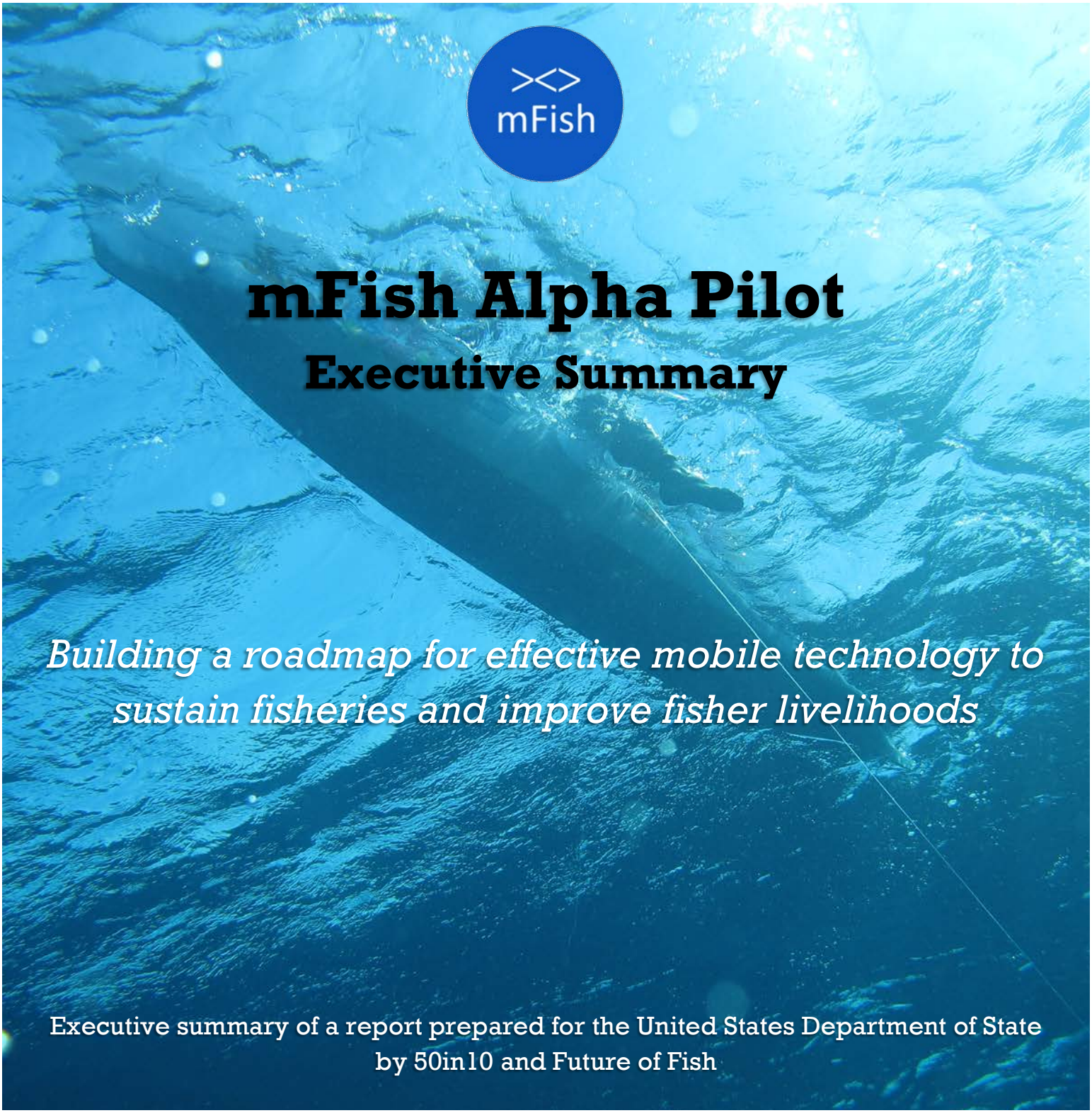


mFish Alpha Pilot

Executive Summary

Building a roadmap for effective mobile technology to sustain fisheries and improve fisher livelihoods

Executive summary of a report prepared for the United States Department of State by 50in10 and Future of Fish

PROJECT OVERVIEW

In May 2015, as part of the mFish public-private partnership, 50in10 and Future of Fish designed a pilot to evaluate how to improve adoption of a new mobile technology platform aimed at improving fisheries data capture and fisher livelihoods. Over four weeks, the fishermen carried smartphones installed with the /tone platform with them at all times. Both at sea and on land they trialed mapping, weather, and plankton apps as well as basic communication features on the phones. Each boat was also outfitted with a Pelagic Data Systems VMS unit to track vessel location throughout the pilot. Dockside, enumerators used tablets to record catch data via a newly developed app by Point 97.

Ethnographic studies were conducted during two field trips, following fishermen and documenting their behaviors, relationships, and reactions to the mobile technology. Observations and interviews were also conducted within the community. Overall, due to a lack of connectivity, fishers could not access the apps the majority of the time. Despite this lack of usability, major drivers of technology uptake and key ethnographic insights provide guidance for improving adoption of functional mobile technology in the future. The full report for the mFish Labuhan Lombok Alpha Pilot can be downloaded here.

BACKGROUND

In June 2014 at the Our Ocean Conference in Washington, DC, United States Secretary of State John Kerry announced the ambitious goal of ending overfishing by 2020. To support that goal, the Secretary's Office of Global Partnerships launched mFish, a public-private partnership to harness the power of mobile technology to improve fisher livelihoods and increase the sustainability of fisheries around the world. The three founding partners of mFish are private communications company /tone, the fisheries restoration accelerator 50in10, and the US Department of State.

To complement independent efforts by /tone for large-scale distribution of mobile technology, the US Department of State provided a grant to 50in10 to create a pilot of mFish that would allow for the identification of behaviors and incentives that might drive more fishers to adopt novel technology. 50in10 engaged several partner NGOs to identify a fishing community that could serve as a test pilot for deployment of mFish, and in February 2015 launched the "Labuhan Lombok Alpha Pilot" of mFish in Labuhan Lombok, Indonesia in collaboration with Yayasan Masyarakat dan Perikanan Indonesia (MDPI) and the non-profit Future of Fish. The pilot involved the introduction of 15 smartphones equipped with the /tone platform and apps to fishermen in Indonesia's handline tuna fishery.

ALPHA PILOT DEVELOPMENT AND HUMAN CENTERED DESIGN

To assist 50in10 with the planning, implementation, and evaluation of the Alpha Pilot, Future of Fish used a human centered design (HCD) approach, based in ethnography, to identify individuals' motivations in order to craft incentives that align existing values with desired outcomes. The strategy is based on the premise that people have reasons for behaving the way they do, and most often those reasons stem from the structures of the systems in which people operate. Early conversations with partners and regional experts surfaced the following concerns, which shaped significantly how mFish technology was introduced and implemented in Labuhan Lombok, and should be considered for all future mFish pilots:

Risk 1: Technology meant to help fishers improve their catch may unintentionally result in increased overfishing.

Risk 2: Although seasoned technology users tend to assume new products will have bugs and glitches, the expectation of pilot participants can be that technology will work flawlessly. Introducing an imperfect product creates a risk that participants will become jaded from failed pilots, potentially jeopardizing future technology work with those communities.

Risk 3: Poorly planned pilots not only threaten the future of the program itself as it aims to scale, but also threaten the reputation of the local NGO among participants and thus, risk the success of other on-going programs.

ETHNOGRAPHIC INSIGHTS

The ethnographic fieldwork surfaced four overarching insights from the multiple observations and interviews conducted in both Labuhan Lombok and Ampenan. These emergent themes provide a lens through which actions, behaviors, and decision-making can be understood, and motivations and incentives can be identified.

An extended sense of family

Up and down the supply chain and among fishers, relationships are social or familial, not just transactional. At home, at port, and at sea, the community value of looking out for one another often out-weighs economic ambition. Great value lies in the patient building of trust and personal investment in one another over time. An expectation exists that, once initiated, relationships will be enduring and forward-looking. That desire to build connection can fuel long-term engagement in mFish initiatives, but it also requires careful planning so as not to disappoint or fail to meet cultural expectations.

Partnerships and collaboration

This fisher community is a society where teamwork is necessary and embraced. In this system, risk is assumed collaboratively, as is reward. Introducing an individualistic device such as a mobile phone into a setting where group ownership is the norm could disrupt social dynamics. It is important to understand what makes for the most appropriate "unit" of delivery.

The gift economy

Social relationships are reinforced through the tangible exchange of material goods. Through gift giving, individuals nurture enduring relationships that are grounded in both the past and the future. Gifts are not commodities – they reflect the social and personal capital invested between giver and receiver. Gift giving initiates or perpetuates a social obligation to reciprocate, something that may have ripple effects for technology deployed with "free" products or services.

Predictability vs. vulnerability

In an industry riddled with uncertainty, the ability of individuals to mitigate risk through smart decision-making is highly valued. Fishers are constantly faced with weighing their need to fish against the potential dangers of fishing; the benefits of extending their fishing trips and increasing the catch amount, versus the downside of lower quality fish. Ambition and risk are forced trade-offs in every decision. Providing new tools that can reliably reduce vulnerability will be an enormous asset to fishers, but those tools must be deployed with caution. New tools will influence the way people make decisions, and the consequences of a bad decision can be catastrophic.

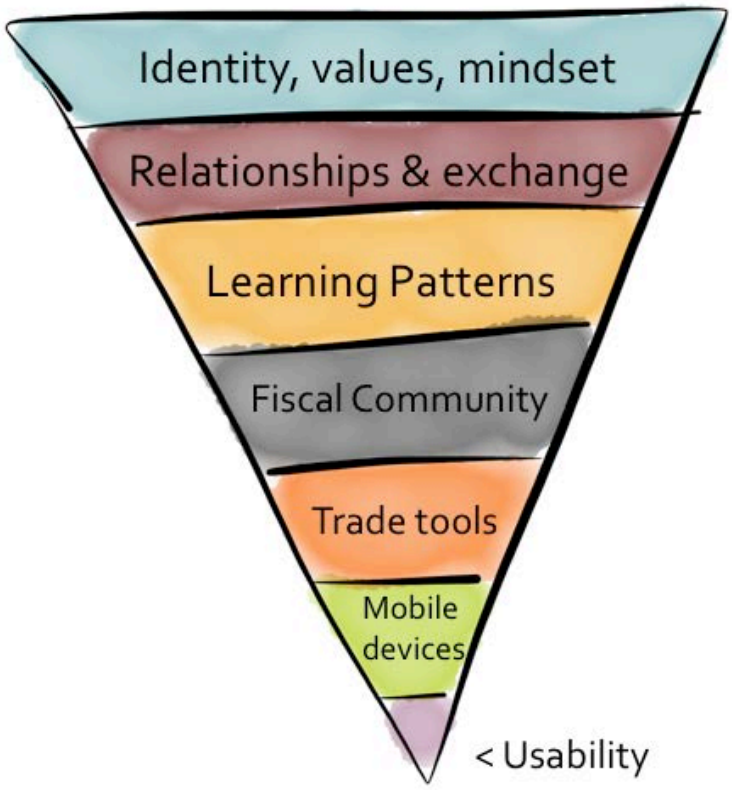
SENSE-MAKING: SURFACING INSIGHTS AND PRINCIPLES FOR FUTURE ROLLOUTS

The goal of mFish is global in reach, seeking to enhance livelihoods and foster sustainable fisheries management across diverse fisheries, geographies, and cultures. To do so successfully requires strategy and design around three aspects of the mFish initiative: the suite of technology solutions, the technology deployment into a community, and pilot site selection and expansion.

Uptake Influencers: Considerations for the Design of the Technology

The usability of a technology is merely one aspect of assessing its success within a test group. Often, social contextual issues have a bigger effect on whether or not a technology is appropriate. Our ethnographic research identified several key layers of influence that affect uptake of technology. Knowledge of these layers will allow developers to design apps or other technology products that have clear value and cultural alignment – factors that greatly improve the chances of adoption.

Identity, values, and mindset: The more a technology is consistent with or reinforces the values and mindset of the community, the more likely it will be to succeed.



Relationships and exchange: How does technology fit into the existing ways relationships are structured? Some apps may need to be far more polished upon release than others if their use affects important relationships.

Learning patterns: Understanding how individuals learn and absorb new information, experiences, or products can inform how technology can be introduced most effectively.

Fiscal community: There are myriad ways fishers and supply chain players may finance the business of fishing—how might technology support or disrupt these systems?

Trade tools: The degree to which tools or technology are used to get work done on a daily basis can indicate whether a smartphone device could be incorporated into the logistics of work at sea, as well as whether introduction of new tools, such as VMS, might be a possibility.

Mobile devices: Understanding where a community currently sits with regard to mobile development, and where it is headed, can help shape the context of future mFish pilots.

Usability: Finally, usability explores the user experience and value of the mFish technology and apps for fishers at sea and on land, in the context of all other influencers.

Recommended Apps for Future Consideration

Alpha Pilot participants were genuinely interested in using the phones and the ethnography surfaced a number of desired apps and services that could be developed. These ranged from apps that could support better decision-making by assisting captains with weighing factors such as weather, fuel prices, and market opportunities to improved "weather apps" that focused on sea

surface conditions to apps that served as detailed reference guides for both regulations and species identification. See full report for a complete list of recommended apps.

CORE PRINCIPLES OF FUTURE PILOT DEVELOPMENT

The following core principles provide a framework for continued development of the mFish platform so that it works with, rather than against, the value and cultural context of the target fishery. Although insights are specific to Labuhan Lombok, most are indicative of larger patterns of technology uptake in coastal nation artisanal fisheries and can help guide any future technology pilot.

1. Relationships above all else. Fishermen can be reluctant to engage in new initiatives, especially ones pertaining to resource conservation or management. Thus, local NGOs are critical to getting pilots off the ground. The success, efficiency, and feasibility of a pilot depend on the strength of the relationship between the local NGO and local community.

2. Mitigate risk for the NGO. Of all the stakeholders investing in a pilot, the local NGO stands to lose the most if the technology fails to perform or somehow disrupts the system in a way that leads to negative outcomes. A failed pilot might not only turn fishers off to the idea of that specific technology, but might also jeopardize the local NGOs' future work in the community, especially if the social capital built with the community is spent on damage control.

3. Achieve early proof of concept. A poor track record in conservation and management efforts precedes the work of mFish in many regions around the globe. A consequence of this history is that fishers and NGOs have little tolerance for failure, which reduces the timeline within which iteration can happen. The mFish platform likely needs to be more refined than may be typical of most types of technology deployment in order to avoid derailment early on.

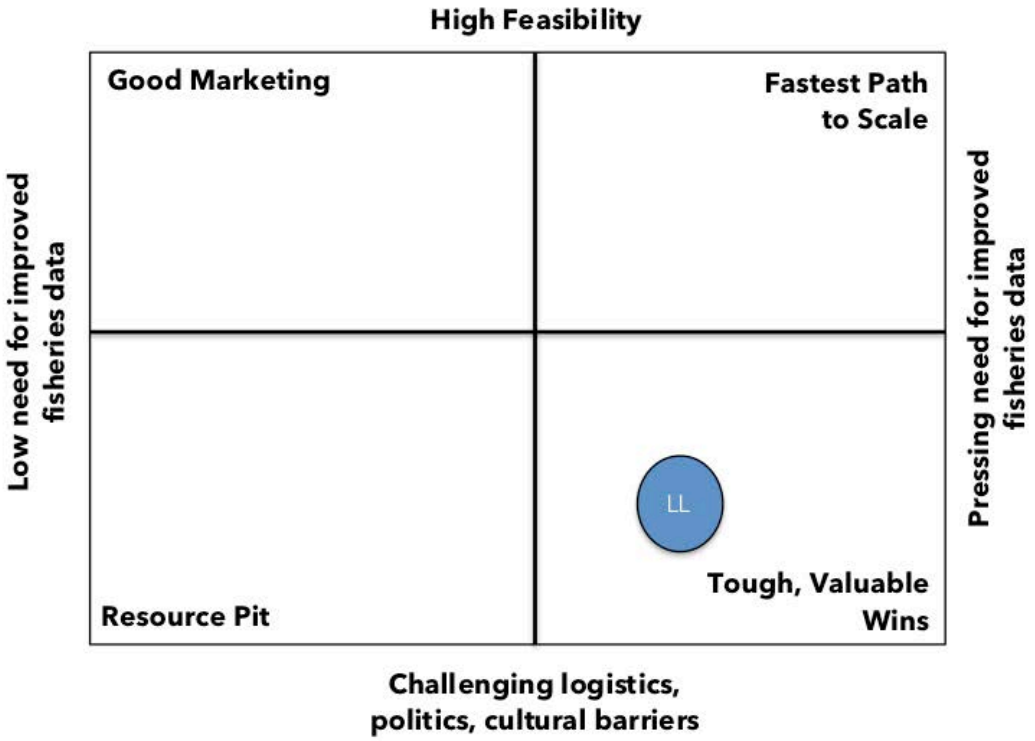
4. Respond in a timely way. The success or failure of early mFish pilots will greatly affect receptivity of future pilots, increasing the pressure for these initial efforts to succeed. Fishers that saw the effort on the part of the mFish team to provide swell data – even in a rough fashion – were noticeably pleased (and surprised) at this level of responsiveness. Setting up the resources for pilots to support rapid response to fisher feedback will go a long way in establishing positive reputation and outcomes of the mFish initiatives.

5. Diversify technology to build ecosystems. Diversifying the number and kinds of technology partners affiliated with mFish is important for long-term success for several reasons. First, it helps to mitigate risk, so that upon release, the chances are greater that some element of the mFish system will work and provide value to fishers, and the chances are lower that any problems with

one technology partner will negatively affect the entire mFish program. Second, diversification of technology partners could help drive more efficient and effective product development, helping to address issues of connectivity, app creation and design, as well as the incorporation of a more diverse set of incentive structures. Third, a true technology ecosystem means the different products and services complement and support one another, creating a more powerful and valuable product overall.

6. Address database management needs. MDPI identified early on the need for back-end database management support in order to effectively capture, store, and securely share data gathered by mFish. Collection of data does nothing to help fishers or fisheries if that data cannot be accessed and analyzed in ways that inform better management or provide opportunities for fishers. Many of the emerging market economies that have data poor fisheries, where mFish could be most helpful, also lack government resources or coordination to manage the data. This is a non-trivial concern that requires extreme care in handling: fisheries data is highly sensitive information, for both fishers and governments. Discussions and likely facilitated co-design of effective models for database architecture and management are needed to support the larger mFish initiative.

A DECISION FRAMEWORK FOR MFISH EXPANSION



Need vs. Feasibility

Every potential pilot fishery falls somewhere along an intersection of the two continuums: Need and Feasibility. The Need continuum is a measure of the information deficit of a fishery and the impact of that deficit on the health of the resource and the people who depend upon it. Feasibility is a measure of the logistical and cultural factors that either stifle or stimulate the uptake of mobile-based technology solutions. Together, these two axes build a framework for decision-making. Understanding where a potential pilot fishery falls within this framework will help to identify the easy wins for mFish rollouts, as well as where more resources may be needed in order to effectively scale the initiative.

- High Need sites represent fisheries under pressure and fishing communities facing hardship; they are likely to attract the most attention and funding.
- Fastest Path to Scale sites are those potential fisheries that demonstrate both high Need and high Feasibility. These represent low-hanging fruit for next-stage pilot rollouts.
- Sites within the Resource Pit landscape have little need for data collection and have very challenging deployment conditions. Such sites, at least for the first wave of mFish expansion, offer little bang for the buck.
- Good Marketing sites offer a combination of low need but high feasibility, which can provide ideal testing conditions for new technology or for comparison of mobile solutions with other forms of data collection already in place under low-pressure conditions.
- Tough, Valuable Wins sites, such as Labuhan Lombok (LL in the diagram above), require more resources up front, but offer potentially valuable wins in terms of providing much needed information to data poor fisheries.

Impact Metrics

Before selecting new pilot sites, mFish must set a clear strategy for how to define and measure impact. To the extent that early pilots can show how mFish meets fisher needs and fisheries data management goals, the program will see uptake into new regions. Additionally, the power of the mFish platform lies in its potential to address multiple issues facing global fisheries. However, without clearly defined goals, the program will be unable to manage expectations and design for success. Sites where Need and Feasibility are both high, and where clear metrics can be collected and evaluated, may prove the most strategic sites for the next wave of mFish pilots.

Further Ethnographic Study

Finally, ethnographic research provides insight into the underlying incentive structures that, if designed for, can move a site from low to high Feasibility. While a deep ethnographic study cannot be conducted for every pilot site, the use of this methodology to help identify a broader set

of potential incentives could prove extremely valuable for building a Typology of Technology Uptake for emerging market fisheries. That work would allow the mFish initiative to design more impactful technology ecosystems that are readily aligned with the needs and feasibility requirements of fisheries around the globe.

ALPHA PILOT EVALUATION

The ethnographic research and interviews conducted by the Future of Fish team during pilot development, implementation, and evaluation led to a number of observations and lessons, which are summarized below. These lessons inform the Core Principles and Decision Framework presented above.

Small-scale rollout and portfolio approach help mitigate risk

Building a technology portfolio was a successful approach to initiating the Alpha Pilot, both in terms of reducing the impact of a single technology failure, as well as leveraging the core competencies of qualified technology providers with useful apps for fishers. The small size of the pilot also helped alleviate fears that technology failure could have wider-reaching ramifications. Having an independent entity (in this case, Future of Fish) to mediate between partners during negotiations and in executing agreements was critical to advancing the technology collaboration necessary for building out the mFish platform. Prior to Future of Fish involvement, communication among technology vendors had been stalled by concerns over how partnerships would progress.

Importance of local mFish coordinator and on-the-ground tech support

The local mFish coordinator was the bridge between the fishers and mFish partners, providing a personal face and collaborative pathway for fishers as they engaged. Having someone who was familiar with the community, bilingual, and had previously worked with MDPI helped to increase trust in the mFish initiative.

Logistical and technical difficulties highlight need for adaptive planning

Proper reconnaissance, to anticipate key logistical hurdles, such as the strength of basic connectivity on land, will go a long way toward effectively customizing mFish platform to suit the conditions of the region (see Appendix I Pilot Checklist). Even so, unanticipated hurdles are to be expected. Customs delays, problems with hardware, poor connectivity on land, and software glitches significantly delayed the launch of the Labuhan Lombok Alpha pilot and served as key indicators that flexible planning schedules and on-the-ground tech support personnel are needed for effective execution of pilots.

Setting realistic expectations critical for training process

According to MDPI, past experiences with failed initiatives, researchers that asked a lot of questions and disappeared, or other "experts" promising solutions that never materialized have left a lingering skepticism in the Labuhan Lombok fishing community. Thus, for the Alpha Pilot, fishers were told that solutions were still being tested, and that the mFish team needed help refining and improving those solutions, and in turning ideas into reality. That clarification was repeated necessarily several times, as fishers continued to push for more information about what the phones could and would do. The enthusiasm of mFish, while requiring appropriate management of expectations, also meant fishers made helpful suggestions regarding how they wanted to use the phones.

Participants faced double learning curve; more dynamic training needed

For captains and fishers, not only were the /tone platform and apps unfamiliar, but many had never used a smartphone. For that reason, a fair amount of time was spent introducing participants to the devices with a high instructor-to-pupil ratio of 1-to-4 to introduce both the smartphones and the /tone applications. Future pilots should prepare for the possibility of steep learning curves, while also ensuring that trainings align with participants' learning styles. Fishers and captains are not accustomed to classroom-style learning, and should not be expected to grasp abstract ideas and unfamiliar technology by way of written guides and oral presentations. To the extent that training manuals are necessary, they should be brief, oriented toward troubleshooting, and designed for use at-sea.

Fisher training outside MDPI office. Photo: Charley Scull

"Co-Design" aspect of Alpha Pilot appealing to fishers

Fishers in Labuhan Lombok were attracted to the idea that they were part of developing the mFish platform, and liked that trainings were conducted at the MDPI office in a "formal" setting. Fishers enjoyed meeting other MDPI staff and took pride in being seen as part of the official mFish program. If this is the case for fishers in other regions, efforts to demonstrate larger project scope could help to engage fishers and build their sense of pride in being part of something bigger.

Formalizing participation through "contracts" may also increase participation, quality of feedback, and willingness to serve as ambassadors for the program.

Pre-loaded apps miss the mark

The three apps that populated the /tone platform and the enumerator app each faced significant but different challenges. The three apps on the /tone platform failed to deliver the promised information that could have been beneficial to fishers: location, plankton, and weather data. As a result, participant reaction to mFish technology was fairly negative. Fishers expressed frustration with the gap between expected functionality and the reality of what was delivered. The enumerator app designed by Point97 worked flawlessly in terms of technology, but fear from the test group that learning the technology might slow down their paper-based process and thus risk supply chain relationships, impeded uptake.

Mapping app not functional offline

The mapping app on the phones failed to function during the Labuhan Lombok pilot. Although the app was meant to work offline to allow fishers to drop pins and record notes, it did not. Once at sea and away from cellular service, the mapping app did not open on the /tone platform at all. In contrast, the mapping app did work where connectivity was greater in the Ampenan pilot. There, fishers were pleased to be able to locate their buddies on the water and send messages while at sea.

Plankton app data outdated

The idea behind the plankton app is that for some fisheries, higher levels of plankton productivity can be correlated with abundance of different fish species. However, because plankton levels change dramatically over narrow windows of time, any app that provides this information must be near real time to be useful. As deployed during the pilot, the plankton apps were fed data from out-of-region databases and over time-delayed periods, which was unhelpful for fishers.

Weather app fails to forecast

As currently configured, the weather app gathers current weather data (temperature and wind speed) from land-based weather stations. Fishers, however, need weeklong weather forecasts for offshore sites. They want information to help them plan their trips and determine when to set out for sea, or when to stay put. The importance of accurate weather forecasting cannot be underestimated. Safety at sea is a real risk that was noted by fishers in both pilot sites.

Ad hoc addition of makeshift swell data app a hit with fishers

Fishers noted that one of the most important weather features was sea surface swell – data that were not included in the preloaded apps. Future of Fish staff researched surfer community

websites that provided near real-time and forecasted swell information for the region. The local mFish coordinator was then able to upload this website to the news platform for the mFish pilot, providing all fishers connected to the /tone platform the ability to see the new content. Unfortunately the website was in English, so it was not an ideal site for this feature, but it did provide an opportunity to test the responsiveness of the /tone platform to iteration based on fisher feedback. When shown this update, fishers were enthusiastic about the potential, and especially appreciative of the effort to respond to their requests.

Enumerators hesitant to adopt new data-recording technology

Point 97's enumerator app was created to mimic enumerators' paper reporting forms, as well as streamline the data entry process and promote more efficient workflow. While these features functioned well, the pilot version did not allow entries to be modified once they were submitted. Enumerators felt uneasy about their inability to make corrections, and also feared that learning to use the app would slow down their data recording process and strain their relationships with suppliers.[1] In some circumstances, app developers may need more direct insight – preferably on-the-ground observation – of the community for whom they are building solutions in order to increase effectiveness of the apps. Providing funding up front to support such observation and interaction between developers and the users can result in cost-savings and greater effectiveness down the road.

Pelagic VMS initially met with caution, eventually embraced and praised by fishers

Fishers review track from VMS system for first time. Photos: Charley Scull

[1] In Labuhan Lombok, the first receivers of the fish from fishers are referred to as suppliers, as they often provide additional services to fishers, such as supplying equipment, loans, etc. These are the equivalent of buyers or middlemen in other artisanal fisheries.

Upon introduction to the Pelagic Data Systems VMS, fishers were initially wary of the idea of a tracking device. However, once they learned that the information from the unit would be for their own viewing, as well as for the mFish team, they were excited to try it out. Further, in contrast to the high-touch training and education required to get fishers up to speed to use smartphones, the deployment of the Pelagic VMS was seamless, and data collection effortless. By using GPS to track locations, the VMS provided detailed *ex post* maps of fishers' journeys, which proved popular with fishers who could view tracks once back on land where connectivity occurred.

NEXT STEPS WORKSHOP

Workshop participants present their prototypes. Photo: Charley Scull

On May 20, 2015, Future of Fish and 50in10 hosted a one-day workshop for stakeholders of Indonesian fisheries in Bali, Indonesia. The purpose of the meeting was to share preliminary findings from the Labuhan Lombok mFish pilot and solicit feedback from regional experts in an effort to craft an informed and effective roadmap for future rollouts of mFish. Workshop attendees included staff from local and international NGOs, government officials, and seafood industry experts. The mFish history and goals were explained by the three founding partners of the program, and the Future of Fish team presented findings from the Alpha Pilot. A panel discussion followed, which featured local NGOs working with pilot programs in Labuhan Lombok and Ampenan. The final workshop activity involved attendees forming groups to design their own apps for the mFish platform. The full report from the Next Steps Workshop can be found here (PDF link)

Feedback from workshop attendees was generally positive. Several regional NGOs expressed interest in how mFish technology might be beneficial to their programs, but were also concerned about feasibility challenges, including funding. The anthropological and design approach and preliminary results resonated strongly with many of the practitioners present, in particular the idea of non-monetary incentive structures for changing behaviors and practices.

METHODS: TECHNOLOGY PARTNERS, DEPLOYMENT, AND FIELDWORK

50in10 and Future of Fish designed the Labuhan Lombok Alpha Pilot to include a suite of products that provided for a diverse and complementary technology ecosystem. Beyond the /tone platform's standard features, two additional private technology partners (Pelagic Data Systems and Point 97) were recruited for the pilot. The Alpha Pilot was intentionally small to help minimize the risks outlined above. As such, the pilot involved five boats and 15 smartphones: Five phones and Vessel Monitoring Systems (VMS) units went to captains, five phones went to crew, and five additional phones were distributed to each of two suppliers, a local mFish coordinator, and Future of Fish and MDPI staff member. Three tablets also went to enumerators. The mFish technology training occurred at the MDPI office.

The ethnographic fieldwork involved two phases. The first phase consisted of formalized sit-down interviews with Labuhan Lombok fishers at the MDPI office, supplier base, and fisher homes, as well as less structured, in situ interviews, conducted in the observational context of the docks and community. This phase also included a trip to Ampenan, another fishing community on the other side of Lombok island where /tone had launched a separate commercial pilot of 50 phones. The second phase involved at-sea observation of Labuhan Lombok fishers.

In addition, 50in10 and Future of Fish engaged experts in technology deployment in Asia, as well as fisheries experts, to discuss how to most effectively use the mFish pilot to generate fisheries-relevant data and engage fishers. The findings based on those preliminary discussions indicated that there are significant barriers and disincentives to fishers reporting catch data in the region, including:

- The structure of the tax system, in which fishers are taxed based on their reported catch
- Cultural and logistical concerns regarding carrying or using additional devices while at sea
  General suspicion of outside organizations and the government

By spending time with and learning from both MDPI and fishers, Future of Fish was able to identify the barriers and incentives around technology uptake, and design the Alpha Pilot to align with both individual and community values.

The full report for the mFish Labuhan Lombok Alpha Pilot can be downloaded here.