Adapting an NSF-Funded Professional Skills Curriculum to Train Engineers in Industry: A Case Study

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Abstract

This design-focused practice paper presents a case study describing how a training program developed for academic contexts was adapted for use with engineers working in industry. The underlying curriculum is from the NSF-funded CyberAmbassadors program, which developed training in communication, teamwork and leadership skills for participants from academic and research settings. For the case study described here, one module from the CyberAmbassadors project was adapted for engineers working in private industry: "Teaming Up: Effective Group and Meeting Management." The key objectives were to increase knowledge and practical skills within the company's engineering organization, focusing specifically on time management as it relates to project and product delivery. We were also interested in examining the results of translating curricula designed for an academic setting into a corporate setting.

Training participants were all from the dedicated engineering department of a US-based location of an international company that provides financial services. The original curriculum was designed for live, in-person training, but was adapted for virtual delivery after the company adopted a 100% remote workforce in response to the COVID-19 pandemic. The training was conducted in four phases: (1) train-the-trainer to create internal evangelists; (2) train management to build buy-in and provide sponsorship; (3) phased rollout of training to individual members of the engineering department, contemporaneous with (4) specific and intentional opportunities to apply the skills in normal business activities including Joint Architecture Design (JAD) sessions.

Effectiveness was measured through surveys at the engineering management level (before, during, and after training), and through direct discussions with engineering teams who were tracked for four weeks after the training. A number of cultural shifts within the company were observed as direct and indirect outcomes of this training. These include the creation and standardization of a template for meeting agendas; a "grassroots" effort to spread the knowledge and best practices from trained individuals to untrained individuals through informal, peer-to-peer interactions; individuals at varying levels of company hierarchy publicly expressing that they would not attend meetings unless an appropriate agenda was provided in advance; and requests for additional training by management who wanted to increase performance in their employees. As a result of this adaptation from academic to industry training contexts, several key curricular innovations were added back to the original CyberAmbassadors corpus. Examples include a reinterpretation of the separate-but-equal leadership roles within meetings, and the elevation of timekeeper to a controlling leadership role within a meeting.

This case study offers valuable lessons on translating training from academic/research settings to industry, including a description of how the "business case" was developed in order to gain approval for the training and sponsorship from management. Future work includes adapting additional material from the CyberAmbassadors program for applications in a business context, and the continued formal and informal propagation of the current material within the company.

Introduction

"Professional" or "transferrable" skills are common terms for the non-technical knowledge and abilities that are essential for success in the engineering workplace [1], [2]. Examples of professional skills include the ability to communicate effectively, both in interpersonal situations and in technical contexts; the ability to work collaboratively and contribute to effective teamwork; and the ability to act as a leader in both formal and informal roles. Strong professional skills help engineers translate their technical knowledge into transformative problem solutions, particularly when tackling interdisciplinary problems that require collaborative approaches [3], [4]. The National Science Foundation (NSF) encourages the development of professional skills through training grants like the CyberAmbassadors project (NSF Award #1730137), which developed a flexible, modular curriculum to provide professional skills training in communications, teamwork and leadership [5]. This case study focuses on efforts to adapt the "Teaming Up" module from the CyberAmbassadors project for use by engineers working in industry, and describes how lessons learned from this experience were used to refine the original curriculum.

Background and Related Work

The CyberAmbassadors program was funded through an NSF effort to train Cyber Infrastructure (CI) Professionals, who are experts in using advanced computational software and hardware to support research and foster discovery in science and engineering [6]. Consequently, the original CyberAmbassadors curriculum incorporates activities, examples and exercises that are centered in the context of exploratory research. This type of research is generally found in academic settings, such as research universities and non-profit institutions, as well as in government-funded laboratories. Designing the curriculum to reflect the language and positions common to these settings (e.g., investigator, research group, graduate student, postdoc) is an important part of the constructivist and sociocultural pedagogy embraced by the CyberAmbassadors project [7]–[9]. In this approach, learning takes place most effectively in contexts that are familiar and relevant for the participants – and gaining familiarity with the culture and language of the discipline is an important component of developing expertise.

The initial CyberAmbassadors curriculum includes nine modules covering communications, teamwork and leadership:

1. Introduction: The CyberAmbassadors Program
2. First Contact: Communicating with a Purpose
3. Let's Talk: Communicating about Problems
4. It's Complicated: Communicating about Complexity
5. Teaming Up: Effective Groups and Meetings
6. Leveling Up: Problem Solving and Decision Making
7. Leading the Team: Understanding Style and Personality
8. Leading the Change: Equity and Inclusion
9. Leading with Principles: Ethics

The CyberAmbassadors curriculum is flexible and includes a variety of tools for facilitators, which allow the materials to be customized at the level of individual learning goals and activities. Volunteer facilitators are trained to offer this program at no cost and the materials have been adapted for use at professional conferences [10], in college classrooms [11], as part of workplace training programs (this case study), and through outreach and education activities offered by nonprofit organizations [12]. In cooperation with Tau Beta Pi, the Engineering Honor Society, the CyberAmbassadors curriculum materials are being adapted for use with engineering students and professionals [12], [13]. Tau Beta Pi has decades of experience offering professional development programs for engineers [14], and through this partnership the CyberAmbassadors program is expected to serve several thousand participants annually.

Professional skills are also essential for the success of scientists and engineers working in industry, and in the United States more than $82 billion is spent annually on professional development and corporate training programs [15]. Yet training programs designed for academic environments may have limited value in industry settings, where the vocabulary, goals and processes can vary considerably from those found in universities and research facilities. When building or adapting a professional skills training program for industry contexts, it is important to consider differences in language and communication styles [16]–[18] as well as the different goals, processes and approaches to research and development that exist in industry [19]–[23]. By acknowledging and understanding these different contexts, professional skills training designed for one setting can be successfully adapted for use in different contexts. Key considerations include aligning the language (in particular, jargon central to the field) and examples to fit the workplace in which the training will be used.

Making the Business Case for In-House Training

This case study reports on efforts to adapt the "Teaming Up" module from the CyberAmbassadors program for use at a US location of an international company that provides financial services, with over 4,000 employees and $294 billion in assets. At this company, the information technology and engineering departments make up 10%-15% of total employment. These units are responsible for creating, enhancing and maintaining a large number of proprietary applications, as well as integrating with many off-the-shelf and cloud service software platforms. The company continues to make strategic reorganizations and adjustments to adapt and stay relevant in the markets they service. As part of this continual improvement process, the technology leadership team identified a need for additional development in teamwork skills, specifically in accelerating progress for the new teams that are created after each reorganization. The overarching goal is to help teams mature more quickly by providing training and tools that (1) assist team leaders in understanding and facilitating effective teambuilding processes, and (2) empowering associates to upskill and apply tried-and-true methodologies to their daily work.

In industry it is rare for individuals to work in isolation; instead working on large teams with experts from multiple disciplines (referred to as cross-functional teams) is commonplace [24], [25]. This is an intentional and strategic operating policy with a number of benefits, including increasing the speed at which the organization can take advantage of new opportunities to generate revenue or reduce expense, and reducing the risks that come from depending on a single

individual (particularly in industries with high turnover rates). Yet the inherently diverse nature of cross-functional teams can pose challenges to successful teamwork [26]–[28]. In addition to differences in disciplinary expertise and technical training, cross-functional teams must navigate the challenges of integrating individuals with different background experiences, communication preferences, and working styles. It is not uncommon for individuals who have significant technical competence to demonstrate less competence in their interpersonal and leadership skills.

Given the challenges of building effective, cross-functional teams in a business setting with frequent reorganizations of personnel and project assignments, the company in this case study sought methods for improving teamwork. More specifically, the goal was to shorten the time between the creation of a new cross-functional team and the point at which it begins to consistently deliver value-added results; while this cycle had been observed to take 9-12 months at this company, the goal range was 3-6 months. In the summer of 2019, company management agreed to allow two employees to attend "Train-the-Trainer" sessions designed to prepare new facilitators of the CyberAmbassadors program, with the goal of adapting this material to conduct trainings in the company's workplace.

After completing the initial training, the two employees shared with company leaders a written plan explaining the content of the CyberAmbassadors program, the specific need for improved teamwork observed at the company, and the plan for training employees. This plan also included an assessment of costs and potential return on investment, which is significant in a business context where money drives many decisions. In this case study, the hard costs (that would be expensed or depreciated) were zero: the program material was developed with public funds and disseminated at no cost to facilitators, and the in-house training was conducted by existing employees during standard work hours. However, the soft costs (those that involve directing the use of existing committed expenses, such as salaries) were significant.

Using a generic reference rate of $114 per person hour, the soft costs for the planned training were estimated as $15,162 for 133 person hours, as detailed in Table 1. In comparison, the market rate for third-party, on-premise training for similarly sized groups ranges from $5,000-$10,000 per day in hard-costs, plus the soft-costs of employees' time. Thus, the company calculated that having employees trained as facilitators to provide training internally, as needed, would save at least $55,000 in initial hard-costs compared to engaging a third-party to provide an equivalent program. In addition to direct cost savings, having internal facilitators allows the program to expand as additional company leaders see the positive impact of the upskilled (trained) individuals and desire their own teams to complete the training program.

Teaming Up: Effective Groups and Meetings

The training described in this case study focuses on content from one module of the CyberAmbassadors curriculum, called "Teaming Up: Effective Groups and Meetings." This session builds on the premise that simply putting individuals into a group is not enough; to become an effective team the group members need training and support. In the "Teaming Up" module, participants examine the conditions necessary for groups to develop into effective teams and learn practical tools for encouraging team growth. The training also focuses on tools for effective meetings, including developing strong agendas and ensuring that three key leadership

roles are filled (facilitator, notetaker, timekeeper). Table 2 summarizes the individual learning goals and activities for "Teaming Up."

The CyberAmbassadors program includes an introductory module that is designed to preface all the other training modules. This introduction gives an overview of the CyberAmbassadors program, allows participants to get to know each other, to develop a better understanding of the dynamics of small group interactions, and to generate ground rules for the training experience. Combining this introductory content with the "Teaming Up" materials produces a training session of 90-120 minutes, depending on how much interaction is desired. While the CyberAmbassadors program was designed for interactive, small group, in-person learning, the materials have been adapted for online delivery as well, in part due to the pandemic.

Table 1: Soft costs (person hours) to implement the training described in this case study

Item	Number of Person-Hours
2 employees completing "Train-the-Trainer"	32**
Planning and gaining internal sponsorship	12
Training and coaching middle leadership	48
Training and coaching team leaders	32
Training and supporting the first team	20
Training additional teams	21
**These costs were removed from the final calculation, as it was determined they did not impact employee productivity.	

Table 2: Learning Objectives and Activities for the Teaming Up Training

Learning Objectives	Core Activities	Minutes
1. Describe the stages of team formation and illustrate effective leadership activities for each	1. Understanding Team Development	10
2. Develop an effective agenda that reflects the priorities and goals of the meeting	2. Developing Effective Agendas	5
3. Describe who should attend a meeting and the three key roles for managing effective meetings	3. Meeting Participants and Roles	5
4. List three ways that meetings might get off track and illustrate methods for responding effectively in each situation	4. Managing Distractions in Meetings	15
5. Model effective leadership strategies during a meeting	5. Meeting Rehearsal	15
6. Reflect on the training and identify areas where they can apply what they've learned	6. Wrap Up	10

Training Methodology

The rollout of this upskilling initiative was broken down into 4 phases. In Phase (1), two existing staff members were trained as facilitators of the content through the CyberAmbassadors "Train-the-Trainer" program in the summer of 2019. These staff then acted as internal advocates within the company in late 2019, adapting the CyberAmbassadors material for the company's business needs and developing the written proposal to convince company leaders of the need for the training more broadly.

In Phase (2), those company leaders who were convinced of the need for the training became internal sponsors for the program. This corporate support allowed the initial rollout of training to middle management in early February, 2020. This "top-down" method of training conforms to the company's belief that management should model the behaviors expected of individual contributors. These managers were given 4 weeks to adopt and demonstrate competence with the new material, which focused on specific skills for improving meetings, including developing and using agendas, assigning and rotating through meeting roles and responsibilities, and follow up on key action items after the meeting ends.

Phase (3) was the training of employees in groups that needed to collaborate together for a known period of time. Where possible, this training occurred just prior to the formation stage of the group and then the group leaders used and reinforced these meeting management methods. After the training, each group was provided four weeks of close management when they were encouraged to implement the strategies and tools they learned in the "Teaming Up" session, and provided with additional support as needed.

Phase (4) was having trained and untrained groups work together in a Joint Architecture Design (JAD) session [29]–[31]. Also known as Joint Application Development, JAD activities bring together multiple groups to coordinate planning for a specific initiative and to collaborate on a total solution, typically in a computational environment. The JAD differs from normal work activities, where individual teams focus only on those subsets of the total solution that are within the team's areas of expertise. This approach often leads to uncoordinated designs and fragility in mid- and long-term lifecycle of the resulting product. For strategically important initiatives, such fragility risk is not acceptable and the solution is to employ a JAD process to coordinate the efforts of multiple teams. JAD projects are often stressful, since the groups involved are not used to collaborating and JAD deliverables are highly visible to the organization, critical to strategy delivery, and often on accelerated schedules. Our hypothesis was that having some of the teams trained in effective group dynamics and meeting management strategies would improve the JAD experience and encourage the proliferation of the best practices from the training within the company without requiring additional dedicated training times.

At the time of this writing, 8 groups (58 total participants) have been trained. The initial round of training, which involved 4 individual teams, was conducted between April 2020 and June 2020. Those teams implemented the lessons they learned in their day-to-day work, which created positive social pressure within the organization. This led to the self-recruitment of 4 additional teams, who were authorized for and received the training between October and December, 2020. Note: due to the COVID-19 pandemic, most individuals at this company shifted to remote work

in March/April 2020; thus most of this training and the implementation of the lessons learned during training happened remotely. We did not examine potential differences between remote and in-person training or work in this case study.

Feedback and Discussion

The leader from each of the 8 groups of trainees was asked to complete three surveys about the training process: (1) prior to participation in training; (2) soon after the training; and (3) about four weeks after the training, at the conclusion of the period of close management. The rationale for surveying only group leaders is that these individuals were responsible for ensuring that their teams integrated skills and tools learned in training into their day-to-day work. Given this small, homogenous population (N=8 on survey 1, and N=7 on surveys 2 and 3) and the fact that the experiences and responses from these team leaders reflect in part the functioning of their team, we did not perform a comprehensive statistical analysis. Instead, we used information from the surveys to capture a snapshot of team leader feedback on the training and its value for their own work, as well as to provide company management with some assessment of the value and impact of these training activities. In addition to surveys of team leaders, qualitative insights were gathered through anecdotal and non-directed conversations with senior management, as well as in-the-wild observations of the behaviors of trained and untrained employees.

All survey results described here were gathered using a five-point Likert-style scale where 1 is Strongly Disagree, 3 is Neutral, and 5 is Strongly Agree. As summarized in Table 3, team leaders surveyed before the training generally chose Agree/Strongly Agree when asked about the value of the training for their own careers and for the well-being of the company. Responses to one question stand out, however: when asked about the overall interest in improving meeting norms at the company the consensus was that interest was fairly low. That was not surprising to the company, given that meeting norms were not a common topic of conversation or area of development prior to the training described in this case study.

Table 3: Survey 1 Results (1=Strongly Disagree, 5=Strongly Agree)

Survey 1: Prior to Training	Mean	St. Dev.	N
Overall there is great interest improving meeting norms at the company.	2.25	0.46	8
Knowledge, skills and information gathered during this training will help me play a bigger role in my current job.	4.25	0.46	8
I feel the company needs training on meeting norms.	4.38	0.52	8
I feel training on meeting norms should be taken more seriously.	4.50	0.53	8
The training is relevant to my growth and development.	4.75	0.46	8
Improved skills for meeting norms improve the overall performance of the company.	4.75	0.46	8
I think training is an ongoing process.	5.00	0.00	8

The results from survey 2 (Table 4), conducted soon after the training, indicate that overall the team leaders felt that the "Teaming Up" training was valuable. For example, all respondents choose "Strongly Agree (5)" in response to the question "I was able to apply the knowledge I learned to my daily work soon after the training was delivered." The structure, content and relevance of the training were also highly rated. The most neutral responses – and the highest variance – were to the statement "there was a high degree of participation and involvement during the program." This is not unexpected, given that each team leader completed the training with their own team members and the personalities, workflows and experiences of each team are unique.

Table 4: Survey 2 Results (1=Strongly Disagree, 5=Strongly Agree)

Survey 2: Soon after Training	Mean	St. Dev.	N
There was a high degree of participation and involvement during the program.	3.71	0.76	7
During the program, I came across a lot of new ideas, which are useful to me.	4.29	0.49	7
The program was well structured and sufficient time was allocated for each topic.	4.43	0.53	7
Required training material and assistance was given during the program.	4.43	0.53	7
The Trainer presenting the materials was knowledgeable and the material was easy to understand.	4.71	0.49	7
To a large extent, the training program was relevant to my present job.	4.86	0.38	7
Several relevant cases/examples/live situations were discussed.	4.86	0.38	7
My belief in the usefulness of training has been reinforced by this training program.	4.86	0.38	7
I was able to apply the knowledge I learned to my daily work soon after the training was delivered.	5.00	0.00	7

The final survey was completed about 4 weeks after training, once the teams had completed their period of close supervision during which the trainers and managers assisted team leaders in implementing and reinforcing the meeting norms taught during the training program. The results from survey 3 (Table 5) indicate that the team leaders still agreed that the "Teaming Up" training was valuable after a month of incorporating it into their teams' workflows. The team leaders also noted that the training was helpful to their own professional development, with everyone strongly agreeing (5) with the statement "I think this training was helpful in upgrading my skills."

This positive feedback about the Teaming Up training was well-aligned with results from the more detailed research conducted as part of the CyberAmbassadors project, which included multiple phases of developing, piloting, revising, and retesting the curriculum [5], [10], [11], [13]. The corporate context of this case study did highlight one interesting set of responses that was not studied in the original research: the impact of having effective meeting norms on "bridging the gap" between different groups. As shown in Table 6, team leaders had fairly

neutral feelings about the effectiveness of meeting norms at bridging gaps between peers on the same team both before and after the training. Their feelings about the value of meeting norms for bridging gaps between supervisors and subordinates, and between different teams within the same company, were positive in both surveys. However, there was a slight decline in their opinions on the value of meeting norms for bridging gaps between teams from multiple companies when comparing response before the training and about four weeks later. Anecdotally, one possible reason for this shift is that during the training team leaders gained more specific understanding of what effective meeting norms look like – and realized that some of their value is in the shared expectations of the meeting participants. Thus, meeting norms may be less effective when working with teams from outside the company who do not have the same training or expectations of meeting norms. While this might be an interesting point for further discussion or study, overall team leaders responded Agree/Strongly Agree to this question both before and after the training, indicating that meeting norms are still reasonably helpful with mixed teams.

Table 5: Survey 3 Results (1=Strongly Disagree, 5=Strongly Agree)

Survey 3: 4+ Weeks after Training	Mean	St. Dev.	N
Effective meetings contribute to a large extent in improving the confidence and commitment of an employee.	4.14	0.38	7
I think that I can be of great help in creating and maintaining a friendly and orderly meeting culture in the company.	4.29	0.49	7
Effective meeting norms skills is relevant to my growth and development.	4.43	0.53	7
Improved skills for meeting norms is relevant to the overall performance of the company.	4.57	0.53	7
As a result of going through this program. I will have been able to improve the way I do my current job.	4.57	0.53	7
I understand and retain the knowledge from the meeting norms training program.	4.71	0.49	7
I am interested in more training like this in the future.	4.71	0.49	7
I think this training was helpful in upgrading my skills.	5.00	0.00	7

Table 6: Efficacy of Meeting Norms in Bridging Gaps

I think effective meeting norms help in bridging the gap between…	Before	After	Diff.
…peers on the same team.	3.25	3.29	+.04
…supervisor and subordinate.	4	4.14	+.14
…different teams within the company.	4.5	4.71	+.21
…teams from multiple companies.	4.75	4.43	-.32

Observations of in-the-wild behaviors within the company after the training have also noted a significant change in behavior regarding agendas. From essentially zero use of agendas prior to the training, agendas have now become commonplace within the company. Employees regularly

request agendas from leadership within and outside the company, and four of the individuals who were trained have publicly shared via email a requirement that their attendance is contingent on the existence and distribution of a well-constructed, detailed agenda prior to the meeting. Team leadership meetings involving the original 4 teams have adopted a 100% agenda policy, and a scheduled rotation for the 3 meeting roles. The creation of a 4th role within the company's meeting rotation, called "No responsibilities whatsoever," is used lightheartedly but demonstrates a broad acceptance of the meeting roles as normative behavior within the company post-training.

Three instances of self-propagation were observed where unofficial, peer-to-peer training occurred. In these cases, an individual from one of the trained groups shared content and meeting norms with another individual who had not been formally trained. In all three cases, the previously-untrained individual was observed using the meeting norms (agendas, meeting roles, etc.) during collaboration with participants only from untrained groups.

Revising the Curriculum to Incorporate Lessons and Language from Industry

In addition to the survey responses, anecdotal input from participants and managers helped to inform adjustments to the "Teaming Up" materials as the trainings were repeated at the company. The same two facilitators worked with all 8 teams for their initial training, and as this process took several months the facilitators had the opportunity to revise their materials based on feedback from participants. This led to several significant adjustments and clarifications to the "Teaming Up" materials, which were ultimately used to improve the parent CyberAmbassadors curricula.

For example, the responsibilities of individuals in each of the three key meeting roles (facilitator, notetaker, timekeeper) were clarified by using the language of power and control that is more familiar in industry than academia. In these terms, the "Facilitator" role was described as the person who controlled the microphone (literally or figuratively), as differentiated from a speaker or lecturer. The Facilitator's role then was to ensure that all voices were heard during the meeting, and that appropriate focus is given to the individual currently speaking. The description of the Notetaker's responsibilities was revised to focus on controlling the Record. Within many companies, Records are restricted and highly significant documents; thus, this designation was intended to reflect the importance and power of the Notetaker role. Finally, the Timekeeper role was promoted to a position of prominence by describing it in terms of controlling the time, with a specific focus on ownership of the agenda. The Timekeeper was given the responsibility to create and update the agenda, specifically authorizing what topics will be included and how much time will be allotted to each. Additionally, during meetings, the Timekeeper is authorized to make judgement calls on the productive use of time: they may authorize time extensions to continue productive conversations, and may reduce or eliminate time allocated to topics that are unproductive for any reason (including when the required participants are not present or if the nature of the conversation ceases to be productive).

In addition to these adjustments to the curriculum, the facilitators at this company helped to generate a meeting agenda template that adopted a predefined first-topic item specifically adapted to collaborating in a pandemic, referred to as "Resolve Technical Issues and General

Chit-Chat, [All, 5min]". This topic is designed to account for two common behaviors: (1) issues related to collaboration tools (e.g. missing login links, setting up microphones and cameras, network and server issues); and (2) encouraging the social customs of greeting and establishing or affirming trust relationships. This standard agenda item has been highly successful at time-boxing these two behaviors without negatively effecting the productivity of the meeting, and has been adopted as a norm by multiple teams at the company.

Not all adaptations inspired by this training have found widespread adoption within the company, however. For example, one of the teams that completed training early in the process developed a standard template for agendas that included stylistic formats for detailing topics, owners, and planned time limits. The format uses standard bullets rather than numbers, to avoid the perception of priority that is naturally conveyed by an ordered list. The use of timebox limits is including using square brackets tuple of [Speaker, Duration]. Finally, an actions items list is included using a standard color, font, and set of columns (#, Topic, Owner, Target, Notes). By using a standard format, it is easy to copy/paste or import/export action items across a variety of tracking tools. While this detailed agenda template was shared broadly within the company, it has seen less reuse outside the initial group – possibly because of the quantity of different work tracking tools used by the trained and untrained groups (greater than 20 tools are in common usage at the company, all with redundant capabilities and used without integration or centralized data authority).

Lessons Learned and Future Work

This case study provides insight for the successful adaptation of professional skills training materials from academic/research settings to the corporate world. In addition to ensuring that the curriculum materials utilize language and examples relevant to the industry and audience, the process for securing support for training is significantly different in a business setting than at a university or academic-style research facility. While training programs are common in academic and research settings and participants can often sign up without obtaining approval in advance from their supervisors, in a corporate setting it can be much more challenging to spin up a new training program in-house. Making a business case for the investment of employee time and company resources necessary to implement a training program requires an understanding of the "soft" and "hard" costs involved, as well as costs for comparable training provided by other vendors.

It should also be noted that a number of valuable lessons and insights were drawn from the corporate setting to improve the original training materials in academic and research settings. For example, reframing the meeting roles (Facilitator, Notetaker, Timekeeper) in terms of power and control made them more familiar and applicable in industry settings – but also improved the way that these meeting roles were explained and implemented in academic and research contexts. Industry settings often have much more formalized structures for management, employment and decision-making processes, which influenced how the meeting roles in the "Teaming Up" module were taught and implemented for this case study. Carrying some of this formality back into the academy has helped to refine the key roles for effective meeting management and improved how the "Teaming Up" module is presented in all contexts. The two facilitators from the company presented their revised "Teaming Up" materials at trainings for external audiences,

including members of the Information Technology group at a large research university and members of Tau Beta Pi. Both trainings were very well received.

Moving forward, the CyberAmbassadors project as a whole is continuing to adapt and revise the curriculum materials for different contexts across academia and industry. The company at the center of this case study is interested in adapting additional CyberAmbassadors modules for internal training purposes, as they build professional skills capacity in employees across their organization.

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