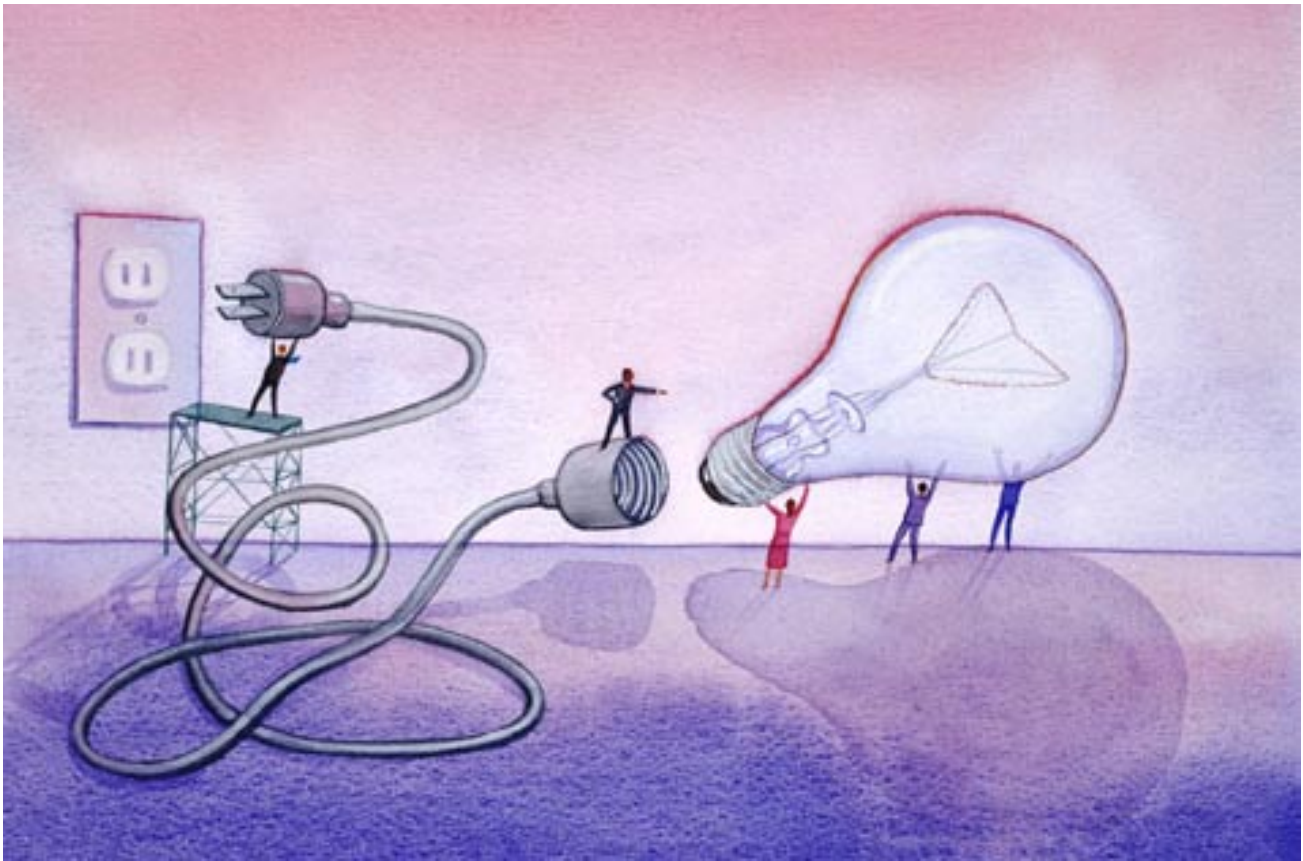




Modeling and Replicating Effective Collaboration: A Case Study of The Harvard Stem Cell Institute

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**“Tangible results are critical...
but to get them efficiently from
bench to bedside requires a
new level of collaboration.”**

-- Brock Reeve, HSCI Executive Director
Boston Globe, June 11, 2007

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Summary

This paper examines the collaboration among a team of researchers affiliated with the Harvard Stem Cell Institute (HSCI). The purpose of the collaboration among the researchers is two-fold: to increase the quantity and quality of scientific output and to advance the careers of the researchers, who at the time of the authors' research, were all junior faculty members at Harvard. Leaders of the Institute believed the subject team to be collaborating effectively. The authors conducted research to describe effective collaboration among the HSCI team so that practices could be modeled for other teams to apply in their own endeavors. Another purpose of the research was to identify barriers to effective collaboration within the HSCI community.

Research Methodology

Unless otherwise noted, all of the frameworks and definitions related to collaboration, collaborative networks, collaborative capability, collaborative behavior, and relationship currencies have been developed by the authors through their experiences as organizers and operators of and consultants to collaborative networks of customers, partners, and suppliers. Our work crosses multiple industries including oil and gas, pharmaceuticals, international economic development, and information technology.

Research on the Harvard Stem Cell Institute project team is based on a multi-method design, emphasizing open-ended interviews with members of the selected team, HSCI management, and a content analysis of organizational documents and archival records. The research is part of a consulting engagement, the objectives of which were:

- Understanding how the team engages in key collaborative behaviors and builds an environment of trust and reciprocity
- Identifying the outcomes (metrics) the team is achieving
- Identifying any structural barriers to effective collaboration that this team's approach overcomes
- Developing a model of collaborative work that other teams can apply

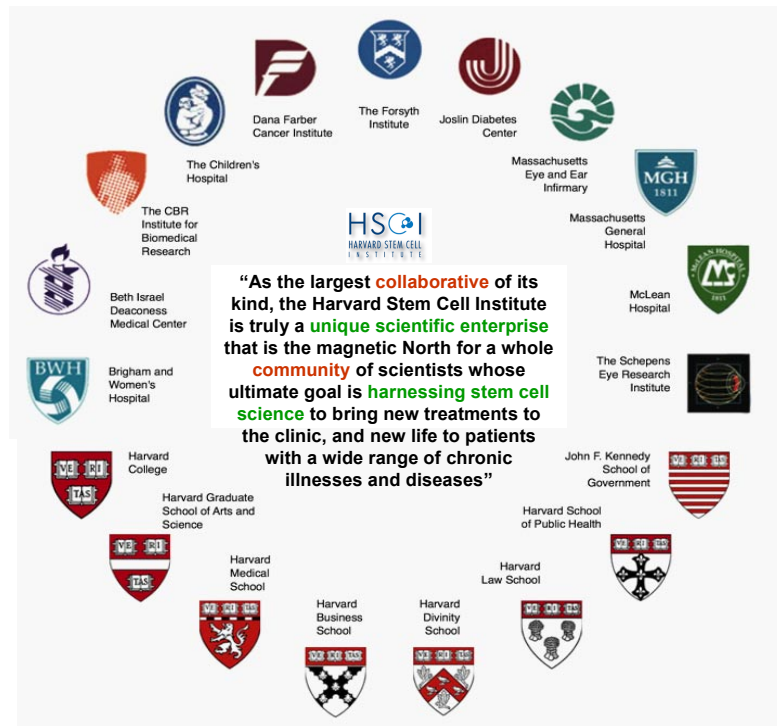
Creating a New Business Model

The Harvard Stem Cell Institute is a four-year-old startup that links academic research, clinical practice, and, ultimately, commercial investment. HSCI is also creating a new research and development business model – a community of collaborative networks – to take complex technology to market more quickly than traditional business models.

HSCI brings together the teaching hospitals of Harvard, as well as all the colleges of Harvard to take a multi-disciplinary approach to an area of science that has ethical, religious, and legal challenges—in addition to the challenge of the science itself (see Figure 1 – HSCI Community).

“The nature of innovation – the inherent definition of innovation – has changed today from what it was in the past. It’s no longer individuals toiling in a laboratory, coming up with some great invention. It’s not an individual. It’s individuals. It’s multidisciplinary. It’s global. It’s collaborative.”

Sam Palmisano
Chairman and CEO
IBM Corporation



HSCI Community
source: www.hsci.harvard.edu

Figure 1

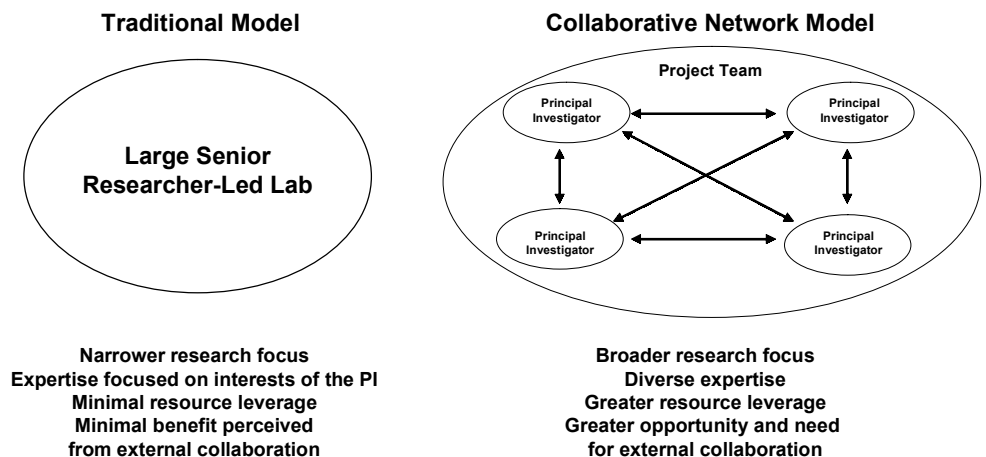
Making this collaboration even more challenging, many of the hospitals compete with one another for talent, funding, and patients. Further, while the Institute intends to bring therapies to the commercial marketplace, it is at the same time focused on advancing stem cell science for the social good.

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In HSCI's *2006 Annual Report*, Executive Director Brock Reeve noted: "We are creating a new business model. The commercial life sciences industry has a well-known research productivity and output problem. The network of institutions that HSCI represents gives us the ability to truly go from 'bench to bedside' in many disease categories and with many technologies under one 'umbrella'. As a result, HSCI should be able to move more quickly and be more productive in a complex field than others."¹

Innovation increasingly occurs within collaborative networks. The collaborative network is a dynamic, fit-for-purpose structure that has the agility to iterate its members and how they relate to one another legally and operationally as the purpose and context of the network evolves. Each network has a specific purpose and encompasses specific stakeholders from each partnering organization. Each network looks for differing kinds of value that may vary in importance to individual participants. The structure harnesses the strengths of all who contribute and thus benefits and connects them in new, innovative ways.

The business model of HSCI allows it to benefit from the agility, entrepreneurial nature, and resource leverage of a collaborative network, while taking advantage of the strengths of a more traditional, hierarchical research model. More specifically, HSCI includes traditionally organized, large senior researcher-led labs and project teams that are comprised of multiple labs. While each model is relevant in different situations, the more complex, inter-disciplinary science is increasingly conducted in a collaborative network. This networking of the strengths of multiple labs is intended to accelerate what is hoped to be breakthrough science that one day saves lives (see Figure 2 – Traditional Lab vs. Multiple Lab Network).



Traditional Lab vs. Multiple Lab Network
Figure 2

¹ *Connectivity, Annual Report 2006*, Harvard Stem Cell Institute

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The senior researcher-led lab generally focuses on the specific scientific niche that has led to achievement of certain professional and positional status. The prior work establishes the line of inquiry to which the researcher attracts both staff and funding. Because of the focus of the work – and the need to continually seek funding – the researcher may see little benefit from collaborating with other labs. Much collaboration may be occurring within the lab, but it seldom opens itself to external collaborations.

In contrast, HSCI's collaborative network model links together smaller labs of junior researchers to address a broader scientific question for which there are many potential answers and, thus, many potential areas of study. When combined, the network—or project team—approximates the resources of the senior researcher-led lab in terms of staff, if not funding. These diverse researchers possess expertise that is reasonably comparable to that of the single researcher-led lab. Each lab within the network pursues its own avenue of inquiry, a process described by HSCI as “working individually together.” With this approach, the networked labs have identified when it makes sense for them to collaborate as a project team and when it does not. They also collaborate with the larger stem cell community in furtherance of science and with the community as a whole in the broader debate about stem cell science.

Thus HSCI can employ a traditional lab when that structure is deemed most suitable and it can establish collaborative project teams. With each of these models representing two dimensions on a continuum, HSCI can design and assemble fit-for-purpose collaborative networks, using the right degree of orchestration to achieve the necessary intensity of collaboration to fulfil the individual value propositions for network members, as well as the unifying purpose of the network.

The Challenge of Collaborating

The success of HSCI's collaborative network business model for research and development depends on the willingness and ability of funded project team members to collaborate with one another within the supportive infrastructure the Institute provides. Unfortunately, collaboration is a behavior that is poorly understood, thus it is hard to put into practice. Studies from Accenture, IBM, and others consistently report that more than 50% of strategic collaborations fail to achieve their objectives outright or otherwise disappoint.² IBM's study *Expanding the Innovation Horizon* found that CEOs recognize the importance of collaboration and external partnering to their company's future, yet they bemoan the lack of collaborative ability within their workforce.³

Our definition of collaboration is:

A purposeful, strategic way of working that leverages the resources of each party for the benefit of all by coordinating activities and communicating information within an environment of trust and transparency.

Give and Get

Working collaboratively requires mastering the art of give and get. In collaboration, one gets what one wants by helping others achieve *their* desired outcomes. That means coordinating activities; having lots of conversations and sharing information; and looking at what has worked and what should be done differently going forward. It also involves understanding what motivates someone's actions, and using those motivations constructively to realize collective objectives. Sometimes give and get also means having to work through conflict.

Collaboration is not an all-or-nothing proposition. People can collaborate a little or a lot, depending on the situation and their shared level of trust in one another. Effective collaboration requires trusting, purposeful, mutually beneficial relationships—not as an end in and of themselves but as the means of achieving the goals of collaboration. However, it is a fallacy among novice collaborators that network participants must have common goals and objectives in order to achieve them. In fact, collaborations are most successful when they create multiple currencies of value that are useful to all participants in achieving their respective goals.

These currencies of value – or “relationship currencies,” as we have termed them – are the insight, access, and physical resources of one party, which another can only access because a relationship exists. It is the “give and get” of these currencies that produces the unique value of

² See for example *Expanding the Innovation Horizon: The Global CEO Study 2006*, IBM, 2006 and Shuman, Jeffrey and Janice Twombly, *CollaborativeBusiness*, The Rhythm of Business, Inc., 2006

³ *Expanding the Innovation Horizon: The Global CEO Study 2006*, IBM, 2006

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working collaboratively. In collaboration, knowledge, insight, access to key relationships, and opportunities to participate in certain activities are more valuable than traditional resources such as capital because these are resources that money can't buy. They are only made available because the parties trust each other to make appropriate use of these resources.

Another way to look at the value of collaboration is shown in Figure 3 – Value of Collaboration.

$$\text{Value of Collaboration} = \frac{\text{Resources Leveraged}}{\text{Time and Effort to Collaborate}}$$

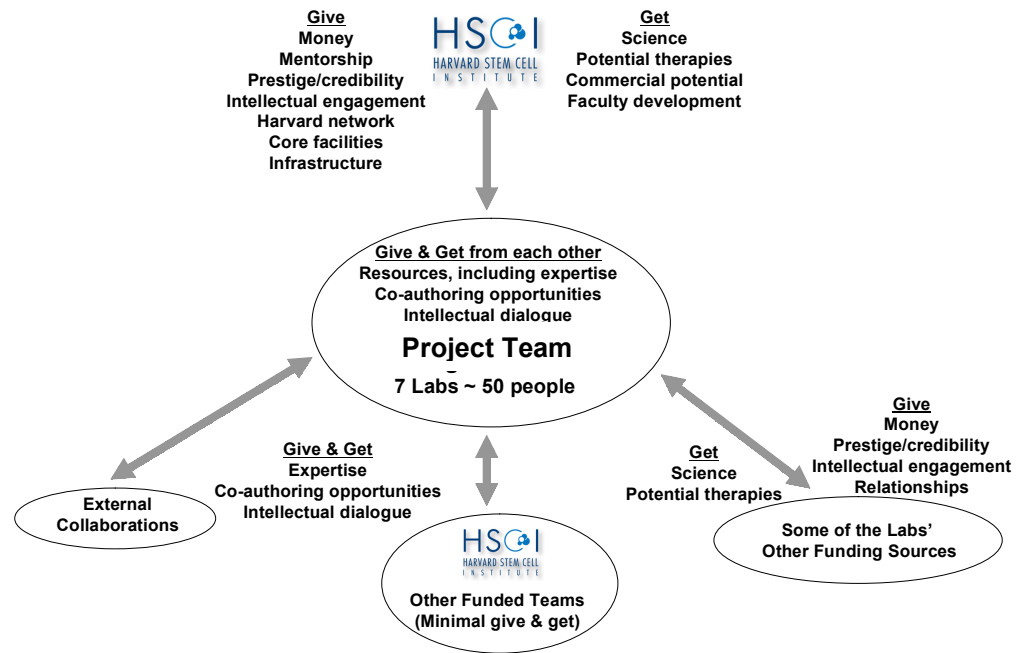
Value of Collaboration
Figure 3

One doesn't access the currencies of another without a cost. However, only the recipient can value the currencies received from collaborating, because value is personal, relative, and time sensitive. The cost of, or investment in, any collaboration is the time and effort it takes to collaborate. Collaboration is work. To make it worth one's time and effort to access the currencies of another, the value of the resources one gets from collaborating must exceed the value of the time and effort it takes to get those resources. A piece of information may be of negligible value to the person offering it, but it may be what connects the dots for someone else. But if the dots aren't connected until it is too late to inform an important decision, the information is of little value.

Give and get implies an ability to uncover motivations, needs, and desires that are only partially articulated, if at all. And what is important and useful to one party to the collaboration may be of limited use and value to another party. When one understands what is of value to someone else, their motivations also become clearer. This is a powerful insight that when used properly can make obstacles vanish and innovative solutions materialize.

To illustrate the give and get in action, we conducted in-depth, face-to-face interviews with each of the seven project team members and key HSCI management. The result was the Give and Get Map depicted in Figure 4. The Give and Get Map is a useful tool for describing the monetary and non-monetary currencies comprising the various value propositions that are the reasons individual members participate in the network. With the value proposition for each member of the network made explicit, members have the insight to guide the activities of the network in mutually beneficial ways.

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Community Give and Get
Figure 4

Challenges to Collaboration within the Operating Environment

In addition to a behavioral ability to collaborate, the operating environment must support organizing and working in a collaborative way, which can be contrary to traditional structures, policies, incentives, and roles. For example, the seven principal investigators, whose labs comprise the subject project team, work for four different institutions within the HSCI network. Each institution has its own culture and operates with distinct processes and systems, including different incentive and reward systems as well as regulatory and compliance programs. A detailed discussion of an operating environment that enables collaborative work is beyond the scope of this paper.

From the perspective of the Harvard Stem Cell Institute's business model, there are two major external challenges for its collaborative network model, neither of which they control. These are:

1. Traditional metrics and standards for granting tenure
2. Traditional metrics and standards for securing funding

These challenges vary for each individual scientist and, whether true or not, the perception is that solo work is more highly valued in the traditional tenure and funding processes.

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“In the first half of the 20th Century 39 Nobel Prizes were awarded to individuals as opposed to four for teams. In the second half, 33 were awarded to individuals as opposed to 36 for teams.”

**Tom Koulopoulos
Executive Director, Babson
Center for Business Innovation**

The project team members interviewed all believe that collaboration is beneficial to the scientific process. They cite the number of opportunities to participate in an experiment and learn, as well as the increased publishing opportunity that working in a network represents. According to research by Lee Fleming of Harvard University, collaborations of scientists are more likely to produce a greater quantity of innovations. The more opportunities scientists and engineers have to experiment the more likely they are to produce.⁴ Fleming refers to this as the “average score” of innovation. Collaboration also contributes to improving the “maximum score” of innovation. This metric measures the total number of inventions. Having more opportunities results in more inventions. Paradoxically, collaborations produce higher average and maximum scores; however, they also are less likely to generate breakthroughs. Herein is the challenge for HSCI and its junior faculty.

Tenure and funding are geared towards individual work. Breakthroughs are a direct path to tenure and significant funding. They propel the scientist on a path to “stardom” however the individual defines it. Yet few scientists actually create breakthroughs. Advancing a career then is a process of advancing science; one step at a time, increasing Fleming’s average score and maximum scores. The HSCI team members have experienced how collaborating can help them get more “shots on goal” and increase their chances of being published, all of which helps their careers. At the same time they believe their unique mix of working individually together has produced better science for HSCI, their respective institutions, and the public at large.

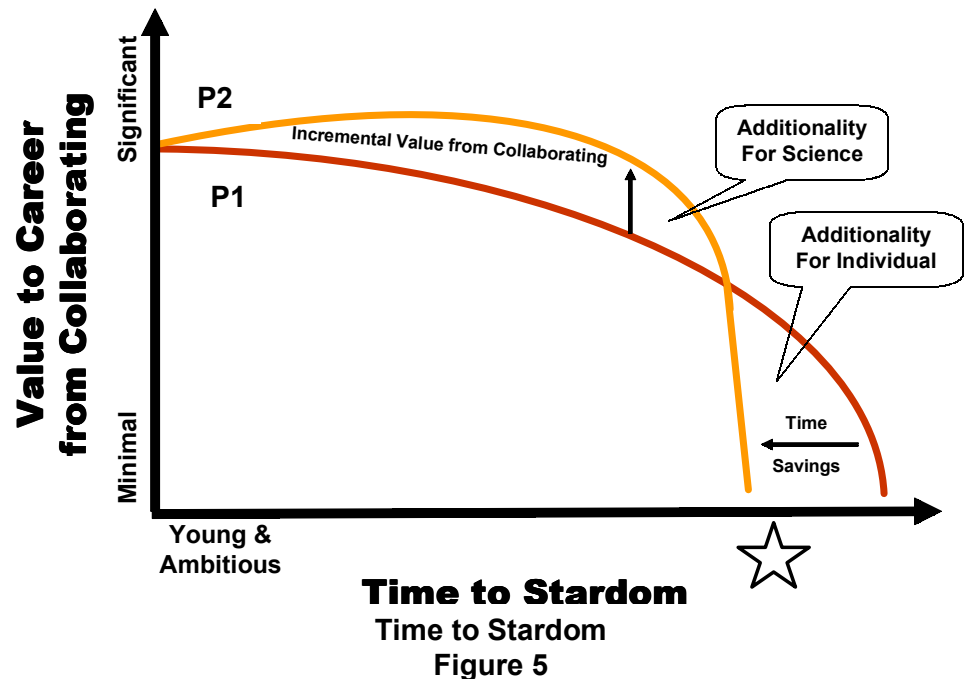
The additionality of resources that collaboration provides is the key reason to collaborate. As seen in Figure 5 – Time to Stardom, the area marked **incremental value from collaborating** reflects the additional benefit to the organization and to science overall from having increased opportunities. The additionality for science leads to the additionality for the researcher: Collaborating should result in more publications, presentations, and funding due to the increase in the number of shots on goal, which, in turn, should help the researcher achieve “stardom” sooner (**time savings**) than he/she would have had the researcher not engaged in the continued collaboration.

As professional recognition increases, the currencies created by collaboration are currently perceived as having less value to an individual’s career, given existing recognition and reward systems (P1). As one approaches “stardom,” greater importance is placed on funding to keep the more narrowly focused work of the lab on track than on continuing to collaborate as the scientist has in the past. Practically, this could mean that the scientist limits the scope and/or the number of collaborations that he/she participates in but does not lead. This is not to say that scientists stop collaborating after reaching “stardom.” Rather,

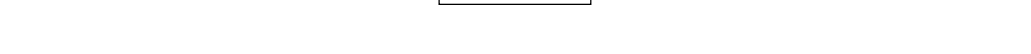
⁴ Fleming, Lee, “Breakthroughs and the ‘Long Tail’ of Innovation,” MIT *Sloan Management Review*, Fall 2007, Vol. 40, No. 1

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Figure 5 reflects only the timeframe until they achieve the stardom which is the scientist's current career goal however the individual defines stardom.



The curve P2 represents the assumed career trajectory of an individual who achieves stardom through a more collaborative path. As Figure 5 shows, through collaboration, scientists can shorten the Time to Stardom versus those who tend to work individually (curve p1). With both paths, there comes a point in time when the goal is achieved and collaboration for the purpose of achieving that specific goal provides minimal incremental value, given the time and effort required to obtain it. Thus for the Harvard Stem Cell Institute and other similar collaborative networks a key challenge to successful collaboration is to ensure that collaboration continues to provide value to the individual and create value for the institution.



1 Team Formation designing

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Team Formation

Teams may self-organize or they may be highly orchestrated. Most likely they represent a blend that falls somewhere in between. In the case of the subject team, a core group of founding members realized they could devise a project and assemble a funding proposal. To do so, they recruited colleagues they had worked with previously and all of whom were at reasonably similar stages in their careers. Essentially, they were peers. Additionally, to a greater or lesser degree, each understood the focus of their research within the larger scientific question, “How do cells regenerate?” For example, one team member examines human cells, another member studies the process within zebra fish, another uses embryonic cells, etc. In this manner, they do not duplicate each other’s work; they complement one another. Because any of their respective avenues of research could yield “the answer,” the team members compete with each other in a productive fashion, which they all believe helps to accelerate the science.

Using the HSCI team’s experiences and drawing on our prior work, we’ve identified certain pre-conditions for the successful formation of collaborative innovation teams.

- **The Collaborative Network** – The network must create greater scientific and career development value than what could be obtained by individual effort, while still allowing each person to achieve the desired stature in his/her discipline. As junior faculty at Harvard, team members are at a critical juncture of their careers when having their work published in certain journals is essential to advancement. As a member of the team, each is presented with opportunities to collaborate with colleagues in experiments and to coordinate work in a manner that allows for an increased number of opportunities to publish—or greater “shots on goal,” as Fleming describes. This “additionality” is why the collaboration is valuable to them as individuals, as it should increase their research output and thus accelerate their path to stardom. For HSCI, the supposition is that its funding is better leveraged in pursuit of a scientific breakthrough that could result in life saving therapies.
- **Alignment** – A misperception of how to work collaboratively is manifested in the belief that common goals are required and thus two or more people share the same work. In pharmaceutical alliances it is not uncommon to see that processes and work are duplicated within each partner. This practice is antithetical to true collaboration. It dissipates rather than leverages the resources each partner brings to the collaboration. The project team studied has come to appreciate the leverage it gets by aligning around a single scientific question while each member pursues his/her own avenue of research. In this manner, each team’s work may not have the same measurable goals, yet they all share a unifying purpose. It is

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this alignment that enables participants to realize the additionality of working individually together.

- **Relationship Currencies** – It isn't just the work that aligns the team members. Because of the similar stage of career development, each member sees value in being a part of the team. The value that advances their careers is evidenced by the relationship currencies identified in the Give and Get Map for the HSCI community depicted in Figure 4. Each team member may benefit from different currencies while contributing a basket of currencies that are unique to his/her own expertise, resources, and work product. The specifics of the currencies exchanged matter less than the shared belief that each team member is a reasonably equal contributor and beneficiary of the additionality the collaboration produces.
- **Trust** – There is no collaboration without trust. The project team accelerated its ability to produce tangible work because of pre-existing relationships and a reservoir of trust. This has given team members the ability to be transparent about their work and to have faith that their contributions to the team will be valued. Having pre-existing relationships is not a prerequisite for successful collaborative teams. Trust is built over time by experiencing trustworthiness in the behavior of others. However, pre-existing relationships do accelerate the creation of value.

Team Launch

The project team held a launch event to formally kick off the project. They purposefully invited all of their lab staff, gave them time to introduce themselves to the group, and included social activity. Formal launch meetings are essential. Additional long-term benefits result when the business portion of a launch event includes a chartering process. Team charters are a best practice that has proved to be quite valuable in alliances. It is equally applicable to any collaborative team.

A team charter establishes how the team will operate and provides a foundation for accountability (see Figure 7 – Team Charter). The charter sets expectations about how the team will work, defines its purpose and objectives, and clarifies the roles different people play on the team. A team charter is necessary because collaborative team members often come from different organizations, have different bosses, different objectives, and different measures of success. Without a charter, team members have no accountability to each other. Conflicts go unresolved. Hidden agendas can proliferate. With a charter, everyone understands the ground rules; it is fast and easy to bring new team members up to speed. Conflicts are addressed in a way that removes personalities and focuses on the issues at hand. Charters also define how decisions are made, the purpose of team meetings, and how the team communicates with each other.

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 Team Charter		
Instructions: Document the team's expectations about how the team will operate and norms of individual behavior		
Team Members:	Roles:	Responsibilities:
Team Member: Examples of behavior we value most		Team Meeting Expectations: How we will use meeting time effectively
Decision Making Norms: How we will make result-focused decisions considering input from multiple sources		Conflict Resolution Process: How we will deal with differences
Achieving Alignment: How we will coordinate and integrate our research to answer the broader scientific question we are pursuing		Communication Plan: How we will share information both formally and informally within the team

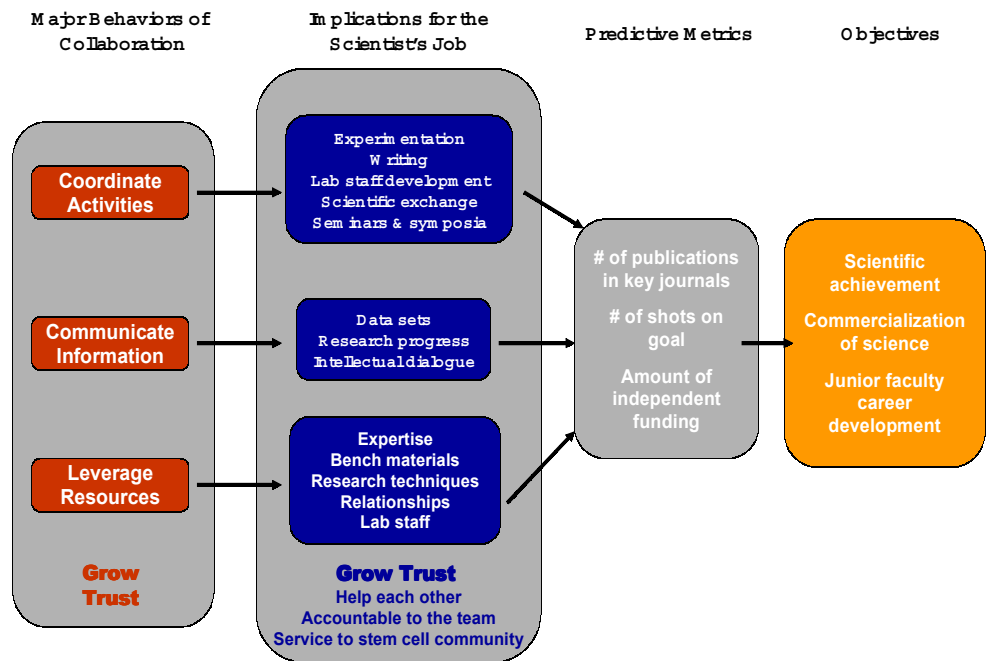
Team Charter
Figure 7

The team should select a leader and members should determine how they want the team to function. All team members must agree to abide by the charter. Once established, the charter only needs to be revisited periodically to ensure it accurately reflects effective team operations or to provide guidance if things aren't going so well. A formal team charter is a best practice that sets up the team for success over the long run.

Team Operation

Collaboration is a purposeful way of working in pursuit of specific objectives. Figure 8 – Linking Collaborative Behaviors to Objectives shows how the major behaviors of collaboration further the objectives of both the Harvard Stem Cell Institute and of the team members. The behaviors of collaboration – coordinate activities, communicate information, leverage resources, and grow trust – are always the same regardless of the collaborative objectives. Those behaviors are then manifested in the specific jobs of the individuals carrying out the collaboration (Implications for the Scientist's Job in Figure 8), which should positively influence metrics deemed predictive of desired objectives.

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Linking Collaborative Behaviors to Objectives
Figure 8

On the right hand side of Figure 7 are the individual and organizational objectives that are the purpose of the collaboration. For collaboration to be effective, both must benefit. For HSCI and its scientists, these objectives can be described as:

- Scientific achievement – Advance the understanding of stem cell science from laboratory bench to the bedside
- Commercialization of science – Develop therapies and products that benefit patients and provide revenue streams that can support continued scientific development
- Junior faculty career development – Accelerate the post-doctoral/faculty transition and support the career development of new faculty members

The effectiveness of the efforts of the scientists – i.e., whether or not they are engaging in the right activities, communicating as needed, and leveraging their combined resources – should have an impact on the predictive metrics an organization uses to track its progress toward objectives. Although effective collaboration is not the only actor upon the metrics, if the metrics are moving positively, it is an indication that the behaviors are producing desired results. The methods we use to measure the effectiveness of collaboration are beyond the scope of this paper.

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Currently, there are three predictive metrics that have been identified:

- Number of publications in key journals – Primary measure used by scientific community to value the contribution to the science and key to career advancement
- Number of “shots on goal” – The number of opportunities to attempt a breakthrough increases the likelihood one will occur
- Amount of independent funding – Measure of value placed on the work of the team and its members by non-Harvard sources

Beginning with the objectives – the unifying purpose of the collaborative network – allows the key metrics to be identified and the nature of the collaborative work to be defined. The linkage diagram is useful in highlighting what should be measured and helps the team understand the ways in which they should collaborate. Activities of the project team that must be sufficiently coordinated include:

- Experimentation – Working independently together to create more opportunities to achieve individual, team, and organizational objectives
- Writing – Joint authorship of papers based on findings and results of coordinated experimentation
- Lab staff development – Training staff in new techniques to enhance coordinated experimentation
- Scientific exchange – Support each other’s research programs by integrating the work of individual labs in furtherance of the team’s objective
- Seminars and symposia – Jointly planning and organizing opportunities to learn from one another and the broader stem cell research community, build relationships, inform the public, and contribute to the ethical, political, and regulatory discussion

Within the context of these activities, certain information must be communicated to (and be available to) the right person at the right time to appropriately inform and ensure timeliness and agility in decision making and to facilitate learning. Key elements of information sharing among the team include:

- Data sets – Content for scientific exchanges that is produced through coordinated experimentation
- Research progress – Status updates to ensure the overall work of the team is on target
- Intellectual dialogue – The formal and informal discussions that spark ideas and challenge assumptions

Effective collaboration fully leverages the resources available to the team as a whole in pursuit of the objectives. Relevant resources and examples of how they are used include:

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- Expertise – Utilize the deep knowledge of the many disciplines represented by the team and the greater Harvard and stem cell communities to accelerate the advance of the science
- Bench materials – Share materials among labs as appropriate and relevant to conserve limited financial resources and save time
- Research techniques – Help each other develop new methods to accelerate scientific advancement
- Relationships – Provide access to each other's professional and social networks to advance the work of the team and career development of team members
- Lab staff – Cross train, where appropriate, and leverage individual expertise and knowledge

Finally, effective collaboration requires trust. Not absolute trust, but enough so that parties are willing to give of their time, effort, and other resources to get the collective job done. Unless team members are able to develop the required level of trust in each other they will not collaborate. Team members need to work in ways that grow trusting relationships among team members.

- Help each other – Demonstrate that mutual self interest is a key underpinning of the team
- Accountable to the team – Live up to commitments and adhere to operating norms
- Service to the stem cell community – Use service activities as a means to grow trusting relationships

The value of the linkage model is defining collaboration in the context of the project team. By defining it and the metrics it is intended to influence, teams can have a better understanding of which elements of their work should be collaborative. The model gives the team leader a way of assessing if the team is working well and it allows HSCI management to provide guidance on successful team operation.

Replicating Effective Project Team Collaboration

To accelerate science through effective collaboration requires that funded project teams are able to collaborate effectively. Although there are people who do understand collaboration and intuitively use give and get to create mutually beneficial outcomes, the majority of people and organizations lack the ability to collaborate. To overcome this reality and enhance the viability of HSCI's new business model for the life sciences, the Institute is introducing a Team Launch and Chartering Workshop for newly funded teams that are structured similarly to the subject project team.

In addition to launching new teams, any project team must be able to incorporate new members as the work of the team expands or as members move onto other projects. Having a set of criteria that can be applied to evaluate potential new members makes it easier to onboard new members. The Team Charter and linkage diagram also aid in developing a consistent approach to the work of the team, as well as its ways of working. Additionally, HSCI management wants to capitalize on the relationship/social capital that develops over time. Team members may come together in new endeavors. Consistent team structure and ways of working make it easier to leverage that capital and create fit-for-purpose collaborative networks best able to achieve their objectives.

Collaboration must be a core competency of individuals in project teams, as well as an organizational capability consisting of guidance, processes, and tools that aid individual efforts. With individual competency and organizational capability, collaboration becomes a way of working that is embodied in the essence of the organization and pervasive throughout it

Concluding Thoughts

Collaborative networks challenge existing paradigms of what constitutes an organization, how work is conducted, and what types of performance should be rewarded. We've left many questions unanswered in this paper, not the least of which is whether existing tenure and funding processes inhibit the benefits of effective collaboration. Also as yet unanswered is whether or not HSCI's unique business model will accelerate the discovery of new therapies. However, by focusing on providing an environment conducive to collaborating and equipping scientists with guidance, processes, and tools that enable that collaboration, the Harvard Stem Cell Institute is taking significant steps to ensure that better science will result from more effective collaboration.

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About The Rhythm of Business

The Rhythm of Business specializes in collaborative business—the organizations, business models, management and ways of working to innovate and grow through collaboration. For more than 25 years, principals of the firm have built collaborative business models, developed and operated alliances and supplier networks, and consulted within both corporate and civic sectors on building and using collaborative relationships to achieve strategic and financial objectives. Through comprehensive management frameworks, skill development, and measurement and analysis tools, we enable individuals and organizations to innovate and grow through collaboration.

Co-founders Jeffrey Shuman and Janice Twombly have co-authored numerous books, articles, and white papers and regularly speak at a variety of venues around the world on the ongoing transformation of organization structures to collaborative networks. Their methodologies inform Shuman's popular MBA courses on Managing Collaborative Relationships and Entrepreneurial Thinking at Bentley College where he is professor of management.

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