Academic-humanitarian technology partnerships: an unhappy marriage?

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Working together seems like a good idea—especially when working toward a noble goal. In the hopes of more efficiently and quickly reaching their aims, many humanitarian and development organizations (HDOs)—including nongovernmental organizations, such as the International Committee of the Red Cross (ICRC) and Doctors Without Borders (MSF), and international organizations such as the United Nations International Children's Emergency Fund (UNICEF) and the World Health Organization (WHO)—have frequently sought partnerships with academia in recent years. These partnerships aim to use academic research and scientific expertise to address problems, through technology, that HDOs encounter "in the field"—generally in low-income or crisis-affected settings. There are hundreds of examples, covering diverse topics: from digital health software, to drone cargo delivery, to the development of new biomedical hardware (1–3).

An International Committee of the Red Cross mobile surgical team performs a skin-graft on a patient with a severe burn. In poor, war-torn countries, well-equipped medical facilities are often unavailable or damaged, so ICRC surgical teams work in basic care facilities or in vacant buildings. Appropriate technologies are essential, but medical equipment is typically not designed for harsh environments. Developing new technologies adapted to such environments is essential to save more lives—collaborations with research institutes can help. Image credit: International Committee of the Red Cross/Jacob Zocherman.

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However, little has been reported to date about the success and efficiency (or lack thereof) of such partnerships as a practical matter. There is a tendency to resist critical self-evaluation of such collaborations—in particular, as to when a project should be considered a waste of finite resources (4, 5). The reasons are easily deducible: The HDOs don't want to reveal a waste of resources to their donors, and academia doesn't want to show a lack of real-world impact that could affect the perceived quality of the research and future funding (6). As a result, such partnerships continue without adequate understanding of what will make them successful (7).

Having witnessed many of these collaborations produce subpar results, we, a group of innovation practitioners with experience in both sectors, have critically analyzed these partnerships and found numerous pitfalls that—if known upfront—may have led to improved or avoided partnerships. Supplementing our own experience, we have held workshops and conducted interviews with both academics and those working in HDOs. Three main categories of pain-points keep cropping up along the technology development timeline: resources, deployment strategies, and roles and responsibilities (8). Within these three categories, we have identified when and how partnerships tend to have difficulties. To encourage openness, we have kept examples anonymized.

Our aim is to outline the practical difficulties facing the implementation of technology development partnerships between the academic and humanitarian and development sector. We believe the high-level strategy of cross-sector collaboration is a positive thing. But it needs to operate in a more efficient way, avoiding some common pitfalls of recent cross-sector initiatives—many of which fail to move beyond proof of concept or a single short-term deployment (9). Although an essential part of the technology development process, single deployments are rarely considered an end for HDOs, who wish to see large-scale impact for their time and resource investments (10).

Funding and Human Resources

As with so many things, adequate funding is a prerequisite for success. Yet, in the case of all stages of technology partnerships, the importance of securing sufficient resources for the full project duration is often underappreciated. At the beginning of the work, both sides either tend to believe that the other will fund it or they do not plan a fundraising strategy. A common view within the nonprofit sector is that the academic world is able to access funding for experimental projects. Truly "experimental" projects rarely fulfill the requirements of HDO fieldwork in remote settings. For example, building prototype hardware that can function in a lab environment is far removed from the reliability and ruggedness required for long deployments in humid and dusty remote locations—often with poor electricity supply and connectivity (11). Failure to plan for these kinds of differences in operating conditions frequently leads to proof-of-concepts that, although scientifically "interesting," do not reach the HDO's beneficiaries, resulting in little overall positive impact.

Academic funding also tends to be linked to specific projects and, as a result, cannot be used for the early exploratory stages of projects (12). To get around this problem, academics often try to involve students during this stage for initial scoping or research. This practice rarely generates a truly appropriate outcome because of the highly specific nature of the HDO work as well as their complex operational structures (13). The academic sector, meanwhile, often perceives the financial autonomy of HDOs as an opportunity to extend funding to projects, particularly in the initial exploratory stages. Again, this is not normally possible, given that the allocation of HDO funds—usually earmarked for specific programs—requires high-level buy-in and detailed reporting to donors. Justifying spending on less tangible research can be hard when compared with the direct, measurable impact that spending on medical relief or basic goods for populations in need has.

To illustrate this challenge, the humanitarian sector was identified as particularly bad at spending at the level required for successful research and development (R&D) by Deloitte in 2015 (14). The author found that even the biggest spender amongst HDOs spent only up to 0.67 percent of their total budget on R&D. Given that the medical equipment industry averaged 3.55 percent, this spend is well below the typical levels of R&D investment.

Since 2015, a number of HDO funding mechanisms have been put in place to help facilitate innovation in the humanitarian and development sectors (especially during the early stages), with varying degrees of success (15–17). The Humanitarian Innovation Fund, Transformational Investment Capacity at MSF, and the Humanitarian Grand Challenge are some examples. But despite these important steps, securing funding remains a significant challenge (18).

Not surprisingly, the humanitarian and development sector also suffer a knowledge resource gap when it comes to technology development. After all, for most HDOs, such projects fall outside their "core business," and the HDOs thus lack the internal expertise to properly evaluate or strategize for such projects. This means that when a technology has the potential to reach the wider market, questions of ownership and pricing can become a major cause for concern. Inevitably, this can lead to friction in the partnership, which in turn might seriously damage the chance of impact and sustainable scale-up (19).

The inability to commit human resources to projects from both sides of a cross-sector collaboration also limits the chances of success. At the start of projects, this lack of commitment can make it very hard to turn an idea into a working project. Writing project plans, funding applications, and detailed briefs take a lot of resources and, with no seed funding available, partners (especially HDO staff) find it difficult to carve out an appropriate amount of time for this.

Even once funding has been secured, sustaining HDO staff involvement can be hard. This is attributable

to a range of factors, but in particular the longer timeline to which academics are accustomed. Most HDOs work on yearly budget cycles and have a high turnover of staff. Their reporting cycles are also often annual; thus, any use of resources will have to show results within a short period of time and should align with the HDO's strategic goals (of which technology innovation is rarely a part). For technology innovation aimed at solving complex problems, this timeline can prove difficult (10). Industrial partners have a tendency to work quickly toward prototypes. Academics do not. As the timeline for a technology to become operational extends, the motivation of the HDO to be involved often decreases.

Deployment and Sustainability

A technology can only really be considered successful for HDOs if it is deployed—ideally on a wide scale, across multiple projects and operational contexts, reaching a large number of beneficiaries. Yet this result is a rare occurrence, particularly for academic–HDO partnerships (20). One reason may be that these partnerships inherently lack a profit motivation to succeed. Although arguably a good thing from an ethical standpoint, technologies require maintenance, improvement, and training, factors often neglected for these types of projects. Commercially, these operational expenditures would be covered by the income from selling a technology or service. However, for technology deployed in low-income or crisis-affected settings to destitute populations, this is not necessarily a given.

In some cases, a project will lead to the spin out of a company. For a company to keep its technology on the market and grow (*and* provide support, training, and update services to existing customers), the company needs to sell a sufficiently large amount of goods or services to generate enough revenue. An ability to do so is considered the "self-sustainability" of a new technology. Investigating this self-sustainability is essential due diligence for HDO's planning at technology deployment—because technology obsolescence will have significant negative impacts on the HDO's operations further down the line. That said, often the volumes of goods needed by just one HDO (e.g., the partner) are not sufficient, and the company is often compelled to explore different customers and market segments for deploying the new technology. If other market segments are incorporated in the strategy, there is a risk of "mission creep," in which the company starts adapting the technology to the most profitable "customer" —which might not be the HDO.

In a real example from the authors' experience, technology designed by an HDO in partnership with a university research lab for the improved transport of medical goods in hot climates was formally transferred to a commercial actor with a good-faith commitment to take it to the humanitarian market. Despite significant financial and time investment, the HDO decided its main role in the project—providing the use case and user expertise—had come to a logical conclusion. Following the handover, the commercial project lead moved quickly to take the technology to the pharmaceutical industry, which offered a more profitable business case. As of today, the technology has not reached the originally intended beneficiaries.

It is essential to reflect on questions of deployment strategy early, as they play a crucial role in striking the right balance between the spin-off's financial sustainability and its ability to deliver the technology sought by the HDO for a specific target group. Of course, a deployment via a spin-off company is not the only way to achieve impact. There can be blended approaches in which established companies also play a role (for example through manufacturing or distribution). This additional complexity makes an early strategic analysis all the more important.

A lack of knowledge of the motivations and realities of the other organization will often result in frustrations and a fractious working relationship. Some of these challenges can be addressed through better joint planning early on and clearer resource management.

Also at this stage, the divergent goals of scientific excellence (in the case of academia) and on-the-ground impact (for HDOs) can become more apparent. Academics are often keen to pursue the tangential scientifically interesting findings but at the expense of the scaled-up implementation of technology for impact. Although furthering scientific knowledge is undoubtedly a positive outcome, for technology to be successfully scaled-up "in the field" it needs to be affordable, robust, and simple to use—aims that that do not necessarily overlap with cutting-edge research (21). The requirement for tried-and-tested technology in the HDO sector is often overlooked at the early stages of collaborations, again showing the need for a critical partner selection process.

Additionally, once a pilot study has yielded positive results, which have been published in an academic journal, it is hard for the researchers to remain involved and not move on to their next project. This often effectively ends much needed further development for future deployments. Again, from the HDO perspective of durably providing solutions at a large scale, implementation in one pilot study would unlikely be considered a resounding success.

Roles, Responsibilities, and Expectations

Expectations play a massive role in determining whether partnerships are perceived as a success. Therefore, defining roles and responsibilities clearly and early on in partnership is essential. Many partnerships are effectively opportunistic and based on an individual's drive and contacts (22, 23). This means that academics and HDOs will often too quickly start a partnership without truly mapping out their needs, expectations, and required deliverables within a certain timeline. One such example was a research group

working to audio-diagnose respiratory illness. After publishing their findings, a number of large HDOs quickly moved to pilot the technology. After months of planning—and significant financial spend—a parallel assessment of the technology showed it could not even function in US clinics because of audio interference. Given the noisy, open-plan clinics in the HDO's project locations, the HDO decided that the pilot should be scrapped despite the many thousands of dollars already spent. This opportunism demonstrates the way in which HDOs' lack of due diligence can lead to rushed, inappropriate partnerships. Although it is reasonable to assume that this technology could have a positive role to play in the long run, sufficient reflection could have avoided waste. Finding the right timing for partnerships is a step that is often overlooked. Should HDOs take a more measured approach, strong arguments would likely be made for adapting an existing technology solution from a commercial player that is already on the market, rather than starting from scratch.

We argue that it is rare for the classic academic approach to technology development and the requirements of an HDO to overlap perfectly. Yet HDOs often seem more willing to partner with academia than commercial actors. We speculate that this stems from the HDO's historically negative view of the private sector, which has traditionally limited exploring closer partnership arrangements with them. Yet, universities are keen to spin-out their research into practical applications—most now funding their own innovation and business parks and litigating over intellectual property. The common HDO view, that academia is neutral in this perspective, is outdated and introduces another flaw in the reasoning of the partner selection process.

In an ideal project, the entire process (from initiation to deployment, with roles and responsibilities) would be mapped out and formalized from the earliest stage. This would avoid many of the accountability issues that tend to arise later on. This approach, with clear deliverables for both parties, forces the partnership to reflect and debate over ownership and how to implement an effective technological solution sustainably over time, avoiding unnecessary frustrations. The HDO view in these discussions can run afoul of the basic view that profitability is inherently bad, rather than understanding that profitability can be a means to a self-sustaining solution (8, 11). HDOs need to better understand technology innovation/development and its associated aspects (intellectual property, the value chain, and distribution models, etc.). This understanding would allow the HDOs to better grasp what they are getting themselves into, with whom, and for how long.

In sum, partnerships between the humanitarian and academic sector will often *seem* like a natural match, but the reality is more complex. A lack of knowledge of the motivations and realities of the other organization will often result in frustrations and a fractious working relationship. Some of these challenges can be addressed through better joint planning early on and clearer resource management.

However, if HDOs wish to develop innovative technology solutions, it is crucial that both partners put a coherent strategy in place from the start. This can ensure high-level buy-in and stronger management processes. A critical partner selection process, by HDOs as "problem owner," is also crucial to question whether an academic or commercial partner is more appropriate for delivering results that align with the desired timeframe. This requires a literacy in the technology innovation/development and scaling processes, a literacy often lacking in HDOs focused on tangible deliverables and the impact they have on their target populations.

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