

WeRobotics: Capturing the Impact of Localized Robotics Technologies Developing an appropriate and practical monitoring & evaluation strategy



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EXECUTIVE SUMMARY

WeRobotics has co-created a global network of local knowledge hubs, known as Flying Labs®, to accelerate the positive impact of local aid, health, development, and environmental projects through the use of drones for social good. WeRobotics aims to do this sustainably through training local partners on how to use robotics technology responsibly and effectively, in order to accelerate and scale social development outcomes. The Flying Labs® expand local markets by creating new jobs and businesses that offer drones as a service.

WeRobotics requested a team from Columbia University's School of International and Public Affairs (SIPA) to conduct research and design an appropriate and adaptable monitoring and evaluation (M&E) framework that would be used across their global network of Flying Labs®.

The SIPA team conducted preliminary desk research and visited two regional affiliate Flying Labs® in Tanzania and Panama. During these visits, the team facilitated a number of participatory activities with Flying Labs® staff, conducted interviews with a wide range of stakeholders, and piloted a monitoring tool. This fieldwork supplemented the team's desk research and informed the findings and recommendations listed.

The team's main findings include:

- a lack of streamlined communication between all the Flying Labs®
- varying understanding of the meaning of localization, which makes it harder to carry out the mission of WeRobotics
- differing working capacities of each of the Flying Labs® (each face contrasting financial, regional, and human resource constraints)
- WeRobotics and the Flying Labs® each have different expectations of activities and objectives
- there is a lack of data storage and collection procedures put in place

Through on-the-ground interviews, focus groups, activities, and surveys, the team was able to design and develop an appropriate M&E system that reflects the needs and desires of both WeRobotics and the Flying Labs®. The M&E system created, includes a project document form, a stakeholder engagement form, and a streamlined M&E framework piloted through an online platform that is easily accessible to all. The idea is to allow the Flying Labs® to have a space where they can enter their projects and activities that are easily tracked and can be shared across all Flying Labs® and WeRobotics, to then be able to measure progress and advance learnings.

DEFINITIONS

Monitoring & Evaluation (M&E) - Monitoring and Evaluation (M&E) is a process that helps improve performance and achieve results. Its goal is to improve current and future management of outputs, outcomes, and impact.

M&E Framework - An M&E framework is a table that describes the indicators that are used to measure whether the program is a success.

M&E Plan - An M&E Plan is a table that builds upon a project/program's logframe to detail key M&E requirements for each indicator and assumption. It will allow Flying Labs ® staff to track progress towards specific targets for better transparency and accountability within and outside the organization.

M&E System - An M&E system refers to all the indicators, tools and processes that are used to measure if a program has been implemented according to the plan (monitoring) and is having the desired result (evaluation). This M&E system is often described in a document called an M&E plan.

Logic Model - A logic model is a graphic depiction (road map) that presents the shared relationships among the resources, activities, outputs, outcomes, and impact for your program. It depicts the relationship between your program's activities and its intended effects.

Reflection Session - A reflection or sense making session is an introspective activity which takes place post completion of the tools and techniques to monitor activities carried out for a project. It is a post-monitoring assessment to highlight positive outcomes and successes as well identifies problems and weaknesses, and develops future actions to overcome any obstacles.

River Journey Mapping - A river journey mapping exercise is an organizational goal mapping process where intended impacts are identified and subsequent outcomes and activities leading to their attainment are established, enabling the development of a simplified logic model.

Fish and Boulders - This is an activity that illustrates the collective vision of the organization and opportunities and challenges that the organization faces. The fish represent strengths or opportunities and the boulders represent challenges that hinder the realization of the collective vision.

Activities - Activities are the actions of the organization that are designed to meet a project's objectives. It is any action taken through which inputs (financial, human, and material resources) are mobilized to produce specific outputs. e.g. trainings for drone pilots.

Outcomes - Outputs are the tangible and intangible products that result from project activities. These are products, capital goods, and services that result from development interventions. e.g. number of trained pilots.

Outputs - Outcomes are the benefits that a project or intervention is designed to deliver. These are short term and medium-term effects of an intervention's output that lead to changes in development conditions. e.g. an increase in the local capacity of drone pilots.

Impact - Impacts are the higher-level goals to which you hope your project will contribute. They are actual or intended changes in human development as measured by people's well-being or improvements in people's lives.

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PART A: INTRODUCTION

WeRobotics is a not for profit organization that utilizes robotics and artificial intelligence (AI) tools with a focus on developing localized solutions to social and economic challenges worldwide. Through a global network of local knowledge hubs, known as Flying Labs®, WeRobotics aims to accelerate the positive impact of local aid, health, development, and environmental projects through the use of drones for social good.

Project Overview

Monitoring and evaluation strategies in the social development sector focus on changes to target constituents over a set timeframe as a result of singular interventions. The SIPA team was tasked with developing an M&E framework that would be applicable across all 22 current Flying Labs®, including any future expansion of the network.

WeRobotics currently collects discrete data to meet specific funder or donor requirements; however, the organization does not have an M&E strategy put in place. The dynamic and expansive nature of their work and technological advancements in the sector complicate the establishment of a traditional monitoring and evaluation (M&E) strategy. In this case, the M&E strategy must be adaptable, relevant, and easily implementable across their network.

Client Overview

Based out of the United States and Switzerland, WeRobotics currently operates through a network of 22 Flying Labs® in Africa, Latin America, South and East Asia, and the South Pacific.



Fig A. Flying Labs® Locations May 2019

WeRobotics provides operational support such administrative resources, project management tools, and training resources but not financial resources to Flying Labs®. Two distinct categories of Flying Labs exist through a franchise model:

1. **Regional Flying Labs®** act as technological hubs, incubate affiliate Flying Labs® and run business incubation programs for local businesses that aim to provide a range of drone services. They operate strictly under the four sector-based program tracks.
2. **Affiliate Flying Labs®** are preexisting organizations in developing countries that are building local robotics capacity. They have direct access to the expertise, technology solutions and partners of WeRobotics. They utilize the Flying Labs®' logo for their strategic communications and fundraising purposes as well as use assets produced by WeRobotics and other Flying Labs®, such as drone training curricula, sample datasets, and research data.

WeRobotics continues to expand at an accelerated pace (i.e. when the project with SIPA began, there were 15 Flying Labs®). All the labs are open, knowledge-sharing collaborations with local stakeholders in academia, technology development, NGOs, and representatives from both the private and public sectors.

The Flying Labs® and their local stakeholders are crucial players in achieving the organization's goal to localize technological services. Under this model, localization ensures that entrepreneurs, governments, and academia are involved in the development and completion of projects that WeRobotics carries out in their communities, through a bottom-up approach.

WeRobotics has four sector-based program tracks to where the focus of Flying Labs® projects lie.

1. **AidRobotics** focuses on disaster risk reduction. WeRobotics runs AidRobotics workshops in developing countries to teach attendees how to deploy drones for disaster relief.
2. **HealthRobotics** focuses on performing health outreach in remote communities using cargo drone solutions. For example, the Panama Flying Lab® is looking into delivering medicines to remote areas in Panama through drones.
3. **EcoRobotics** focuses on developing sustainable agriculture and fishing practices, nature conservation, and climate change resilience. For example, several Flying Labs® engage in drone mapping for agricultural purposes.
4. **DevRobotics** focuses on creating professional development programs for local communities to create local “drones-as-a-service” markets and ecosystems using emerging

technologies. For example, several Flying Labs® offer trainings to students and entrepreneurs on how to use drones.

All Flying Labs® follow WeRobotics' principles, which are the following:

‘ WeRobotics creates local capacity, trains the local workforce, and expands local markets by leveraging robotics and other technologies. These labs also help develop best practices for solutions to social challenges in humanitarian, development, environmental, and public health sectors. WeRobotics sets standards, shares learnings, and brings together all the stakeholders involved during the process. These stakeholders include: local communities in developing countries, global and local NGOs, and relevant technology manufacturers in the robotics space.’

Sector Overview

The contemporary technology market is often referred to as the Fourth Industrial Revolution—the major industrial era since the first industrial revolution, one marked by the rise of technology breakthroughs in multiple fields. It is within this dynamic and emerging context that WeRobotics operates and iterates its AI and drone services. Until recently, the use of drones or unmanned aerial vehicles (UAVs) has been associated primarily with military remote armed attacks. Recently, their applications have expanded as more and more UAVs are used in the development context. Drones and associated technologies are now used to address social development challenges such as: aerial observation and cargo relief provisions, data collection, search and rescue, mapping, real time information gathering, and advocacy.

Currently, the most common uses for drones in humanitarian response are mapping and monitoring terrain, delivering supplies and medicines (especially in high-frequency, low-volume missions to remote areas known as “last mile” deliveries) and search-and-rescue efforts.

This includes the use of drones for immediate post-crisis missions, such as the delivery of medical aid within the first 72 hours of a crisis (when damaged infrastructure or flooding can make roads impassable), the transporting of microbiological samples from field clinics to testing labs (since transporting samples by vehicles or boats can be slow), and the delivery of much needed vaccinations.

PART B: OBJECTIVES

To provide WeRobotics with a practical and comprehensive M&E strategy, the SIPA team aimed to:

1. **Gain a clear understanding of WeRobotics and its approach to “drones for social good”.** This included WeRobotics’ vision, mission, its logic model, and relevant stakeholders including the Flying Labs® and their activities to best determine the potential indicators and measures of success to include in the M&E strategy. Synthesizing a clear logic model depicted the relationship between the organization’s activities and its intended effects. This was important to allow us to build a better-informed M&E strategy with a directed focus on capturing what is relevant and important for WeRobotics.
2. **Cultivate a detailed picture of the financial, human, and other resource limitations** present for the organization in order to ensure the creation of an M&E strategy that is both feasible and practical. Understanding the financial and human limitations allows for the appropriate selection of platform and technical tools or recommendations for an implementation strategy based on cost considerations and capacity.
3. **Develop a M&E framework for WeRobotics** by involving stakeholders in a process so that they may inform the development of an M&E strategy. The aim of the strategy was to improve capacity building, foster decentralization, and allow greater access to projects and funding based on the ability to measure impact.

PART C: METHODOLOGY

The SIPA team identified three main evaluation questions as a guideline throughout the five project phases to design a M&E framework for WeRobotics. The team also applied a wide range of tools and techniques for data collection and piloting the proposed M&E tools while also acknowledging the limitations of its methodology given the time and financial constraints.

Evaluation Questions

To design an appropriate and actionable M&E framework, the SIPA team took the following research questions into consideration:

1. **The outputs and outcomes based on the development of logic models that need to be tracked over time:**
 - a. What are the common activities and objectives among the network of Flying Labs® and what outcomes or outputs are congruent with these activities?
 - b. What are the most appropriate and practical indicators WeRobotics should use to measure these outputs and outcomes?
2. **The tools and practices that need to be utilized and implemented at WeRobotics to ensure the most critical data is accurately gathered and analyzed:**
 - a. How do comparable organizations (i.e. doing technology or robotics work in emerging economies) facilitate M&E? In other words, what effective and efficient methods are used by these organizations and why?
 - b. Factoring in financial and human constraints, what are the most efficient and effective ways to track WeRobotics program outputs and short-term program outcomes?
3. **Other critical considerations necessary in designing and implementing a successful M&E framework:**
 - a. Considering the vast geographical range of the Flying Labs® as well as technological constraints, how will program data be stored?
 - b. In terms of monitoring and evaluation, what should WeRobotics consider as it expands its network over the next few years but remains a lean organization with a small staff?

Project Phases

The project consisted of five distinct phases:

1. **Preliminary Research and Preparation** (November 2018 through January 2019): The team focused on conducting comprehensive desk research on WeRobotics' global operations, local contexts in Tanzania and Panama (the locations of the team's field visits), relevant literature on M&E frameworks and tools applicable to the project, as well as models and operations of similar organizations.
2. **January Field Visit to the Tanzania Regional Flying Lab®** (January 2019): The team conducted field research to gather an in-depth understanding of the Flying Lab's® operations on the ground. Field research consisted of key stakeholder interviews, structured observation, and a journey river mapping exercise.
3. **Analysis, Tool Development, Activity Information Gathering, and the WeRobotics Conference** (January 2019 – March 2019): The team analyzed information from the field, developed preliminary M&E tools to pilot, conducted formal interviews with a sample of Flying Labs® (both regional and affiliate), completed the fish and boulders activity with Flying Labs® at the WeRobotics Conference, and attended the WeRobotics conference presentations.
4. **March Field Visits to the Tanzania and Panama Regional Flying Labs®** (March 2019): The team conducted additional key stakeholder interviews, piloted the project documentation form and reflection session monitoring and evaluation tools, and completed structured observations. Additionally, the team visiting the Panama Flying Lab® conducted a journey river mapping exercise with the staff.
5. **Analysis and Preparation of Findings and Recommendations** (March 2019 – May 2019): The team synthesized the results from their March fieldwork, completed a guided sense-making session with their faculty advisor to identify key trends and gaps, and finalized their findings and recommendations.

Data Collection Tools and Techniques

The team used a range of methods to gather insights from WeRobotics and Flying Labs® stakeholders, and then used the information to develop a preliminary M&E system:

1. Document Review

A thorough review of the extensive documentation provided by the client on grant-reporting mechanisms, stakeholders, and current data collection processes for WeRobotics was conducted. Additionally, the team completed review of the literature on monitoring and evaluation, robotics and drone regulations in Tanzania and Panama, and M&E frameworks in similar organizations.

2. Interviews

The team conducted a total of 19 semi-structured interviews with a variety of WeRobotics and Flying Lab® stakeholders, including Flying Labs® staff, government officials, international donors, NGOs, and academic partners (an exhaustive list of all subjects interviewed can be found in Appendix A). These interviews captured details about the client activities, data collection and analysis practices, as well as any existing metrics. Interview subjects ranged broadly from Flying Lab® and WeRobotics staff members to local partner organizations.

3. Participant Observation

Team members completed observations of staff members to gain a deeper understanding of the Flying Labs®' daily activities, including engagement with communities and stakeholders, organizational priorities and objectives, and inter-organizational power dynamics.

4. Participatory Activities:

- a. **The River Journey Mapping Activity** is a modified version of a participatory exercise whereby the participants list an organization's current activities and ultimate goals (impacts), and then uses the "river" as the pathway to connect the two. The use of the rivers allows for a distinct stream for each of the four WeRobotics program tracks (AidRobotics, HealthRobotics, EcoRobotics and DevRobotics). In essence, this participatory activity can help organizations to develop a simplified logic model (for additional information on this activity, please see Appendices B, C, D).
- b. **The Fish and Boulders Activity** uses a lake to represent the ideal M&E system for the organization with a stream running into the lake. Participants then identify the organizational strengths that will help them reach this ideal vision (the fish) and the obstacles or challenges preventing them from achieving it (the boulders). This technique allowed the team to develop a nuanced understanding of the key qualities and values the staff would prefer in their M&E framework, as well as the constraints and limitations with

which the staff are concerned about (for additional information on this tool, please see Appendices E and F).

5. Project Documentation Form

One of the project's key deliverables is the project documentation form. This form captures specific program-level data for ongoing and completed projects by the Flying Labs®, which include: project descriptions, problem statements, program tracks, project stages, collaborators and beneficiaries, funding, project activities, expected outcomes and outputs, proposed output indicators, and uses of technology. This reporting device was piloted in-person by the team in March with the Tanzania and Panama Regional Flying Labs® and virtually with some affiliate labs.

6. Reflection Session

The reflection session is an introspective activity which takes place post completion of the tools and techniques to monitor activities carried out for a project. It is a post-monitoring assessment to highlight positive outcomes and successes as well as identifies problems and weaknesses, and develops future actions to overcome any problems or obstacles. The session requires participation from Flying Lab members and WeRobotics staff and will act to modify the existing M&E strategy as well as its implementation. The reflection session ensures that the M&E strategy is a living document that allows for constant improvement as the situation – whether a community, project/program, behaviors, regulations etc., evolve. This tool was piloted with the Tanzania Regional Flying Labs® in March.

Methodological Limitations

Due to time and financial constraints, the team was only able to travel to two of the Flying Labs® (Tanzania and Panama regional Flying Labs®). While the team interviewed a sample of the affiliate Flying Labs® to collect information on their activities, the data collected throughout the aforementioned tools and techniques are partisan towards regional Flying Labs®. Therefore, the recommendations and findings presented in the report make the critical assumption that the M&E framework that is best suited for the regional Flying Labs® is equally-suited for the affiliate Flying Labs®.

PART D: LITERATURE REVIEW

What is Evaluation?

The following section offers an academic overview of what evaluation is and explains M&E in the development field. While there is no single definition to the concept of “evaluation”¹, the existing ones suggest there are different purposes of evaluation that are distinguishable depending on the nature and the goal of what is being evaluated, as well as how the evaluation will be used. Looking at the literature on what evaluation is and its most common use, five definitions give the most detailed explanation.

According to Michael Scriven, evaluation refers to the “process of determining the merit, worth, or value of something, or the product of that process. The evaluation process normally involves some identification of relevant standards of merit, worth, or value; some investigation of the performance of evaluands [i.e. what is being evaluated] on these standards and some integration or synthesis of the results to achieve an overall evaluation or set of associated evaluations.” Scriven’s definition points out to the systematic process of evaluation. It is a standard definition marked by the process to “appraise, analyze, assess, critique, examine, grade, inspect, rank, study, and test”.² This definition follows the basic logic of evaluation. It includes 1) the selection of criteria, or the dimensions under which what is being evaluated must do well, 2) the construction dictating how what is being evaluated should do well under each dimension, 3) gathering data to measure the performance and compare against standards, 4) synthesizing and integrating evidence into final judgments of worth, and 5) making recommendations.³

Peter H. Rossi, Mark W. Lipsey, and Howard E. Freeman define evaluation as “the use of social research methods to systematically investigate the effectiveness of social intervention programs (...) and it is intended to be useful for improving programs and informing social action aimed at ameliorating social problems”.⁴ Michael Quinn Patton defines evaluation as the “systematic collection of information about the activities, characteristics, and outcomes of programs to make judgments about the program, improve program effectiveness, and/or inform decisions about future programming”.⁵

These two definitions emphasize the use of social science research methods and the utilization of evaluation for improvement and to inform decision making.⁶ They also point towards evaluation

¹ KPMG International Cooperative. 2014. *Monitoring and Evaluation in the Development Sector*

² Scriven, Michael. 1991. *Evaluation Thesaurus*. London: SAGE Publications

³ Poncelet, Julie. 2018. *Program Evaluation and Design Lecture*. Columbia University, School of International and Public Affairs.

⁴ Rossi, Peter; Lipsey Mark; Freeman, Howard. *Evaluation: A Systemic Approach*. London: SAGE Publications

⁵ Patton, M. 1997. *Utilization-Focused Evaluation*. Thousand Oaks, CA: SAGE Publications

⁶ Poncelet, Julie. 2018.

as a process of systematic investigation, which could be understood as the organized collection of data (either quantitative, qualitative, or a mix of both) that is then analyzed in order to answer questions about what is being evaluated.

According to Rosalie Torres and Hallie Preskill, evaluation is “an ongoing process for investigating and understanding critical organization issues. It is an approach that is fully integrated with an organization’s work practices, and it engenders organization members’ interests and abilities in exploring critical issues using evaluation logic, organization members’ involvement in evaluative processes and the personal and professional growth of individuals within the organization”.⁷ What is salient from this definition is that evaluation builds capacity within an organization. Evaluation is integrated into existing practices and allows for participation of those who are affected by the work.

Lastly, Melvin M. Mark, Gary T. Henry, and George Julnes point to evaluation as a process for making sense of contexts in which evaluation takes place, the issues around it, and highlight the role of evaluation for social improvement. In their words, evaluation “assists sensemaking about policies and programs through the conduct of systematic inquiry that explains policies and program operations’ effects, justifications, and social implications. The ultimate goal of evaluation is social betterment, to which evaluation can contribute by assisting institutions to better select, oversee, improve, and make sense of social programs and policies.”⁸

Putting together these definitions, evaluation becomes a systemic process that enhances decision making through data collection. In other words, evaluation is a planned process where data becomes relevant for answering questions about an organization, project, or program. In the end, it helps to make improvements to a program process or product, or helps determine whether or not to continue or expand the program, process, or product in question. As such, it answers three key questions: what is being evaluated, why results turned out in the way they did, and offers recommendations on how to use the information it provides.⁹

Evaluation in an International Development Context

Over the past decade, development organizations have faced external pressure to become more effective and many of them have launched agendas for results-oriented programming. While M&E is recognized to be a key element in understanding and tracking results of development interventions, admittedly, the practice needs to improve in the development field.¹⁰ Through

⁷ Preskill, Hallie; Torres, Rosalie. 1999. *Evaluative Inquiry for Learning in Organizations*. SAGE Publications

⁸ Mark, M., G. Henry, and G. Julnes. 2000. *Evaluation: An integrated framework for understanding, guiding, and improving policies and programs*. San Francisco: Jossey-Bass

⁹ Poncelet, Julie. 2018

¹⁰ FAO Investment Center. 2010. *The Use of Monitoring and Evaluation in Agriculture and Development Projects*.

extensive research and the review of M&E systems across more than 75 development projects the World Bank supports in partnership with the United Nations' Food and Agriculture Organization, the Bank has compiled six guiding principles for M&E in international development. Combined with the purpose of evaluation described in the section above, these principles bring a powerful prescription of how evaluation in the development field adds value to the overall sector. According to the Bank, M&E in the international development field should:

1. Focus on all relevant stakeholders through each step of the M&E process (from concept note, project preparation, appraisal, implementation, and beyond)
2. Place higher emphasis on M&E system design to allow refinement and evolution over the course of implementation
3. Performance indicators should be appropriate to their respective hierarchical level
4. Undertake updating of baseline data early in project life
5. Start implementation of the M&E system only when competent staff is in place
6. Ensure clear institutional linkages between those responsible for operating the M&E system and those charged with implementing specific project components

Most of the literature around M&E for organizations using drones focuses on the opportunities to harness these technologies to potentially reduce the costs of gathering real time data for different types of projects in agriculture, the service industry, support workers in the public sector (particularly government agencies), and even engage banking customers.¹¹ In fact, PwC estimates that the market for drone-powered solutions in agriculture at US\$32.4 billion, but as it relates specifically to M&E practices for organizations using drone technologies, a franchise model and a bottom-up approach (such as WeRobotics) has had no research.¹² Arguably, an M&E framework for an organization such as WeRobotics should be clear in defining what is being evaluated, why results have turned out in the way they have, and offer recommendations on how to use the provided information.

¹¹ KPMG International Cooperative. 2014; Leiber, Nick. 2014. *Using Drones to Make Peace, Not War*: Bloomberg; Deloitte Insights. 2017: *How a New Generation of Robots is Changing Business*)

¹² PwC. 2013. *The Drone Revolution is Disrupting Industries Ranging from Agriculture to Filmmaking*.

The developed M&E framework intends to do this. It emphasizes evaluation in both WeRobotics and the Flying Labs®, engages staff in the process to identify results and begin a process of internal learning through the project monitoring and stakeholder engagement forms, and feeds into a larger effort to inform recommendations on how to use the information provided.

Additionally, it focuses on relevant stakeholders (beneficiaries and staff) through each step of the M&E process (from inception of the framework, to piloting and implementation), gives room for refinement and evolution over the course of implementation, and ensures clear institutional linkages between those responsible operating the framework and those charged with implementing specific project components.

PART E: FINDINGS

Key Findings

The findings presented below summarize the critical data and information collected through the data-gathering tools discussed in the methodology section. They contextualize the complex system in which WeRobotics' M&E system will operate, and have aided in the development of the proposed M&E framework. Finally, these findings led to the creation of the recommendations provided at the end of this section.

1. **Lack of a Current Data Collection Procedures and M&E Experience** – Since WeRobotics is in its infancy (recently formed in December 2015), the organization does not yet have any data collection system or M&E practices in place.
 - a. **M&E Experience:** A poll administered at the beginning of the fish and boulders activity revealed that the Flying Labs® staff members, on average, have little experience with M&E practices. Four out of thirteen participating Flying Labs® staff members were familiar with evaluation techniques and three out of thirteen participants were familiar with the term “monitoring and evaluation.”
 - b. **Data Collection and Storage:** The SIPA team conducted interviews with six affiliate Flying Labs® and three regional Flying Lab® to confirm that the majority of the Flying Labs® do not have any data collection, storage, or analysis processes in place. Therefore, the M&E system proposed needs to be easy to understand, intuitive, and easily implemented, while also providing a basic level of detail for both the M&E components of the system.
2. **Complexity of Strategic Focus on “Localization”** – At the WeRobotics level, “localization” means expanding the Flying Labs® network on the ground while at the Flying Labs® level, it is understood as meeting local needs, building local skills, and catalyzing local businesses. Without a common understanding of what localization entails- activities, outputs, and outcomes are not measured in a standard fashion.

This variation in the definition of “localization” was discovered through interviews with WeRobotics and Flying Labs® staff members.

3. **Financial and Human Resource Constraints** – analyzing and developing a complete picture of the constraints of WeRobotics and the Flying Labs® was important to develop a functional M&E system.
 - a. **Human Resource Constraints:** The regional Flying Labs® are staffed with full-time staff members, however, affiliate Flying Labs®, particularly those that have been recently established, are staffed by individuals with other employment/time commitments. This severely limits the amount of time staff members can expend on collecting and analyzing M&E data. For example, interviews with staff members from the Uganda and Cameroon Flying Labs® revealed that in addition to these other employment/time commitments, the novelty of these Flying Labs® means that most of their time and resources are allocated to securing projects and funding, becoming better acquainted with all of the WeRobotics’ resources, and formulating clear strategic operating plans.
 - b. **Financial Constraints:** Based on documentation shared with the team and interviews with affiliate Flying Labs® in particular, it is our understanding that Flying Labs® either self-sustain through local consulting opportunities or donor-based funding for larger projects. This means that financial resources are either allocated for specific projects or are hard to come by, leaving few resources to expend on M&E activities. These constraints are further documented as “boulders” or negative forces identified by Flying Labs® staff in the fish and boulders activity.

Therefore, the proposed M&E framework and recommended tools/techniques must be:

- i. Fast and easy to implement
- ii. Accessible and easily comprehensible as to not require extensive training
- iii. Cost-efficient for both the Flying Labs® and WeRobotics.

If the tools and techniques are time-consuming to execute (i.e., require hours to complete a monitoring form) then Flying Labs® staff will not complete this tool consistently, which is supported by direct feedback the team received from piloting one of the monitoring tools with a subset of the Flying Labs®.

Additionally, this demonstrated time constraint, coupled with the average Flying Labs® staff member’s unfamiliarity with M&E practices, suggests that any M&E system which requires extensive training is not feasible, which is corroborated by the Flying Labs’® expressed desire to have a “simple” and “accessible” M&E system as documented through the fish and boulders activity.

4. **Ideal M&E Vision** – The data gathering tools employed by the SIPA team largely aim to obtain a wide-range of participation from various Flying Labs® and WeRobotics staff in order to design a system that incorporates their ideal vision for M&E.

The SIPA team employed the fish and boulders activity to map out the Flying Labs®’ ideal vision. Findings from this activity noted that the Flying Labs® would ideally like an M&E system that is accessible, user-friendly, compliant, robust, adaptable, interoperable, financially feasible, traceable, relational, simple, flexible, participatory with the community, and aggregable (further detailed in Appendix F).

These qualities served as the guiding principles for the SIPA team while drafting the M&E framework and designing the associated tools and techniques for the M&E system. Furthermore, the positive forces identified through this exercise (principally the Flying Labs®’ association with WeRobotics, their global network, and their understanding of the local context) and the challenges to achieving this identified vision (namely financial and human resource constraints, lack of M&E experts accessible to the Flying Labs®, and lack of coordination and sharing of information between the Flying Labs®) were carefully considered when designing the proposed tools, techniques, and methods for collecting and analyzing M&E data. The team’s fieldwork to the Tanzania and Panama regional Flying Labs® supplemented these findings by allowing the team to observe additional constraints in the local context. For example, in Tanzania, the wireless internet speed can pose an issue hence, the M&E system must be accessible to everyone and not require high-speed internet.

5. **Flying Labs® Logic Models** – In completing the river journey mapping exercise and interviews with select Flying Labs®, the SIPA team captured data on the current activities and proposed outputs and outcomes for a sample of the Flying Labs®. While each Flying Lab has a variety of different projects, activities, and objectives tailored to the local context in which they operate, there are some commonalities which serve to form the core of the M&E framework presented as Deliverable A.
 - a. **Common Flying Labs® activities identified:** community engagement activities to increase drone awareness, aerial mapping for disaster response and preparedness, community training in disaster response, technical trainings and drone pilot certifications, participation in presentations and conferences to share knowledge on drones, aerial mapping of areas at risk for environmental damage or undergoing conservation efforts, mapping of farms using various sensors to estimate and augment crop yield, entrepreneur training, and business incubation. This activity data informed the creation of a large portion of the outputs for the Flying Labs® as detailed in the M&E framework.

- b. **Common outcomes identified by the Tanzania and Panama Flying Labs®:** increased community awareness of drones and their uses in each of the program tracks, increased access to health resources, decreased prevalence of illnesses targeted with drone solutions, increased knowledge and skills of local community to use drone technology in response to natural disasters, changes in regulations related to drones for social good, increased environmental conservation, and the development of a drone as a service industry/sector in local communities. These outcomes informed the development of outcomes and outcome indicators in the M&E framework. A complete and comprehensive list of activities, outcomes, and impacts derived through the journey river mapping exercise (found in Appendix C for the Tanzania Flying Lab® and Appendix D for the Panama Flying Lab®).
6. **WeRobotics Activities and Objectives** – Similar to the information gathered on the activities, outputs, and outcomes for the Flying Labs®, the SIPA team, through an extensive review of organizational documents and continued conversation with WeRobotics staff members, captured data on the primary activities and objectives for WeRobotics specifically.

The activities that WeRobotics carries out to provide the Flying Labs® and the global community with resources and learning include: technology partnerships (hardware, software, platforms), online trainings, massive open online courses (MOOCs), and webinars on a variety of topics. WeRobotics also creates project partnerships with leading NGOs, research institutes, and industry partners to build a pipeline for the Flying Labs®, organizes and hosts conferences and workshops, aids in the business incubation programs with regional Flying Labs®, and attends conferences and gives keynotes. This data informs the majority of the content included in the M&E framework (including the foci, outputs, outcomes, and indicators) for WeRobotics.


PART F: DELIVERABLES AND RECOMMENDATIONS


Key Deliverables


Following the guidance provided in the Project Terms of Reference (PTOR) from WeRobotics, the SIPA team proposes the following completed deliverables to WeRobotics:

1. **Actionable Monitoring and Evaluation Framework** – Modeled after a modified version of the theory and practice-led template presented by Anne Markiewicz and Ian Patrick (2016), the following M&E framework serves as a road map of the key output and outcome indicators WeRobotics and the Flying Labs® should track at their current stage of development. This practical and actionable framework includes:
 - a. **Deliverable A-1 Monitoring Plan:** with identified foci, outputs, indicators, monitoring data sources, and suggested tracking timelines for monitoring distinctly grouped by WeRobotics or Flying Labs®
 - b. **Deliverable A-2 Evaluation Plan:** with identified foci, outcomes, indicators, evaluation methods, and suggested timelines for evaluation also distinctly grouped by WeRobotics or Flying Labs®. The framework integrates findings and information collected from fieldwork with the Tanzania and Panama regional Flying Labs®, interviews with additional regional and affiliate Flying Labs® (see Appendix A for a complete list), a comprehensive review of the organization’s documents, and various conference calls with WeRobotics’ founder Sonja Betschart. Moreover, this framework attempts to incorporate the values identified by the Flying Labs® staff as components of their ideal M&E system (see Appendix F for a complete list of the values identified by the Flying Labs® present at the WeRobotics 2019 Global Conference).
2. **Strategic Implementation Plan** – Based on the organization’s current M&E practices, financial and human constraints, and intended growth path:
 - a. **Deliverable B Strategic Implementation Plan:** includes recommendations for quickly and accurately implementing the recommended techniques for the proposed M&E system (these techniques are further detailed in the recommendations section of the report). This plan includes the technique or tool, the purpose, number of implementors required, the monitoring or evaluation subject, the proposed timeframe for implementation, considerations to keep in mind for ideal implementation, the outlined process for implementation, and suggested locations to store all of the program-related data collected.


Deliverable A-1: Monitoring Plan

	Focus of Monitoring	Outputs	Output Indicators	Monitoring Data Sources	When?
	Project Details	<ul style="list-style-type: none"> - Information on ongoing and completed projects by the Flying Labs® - Systematic record-keeping of project-specific data, which can be used to make enhanced program-related decisions 	<ol style="list-style-type: none"> 1. Quantity / Type - Number of projects ongoing, completed, and planned, each segmented by type or program track 2. Duration - Length of project in months 3. Funding - Funding breakdown by source in percent value; Funding type (qualitative) 4. Budgetary Information - Donor-funding vs. self-funding (sources of income - %); number of projects expected to be profitable 5. Activities - List of specific activities completed as part of each project 	1, 2, 3, 4, & 5 - the Project Doc. Form will capture this data and can be aggregated across the flying labs or analyzed by flying lab	Project Documentation Form should be filled in once at the beginning and end of the project, and yearly for projects with a duration exceeding one year
	Community Engagement	<ul style="list-style-type: none"> - Amount of engagement Flying Labs® staff have with the local community, students, and entrepreneurs / business incubation participants - Amount of engagement Flying Labs® have with the global community virtually through website communications 	<ol style="list-style-type: none"> 1. Total number of individuals/participants that Flying Labs® staff are interacting with on drone awareness per year (disaggregated by type; i.e., school-aged children, university students, local entrepreneurs, local government, other) 2. Total number of individuals/participants that Flying Labs® staff are engaging with on co-creation workshops to develop projects per year (disaggregated by type) 3. Total number of technical trainings offered per year and the total number of participants at technical trainings per year 4. Total number of conferences organized by the Flying Labs® and the total number of participants at the conferences 	1, 2, 3, & 4 - the Stakeholder Engagement Form will capture this data and can be aggregated across the Flying Labs® or analyzed by each flying lab individually	Stakeholder Engagement Form should be completed by the Flying Labs® any time they interact with community members on drone usage/awareness, project development, technical trainings, or when hosting a conference


	Focus of Monitoring	Outputs	Output Indicators	Monitoring Data Sources	When?
	Change Partnerships	- Development of relationships with external collaborators	<ol style="list-style-type: none"> 1. Average number of collaborators per project in a one-year period 2. Number of distinct collaborators per Flying Labs® per year (disaggregated by type, i.e., local government, NGOs, multilateral institutions, etc.) 3. Number of funding opportunities from or through collaborators 	1, 2, &3 - the Project Doc. Form will capture this data	Project Documentation Form should be filled in once at the beginning and end of the project, and yearly for projects with a duration exceeding one year
	Drone Data & Innovation	<p>- Quantity and usefulness of data captured and processed / analyzed</p> <p>- Varied use of technology in capturing drone data</p>	<ol style="list-style-type: none"> 1. Number of drone flight exercises used to capture drone data per year 2. Number of drone flight exercises disaggregated by the type of sensor per year 3. Number of finished data products developed per year (segmented by type; i.e., multispectral data, infrared, etc.) 4. Number of data products shared with collaborators (disaggregated by type of collaborator, i.e., local government, NGOs, multilateral, etc.) 5. Variety of technology employed by each Flying Labs® per year 	<p>1 & 2 - should be collected through completed Drone Flight Log</p> <p>3 & 4 - can be tracked through the Project Doc. Form</p>	<p>Drone Flight Log should be completed at the end of every flight completed by the Flying Labs®</p> <p>Project Documentation Form at beginning & end of project, with yearly updates for projects exceeding one year</p>
	Business Incubation	- Participation in the business incubation program, networking, and training	<ol style="list-style-type: none"> 1. Total number of applicants to the business incubation program per year 2. Number of local entrepreneurs who complete the business incubation program per year 3. Number of teams who compete in the business incubation program per year 	1, 2, & 3 - the Project Doc. Form will capture this data	Project Documentation Form completed each time a Flying Lab® hosts a business incubation program at the beginning and end of the program


Focus of Monitoring		Outputs	Output Indicators	Monitoring Data Sources	When?
	Sharing & Engagement	<ul style="list-style-type: none"> - Increased interactions with global community and multilateral organizations to foster a network of sharing 	<ol style="list-style-type: none"> 1. Number of conferences organized and hosted by WeRobotics (disaggregated by focus; i.e., drone regulation, drones for social good, etc.) 2. Number of conferences with WeRobotics as keynote speaker (disaggregated by focus) 3. Number of conferences attended by WeRobotics (disaggregated by focus) 4. Number of technological partnerships formed per year (disaggregated by type; i.e., hardware, software) 5. Number of partner or program partnerships former per year (disaggregated by type; i.e., local government, multilateral, NGO, etc.) 	1, 2, 3, 4, & 5 - can be tracked through the Stakeholder Engagement Form	Stakeholder Engagement Form should be completed by WeRobotics anytime they host/attend a conference, training, or form a new technology or program/project partnership
	Training & Education	<ul style="list-style-type: none"> - Increased offerings of and participation in trainings - Development of tools and trainings to improve Flying Labs® activities 	<ol style="list-style-type: none"> 1. Number of online trainings, MOOCs, and webinars hosted by WeRobotics (disaggregated by focus of the training) in one year 2. Average number of participants in each online training (disaggregated by focus of the training) 3. Total number of participants in all online trainings in one year 4. Number of in-person trainings or information sessions hosted by WeRobotics in one year 	1, 2, 3, & 4 - can be tracked through the Stakeholder Engagement Form	Stakeholder Engagement Form should be completed by WeRobotics anytime they host/attend a conference, training, or form a new technology or program/project partnership

Deliverable A-2: Evaluation Plan

	Focus of Evaluation	Outcome	Suggested Outcome Indicators	Evaluation Data Sources	When?
	AidRobotics	<ul style="list-style-type: none"> - Change in awareness of the local community in drone use for disaster prevention, response, and management - Change in local individuals' skills and knowledge to respond quickly to a disaster - Change in governmental policies / knowledge to incorporate drone data into disaster prevention and response 	<ol style="list-style-type: none"> 1. Increased community awareness¹³ on drone capacity for disaster prevention, management, and relief in one year 2. Increased number of certified drone pilots that lend services during disaster response in one year 3. Change in the size of geographic coverage for disaster mapping activities in one year as a percent of total national area 4. Number of policy changes or pieces of approved legislation that enhance local drone regulations for disaster prevention, management, and relief 5. Number of policy changes or pieces of approved legislation that favor disaster prevention over disaster response 	<p><i>1</i> - Focus group to assess changes in local community awareness</p> <p><i>2, 3, 5, & 6</i> - retrieved from governmental agencies on disaster services and local media</p> <p><i>4</i> - Project Documentation Form would include project locations</p>	<p>Focus groups completed at conclusion of projects</p> <p>Project Documentation Form completed at beginning and end of project, updated yearly</p> <p>Other data should be retrieved yearly</p>
	HealthRobotics	<ul style="list-style-type: none"> - Change in community awareness of drone uses for health - Change in health outcomes when drones are employed to target specific illnesses 	<ol style="list-style-type: none"> 1. Increased community awareness about use of drones to improve health of community in one year 2. Increased usage of cargo drones by health providers and health-oriented NGOs per year 3. Percent decrease in targeted illnesses where drones are used as part of the solution 	<p><i>1</i> - Focus group to assess changes in local community awareness</p> <p><i>2 & 3</i> - retrieved from local industry and health data sources</p>	<p>Focus groups completed yearly</p> <p>Other data should be retrieved yearly or as published</p>

¹³ As defined by WeRobotics

	Focus of Evaluation	Outcome	Suggested Outcome Indicators	Evaluation Data Sources	When?
	EcoRobotics	<ul style="list-style-type: none"> - Change in community awareness of drone uses for agriculture and nature conservation - Change in adoption of drone technology for agriculture and conservation - Change in drone data resources for governmental agencies about local environmental issues (i.e., mangrove deforestation) 	<ol style="list-style-type: none"> 1. Increased community awareness of uses of drones to help with conservation and climate change resilience per year 2. Increased community awareness of uses of drones in agriculture per year 3. Increased community awareness of local environmental challenges per year 4. Increased local adoption of drone technology and agriculture-specific sensors by farmers in one year 5. Increase in the quantity of drone data products on environmental issues that are read by policy makers and gov. officials 6. Increase in crop yield in one year for targeted intervention areas where drones are utilized to better manage farm plots 	<p><i>1, 2, & 3 - Focus group to assess changes in local community awareness</i></p> <p><i>4 & 6 - retrieved from local industry statistics and food security / agricultural organizations</i></p> <p><i>5 - retrieved from local governmental agencies</i></p>	<p>Focus groups should be completed yearly</p> <p>Other data should be retrieved yearly or as published</p>
	DevRobotics	<ul style="list-style-type: none"> - Change in community awareness of drones as a service - Change in knowledge and adoption of drones in local businesses and change in entrepreneurs' technological and business skills 	<ol style="list-style-type: none"> 1. Increased community awareness of the uses of drones as a service and engine of economic development per year 2. Increase in the number of businesses that Flying Labs@ convinces/helps to use drones in their business practice to create a drone-as-service industry 3. Increase in employment in drone sector 4. Number of participants that complete training and feel confident in writing a business plan each year 	<p><i>1 - Focus groups</i></p> <p><i>2 - Stakeholder Engagement Form</i></p> <p><i>3 - local industry statistics</i></p> <p><i>4 - Project Documentation form</i></p>	<p>Focus groups completed yearly</p> <p>Stakeholder Engagement form completed after engagement</p> <p>Other data retrieved yearly</p>

	Focus of Evaluation	Outcome	Suggested Outcome Indicators	Evaluation Data Sources	When?
	Training & Education	<ul style="list-style-type: none"> - Change in individuals' awareness, skills, and knowledge of drones and technology for social development goals (including gender, social inclusion, health, etc.) - Change in awareness and knowledge of drone usage as a medium for improving business capacity 	<ol style="list-style-type: none"> 1. Percent change in individuals' scores on pre- and post-quizzes administered at the beginning and end of select technical trainings, online webinars, and MOOCs 2. Increased correct usage of SOPs created and implemented by WeRobotics for the Flying Labs® (i.e., Drone Flight Log, Drone Pre-Flight Checklist, etc.) 3. Increased awareness of drones and technology for social development goals per year 	<p><i>1</i> – Data would come from online training platforms / retrospective surveys</p> <p><i>2</i> - Data would come from the SOP tools developed by WeRobotics (i.e., the drone flight log)</p> <p><i>3</i> - Focus group of training participants</p>	<p>Data from online training platforms and SOP tools should be collected and analyzed yearly</p> <p>Focus groups should be completed yearly</p>
	Regulation & Industry Standards	<ul style="list-style-type: none"> - Change in industry knowledge, standards, and regulations with a specific focus on localized drone usage for development 	<ol style="list-style-type: none"> 1. Number of regulations passed or legislation approved that focus on localized drone usage for development or social good in countries where WeRobotics has had continued/documentated interactions 2. Number of regulations proposed that focus on localized drone usage for development in countries where WeRobotics has had continued/documentated interactions 3. Number of new entities that adopt the Drone Code of Conduct 	<p><i>1</i> & <i>2</i> - International and multilateral data sources</p> <p><i>3</i> - should be tracked in the Stakeholder Engagement Form</p>	<p>Stakeholder Engagement Form after each new partnership is formed</p> <p>Other data retrieved yearly or as published</p>

Deliverable B: Strategic Implementation Plan

Tool	Purpose & No. of Implementors	Subject & Timeframe	Considerations for Implementation	Process for Implementation	Where to Store Data
<p align="center">Project Documentation Form</p>	<p>Purpose: Collect relevant details on each project being completed by the Flying Labs®</p> <p>Number of Implementors: One staff person on the project needs to fill out <u>one</u> form per project after gathering information from all relevant stakeholders and project staff</p>	<p>Subject: Flying Labs®' projects</p> <p>Timeframe: Completed at beginning of a new project, end of a completed project, and annually for projects longer than one year. Takes approximately 12 minutes to complete.</p>	<p>Staff should be as specific as possible when completing form</p> <p>To maximize usefulness, staff should brainstorm project activities and objectives with other collaborators prior to completing form (could be done through River Journey Mapping in Appendix B)</p>	<ol style="list-style-type: none"> 1. Distribute survey link for current year to Flying Labs® (could include in Welcome Kit/Resources) 2. Review and share attached Appendix G: Guidelines for Optimal Tool Usage 3. Request Flying Labs® to complete for all ongoing projects and to adhere to suggested timeframe 4. Compile results at end of the year and analyze according to M&E framework 5. Provide completed copy of data gathered to each flying lab (one for all Flying Labs® and one per individual Flying Lab) 6. Create new link using Appendix G: Guidelines for Optimal Tool Usage for next year and repeat 	<p>Data housed on platform (proposed: SurveyMonkey with resulting dashboards).</p> <p>Data should be downloaded annually and housed on Google Drive</p> <p>Flying Labs® can be added as collaborators on SurveyMonkey to view results and develop their own charts and analysis</p>
<p align="center">Stakeholder Engagement Form (Flying Labs)</p>	<p>Purpose: Document the type and level of participation at any community engagement Flying Labs® host.</p> <p>Number of Implementors: Can be filled out individually by staff person managing activity</p>	<p>Subject: Flying Labs®' community engagement</p> <p>Timeframe: Should be completed anytime Flying Labs® staff interact or engage with the community</p>	<p>It is best to fill out the form during the event, if possible, so the staff member can count the number of people / types easily</p> <p>Must be filled out consistently. Should consider placing one person in charge</p>	<ol style="list-style-type: none"> 1. Distribute survey link for current year to Flying Labs® (could include in Welcome Kit/Resources) 2. Review and share attached Appendix G: Guidelines for Optimal Tool Usage 3. Request Flying Labs® to complete (ideally during, but at least after) any community engagement is made 4. Compile results at end of year, measure indicators, and provide results to Labs 5. Create new link using Appendix G: Guidelines for Optimal Monitoring Tool Usage for next year and repeat 	<p>Data housed on platform (proposed: SurveyMonkey)</p> <p>Data should be downloaded annually and housed on Google Drive</p> <p>Flying Labs® can be added as collaborators on SurveyMonkey to view results and develop their own charts and analysis</p>
<p align="center">Tool</p>	<p align="center">Purpose & No. of Implementors</p>	<p align="center">Subject & Timeframe</p>	<p align="center">Considerations for Implementation</p>	<p align="center">Process for Implementation</p>	<p align="center">Where to Store Data</p>

<p>Stakeholder Engagement Form (WeRobotics)</p>	<p>Purpose: Document the type and level of global engagement and knowledge sharing by WeRobotics</p> <p>Number of Implementors: Can be completed by one individual</p>	<p>Subject: WeRobotics' external engagement</p> <p>Timeframe: Should be completed anytime WeRobotics participates in and/or organizes a knowledge-sharing event or training and/or forms a new partnership.</p>	<p>Need clear communication and coordination across the organization to ensure form is completed timely and only once / event or partnership</p> <p>Need to emphasize the consistent completion of form</p>	<ol style="list-style-type: none"> 1. Distribute survey link for current year to all WeRobotics staff (and make it easily accessible) 2. Review and share attached Appendix G: Guidelines for Optimal Tool Usage 3. Request fellow WeRobotics staff members complete (ideally during, but at the least after) any external engagement is made 4. Compile results at end of year and measure indicators detailed in M&E framework 5. Create new link using Appendix G: Guidelines for Optimal Monitoring Tool Usage for next year and repeat 	<p>Data housed on platform (proposed: SurveyMonkey with resulting dashboards)</p> <p>Data should be downloaded annually and housed on Google Drive as spreadsheet</p> <p>Flying Labs® can be added as collaborators on SurveyMonkey to view results.</p>
<p>Focus Group (Flying Lab® Stakeholders)</p>	<p>Purpose: Assess changes in community's drone awareness, knowledge, and/or skills (depending on project's focus)</p> <p>Number of Implementors: Minimum two individuals (one facilitator, one notetaker), but three individuals are ideal</p>	<p>Subject: Community's Awareness, Knowledge, and/or Skills because of Interaction with Flying Labs®</p> <p>Timeframe: Should be completed at conclusion of project with community engagement or annually at a minimum.</p>	<p>Focus group participants should be representative of specific community served during the Flying Lab's® project</p> <p>Be sure to use careful probing questions and not to lead participants to just agree with definitive statements that prove outcomes and/or satisfaction with the Flying Labs®</p>	<ol style="list-style-type: none"> 1. Decide on date(s) for focus group(s), recruit participants, and receive consent for participation from subjects 2. Review protocol and adjust as necessary, recruit staff and assign roles, gather necessary materials for focus group(s) – Sample Protocol Provided in Appendix K 3. Facilitate the focus group(s) with community members and record results on the documentation form 4. Review documentation form(s) from focus group(s) and discuss results and observations with all facilitators - Documentation Form provided in Appendix K 5. Maintain records from focus groups to be used in the reflection session 	<p>Data should be drafted on the documentation form (included in the Focus Group Protocol).</p> <p>Data <i>can</i> then be typed and stored on Google Drive as a spreadsheet OR entered in a newly-created form on SurveyMonkey. This data should be maintained by the Flying Labs® and used in the reflection session.</p>
<p>Tool</p>	<p>Purpose & No. of Implementors</p>	<p>Subject & Timeframe</p>	<p>Considerations for Implementation</p>	<p>Process for Implementation</p>	<p>Where to Store Data</p>

<p>Focus Group (WeRobotics Stakeholders)</p>	<p>Purpose: Assess changes in awareness and knowledge of individuals involved in WeRobotics knowledge-sharing events / trainings</p> <p>Number of People: Minimum two individuals (one facilitator, one notetaker)</p>	<p>Subject: Awareness and/or knowledge of individuals involved in WeRobotics trainings</p> <p>Timeframe: Should be completed at conclusion of event series, training, or conference.</p>	<p>Focus group participants should be somewhat representative of community and should be rich in diversity</p> <p>Be sure to use careful probing questions and not to lead participants to just agree with definitive statements that prove outcomes</p>	<ol style="list-style-type: none"> 1. Decide on date(s) for focus group(s), recruit subjects participants, and receive consent for participation 2. Review protocol and adjust as necessary, recruit staff and assign roles, gather necessary materials for focus group(s) – see Sample Protocol in Appendix L 3. Facilitate the focus group(s) with participants and record results on the documentation form 4. Review documentation form(s) and discuss results and observations with all facilitators - Sample Protocol see Appendix L 5. Input data from documentation form(s) and observations from reflection 6. Measure indicators from M&E framework 	<p>Data should be drafted on the documentation form (included in the Focus Group Protocol).</p> <p>Data should then be typed and stored on Google Drive as a spreadsheet. This spreadsheet should be analyzed annually by WeRobotics to answer indicators suggested in M&E Framework. Alternatively, use a SurveyMonkey form to house/track data.</p>
<p>Reflection Session</p>	<p>Purpose: Highlight positive outcomes and successes as well as to identify problems and weaknesses, and to develop future actions to overcome any problems or obstacles. Update processes/tools and the M&E strategy</p> <p>Number of People: Minimum two individuals (one facilitator, one notetaker)</p>	<p>Subject: Flying Labs’ activities and strategies®</p> <p>Timeframe: Regional Flying Labs® should aim to complete this session quarterly; Affiliate Flying Labs® should aim to complete this session biannually (every six months).</p>	<p>Conclusions and analysis on outcome indicators made during the reflection session should be backed up with clear evidence</p>	<ol style="list-style-type: none"> 1. Decide on date(s) for reflection session, reserve times for sessions, and alert Flying Lab staff members 2. Review Reflection Session Protocol provided in Appendix J and adjust as necessary 3. Bring documentation records from focus groups and data from interviews with other data sources and review during session 4. Facilitate reflection of data gathered, data gathering process, and lessons learned 5. Record conclusions on documentation form provided in Appendix J 6. Flying Labs® will report findings to WeRobotics after conclusion of session 	<p>Data/conclusions from this session should be recorded on the documentation form (included with the Reflection Session Protocol).</p> <p>Analysis/conclusions from session should next be shared with WeRobotics.</p>
<p>Tool</p>	<p>Purpose & No. of Implementors</p>	<p>Subject & Timeframe</p>	<p>Considerations for Implementation</p>	<p>Process for Implementation</p>	<p>Where to Store Data</p>

<p>Existing WeRobotics Tools/SOPs</p>	<p>Purpose: Capture data on a variety of output and outcome indicators not captured in other recommended tools.</p> <p>Number of People: Varies based on the tool.</p>	<p>Subject: Flying Labs®’ and WeRobotics’ activities and strategies</p> <p>Timeframe: Varies by tool; Timeframe for tools already set by WeRobotics. No suggested changes.</p>	<p>Consistent completion of these tools and SOPs are critical to ensuring that the data gathered through these sources are complete and accurate</p> <p>Flying Labs should be notified of the changes in tools</p>	<ol style="list-style-type: none"> 1. Continue implementation as currently done (no suggested changes to implementation) 2. Review M&E framework—specifically the tools/SOPs that are tied to indicators (i.e., drone flight log)—and add any fields or questions necessary to ensure the data for these indicators are captured 3. Emphasize the importance of filling out these tools/SOPs accurately and consistently to improve collection of data 4. Harvest data from these sources annually and analyze as suggested in M&E framework 	<p>Data from these forms/SOPs (Standard Operating Procedures) should be automatically stored on a spreadsheet on Google Drive. Then, a WeRobotics staff member should harvest the data specifically mentioned in the M&E framework in order to produce results for those indicators.</p>
<p>External Interviews with Allied Orgs. (Other Data Sources)*</p>	<p>Purpose: Use bellwether interviews with allied organizations to supplement and help to triangulate to validate qualitative data in evaluation.</p> <p>Number of People: Minimum two individuals (one facilitator, one notetaker), but three individuals are ideal</p>	<p>Subject: Flying Labs® (regional and affiliate) and WeRobotics</p> <p>Timeframe: Data should be retrieved annually at a minimum.</p>	<p>The greater quantity of external data sources, the more accurate and reliable the conclusions will be; however, stop doing interviews after you continue to hear the same thing (reached the point of saturation)</p> <p>Short interview protocols should be drafted before each interview, should be standardized and consistently used</p>	<ol style="list-style-type: none"> 1. Share M&E framework with Flying Labs® and have staff note which indicators require external interviews 2. Create and share standardized spreadsheet to record data from external sources 3. Ask Flying Labs® and WeRobotics staff to find external data sources that may already capture this data and establish contact with them 4. Execute annual interviews with contacts at these data sources to validate qualitative data gathered or suspected by Flying Labs® and WeRobotics 5. Record data from these interviews on spreadsheet and analyze the data 6. Be sure to cite any external metadata sources 	<p>Data from these interviews with other data sources should be recorded on a spreadsheet on Google Drive and this spreadsheet should be maintained by the Flying Labs® and shared with WeRobotics so WeRobotics can aggregate according to the M&E Framework</p>

* This is optional but ideal. May be challenging for Flying Labs® staff with no M&E experience—would be best coordinated by WeRobotics staff member.

Key Recommendations

1. **M&E Tools, Techniques, and Methods** – in addition to some of the forms and tools already being utilized by WeRobotics and the Flying Labs®, the SIPA team recommends the implementation and use of the following M&E techniques and tools. In addition to the following descriptions, protocols and/or samples of each of these techniques are included in the appendices.
 - a. **Project Documentation Form** – The project documentation form is specifically designed for the Flying Labs® to complete to capture the projects that they carry out in local communities and establish a data repository for knowledge sharing. This document captures a variety of project details including but not limited to: the project title and description, the stage of the project (i.e., planning and design, implementation, or conclusion), the relevant program track(s) (i.e., HealthRobotics, AidRobotics, EcoRobotics, or DevRobotics), the funding and budgetary information, the proposed duration of the project, the planned activities, the intended output and outcome indicators, as well as technological aspects of the project. The form was piloted with a subset of the Flying Labs® in two distinct editions: first, hosted on Google Forms and second, on SurveyMonkey. See recommendation two for more information on the SIPA team’s recommendation for WeRobotics and the Flying Labs® to use SurveyMonkey. (See Appendix H for the Project Documentation Form)
 - b. **Stakeholder Engagement Form** – The Stakeholder Engagement Form has been specifically designed to capture the activities that WeRobotics and the Flying Labs® carry out with relevant stakeholders to capture and document the localization aspect of their mission. Following from the aforementioned finding that WeRobotics and the Flying Labs® essentially operate under two distinct understandings of the term “localization” and that the stakeholders differ for both WeRobotics and the Flying Labs®, two separate versions of the form exist:
 - i. **Flying Labs®:** If the user is a staff member of a Flying Lab®, the form will redirect the user to complete the specific questions relevant for the Flying Labs®. This form—which is simple and quick to complete (around three minutes required)—seeks to track data on the Flying Lab’s® community engagement activities and captures information like the activity title and duration, the type of community engagement (co-creation workshops for project development, technical workshops/trainings offered, drone awareness creation, conferences organized and hosted, or other), and the number of community members engaged (disaggregated by gender and category; i.e., school-aged children, university students, local entrepreneurs, community organizations, and local governmental officials). (See Appendix I for Stakeholder Engagement Form)

- ii. **WeRobotics:** If the user is a staff member of WeRobotics, the form will redirect the user to complete the specific questions relevant for the outputs for WeRobotics. The form—which takes approximately three minutes to complete—captures data on the activity title and date(s), the type of external engagement (i.e., conference, technological partnership, program/project partnership, online trainings/webinars, and other), the role of WeRobotics in the engagement (i.e., organizer, participant, keynote speaker, etc.), and the number of participants or community members engaged. (See Appendix I for the Stakeholder Engagement Form)
- c. **Focus Groups** – The local beneficiaries are indirect stakeholders that utilize the technology provided by the Flying Labs®. WeRobotics strives to maintain an aspect of ‘localization’ in their business model therefore, local beneficiaries are the best demographic to conduct focus groups with, being that they are the ones most directly impacted by the services WeRobotics and the Flying Labs® provide. Assessing their increased awareness on the activities carried out by the Flying Labs® or increased awareness of opportunities provided by WeRobotics accessible to them, along with how to increase awareness on both can be topics of discussion for the focus groups. This will help establish how effective the ‘localization’ aspect is for both WeRobotics and the Flying Labs®.
- d. **Reflection/Sensemaking Session** – A reflection or sense making session will be an introspective activity which will take place post completion of the tools and techniques to monitor activities carried out for a project. It is a post-monitoring assessment to highlight positive outcomes and successes as well as to identify problems and weaknesses, and to develop future actions to overcome any problems or obstacles. The session requires participation from Flying Labs® members and WeRobotics staff and will act to modify the existing M&E strategy as well as its implementation. This reflection session will ensure that the M&E strategy is a living document that allows for constant improvement as the situation – whether a community, project/program, behaviors, regulations etc.- evolve.
- e. **External Interviews with Allied Organizations** – Verification of qualitative data is an important aspect of an M&E plan to increase the reliability of the conclusions drawn. While we are cognizant of the lack of independent institutions in areas where most Flying Labs® operate, there are always options such as multilateral organizations and government agencies that Flying Labs® are already in close contact with. This can help verify data and reach a general consensus with parties that may be taking more of an overview and are not hampered by tunnel vision that can sometimes accompany being engrossed in a data gathering or monitoring process.

2. **SurveyMonkey** – In the process of developing M&E tools that are time-efficient, easily accessible, cost effective and user friendly, the SIPA team relied on SurveyMonkey as a platform where all the above needs were met. Having previously used Google Forms and received feedback on the lack of data sharing and analysis possibilities (a primary motivation for the Flying Labs®) as well as the general unwieldiness and lack of user friendliness of the free Google Forms platform lead us to search for an alternative. Some factors that lead us to deploy SurveyMonkey as the platform of choice to house our tools and analytics include (Appendix G provides additional details):
 - a. **Internet connectivity:** Not required, SurveyMonkey can be used on field survey mode and downloaded for offline use.
 - b. **Compatible Devices:** Laptops and all mobile devices (including iPhone®, iPad®, and iPod touch®, as well as Android devices, Kindle, and Nook eReaders). Allowing for use by anyone, even on the go.
 - c. **Cost Effectiveness:** As one of the more reasonable survey platforms available priced at \$1000 per annum for multiple team member access, SurveyMonkey would allow all Flying Labs® and WeRobotics staff access
 - d. **Data Analysis:** SurveyMonkey allows the creation of custom charts and reports quickly and easily with its filter and compare options, as well as the creation of dashboards. You will be able to download survey results in several file formats, including as CSV, PDF, PPT, or XLS files.
 - e. **Data Sharing:** SurveyMonkey makes it convenient to share data with respondents. This can be done by exporting and sharing data, allowing access to results, dashboards and adding collaborators who can manipulate data to carry out their own analysis.
3. **Designated Flying Lab M&E Officer** – Based on our findings that familiarity with M&E practices are not commonplace at most Flying Labs®, we recommend that each Flying Lab® designate a staff member to take charge of all M&E activities and act as a point person for WeRobotics. This can allow dedicated training to take place, dissemination of instructions across the individual Flying Labs® and some degree of consistency in monitoring as well as representation of the dynamics of the Flying Labs®.
4. **Designated WeRobotics M&E coordinator** – Given the increased focus of WeRobotics on the development of a comprehensive M&E system to measure impact, and the initiation of the process in the next quarter, we recommend that WeRobotics hire a central M&E

coordinator with prior M&E experience. This individual can help with the dissemination of the M&E strategy and its evolution. They can also provide trainings to the designated Flying Lab® M&E officers and act as a central point of contact for all future M&E related activities.

5. **Data Collection, Storage, Analysis and Sharing** – Based on our findings, currently there is no comprehensive data collection, storage or analysis plan in place for all Flying Labs® and even WeRobotics. With the tools that the SIPA team has developed, the aforementioned activities can be carried out to share data or analyses throughout the network. This is especially beneficial for technological aspects of projects which was a specific request from the Flying Labs® to allow them to learn from other Flying Labs® with whom they would generally not have opportunities to connect with otherwise. The same can be beneficial for M&E activities and allow the Flying Labs® to learn from each other in the same network. Hence, it is important to encourage the Flying Labs® to utilize these tools to collect data and store it appropriately. Examples of data analysis for strategic decision making should also be circulated and encouraged for future evaluation of projects or programs undertaken by the Flying Labs®.

The buy in of the Flying Labs® is extremely important for the M&E plan to succeed and evolve. Development of appropriate storage and sharing protocols is extremely important to allow dissemination of information across the network of Flying Labs®. The WeRobotics M&E coordinator would be the ideal person to encourage the development and upgrading of these protocols. Additionally, Deliverables A-1 & A-2: Monitoring Plan and Deliverable B: Strategic Implementation Plan have detailed processes, timelines and data storage suggestions for initial success.

6. **Mapping Logic Models for Remaining Flying Labs®** – The use of the river journey mapping exercise maps out the overall direction in which the Flying Labs® see themselves heading. This exercise was pivotal in developing findings regarding outcomes and activities etc. that the two Flying Labs® - Panama and Tanzania - shared. Based on the valuable data that emerged from the exercise and the opportunity it provides the Flying Labs® to align the activities they carry out with impact aligned outcomes, the SIPA team recommends that this exercise be carried out to map out logic model for all Flying Labs® in the WeRobotics network. The WeRobotics M&E coordinator would be the ideal person to carry out these activities so that all Flying Labs® staff can participate and develop the logic model for their Flying Lab®.
7. **Mapping Logic Model for WeRobotics** – The river journey mapping exercise was successful in mapping out the ultimate impact the Flying Labs® expected to create and the

outcomes and activities needed to create that impact. It would be beneficial for WeRobotics to carry out the activity among its staff to determine the pathway to impact that they seek to implement and the logic model that would follow from that.

8. **Define ‘Community Engagement’ in Collaboration with Flying Labs®** – As mentioned in our findings, localization means different things to both Flying Labs® and WeRobotics. This creates some degree of confusion and is difficult to evaluate ‘localization’ or ‘community engagement’ as both mean different things at either level. Separation of terminology or defining it in collaboration with the Flying Labs® is recommended to truly capture the impact at all levels of operationality.
9. **Academic Partnerships** – Flying Labs® based out of academic centers such as Panama and the South Pacific have greater access to human resources and innovation partners through students enrolled at such centers. Additionally, collaborating or operating out of prominent local institutions allows the Flying Labs® to benefit from their reputation and allows easier market accessibility. The SIPA team recommends that Flying Labs® develop partnerships with academic institutions as part of their localization mission and to have greater access to support and associated market goodwill.
10. **AgriRobotics** – A large number of Flying Labs® have projects in the agricultural stream which are currently incorporated into the EcoRobotics program track. This creates confusion as the track is generally associated with environmental projects and agricultural projects that are unable to receive the prominence that they deserve with the Flying Labs® consistently operating out of countries which are agri-focused. A separate program track for agriculture and farming based programs would be beneficial in those projects achieving prominence along with additional funding and collaboration opportunities.

PART E: CONCLUSION

After seven months of work, the SIPA team has been able to develop a preliminary M&E framework for WeRobotics and the Flying Labs® network. The SIPA team proposed three plans based on the study of WeRobotics' essence and the interactions with the Flying Labs® which include: a monitoring plan to identify outputs, indicators and data sources, an evaluation plan to analyze outcomes and evaluation methods, and a strategic implementation plan with recommendations on how to execute the proposed M&E framework.

As the SIPA team encountered financial and human constraints, the proposed tools may have some biases. For example, only two regional Flying Labs® were visited, and the team could not go to any affiliate Flying Labs®. Thus, the underlying assumption is that the M&E framework that is best suited for the regional Flying Labs® is equally-suited for the affiliate Flying Labs®. Still, the team's fieldwork and the conversations with affiliate Flying Labs® and WeRobotics over Skype have allowed these biases to be minimized.

These tools are flexible enough to be adopted by multiple Flying Labs®, and allow WeRobotics to gather information and organize their network. They are also easy to use and do not require any technical expertise. Through these tools, WeRobotics will be able to collect the data to assess their impact and outreach. Over time, collecting data with these tools will become a habit, and the organization will develop more specific indicators to measure their work.

PART F: BIBLIOGRAPHY

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PART G: APPENDICES

Appendix A: Interview and Focus Group Subjects

Interview Subject Name	Date	Focus of Interview
Joseph Muhlhausen; Head of Drone Data and Systems for WeRobotics	December 21, 2018	Drone systems and technology
Ghati Marwa; Drone Data and GIS Specialist, Tanzania Flying Lab®	January 16, 2019	Institutional activities, measuring success, partnerships
Abdul-Rahman Hafidh & Ibrahim Ahmad Abdallah; Founders, Drone Wings	January 17, 2019	Relationship with TFL®, training
Yussuf Said Yussuf; Head Pilot and Trainer, Tanzania Flying Lab®	January 17, 2019	Institutional activities, measuring success, partnerships
Rose Funja; Founder, Agrinfo	January 18, 2019	Relationship with TFL®, drones in agriculture
Dr. Ruchi Saxena; Director, India Flying Lab®	February 21, 2019	Flying Lab® operations, activities, and measures of success
Amrita Lal; Flying Lab Coordinator, South Pacific Flying Lab®	February 21, 2019	
Dr. Ir. Abdelaziz Lawani; Director, Benin Flying Lab®	February 22, 2019	
Deogratius Kiggude (Lead Coordinator) & John Goslino (Business Manager), Uganda Flying Lab	February 25, 2019	
William Elong (FL Coordinator) & Loic Dessap (Robotic Maker), Cameroon Flying Lab	February 28, 2019	
Heidi Sampang, MD; Managing Director, Philippines Flying Lab	February 28, 2019	
Dania Montenegro (FL Coordinator) & Leonel Montes (Project Assistant), Panama Flying Lab®	March 17, 2019	
Dr. Sidia Moreno; Social Innovation Professor, Panama's Technological University	March 19, 2019	Background on technological innovation, impact of Flying Labs®

Focus group participants: engineering students working at the Panama Flying Labs®	March 19, 2019	Stakeholder interaction with the Panama Flying Lab®
Dr. Humberto Rodriguez; Panama Flying Lab® Director	March 22, 2019	Reflection on outcome mapping by Panama Flying Lab®
Abdul-Rahman Hafidh; Founder, Drone Wings	March 20, 2019	Collaboration between Drone Wings and TFL
Denise Bonome and Griselda Salome Soto-Bravo; Consultants Multilateral Investment Fund, Inter-American Development Bank (IDB)	March 20, 2019	Collaboration and reporting requirements with/for IADB
Dr Oscar Garibaldi; Panama Flying Lab® Vice Director	March 20, 2019	Outcome mapping discussion
Leka Tingitana; Managing Director, Tanzania Flying Lab®	March 22, 2019	Institutional activities, measuring success, partnerships
Christopher Mnzava; Coordinator, DarMAERT	March 27, 2019	Collaboration between DarMAERT and TFL
Gussai Sheikheldin (Research Fellow) & Bitrina Diyamett (Executive Director), STIPRO	March 22, 2019	Collaboration between STIPRO and TFL®

Appendix B: River Journey/ Outcome Mapping Formal Protocol



Fig 1. A River Journey Mapping exercise in progress with the Tanzania Flying Lab®

Purpose

The river journey mapping exercise is a modified version of the subject mapping process known as the road journey exercise. This technique allows the facilitators to map out the organization's current activities, ultimate goals, and the pathway that connects the two. In essence, the tool aids the organization's staff in mapping out a logic model which details their current activities, short-term outcomes, medium-term outcomes, long-term outcomes, and impact. This logic model is critical in determining the organization's central outputs and outcomes as well as the indicators the organization should track in their M&E activities. The use of rivers allow for a distinct stream for each project or program (in the case of WeRobotics each river symbolizes a program track; i.e., AidRobotics, HealthRobotics, DevRobotics, and EcoRobotics). After completing the river journey map, participants can focus on the most important activities and outcomes identified and accordingly prioritize these outputs and outcomes in their M&E practices.

Materials Required

- A white board, blackboard, or large sheet of paper
- A white board marker, chalk, or a blue-colored marker to draw the lake and river
- Five different-colored sticky notes (with enough sticky notes for all participants)
- Markers or pens for the participants to use to write on the sticky notes
- Camera to capture an image/series of images of the finalized map
- Documentation sheet and pen/pencil to complete
- Something to keep track of time with (stopwatch, phone, computer, clock, watch, etc.)

Individuals Roles

The minimum recommended number of facilitators: 2

One individual will be the **lead facilitator** who will read the prompts, collect the sticky notes, synthesize and post participants' contributions, and lead the session. The second individual will be the **recorder/note taker** whose primary responsibility will be to take detailed notes during the session using the documentation sheet provided.

Set-Up

1. Make sure participants have approximately 2 hours as a minimum to complete this exercise (ideally, the participants should have roughly 2.5-3 hours of availability with a short break in the middle of the activity, as it can be intellectually draining).
2. **Draw the River Map Outline:**
 - a. Choose the most accessible medium at your disposal (either a white or black board or a large piece of paper) and draw the outline for the map.
 - b. At the top of the board/paper you should draw a large lake and draw rivers flowing into each lake (the number of rivers you draw is based on the number of programs/project tracks; i.e., for WeRobotics you would draw one lake with **four** rivers). Draw the rivers wide, yet leave space between each river.
 - c. Label **each** river at the bottom with the appropriate title (i.e., for WeRobotics one river would be labeled "AidRobotics," the next "HealthRobotics" and so on for all four program tracks)
 - d. Separate the rivers horizontally into **four** sections and label the sections from bottom to top as (1) "Activities," (2) "Short-term Outcomes," (3) "Medium-term Outcomes," and (4) "Long-term Outcomes." Label the lake as "Impact."

3. Distribute the materials - give each participant a small stack of every color of the sticky notes and a marker/pen (i.e., should have 5 stacks of different-colored sticky notes and a writing utensil).
4. Make sure the **recorder/note taker** is equipped with the documentation form and a writing utensil as well

Items for Consideration

- Be aware of any power dynamics between the participants and do whatever is possible to minimize them to achieve the best results. For example, if the participants include a supervisor and some of their direct subordinates, when facilitating the sharing of ideas ask the subordinates to go first and the supervisor to go last. While power dynamics are something to be cognizant of, it is nonetheless important to bring in as many relevant actors as possible; thus, it is not recommended that individuals be removed from the activities purely on the basis of power dynamics.
- Read through the entire protocol before attempting to implement. It is recommended that the lead facilitator attempt to implement this protocol with fellow staff members before leading the participants. In this mock-session, the facilitator can get a better sense of any other directions they need to provide and can better anticipate questions from the participants.
- General examples are provided with the prompts to help facilitate understanding; however, try to think of some other examples in case participants have trouble understanding the prompt.
- Throughout the exercise, it is important to remain a facilitator and not a participant. If the participants are having trouble with a prompt or expressing their ideas, ask probing questions to help them figure out their ideas (as opposed to simply spelling out what you believe their idea to be).
- It is best to provide instructions/prompts one step at a time rather than reading the entire protocol at the beginning. It is also advised to work vertically and complete one river before starting the next. For example, ask the participants to write down the activities for the first river, give them time to complete that, work through sharing the participants' responses, and then move onto the short-term outcomes for that same river. Only after you have completed the impacts for that river should you move on to the activities for the second river. Working horizontally (i.e., across all activities first, then through all short-term outcomes, etc.) is not advised as the protocol is supposed to aid participants in thinking through the connections in the activities, outcomes, and impacts as they flow through the river.

Process

1. Introduce the Activity (5 Minutes)

- a. Explain the purpose of the river journey mapping exercise briefly (i.e., this activity will help you to map out what are the current activities your organization is completing, the impact the organization is aiming to achieve, and the change pathway in connecting these two points).
- b. Explain the symbolism of the exercise (i.e., this activity utilizes a lake to symbolize the combined impact of our organization and rivers to symbolize each program track that leads us to achieve that impact. For example, here we have four rivers—one for each program track, which all flow into the lake on combined impact).
- c. Explain the process of the activity (i.e., we will work up each river starting with the activities and floating upstream to impact. Each sticky note color represents a different section of the river).

2. Mapping Out the Activities for One River (8 minutes / river)

- a. Introduce the river that you are starting with (i.e., we will begin by focusing on the river that symbolizes the program track of “AidRobotics,” as you are familiar, AidRobotics is the program track that includes projects working on disaster management, relief, and prevention).
- b. Introduce the term “activities” to the participants in a clear and concise manner using non-jargon terms (i.e., the first thing we will focus on for this program track are the activities. By activities, referring to the different tasks you complete that fall under this program track. For example, if you are completing a mapping exercise for the government of a river to identify flood damage some activities may include (1) flying the drone over the river and capturing the imagery, (2) analyzing the drone data in ArcGIS, and (3) sending the data product to the government disaster management agency). **Alternatively**, you could ask for more general activities (i.e., for example, “mapping flood damage of the Mbezi River” as your activity).
- c. Give participants ~4 minutes to draft activities, instruct which color post-it to document their ideas on.
- d. Have everyone return to the group and share what they have written. If there are sticky notes that are the same/very similar, consolidate them together. Place the sticky notes at the bottom of the river in the “activities” section for the appropriate river/program track. If something is unclear on the sticky note ask them to clarify and write clarifying notes on the sticky note (3 minutes).

3. Mapping Out the Short-term Outcomes for One River (8 minutes / river)

- a. Ask probing questions to help identify short-term outcomes for the first river. The question should be something similar to, “How have these activities lead to a change in awareness, skills, and knowledge at the individual-level?”

- i. **Awareness** - i.e., increased awareness of drone benefits by primary school children.
 - ii. **Skills** - i.e., increased ability of local entrepreneurs to fly drones.
 - iii. **Knowledge** - i.e., government officials have increased knowledge of how to properly interpret drone data products.
 - b. Give participants ~4 minutes to draft outcomes, instruct which color post-it
 - c. Repeat the facilitation of the sharing exercise from **2d**.
- 4. **Mapping out the Medium-term Outcomes for One River** (8 minutes / river)
 - a. Ask probing questions to help identify the medium-term outcomes for the first river. The question should be something similar to, “how have these activities lead to a change in access, resources, opportunities, and relationships at the community-level?”
 - i. **Access** - i.e., increased access of island communities to medicine through cargo drones.
 - ii. **Resources/Opportunities** - i.e., increased provision of data for decision-making purposes provided to disaster response agencies.
 - iii. **Relationships** - i.e., deeper relationship between the Flying Lab and the Local Aviation Authority.
 - b. Give participants ~4 minutes to draft outcomes, instruct which color post-it to document their ideas on.
 - c. Repeat the facilitation of the sharing exercise from **2d**.
- 5. **Mapping out the Long-term Outcomes for One River** (8 minutes / river)
 - a. Ask probing questions to help identify the long-term outcomes for the first river. The question should be something similar to, “How have these activities lead to a change in leadership, institutions, policies, and conditions at the system-level?”
 - i. **Leadership** - i.e., increased number of governmental leaders using drone-related data in their decision making.
 - ii. **Institutions/Policies** - i.e., new policies passed on drone usage in times of disaster response.
 - iii. **Conditions** - i.e., increased economic prosperity through new drone service sector in the economy, which provides higher paying jobs.
 - b. Give participants ~4 minutes to draft outcomes, instruct which color post-it to document their ideas on.
 - c. Repeat the facilitation of the sharing exercise from **2d**.
- 6. **Mapping out the Impact(s) for One River** (8 minutes / river)
 - a. Asking probing questions to help identify the impact for the first river. In order to do this, ask questions like “To what end?” and “What is/are the ultimate goal(s)?”

If possible, it may be beneficial to have the participants map out their impact prior to offering a formal definition of the term “Impact.” However, if the participants seem confused or have trouble defining their impact, you could offer a formal definition (i.e., impact is a powerful, all-encompassing goal that the organization is attempting to achieve but cannot achieve alone).

- b. Give participants ~4 minutes to draft impact(s), instruct which color post-it to use
- c. Repeat the facilitation of the sharing exercise from **2d**.

7. Repeat Steps 2 through 6 for Each Remaining River

8. Conclusion

- a. Ask if the participants have anything else to add to the river journey map or if they have any questions about the process.
- b. Provide the participants with a review of the map they have made and introduce/explain the M&E definitions used on the map. (i.e., define activities, outputs, outcomes, impact, and how they are all connected).
- c. Explain next steps and how this map can inform their future M&E practices (i.e., based on the activities that you have identified, we can think of the different outputs and output indicators that help measure the implementation of activities. Moreover, for the different outcomes identified, we can think of some indicators that help measure whether these outcomes are being achieved and how well they are being achieved over time. All of this information helps us develop a thorough M&E framework).
- d. Thank the participants for their time and provide them with a finalized copy of the map for their records/internal usage.

Documentation Form

Name of Organization and/or Program: _____

Location of Data Collected: _____

Date of Data Collected: _____ Data Collected By: _____

Photographs Taken During Exercise ____ Yes ____ No; Stored Where? _____

Before Starting:

Number of Participants: _____ Power Dynamics Present? ____ Yes ____ No

If power dynamics are present, how have they been minimized? _____

Observations During Exercise:

For the following table fill in the following information throughout the exercise:

1. In each column header, fill in the name of the corresponding river.
2. In each row header, fill in the color of the sticky note used for each corresponding portion of the river (i.e., if the facilitator instructs the participants to use the blue sticky notes for the activities, then under “activities, color:” write the word “blue.”
3. In each corresponding cell, fill in observations about (1) the central themes discussed, (2) any concerns or questions the participants raise, (3) any challenges the participants have in answering particular questions, and (4) any persistent power dynamics observed that were not able to be controlled.

	River #1:	River #2:	River #3:	River #4:
Activities Color:				
Short-term Outcomes Color:				
Medium-term Outcomes Color:				
Long-term Outcomes Color:				
Impact Color:				

Appendix C: River Journey Mapping Tanzania Flying Lab®

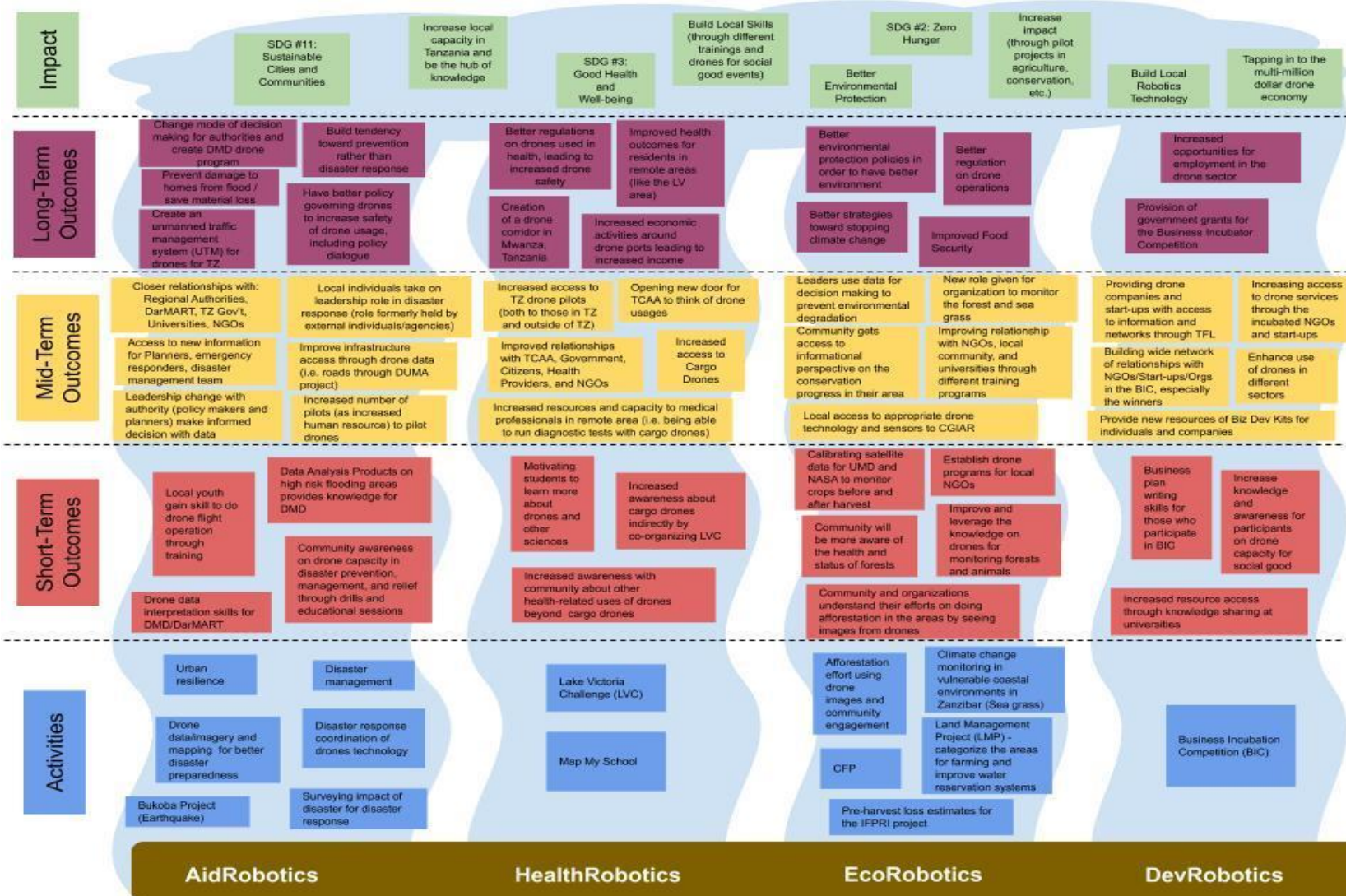


Fig 2. River Journey Mapping exercise completed with the Tanzania Flying Lab®

Appendix D: River Journey Mapping Panama Flying Lab®

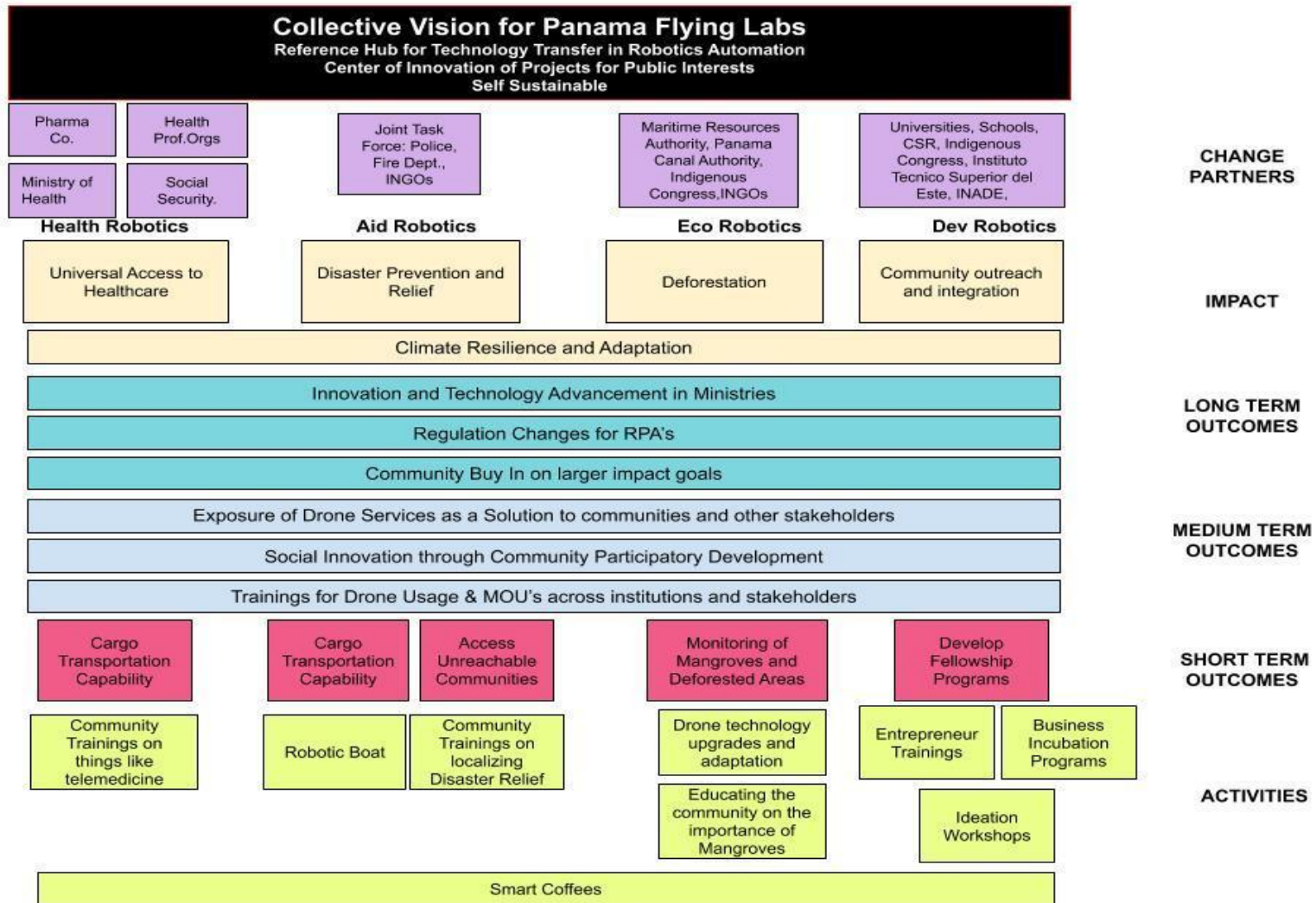


Fig 3. River Journey Mapping exercise completed with the Panama Flying Lab®

Appendix E: Fish and Boulders Formal Protocol



Fig 4. Fish and Boulders exercise completed with multiple Flying Labs® in Brooklyn, NY

Purpose

The fish and boulders activity helps a group of individuals articulate a common vision, the positive forces pushing toward the vision, and the challenges and limitations hindering the achievement of this vision in a participatory manner.

Materials Required

- Large whiteboard, blackboard, or piece of paper
- Drawing utensil (whiteboard marker, chalk, or markers)
- Construction paper or colored paper cut into fish (small size and large size) and boulders (small size and large size)
- Sticky notes
- Markers or Pens for participants

- Camera
- Tape

Individuals Roles

The minimum recommended number of facilitators :2 (a **lead facilitator** and a **notetaker**).

However, we recommend that for every additional small group (5-7 individuals) it is feasible to have an additional facilitator (i.e., if there are 25 participants broken up into 5 groups, the minimum recommended number of facilitators would be 5 **facilitators** and 1 **notetaker**).

Set-Up

1. Make sure participants have at least 1 hour to complete the activity; however, it is recommended that participants have 1.5-2 hours, if possible.
2. On a large piece of paper or white/blackboard, draw a river flowing into a large lake. Then, write the prompt for the common vision question (see example below) in the lake so participants can refer to it.
3. Distribute some small fish, large fish, small boulders, large boulders, sticky notes, and markers/pens to the participants.
4. Break the participants into small groups of maximum 5-7 participants/group. It is advised to think of the participant groupings prior to starting so you can attempt to control for power dynamics and make the groups diverse.
5. Make sure to assign roles amongst the facilitation team and ensure that the notetaker has the documentation form and a writing utensil.
6. Read through the protocol in its entirety before implementing. If time permits, attempt to implement the protocol with a small group to better anticipate any challenges or questions.
7. Feel free to modify the protocol as best fit.

Items for Consideration

- Are there any power dynamics present? If so, what can you do to minimize these power dynamics to have the most unbiased results possible?
- It is best to provide participants with instructions one step at a time. It may also be better to wait to hand out fish/boulders until you are on that step so participants do not write their vision on the fish and boulders.
- Be prepared to provide ample examples to clarify and supplement participants' understanding of the activity.
- Drafting a common vision may be best done in a 1:2:4:all method, where participants spend time drafting principles on their own, then share and brainstorm in pairs, then in groups of four, and finally altogether in a large group. This is most beneficial in instances where there are a large number of participants.

Process

1. **Draft and Share a Common Vision** (15 minutes) - Provide the participants with a prompt that helps them think of their vision (i.e., “What is your collective vision for WeRobotics /the Flying Lab way of learning about projects through a system of gathering, analyzing, and using data/insights about what is implemented and how it has impacted the communities?”) Ask the participants if they understand the prompt, and if not, clarify through alternative probing questions and illustrative examples. Once they understand the prompt, ask participants to reflect on the prompt and draft some ideas. These ideas should be written on sticky notes (one idea/principle per sticky note). After giving approximately 10 minutes to draft their ideas, have them share their ideas with the entire group. Cluster the participants’ responses in the “lake” in a logical manner (it’s okay if they overflow out of the lake).
2. **Articulate the Forces** (20 minutes) - Explain the symbolism of the fish and boulders (i.e., “fish symbolize the positive forces that help you to reach this vision and the boulders symbolize the challenging forces that prevent you from reaching it. The size of the fish and boulders, small and large, indicate whether the force is major or minor.”) Explain that these forces can be anything from capacities, resources, skills, partnerships, or lack thereof. Be prepared to give a few examples of each. Ask if the participants understand. If so, break them into small groups (max. 5-7 people/group) and have them draft some fish and boulders (give them roughly 15-20 minutes to complete). Circulate around the room to ask questions and monitor their progress.
3. **Share Forces** (15 minutes) - After participants are done drafting the forces, have each group present their fish and boulders. If a group has a similar fish or boulder, have them share that and cluster them together. Place fish facing upstream and cluster boulders around the river blocking the fish. If what is written on the fish or boulder is not clear, ask the participants to explain and write on the fish/boulders so the answer is clear.
4. **Group Reflection** (10 minutes) - After everyone is finished, engage the entire group of participants in a reflection conversation. Ask questions like: What are the major themes you learned from this activity? What did you like or not like about this activity? Do you feel like this common vision is achievable someday? Did this activity help to inspire any future action steps to achieve the common vision? If so, what?
5. **Take photos of the completed exercise to save for your records.**

Documentation Form

Name of Organization and/or Program: _____

Location of Data Collected: _____

Date of Data Collected: _____ Data Collected By: _____

Photographs Taken During Exercise ___ Yes ___ No; Stored Where? _____

Before Starting:

Number of Participants: _____ Power Dynamics Present? ___ Yes ___ No

If power dynamics are present, how have they been minimized? _____

Observations During Exercise:

List any general observations made throughout the common vision activity:

List any general observations made throughout the sharing of the fish and boulders component of the activity:

Appendix F: Fish and Boulders Example

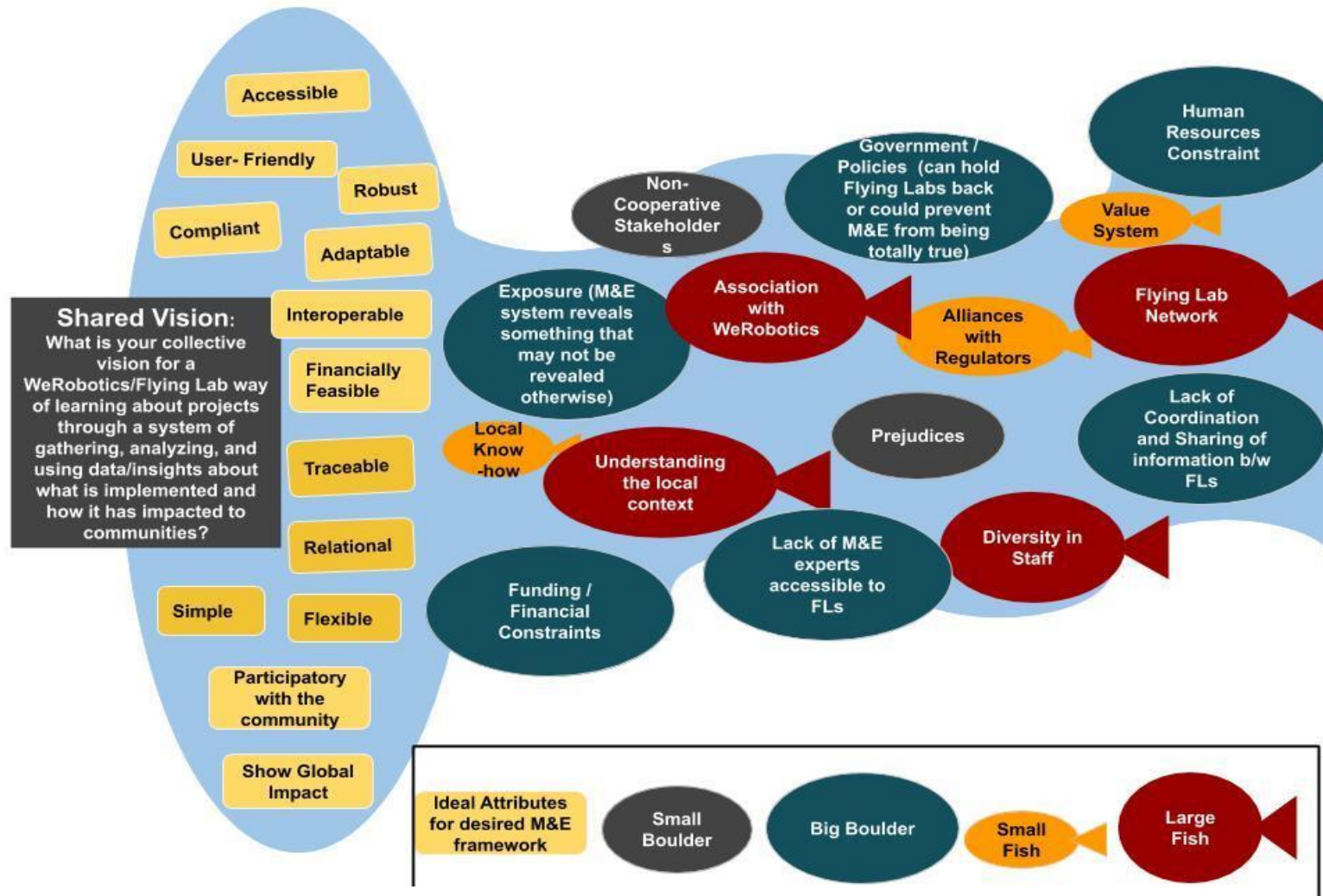


Fig 5. Fish and Boulders for Flying Labs® Mapped Out

Appendix G: Guidelines for Optimal Monitoring Tool Usage

Project Documentation Form Link

Stakeholder Engagement Form Link

Purpose:

a) Project Documentation Form

- To develop a structured M&E system that is cost effective and adaptable across WeRobotics' Flying Labs®.
- To enable knowledge sharing across the Flying Labs network for projects that are in any phase of development
- To allow analysis and strategic decision making based on evidence-based data

b) Stakeholder Engagement Form

- To capture individual activities conducted by WeRobotics and the Flying Labs® with their stakeholders
- To act as a repository of activity-based data
- To lead to the development of evaluation indicators
- To capture data and dynamics of the 'Localization' aspect that WeRobotics focuses on

Operationality

Tools	Frequency	Owner	Primary respondents
Project Documentation Form	<p>Project duration 1 year: beginning and end of the project</p> <p>Project duration > 1 year: beginning, annually and end of the project</p>	WeRobotics M&E person plus Flying Labs® as collaborators with analytics access	Flying Labs®
Stakeholder Engagement Form	<p>Flying Labs: completed after each external engagement (local communities, students/academia, local entrepreneurs, local government bodies)</p> <p>WeRobotics: completed post each external engagement: conferences (attended/hosted/presented at), trainings, or developing new partnerships (program/tech/regulatory/consulting)</p>	WeRobotics M&E person plus Flying Labs® as collaborators with analytics and download access	WeRobotics Flying Labs®

Additional Information

Internet connectivity: Not required, SurveyMonkey can be used on field survey mode and downloaded for offline use.

Device: Laptops and all mobile devices (including iPhone®, iPad®, and iPod touch®, as well as Android devices, Kindle, and Nook eReaders)

Cost:

More information provided **here**:

Item	Billing Period	Quantity	Amount
Team Advantage Annual Plan	Apr 26, 2019-Apr 25, 2020	1	\$336
Additional User	Apr 26, 2019-Apr 25, 2020	<input type="text" value="2"/>	\$672
Prorated Discount	Apr 26, 2019-May 1, 2019		(\$7.40)
Total:			\$1,000.60

Your Charge today: \$1,000.60 / for team of 3

Average survey completion time: 12 minutes (Project Documentation Form), 3 minutes (Stakeholder Engagement Form).

Data Analysis: SurveyMonkey allows the creation of custom charts and reports quickly and easily with its filter and compare options, as well as the creation of dashboards. You will be able to download survey results in several file formats, including as CSV, PDF, PPT, or XLS files.

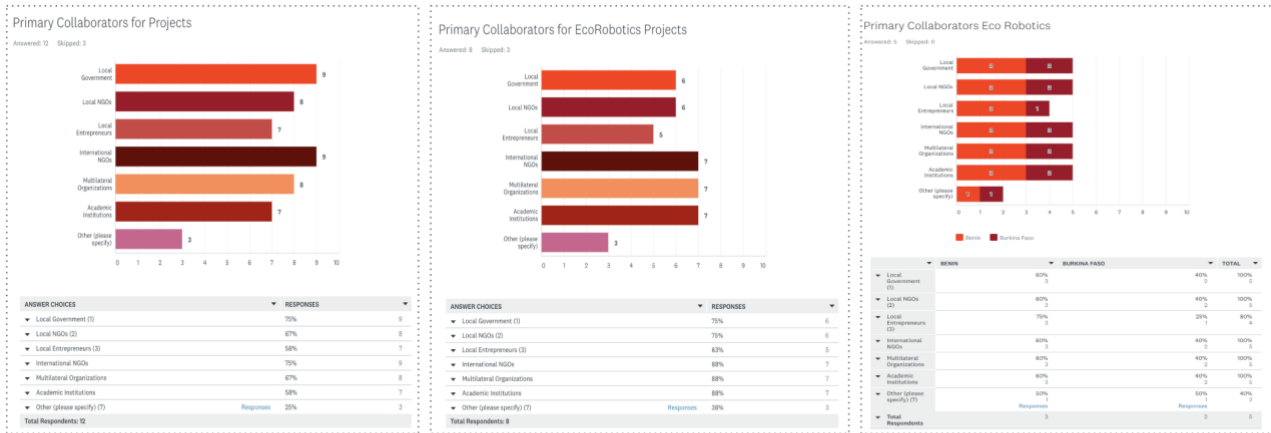
Data Sharing: SurveyMonkey makes it convenient to share data with respondents. This can be done by exporting and sharing data, allowing access to results, dashboards and adding collaborators who can manipulate data to carry out their own analysis. More details are provided **here**.

Roles: One primary administrator and tool editor preferably from WeRobotics, collaboration access provided to one individual from all Flying Labs®. Training on SurveyMonkey is recommended.

Helpful guides:

1. Designing and editing survey tools **here**
2. Analyzing collected data **here**

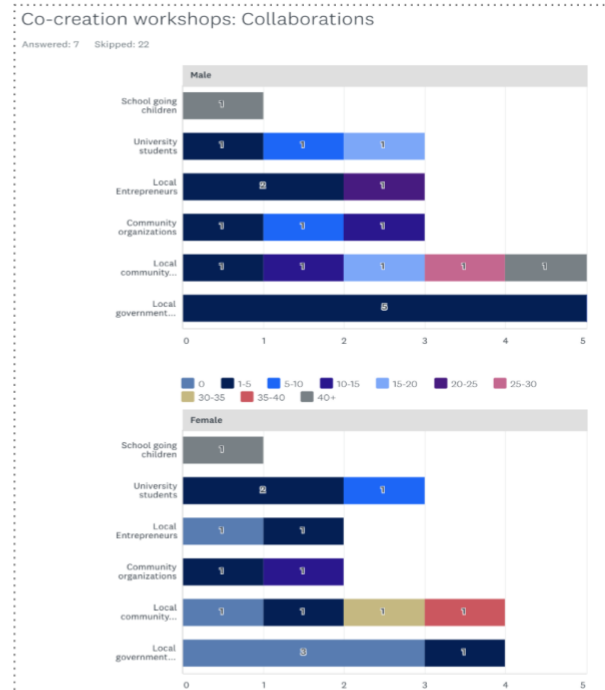
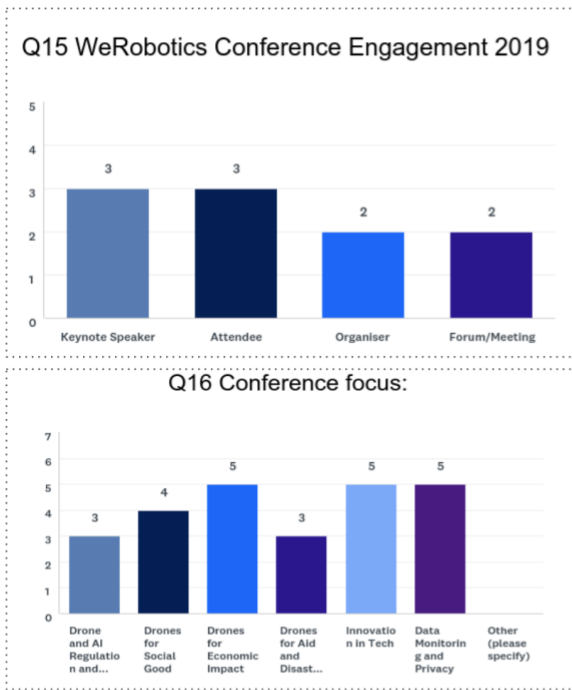
Examples of Data Analysis:



Burkina Faso and Benin Flying Labs® have an opportunity to work on a World Bank project on environmental conservancy with a focus on local NGOs and entrepreneurs. How can the tool help WeRobotics establish that both countries have prior experience with EcoRobotics projects and working with the targeted collaborators?

17

Figure 5.1 Project Documentation Tool



WeRobotics

Flying Labs

Figure 5.2 Stakeholder Engagement Tool

Appendix H: Monitoring Tool-Project Documentation Form

Project Documentation/Monitoring Form Project Details

The purpose of this electronic tool is threefold:

1. To develop a structured Monitoring and Evaluation (M&E) system that is adaptable across WeRobotics' Flying Labs.
2. To enable the sharing of details and objectives for projects that are in any phase of development for the Flying Labs.
3. To allow knowledge sharing among Flying Labs.

* 1. Flying Lab Location

* 2. Project Name

* 3. Project Description

Please provide a brief description of what the project is and what it involves

* 4. Problem Statement

Please provide some context regarding the need for the project (in the community, academic purpose, etc)

*** 5. Project Program Track:**

Aid Robotics

Eco Robotics

Health Robotics

Business Incubation/Social Innovation Challenge

Dev Robotics

Other (please specify)

*** 6. Project Stage**

Please select the current stage of the project you have chosen

Design and Planning Stage

Implementation Stage

Completed Project

*** 7. Project Timeline**

Start Date

DD/MM/YYYY

End Date

DD/MM/YYYY

Project Documentation/Monitoring Form

Section 2: Completed Project

If the project you have chosen has concluded please fill out this section

*** 1. Who were your primary collaborators for this project?**

Please select all that apply

- Local Government
- Local NGOs
- Local Entrepreneurs
- International NGOs (e.g. Red Cross, Oxfam, Amnesty International, MercyCorps, etc.)
- Multilateral Organizations (e.g UN, IDB, The World Bank, ILO, WHO, FAO etc.)
- Academic Institutions (Universities, Research Institutes etc.)
- Other (please specify)

*** 2. Please provide the names of the organizations/local entrepreneurs you selected for Q1**

Local Governments	
Local NGOs	
Local Entrepreneurs	
International NGOs	
Multilateral Organizations	
Academic Institutions	
Other	

*** 3. Who were the primary beneficiaries for this project?**

Please select all that apply

- Local community (e.g students, women, fishermen, etc.)
- Local Entrepreneurs
- Community organizations (e.g unions, professional groups, collectives, etc.)
- Local Institutions (e.g schools, hospitals, etc.)
- Academic Institutions
- Other (please specify)

*** 4. Please provide details (names, specifics etc.) of the groups of the beneficiaries selected above**

Local Community	<div style="background-color: #cccccc; height: 28px;"></div>
Community Organizations	<div style="background-color: #cccccc; height: 28px;"></div>
Academic Institutions	<div style="background-color: #cccccc; height: 28px;"></div>
Local Entrepreneurs	<div style="background-color: #cccccc; height: 28px;"></div>
Local Institutions	<div style="background-color: #cccccc; height: 28px;"></div>
Others	<div style="background-color: #cccccc; height: 28px;"></div>

*** 5. Please list the achieved results or outcomes of the project:**

What were the results or outcomes that actually took place from the implementation of the project. Examples: Increased community resilience against flooding, increased youth awareness of the use of drones for social good.

Result/Outcome 1

Result/Outcome 2

Result/Outcome 3

Result/Outcome 4

Result/Outcome 5

Result/Outcome 6

Result/Outcome 7

Result/Outcome 8

Result/Outcome 9

Result/Outcome
10

*** 6. List all the project related activities that you carried out to achieve the expected results/outcomes**

Examples: training sessions with girls in local schools, mapping of mangrove coverage,overflight missions in the landfill,post project community engagement sessions etc.

Activity

Activity

Activity

Activity

Activity

Activity

Activity

Activity

Activity

Activity 10

*** 7. Please list the activity output indicators of the project:**

Examples include but are not restricted to: number of beneficiaries reached, number of meetings, number of flights, number of communities covered, number of trainings conducted, better communication among agencies, change in attitudes

Indicator

Indicator

Indicator

Indicator

Indicator

Indicator

Indicator

Indicator

Indicator

Indicator

*** 8. Please list the intended future impacts of this project**

These would include long term changes in the economy, environment, society, population etc. Please list as many as you think apply

Impact

Impact

Impact

Impact

Impact

Project Documentation/Monitoring Form

Section 3: Project in Progress

If the project you have chosen is currently in the Design/Planning or Implementation phase, please answer the following questions.

*** 1. Who will be your primary collaborators for this project?**

- Local Government
- Local NGOs
- Local Entrepreneurs
- International NGOs (e.g. Red Cross, Oxfam, Amnesty International, MercyCorps, etc.)
- Multilateral Organizations (e.g UN, IDB, The World Bank, ILO, WHO, FAO etc.)
- Academic Institutions (Universities, Research Institutes etc.)
- Other (please specify)

*** 2. Please provide the names of the organizations/local entrepreneurs selected on Q1**

Local Government	
Local NGOs	
Local Entrepreneurs	
International NGOs	
Multilateral Organizations	
Academic Institutions	
Other	

*** 3. Who will be the primary beneficiaries for this project?**

- Local community (e.g students, women, fishermen, etc.)
- Local Entrepreneurs
- Community organizations (e.g unions, professional groups, collectives, etc.)
- Local Institutions (e.g schools, hospitals, etc.)
- Academic Institutions
- Other (please specify)

*** 4. Please provide details (names and/or specifics) of the beneficiary groups selected on Q3.**

Local Community	
Community Organizations	
Academic Institutions	
Local Entrepreneurs	
Local Institutions	
Others	

*** 5. Please list the expected results or outcomes post the implementation of this project.**

Examples: Increased community resilience against flooding, increased youth awareness of the use of drones for social good.

Outcome/Result 1

Outcome/Result 2

Outcome/Result 3

Outcome/Result 4

Outcome/Result 5

Outcome/Result 6

Outcome/Result 7

Outcome/Result 8

*** 6. List the project related activities that you are planning to carry out to achieve the expected results/outcomes**

Examples: training sessions with girls in local schools, mapping of mangrove coverage,overflight missions in the landfill,post project community engagement sessions etc.

Activity 1

Activity 2

Activity 3

Activity 4

Activity 5

Activity 6

Activity 7

Activity 8

Activity 9

Activity 10

*** 7. Please list the activity output indicators of the project:**

Examples include but are not restricted to: number of beneficiaries reached, number of meetings, number of flights, number of communities covered, number of trainings conducted, better communication among agencies, change in attitudes

Indicator

Indicator

Indicator

Indicator

Indicator

Indicator

Indicator

Indicator

Indicator

Indicator

*** 8. Please list the intended future impacts of this project**

These are long-term changes your work is contributing to in the economy, environment, society, and/or general population, etc.
Please list as many as you think apply

Impact

Impact

Impact

Impact

Impact

Project Documentation/Monitoring Form Technology

Please select all options that apply for the project

* 1. Project Type

- Mapping
- Cargo
- Other (please specify)

* 2. Platform

- Marine
- Terrestrial
- Aerial
- Other (Please specify)

* 3. Sensor type (mapping)

- RGB
- Multispectral
- Thermal
- Lidar
- Other (please specify)

*** 4. Please list your technological partners and service providers**

[Redacted]

*** 5. Can the data collected for the project be shared publicly**

Yes

No

Other (please specify)

[Redacted]

6. List of products created (if any)

1

[Redacted]

2

[Redacted]

3

[Redacted]

4

[Redacted]

5

[Redacted]

Project Documentation/Monitoring Form Funding

1. Sources of Funding for the Project - Please select all that apply

- Multilateral Organizations (e.g UN, IDB, The World Bank, ILO, WHO, FAO etc.)
- International Development Agencies (DFAT, USAID, DFID, EuropeAid etc.)
- Academic Institutions (Universities, Research Institutes etc.)
- Federal Governments
- Local Governments
- Self Funded by Flying Lab as Service Provided

2. If the project has multiple sources of funding, please share a percentage % split. Please only enter a numerical value for this response.

Multilateral Org	<input type="text"/>
International Development Agencies	<input type="text"/>
Academic Institutions	<input type="text"/>
Federal Government	<input type="text"/>
Local Government	<input type="text"/>
Flying Lab	<input type="text"/>

3. Do you expect this project to be financially

Profitable

Not enough information at present

Breaking Even

N/A it is a grant

Loss Making



Project Documentation/Monitoring Form Pilot Form Feedback

Thank you for taking the time to fill out this pilot of the project documentation tool. Please share your valuable feedback with us by answering the 3 questions below.

* 1. How many team members were involved in filling out the form?

*** 2. Please share your feedback:**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The form was not time consuming to fill out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The form was easy to navigate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The questions were easy to understand (if you disagree or strongly disagree, please specify which questions in the text box below)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The data needed to fill out the form was easily accessible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The form will be useful for the Flying Labs' data sharing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The form will be useful for the Flying Labs' to store project data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please share any suggestions or feedback you may have for this tool.

Appendix I: Monitoring Tool-Stakeholder Engagement Form

Stakeholder Engagement Form Identification

The Stakeholder Engagement form aims to capture individual activities conducted by WeRobotics and the Flying Labs for the following reasons:

1. Act as a repository of activity based data
2. Development of evaluation indicators
3. Capture the 'Localization' aspect that WeRobotics focuses on

* 1. Please choose your affiliation

- WeRobotics
- Flying Labs

Stakeholder Engagement Form

Community Engagement Flying Labs

*Define Community Engagement for the Flying Labs <Ask Sonja to define>

* 2. Flying Lab Location

* 3. Activity Title

* 4. Date or Duration of the Activity

Start Date

End Date

Stakeholder Engagement Form

Type of Community Engagement

* 5. What type of community engagement did the Flying Lab engage in?

- Co-creation workshops to develop projects
- Technical workshops or trainings offered
- Creating drone awareness
- Conferences arranged
- Other (Please mention the type)

Stakeholder Engagement Form

Co-creation Workshops

Co-creation workshops are carried out by the Flying Labs to identify and develop projects with local community members with a focus towards solving local issues through the technology offered by the Flying Labs

* 6. Co-creation workshops: Please identify the segments and number of people you interacted with

	Male	Female
School going children	<input type="text"/>	<input type="text"/>
University students	<input type="text"/>	<input type="text"/>
Local Entrepreneurs	<input type="text"/>	<input type="text"/>
Community organizations (e.g emergency workers, unions, professional groups, collectives, etc.)	<input type="text"/>	<input type="text"/>
Local community members (e.g indigenous peoples, local citizens etc.)	<input type="text"/>	<input type="text"/>
Local government officials	<input type="text"/>	<input type="text"/>
Other (please specify)	<input type="text"/>	

Stakeholder Engagement Form

Creating Drone Awareness

Creating awareness of Drones as a tool for social good to create acceptance in local communities and to create a better understanding of the development opportunities that the technology the Flying Labs have access to provides.

* 7. Drone awareness: Please identify the segments and number of people you interacted with

	Male	Female
School going children	<input type="text"/>	<input type="text"/>
University students	<input type="text"/>	<input type="text"/>
Local entrepreneurs	<input type="text"/>	<input type="text"/>
Community organizations (e.g emergency workers, unions, professional groups, collectives, etc.)	<input type="text"/>	<input type="text"/>
Local community members (e.g indigenous peoples, local citizens etc.)	<input type="text"/>	<input type="text"/>
Local government officials	<input type="text"/>	<input type="text"/>
Other (please specify)	<input type="text"/>	

Stakeholder Engagement Form

Workshops and Trainings

Technical workshops and trainings that the Flying Labs have access to from WeRobotics, meetings held to impart technical knowledge and conferences hosted for knowledge sharing.

* 8. Technical trainings and workshops : Please identify the segments and number of people you interacted with

	Male	Female
University students	<input type="text"/>	<input type="text"/>
Local entrepreneurs	<input type="text"/>	<input type="text"/>
Business incubation program participants	<input type="text"/>	<input type="text"/>

Other (please mention the segment and total number of participants)

Stakeholder Engagement Form Conferences

* 9. Conferences : Please identify the segments and number of people you hosted

	Male	Female
University students	<input type="text"/>	<input type="text"/>
Local entrepreneurs	<input type="text"/>	<input type="text"/>
Business incubation program participants	<input type="text"/>	<input type="text"/>
Participants from other Flying Labs	<input type="text"/>	<input type="text"/>
Academic Institutions	<input type="text"/>	<input type="text"/>
Multilateral Organizations	<input type="text"/>	<input type="text"/>

Other (please mention the segment and total number of participants)

Stakeholder Engagement Form

External Engagement WeRobotics

This form is for all external engagement activities that WeRobotics carries out. Please use this form for each specific engagement activity.

* 10. Title of external engagement

* 11. Description of external engagement

* 12. Date or Duration of external engagement

Start Date

End Date

* 13. Please select the type of external engagement

- Conferences
- Technological Partnerships
- Program or Project Partnerships
- Online Trainings/Webinars
- Other (please specify the type of external engagement)

Stakeholder Engagement Form

We Robotics Conferences

14. External Engagement: Conference organiser

- WeRobotics
- Flying Labs
- Other Organizer (Please identify by name)

15. Conference Engagement

- Keynote Speaker
- Attendee
- Organiser
- Forum/Meeting

16. Conference focus:

- Drone and AI Regulation and Accessibility
- Drones for Aid and Disaster Relief
- Drones for Social Good
- Innovation in Tech
- Drones for Economic Impact
- Data Monitoring and Privacy
- Other (please specify)

Stakeholder Engagement Form Technological Partnerships

17. External Engagement: Technological partnerships type:

- Hardware
- Software
- Platform
- Other (please specify)

18. Please mention the technological partners for this specific engagement

Software	<div style="background-color: #cccccc; height: 29px; width: 100%;"></div>
Hardware	<div style="background-color: #cccccc; height: 29px; width: 100%;"></div>
Platform	<div style="background-color: #cccccc; height: 29px; width: 100%;"></div>
Other	<div style="background-color: #cccccc; height: 29px; width: 100%;"></div>

Stakeholder Engagement Form Program Partnerships

19. External Engagements: Project/Program Partnerships

- Multilateral Organizations (e.g UN, IDB, The World Bank, ILO, WHO, FAO etc.)
- International NGOs (e.g. Red Cross, Oxfam, Amnesty International, MercyCorps, etc.)
- Academic Institutions (Universities, Research Institutes etc.)
- Federal Governments
- Other (please specify)

20. Please list all project/program partners for this specific engagement

Multilateral Org	
International NGOs	
Academic Institutions	
Federal Governments	
Other	

Stakeholder Engagement Form Trainings and Webinars

* 21. Type of engagement

	Virtual (No. of People)	In Person (No. of People)
Training	<input type="text"/>	<input type="text"/>
Workshop	<input type="text"/>	<input type="text"/>
Information Session	<input type="text"/>	<input type="text"/>
Demonstration	<input type="text"/>	<input type="text"/>

22. Audience for Engagement - Please list organizations

Flying Labs	<input type="text"/>
Community	<input type="text"/>
Academic Institutions	<input type="text"/>
Multilateral Organisations	<input type="text"/>
INGOs	<input type="text"/>
Tech Partners	<input type="text"/>

Appendix J: Reflection Session Protocol

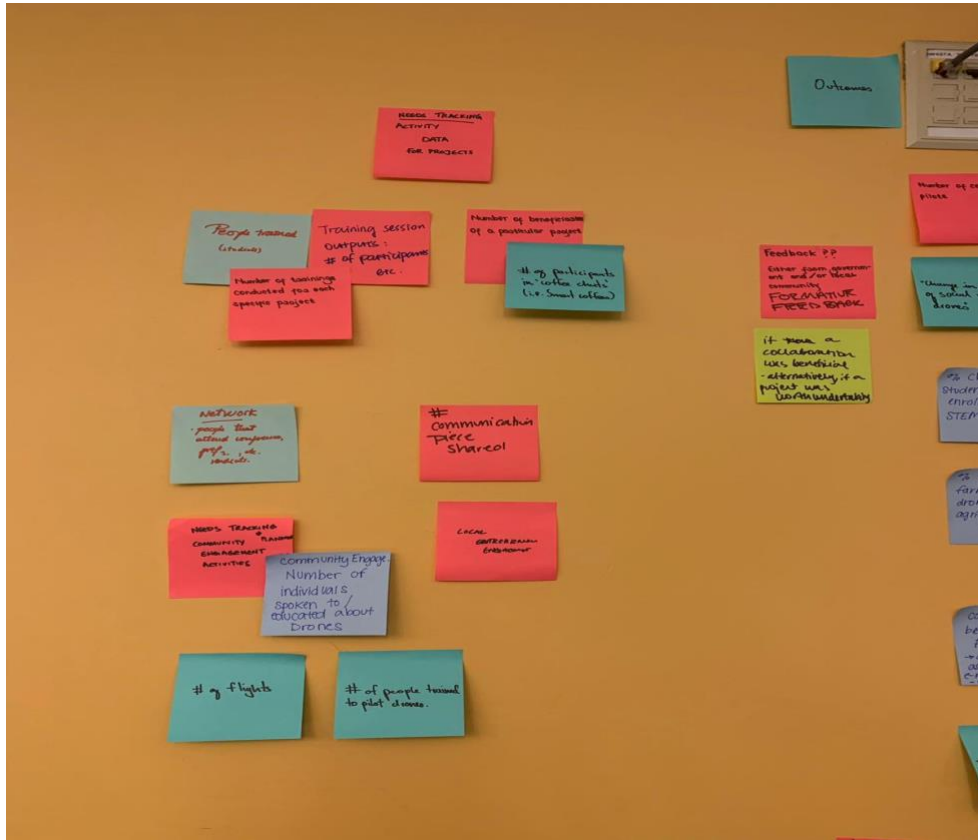


Fig 6. Post field visit workshop reflection session by SIPA team

Purpose

The reflection session is an exercise evaluating the progress that reviews potential strategies that should take place in order to best achieve identified outputs and outcomes. It also allows participants to think about what has been achieved to date and how that can be improved. This will allow in a learning process of the global network of Flying Labs®, how participants have applied the knowledge learned to their projects and establish a reflection / learning process that all Flying Labs® can adapt for their future work.

Estimated Duration: 20-30 minutes

Materials Required

- Five different-colored sticky notes (with enough sticky notes for all participants)
- Markers or pens for the participants to use to write on the sticky notes

- Camera to capture an image/series of images of the finalized map
- Documentation form and pen/pencil to complete
- Something to keep track of time with (stopwatch, phone, computer, clock, watch, etc.)
- Copies of the current M&E framework for each participant

Individuals Roles

The minimum recommended number of facilitators: 2

One individual will be the **lead facilitator** who will read the prompts, collect the sticky notes, synthesize and post the participants' contributions, and lead the session. The second individual will be the **recorder/note taker** whose primary responsibility will be to take detailed notes during the session using the documentation sheet provided.

Set Up

1. Make sure that all Flying Lab® staff are present for the reflection session and that all of the documentation forms and data from the completed focus groups and external interviews (where applicable) are gathered and present for the group to review/consult (digitally or in physical copy). Also, make sure that the current M&E framework is easily accessible during the session (consider printing a copy for each participant).
2. Draw the Reflection Session Engagement Diagram (see below).

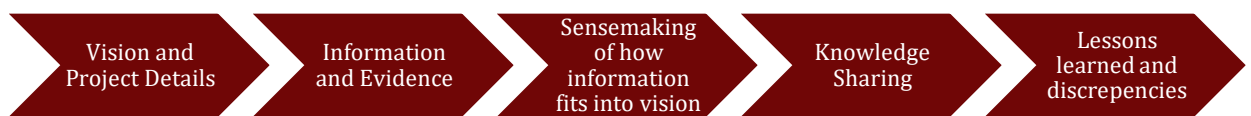


Fig 7. Sample Reflection Session Engagement Diagram

3. Distribute the materials. Give each participant a small stack of every color of sticky notes and a marker/pen (i.e., should have 5 stacks of different-colored sticky notes and a writing utensil).
4. Make sure the **recorder/note taker** is equipped with the documentation form and a writing utensil.

Items for Consideration

- Be aware of any power dynamics between the participants and do whatever is possible to minimize these to achieve the best results. For example, if the participants include a supervisor and some of their direct subordinates, when facilitating the sharing of ideas ask the subordinates to go first and the supervisor to go last. While power dynamics are something to be cognizant of, it is nonetheless important to bring in as many relevant actors as possible; thus, it is not recommended that individuals be removed from the activities purely on the basis of power dynamics.
- Read through the entire protocol before attempting to implement. It is recommended that the lead facilitator attempt to implement this protocol with fellow staff members before leading the participants. In this mock-session, the facilitator can get a better sense of any other directions they need to provide and can better anticipate questions from the participants.
- General examples are provided with prompts to help facilitate understanding; however, try to think of some other examples in case participants have trouble understanding the prompt.
- Throughout the exercise, it is important to remain a facilitator and not a participant. If participants are having trouble with a prompt or expressing their ideas, ask probing questions to help them to figure out their ideas (as opposed to simply spelling out what you believe their idea to be).
- It is best to provide instructions/prompts one step at a time rather than reading the entire protocol at the beginning. It is also advised to work vertically and complete one river before starting the next. For example, ask the participants to write down the activities for the first river, give them time to complete that, work through sharing the participants' responses, and then move onto short-term outcomes for that same river. Only after you have completed the impacts for that river should you move on to the activities for the second river. Working horizontally (i.e., across all activities first, then through all short-term outcomes, etc.) is not advised as the protocol is supposed to aid the participant in thinking through the connections in the activities, outcomes, and impact as they flow through the river.

Process

Introduce the Activity

Explain the purpose of the reflection session exercise very briefly (this activity will evaluate the progress we have made and will help us identify strategies to achieve our intended outcomes).

For each of the outcomes identified in the Monitoring Plan and outputs identified in the Evaluation Plan that the Flying Labs® seek to discuss, complete the following prompts. Have participants write their responses on sticky notes and post them in appropriate groupings. Make sure to leave time for discussion of the prompts amongst participants.

Prompt 1:

Q. What activities did you implement that may have helped to achieve this output/outcome?

Prompt 2:

Q. Were any external interviews completed to test the successfulness of this output/outcome? If so, what did the subjects say about it?

Prompt 3:

Q. What is the overall conclusion on this indicator? Was the output/outcome successfully achieved? If so, what evidence can you cite to support this (through the focus groups or external interviews)

Prompt 4:

Q. Why do you think you were successful (or not successful) in achieving this outcome/output?

a) If there are any disparities, ask, “What do you think brought about the differences?”

Reflection Session Documentation Form

Output/Outcome from M&E Framework	Indicator associated with output/outcome from M&E Framework	Evidence from Focus Groups conducted (cite sources specifically)	Evidence from External Interviews and other data sources (cite specifically)	Conclusion

Date of Reflection Session: _____ **Recorder:** _____

Appendix K: Evaluation Tool - Focus Group Protocol for Stakeholders

The WeRobotics SIPA team will conduct focus groups with local beneficiaries.

The local beneficiaries are indirect stakeholders that utilize the technology provided by the Flying Labs®. WeRobotics strives to maintain a bottom-up approach in their business model therefore, local beneficiaries are the best demographic to conduct focus groups with, being that they are the ones most directly impacted by the services WeRobotics provides. This is so that the workshop team can gain the most comprehensive information on the performance of the Flying Labs® in order to develop an exhaustive M&E structure.

Some of the questions in this specific focus group may be geared towards students in the Panama Flying Lab®, a critical stakeholder for the lab itself.

A. SUMMARY

Participants:

Specific stakeholder of the WeRobotics Flying Labs® in Tanzania/Panama

Location:

Flying Lab® office

Focus group duration:

90 minutes

Focus groups staff and roles:

- One SIPA team member will lead the discussion.
- One SIPA team member will take notes and will assist with the recording of the focus group.

Goal:

To evaluate the impact the Flying Labs® have on its beneficiaries in order to construct an M&E program.

Selection of participants:

10-15 people in each country (Panama/Tanzania) for the focus groups. Our team will ensure that a representative sample of beneficiaries is selected, both in terms of gender, profession, and age.

B. FOCUS GROUP GUIDE

1. BACKGROUND

Introductions:

Good morning,

Thank you for being here with us. My name is [...], and I will be asking you a few questions today. [...], who is sitting right there, will be taking notes. We are graduate students from Columbia University in New York, in the United States, and we are currently working on a project in collaboration with WeRobotics to consult and analyze the impact of their Flying Labs®.

Purpose of the research:

We are interested in speaking with you, as we want to learn more about your experiences with the Flying Labs® workshop and time you volunteer.

We wanted to go through an activity with you today, where we **ask you some questions and you all tell us how you feel about them**. There are no right or wrong answers to our questions as we are here to learn from you.

Please feel free to ask any additional or clarifying questions if you don't understand what we are asking. **We will be here for one hour and a half, so let us know if you want to leave or if you have to take a break**. Also, you do not have to answer any questions that make you feel uncomfortable.

Use of recorder:

We would like to go over this activity later on, so if it is okay with everyone, we would like to record the session. **Please sign this form we have provided you acknowledging your consent**. If you would rather not, please let us know.

Confidentiality clause:

The information you share with us today will be confidential. We will not use your names or identities in our report.

Do you have any questions so far? If you come across any, please feel free to ask us at any point during the session.

Ground rules:

Before we begin, this is an open discussion and we value all opinions and viewpoints so please feel free to speak openly and without hesitation. If you are not comfortable with any questions as part of this focus group, please let us know.

As mentioned previously, we are working on a project to develop a system for the Flying Labs® and are interested in ensuring that the system considers the opinions of everyone who interacts with them. Our questions will focus on your use of the WeRobotics Flying Labs®, specifically on how they are helping you professionally.

2. QUESTIONS

Opening/ice breaker question:

First of all, let's re-introduce ourselves and get to know each other better. **Please state your name and your course of study.**

Transition: I will start. My name is [...]. I am a student at Columbia University, where I focus on [...]. I am originally from [...]. Prior to Columbia, I worked as [...], and after I finish my studies I would like to do [...].

TOPIC 1: First contact with WeRobotics Flying Labs®

Transition: Thank you very much for your introductions. Now, let's turn to the matter at hand, the Flying Labs®.

1. How did you first hear about the [Panama/Tanzania] Flying Labs®?

2. What other opportunities did you have of engaging with robotics and drone tech prior to WeRobotics?
3. Why did you decide to work with the Flying Labs®?
4. Who do you interact with normally?

TOPIC 2: Activities

Transition: It seems that most of you met WeRobotics through [...]. I assume that it has helped you with your careers. Let's talk about how exactly.

1. What activities have you done while at the Lab?
2. How have you used the technology from the Flying Labs® in those activities?
3. What skills and knowledge did you have prior to working with the Flying Labs®?
4. Did the Flying Labs® give you training? What kind? What skills have you gained?

TOPIC 3: Professional Value

Transition: Thanks for sharing this with us.

1. What value has the Flying Labs® had for your academic and professional lives?
2. Could you elaborate with examples?
3. How will you work with them in the future?

TOPIC 4: Impact of Flying Labs®

Transition: Let's move to our final topic now, which is impact.

1. Are you comfortable with the concept of social innovation? If not define, please define your understanding of social innovation.

2. How would you define impact? If not, please define your understanding of impact.
3. What impact do you think the Flying Labs® is having in [country]?
4. What impact do you think the Flying Labs® is having in the region?
5. What about in the robotics field?
6. Why do you think that? Could you give some examples?

TOPIC 4: Final Questions

Transition: We are running out of time, so let's talk a bit about the future.

1. What future direction do you think the [Panama/Tanzania] Flying Labs® is heading in?
2. What role do you think you and future students can have in implementing that direction?
3. What do you think the Flying Labs® can improve in their interactions with you?
4. How can the Flying Labs® expand on their current direction?
5. What are the common things that you have heard during this discussion?

3. CONCLUSION

Closing Remarks:

We want to thank you so much for sharing your thoughts and taking time out of your busy schedule today. We are going to end our discussion here. Thank you for participating, you have all done an excellent job. As we have already said, we will not share your identities outside from this space.

If we have any questions, we will follow up with you. If you have any doubts, please do the same with us.

Thanks again!

