Individuals on both sides of the arrangement need to be able freely to share their unique insight, knowledge, and experience with one another, and space plays a key role in enabling and encouraging this type of direct interaction. One of the most effective ways to encourage communication at a localized scale is to reduce the number of physical barriers between people, creating more opportunities for face to face encounters. In a research setting, walls, doors, shelving, lab benches, equipment, and circulation paths are all large and solid elements which impose limits or rules on how people can interact. By focusing on simple design approaches such as eliminating shelving above the bench and relocating storage to areas under the bench or in nearby storage areas, or eliminating all of the internal doors in a space, team members can more easily see one another and the work they are doing and are more likely to engage in conversation, or share their problems and process.

In addition to developing a more open environment, good communication can also be inspired by creating opportunities for forced interaction. As the make-up of teams continues to become more complex, it is even more important to create spaces that encourage collisions between different populations and users as a means of reinforcing relationships and creating more opportunities for people to collaborate. In a research setting these types of forced interactions can be most effectively created by building upon common use items, such as equipment, or areas where all members of a lab are likely to frequent, such as sinks and entryways. The key is in finding something within the lab that is inherently a

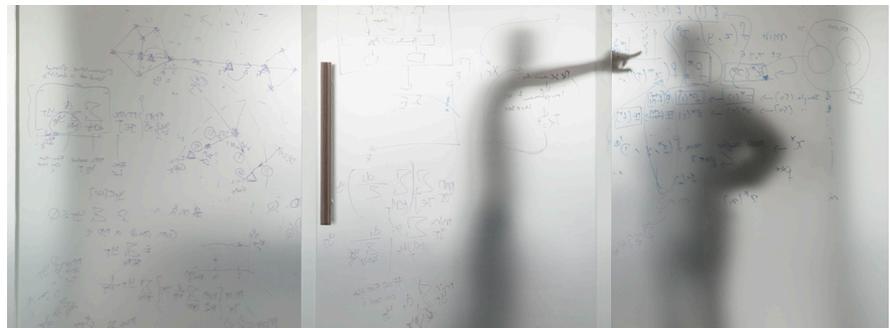
10. “Making Industry-University Partnerships Work: Lessons from Successful Collaborations”, Science Business Board Publication, 2012

collaborative activity or place and intentionally designing space that increases the likelihood of interaction. The simple act of locating a shared piece of equipment like a sequencer or a mass spec just off a main circulation path or adjacent to a lab entry creates a socially charged, shared area where different populations cross paths out of necessity and can utilize the equipment or their current work as a catalyst for discussion. When combined with a small in-lab meeting area with visual display surfaces, spaces like these turn formerly utilitarian lab spaces into eccentric “front porches” for research that don’t belong to any one individual or group, which can be ideal “safe” spaces for meeting or sharing ideas.



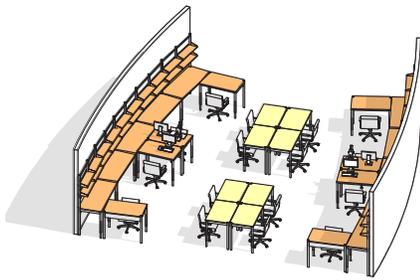
Example of equipment, entry, and meeting space collocated at primary circulation points.

Despite our best efforts to bring people together, the reality is that there is still a significant amount of interaction that takes place remotely, as schedules and other commitments of team members create competing interests for time devoted to the partnership. Though teams may meet monthly to update each other on progress, there is still a need to enable indirect, or surrogate interaction among team members to allow them to more easily share information between shifts or experimental runs. Social media is an obvious tool which helps bridge this gap, but our physical setting can also be an asset to teams. Surrogate interaction can be supported in a space through the use of message boards, notes on writable surfaces such as glass or markerboards, as well as technology and team displays. Many of these things can be added to existing space, again in meaningful spaces like individual work areas and social spaces, to encourage visualization of surrogate interactions. In research labs where all workspaces are shared, this is also a useful way to pass notes and updates on to someone who might be picking up on a task or continuing the developing the research started by someone else were a face to face meeting is impractical.

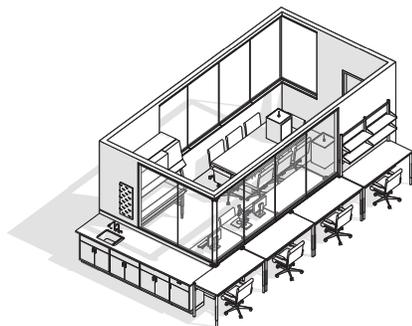


Visual display surfaces as a means of surrogate communication

Whatever the means, the definition of communication needs to be expanded when dealing with research partnerships or interdisciplinary research, as the complexity of teams requires specific attention to make sure everyone is working toward a common goal.



Team Research clusters with space for individual task work (orange) and open spaces for group team work around a shared lab table (yellow), co-located in close proximity.



Semi-Private "bookable research space for teaming or personal research based work within the lab. Space is separate from the research lab, but highly visible and connected to the larger context.

Develop a Collaborative Structure

The concept of collaboration in research has been well documented over the last decade, but it is still of vital importance to the success of research partnerships. At its core collaboration is about bringing people together and helping them establish and execute a common goal, and to do that teams need to be provided a space with a strong structure that is built to enable teamed research.

Within a research partnership, the clearest starting point to encouraging collaboration is to develop a space where everything is shared among participants. Without the constraints of ownership or assigned space, teams are enabled to develop their own "rules of engagement" for how they will work together and create their own structure for how the team will use a space. While principal investigators and directors might make the high level decisions about how a space is used, the structure of a laboratory for collaborative research must be fluid enough to allow the research staff to design and modify their own workflow as needed in order to suit the development of the research.

This collaborative structure should also work to enable a variety of working styles, not limit them. Similar to how offices today provide a mixture of open and closed spaces for teaming and individual work, laboratories should focus on creating a balance of spaces for the various personalities working in them. Lab spaces for collaborative research should primarily revolve around shared space for teams to "play", which create research clusters where groups can gather around equipment or prototypes and work collaboratively on a problem. These types of spaces need to coexist with traditional bench areas that support individual work, allowing for a balance between social group work and individual, concentration based work, but easily allowing participants to move between both areas. Collaboration can also be strengthened through the creation of "bookable" lab spaces, similar to conference rooms, where a team can check out a research space as a team work room, individual thinking space, or a space for a specialized research study. These spaces, as well as in-lab meeting rooms and collaborative equipment areas as previously described help to diversify the types of space normally provided inside the lab for research, and mimic the benefits of their office counterparts, providing a mix of formal and informal, group and individual spaces, to accommodate a wider range of personalities and processes in collaborative research.

Create Dynamic Research Environments

Science today is evolving at a rapid pace, and trends like collaboration, new research technologies, and the drive for greater interdisciplinary research all create unique pressures which have a direct impact on laboratory space. In terms of research, uninhibited, blue-sky discovery and applied research partnerships work best when they are situated in dynamic environments that can easily change as studies take new turns and move in different directions. Space should not limit the direction of research, and for this reason laboratory design has embraced the idea of creating flexible and adaptable environments to enable change over time.

The idea of flexibility is not new, revolving around simple concepts like the use of an open plan, consistent infrastructure, and modular, movable bench work to allow for reconfiguration over time. The fundamental idea is that flexibility allows a space to change and increases the potential for researchers to modify their settings as new needs arise. However, observing "flexible" research settings in practice as they are created for research partnerships, it is clear that there is a difference between spaces that can change, and spaces that do change. Flexible

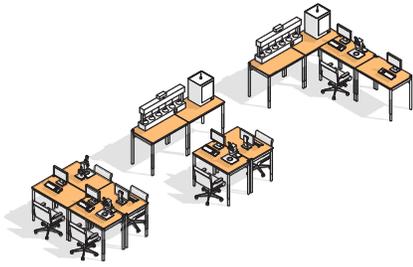


Diagram illustrating a range of potential layouts achievable with four foot mobile benches accommodating a variety of working styles and processes.

design is a great tool, as long as the methods incorporated are simple and clear enough that research staff can make modifications on their own. As one researcher noted “if its not on wheels, it ain’t moving”. Research environments should instead make a shift toward creating more agile environments, designed to accommodate a day to day gradient of needs brought on by the complexity of research undertaken collaboratively.

The simplest way to encourage this type of agility is to increase the ease with which modular lab furniture can be relocated. Benches and equipment on wheels, without cumbersome storage above invite researchers to easily shift locations as needed, experimenting with configurations for teaming or individual work. Infrastructure is a critical consideration in this regard, as power and utilities need to be readily available at various locations throughout the lab. Overhead utility infrastructure, combined with careful location of fixed “monuments” like sinks and hoods, which do not easily move, increase the ease with which people can reinvent their surroundings to meet unique needs. The size of modular components should also factor into design decisions regarding agility. While modularity is a critical need cited by many lab users, the larger a component is the more effort it takes to relocate while the size may limit the overall options for reconfiguration. For example, two four foot benches yield more potential for a variety of combinations than a single eight foot bench. Smaller human scaled components offer more opportunity in realistically creating a dynamic laboratory environment.

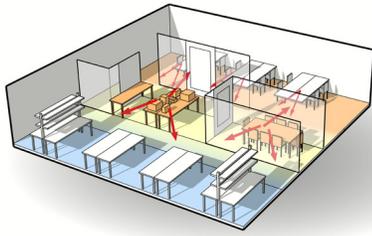
Regardless of the specific methods used to create a dynamic research environment, ultimately lab users need to know that they are allowed and encouraged to interact with and modify their surroundings. The types of interactive components used should be varied, including furniture, whiteboards, benches, and equipment, but need to clearly suggest that the user is in control, and has the ability to play and innovate in order to design their own research process.

Embrace Cultural Differences

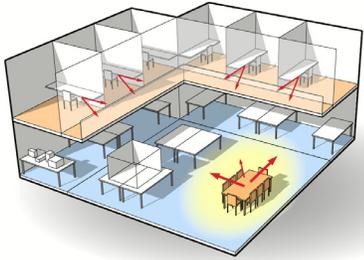
One of the biggest hurdles cited in existing collaborations is a difficulty in navigating cultural differences. Academic researchers see themselves as uninhibited and inherently collaborative, focusing on discovery and research for research sake. They are often bound by academic terms, and tenure requirements, and are motivated to produce research within certain time constraints¹¹. Their industry counterparts on the other hand tend to be more structured groups who are extremely focused on a specific mission or project and the commercialization of that product. There is a tremendous amount these groups can learn from one another, but to do so successful partnerships need to focus first on embracing cultural differences and accommodating the multiple personalities involved in the partnership.

The best approach is to begin the partnership with by creating a mutual understanding of potential barriers between the two groups. Academics and their industry partners understand the typical motivations behind one another, but typically don’t have enough opportunity to interact to really appreciate the realities of one another’s business. Successful research partnerships need to understand up front the unique needs of the two groups and how they plan to work in the partnership, in order to create a space that accommodates the needs of both. An ideal setting should aim to create places for industry, which enable the teaming and project focus inherent in commercialization, as well as places for the academics, where research can be looser and less restrictive. Most importantly though, these groups need to understand where their interests overlap,

11. “Best Practices for Industry-University Collaboration”, Pertuze, et al, MIT Sloan Management Review, Summer 2010 v51, no 4, p 83-90



Meeting spaces (orange) inside and on the boundaries of lab spaces create an inclusive environment that allows non-research partners to share in the research.



and create a unique space for both groups, which plays on the shared interests of each group, and urging meaningful crossover at the seams of each other's comfort zone.

Foster Trust

A lot of work, time, and investment goes into executing a research partnership, so it is important that both sides inherently trust and understand one another. Much of the opportunity to build trust relies on communication and leadership, but the physical setting for research can also lend itself to fostering an environment for mutual trust.

Transparency can play a key role to building trust, both in a physical sense as well as intellectual. On the physical side, it is important that research is visible to both parties within reason. While some industry collaborators may never actually work in the lab itself, creating an atmosphere where they can see what is going on and immerse themselves in the work of the partnership is critical to keeping both sides engaged. This can be as simple as creating open environments for the partnership, so a viewer can get an appreciation of the entire process from a single vantage point, or incorporating meeting rooms with a view into the lab, so status updates can have a visual link to the research efforts in progress. Small moves like these create an inclusive environment rather than an exclusive one, which easily allows people to form connections to people and the work, instilling trust in the process

Intellectual transparency is in many ways just as important, as clarity in the goals and direction of the partnership are imperative for both organizations involved as well as the primary research team. The idea of developing a "roadmap"¹² for partnerships focuses on creating a visualization for the entire team as to the progress and overall direction of the research. This type of exercise can be a great tool for the internal team, as well as the general public to engage with the work of the partnership, and can also lend itself to visually reinforcing trust that the partnership is on track and progressing as expected. Locating this visualization adjacent to meeting rooms, or at the entrances to lab spaces further lends an opportunity to reinforce the status and goals to the team, while also creating a visual brand of the work of the lab.

Another key consideration for fostering mutual trust lies in creating provisions for privacy. Despite the desire to be completely open and inclusive in a research partnership, intellectual property agreements, and the sensitivity of institutional networks and data often create invisible or implied barriers which can result in contentious interactions. Spaces designed for industry collaboration should consider creating provisions for adjustable levels of security, allowing industry partners the ability to work side by side, but with the infrastructure to isolate certain proprietary parts of the research as needed. Some of the concepts discussed earlier can lend themselves to this type of flexibility and increase the overall potential for the partnership and the space as a whole.

While space can help create a positive environment for research partnerships, the players from each side are ultimately the main conduit for establishing a mutual trust and understanding. Design can be a critical ally in reinforcing trust and managing barriers between partners, and can lay the groundwork for a strong lasting collaboration.

12. "Government-Industry Partnerships for the Development of New Technologies", C. Wessner, Editor. National Council of the National Academies, 2003.

CONCLUSION

Designing Collaborative Research Partnerships

As trends in research continue to evolve, research partnerships hold a tremendous amount of potential to rapidly advance research and its application, creating a model where scientific discoveries can quickly have an impact on society. While there continues to be uncertainty to the future availability of federal funding sources, academic-industry collaborations provide a strong model to shore up basic discovery research with the resources required for success, while at the same time creating a greater capacity within the scientific community to tackle complex research problems. As funding continues to shift from 100% grant funding to 100% private funding for research, there is of course the danger that academic researchers will drift too far from the underlying goal of generating science for science and education sake and focus too much on marketable research. However, with careful attention and involvement from academic leadership, it is possible to create a setting to allow for the integration of discovery and applied research which can position academia for continued success in the coming future.

Space can have a tremendous impact on the success or failure of continued collaborative research, by creating a setting that is conducive to interaction and teaming. The ideas illustrated in this study are a starting point for understanding the shared needs of both parties involved in these arrangements, in order to inspire development of environments where it is easier for academics and their industry partners to meet at the edges of their shared interests and engage in research that is truly mutually beneficial to the parties involved as well as society as a whole.

RESOURCES

Further Reading on Academic-Industry Research Partnerships

“Government-Industry Partnerships for the Development of New Technologies”

National research Council of the National Academies, C. Wessner, Editor. National Academies Press, Washington DC, 2003

“University-Private Sector Research Partnerships in the Innovation Ecosystem”

Report of the Presidents Council of Advisors on Science and Technology, November 2008

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