Negotiating Different Perspectives: One End Goal

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Academic and industry partners who work in tandem can push the boundaries of research, development, and commercialization. According to Pellerito and Donohue (2017), sponsored research with university partners expands the industry's capacity to address unmet user needs, while allowing the discovery-driven culture of the university to benefit from the innovation-driven environment of the company (Pellerito & Donohue, 2017). Companies seek collaborative relationships that will provide them with a commercial advantage, better allowing them to perform in a competitive environment. However, negotiating sponsored research agreements that balance university and industry interests can be challenging, particularly when the company has a customer-supplier viewpoint. Contract terms such as intellectual property (IP) ownership, pre-negotiated licensing terms, confidentiality of results, publication review and approval, and indemnification provisions are important issues to consider (Stanford University). Flexible negotiation of the contract is required in order to balance both parties' interests as there may be unrealistic expectations concerning IP and timelines from both entities (Taylor, 2018). In addition, the success of such collaborations may not be easily quantified in traditional academic terms.

A partnership between a Southeastern university and a Midwestern manufacturing company resulted in a three-year, multi-phase project investigating, developing, and evaluating firefighter protective clothing. As one of the most dangerous occupations, and with more than 1.1 million firefighters in the U.S. (Haynes & Stein, 2016), more research is needed to enhance firefighter protection (Coca, Williams, Roberge, & Powell, 2010; McQuerry, 2016; Park, Park, Lin, & Boorady, 2014). The goal of this university/industry collaboration was to: further investigate the user needs of firefighters (Phase 1); design a structural firefighter turnout suit with enhanced mobility, comfort, and functionality (Phase 2); and evaluate the developed prototype for improved performance (Phase 3). Only Phases 1 and 2 will be discussed for process and negotiation purposes; specific findings will be reported once approved by the industry partner.

Phase 1A: The initial step was to organize semi-structured focus groups. We understood that we were limited by the National Fire Protection Association (NFPA) standard regulations for personal protection equipment (PPE); that there are a number of PPE options currently available on the market that advertise mobility enhancements; and that many firefighters have a strong visual idea of what their PPE should look like. However, working directly with a manufacturer, along with a diverse group of firefighters, required additional unplanned negotiations. First, we had to effectively interact with the end user such that they fully understood what feedback we were asking them to provide. Working with a manufacturer who has a strong presence in the industry required balancing sensitive competitor information when it came to discussing design elements specific to PPE manufacturers with the focus group participants. We worked diligently

to make sure that concepts could be addressed during data collection without specific brand manufacturer bias or influence.
Phase 1B: The second step in Phase 1 was a formal nationwide survey. This required minimal negotiation, as the responses were primarily direct with few open-ended questions. User needs data gained from these qualitative and quantitative collection methods were analyzed. As a framework, the user needs results were fit into 3 basic categories of the FEA Design Model: functional requirements, expressive requirements, and aesthetic requirements (Lamb & Kallal, 1992).

Phase 2: The university design team considered the possible changes that could be made to the PPE based on the identified user needs. All changes were evaluated: 1) first on functionality: was the change feasible while maintaining garment function?; 2) if a change was warranted, was it consistent with the expressive needs of the firefighters?; and 3) could any requested aesthetic changes be incorporated? Basic ideas were shared with the company for approval. Working in half-scale, two jacket shells and two pant shells were developed with the expectation that from these ideas, the final prototype design would be selected.

Enter the unexpected stage of the project's process: Phase 2B, Negotiation. When you are working with an industry partner, you are also working with multiple individuals, each of whom are trying to meet their own vision that fits their role within the company. Unfortunately, these individual visions are not always mutually inclusive. As a result, ten half-size garments were created along with several iterations of specific component parts. The next step was to incorporate the most viable solutions into a full size prototype. The outer shell of two jackets and one pant were created using Nomex® fabric, ensuring the design manipulations would work in the required material. However, not all team members were available for every video conference design meeting, thus the university design team would be given one direction, only to be redirected at the following meeting. By the end of Phase 2, the shell of 6 full-size jackets and 3 full-size pants had been constructed. Eventually, a finalized design concept was approved by all members of the industry partner's team and a multi-layer prototype was constructed. Patterns were provided to the manufacturer for sample production. In full, the Phase 2 process took in excess of two years to culminate due to the specific nuances of working with industry partners.

In conclusion, there are important issues to consider when negotiating a sponsored research contract that involves product development with private industry. 1) Use of the results; typically, the researcher retains the data and can use and publish those results, however, the company may receive rights to the data for its own purposes. 2) Publication rights; academic researchers need to publish the results of their work, and in a timely fashion. On the other hand, companies may be concerned that publishing the results will risk the loss of intellectual property and patentability. A specific time period for publication delay should be included so that if the company has not acted on the item, the information can be published. 3) Intellectual Property; in some instances, if the company funds the research, they should have access to the resulting

innovations. The contract might offer first rights to an exclusive license to commercialize; if the company does not commercialize the IP within a set time frame, then the university owns the IP. 4) Realistic timeline; for companies, product and business cycles and changing markets can make innovations time critical. Academics often work with varying time frame expectations. Make sure to include a reasonable timeline. 5) Realistic expectations; identify not only what the researcher may produce, but how many versions that might include. Clearly identify in specific terms what the expected output will be. Ultimately, a successful university/industry design and development partnership is possible and such a relationship provides an excellent opportunity for research sponsorship. Even a small in scope project may provide valuable experience for students, top-quality publications, or a new research avenue for a faculty member.

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