Workshop in Development Practice

Supporting the Power of the "Local" in a Global Network of Robotics Solutions

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Hefei Bai
Andrew Carmona
Justin Z. Seek
Melissa Trimble
Victoria Ruoying Zhang
Qingyue Zhuang

COLUMBIA | SIPA
School of International and Public Affairs

We Robotics®

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List of Acronyms

AI - Artificial Intelligence
GIS - Geographic Information Systems
M&E - Monitoring and Evaluation
NGO - Non-governmental organization
SWOT - Strengths, Weaknesses, Opportunities, Threats

Technical Term Definitions

Bottom-up Approach: A philosophy in economics, humanities, and sciences in which decision-making and implementation originate from lower levels of the organization or those most affected and moves upwards. In this report, the approach represents that each Flying Lab has the autonomy of project selection and daily operations subject to WeRobotics' guidance.

Franchise Model: WeRobotics franchises its brand, knowledge, technology, and partnerships to Flying Labs that meet specific selection criteria and purchase and renew the license.

Impact: Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended.

Indicator: Quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement or to reflect the changes connected to an intervention.

Monitoring and Evaluation (M&E): monitoring is the regular collection of data on all project activities, and evaluation is an assessment of whether the project is achieving its goals and of the impact it is having (WHO | Category 6, n.d.).

Network Model: A global community of like-minded local experts, with the administrative assistance and support from WeRobotics, spanning the aid, health, development, and environmental sectors. The participants openly share knowledge/learnings/resources, inform ethical standards, and convene stakeholders and champions to solve local problems.

EXECUTIVE SUMMARY

WeRobotics is a not-for-profit organization that utilizes a franchise model to create a worldwide network of Flying Labs. They invest in and empower local robotics solutions, such as drone and artificial intelligence (AI) for aid, health, environment, and development. With 27 Flying Labs globally and growing by approximately one new Lab a month, WeRobotics disseminates, through its network of Flying Labs, information on an international scale. The Labs are nodes of the network and work directly with local partners to scale the growing robotics ecosystem in their respective regions. The Flying Labs allow local partners, such as universities, government agencies, local businesses, and NGOs, to use the technology, insights, and training of WeRobotics and the network to address unmet needs in their communities.

WeRobotics sought the assistance of student consultants from Columbia University's School of International and Public Affairs (SIPA) in defining and explaining the added value of its bottom-up network model to their partners and, in particular, funders. The team analyzed the opportunities and limitations of the WeRobotics model in comparison with other models and to provide recommendations to assist WeRobotics in fundraising activities.

Our analysis divided the business model into the bottom-up approach and network model. The key findings for each component were:

	Strengths	Limitations
Bottom-up Approach	1. Local capacity building 2. Credibility and trust gained through autonomy 3. Develop drone tech ecosystem 4. Access to government agencies and supporting local regulations 5. Diverse local/international partnerships 6. Shared benefits with Flying Labs	1. Difficulties in Flying Labs self-sustainability 2. Human resource limitations 3. Lack of focus on operations
	1. Knowledge transfer/collaboration across Labs	1. Poor communication between WeRobotics and Flying Labs 2. Hard to secure sustainable

Network Model	2. Building relationships internally and externally 3. Access to knowledge, tech, and projects from WeRobotics to Flying Labs 4. Funding through WeRobotics 5. Recognition of global brand	funding 3. Competing for limited funding from WeRobotics 4. Weaving incohesive story 5. Poor external communication WeRobotics to funders 6. Accessibility obstacles

Table 1: Key Findings of Bottom-up Approach and Network Model

In light of our key findings, we developed a number of recommendations for consideration. The table below is divided into specific categories and a suggested timeline for implementation.

Business model	A. Articulate and visualize the interplay between the bottom-up approach and the network model	**Short Term**
Communication	B. Continue with storytelling to amplify the visibility as an organization	
	C. Improve the operating procedures of the network to overcome accessibility issues	**Medium Term**
Quality Control	D. Strengthen the quality control of Flying Labs to consolidate the network	
Network Sustainability	E. Provide mechanisms for network members to connect with one another to achieve self-sustainability and ecosystem expansion	**Long Term**

Table 2: Summary of Recommendations

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Part I. Introduction

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A. Client Agency

WeRobotics is an international nonprofit founded in 2015 that uses drones, data, and AI to foster local solutions for greater impact. Utilizing these technical tools, the organization provides governments, NGOs, universities, and other institutions with global solutions, coordination, and training to tackle key localized development issues. Working with the latest robotics technologies, WeRobotics targets seven Sustainable Development Goals[1], focusing particularly on development, humanitarian aid, public health, and environmental issues. The global organization is headquartered in Geneva, Switzerland and co-creates the rapidly growing Flying Labs network, which currently consists of 27 worldwide franchisees with approximately one new Flying Lab established each month.

WeRobotics disseminates information and technology on an international scale through both Regional and Affiliate Flying Labs using a franchise model. Regional Labs act as knowledge hubs, working with local partners to scale the growing robotics ecosystem in their respective regions. Affiliate Flying Labs allow local partners, such as universities and companies to use the technology, insights and training of WeRobotics and other Flying Labs to address unmet needs in their communities.

Flying Labs concentrate on four sector-based program tracks:

- **AidRobotics** - Identifies and implements appropriate robotics solutions that can accelerate a wide range of local humanitarian efforts. This includes identifying and implementing policy and coordinated solutions as well as technical and data analysis solutions. Localized expertise by Flying Labs and partners increase the impact of humanitarian efforts. WeRobotics accomplishes these goals through both customized in-person and online training. They also provide direct support and consultations during disasters to ensure the safe, responsible and effective deployment of drones.
- **HealthRobotics** - Robotics in public health is the merging of community health workers and mapping support and affordable cargo drone deliveries centers. WeRobotics fosters low-cost methods to conduct high-precision health care in remote areas with limited access to services. Mapping provides insight of existing populations and households by expanding community health worker outreach and

[1] They are respectively: 3. Good Health and Well-being, 8. Decent Work and Economic Growth, 9. Industry, Innovation, and Infrastructure, 10. Reducing Inequality, 11. Sustainable Cities and Communities, 13. Climate Action, 14. Life below Water, 15. Life on Land, 17. Partnerships for the Goals.

contact tracing. The use of Geographic Information Systems (GIS) allows for spatial precision in analysis of medical contact data. Transport of medical materials are reliable, low-cost, and locally repairable.

- **EcoRobotics** - Through the engagement of aerial and underwater robotics, WeRobotics is developing sustainable environmental practices, like new farming and fishing methods. This enables local workers to better protect their fragile ecosystems by monitoring wildlife habitats to plan for the environmental impacts of global warming. WeRobotics provides enhanced technologies that give local partners new tools to generate data in more effective and efficient ways. This produces swift analysis that fosters profound insights for decision-making.
- **DevRobotics** - Flying Labs and local partners use aerial robotics to engage in local sustainable development projects. These projects address infrastructure needs and create new local economies. Drones have improved local mapping of informal settlements, property rights, social infrastructure, and waste management issues. Optimizing the local job market is also an important goal of DevRobotics. Incubating businesses that offer “Robotics-as-a-Service” creates a localized self-sufficient environment for data collection, production of insights, and analytics. WeRobotics aims to build the technical skills of the community but also grow the local “Drones-as-a-Service” ecosystems through their Business Incubation Programs.

B. Project Objectives

WeRobotics aims to democratize emerging drone and robotics technologies by harnessing the power of the local. Through their bottom-up approach, the emphasis is placed on the needs of the community while effectively and sustainably leveraging local expertise and solutions. The Flying Labs form the technology hubs that identify local problems and solutions; each Lab is built with existing local organizations or universities to support drone experts. Through donor funding, WeRobotics supports the establishment of the Flying Labs globally and occasionally provides additional financial assistance depending on availability. They also supply Flying Labs with software and hardware support when needed in addition to knowledge and best practices in the use of drones. Furthermore, WeRobotics facilitates the network of the Flying Labs and encourages them to share use cases, experiences, expertise, and resources.

Our project objective was to succinctly explain the added value of WeRobotics’ bottom-up approach and network model and thereby address questions or concerns raised by donors, partners, and Flying Labs on the organization’s localized approach. Donors have struggled to comprehend the complexity of the Flying Labs model, which are locally owned, managed, and self-sustained; therefore, their activities, reach, and impact all vary. Flying Labs vary in their approach to self-sustainability, communication within the

network, and relationship with WeRobotics. Additionally, the Flying Labs' partners want various involvement in the network and find resource limitations one of the biggest barriers to having impact. Finally, the championed bottom-up approach operates in a top-down environment in terms of funding opportunities and technological development, so the team sought to analyze opportunities and threats to WeRobotics' model in operating in such an environment.

C. Literature Review

To gain a better understanding of the nuances regarding the various features of the WeRobotics model and the environment in which it operates, a review of existing literature was conducted and covers the bottom-up approach and network model, applications of drone technology for social good, and trends for donor funding.

The team researched existing bottom-up and top-down models as well as network models to compare strengths and weaknesses of each and to prepare us for interviews. We further examined applications for drone technology, particularly for social good, to comprehend the industry setting WeRobotics operates in. Finally, since one project objective is to address donor concerns, we identified trends in donor funding, particularly in the United States where six out of seven donors we interviewed are based. Furthermore, the Charities Aid Foundation (CAF) World Giving Index in 2019 found that the United States is the world's most generous country for the last ten years (CAF World Giving Index 10th Edition| Ten Years of Giving Trends, 2019). We sought to understand WeRobotics' donors' environment and function by looking at their funding method and subsequent expectations.

a. Top-down vs. Bottom-up

As top-down being a standard model in traditional organizations, the bottom-up model has been discussed and tested in the development area increasingly. While the two models have its strengths and limitations, as discussed below, research suggests that in a development context, the two types of models should be combined to empower and utilize local expertise while maintaining high efficiency.

A top-down model has strengths in relationship with donors and operation efficiency.
The advantages of a top-down model are being able to mobilize resources and funding with a secure headquarters. Also, there are fewer trust issues from donors as compared to bottom-up local institutions with teams that donors are not familiar with. A top-down model is in fact a "protect and enforce" model (Apfelbaum, Haney and Ugalde, 2019). Therefore, in top-down institutions, operations are often considered efficient especially in terms of resource mobilization and less likely face the challenge of lack of cohesion as

many bottom-up institutions do since decisions are made at multiple levels and the business runs the risk of operating without a clear strategy and milestones. (Walton, Davies, Thrandardottir and Keating, 2016; Marker, 2019). Furthermore, top-down institutions with consistent standards and protocols face fewer challenges as bottom-up organizations in terms of “excuses from funders” (Banks, 2015), including doubts on whether they can fulfill reporting requirements, difficulties in managing smaller grants, absence of a trusted partner to manage local risks and others.

A top-down model lacks the sustainability of a bottom-up model.
In a top-down organization, projects are reviewed, refined, and prioritized within a structured framework (Apfelbaum, Haney and Ugalde, 2019) and local communities are far less involved and therefore do not have input on the expected changes. The top-down model is often criticized for maintaining “a system of oppression” (Nepon, Redfield and Spade, 2013) that keeps the privileged in power, being more accountable to funders rather than the people they serve and having higher costs. A bottom-up model can empower the local by giving the communities the decision-making right and thus create better buy-in from the local community and benefits that last longer. Bottom-up institutions also have the flexibility that the top-down ones lack, such as lean organizational structures, so they are more cost-efficient and well-positioned to adapt to changes on the local level.

b. Applications of Drone Technology for Social Good

The applications of drones in development practices vary extensively and continue to expand. The use of drones in mapping is the most common and popular application. Geospatial information is used to produce accurate two- and three-dimensional maps, as well as elevation models of terrain. Images required via Unmanned Aerial Vehicles (UAV) such as drones and satellites can be inputs for GIS and mapping. For example, the Airborne International Response Team (AIRT), an NGO based in the U.S., uses drones to assess critical infrastructure and other vital assets to help communities recover from natural disasters.

Another application for drones for social good is the use of cargo delivery drones. These drones can deliver cargo such as medical supplies by either landing on the ground and delivering the items or releasing the cargo via parachutes. An example of this is UNICEF’s partnership with the Government of Malawi to launch the first air corridor to test the potential humanitarian uses of drones. One of the main areas of tests, besides aerial mapping for crisis preparedness and extending Wi-Fi signals in remote regions, is the use of drones in delivering medical supplies like vaccines.

c. Trends for Donor Funding

In spite of the rapid growth of crowdfunding and other innovative channels to fundraising, securing funds, particularly from previous donors, remains a significant challenge for nonprofits. Two factors inhibiting the relationship between nonprofits and donors in the United States are:

Most NGOs are non-autonomous in directing funds.
Only 20% of nonprofit funding in the United States is unrestricted (The Long Spoon Problem - Five Models of Philanthropic Collaboration, n.d.). Most nonprofits receive grants that obligate them to put money directly toward specific programs. Furthermore, grant recipients are usually required to fill out specific budgets indicating the expense line items they intend to use the funds for. However, a study by the Bridgespan Group found that indirect costs, or any general expenses that are not for a specific program or service such as headquarter administrative expenses, made up between 21% and 89% of all costs (Hanken, 2018). Without unrestricted funding, nonprofits struggle to fund the human resources needed to maintain daily operations. Organizations that cannot invest in essential management and support generally have difficulty sustaining their impact (Paynter, 2018).

Donors want more data than NGOs are able to provide.
75% of nonprofits collect data, but few say they use it effectively (Paynter, 2018). In order to ensure that their money is well-spent, donors seek indicators that show the programs and services of the nonprofit are making a difference in their target causes. These indicators are complex to define, measure or capture. Over 55% of nonprofit organizations indicated that their funders require more information than they had previously, making securing funding more difficult each year (Hanken 2018). In fact, more than half of funders require outcome data from their grantees, but less than 70% ever cover the costs associated with measurement (Ibid.). This leaves nonprofits with limited funds to do the required data collection and analysis.

Part II. Methodology

Part II. Methodology

In the project work plan, the team designed research questions probing into four major aspects of the project objectives:

1. WeRobotics' business model and different typologies of Flying Labs' operations
2. Added value and limitations of the bottom-up approach and the network model
3. Donor and partner feedback and expectations for both WeRobotics and Flying Labs
4. Status of WeRobotics' M&E and its potential areas to improve

To answer these questions in a systematic way and to ensure the representativeness of our findings, the team mainly utilized methods including semi-structured interviews, sense-making and data triangulation. We spoke with Flying Labs, partners, and donors. Overall, the project is composed of five stages: project planning, desk research, interview, data analysis and report drafting.

A. Semi-structured Interviews

In total, the team conducted interviews with three stakeholders: fourteen Flying Labs, seven donors and six Flying Labs partners. The interviews were completed using varied languages including English, Spanish and French. For the donor stakeholder group, we interviewed current core donors, donors that stopped funding WeRobotics, and donors that WeRobotics submitted proposals to but did not successfully secure funding from. For the Flying Labs stakeholder group, the team was able to cover different regions across Africa, Asia and Latin America. For the partner group, we covered two partners for both Nepal and Senegal Flying Labs and one partner for Panama and Philippines Flying Labs.

Drawing on the research questions listed above, the team developed interview protocols for each stakeholder group. All of the protocols were tailored to explore relationships, experiences, and opinions of each group. During the interview stage, the team adjusted minimal parts of the protocols, mainly on the M&E related questions, to align with client requests while the majority of the protocols remained consistent over the entire project timeframe.

B. Sense-Making (Ecosystem Mapping and SWOT Analysis)

Prior to developing the interview protocols, the team conducted a session to map out the WeRobotics and Flying Labs ecosystem and to identify the connections between stakeholders with underlined inputs and outputs (Graph 1). After completing and transcribing the 28 interviews, the team completed a sense-making session utilizing a Strength, Weakness, Opportunity, Threat (SWOT) structure to sort and organize

information gathered. The data was further triaged according to the “network model” and “bottom-up approach.”. The exercise enabled the team to identify themes and patterns within and across the stakeholder groups.

C. Data Triangulation

The sense making session helped the team develop a codebook for the qualitative analysis of the interview data. We created an Excel spreadsheet to organize interview excerpts according to the characteristics of the two models. After resolving all the outliers specific to single interviewees, the team further calculated the frequencies of each key term across all the interviews and within each interview group. The statistics allowed the team to identify the most commonly perceived characteristics and gaps in perception between different groups. With the qualitative nature of the project’s design, the data were analyzed and findings validated using an approach known as “triangulation,” collecting data from across the WeRobotics and Flying Labs ecosystem and comparing data and findings to ensure the reliability and validity of evidence.

D. Project Limitations

Coronavirus pandemic

The Coronavirus severely disrupted the overall project plan, which included field visits to three local Flying Labs in Panama, Nepal, and Senegal. With great support from WeRobotics and the three Flying Labs, the team managed to transfer a majority of the fieldwork to an online format. Due to varied or limited access to the internet in some localities, a number of partners were unable to participate in virtual interviews.

Slow reply from interviewees

The team experienced numerous delayed responses from potential interviewees. Due to busy schedules or limited labor force, some of the local Flying Labs were not as active in replying emails as the others. As a result, the team only had completed five out of 14 interviews with Flying Labs by the end of February. To increase the data’s reliability the team reached out to additional Flying Labs to schedule interviews and completed another seven in March and two in April.

Part III.
Key Findings

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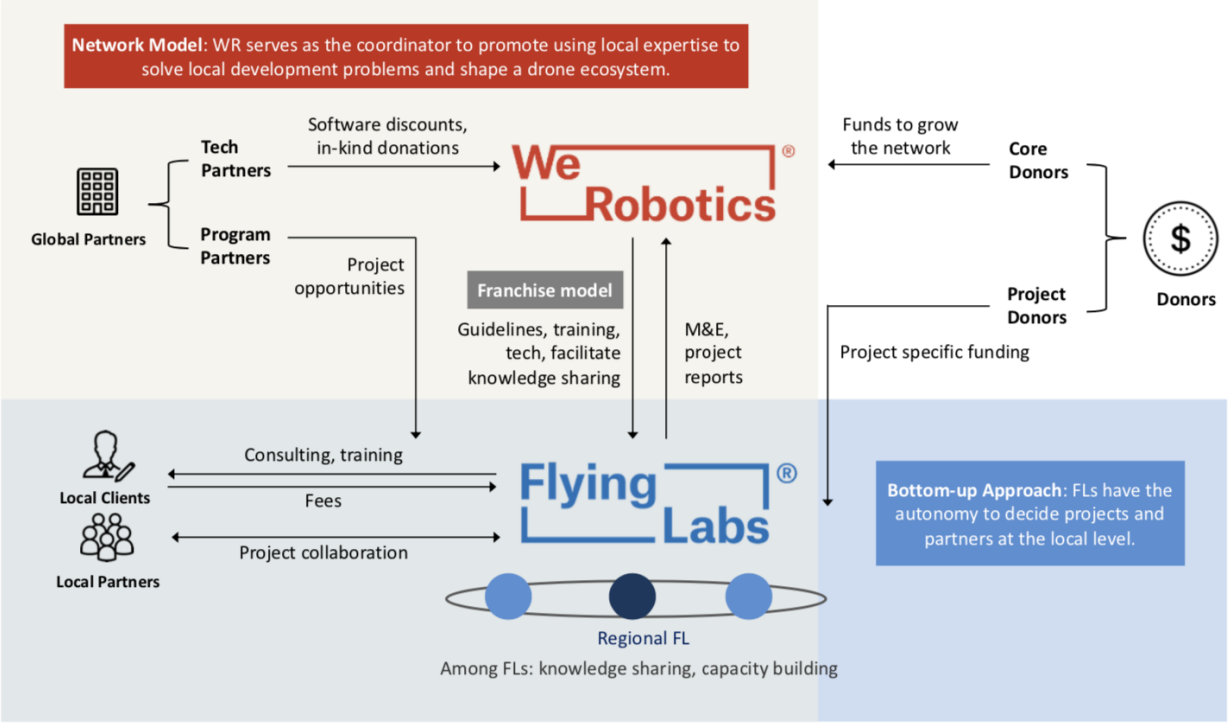
The following section provides an overview of the team's findings and results. Section A explains WeRobotics' business model based on the team's research and understanding. Section B summarizes feedback from the donor interviews. Finally, Sections C and D elaborate on the main strengths and limitations of the bottom-up approach and the network model based on our data analysis.

A. WeRobotics Business Model Illustration and Relationship Mapping between Stakeholders



Graph 1: Stakeholder Relationship Map

a. Stakeholder Relationships

Graph 1 illustrates the major stakeholders in WeRobotics' ecosystem: WeRobotics, Affiliate Flying Labs, Regional Flying Labs, global partners, including tech partners and program partners, local clients, local partners, and donors including core donors and project donors.

Between WeRobotics and Flying Labs: WeRobotics provides Flying Labs with project and activity guidelines. In addition, WeRobotics supports the Flying Labs with training and technology in the forms of training by tech experts (mostly for the Regional Flying Labs), software discounts, and access to hardware including drones. WeRobotics also promotes

knowledge sharing among Flying Labs through both regular activities and annual retreats, and, with the support from Regional Flying Labs, facilitates knowledge-sharing webinars. In return, Flying Labs share their project plans and results to WeRobotics through regular spreadsheet reports and submit information on those projects and activities for monitoring and evaluation purposes via monthly or bi-monthly calls.

Between Flying Labs: Flying Labs often provide consultations to other Labs when they have expertise in an area, which allows the Labs to learn from each other's best practices and experiences. In addition, as Labs are located globally, the different time zones optimize knowledge sharing and communication. In addition, there are various types of cross-Lab collaboration, including training and projects. For example, Cameroon and Kenya Flying Labs collaborate on an agricultural project using cartography and soil analysis to grow better crops, while Tanzania Flying Lab conduct training and certifications for Uganda Flying Labs on using fixed-wing drones. The Regional Flying Labs play a significant role in facilitating these knowledge transfers and expertise development as they are the Labs that receive initial funding from WeRobotics to help build and develop other Flying Labs in the region.

Between global partners and WeRobotics: WeRobotics receives in-kind donations and other tech support such as software discounts from their global tech partners, such as DJI, a global drone producer, and Pix4D, a drone mapping software company, and they share these resources with the Flying Labs. Global program partners are international institutions interested in partnering with WeRobotics on drone-related projects. WeRobotics passes the project opportunities to Flying Labs based on the opinions of the partners and expertise of the individual Labs.

Among local clients, partners and Flying Labs: On the local level, the partners and clients of the Flying Labs can be government agencies, NGOs, private-sector companies, and universities. Flying Labs collaborate with local partners to deliver projects and activities for their clients; partners can be subcontracted by the Labs to provide services for financial support, human resources, and technology. By providing consulting, training, and other project-based services to the clients, many Flying Labs are able to generate their own revenue. Furthermore, in the Flying Labs' daily operations, they are able to engage with government agencies and participate in the policy-making process by providing input and services. Flying Labs are also deeply involved in shaping the local drone ecosystem through business incubation programs and other activities mentioned above.

Among donors, WeRobotics and Flying Labs: WeRobotics' donors are categorized into core donors who provide funding to WeRobotics to develop the network, and project donors who give project-specific funding shared between WeRobotics and the

implementing Flying Labs. For project donors, WeRobotics collaborates with Flying Labs to apply for grants together.

b. Business Models

Bottom-up approach: The horizontal blue area at the bottom of Graph 1 represents the bottom-up approach. WeRobotics co-creates Flying Labs with like-minded local partners that are able to gather talents with tech expertise and experience in drones for social good.

Network model and franchise model: The vertical grey area on the left side of Graph 1 represents the network model in which WeRobotics is the "coordinator." Specifically, WeRobotics is the backbone of the network to ensure it functions and develops. As managers of the network, WeRobotics is connecting (funding and project resources), building capacity (mainly on technology), and facilitating sharing. By connecting the various stakeholders and providing support to the whole ecosystem, WeRobotics guarantees that the overall network is moving towards a direction aligned with WeRobotics' mission. To establish and develop the network, they utilize a licensing franchise model in which Flying Labs pay an annual fee and the two parties have the right to choose whether to renew the license.

The network model and the bottom-up approach are an organic whole, and only with these two parts acting together does the WeRobotics' business model stand out as a successful model that can be further duplicated by other organizations and developed in scale. The network model and the bottom-up approach supplement each other in a way that the network of Flying Labs provide what a single local Flying Lab may lack. In a developing country environment, Flying Labs encounter challenges with low capacity in advanced technology. For example, on the knowledge of drone hardware, and with complicated development issues that have not been solved by robotics before. Even by adopting a bottom-up model, it would be challenging for a single Flying Lab to carry out projects and create impact without the tech and expertise support brought in by the network. On the other hand, without the bottom-up approach, a network model could become formalistic as its current benefits would be from the top and the Labs would be imposed with tasks that may not meet or align with local needs. While specific elements of the business model need refinement the network model and the bottom-up approach are complementary so that the Labs have the freedom and receive the support they need while abiding to certain standards.

B. Donor Feedback on WeRobotics and Flying Labs

WeRobotics seeks donor funding to expand the network in size, expertise, and number of sectors. Core and program funding allow them to increase the number of Affiliate Flying

Labs and to further support and create Regional Flying Labs from their most active Affiliate Flying Labs[2]. In setting up Regional Flying Labs, WeRobotics pitches to donors various activities that will be accomplished, including:

1. Professional-level capacity building
2. Pilot and research projects
3. Business incubation
4. Community and stakeholder engagement
5. Ecosystem building

Every donor interviewed acknowledged the benefits and strengths of the current model and bringing emerging technology to local communities in the Global South. The majority of donors expressed the appreciation of genuine partnership and collaboration within the network. Flying Labs, partners, and donors establish relationships locally and globally. Another frequently mentioned strength for the network model is the knowledge and resources sharing between WeRobotics and Flying Labs as detailed in the previous section. Donors recognize the network model as scalable and with the flexibility to adjust given various situations. Moreover, donors recognized WeRobotics and Flying Labs as a global brand with credibility.

"The success of WeRobotics has also given us credibility as the funder. It is a two-way street in that regard and has the value positioning us for the future." - WeRobotics Donor

In addition, donors identified that the bottom-up approach would allow Flying Labs to have the autonomy in project selection and tackle the most needed local issues. Meanwhile, they contribute to the capacity building and local drone ecosystem, which leads to local buy-in and ensures sustainability. Donors also mentioned that the bottom-up approach could be beneficial in terms of cultivating entrepreneurship and job creations.

"This kind of thing, you can't prop up on someone and then leave again. So it is very important that you have a bottom-up approach in that respect that the people adopt it [...] and develop their own ideas and how to use these techniques and technology." - WeRobotics Donor

When discussing the network model, however, donors raised several concerns. The question of long-term financial sustainability came up in half of the donor interviews. Donors in the Global North wondered how the Flying Labs would become and stay self-funded and self-sustainable, and if the network model would encourage long-term

[2] Regional Flying Labs act as regional hubs to grow the ecosystem of robotics services in their countries while supporting Affiliate Flying Labs in their regions.

economic impact in the communities. Another donor noted that WeRobotics' current financing strategy encouraged short-term, one-off grants from siloed donors rather than cross-cutting and solution-oriented granting that allowed for longer, cohesive growth.

"[We want to see] some buy-in and some actual traction on [a] pathway to scale before making a significant investment." - WeRobotics Donor

The perceived lack of control in quality, direction, and activities came up as well. The rapid expansion of the network raised concerns over the quality of the Flying Labs and their activities, and whether WeRobotics should pause for a "*consolidation phase*" to ensure the Labs function as anticipated. Furthermore, given the emphasis on local control, donors wondered if WeRobotics have a governance relationship over the Flying Labs, and if not, does a process exist to close Flying Labs that fail to meet expectations.

"if you've given a lot of local control, what happens if it's not working? [Does] HQ have the power to shut one down?" - WeRobotics Donor

Continuity of mission and Flying Labs direction further confused donors due to localized control. They inquired how WeRobotics makes sure the Flying Labs activities work to drive change in the same direction, and how WeRobotics keeps Flying Labs focused on the organization's mission. The question many donors asked was "how do [HQ] and a franchise, decentralized model of Labs ensure that the Labs themselves are both oriented towards and have the capacity to do that kind of work?" Finally, due to the decentralized model, donors voiced concerns over not knowing the projects they funded until they received a report after completion, rather than during the planning and execution phases.

The issue raised by all donors interviewed regarded general communication. A lack of storytelling about long-term goals, successful use cases, current projects, and the added value of the network created confusion when deciding to fund WeRobotics and Flying Labs. One donor said it took them "two years to really understand what WeRobotics was doing [since] it's on so many levels." Many did not understand the relationship between WeRobotics and the individual Flying Labs regarding quality control, financing, and accountability, even though some of these are not perceived as WeRobotics' responsibility. Some donors were also uncertain about WeRobotics relationships with the Flying Labs' partners. Finally, donors noted a lack of communication between them and WeRobotics about current projects by the Flying Labs and final outcomes, whether the expected outcomes aligned with donors' expectations or not. One interviewed donor said that during the pitch, it "was a bit hard to understand what was the end impact that WeRobotics was really after."

Other concerns were also raised by donors such as accessibility issues resulting from language barriers and that most of the grant went to WeRobotics headquarters rather than the Flying Labs themselves. However, several donors noted that WeRobotics has the opportunity to hone their storytelling around capacity building to demonstrate their added value in the development space. Highlighting their bottom-up approach will help differentiate themselves and their work and attract greater attention from donors:

"as much as they can frame their storytelling within the more traditional verticals, but highlight the difference in their bottom up approach. I think that will help them kind of differentiate themselves from others that are out there, and will lead to kind of more sustainable and longer term funding sources." - WeRobotics Donor

C. Bottom-up Approach

	Strengths	Limitations
Flying Labs	1. Local capacity building 2. Credibility and trust gained through autonomy 3. Develop drone tech ecosystem 4. Access to government agencies and supporting local regulations 5. Diverse local/international partnerships	1. Difficulties in Flying Labs self-sustainability 2. Human resource limitations
Donors	1. Local capacity building 2. Credibility and trust through autonomy 3. Develop drone tech ecosystem	1. Human resource limitations 2. Lack of focus on operations
Partners	1. Local capacity building 2. Credibility and trust through autonomy 3. Shared benefits with Flying Labs	1. Human resource limitations

Table 3: Summary of Bottom-up Approach - Main Strengths and Limitations

a. Strengths of the Bottom-up Approach

The six main strengths of the bottom-up approach are:

Local capacity building: this refers to activities (workshops, training and demonstrations) that are focused on developing the knowledge, skills, and abilities of Flying Labs in using software and drones to solve local issues.

Our research shows that every Flying Labs interviewed had some form of capacity building activity, whether this was through academic institutions, government agencies or public and private organizations. Of those that we interviewed, 67% of donors and 83% of partners indicated this as being a fundamental strength of the bottom-up. In fact, one of their primary donors commented on the Flying Labs focus on capacity building as a particular reason that they became a donor as these activities would strengthen their existing investments in the regions they operate. The real difference, which speaks to the

bottom-up approach, is the method and target of these programs. For example, in Cameroon, Papua New Guinea, and Kenya there is a focus on STEM education for youths in the communities. Whereas, in Nepal, Panama, and Tanzania, there is a stronger emphasis on industry development through incubation programs and workshops and trainings for the private sector and government to utilize drone technology for social good. Another key area of capacity building has been in disaster response. Many of the Flying Labs were originally established to develop disaster response and environmental mapping. They have created imaging, mapping and surveying techniques for disasters. The focus on capacity building as a key strength was corroborated by both donors and partners.

Credibility and trust gained through autonomy: refers to how the bottom-up approach enables the local Flying Labs to gain traction and buy-in from the communities they serve and international donors. The resulting benefits are that they see an improved ability to be self-sustainable because they are more effective in the local context. A major strength of the bottom-up approach is that Flying Labs are able to choose their projects independently from WeRobotics. Research has shown that projects are often selected based on regional context, community needs, and interesting use cases.

Compared with top-down organizations, bottom-up entities are able to select the projects that are most relevant or urgent. About 80% of the Flying Labs interviewed commented that this autonomy was desirable as they have the freedom to target greatest need. Half (50%) of partners agree with this view, while only 33% of donors see this as a key strength. The concern for donors is on focusing the mission and goals. Simply put, if Labs are able to freely choose their projects, WeRobotics may not have control of the final impacts or outcomes. However, this may be a communication issue, as many Labs have mentioned that within their autonomy they are still required to abide by a central document outlining criteria for project selection, such as only working on social good projects, and even ethics codes. In this sense, WeRobotics still retains a certain degree of control over the Flying Labs.

Another benefit of autonomy is that this adds credibility to the Flying Labs' operations on the ground. Approximately 60% of Flying Labs and partners and 50% of donors mentioned that this autonomy leads to greater self-sustainability as this improves the credibility of the Flying Labs.

Development of drone/tech ecosystem: relates to the creation of not just work and industry through incubation programs, but also developing supporting organizations, changing opinions of drones locally and influencing drone policy to further the use of drone technology in the local context.

The research has shown that the majority of the Labs are contributing towards developing the tech ecosystem. Aside from capacity building activities, some Labs have actively assisted with developing industries. Tanzania, Nepal, and Panama have held incubation competitions that not only provided expertise on drone usage, but also business mentorship that created functioning businesses in their regions. A partner that we interviewed corroborated these findings as they see this type of activity as a method to scale the industry even faster. Furthermore, as Flying Labs are focused only on social good projects, partnerships can develop in which these newly formed businesses can take on these types of projects. The ability to pass on projects allows the Flying Labs to further develop the usage of drones and data analysis in the country without having to take on the projects themselves, thus freeing up manpower and still ensuring that local capacity can be developed further. Furthermore, a key aspect has been the ability to change opinions and perceptions on drone usage and our research has shown that in some regions, drones are looked upon negatively. Flying Labs have specifically mentioned that through education programs they hope to ameliorate the view of drones and their perception towards social good rather than harm.

Another key aspect has been the pilot projects that a number of Flying Labs have pursued as a means to demonstrate the utility of drones in existing fields. Essentially, as mentioned by a Flying Labs interviewee, these are “trials to see if drones, more importantly, how drone data can already help what they are doing.” A partner has mentioned that they follow a similar process, in which they provide pilot programs for free to those who would be their future clients.

Access to governments and influencing policy: is defined as Flying Labs having the ability to either train governments in the usage of both software and hardware to develop innovative solutions or improve efficiency for existing tasks, and also directly influence the development of drone regulations.

A majority (79%) of the Flying Labs, especially more established and Regional Labs, reported some form of contact with their governments. The contact may come in the form of training and workshops on using drones and data analysis for disaster response, agriculture, conservation, health, and urban planning.

In some cases, such as in Nepal, drone regulations and laws were actually developed by WeRobotics based on the Flying Labs’ inputs. Another example is in Kenya, where the government has imposed a nationwide ban on flying drones until they have developed formal regulations. Kenya Flying Labs is currently collaborating with the government to create a drone corridor. Philippines Flying Lab was the first certified Civil Aviation Authority of the Philippines (CAAP) licensed company to operate drones commercially.

In many cases, the Flying Labs is a country's primary expert in the usage of drone technology. Furthermore, due to their non-profit structure which gives them more credibility, Flying Labs have the opportunity to shape the regulatory environment.

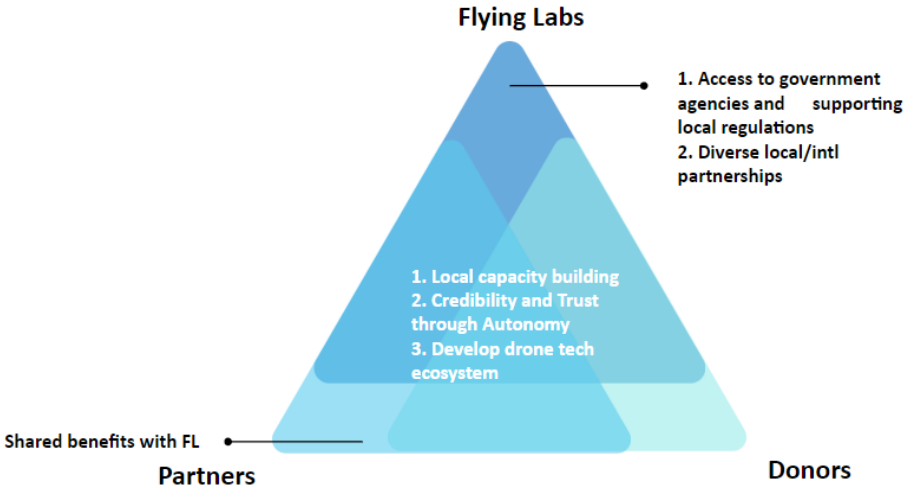
Diverse partnerships with local and international organizations: refers to the variety of partners that the Flying Labs manage to develop on their own without the assistance of WeRobotics.

10 of 14 Flying Labs have indicated this as a strength, while 1 out of 6 partners mentioned this as a strength and 1 donor stated that this actually could be a potential limitation. The differing view could be that Flying Labs experience the diversity of working with partners from academic institutions, government agencies, private sector companies, and local communities and are able to develop use cases and knowledge for all these sectors. Whereas, the donor who raised the issue was highlighting the difficulties associated with control, focus on objectives, and goals of the Flying Labs.

Shared benefits with Flying Labs: refers to any resources or projects shared between partners and Flying Labs.

Many (67%) of the partners interviewed mentioned that there is certainly a benefit to being able to share projects and resources with Flying Labs. In Tanzania and Nepal, both Flying Labs mentioned this relationship with businesses that they had incubated. Partners were able to access the equipment for their businesses and projects and also receive drone related projects that fell outside of the social good criteria. In Senegal, the Ministry for the Environment and Sustainable Development commented on the "win-win" relationship they shared with the Flying Lab since the Lab helps them ameliorate their system for collecting data on biodiversity.

b. Takeaways - Strengths of the Bottom-up Approach:



To summarize, the main strengths of the bottom-up approach are that Flying Labs integrate with communities to sustainably operate by developing the skills and abilities in their regions. There is consensus among the three stakeholder groups that local capacity building and developing local drone tech ecosystems are a key strength of the bottom-up approach.

The main difference from the top-down model is that the bottom-up approach to developing capacity and industry allows for solutions to be sustainably adopted by and scaled to communities. Even if a top-down organization aimed to develop capacity in a region, without establishing a consistent node for disseminating technology and knowledge, these tools are still owned by the Global North. Therefore, in the long-run, these solutions will not persist once the organization leaves. Ultimately, we see this as creating the foundation upon which an industry can be created. However, this will take time, and as seen from two of the most mature and established Labs, Tanzania and Nepal Flying Labs, who still have not reached that critical mass in tech adoption, this could take years to develop to a point that is sustainable.

c. Limitations of the Bottom-up Approach

The three main limitations of the bottom-up approach are:

Human resource limitations: in regards to the lean model that all Flying Labs are using. In many cases, this limitation prevents the Flying Labs from taking on more projects, building more partnerships, and benefiting existing partners.

11 of 26 interviews responded that this was an issue, with approximately 30% of Flying Labs, 30% of donors, and 80% of partners responded that they noticed a human resource limitation as an impediment to the Flying Labs' impact. Partners in Nepal highlighted that they believe their inability to connect with other Flying Labs in the network was specifically due to Nepal not having enough personnel to assist them. Nepal's partner also mentioned that they were assisting with financials and accounting for the Nepal Flying Labs as a result of the limited personnel. In Senegal, partners noted they wanted to do more projects but that they and the Flying Lab lacked the capacity.

Having full-time staff, whilst there are no projects, would be too costly for the Flying Labs. As a workaround, Flying Labs are able to recruit volunteers or simply hire expertise on a per need basis. For example, Chile, Philippines and PNG Flying Labs have been able to recruit volunteers to assist with projects. Chile has 25 - 30 volunteers from the University, whom they are able to assist with data collection. According to both the Philippines and Chile Flying Labs, the volunteers' contributions have proved highly beneficial in supporting the Lab's work.

Difficulties in Flying Labs self-sustainability: refers to the difficulty that Flying Labs have in obtaining enough funds to be self-sustainable.

For this category, we counted Labs that indicated they were concerned with generating enough revenues to sustain operations and donors that raised concerns with Flying Labs being able to self-fund themselves. For example, one Lab had their foundation funding end recently and have been submitting multiple applications for grants without success. Labs such as Cameroon and Philippines are directly funded by staff members and host organizations, which also means that this might not be considered self-sustainable even though it is self-funded. Another example is how Panama Flying Labs will have their IDB funding end next year, and therefore we wonder if they will have enough revenue to operate when their main source of funding disappears. The varying degrees of obtaining funds for operations, such as through host organizations, staff members, funding on a project by project basis and donors, is a rather subjective measure as to whether a Flying Lab is self-sustainable. Furthermore, approximately 50% of the Flying Labs mentioned that they had some degree of difficulty in securing grants. Some Flying Labs have submitted multiple applications without success, while others did not know how or who to approach. In some cases, Flying Labs are looking to cast their net wider and search for donors outside of their regions. Overall, it appears that more Labs than not consider themselves to be self-sustainable, however, this is still a limitation as there were enough responses in our data to this being a potential concern.

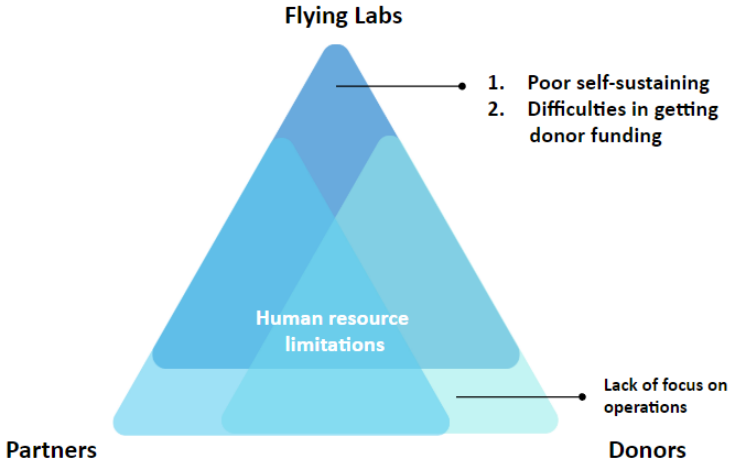
Lack of focus and control on operations: refers to how Flying Labs are unable to focus their operations on a single goal.

Data indicates that this is mainly a concern for 30% donors and partners. As mentioned by one donor, there is a concern that:

"some coherence around what are the specific use cases we're really hoping to drive forward or what are the specific development sectors [WeRobotics] really hoping this applies to or perhaps it's just that [WeRobotics is] in so many cities already in such a short time. It makes it hard to discern what's meeting it all together." - WeRobotics Donor

Although this donor agrees that the bottom-up approach has its benefits to development work, the rapid expansion and growth of the Flying Labs and the intrinsic nature of autonomy in the bottom-up means WeRobotics has difficulty ensuring that all Flying Labs are working towards a common goal. However, this might also be a power dynamic issue, insofar as donors are uncomfortable relinquishing that control to Flying Labs even if the Labs are required to operate under a set of guidelines and criteria.

d. Takeaways - Limitations of the Bottom-up Approach:



Of the top three limitations of the bottom-up approach mentioned in the data analysis, human resource constraints appear to be a concern across all three stakeholder groups. However, depending on the stakeholder group, different limitations take precedence. For example, although Flying Labs indicated that human resource is a limitation, financial constraints are their greatest limitation, whereas donors and partners noted human resources as the greater constraint. For the most part, we see this as differing priorities, in that donors are more worried about having the right expertise to run the Flying Labs

whilst partners are unable to scale-up projects without more staffing in the Labs. Although Flying Labs mentioned human resources as a minor concern, we believe they do not see it as a significant issue because they are able to adapt (i.e., recruiting volunteers or hiring expertise). In many cases, the lack of human resources is a consequence of a lack of funds. However, it should be noted that many Labs take the lean approach and would prefer to limit the staff to ensure efficient operations.

As compared to top-down organizations, it is understandable that Labs face resource issues. Many top-down organizations that have local operations also have funding and human resources that they can draw from outside of the country. Interviewees noted that the pace of development in many countries is slow and that often the market is not "inundated with work." Prudence is perceived as logical; to grow the Lab at the same speed as the industry grows, rather than growing too fast and ultimately becoming unsustainable.

D. Network Model

	Strengths	Limitations
Flying Labs	1. Knowledge transfer/collaboration across Labs 2. Building relationships internally and externally 3. Access to knowledge, tech, and projects from WeRobotics to Flying Labs 4. Funding through WeRobotics	1. Poor communication WeRobotics and Flying Labs 2. Hard to secure sustainable funding 3. Competing for limited funding from WeRobotics
Donors	1. Funding through WeRobotics	1. Weaving incohesive story 2. Poor external communication WeRobotics to funders
Partners	1. Recognition of global brand 2. Access to knowledge, tech, and projects from WeRobotics to Flying Labs	1. Accessibility obstacles

Table 4: Summary of Network Model - Main Strengths and Limitations

a. Strengths of the Network Model

The five main strengths of the network model are:

Building relationships internally and externally: this refers to the access Flying Labs have to other Labs, local partners, donors, and WeRobotics and the relationships that are formed by these interactions. Internal relationships are connections formed with Flying Labs and WeRobotics. External relationships refer to donors, and local partners.

All of the Flying Labs (100%) interviewed view the relationships they developed via the network model as a strength. Flying Labs are the group of the network model that benefit the most from these relationships. Universities, non-profits, NGO's, government, and private sectors connections have all contributed to the development of Flying Labs.

India Flying Labs, for example, has grown from one Flying Lab entity into a collaboration of 20-25 different partners, working together under the India Flying Labs brand. Dominican Republic (DR) Flying Labs is located in a Cyber Park which is an incubator that has a formalized Public-Private Partnership. DR Flying Labs has an easy time finding partners for projects because of the central innovative location of the Lab. These collaborations for private, public, and governmental projects have also been fostered by the DR Flying Labs relationship with the International Development Bank (IDB).

Another example is Nepal Flying Labs; they have worked on several projects with the government on disaster-related mapping and medical health services. Universities play a strong role in contributions to several Flying Labs. Universities provide space, transportation, technology, and an environment to conduct outreach to youth interested in robotics, as is the case for Senegal Flying Labs. Half of the donors and a third of the partners interviewed are in agreement that the fostering of relationships with other stakeholders is a valuable part of the network model.

Access to knowledge, tech, and projects from WeRobotics to Flying Labs: refers to the resources received from WeRobotics to Flying Labs and how it benefits local partners and communities.

WeRobotics is the backbone of the network model. The transference of technology, knowledge and projects are a major benefit to the Flying Lab component of the network. Seven out of ten Flying Labs interviewed stated that the access to training and software was a major benefit of being a part of the WeRobotics network. Flying Labs are mostly located in developing countries; therefore, the costs of training workshops are beyond the means of Flying Labs. WeRobotics has developed partnerships with outside tech partners

who provide free training to Flying Labs. Chile Flying Labs mentioned that the added benefit of the training and software more than offsets the cost of the licensing fee. Japan Flying Labs also mentioned benefiting from the direct access to the latest technologies from the United States. Flying Labs extend the reach of the training workshops through educational outreach initiatives. At the primary, secondary, and tertiary levels of education, Flying Labs stimulate local interest in the robotics field.

Several Flying Labs rely on WeRobotics for technology. For example, the software available locally to Uganda Flying Labs is not as sophisticated as the technology provided by WeRobotics. The cutting-edge software provides Uganda Flying Labs with the capacity to conduct more complex projects. WeRobotics introduces Flying Labs connections to projects outside of the Flying Labs network. For example, Philippines Flying Labs was referred to the World Bank and won a bid for a project.

Knowledge transfer and collaboration across Labs: this refers to the resources that can be shared across Flying Labs.

The network model provides opportunities to collaborate between Labs on projects. When working on projects, Flying Labs can post questions and receive advice from other Flying Lab experts all over the world and from a variety of different professional backgrounds. According to the Panama Flying Labs, members have 24/7 access to consultations because of the network's global reach across different time zones. Nepal Flying Labs mentioned that information sharing becomes much more valuable when it comes to decision making. Consulting with other Labs when choosing a drone that is the best suited for a project or opportunities to pitch their business internationally through the connections of the network are some of the benefits of information sharing. Flying Labs see opportunities to provide workshops to other Flying Labs in their area of expertise in robotics. The exchange of best practices for projects or development had a large impact on the accelerated progress of new and old Flying Labs.

"The network model helps you learn more and [make] smarter and effective decisions…the network helps us to learn, pitch our business, grow, and then help[s] us bring more projects." - Flying Lab

Cross-Lab project collaboration is a major strength of the network model. Philippines Flying Labs stated that the conferences organized by WeRobotics have stimulated more in-depth discussions between Flying Labs and have led to conversations about projects, specifically medical delivery projects with India Flying Labs and Philippines Flying Labs. One of the most popular examples of cross-lab projects is the medical cargo drone project. Flying Labs have made an international effort to provide medical services to those

who do not have access to them via the use of drones. Regional and international coordination developed this project via the Flying Labs component of the network model. Most (79%) of the Flying Labs stated that the united network of Labs is a powerful factor and benefit of the network model. However, partners and donors did not mention this in their interviews. This suggests, donors and partners do not directly benefit from this part of the network model and may not be aware of its internal (the development of lab and local tech ecosystems) and external (community projects) impacts.

Recognition of global brand: refers to the external benefits awarded to stakeholders by being associated with WeRobotics.

Being associated with the WeRobotics trademark provides credibility to Flying Labs, when Flying Labs look to secure partnerships and funding, in particular. For Chile Flying Labs, being a part of the WeRobotics network is a "strong part" of why they were able to secure academic partnerships in Colombia and the United States. A Flying Lab has also been able to gain funders for projects because of the "goodwill" provided by being associated with WeRobotics.

"we...use the goodwill of the Flying Labs network and the human resource expertise of WeRobotics and Flying Lab network to convince the donor that we belong to this group that already has an international presence. So by that way, it has been praised." - Flying Lab

Four out of six partners agreed that this was a strength of the network. Partners benefit from the network model both directly and indirectly. For example, Nepal Flying Labs has passed on projects to Dronepal who otherwise would not have access to. Dronepal stated that the multi-stakeholder groups associated with WeRobotics have given them access to projects from other sectors outside of the commercial and industry projects they have been routinely working with. In addition, some partners connected to the WeRobotics network have stated their credibility and authority have increased within their field.

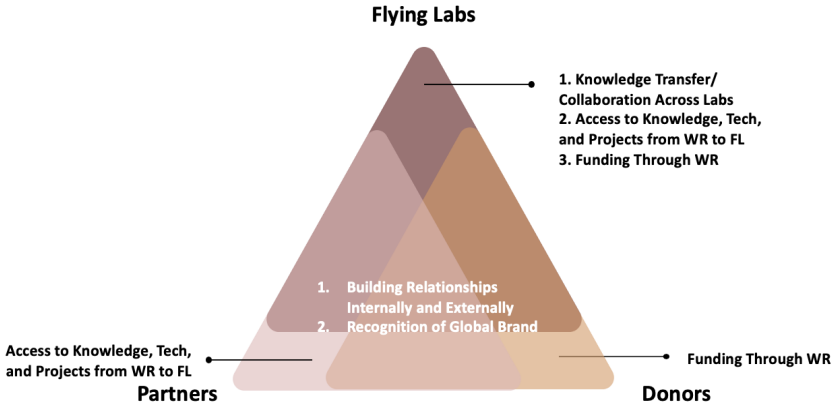
Several Flying Labs were developed through the existing relationships of WeRobotics. The IDB, for example, has worked with WeRobotics on projects prior to the establishment of Panama Flying Labs. It was the trust between the two organizations that led to the founding and funding of Panama Flying Labs:

"their technical knowhow, their vision of impact, their reputation is what has made the partnership with the WeRobotics…. a sustainable partnership." - WeRobotics Partner

Funding through WeRobotics: refers to any financial or in-kind donation benefits provided from WeRobotics to Flying Labs and the network.

Through WeRobotics, the coordinator of the network, Flying Labs have benefited in the form of donations, funding and information for finding funding. Many of the Flying Labs receive donations in the form of in-kind donations from WeRobotics, such as software and training workshops. Additionally, WeRobotics provides information to the Flying Labs on a bi-monthly basis about potential grants they can apply to. Challenges initiated by WeRobotics give opportunities to Flying Labs to compete for prizes, like a free drone. Aside from the large-scale benefits provided to all Flying Labs, WeRobotics have provided microgrants for specific projects to Flying Labs. 11 of the 14 Labs interviewed benefited from WeRobotics funding through the network model.

b. Takeaways - Strengths of the Network Model



The most impactful categories mentioned by all stakeholders within the WeRobotics network are building relationships internally and externally, access to knowledge, tech and projects from WeRobotics to Flying Labs, and knowledge transfer and collaboration across Labs.

The added value of the WeRobotics network revolves around the fostered relationships among all stakeholders. The network model brings together the power of the local through the interactions of institutions, which include WeRobotics, Flying Labs, universities, local non-profits, NGOs, government agencies, and the private sector. Through these interactions, training, technology, funding, and human resources are shared among stakeholders. The WeRobotics brand accelerates the building of these relationships due to the trust and credibility associated with the WR brand. Therefore, we infer a virtuous cycle of how partners, donors, and Flying Labs are able to strengthen their relationships

among themselves and within the communities in which they operate by associating with the valuable WeRobotics brand.

c. Limitations of the Network Model

The four main limitations of the network model are

Accessibility obstacles: refers to any cultural, linguistic, and geographical barriers encountered by donors, partners or Flying Labs.

Some of the major issues Flying Labs, donors and partners face in regards to the network model are the cultural, linguistic, and geographical limitations. A number of Flying Labs (21%) encountered at least one of these obstacles. For example, Panama Flying Labs faces language barriers when publications and communications are conducted in English. Submitting materials in English requires a larger time commitment for Flying Labs with less fluency in English. Consequently, Flying Labs such as Panama participate less frequently than they would if communication and materials were available in Spanish.

Flying Labs in close proximity to each other maintain consistent communication with one another. Some have created a Whatsapp group to communicate about projects and consultations. However, a Flying Lab stated, due to time differences, they don't usually communicate with Labs from other regions. They claim that the network is not administered to reflect the multilingual ecosystem established by WeRobotics.

"We don't know what [Flying Labs from other regions] are doing...We communicate very often [with Flying Labs from our region], but the rest, the distance, difference in time, it is difficult to connect." - Flying Lab

A third (33%) of donors and partners shared similar reflections. A donor stated that it is difficult to provide additional support to Flying Labs due to language barriers.

"The challenge that we face is that we pride ourselves on the ability to deliver investment support for our portfolio... For us that requires entrenched relationships with our post investment and the teams of our portfolio. A lot of [the obstacles related to] that are language barriers, distance, a lack of understanding of our technology suites and the abilities that we have in timing and capacity on both ends to actually realize to create value." - WeRobotics Donor

Hard to secure external sustainable funding: refers to the level of difficulty for WeRobotics to receive funding.

WeRobotics is having trouble finding and retaining funders. Due to the broad range of projects, cultures, languages, and locations of Flying Labs and the narrow scope of funding requirements from donors, WeRobotics faces challenges in navigating the philanthropic domain.

"Adjust[ing] to whatever the local context is… makes it difficult to attract sustainable funding sources because oftentimes funders are very siloed… And for something that is a little bit more cross-cutting, and service-oriented and solution delivery rather than trying to focus on one particular problem area. It makes it hard to navigate the funder landscape." - WeRobotics Donor

As outlined in Section B, Donor Feedback, the quality control of Flying Labs, given their quick expansion, is an obstacle for WeRobotics to acquire funding. Donors have raised concerns over WeRobotics' ability to step-in if Flying Labs decided to disassociate from the network. From the perspective of a donor, the governance structure of WeRobotics is flawed. If WeRobotics has no authority over the Flying Labs, then that is truly bottom-up; however, what happens when WeRobotics does not agree with the orientation of a Flying Lab? Do you simply shut it down, or do you impose your vision on the Flying Lab? Despite Labs having mentioned they are required to abide by a central document outlining criteria for project selection and ethics codes, donors raise concerns about WeRobotics' control over Flying Labs. These guidelines may not have been properly communicated to some of the donors or may be perceived as too liberal.

Funders seek-out specific objectives when providing grants to organizations. The broad scope of the Flying Labs limits WeRobotics' funding opportunities because not all projects align with the goals of the funder. Also, mentioned in the previous section (accessibility obstacles), linguistic, geographical and cultural barriers play a major role in the hindrance of donor participation. These are the main reasons a third (33%) of the donors stated funding is a limitation to the WeRobotics approach.

Poor communication between WeRobotics and Flying Labs: refers to the clarity of objectives from WeRobotics to Flying Labs and the quality of reporting mechanisms of Flying Labs to WeRobotics.

Nearly half (43%) of interviewed Flying Labs mentioned issues with the M&E reporting. Monthly reporting is required by WeRobotics from the Flying Labs on new and ongoing projects. Some Flying Labs stated, due to the additional reporting they must complete for

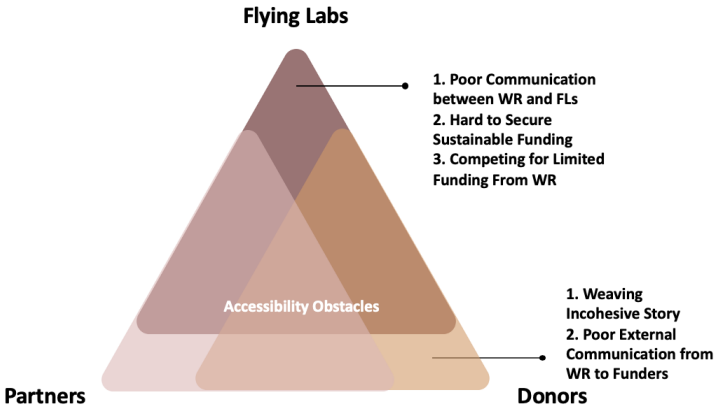
other partners, like universities and NGOs, they sometimes do not complete the WeRobotics reporting or are late. These Labs prioritize the needs of their partners because they provide sustainable funding or other valuable donations like a work space or transportation and feel obligated to report to them first.

A Flying Lab raised concerns about the organization of the reporting to WeRobotics. At the moment, Flying Labs complete surveys on Google Docs or Google Forms at least once a month. However, a Flying Lab recommends a more interactive platform in which leaders from Flying Labs can log in and find reports organized by sectors, such as agriculture, disaster assistance, and health would be beneficial. Flying Lab representatives can then add supporting documentation to these projects to provide a full picture and be able to view the progress of other Labs. Several Labs were not able to initially answer our questions about M&E since they do not refer to the current process as "M&E" or "reporting." Other Flying Labs have mentioned that WeRobotics is not even aware of their current progress. Flying Labs perceive there to be a lack of organization in reporting measures.

Poor external communication from WeRobotics to funders: refers to the lack of clarity in general communications between WeRobotics and funders.

As stated in Section B, Donor Feedback, some of the main concerns raised by funders was a lack of storytelling about long-term goals, successful use cases, current projects, and the value added by the network. The lack of communication created confusion when deciding to fund WeRobotics and Flying Labs. Donors found it difficult to understand the structure of WeRobotics' model and their ability to maintain the quality control of the Flying Labs. Some donors mentioned it was difficult to comprehend the goals of some of the projects from the beginning, despite receiving progress reports.

d. Takeaways - Limitations of the Network Model



The three major weaknesses of the network model are accessibility obstacles, poor communication between WeRobotics and Flying Labs, and challenges in securing sustainable funding.

We found the central limitation between all these challenges to be communication. Cultural, linguistic, and geographical barriers are issues faced between all stakeholders in the network model. Donors and Flying Labs find it difficult to optimize the benefits of the network Models because of the time and language differences preventing them from speaking to one another.

Donors struggle to understand how the network model functions. WeRobotics struggles to communicate how having many locally prescribed institutions will have a greater impact on communities. Convincing donors of the network model's stability, despite the organization's large sphere of influence, and the narrow scope of donor funding is preventing grant opportunities.

Flying Labs view the reporting methods as disorganized, and question if WeRobotics is aware of their progress. Additionally, they feel disconnected from the rest of the network outside of their respective regions. In the triangulation graph, partners do not have a category for communication with WeRobotics. Partners vary in their communication with WeRobotics, but mostly work directly with the Flying Labs. However, partners have an indirect relationship with WeRobotics through the Flying Labs, through project and networking opportunities. Communication is a limitation for partners as well. Language barriers and time zones affect both Flying Labs and partners' ability to engage and communicate with other Labs.

Communication limitations come in the form of clarity, access to participate, language and physical distance between all stakeholders.

Part IV. Recommendations

Part IV. Recommendations

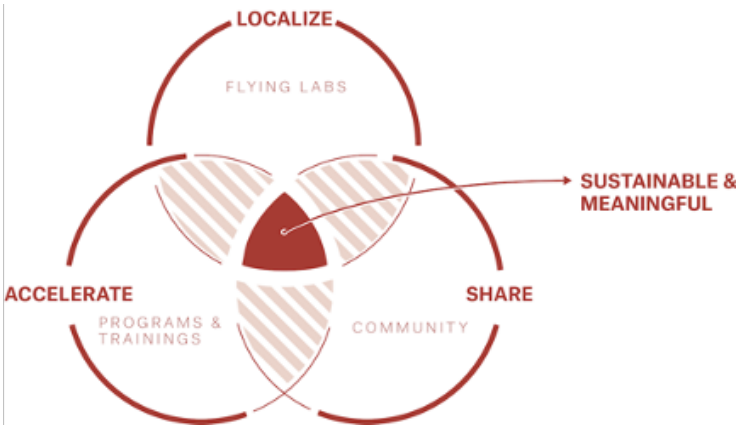
Based on our findings from the desk research and the interviews, the team has proposed five recommendations for WeRobotics to demonstrate the added value of its business model and to respond to the concerns of top-down partners and donors. These recommendations are listed in both chronological and theme order.

Business model	A. Articulate and visualize the interplay between the bottom-up approach and the network model	**Short Term**
Communication	B. Continue with storytelling to amplify the visibility as an organization	
	C. Improve the operating procedures of the network to overcome accessibility issues	**Medium Term**
Quality Control	D. Strengthen the quality control of Flying Labs to consolidate the network	
Network Sustainability	E. Provide mechanisms for network members to connect with one another to achieve self-sustainability and ecosystem expansion	**Long Term**

Table 5: Summary of Recommendations

A. Articulate and visualize the interplay between the bottom-up approach and the network model

To explain the added-benefits of the bottom-up approach and the network model, WeRobotics should first be able to articulate and visualize the interplay of these two models in a clear and effective manner. It became salient throughout the preliminary research and interviews that the power of the local (bottom-up approach) and the network (network model) are two interdependent components intrinsically embedded in WeRobotics' business model, yet the nuances of how the global hub is supporting the operations of the network to boost knowledge exchange among the local nodes have not been exhibited sufficiently in WeRobotics' current business model illustration (see Graph 2).



Graph 2: WeRobotics' current model illustration

An illustration that effectively communicates the uniqueness of WeRobotics' business model is critical for two reasons. Firstly, it helps WeRobotics to re-examine the clarity of its organizational structure. WeRobotics has been adopting a flexible and learning approach to adapt its business model since its establishment and rapid expansion of the Flying Labs, and it is recommended to consolidate the Labs for their future plans. Secondly, it can also provide a better explanation of the pieces that might cause confusion for external stakeholders, especially for donors who offer core funding, and further enhance trust between WeRobotics and such stakeholders.

The business model illustration should be able to convey the following messages: 1. Flying Labs make localized decisions to solve local community problems; 2. Flying Labs share knowledge and cooperate within the Flying Lab network to enhance learning for greater localized impacts; and 3. WeRobotics coordinates the operations and ensures the quality of the network. A detailed stakeholder relationship map would be helpful to address the interplay of different models, which can be found in Graph 1 in the Key Finding section.

B. Continue with storytelling to amplify the visibility as an organization

WeRobotics should continue to exert the power of storytelling to amplify its visibility as an organization, as it is one of the key methods to raise awareness and attract funding from donors. Donors are not only interested in following how the local experts are tackling local problems in humanitarian, health, environment and development sectors in a responsible manner, but also in understanding the greater impact of past and ongoing projects in terms of job creation, income generation, local government engagement, drone policy formation and development of local tech ecosystems. Recently, WeRobotics has been

successfully updating news regarding how drones are being deployed to respond to the Coronavirus pandemic across the globe. More profound stories that record each Flying Lab's actions should be documented and published to enhance the awareness of the critical roles that the local leaders are playing amid a global health crisis, when international experts cannot offer fly-in projects because of the halted flights and work of international organizations. WeRobotics can identify thematic case studies that record the emergence of problems, the methods of addressing the challenge, the outcomes due to the intervention and the potential impact. The case studies would add more evidence to showcase the capacity of the Flying Labs network in addition to collecting the information on the application of drone tech in different countries. Donors noted that a greater use of pictures and individual success stories would allow them to connect more to the mission and for WeRobotics to simplify the initial pitch.

Since story collection from more than 25 Flying Labs and blog posting require both time and human capital, we recommend WeRobotics fully utilize the resources and power of the local and urge each Flying Lab to update their individual website based on what they previously agreed upon to increase their presence. To raise Flying Labs' awareness and capacity in external communication, WeRobotics could offer webinars and online courses on nonprofit marketing, blog post writing, website design and graphic design. They can also work with students and partners to expand and improve storytelling in the local community. The enhanced capacity in communication at the Flying Lab level would further enrich WeRobotics' storybase and help the Flying Labs community coordinators screen and select scalable pieces to be written and published as case studies. Case studies that show greater impact of the intervention should be accompanied with accurate and sufficient data which requires periodic tracking in the median term. This further indicates the importance of improving the overall communication capacity of the Flying Labs network.

C. Improve the operating procedures of the network to overcome accessibility issues

Based on our findings, many Flying Labs have identified the poor communication of operating procedures as one of the weaknesses manifested by the infrequent submission of the monthly reporting forms and the redundant procedures of having to submit different forms to multiple stakeholders. While this is in part due to Flying Labs' unfamiliarity with the newly established M&E processes, we believe that WeRobotics should improve the operating procedures to overcome accessibility issues.

Currently the two Flying Labs community coordinators are responsible for collecting and organizing the M&E among more than 25 Flying Labs. The increase in projects at each

Flying Lab and the rapid expansion of the network will consequently escalate the workload. Improvement to the internal operating channel is important for two reasons. Firstly, it could help WeRobotics organize the significant amount of data collected from the field and ease the workload of the community coordinators. Secondly, it could elevate Flying Labs' motivation to provide WeRobotics with the information needed and overcome accessibility issues related to language and geographic location.

A possible approach is to empower the Regional Flying Labs to facilitate the M&E in their respective regions and report to the community coordinators since they are relatively more experienced in project management and were granted initial capital to cover administrative costs. This would involve not only data collection but also providing training and workshops to the Affiliate Flying Labs to increase both their capacity on standardized M&E and awareness of its necessity. In this way, a chain of responsibility and accountability to implement the M&E would be created to ensure its efficacy and Flying Labs can also provide their feedback to help optimize the current M&E framework and process. However, this might require WeRobotics to provide additional funding to the Regional Flying Labs to help them run the program. Overall, this would be capacity building of the Flying Labs before introducing a tool or software platform that could improve the efficiency of data collection.

D. Strengthen the quality control of Flying Labs to consolidate the network

While WeRobotics pursues a rapid expansion of the Flying Labs network with approximately one Lab created each month, it is equally important to ensure quality throughout the process from a median-term perspective. As WeRobotics' goal for 2019-2021 is to keep improving the current model and appropriate processes to ensure quality control and professionalization,[3] we recommend WeRobotics approach this issue at both the initial and development stage of granting licenses without infringing on the autonomy of the Flying Labs.

At the initial stage, WeRobotics should have a more formalized due diligence process for the applicants before granting licenses. It is recommended to acquire information on the long-term goal of the Flying Lab to ensure mission alignment, the number of partners in hand to evaluate the project development capacity and potential for self-sustainability. There also should be certain clauses in the event of a breach of contract, such as the rejection of license renewal by WeRobotics or a certain amount of termination fee.

Entering into the development stage, WeRobotics should build a systematic quality control mechanism. The benefits of establishing such a platform include: 1. Monitor each

[3] WeRobotics internal document.

Lab's current operational capacity and identify areas of improvement; 2. Help Flying Labs understand their own position; and, 3. Promote potential cross-Labs knowledge exchange.

To date, the organization has been working on the implementation of a Frequent Flyer program to support Flying Labs in Professionalism (Drone & Project Management), Expertise (Data & Sector), Impact, Sharing, Collaboration, Ethics and Partnership. After an initial scoring, WeRobotics intends to identify tools and resources to help Flying Labs to improve in the poorly-scored areas. This system can be integrated into their M&E process so that they can demonstrate increasing local capacity and other outcomes. WeRobotics may consider fostering a sister-Labs program where Labs with higher scores in one area could transfer expertise and assist its sister Lab in improving performance. It may also provide financial incentives in the form of in-kind donations or mini-grants for those Labs that are ranked in level 1 for each category.[4]

E. Provide mechanisms for network members to connect with one another to achieve self-sustainability and ecosystem expansion

In the long term, after consolidating the quality of Flying Labs in terms of project management and partnerships, WeRobotics can consider expanding the Network so that partners and donors are easily approachable and can be shared across different Labs. Through this expansion of the network, the Flying Labs will be better positioned to establish partnerships, get in touch with a broader range of clients, and explore funding opportunities and can subsequently speed up the process of achieving self-sustainability.

First, it is necessary to clearly define what self-sustainability for Flying Labs means. Due to the varying ways in which Flying Labs can be self-funded, it would be beneficial to determine what type of funding would be considered self-sustainable. For example, if a Lab is self-sustaining if it relies on individual staff members or funding on a project by project basis or earning revenue from paying clients. Furthermore, it would also be helpful to determine over what time period a Lab would be considered sustainable. For example, determining if a Lab that has a two-year grant is considered self-sustainable or still developing to become sustainable. We recommend creating an objective measure of self-sustainability as it will increase credibility of the bottom-up approach and potentially be a benefit when presenting the business model to donors.

Aside from defining self-sustainability, WeRobotics may also need to invent a systematic method of integrating the partners, sharing clients, and connecting business programs not only from the headquarters to Flying Labs but also across different Labs and regions.

[4] There are overall three levels in ranking and we assume that level 1 is the top rank.

Several partners and Flying Labs mentioned they could benefit from greater connectivity. They should also consider facilitating funding opportunities by not only sharing the information in the bimonthly newsletter but also initiating warmer introductions among the stakeholders. We believe that this will eventually help boost a healthy and powerful network to support the Flying Labs in achieving self-sustainability and develop the drone ecosystem in the Global South by truly harnessing the power of the local.

CONCLUSION

WeRobotics sought the assistance of student consultants from Columbia University, School of International and Public Affairs in defining and explaining the added value of its bottom-up and network model to partners and funders. The team worked to analyze the opportunities and limitations of the WeRobotics model in comparison with other models and to provide recommendations to assist WeRobotics in fundraising activities. Our recommendations aim to strengthen WeRobotics' external pitch as well as the internal communication and operations to ensure Flying Lab quality and long-term sustainability.

Nearly every individual interviewed acknowledged the positive aspects of the bottom-up approach and the focus on local decision making to ensure long-term sustainability. The bottom-up approach and network model working together allow communities to build capacity and identify and solve their own challenges with a new kind of development assistance from WeRobotics and donors. This model highlights what the more traditional top-down approach often lacks: local input. In the words of one Flying Lab director:

"One word I [use to] describe the approach, sustainable, in the sense that it actually gives us the opportunity to run things ourselves [...] And that is what we actually advocate for because at the end of the day, we know the terrain better than anyone [...] And we even know our communities better than anyone. So doing that on our own, with the support of partners, with the support of others from different countries in different parts of the world, [...makes it] much easier for us to do the work to meet our communities, to speak for our own people in our own local languages, and be able to explain to them clearly what this is about." - Flying Lab

Overall, the efficacy of the WeRobotics model is still being proven. The balance between autonomy of the Flying Labs and control of headquarters is still being refined. We acknowledge that it has only been a few years since inception and that tweaks and adjustments are an on-going process. Regardless, we believe that the synergistic relationship between the bottom-up approach and the network will lead to faster adoption of these technologies and ultimately success in achieving WeRobotics' intended outcomes and impacts.

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Workshop in Development Practice

Appendices

APPENDICES

Appendix A. Interview Guide - Current Donor

Interview Objectives

1. Understand the donor's reasoning for funding WeRobotics/Flying Labs and their intention for future collaboration.
2. Gain insights into the current reporting mechanism between WeRobotics/Flying Labs and donors and donors' expectations of programs.
3. Learn the donors' understanding of WeRobotics' bottom-up model.

Introduction [Time allocated - 2 minutes]:

Ensure the interviewee knows who we are and understands the purpose of this interview.

Good morning/afternoon/evening, thank you for taking the time to meet with us today. My name is _____ and this is my colleague _____. We are both student consultants from Columbia University and we are involved in a project with WeRobotics. The purpose of our project is to explore WeRobotics' bottom-up approach. As student consultants, we are not employees of WeRobotics. For the purposes of this project, we will be delivering our final findings via a report and PowerPoint presentation to both Columbia University and WeRobotics.

In order to explore WeRobotics' bottom-up model, we would like to explore the reasons why some donors fund the work of Flying Labs. As a current donor, your opinion is very important to us and we are here to learn more about your experience with the organization.

Interviewee Consent [Time allocated - 2 minutes]:

This section is to gain consent from the interviewee before proceeding with the questions. Furthermore, this section is used to confirm that the interviewee understands the confidentiality principle of the information provided during the interview and their right to remove any information that they would not like for us to include in our reports.

The information you share with us today will be confidential. This means we will not use your name or identify any of your statements in our report or presentation. We may use unidentified excerpts from this interview as quotes in our report or presentation. During the interview, you may choose to stop at any point and if there are questions you would prefer not to answer, please let us know and we will skip them. Do you consent to be interviewed?

[Pause for consent. If consent is given, proceed with interview. If not, end interview and do not ask any further questions]

We want to record the interview for transcription purposes only. Only members of our Columbia University student consulting team will have access to the recording. The recording will be deleted in June 2020. If you prefer that we not record the interview, please let us know. Do you consent to have the interview recorded for transcription purposes only?

[Pause for consent. If yes, switch on tape recorder. If no, proceed to next question]

Do you have any questions before we begin?

[Pause for questions and address any concerns]

Part 1. Opening Questions [Time allocated - 10 minutes]:

Build rapport with the interviewee and gain a foundational understanding of how the organization got to know WeRobotics.

1. Please give us a bit of background about yourself and your position at the foundation?
2. Could you please give us some background on your foundation/business?
    a. [*Clarify if necessary*] Could you briefly describe the industry and focus of your foundation/business?
3. How did your foundation learn about (WeRobotics/Flying Labs)?
4. In your own words, how would you describe WeRobotics/Fly Labs?

Part 2. Questions about relationship with Flying Labs [Time allocated - 15 minutes]:

Understanding why the foundation/organization initially provided funds to WeRobotics' Flying Labs and if the relationship is still positive.

5. What about (WeRobotics/Flying Labs) garnered your organization's initial interest in providing financial support?
    a. [*Follow-up*] What are your decision-making processes for donating? For example, does the decision-making focus on funding projects in certain regions, focus on specific sectors or technologies or meet specific objectives?
6. How frequently do you communicate with (WeRobotics/Flying Labs) staff during the duration of the funding/project? And what was the nature of that communication?
    a. Probing: How involved would you say you or your team is in the project your organization funded?
7. Are there any requirements initially given by your organization that (WeRobotics/Flying Labs) must adhere to in order to receive funding? Please describe these requirements and why they are in place.
8. Are there any areas/opportunities that WeRobotics/Flying Labs can improve on?

Part 3. Questions regarding Flying Labs and Project Selection [Time allocated - 15 minutes]:

Understand the donor's interest in funding specific projects and their evaluation methods of these projects in the regional/affiliate Flying Labs.

9. Did you grant Flying Labs/WeRobotics funds for a specific project or was it a general grant to the (WeRobotics/Flying Labs)?
    a. [*If funded a specific project*] Does your foundation normally provide unrestricted funding?
    b. [*If provided a general grant*] What made you decide to give an unrestricted grant to Flying Labs?
        i. Probing: Do you think it is a trend for philanthropic organizations to offer more unrestricted funding in the future? Please explain.
10. Does your organization follow or require grantees to complete evaluations using a specific process or approach? Please explain.
    a. [*If own evaluation system*] – Please describe your approach to project reporting. Are there requirements for grantees?
    b. [*If they relied on* (WeRobotics/Flying Labs) *reporting mechanism*] - Are you satisfied with (WeRobotics/Flying Labs) reporting methods or would you like to see certain improvements? Please explain.
11. Has there been a situation in which your organization's expectations on the project outcomes and reports were not met?
    a. [*Follow-up*] Can you describe how your organization handled the situation?

Transition: Thank you for sharing with us your project selection and evaluation process as well as information of your evaluation system/feedback on the evaluation system adopted by WeRobotics' Flying Labs. We would now like to move onto questions regarding the bottom-up model that is used by WeRobotics and your organization's understanding of this approach.

Part 4. Questions regarding bottom-up approach [Time allocated - 15 mins]:

Gain insight into the interviewee's organization's understanding and perspectives regarding WeRobotics' bottom-up model

12. In your own words, can you tell us what you know about WeRobotics's bottom-up approach?
    [Further explanation] Flying Labs use a decentralized model, where the bottom-up approach regards each lab as an autonomous component able to select their

projects independently but can use the resources and knowledge of all Flying Labs to complete them.

13. What is the value, if any, of such an approach to meeting your organization's objectives?
14. How effective do you think this model is in meeting your organization's objectives compared to other NGO's that use a top-down or more "traditional" approach?

15. Are there any aspects of the model that you do not understand or find particularly difficult to explain?
    a. Probing: Does this make working with (WeRobotics/Flying Labs) challenging?

Transition: Thank you. This is really helpful for us to understand your organization's knowledge of the bottom-up model that WeRobotics uses.

Part 5. Closing Questions [Time allocated - 5 mins]:

Aim to gather some open-ended suggestions from the interviewee regarding improvements and recommendations for WeRobotics.

16. Based on your experience, do you have any additional recommendations for (WeRobotics/Flying Labs) in potentially securing more funding?
17. Do you have any questions for WeRobotics/Flying Labs?
18. Is there anything else that you would like to share with us?

Conclusion and follow-up [Time allocated - 2 mins]:

This is the final section to remind the interviewee of the consent clauses covered in the opening of the interview. Additionally, aim to keep lines of communication open with interviewee in case of further follow-ups or questions that we may have.

Thank you very much for taking the time to answer our questions. Please feel free to contact our team if you have any questions or concerns. Again, thank you for your time and cooperation!

<END INTERVIEW>

Appendix B. Interview Guide - Donors that did not approve WeRobotics applications

Interview Objectives

1. Understand the donor's reasoning for not funding WeRobotics/Flying Labs and within that reasoning if there is anything that WeRobotics can improve on to receive future funding.
2. Understand the donors' understanding of WeRobotics' bottom-up model.
3. Learn if the donors have suggestions for WeRobotics on fundraising and alignment with the donor's missions.

Introduction [Time allocated - 2 minutes]:

Ensure the interviewee knows who we are and understands the purpose of this interview.

Good afternoon, thank you for taking the time to speak with us today. My name is _____ and this is my colleague _____. We are both student consultants from Columbia University and we are involved in a project with WeRobotics. The purpose of our project is to explore WeRobotics' bottom-up approach.

In order to explore WeRobotics' bottom-up model, we would like to explore the reasons why some donors fund and why others do not fund the work of Flying Labs. Your opinion is very important to us and we are here to learn more about your experience with the organization.

Interviewee Consent [Time allocated - 2 minutes]:

This section is to gain consent from the interviewee before proceeding with the questions. Furthermore, this section is used to confirm that the interviewee understands the confidentiality principle of the information provided during the interview and their right to remove any information that they would not like for us to include in our reports.

The information you share with us today will be confidential. This means we will not use your name or identify any of your statements in our report or presentation. We may use unidentified excerpts from this interview as quotes in our report or presentation. During the interview, you may choose to stop at any point and if there are questions you would prefer not to answer, please let us know and we will skip them. Do you consent to be interviewed?

[Pause for consent. If consent is given, proceed with the interview. If not, end the interview and do not ask any further questions]

We want to record the interview for transcription purposes only. Only members of our Columbia University student consulting team will have access to the recording. The recording will be deleted in June 2020. If you prefer that we not record the interview, please let us know. Do you consent to have the interview recorded for transcription purposes only?
[Pause for consent. If yes, switch on tape recorder. If no, proceed to next question]

Do you have any questions before we begin?
[Pause for questions and address any concerns]

Part 1. Opening Questions [Time allocated - 10 minutes]:

Build rapport with the interviewee and gain a foundational understanding of how the organization got to know WeRobotics.

1. Could you please give us a bit of an introduction to the Unorthodox Philanthropy/ DRK Foundation and your work at the organization?
2. How did your foundation learn about WeRobotics? What are your general perceptions of WeRobotics?

Part 2. Questions regarding the Applications of WeRobotics [Time allocated - 15 minutes]:

Understand the donor's interest in funding specific projects and their evaluation methods of these projects in the regional/affiliate Flying Labs.

3. We understand that WeRobotics submitted a grant proposal to your organization in 2019 but did not receive a grant. Could you share with us the reason behind your decision?
   [*Follow-up*] a. What are some of the selection criteria or focuses of your grants? [Follow-up] b. What do you think WeRobotics may improve on to potentially secure funding in the future?
4. Does your organization require awardees/grantees to measure and report outcomes or provide an impact evaluation? If so, what information do you require from them?
   [Probing Question] Do you think WeRobotics would be able to meet the requirements in this area?

Transition: Thank you for sharing with us your project selection and evaluation process as well as information of your evaluation system/feedback on the evaluation system adopted by WeRobotics' Flying Labs. We would now like to move onto questions regarding the bottom-up model that is used by WeRobotics and your organization's understanding of this approach.

Part 4. Questions regarding the bottom-up approach [Time allocated - 15 mins]:

Gain insight into the interviewee's organization's understanding and perspectives regarding WeRobotics' bottom-up model

5. In your own words, can you tell us what you know about WeRobotics's bottom-up approach?
   [Further explanation] Flying Labs use a decentralized model, where the bottom-up approach regards each lab as an autonomous component able to select their projects independently but can use the resources and knowledge of all Flying Labs to complete them.
6. Are there any aspects of the model that you do not fully understand or find particularly difficult to explain?
   Probing: Do you think the difficulty in explaining the model would pose additional risk for WeRobotics to acquire funding achieve their mission?
7. Compared with traditional NGOs that operate in a top-down model, how do you see the strengths and limitations of WeRobotics' model?

Transition: Thank you. This is really helpful for us to understand your organization's knowledge of the bottom-up model that WeRobotics uses.

Part 5. Closing Questions [Time allocated - 5 mins]:

Aim to gather some open-ended suggestions from the interviewee regarding improvements and recommendations for WeRobotics.

8. Based on your experiences, do you have any additional recommendations for (WeRobotics/Flying Labs) in potentially securing funding?

Conclusion and follow-up [Time allocated - 2 mins]:

This is the final section to remind the interviewee of the consent clauses covered in the opening of the interview. Additionally, we aim to keep lines of communication open with the interviewee in case of further follow-ups or questions that we may have.

Thank you very much for taking the time to answer our questions. Please feel free to contact our team if you have any questions or concerns. Again, thank you for your time and cooperation!

<END INTERVIEW>

Appendix C. Interview Guide - Flying Labs

Interview Objectives

1. Understanding how the bottom-up approach benefits or poses challenges to the Flying Labs program planning, project design and daily operations.
2. Identifying how a Flying Labs acquires funding (either through donor or revenue streams) and technology.
3. Understanding how the Flying Labs finds and forms partnerships with program and tech partners.
4. Understanding Flying Labs' perception on the value of the newly implemented M&E framework.
5. Identify the regulatory environment that the Flying Labs operates within and how the Flying Labs is working on with local regulators in shaping drone policy.
6. Learning how Flying Labs monitor success/impact in their projects using the M&E framework and any difficulties they face in providing information required.

Assumptions

1. We assume that the Flying Labs is clearly aware of the regulatory and operating environment in their country.

Introduction [Time allocated - 2 minutes]:

Ensure the interviewee knows who we are and understands the purpose of this interview.

Good morning/afternoon/evening, thank you for taking the time to meet with us today. My name is _____ and this is my colleague _____. We are both student consultants from Columbia University in New York City and we are working on a project with WeRobotics. The purpose of our project is to explore WeRobotic's bottom-up approach. As student consultants, we are not employees of WeRobotics. For the purposes of this project, we will be delivering our final findings via a report and PowerPoint presentation to both Columbia University and WeRobotics.

In order to determine the added value for WeRobotics' bottom-up model, we would like to explore how this approach affects the operations and project selection of Flying Labs. Ultimately, we are looking to deduce the benefits, and potentially difficulties that are directly linked with this bottom-up approach. As a coordinator/manager of the lab, your opinion is very important to us and we are here to learn more about your experience.

Interviewee Consent [Time allocated - 2 minutes]:

This section is to gain consent from the interviewee before proceeding with the questions. Furthermore, this section is used to confirm that the interviewee understands

the confidentiality principle of the information provided during the interview and their right to remove any information that they would not like for us to include in our reports.

The information you share with us today will be confidential. This means we will not use your name or identify any of your statements in our report or presentation. We may use unidentified excerpts from this interview as quotes in our report or presentation. During the interview, you may choose to stop at any point and if there are questions you would prefer not to answer, please let us know and we will skip them. Do you consent to be interviewed?
[Pause for consent. If consent is given, proceed with the interview. If not, end interview and do not ask any further questions]

We want to record the interview for transcription purposes only. Only members of our Columbia University student consulting team will have access to the recording. The recording will be deleted in June 2020. If you prefer that we not record the interview, please let us know. Do you consent to have the interview recorded for transcription purposes only?
[Pause for consent. If yes, switch on the tape recorder. If no, proceed to next question]

<u>Part 1. Opening Questions [Time allocated - 10 minutes]:</u>

Build rapport with the interviewee and gauge understanding on the bottom-up and franchise model of WeRobotics relationship with the Flying Labs.

1. Please give us a bit of background about yourself and your position? We'd like to know more about your work and role.
2. What are the Flying Labs' current objectives? What do you hope the Flying Labs will achieve in the future?
    a. [*Follow-up*] Do you see the Flying Labs objectives evolving in the future?

Transition: Thank you so much for sharing your experiences with us. Particularly _____, I found it to be very interesting. Now we'd like to move to asking you questions about the objectives of the lab.

3. Why and how was this Flying Labs created?
    a. [*If necessary*] Who are the co-creators of this lab?
4. In your own words, how would you describe the WeRobotics bottom-up approach or franchise model?
    a. [*Clarify if necessary*] Explain that the bottom-up model refers to Flying Labs having autonomy of lab control and therefore, project selection and daily operations.

Transition: Thank you, we would now like to move onto understanding more on how this model affects decision-making on project selection.

Part 2. Questions about Bottom-up approach affecting project selection [Time allocated - 10 minutes]:

Understanding how this model affects decision-making on project selection.

5. Could you give us a brief overview of the Flying Labs' past, present and future projects? To clarify, by projects we mean any activities, including training and workshops.
6. Thank you, could you explain how these projects were selected?
    a. [*If necessary*] Could you use some examples of how decisions were made to pursue these projects?
    b. Probing questions:
        i. For Donor/Grant requirements:
            1. [*Follow-up*] How did you learn about this opportunity?
            2. Were there any requirements or restrictions for this opportunity?
        ii. For regional context:
            1. [*Follow-up if no explanation given*] Was this a pressing concern and a reason that the Flying Labs was setup in the first place?
            2. [*Follow-up*] Outside of regional context, how else would you go about selecting your projects?
        iii. For Partnerships:
            1. [*Clarify*] Was this a tech, program partner or both?
            2. [*Follow-up*] Could you tell us the process of partnering? I.e how did you approach them?
7. Overall, do you feel there is a good balance between autonomy and support from WeRobotics in regards to project selection?
8. According to Sonja, WeRobotics has recommended a monitoring and evaluation plan to the Flying Labs, has your Flying Labs implemented the M&E framework, or portions of it? Do you find this M&E framework valuable? What components of the M&E framework, if any, were useful to your Flying Labs? Did you encounter any difficulties in providing information required by the M&E framework?

Transition: Great, with an understanding of the types of projects that you work on and how you selected them, we would like to move onto a line of questions regarding how you see the bottom-up approach affecting your ability to acquire funding.

Part 3. Questions regarding Flying Labs ability to acquire donor funding [Time allocated - 15 minutes]:

Understand the donor's interest in funding specific projects and their evaluation methods of these projects in the regional/affiliate Flying Labs.

9. Please describe briefly from where the revenue for the Flying Labs comes?
    a. Probing Questions:
        i. Donor funding
            1. How did you receive this type of funding?
            2. Do you have any donors that provide unrestricted cash that can be used for administrative costs etc. for the lab?
        ii. In-kind donations
            1. [*If not explicit*] What types of in-kind donations did you receive?
            2. How did you receive these donations?
        iii. Training/Consulting [skip to question 10.]
10. What are donors' reactions to the WeRobotics/Flying Labs' bottom-up approach?
11. Is it possible to give us a rough percentage breakdown on the different types of revenue?
12. If applicable: How many donors does the Flying Labs contact annually?
    a. [*Follow-up*] Are the donors local or international?
    b. [*If a mix of both else skip to the next follow-up*] Have you noticed any differences between local and international donors? Please explain.
    c. [*Follow-up*] Do the donors have reporting requirements/demands to get the funding?
    d. [*Follow-up*] What do you usually report to these donors?
13. If applicable: has this lab lost any donors?
    a. [*If yes, follow-up*] Could you tell us why you believe you lost the donor?
    b. [*Follow-up*] Is there anything you could have done differently to maintain this relationship?

Transition: Thank you for sharing with us your thoughts on acquiring funding from donors and reporting procedures. We would now like to move onto questions regarding tech and program partners.

Part 4. Questions regarding partnerships [Time allocated - 10 mins]:

Gain insight into the Flying Labs development of tech and program partnerships. We are trying to identify how the bottom-up model plays into acquiring partnerships. Furthermore, we need to understand how they utilize the whole WeRobotics network.

14. According to your Flying Labs page, you have partnerships with [*list the partnerships that we have identified]*. Can you give a brief overview of the lab's relationship with these partners?
    a. [If necessary] - Of the partners that are listed, we noticed that this Flying Labs has other projects with partners that are not listed, can you tell us how you organize the information?
15. How do you get these partnerships?
    a. [*Clarify*] Does WeRobotics introduce these partners or are they through your own connections?
    b. [*Follow-up*] Is the Flying Labs in-charge of monitoring and evaluation of projects?

16. Can you explain how this Flying Labs works with program partners?
17. Do you work with the government?
    a. [*If yes*] How do you collaborate with them? Do you participate in the local regulatory process? What's your Flying Labs' contribution in this process?
    b. [*If no, skip question*]
18. In regards to technology partnerships, do you rely mostly on WeRobotics connections to get your software and hardware, or do you seek out or go after your own tech partners?

Transition: Thank you. This is really helpful for us to understand your team's concerns of the bottom-up model.

Part 5. Closing Questions [Time allocated - 5 mins]:

Aim to gather some open-ended suggestions from the interviewee regarding improvements and recommendations for WeRobotics.

19. Do you plan to renew the license with WeRobotics in the future? What are some key factors that you would consider?
20. Based on your experience, do you have any additional recommendations for WeRobotics in how they could assist you with acquiring funding?
21. In regards to partnerships, do you have any suggestions that might make it easier for you to develop more partnerships?

Conclusion and follow-up [Time allocated - 2 mins]:

This is the final section to remind the interviewee of the consent clauses covered in the opening of the interview. Additionally, aim to keep lines of communication open with interviewee in case of further follow-ups or questions that we may have.

We had such a fruitful conversation. Thank you very much for taking the time to answer our questions. Please feel free to contact our team if you have any questions or concerns. Again, thank you for your time and cooperation!

<END INTERVIEW>

Appendix D. Interview Guide - Partners

Interview Objectives

1. Understand how the partner cooperates with WeRobotics and specific Flying Labs, including what kinds of support they provide using what ways.

2. Understand the partner's overall opinions about the cooperation with WeRobotics and the Flying Lab including their initial motivations, main reasons, strengths and weaknesses.

3. Identify if there are any processes or systems for reporting requirements between the partner and WeRobotics and Flying Labs.

4. Discern the partner's understanding and evaluation of WeRobotics' bottom-up model.

5. Understand the partner's perception of originating local power from the Global South.

6. Learn the partner's outlook towards future cooperation with WeRobotics and the Flying Labs.

Assumptions

1. We assume that the representative from the partner is familiar with their organization's cooperation with WeRobotics and the Flying Labs.
2. We assume that the representative from the partner has knowledge of collaborative activities with WeRobotics or the Flying Labs in the past.

Introduction [Time allocated - 2 minutes]:

Ensure the interviewee knows who we are and understands the purpose of this interview.

Good morning/afternoon/evening, thank you for taking the time to meet with us today. My name is _____ and this is my colleague _____. We are both student consultants from Columbia University and we are involved in a project with WeRobotics. The purpose of our project is to explore WeRobotics' bottom-up approach. As student consultants, we are not employees of WeRobotics. For the purposes of this project, we will be delivering our final findings via a report and PowerPoint presentation to both Columbia University and WeRobotics

In order to determine the added value for Werobotics' bottom-up model, we would like to explore how this approach affects the operations and project selection of Flying Labs. Ultimately, we are looking to deduce the benefits, and potentially difficulties that are directly linked with this bottom-up approach. As a current partner of WeRobotics/ _____ Flying Lab, your opinion is very important to us and we are here to learn more about your experience.

Interviewee Consent [Time allocated - 2 minutes]:

This section is to gain consent from the interviewee before proceeding with the questions. Furthermore, this section is used to confirm that the interviewee understands the confidentiality principle of the information provided during the interview and their right to remove any information that they would not like for us to include in our reports.

The information you share with us today will be confidential. This means we will not use your name or identify any of your statements in our report or presentation. We may use unidentified excerpts from this interview as quotes in our report or presentation. During the interview, you may choose to stop at any point and if there are questions you would prefer not to answer, please let us know and we will skip them. Do you consent to be interviewed?
[Pause for consent. If consent is given, proceed with interview. If not, end interview and do not ask any further questions]

We want to record the interview for transcription purposes only. Only members of our Columbia University student consulting team will have access to the recording. The recording will be deleted in June 2020. If you prefer that we not record the interview, please let us know. Do you consent to have the interview recorded for transcription purposes only?
[Pause for consent. If yes, switch on tape recorder. If no, proceed to next question]

Do you have any questions before we begin?
[Pause for questions and address any concerns]

Part 1. Opening and questions on basic information of the partnership [Time allocated - 10 minutes]:

Build rapport with the interviewee and gauge understanding of how the partner cooperates with WeRobotics and the Flying Lab.

1. Can you please give us a bit of background about your organization and your role?

   Transition: Thank you so much for sharing your experiences with us. Particularly _____ *(one keyword from the interviewee's previous answer)*, I found to be very interesting. Now we'd like to move to ask you questions about the partnership between _____ *(name of the partner)* and WeRobotics.

2. We understand that you are an important partner for WeRobotics (or name of a Flying Lab based on desk research). Do you work with WeRobotics or just the local Flying Lab?
3. Thank you for the clarification. Could you please explain to us how you communicate and collaborate with the _____ (*based on the answer of the interviewee from question 2*)?

a. [Clarify if necessary] Please describe for us projects that you have collaborated on with WeRobotics/Flying Labs?

b. Probing question:

i. What specific types of support do you provide to _____ (*based on the answer of the interviewee from question 2*), such as funding, technical support, and program-wise advice?

ii. How involved is your organization in the management of the partnership? For example, how you make decisions for starting a project, budgeting, staffing and how you evaluate them after.

Transition: Thank you, those are really helpful for us to understand this partnership. We would now like to move onto your general feedback about this partnership.

Part 2. Questions regarding assessment of the partnership [Time allocated - 15 minutes]:

Understanding the partner's overall opinions about the cooperation with WeRobotics and the Flying Lab.

4. What are the reasons for choosing to work with WeRobotics/Flying Labs as a partner?
5. What factors contribute to the sustainability of this partnership?
6. What are possible barriers to the partnership with WeRobotics/Flying Labs?
    a. [*If necessary*] Could you use some examples to explain supportive aspects and/or barriers?
    b. [*If the interviewee does not mention the aspect*] Probing questions:
        1. Do you think your organization's and WeRobotics' visions are aligned? Please explain.
        2. Have there been moments during your partnership with WeRobotics/Flying Labs during which your expected results were not achieved? Please explain.
        3. Have WeRobotics/Flying Labs requested extra support during a project's implementation? If yes, what was the additional support request and how did you organize address this request.
        4. Overall, are you satisfied with WeRobotics/Flying Labs performance as a partner? Please explain.
7. Do you and _____ (*based on the answer of the interviewee from question 2*) provide each other relevant information for reporting purposes, e.g. impact measurement, feedback on past activities, etc.?
    a. [*If yes*] How would you describe the mechanism you use to provide information for reporting? Is there anything that could be further improved?
    b. [*If no*] Do you think this should be implemented in the future and why?

Transition: Great, with an understanding of your general opinions about the partnership and needs for reporting, we would like to move on to how you evaluate the bottom-up model that WeRobotics and Flying Labs use.

Part 3. Questions regarding Bottom-up Model [Time allocated - 10 mins]:

To understand the partners' perception of the bottom-up model and the experiences with Flying Labs.

8. Are you aware and do you understand WeRobotics' bottom-up approach and network model?
    a. [*Clarify if necessary*] The bottom-up approach refers to the power of the local. WeRobotics aims to build locally-led projects around emerging technologies for social good and believes that it is fairer and more effective in addressing pressing challenges.

9. What do you think are the strengths/benefits and challenges/limitations of WeRobotics' bottom-up model?

a. [Probing] Do you see whether the Flying Labs has enough expertise in understanding the local context as compared to outsiders?
b. [Probing] Do you notice that the Flying Labs has a lot of autonomy, flexibility and speed in decision-making?
c. [Probing] Do you see there is a lack of coherence and focus in their projects and activities with the objectives?

Transition: Thank you for sharing your thoughts on WeRobotics' bottom up model. It is important for us to better define and explain the model in future partnerships. We will now move to the last section of questions.

Part 4. Questions regarding revenue [Time allocated – 5 mins]

To learn from past collaborations and to suggest possible improvements.

10. Can you tell us if you have worked on projects with the Flying Labs that have received revenue?

    a. [*If yes*] Can you give us a rough average percentage on the splits between your organization and the Flying Labs?

    b. [If necessary] Can you further elaborate on how the decisions were made to split the revenues?
    c. [*If no, proceed to Question 11*]

Transition: Thank you very much for kindly sharing the stories with us and for the valuable suggestions. We will think it through and discuss it with our colleagues. We are almost finished.

Part 5. Questions regarding lessons to learn [Time allocated – 5 mins]

To learn from past collaborations and to suggest possible improvements.

11. Do you partner with other similar organizations?

a. [*If yes*] What types of organizations are these? How might these collaborations be different, if at all, from WeRobotics? Could you please provide some examples of differences?
b. [*If no, proceed to Question 14*]

12. Based on your existing partnership with WeRobotics and Flying Labs, what recommendations do you have to improve future collaboration?

Transition: Thank you very much for kindly sharing the stories with us and for the valuable suggestions. We will think it through and discuss it with our colleagues. We are almost finished.

Part 6. Closing Questions [Time allocated – 3 mins]

To hear from the interviewee on any supplements and suggestions.

13. Is there anything else you want to address or share with us?

14. Do you have any additional recommendations or questions for WeRobotics or Flying Labs?

Conclusion and follow-up [Time allocated - 2 mins]:

To assure the interviewee regarding information protection and open for future communication.

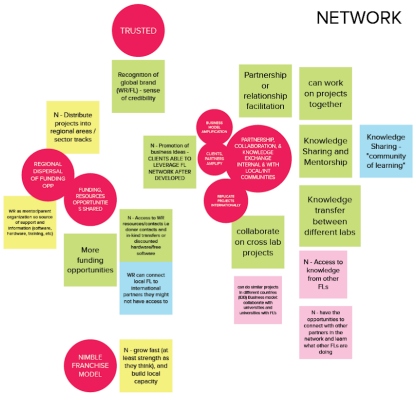
Thank you very much for taking the time to speak with us and sharing insightful perspectives. Please feel free to reach out for any further questions or concerns. Thank you again for your time and help.

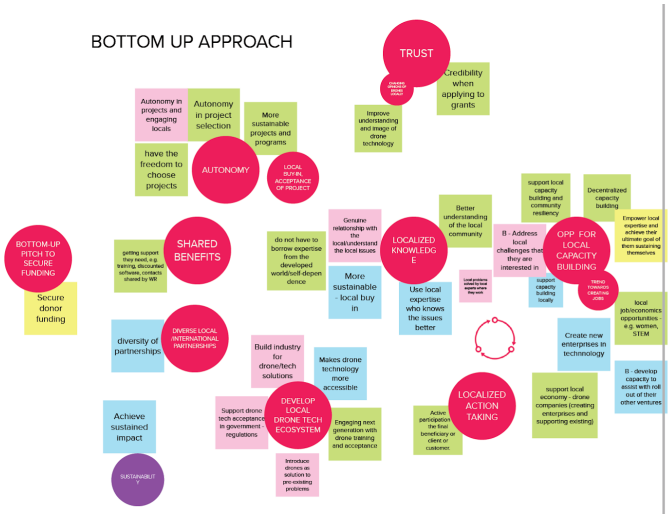
<END INTERVIEW>

Appendix E. SWOT Analysis

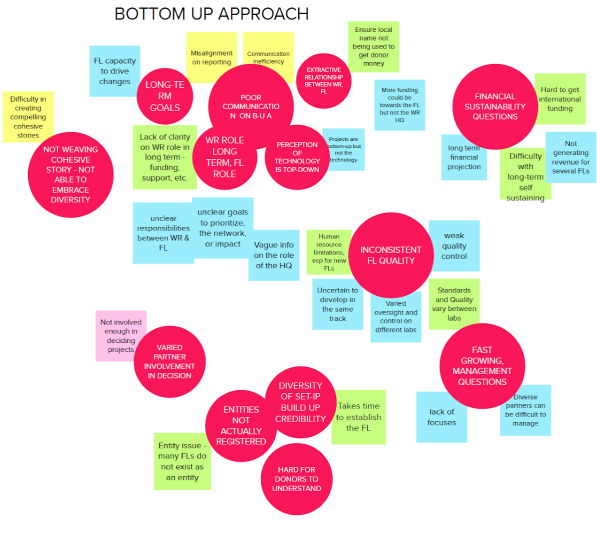
WeRobotics & Flying Labs SWOT Analysis - Network & Bottom-up Approach

Identified Strengths

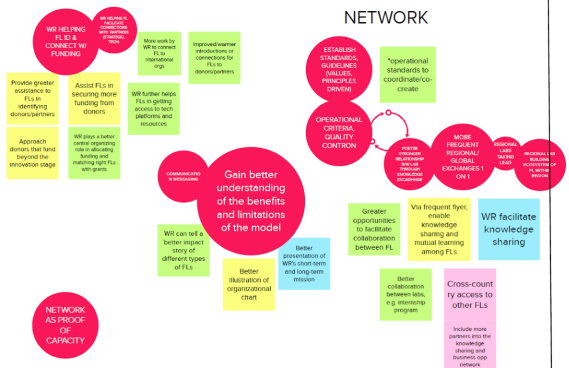




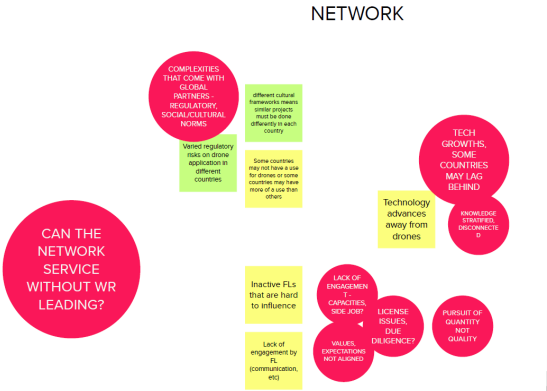
Identified Weaknesses

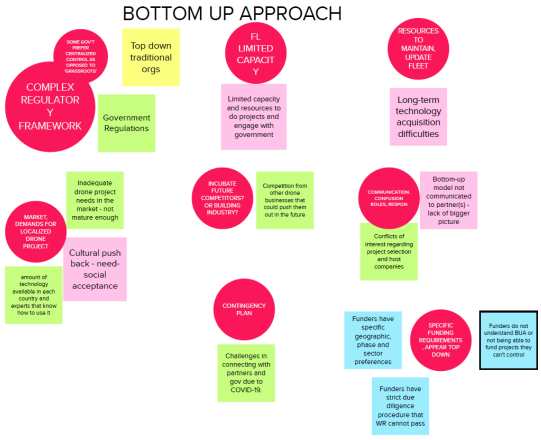


Identified Opportunities



Identified Threats





Appendix F. Interview Data Analysis

Category	Total Resp.	Flying Labs	Donor	Partner	Total Resp. Rate	Flying Labs	Donor	Partner
Strengths of the Bottom-up Approach								
Local capacity building	23	14	4	5	88%	100%	67%	83%
Credibility and Trust Gained Through Autonomy of FL	17	12	2	3	65%	86%	33%	50%
Developing Local Drone Tech Ecosystems	16	10	3	3	62%	71%	50%	50%
Diverse Local and International Partnerships	12	10	1	1	46%	71%	17%	17%
Access to Government Agencies and Supporting Local Regulations	11	10	0	1	42%	71%	0%	17%
Self-sustainability	11	10	0	1	42%	71%	0%	17%
Changing Opinons on Drones Locally	10	7	1	2	38%	50%	17%	33%
Shared benefits between FLs and Partners	9	5	0	4	35%	36%	0%	67%
Diversity of FL Creation (i.e not registered entities)	4	3	0	1	15%	21%	0%	17%
Bottom-up Approach is a Pro to Attract Local Donors	2	2	0	0	8%	14%	0%	0%
Limitations of the Bottom-up Approach								
Human resources limitation	11	4	2	5	42%	29%	33%	83%
Lack of focus of operation	2	0	2	0	8%	0%	33%	0%
Bureacracy and hierarchy within public institutions (University)	4	2	0	2	15%	14%	0%	33%
Poor FL self-sustaining	7	6	1	0	27%	43%	17%	0%
Difficulties in getting donor funding (local or international)	7	7	0	0	27%	50%	0%	0%

Category	Total Resp.	Flying Labs	Donor	Partner	Total Resp. Rate	Flying Labs	Donor	Partner
Strengths of the Network Model								
Vision/Misson	6	2	3	1	23%	14%	50%	17%
Recognition of Global Brand	11	5	2	4	42%	36%	33%	67%
Increased Credibility and Recognition of Donors/Partners	1	0	1	0	4%	0%	17%	0%
Replicate Projects	5	4	0	1	19%	29%	0%	17%
Knowledge Transfer/Collaboration Across Labs	12	11	1	0	46%	79%	17%	0%
Building Relationships Internally and Externally	19	14	3	2	73%	100%	50%	33%
Funding Through WR	11	11	0	0	42%	79%	0%	0%
Growing and Adaptable Franchise Model	4	2	2	0	15%	14%	33%	0%
Access to Knowledge, Tech, and Projects from WR to FL	14	10	1	3	54%	71%	17%	50%
Standards and Guildelines are Followed by FLs	1	1	0	0	4%	7%	0%	0%
Communication / Reporting	7	5	2	0	27%	36%	33%	0%
Limitations of the Network Model								
Lack of Experience	2	1	0	1	8%	7%	0%	17%
Accessibility Obstacles	7	3	2	2	27%	21%	33%	33%
Hard to Secure Sustainable Funding	7	5	2	0	27%	36%	33%	0%
Competing for Limited Funding From WR	3	3	0	0	12%	21%	0%	0%
More Funds to WR Than FLs	2	1	1	0	8%	7%	17%	0%
FL Quality Control	5	2	3	0	19%	14%	50%	0%
Poor Communication WR and FLs	6	6	0	0	23%	43%	0%	0%
Poor External Communication WR to Funders	5	2	3	0	19%	14%	50%	0%
Clarity of Roles of WR and FL	3	1	2	0	12%	7%	33%	0%
Weaving Incohesive Story	5	0	5	0	19%	0%	83%	0%
Lack of Clear Definition of Bottom-up	4	2	1	1	15%	14%	17%	17%

Appendix G. Interview List

	Flying Lab	Date of Interview	Completed?
1	PNG	4-Feb-20	Yes
2	Japan	10-Feb-20	Yes
3	Kenya	13-Feb-20	Yes
4	Cameroon	20-Feb-20	Yes
5	India	24-Feb-20	Yes
6	Uganda	2-Mar-20	Yes
7	Dominican Republic	5-Mar-20	Yes
8	Tanzania	7-Mar-20	Yes
9	Nepal	15-Mar-20	Yes
10	Senegal	18-Mar-20	Yes
11	Philipines	30-Mar-20	Yes
12	Panama	30-Mar-20	Yes
13	Nigeria	1-Apr-20	Yes
14	Chile	2-Apr-20	Yes
15	Peru	N/A	No
16	Cote-d'Ivoire	N/A	No
	Partners		
1	DroNepal	19-Mar-20	Yes
2	NAXA	20-Mar-20	Yes
3	Inter American Development Bank	31-Mar-20	Yes
4	Head of Wetlands Division, Senegal National Parks Directorate, Ministry of the Environment and Sustainable Development	1-Apr-20	Yes
5	Geo Ladies	4-Apr-20	Yes
6	Director, Earth Sciences Institute (IST) Universite	7-Apr-20	Yes
	Donor		
1	Rockfeller	21-Feb-20	Yes
2	Hewlett	14-Feb-20	Yes
3	PlaceFund/Omidyar Network	14-Feb-20	Yes
4	Autodesk	19-Feb-20	Yes
5	Unorthodox	21-Feb-20	Yes
6	DRKFoundation	28-Feb-20	Yes
7	Primesteps/Jansen	19-Mar-20	Yes