

Do mLabs Make a Difference?

A HOLISTIC OUTCOME ASSESSMENT OF
infoDev'S MOBILE ENTREPRENEURSHIP
ENABLERS



THE WORLD BANK

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Mailing Address: MSN I9-900 1818 H St. NW, Washington D.C., 20433 USA

Telephone: (+1) 202- 458-4070

Website: www.infodev.org

Email: info@infodev.org

Twitter: @infoDev

Facebook: /infoDevWBG

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About **infoDev** and **CSBKE**

infoDev, a global trust fund program in the Financial and Private Sector Development Network of the World Bank Group, supports growth-oriented entrepreneurs through innovative venture enablers. It assists entrepreneurs to secure appropriate early-stage financing; convening entrepreneurs, investors, policy makers, mentors, and other stakeholders for dialogue and action. infoDev also produces cutting-edge knowledge products, closely linked to our work on the ground. Among other initiatives, infoDev has implemented the Creating Sustainable Businesses in the Knowledge Economy (CSBKE) program, a trust fund established by the government of Finland with the objective to increase the growth of small, innovative, and technology-based business, primarily in the information and communications technology (ICT) and agribusiness sectors. The CSBKE program was designed as a public-private partnership among infoDev, Finland, and the Nokia Corporation and covers the period from March 2010 to June 2014.

About **CAD**

CAD (Centre of Partnerships for Development) is a network of international experts specialized in international development, local economic development, and public-private partnerships, with a focus on small and medium enterprises (SMEs) in developing countries, entrepreneurship, Base of the Pyramid, and monitoring and evaluation tools and methods.

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1. EXECUTIVE SUMMARY



This report is an assessment of the overall effects of infoDev's mobile application labs (mLabs). mLabs are specialized mobile business incubation and acceleration facilities offering physical workspace, mentoring and coaching, devices for mobile application testing, training, and startup competitions. mLabs were designed as pilot projects under the Creating Sustainable Businesses in the Knowledge Economy (CSBKE)¹ program and have since become part of infoDev's Mobile Innovation Program.²

The Outcome Assessment compares mLabs' results against the original program objectives. At the outset, the goal for mLabs was to derive and test new approaches that would "1) increase the competitiveness of innovative enterprises in the mobile industry, and 2) ensure that locally relevant applications are created to meet growing developing country user demands." Within the three-year project implementation period, the pilots were expected to "generate 8-10 mobile applications; increase the commercialization rate of applications that have the potential for significant development impact; and increase the scale and competitiveness of innovative mobile applications enterprises leading to greater reach to disadvantaged populations." The design and testing of mLabs started in 2010.

In accordance to the original objectives, the assessment examines mLabs' effects on startup creation and development (as the best available proxy measures of increased competitiveness in mobile application enterprises) and the development impact generated through the use of applications developed by mLab-supported developers and entrepreneurs, including the number of relevant applications. The assessment also includes an analysis of mLabs' effects on entrepreneurial ecosystems, since anecdotal evidence previous to the assessment pointed towards potentially substantial effects that were not originally envisioned under the CSBKE program.

The geographical scope of the assessment is South Africa for mLabs Southern Africa; Armenia for mLabs ECA (Eastern Europe, South Caucasus, and Central Asia); and Kenya for mLabs East Africa. mLabs East Asia in Vietnam was not part of this assessment as the mLabs was not operational long enough to justify a comprehensive effect analysis. The assessment thus covers three of the four operational mLabs.

Data collection encompassed 116 semistructured interviews with stakeholders from 82 different organizations, covering most stakeholder groups of analyzed entrepreneurial ecosystems. In addition to primary qualitative data, secondary quantitative data from monitoring records and statistical sources were considered. Overall, the analysis followed a qualitative in-depth assessment methodology and a contribution analysis approach, employing a "best effort" qualitative counterfactual.

The assessment adds to an earlier evaluation of mLabs' business models³. The present report therefore covers only the information pertaining to the Outcome Assessment. It will not elaborate on findings and background information already described in the Business Model Evaluation, such as the following: information on budgets of the mLabs program, the rationale and original conception of the program, future directions, detailed case studies of each mLabs including mLabs East Asia, lessons learned, challenges and failures,

1 · The CSBKE program was launched in 2010 with the objective to derive and test new approaches to advancing innovation and entrepreneurship in developing countries.

2 · See <http://www.infodev.org/workprogram>.

3 · Available at <http://www.infodev.org/mobilebusinessmodels>.

4 · Mobile startup and entrepreneur case studies are available at <http://www.infodev.org/mobilecases>.

operational models, financial sustainability, and more. The report provides excerpts of more detailed case studies from noteworthy mobile application startups that were published separately⁴.

mLabs' Effects on Startup Creation and Development

Reported results together with qualitative data from interviews suggest that mLab-supported startups have had tangible economic success after less than three years of operation. There are reasonable indications that mLabs contributed to this success, though the evidence is not entirely conclusive and the net economic effect cannot be quantified with precision. mLabs supported and incentivized the creation of close to 70 new startups through their activities. The newly created and other client startups increased revenues over the duration of the support period, created over 180 high-quality jobs, and raised more than \$2.2 million in investments and seed funding as of September 2013 (including grants).

Development Impact Through the Use of Mobile Applications

For the purpose of this study, 'development impact' was defined as a mobile application's contribution to the Millennium Development Goals (MDGs), addressing the needs of users at the Base of the Pyramid (BoP), or otherwise pointing towards transformative potential to improve conditions for people and businesses. By this definition, 41 of the total 292 identified mobile applications had actual or potential development impact, of which 29 were analyzed in detail.

This group of 29 applications includes a few significant development impact success stories, several applications that generating satisfactory effects, and a majority of applications still in pilot stages. The number of mobile applications generated greatly exceeded the original target of 8 to 10 applications per mLab, and in most cases, the applications represented locally relevant solutions.

In Kenya, development impact through application usage included improved access for impoverished rural communities to fundamental services such as health, education, and financial services. In South Africa, three applications are generating a positive impact on mobility and employment opportunities, and two others are raising awareness on crucial problems such as gender violence and child abuse. In Armenia, applications are at a more

incipient stage of roll-out, but examples with potential development impact include applications for reforestation and water quality management.

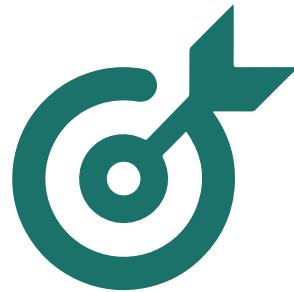
mLabs' Contribution to Entrepreneurial Ecosystems

mLabs have functioned as active ecosystem builders: their business models and value propositions have focused not only on startup creation, but also on elements that have expanded the breadth of entrepreneurial ecosystems. mLabs have created new spaces for exchanges, brought in new actors, generated new linkages between stakeholders, opened channels and pipelines for startups to emerge that did not exist previously, and stimulated new innovation processes in the ecosystem. Pilot experiences of all three analyzed mLabs have also shown that the regional and cross-national nature of mLabs enables a high potential to connect local, regional, and international ecosystems.

It was assessed that mLabs had a positive impact on the ecosystem based on the report analysis. Notably, the analysis was able to identify unexpected and indirect contributions, including for client and beneficiary groups that are only indirectly connected with the mLabs. While this assessment does not present precise quantifications, the evidence overall suggests that the direct net economic effect of mLabs through the creation and development of mobile application startups is only one part, and potentially not even the largest part, of mLabs' contribution.

In particular, mLabs have proven a viable mechanism to enhance entrepreneurial ecosystems. This effect is particularly noteworthy as it had not been an explicit goal in the original mLab program design. The effect also implies promise for mLab replications in countries and regions with incipient and latent, yet promising, mobile entrepreneurship ecosystems. Regarding development impact through the use of mobile applications, the original (and in hindsight, modest) goals for the number of applications produced per mLab were surpassed. Yet, the number of applications with significant development impact that have scaled has so far been low. The coming years will determine whether the many applications currently undergoing testing will in fact be successful in the market, which would add significantly to the overall development impact through application usage.

2. SCOPE AND OBJECTIVES



This report aims to broadly answer the question: Do mLabs make a positive difference for their clients and stakeholders? To do so, the document aims to assess mLabs' holistic effects, including effects that had originally been envisioned as well as those that became apparent later.

mLab services are geared towards three broad goals: (1) startup creation and support; (2) skills development; and (3) community building⁵. mLabs were designed as pilot projects under the Creating Sustainable Businesses in the Knowledge Economy (CSBKE)⁶ program from infoDev and have since become part of infoDev's Mobile Innovation Program⁷.

infoDev took the traditional concept of business incubation and integrated it with elements drawn from areas, such as startup acceleration, app economies, and tech and startup communities. The program moved from traditional incubators toward more flexible mobile entrepreneurship enablers that would be placed at the heart of mobile innovation and entrepreneurship ecosystems.

Today, mLabs form a part of infoDev's Mobile Innovation Program, a work stream that supports growth-oriented mobile app businesses in emerging and frontier markets⁸. The program does this by enabling entrepreneurship in the mobile industry, through venture incubation and acceleration, building mobile innovation communities of entrepreneurs, investors, partners, and mentors, and by researching the app economy of local markets.

At the core, this report was an effort to test whether mLabs had achieved their original goals and if they resulted in

any other notable effects. Originally, the objective of the mLab program was to derive and test a new operational approaches that would "1) increase the competitiveness of innovative enterprises in the mobile industry, and 2) ensure that locally relevant applications are created to meet growing developing country user demands." Within the project implementation period (three years), the pilots were expected to "generate 8-10 mobile applications; increase the commercialization rate of applications that have the potential for significant development impact; and increase the scale and competitiveness of innovative m-applications enterprises leading to greater reach to disadvantaged populations."

The two first types of effects that the assessment examines thus follow logically from the original objectives of the mLab program: the report describes (1) mLabs' effects on startup creation and development (as the best available proxy measures of increased competitiveness in mobile application enterprises)¹⁰ and (2) the development impact generated through the use of applications developed by mLab-supported developers and entrepreneurs, including the number of relevant applications. In addition, during early consultations with infoDev it became clear that a third type of effect could substantially contribute to mLabs' overall effect, even if it had not originally been envisioned under the CSBKE program. Namely, the assessment revealed that (3) mLabs could have notable effects on the host cities' and nations' entrepreneurial ecosystems (see box 1 for a definition). The three research questions that resulted from initial discussions are summarized in table 1. Broader goals of CSBKE, such as improvements in the knowledge economy or reaching disadvantaged populations with mobile innovations, are covered implicitly under these three types of effects.

5 · Source: The Business Models of mLabs and mHubs – An Evaluation of infoDev's Mobile Innovation Support Pilots, available at <http://www.infodev.org/mobilebusinessmodels>.

6 · CSBKE is a public private partnership program implemented by infoDev with support from the government of Finland, in partnership with Nokia.

7 · See <http://www.infodev.org/workprogram>.

8 · infoDev's complete Work Program is at <http://www.infodev.org/workprogram>, and more information on the Mobile Innovation Program can be found at <http://www.infodev.org/mobileinnovation>.

9 · Source: CSBKE project documentation.

10 · Although this is not stated explicitly in the excerpt from CSBKE program documentation, the goal was to improve mobile application enterprise competitiveness in the early stages of innovation, including up from the idea stage ("From Mind to Market"). This is where infoDev and others identified a support gap. Also see the rational for mobile entrepreneurship enablers in the Business Model Evaluation, available at <http://www.infodev.org/mobilebusinessmodels>.



WHAT IS AN ENTREPRENEURIAL ECOSYSTEM?

In this report, the term entrepreneurial ecosystem refers to all organizations, individuals, and institutions with an influence on growth-oriented technology entrepreneurs that focus on early-stage mobile application innovations, as well as the roles of these actors and the interactions between them.

TABLE 1: THE THREE RESEARCH QUESTIONS FOR THE ASSESSMENT

EFFECTS ON STARTUP CREATION AND DEVELOPMENT

What has been the contribution of mLabs to the creation and success of mobile application enterprises?



DEVELOPMENT IMPACT THROUGH THE USAGE OF MOBILE APPLICATIONS

What is the development impact from the usage of mobile applications and software developed by entrepreneurs and innovators supported by mLabs?



ECOSYSTEM IMPACT

What have been the effects of mLabs on entrepreneurial ecosystems?



The assessment is complementary to the earlier evaluation The Business Models of mLabs and mHubs – An Evaluation of infoDev's Mobile Innovation Support Pilots¹¹. The report analyzed the business models that mLabs and mHubs¹² implemented, putting the focus on how they generated value for stakeholders and income for themselves. This Outcome Assessment enhances the analysis of economic effects conducted in the Business Model Evaluation, and adds an analysis of the development impact through the use of mobile applications, as well as effects and influence of mLabs on local entrepreneurial ecosystems.

At the same time, this report will not cover findings and comprehensive background information on the mLab program, which were already described in the Business Model Evaluation. Indeed, it is advised that readers of this report first review sections of interest in the Business Model Evaluation to be able to put the analysis in the present assessment into context. Namely, the Business Model Evaluation includes budget information and financial plans, a

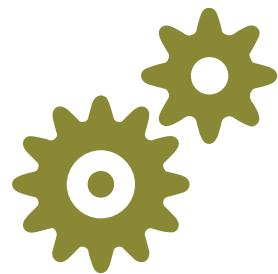
description of the rationale and original conception of the program, an extensive discussion of lessons learned, reflections on future directions for mLabs and infoDev, detailed case studies, more information on the operational models of mLabs and mHubs (including mLab East Asia and four mHubs not covered here), and descriptions of challenges and failures, as well as additional contextual information.

The remainder of the report is structured as follows: Chapter 2 describes the assessment methodology and chapter 3 gives outlines of mLabs' intervention context, mainly mapping the three analyzed entrepreneurial ecosystems. Chapter 4 includes the main findings of the assessment with one section for each examined effect type, namely the economic results of mLabs; the development impact generated through the use of applications developed by mLab-supported developers and entrepreneurs; and mLabs' impact on entrepreneurial ecosystems. Chapter 5 summarizes the findings and includes concluding remarks.

11 · In the following, we will refer to this report simply as the Business Model Evaluation. It is available at <http://www.infodev.org/mobilebusinessmodels>.

12 · mHubs, or Mobile Social Networking Hubs, are another type of mobile entrepreneurship enabler implemented under CSBKE, focusing on mobile innovation community building more than on incubation and startup support.

3. ASSESSMENT METHODOLOGY



Approach and Rationale

The assessment followed a qualitative in-depth assessment methodology based on interviews, focus groups, and observation techniques. A qualitative approach was considered to be the most effective to find answers to the posed research questions: First, the aim of the assessment is to understand the nature of the outcomes, and for this, qualitative methods are suitable because they generate information with a level of depth that purely quantitative methods cannot generate. Second, qualitative methods have been considered suitable to identify unexpected assessment outcomes, as well as complex effect interactions.

The assessment followed a contribution analysis approach¹³. To assess mLabs' effects beyond the immediate realm of their activities, the Outcome Assessment went through three process steps, drawing on the entrepreneurial ecosystems as boundaries for the analysis (see box 1): The identification of main actors and subsystems within the ecosystem (for example, innovation or startup creation) was followed by an analysis of roles and positions of mLabs within the ecosystems, before the actual assessment of mLabs' contribution to the quality and effectiveness of the ecosystems was completed.

This analytical process resulted in a mapping of each ecosystem, the identification of key actors and linkages between them, and ultimately an analysis of mLabs' contribution from diverse perspectives and parts of the ecosystem. The ecosystem maps for each mLab and the relational flows among actors are presented in chapter 3.

Data Collection

Primary data came from face-to-face interviews and group discussions, as well as direct observation of events. In total, 116 participants were interviewed, most of them in semistructured in-depth interviews and focus groups. Interviews were conducted during four-day field visits in Armenia, South Africa, and Kenya. The interviews also generated primary qualitative data for in-depth entrepreneur and mobile application case studies, published separately from this report, while¹⁴ section 4.2 includes excerpts. Annex B includes the list of all the people interviewed, organized according to these five groups. Field researchers asked questions such as "Do you think the mLab makes a difference for [a given startup's] success? What factors do you think made a difference?" or "Have community-building initiatives lead to the creation of new start-ups? If so, how?"

Secondary quantitative and qualitative data came from monitoring records and statistical sources, as well as a desk review. Also included were secondary qualitative data from interviews conducted for the Business Model Evaluation and an evaluation of mLab East Africa conducted by the University of Nairobi.

Sampling

The sampling method used was purposeful sampling, that is, nonprobability sampling, a method usually applied when the objective is to study information-rich cases in-depth. Table 2 gives an overview of the interviewed participant groups.

13 · In order to address the questions: What difference did mLab make? and What would have happened if the mLab had not been in place?, it was attempted to compare reports from client entrepreneurs with those from entrepreneurs that did not use mLab services. In other words, the assessment made a "best effort" to incorporate a counterfactual, even if only qualitatively, to be able to grasp the difference between overall effects and the unique effects of mLab interventions. However, the researchers were not able to construct a large enough, comparable counterfactual group to make claims about mLab's effects on startup creation and development. Instead, the interviews from the counterfactual group were used to corroborate findings on mLab's effects on entrepreneurial ecosystems.

Therefore, the assessment overall mainly draws on qualitative statements made by client entrepreneurs and other stakeholders (summarizing their judgments whether mLab made a difference), and the counter-factual will not be referred to explicitly in the assessment.

14 · Mobile startup and entrepreneur case studies are available at <http://www.infodev.org/mobilecases>.

TABLE 2: SAMPLE GROUPS

CLIENT GROUPS	COMPARISON GROUPS	COUNTERFACTUAL INDIVIDUALS
		
People directly benefiting from the services provided by mLabs, for instance, entrepreneurs, startups, trainees, and event participants.	Organizations providing similar services to those provided by the mLab and their clients, for example intermediary organizations and beneficiaries (startups and trainees) of their programs.	Entrepreneurs, startups, and businesses that have developed mobile applications and businesses without having drawn on business support services, such as incubation and acceleration.
		
ECOSYSTEM ACTORS	END USERS	
All actors populating the entrepreneurial ecosystem not included in any of the other four categories, such as universities, mobile operators, original mobile equipment manufacturers (OEMs), investors, training companies, government agencies, and others.	Individuals and businesses benefiting from the use of mobile applications or from an improved ecosystem, for instance, mobile application users and their communities, enterprise customers using the applications developed, and others.	

A comparison between the range of actors in the ecosystem and the range of people and organizations interviewed gives an estimation of the coverage of the Outcome Assessment in each country. The relevance of the findings in section 5.3, which analyzes the influence of mLabs in the ecosystem, is corroborated by interview participants covering nearly all relevant stakeholder groups in the three countries analyzed.

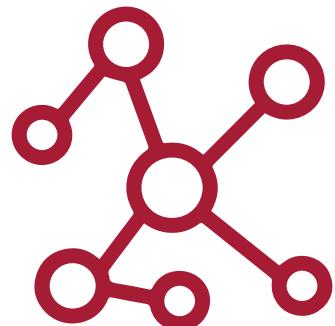
Limitations

As a post-hoc analysis and given the complexity of the effects that were of interest, the assessment does not provide a strict attribution analysis that would satisfy rigorous standards of impact evaluation. Construction of an immediately comparable counterfactual and derivation of statistical information was impossible given the timing and scope of the project as well as the intricate interactions of stakeholders in entrepreneurial ecosystems (implying that the observed groups are not

independent of each other). The assessment also faced inconsistencies in quantitative data collection as well as absence of data in some areas of analysis. Also, the overall time frame for the assignment (see annex C) was considered short to perform a comprehensive, in-depth analysis. Finally, the field researchers encountered a certain degree of evaluation fatigue and reluctance to disclose data on the part of startups.

4. mLabs in the context of entrepreneurial ecosystems

The three mLabs covered in this assessment interact with idiosyncratic local entrepreneurial ecosystems, with consequences for a given mLabs's strategy, business model, and results. This chapter outlines the local specificities of entrepreneurial ecosystems and outlines each mLabs's positioning within them. In this way, the chapter constitutes the analytical backdrop for the ensuing analysis in chapter 5¹⁵. In this section, a brief paragraph will outline the ecosystem of each country, followed by a snapshot of the respective mLabs's role in it.



15 · This chapter is intended to provide a snapshot of mLabs' activities and positioning within local entrepreneurial ecosystems, as well as the broader linkages between actors. For a more elaborate description of mLabs services and an analysis of their business models, refer to the Business Model Evaluation, available at <http://www.infodev.org/mobilebusinessmodels>.



mLab Southern Africa and the South African Entrepreneurial Ecosystem

The mobile technology market in South Africa is mature compared to other developing countries, characterized by a large number of established companies and multinationals dominating the ecosystem. Yet, a number of small “pockets of innovation” in subnational regions are not well-connected and have different strengths and weaknesses. For example, in Johannesburg, the ecosystem is built around the business community; in Pretoria, it is built around government; while most startups are located in Cape Town. The ecosystem is growing at a fast pace, with stakeholders covering not only the mobile and ICT industry, but also government, academia, and the software developer community at large.

Within this ecosystem, mLab Southern Africa has positioned itself as a pre-incubator that provides support to mobile developers and entrepreneurs through a number of core services. The mLab provides infrastructure that encourages innovation of young entrepreneurs (for example, application testing devices) and connects them with the existing industry. Notably, it acts as a convener between provincial and national government agencies based in Pretoria and grassroots entrepreneurs and ICT developers. It has also begun to interconnect innovation pockets in different areas of South Africa, namely the Eastern Cape Province, startup communities in Cape Town, and mobile companies in Johannesburg (see figure 1 and table 3).



FIGURE 1: MLAB SOUTHERN AFRICA ECOSYSTEM

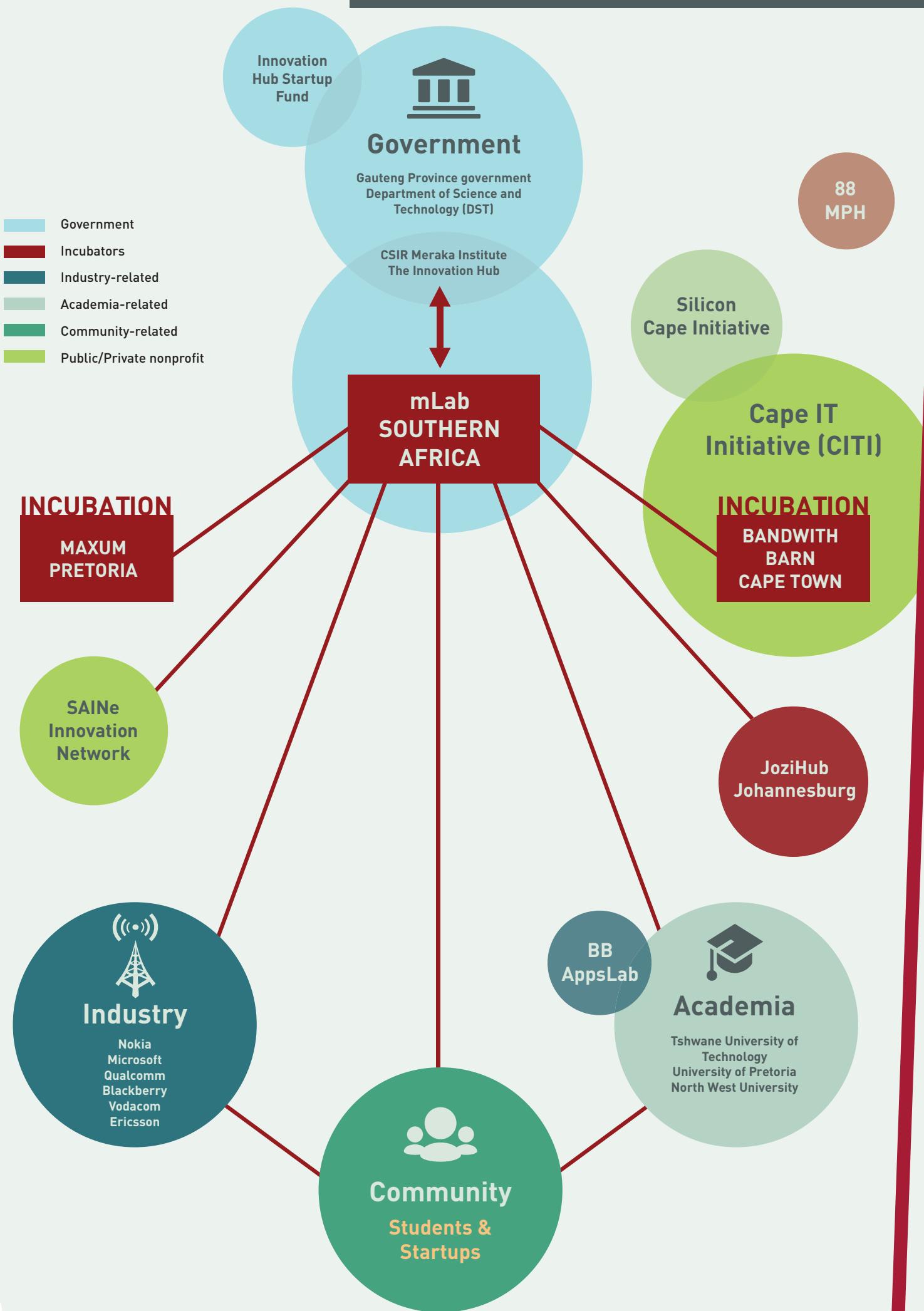


TABLE 3: MLAB SOUTHERN AFRICA'S ROLE IN THE SOUTH AFRICAN ENTREPRENEURIAL ECOSYSTEM

GOALS

To support entrepreneurs up to a stage where they create startup businesses and launch their products to the market, and reach out to other incubators and regions in South Africa. To connect young developers with the industry.



mLab strategy and positioning in the ecosystem

NEEDS OF THE ECOSYSTEM	MLAB SERVICES	MLAB TARGET GROUPS	MLAB APPROACH TO STARTUP INNOVATION	PERCEIVED IMAGE OF MLAB IN ECOSYSTEM
Difficulty to access private sector finance; lack of skilled professionals; missing connection between grassroots tech communities and industry.	Outreach, community building and skills setting through a structured program (Ideas Lab, Acceleration Lab, and Launch Lab) that prepares entrepreneurs for the market or follow-on support from other incubation centers.	Young entrepreneurs and students. Programmers who develop applications. Entrepreneurs who have skills other than programming (designers, and others.)	Offering one-on-one mentorship through entrepreneur in residence. Development of a vertical model that allows the mLab to plug into existing incubators and innovation spaces with mobile tech-specific incubation services.	Good brand reputation and recognition.

mLab interventions and services

MENTORING, COACHING, AND TRAININGS	NETWORKING	BRANDING	INFRASTRUCTURE	ACCESS TO MARKET/ FINANCE
Business mentoring and coaching through Ideas, Acceleration, and Launch Lab.	Brokerage of connections and opportunities, connecting young developers and incubatee startups with potential partners, customers, industry, and others.	Brand affiliation: infoDev/ World Bank, Innovation Hub, Gauteng province government, CSIR Meraka Institute and private sector (for example, Nokia, Microsoft, Qualcomm, Blackberry, Vodacom).	Provision of core infrastructure (office space, connectivity, meeting room, and app testing facility).	Effort to leverage the startups' resources and strengths. "Plug" into existing incubation centers. Connection of startups with available government funding.

Armenia has a long-standing engineering culture inherited from Soviet times. The independence from USSR in 1991 and subsequent years of transition were difficult, but the government's assertion of ICTs as national priority in 2001 gave new impulses to the sector, which is currently undergoing a profound renewal. Yet, the mobile application sector is still nascent and started to grow substantially only in 2010 with increasing smartphone penetration.

The ecosystem is currently in need of specialized and highly skilled mobile developers to be able to compete with the global market, given the country's small domestic market. The focus of mLab ECA is, therefore, on investing in the early-stage innovation and high-potential entrepreneurs aiming at long-term results and impact.



In this endeavor, mLab ECA has benefited from the support and contact brokerage of its mother organization, Enterprise Incubator Foundation (EIF). It has also connected and complemented existing ICT developer training facilities, reached out to the few established startups, and started to support the local innovator community through events and competitions (see figure 2 and table 4).



FIGURE 2: MLAB ECA ECOSYSTEM

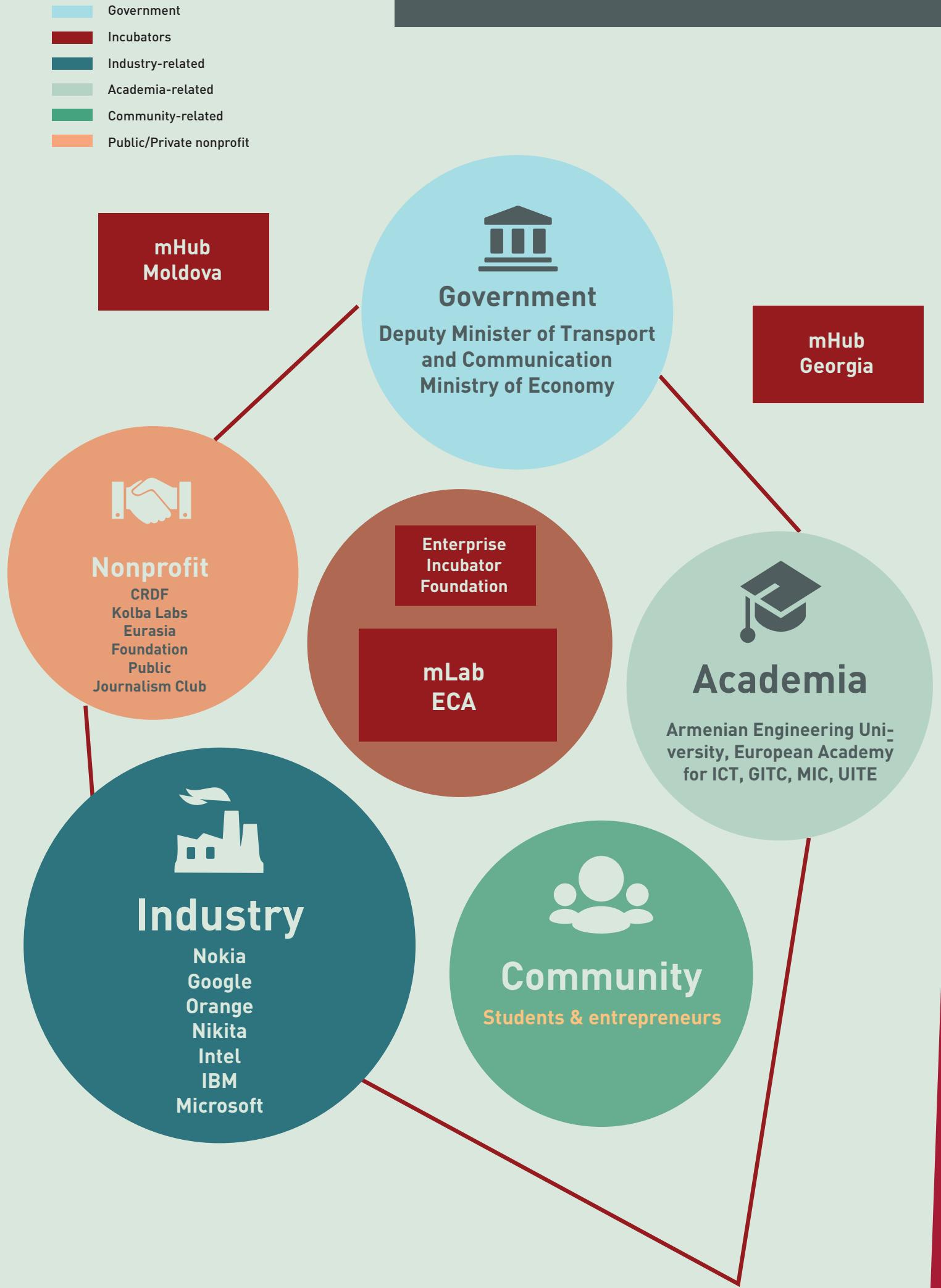


TABLE 4: MLAB ECA'S ROLE IN THE ARMENIAN ENTREPRENEURIAL ECOSYSTEM

GOALS

Building skills in mobile technology and stimulating creation of innovative new mobile applications and services to bring them to market. To have talented entrepreneurs committed to promote startup creation.

mLab ECA

mLab strategy and positioning in the ecosystem



NEEDS OF THE ECOSYSTEM	MLAB SERVICES	MLAB TARGET GROUPS	MLAB APPROACH TO INNOVATION	PERCEIVED IMAGE OF MLAB IN ECOSYSTEM
Talented local mobile app professionals, strong mobile startup communities.	Skills development, startup creation and support, incubation, and networking.	Students and graduates with no work experience and people interested in improving skills and working on mobile app development.	Stimulating and creative environments for young and motivated people to develop ideas. “Bottom up”: attending young students with little entrepreneurship experience to create a startup community.	Workplace for young people to develop their skills.

mLab interventions and services

MENTORING, COACHING, AND TRAININGS	NETWORKING	BRANDING	INFRASTRUCTURE	ACCESS TO MARKET/ FINANCE
Provides advice and connections in Armenia and ECA region.	Provides applied skills development for all interns and direct mentorship for team leaders.	Brand affiliation to other training centers and World Bank.	Office space, connectivity, computers (Mac and PC), mobiles (Android, iPhones and Microsoft), and meeting rooms.	Helps teams to secure grants and small seed investments (for instance, from Enterprise Development and Market Competitiveness (EDMC) or Civilian Research & Development Foundation (CRDF) Global).
Online newsletter twice a month.				
Number of community building activities.				

mLab East Africa and the Kenyan Entrepreneurial Ecosystem

The ecosystem in Kenya is relatively young but has been thriving in recent years. Several innovation hubs and incubators have been launched since the establishment of the iHub in March 2010, which has taken on a dominant role model and convener function. The enabling environment for mobile entrepreneurs—albeit hampered by typical constraints of low-income countries—is sound: favorable governmental policies, foreign investment, stable economic conditions, and a growing demand for mobile applications.

Since its launch, mLab East Africa has complemented the iHub's services by establishing a training program in collaboration with eMobilis, running the annual regional startup competition Pivot East, and a core incubation and mentoring program for resident startups. Through these services, the mLab reached both more advanced, growth-oriented entrepreneurs and early-stage innovators and developers.





Also through community events, the mLab aims to broker partnerships and access to additional support resources for its clients, interconnecting them with a large array of actors in the ecosystem. These actors range from mobile industry players with offices in Nairobi to other accelerators and innovation hubs such as 88mph, Savannah Fund, or Nailab (see figure 3 and table 5).



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FIGURE 3: ECOSYSTEM MLAB EAST AFRICA

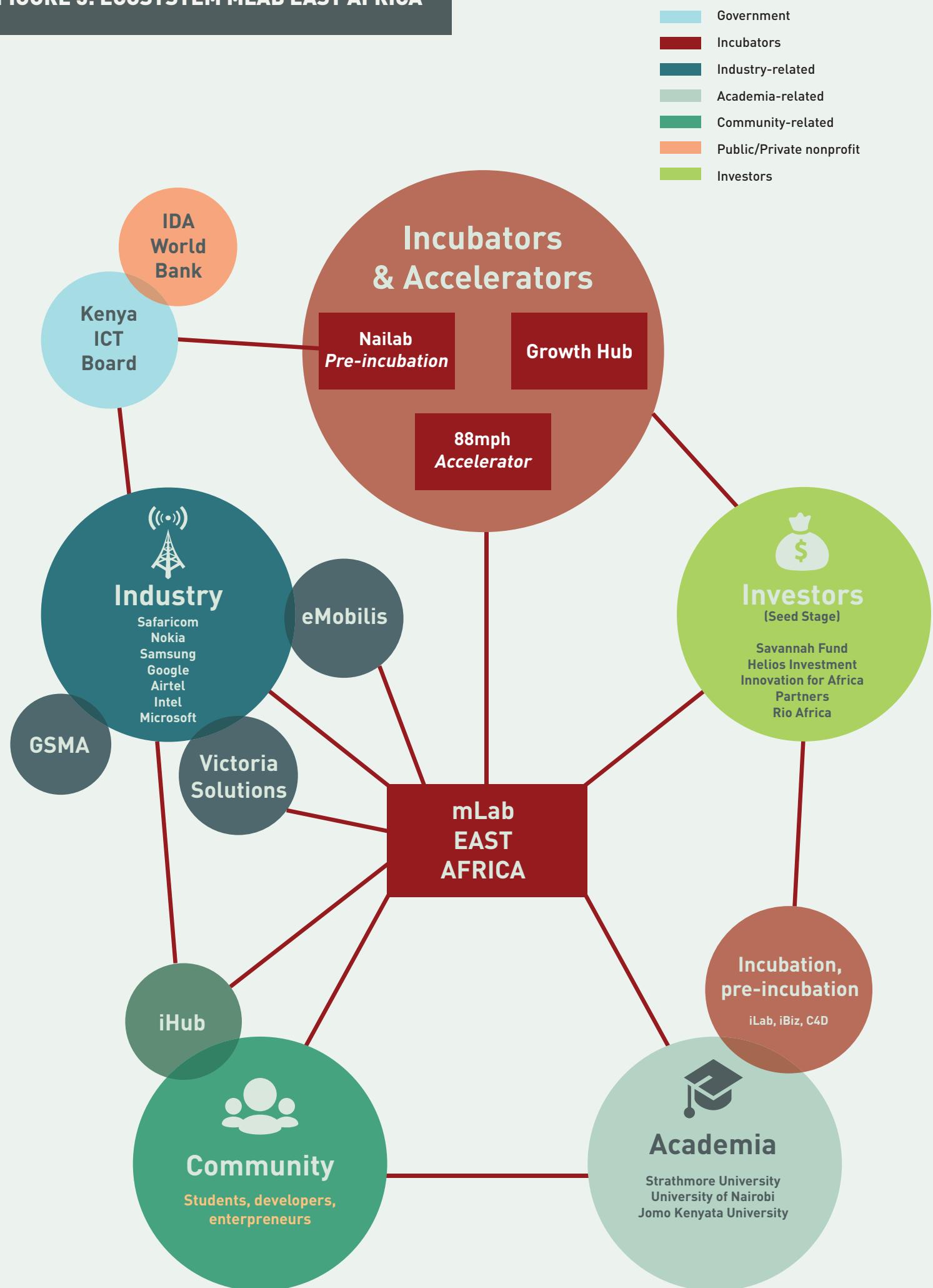


TABLE 5: MLAB EAST AFRICA'S ROLE IN THE KENYAN ENTREPRENEURIAL ECOSYSTEM

GOAL

To facilitate demand-driven innovation by regional entrepreneurs, ensuring that breakthrough low-cost, high-value mobile solutions can be developed and scaled-up into sustainable businesses that address social needs.



mLab strategy and positioning in the ecosystem



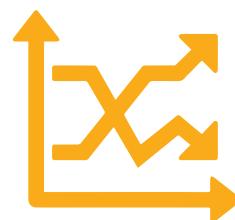
NEEDS OF THE ECOSYSTEM	MLAB SERVICES	MLAB TARGET GROUPS	MLAB APPROACH TO INNOVATION	PERCEIVED IMAGE OF MLAB IN ECOSYSTEM
Access to funding; turn “techpreneurs” and good ideas into sustainable business.	Incubation and acceleration, networking, and partnership building.	Mobile app developers, young entrepreneurs, students for training programs, startup incubatees, and experienced entrepreneurs.	Identify innovative solutions and turn them into profitable businesses. Focus on applications with social development impact and mobile payment facilities.	Active incubator with successful startups.

mLab interventions and services

MENTORING, COACHING, AND TRAININGS	NETWORKING	BRANDING	INFRASTRUCTURE	ACCESS TO MARKET/ FINANCE
One-on-one business mentoring and coaching.	Brokerage of contacts and opportunities.	Brand affiliation (to the iHub, large tech companies, and the World Bank).	Provision of core infrastructure (office space, connectivity, meeting room, and especially the app testing facility).	Offers exposure and linkages to investors through networking and brokerage.
Skills development and startup creation through an intensive training program.	Creation of subcommunities – (Wireless Wednesday event series for various sectors).	Private sector sponsorship.		

5. ASSESSMENT OF mLabs' EFFECTS

This chapter presents the main findings of the Outcome Assessment and is divided in three subsections: The first presents mLabs' effects on startup creation and development; the second the development impact generated through the use



of mobile applications commercialized by mLabs-supported entrepreneurs; and the third outlines mLabs' effects on local entrepreneurial ecosystems. While this chapter outlines detailed technical findings, chapter 6 summarizes the assessment.

5.1

mLabs' Effects on Startup Creation and Development

This section will address the research question: "What has been the contribution of mLabs to the creation and success of mobile application enterprises?" It will identify mLabs' economic effects, providing quantitative data for the creation and development of startups that have been affected by mLabs.

mLabs cannot claim to have caused the full extent of the results elaborated on in the following. Rather, the data should be seen as evidence of the achievements of mLabs-supported entrepreneurs and startups, which, together with the qualitative evidence collected, leads to reasonable conclusions about mLabs' contribution to this success (or lack thereof). While a simple approach, it follows standard practice for accelerators and incubators that typically advertise their own success by showcasing the success of previous clients. Quantifying mLabs' net contribution to the startups' success—and thus mLabs' economic impact in a narrow sense—would require long-term, rigorous impact evaluation or, at the minimum, sophisticated comparative techniques and benchmarking. Yet, such methods are difficult to implement for interventions such as mLabs, which are interdependent with dynamic and complex entrepreneurial ecosystems. Therefore, an economic impact evaluation is beyond the scope of this assessment.

Whenever this chapter refers to support by mLabs to entrepreneurs, innovators, and startups, this refers to one or more services that mLabs have provided as outlined in chapter 3¹⁶.

It should be noted that mLabs have implemented a wide range of services, with varying degrees of intensity of support (ranging from a client participating at a networking event to multiyear incubation, including office space and regular mentoring).

Yet, to maintain simplicity and given the interdependence of effects from different support types across client groups, this chapter will usually broadly refer to mLabs support and not specify the exact service that a client received, unless the evidence showed that a service made a particular contribution.

¹⁶ See the Business Model Evaluation for in-depth reviews of each mLabs's value proposition, as well as reflections on the differences in the effects between different models. The Business Model Evaluation is available at <http://www.infodev.org/mobilebusinessmodels>.

The following analysis will provide few remarks on high-level findings, followed by considerations of the following four major indicators that indirectly reflect mLabs' effects and performance:

- **Startups created**
- **Revenue generated by supported startups**
- **Jobs created by supported startups**
- **External investment raised by supported startups**

This section mainly focuses on aggregate results numbers and few quotes from qualitative data.

Section 5.2 and in-depth startup case studies published separately from this report¹⁷ provide more detailed information on mLab-supported entrepreneurs and illustrate the results and mLabs' effects.

Within less than three years, mLabs have managed to generate a positive contribution to the economy in terms of revenue generation and job creation of supported startups.

5.1.1

High-Level Findings on mLabs' Contribution to Startup Creation and Development

Within less than three years, mLabs have contributed to an increasing number of new startups through their interventions. Overall, the assessment finds that startups supported by mLabs have managed to generate a tangible contribution in the economy as reflected in the positive evolution in several indicators. The collected qualitative evidence suggests that mLabs can claim to have contributed to this effect. However, the evidence is not entirely conclusive, the net effect size cannot be quantified with the means used for this assessment, and the size of the contribution varies across contexts and cases.

The Outcome Assessment addressed first whether startup creation and development is in any way related to mLabs's support. Second, in case of a relationship, the assessment identified which mLab activities contributed to startup results. Qualitative evidence suggested, first, that there is a link between mLabs and startup creation and development, and thus that mLabs are effectively contributing to startup results. Second, the assessment concludes that the mLab contribution varies by the mLab's environment, business model, and service type.

Networking, provision of infrastructure, branding, and access to markets and financing contributed to startup creation and development for all three

examined mLabs. The contribution of mentoring, coaching, and training has been less evident as a contributing factor for incubatee startups, especially for mLab East Africa.

The more indirect effect in Kenya could be explained by the higher maturity of incubated startups. The mLab's contribution consisted of assistance with networking, branding, and infrastructure provision. Branding played a key role as it intensified the possibility of generating networking among actors. For instance, Sleepout, a startup with an already successful product and established brand name, sought to be part of the mLab explicitly looking for brand association to expand networking and investor alternatives. Colocation and institutional ties with key partners (in particular, the iHub) gave the mLab traction.

Startup development had a more direct link to the mLab's interventions in South Africa, because revenue increases were often associated with business deals made among start-ups within the mLab, or with deals made between startups and external actors thanks to mLab mediation and credibility. For mLab ECA, the mobile application enterprises' revenue models and employment are also very directly linked to the mLab, given that it plays a key role in the marketing of the applications, including their branding.

5.1.2

Startup Creation

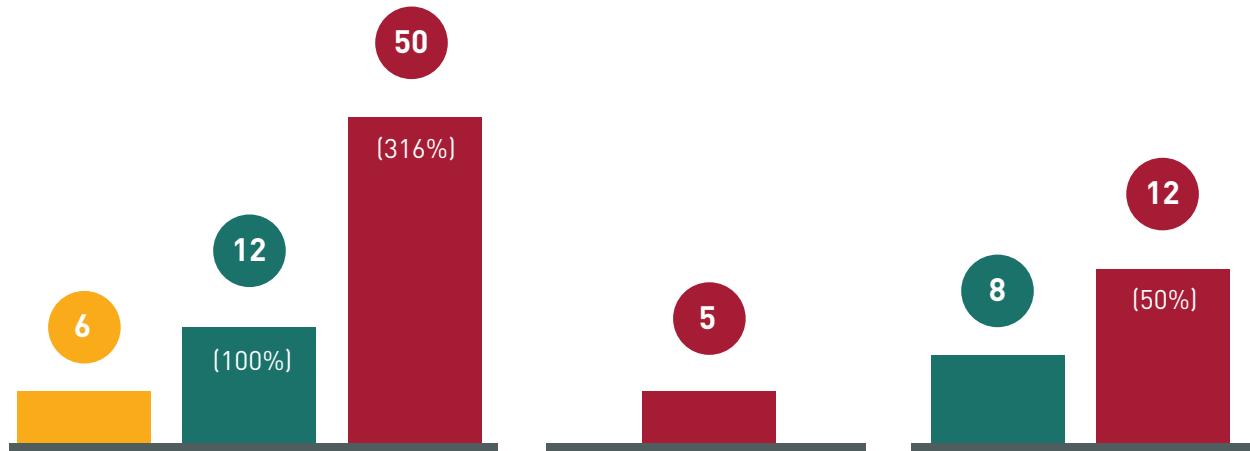
Key Findings



- mLabs contributed to the creation of an increasing number of new startups through their interventions.
- As of October 2013, all startups that graduated from incubation programs were still active¹⁸.



FIGURE 4: NUMBERS OF STARTUPS CREATED BY MLABS



One of the main goals of mLabs had been the creation and development of startups. The assessment finds that mLabs have indeed contributed to the creation of an increasing number of new startups through their interventions. Figure 4 includes the available results for new startups created in 2011, 2012, and 2013 at each mLabs¹⁹.

At the time of this analysis, all startups incubated by mLabs ECA and mLabs Southern Africa were still in business, and the ten startups that had already graduated from mLabs East Africa were also active as of October 2013²⁰.

¹⁸ · This statement refers only to the incubated startups and not to all the startups created with support of mLabs services. "Active" is defined as at least one founder still refining the startup's business model and working toward the commercialization or expansion of the startup's mobile application product. In Kenya, the startups graduated from the incubation program (all of them active) were 10 out of the 50 shown in the graph.

¹⁹ · Startup creation figures are derived primarily from reporting by mLabs managers. Managers were instructed to only count businesses that have formally registered. It should be noted that the burdens of registering a business vary substantially across the three countries analyzed, which makes benchmarking difficult. In internal reporting, infoDev also used the measure of "solid startup teams" to account for stable startup projects that avoid registering as a business. See the Business Model Evaluation for high-level results for each mLabs, available at <http://www.infodev.org/mobilebusinessmodels>.

²⁰ · The fact they are all active is not an ultimate indicator of success as it is still quite early to judge whether they are sustainable/growing businesses. Five-year time frames are usually used to assess this aspect.

“

The figure for startup creation for mLab East Africa was much higher during the third year of operation as it includes not only startups participating in the incubation program¹⁸ but also startups that were created during the Pivot East competition. Conversely, mLab ECA and mLab Southern Africa figures include startups participating in the incubation program only.

mLab Southern Africa supported the creation of 12 startups in a rather short time period. Given that mLab Southern Africa focuses its support on pre-incubation, the majority of these startups are still in the product idea and business skills development phase.

“

When I had the idea of MySales, I shared it with the mLab manager and other team members, who gave support immediately, for example, by sharing lots of ideas and designing the business model. The mLab then helped develop the website for our platform and [together] with the [other] mLab team members, I could begin developing my app. I started my career in [the] mLab. Now I have a startup and I am more confident.

(An entrepreneur at mLab ECA)

I met with the mLab manager who asked me to develop a prototype of my idea. Based on this prototype, I was signed on at the mLab.

(An entrepreneur at mLab Southern Africa)

”

Although it started its activities in September 2011 as a program from Enterprise Incubator Foundation (EIF), mLab ECA effectively started its incubation work only in May 2012, before finally settling down in its current, expanded premises in June 2013. From this point on, the mLab increased its support to entrepreneurs, which resulted in the creation of five startups within a year.

A further increase in the number of startups created can be expected in the coming years, given the trend of increasing startup creation numbers for each of the three observed mLabs and assuming that the first year of implementation (when mLabs are themselves startups) tends to be the most difficult.

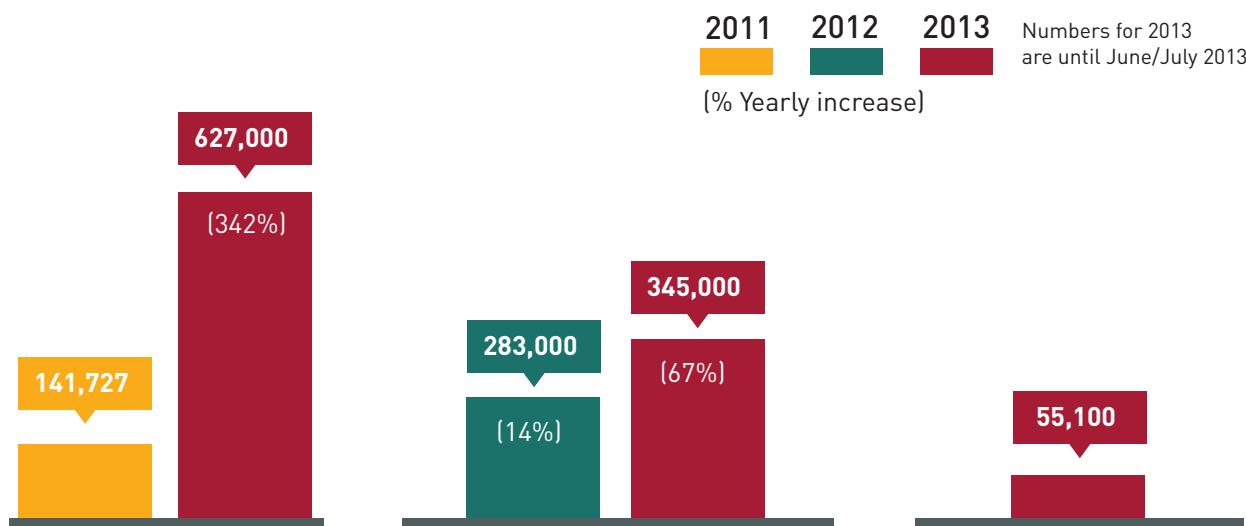
Moreover, the ecosystem in Kenya is expanding rapidly with a continuously growing pipeline of technology entrepreneurs, and in Armenia and South Africa, the mLabs' current and planned capacity building efforts will most probably pay off in terms of more startups being created as well.

”

Key Findings

- mLab-supported startups have increased revenue generation through 2012 and 2013.
- Total revenue generated by m-Labs supported startups in Kenya increased four-fold in less than two years.
- mLab Southern Africa has created an internal economic market place, in which entrepreneurs provide services for each other.

FIGURE 5: REVENUE GENERATION BY MLAB-SUPPORTED STARTUPS AND ENTREPRENEURS (USD)



A second indicator of mLabs' positive performance is that their incubatee startups' revenue generation has increased over time across the board. In Kenya and Armenia in particular, the startups' revenue streams have increased significantly during the period.

For mLab East Africa, data broken down by company was available for the analysis so that it is possible to compare the incubatees'

revenues at the time of joining the mLab with their current revenue: the aggregate revenue for the ten graduated incubatees went from an initial \$141,727 when joining the mLab to \$627,000 in June 2013. In the case of mLab ECA, entrepreneurs' revenue at this point in time was at about \$55,100. For mLab Southern Africa, startup revenues increased from \$283,000 in 2012 to around \$345,000 in 2013.

These revenues have been generated mainly by the launch of successful applications. Two entrepreneurs have launched their applications to the market with considerable success, with the additional support of incubators that the mLab is partnering with (Maxum incubator of the Innovation Hub in Pretoria and Bandwidth Barn in Cape Town).

The added value of mLab Southern Africa in the pre-incubation phase is the provision of an innovative collaborative working space for incubatees with access to application testing devices, one-on-one coaching, and mentoring services for business skills and business model development, as well as networking activities. In its facilities in Pretoria, mLab Southern Africa has also created an internal economic space, where incubatee entrepreneurs market services, such as graphic design or programming, can work together²¹.

Qualitative data indicate that these increases in startups' revenue generation are due to mLabs' contribution, while the evidence was not entirely conclusive. The assessment found it difficult to discern a clear causal effect, given the complexity of entrepreneurial ecosystems that both the mLab and its clients operate in and the many other factors that determine a startup's development. In addition, interviewees' opinions about how strong the mLab's contribution was covered a wide range. It remains that infoDev should pay close attention to the evolution of revenue figures (including through impact evaluation), identify whether the positive signs can be substantiated further, and reflect on expanding the current two-year financing frameworks for mLab grants to ensure the continued positive evolution of economic results.

5.1.4

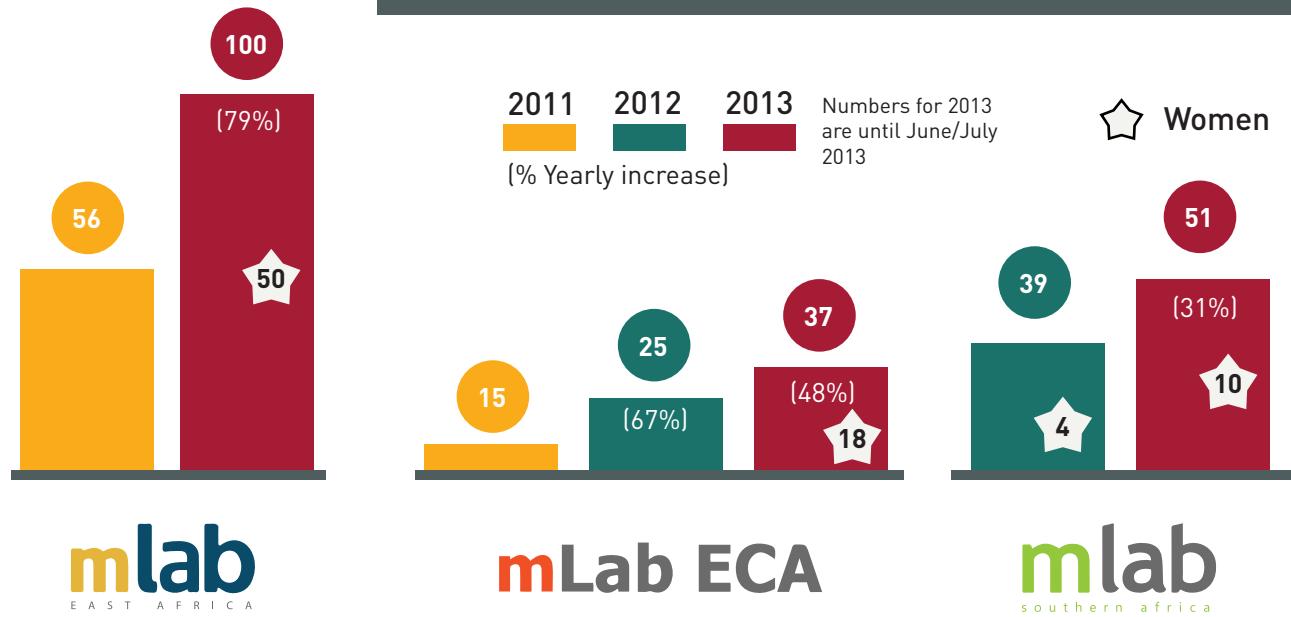
Job Creation by Supported Startups



Key Findings

- mLab-supported startups create an increasing number of high-quality jobs.

FIGURE 6: JOBS CREATED BY MLAB-SUPPORTED STARTUPS AND ENTREPRENEURS



21 · See the Business Model Evaluation for more detail: <http://www.infodev.org/mobilebusinessmodels>

High quality job²² creation has been increasing among startups supported by the three mLabs as well. Albeit absolute numbers of direct jobs created by mLab-supported startups should not be expected to go into the hundreds, this significant growth hints at a considerable potential that mLabs can stimulate the creation of numerous high quality jobs. Future studies could also examine indirect job creation, for instance, in sectors that startups draw on, such as business consulting, accounting, design, various parts of the creative industry, or industries producing technological inputs (such as local software and device manufacturers). Furthermore, through mLabs' training and human resource building activities (see section 5.3.1.), mLabs have also improved clients' job opportunities in cases where they do not opt to start a company themselves. This represents yet another valuable of inquiry for future assessments.

“Several of the people that have been through the mLab have been contracted to work with us.

(Cofounder and CEO of PicsArt, an internationally recognized Armenian mobile application enterprise)

5.1.5

External Investment Attracted by Supported Startups

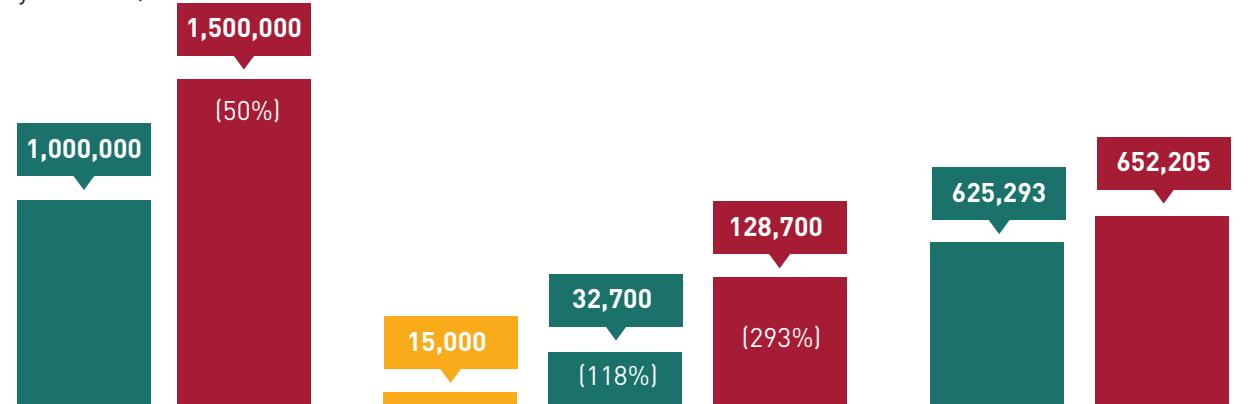
Key Findings

- Incubation graduate startups have been successful at attracting investments and raising funds.
- In Kenya, the mLab's incubatees have managed to raise more than \$1.5 million in investments up to June 2013.

FIGURE 7: EXTERNAL INVESTMENTS ATTRACTED BY MLAB STARTUPS (USD)

2011 2012 2013 Numbers for 2013 are until June/July 2013

(% Yearly increase)



22 · We define high quality jobs as white collar jobs as well as for-pay work that bring exposure to the intense and stimulating environment of a startup and entrepreneurial communities: founders and startup employees are likely to learn valuable skills and gain experience, more than in other white-collar employment. Also refer to the 2013 IFC Jobs Study for a discussion of the difference between high and low-quality jobs, see http://www.ifc.org/pdf/IFC_Job_Study_Report_12-26.pdf.

For all mLabs, startups have been rather successful at attracting investments and raising funds. In Kenya, mLab-support startups have raised \$1.5 million in investments up to June 2013, although the figure should be interpreted with caution, as the distribution is heavily skewed toward a few startups. Breakdown data by a company for mLab East Africa also reveal that investment attracted increased for each graduated incubatee during the period that they stayed in the mLab.

With a cumulated amount inferior to the other mLabs, mLab ECA's entrepreneurs are succeeding in attracting an increasing number of external investors, summing \$128,700 as of August 2013. A series of startups have benefited from grant seed funding in Armenia (for example, Microforester or Clean H2O) or in the region (Be Healthy – Uzbekistan). The mLab is also contributing to the development of an equity investment culture in Armenia, for instance, by taking shares in some of the startups it is supporting.

Seven companies supported by mLab Southern Africa have managed to attract a total of \$652,205 of external funding. The biggest portions were raised by the two most advanced companies: Afroes and GoMetro.

“
Thanks to the mLab publicity and networking, getting funds was much easier. Some of the funds we got came through this channel, others came from outside.

(An incubation graduate of mLab East Africa)

”

“
In the Idea2Market Contest, organized by CRDF Global (an independent nonprofit organization) and the Ministry of Economy of Armenia and facilitated by mLab in Yerevan, we won a grant of \$25,500 which made it possible for us to accelerate the process of implementing our application in the country.

(An entrepreneur of mLab ECA)



”

5.2

Development Impact through the Usage of Mobile Applications

This section addresses the second research question: "What are the development impacts from the usage of the mobile applications and software developed by entrepreneurs at mLabs?"²³



Key Findings

- Nearly 10 percent (29) of a total 292 mobile applications were identified to have actual or potential development impact. (This sample includes applications not yet launched to market.)
- The percentage is relatively low for three reasons: (1) the criteria for inclusion of applications in the sample were based on a narrow definition of development impact, focusing on a contribution to MDGs, BoP users, or transformative potential; (2) the generation of social and environmental impact is not a precondition to access mLab support; (3) at least in the short-term, startups prioritize revenue generation over development impact.
- Two factors limited the depth of observed development impact: (1) some applications were operational but had not yet been launched to the market; (2) even when applications had already been launched, the time span elapsed since launch was mostly very short.
- The identified applications addressed relevant national challenges and offered practical solutions in the areas of education, health, financial inclusion, agriculture, employment, environment, mobility, and information technology.
- Developers and entrepreneurs supported by mLab East Africa generated the largest number of applications in comparison to the other mLabs. This mainly resulted from the expansive strategy adopted by the mLab in promoting startup creation. Services such as training programs or competitions (in addition to incubation) tend to generate much larger numbers of mobile applications and prototypes, even if this does not speak to the quality and sustainability of these products.
- Within the identified applications with actual or potential development impact, there were a few significant success stories, several companies with satisfactory effects, and a majority of applications still in the pilot stages (that is, they are undergoing testing and readjustments previous to a fully fledged launch). The latter group of applications has not yet succeeded in the market but have potential for development impact in months and years to come.
- Overall, prospects for wider impact are promising given the high relevance of the problems that the identified mobile applications intend to address as well as the high appropriateness of the proposed solutions.

²³ · The answer to the question has taken into account not only mobile applications developed by mLab incubatees but also applications created by developers and entrepreneurs supported through events and competitions implemented by mLabs.

5.2.1

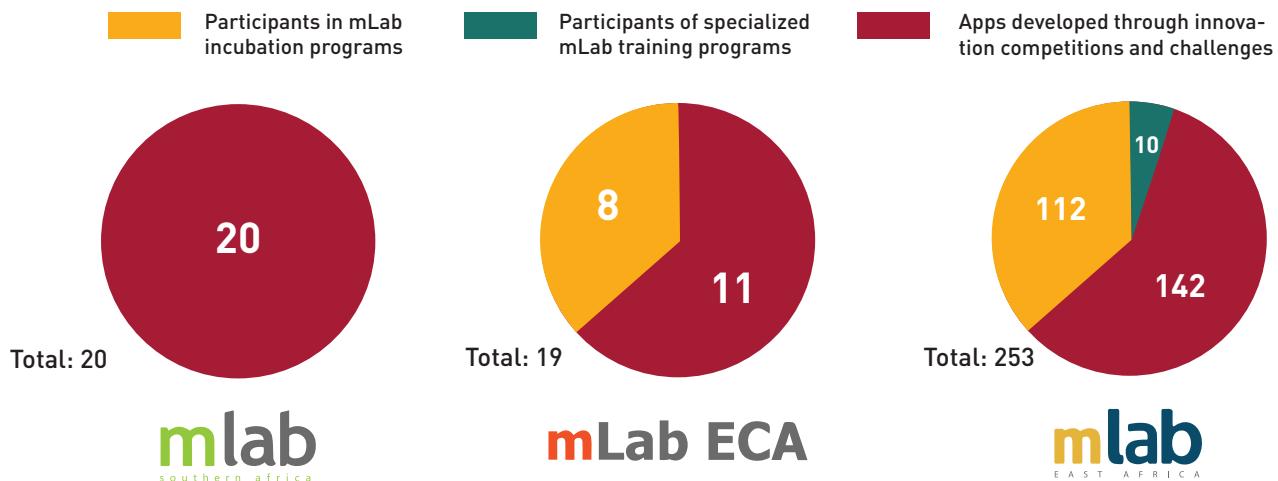
Identification Process for Mobile Applications with Development Impact

The total population of mobile applications from which development impact applications were selected was a list of 292 mobile applications linked to mLab ECA, mLab Southern Africa, and mLab East Africa²⁴.

This list was compiled from three data bases of applications known by name to mLab managers²⁵, which correspond to the three types of support provided by mLabs: (1) applications developed by participants in

mLabs' incubation programs (applications developed with direct support from the mLabs); (2) applications developed through innovation competitions and challenges, such as the Regional Mobile Applications Contest in ECA and Pivot East in East Africa; and (3) applications developed by participants of specialized training programs delivered by mLabs. Figure 8 shows the inventory of applications by type of source and country.

FIGURE 8: MOBILE APPLICATIONS BY MLAB SERVICE TYPE



There are two reasons for the large number of applications in Kenya in comparison to Armenia and South Africa. The first is associated with mLabs' service portfolio. mLabs aim to promote startup creation and growth using different services and activities. Some of these activities result in the generation of a large number of applications and prototypes (in particular, training programs and competitions) whereas others do not (such as incubation focusing on few enterprises and products). As it can be inferred from figure 8, mLab Southern Africa particularly emphasized incubation and did not implement training programs or competitions to the extent mLab East Africa did²⁶; this is the main reason why mLab East Africa features a much higher number of applications. The second reason is related to

the availability of the information at the time of this assessment.²⁷

Three selection criteria were applied to the 292 applications in order to select the sample to be analyzed in more depth:

- (1) Applications that contribute to the Millennium Development Goals (MDGs).
- (2) Applications that address the needs of users at the Base of the Pyramid (Bop).²⁸
- (3) Applications that otherwise have a transformative potential in terms of improving the general conditions of people and businesses and/or the functioning of society as a whole (in particular, applications that may have a potential to alleviate poverty or deprivation suffered by disadvantaged groups of the society).

24 · Details on the list of applications per mLab and by source of applications were too extensive to be included in this document, but can be obtained from infoDev upon request. Case studies of notable mobile startups and entrepreneurs are also available at <http://www.infodev.org/mobilecases>.

25 · More mobile applications and application prototypes have been created at hackathons, workshops, and so forth, but not all are documented and known to mLab managers.

26 · mLab East Africa ran three editions of the regional startup competition Pivot East (yielding nearly 50 applications each) and five waves of training with approximately 20 participants each.

27 · In Armenia, the mLab's training programs are producing mobile applications; however, these applications were not included as the data were not available at the cut-off date for this assessment.

28 · http://www.ifc.org/wps/wcm/connect/as_ext_content/what+we+do/inclusive+business/news+and+highlights/defining+the+base+of+the+pyramid.

From here on in this assessment, development impact will refer to these three aspects. Spillover or indirect secondary effects generated by mobile application enterprises such as spurring innovation processes and creating employment as a side effect of producing and selling the application have not been included as development impact.²⁹

Forty-one mobile applications with either potential or actual development impact complied with the three criteria.³⁰ This assessment also includes applications with potential development impact to maintain a greater depth of analysis and avoid limiting scope to only few of the total number of applications, as this would imply the risk of drastically underestimating the development impact that may ultimately be generated.

Twelve applications had to be disregarded because of substantial lack of information to conduct the analysis (such as absence of information on the functioning and impact of the app, unavailability of entrepreneur contact details, discontinued app, etc.). This left a sample of 29 applications that were

subsequently analyzed in detail.

Data on impact were collected (for each application) on the following of variables:

- (1) Actual or potential impact,
- (2) The size of the problem (quantitative and qualitative),
- (3) Types of users (such as students, farmers, and SMEs),
- (4) Focus on Business to Business (B2B) or Business to Consumer (B2C),
- (5) Whether the application targets BoP users,
- (6) Geographical and sector scope,
- (7) Application usage and reach (such as downloads, subscriptions and user numbers),
- (8) Period of operation, and
- (9) An assessment of the difference made in a user's life (quantitative and qualitative).

The sources of information used for the collection and analysis of these variables were desk research, data from in-depth interviews conducted for case studies during country visits, and remote follow-up interviews to fill data gaps.

5.2.2

Characterization of the Sample of Identified Applications

Of the 29 selected mobile applications with actual or potential development impact, two are in Armenia, six in Southern Africa, and twenty-one in East Africa. As shown in figure 9, the applications cover eight sectors: health (5); education (6), including nonformal education and awareness-raising; environment (3); agriculture (6); financial inclusion (6); employment (2); mobility (2); and grassroots innovation (1). Applications are double-counted when they cover more than one sector.³¹

When comparing the total population of applications with the number of selected applications, the selected sample covers 11 percent of the applications in Armenia, 8 percent in Kenya, and 30 percent in South Africa. The percentages are relatively low for three reasons. First, the criteria for selection of applications

did not apply a broad definition of development but one that would only include applications focused on MDGs or users at the BoP as well as those with transformative potential. A broader definition would have meant a greater number of selected applications. Second, the generation of social and environmental impact is not a precondition to access mLab support. Developers are held to pursue business ideas that could be successful from a commercial point of view but not necessarily generate impact according to the applied selection criteria. Third, while many startups would like to develop mobile applications that have development impact (some have specific plans to do so), the need to generate revenue in the short-term to sustain their business is prioritized over development considerations.

29 · However, employment creation has been incorporated when it was the explicit goal of the application (micro-work), and when employment creation particularly targeted the BoP.

30 · The remainder of the total 292 applications were either not related to usage that would typically lead to development impact as defined here, or they were clearly left at the prototype stage after ad hoc development at an event.

31 · As shown in the figure this is the case for Microforester, which covers environment and employment, and Dairy Sacco, which covers financial inclusion and agriculture.

FIGURE 9: OVERVIEW OF THE SELECTED APPLICATIONS BY COUNTRY AND BY SECTOR

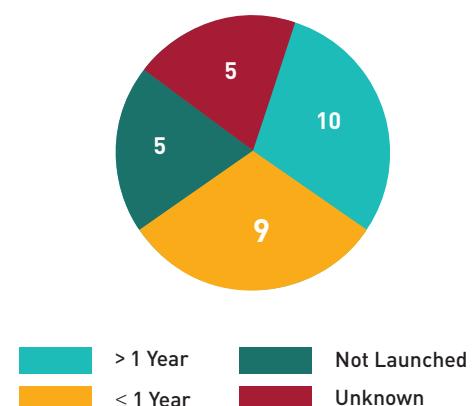


Note: Actually launched applications are marked with (a); potentially launched applications are marked with (p). Applications where the available information was insufficient to assess the innovation stage have no indication.

FIGURE 10: OPERATIONAL LIFE OF THE 29 SELECTED APPLICATIONS

Out of the selected applications, at least 66 percent (19) are operational, meaning that they are either undergoing testing or have already been launched to market. Ten operational applications have been active for one to three years and nine for a year or less; none of the 19 applications have been operational for more than three years.

Five applications out of the 29 selected have not been launched, of which two have been abandoned, and for the remaining five applications, insufficient information is available to assess their operational status.



5.2.3

Assessment and Illustration of Development Impact through Application Usage

Given the diversity in terms of maturity and sector coverage of the identified applications, the assessment will not include estimates of the aggregated quantitative effects that applications have had. Instead, the assessment will highlight general trends in the selected sample before illustrating development impact through brief descriptions of notable cases of actual or potential development impact.³²

Quantitative data, such as usage numbers, are included where available and meaningful. Because of space and scope limitations, not all analyzed applications are covered in depth in this report but documentation of each of the applications can be obtained upon request from the infoDev team. Detailed mobile startup and entrepreneur case studies and success stories were also published separately.³³

General Trends among Applications with Development Impact

Overall, the selected applications followed a distribution where there were few significant success stories, several companies generating satisfactory effects, and a majority of applications in pilot stages, that is, they were still undergoing testing and readjustments previous to a full-fledged launch. The latter have not yet succeeded in the market but feature good potential for development impact if and when they launch in the coming months and years.

The depth and breadth of the actual, observed impact is limited because of two factors: (1) some applications have not yet been launched, so only potential impact can be analyzed, and (2) even for the already launched applications, the time span since the launch has been relatively short. mLabs have been operational for two years, a rather short period of time for the development impact of the usage of mobile applications to become manifest. At the time of the assessment, some of the applications with good prospects to make a difference were at a transitional phase. Most interviews revealed that even when impact is still at initial stages of the expected impact sequence, many applications are on the path to make a difference, even if they currently report only modest levels of market penetration.

To understand such delays in impact generation, it is useful to consider the typical launch process of B2C applications as described by

interviewed entrepreneurs. Typically, a prototype is developed prior to market launch, which is uploaded to an application store or Internet platform in the case of smart phone applications or made available as an SMS or USSD service for feature and basic phone applications. Often, during this phase previous to commercialization to end-users, application development might face technical difficulties or there might be the realization that the application does not yet tally with actual market needs. At this point, several startups decide to conduct further market research to better understand the results of the testing phase and improve previous versions. This phase is critical because it requires startups to further invest before they can generate revenue. Fishmate, Gorecyclер, Aftarobot, Green House Pro, and MobiAgent are examples of this approach.

In fact, a recurrent aspect found when interviewing entrepreneurs was the need to put in place systems to track the impact of their applications, as impact-monitoring systems would enable them to learn about the uses of the application and improve its features and the associated business model. Most startups did not have these systems in place and required support in setting them up. Consequently, the design and technical support for impact-tracking systems for startups is an aspect that mLabs could consider integrating in their programming.

32 · The applications considered in the analysis are those that got beyond the prototype stage, that is, they had been fully developed, even if they were not launched to the market in some of the cases.

33 · They are available at <http://www.infodev.org/mobilecases>.

Another element influencing the timing for impact generation are barriers of awareness that stand between entrepreneurs and low-income user segments with potentially poor knowledge of mobile technologies³⁴. For instance, users may find it difficult to get used to buying and selling through applications in the case of mobile payment applications.

This means that applications have to go through a process of technical adaptation, as well as gaining confidence and trust, which can take time and delay the generation of impact. Fishmate, Green House Pro, GoRecycler, Uhasibu, Afta Robot, and mKulimabima are examples of applications experiencing this situation.

Applications with Development Impact in Armenia

The main national development goals supported in the World Bank's Country Partnership Strategy include reducing inequality, ensuring human development and accelerating economic growth. In 2008, the government adopted a ten-year industry development strategy including the development of knowledge economy as a critical point to form a strong and advanced information technology sector.³⁵

The two selected applications in Armenia are Clean H2O (health) and Microforester (environment, employment); both are applications with a focus on social and environmental impact and potential to produce significant impact not only in Armenia but also in other countries. Both applications won awards but have not yet been launched, while the size of the problems they intend to address and the solutions they offer (business models and technological advancement) hint at good prospects for impact.

Microforester is a mobile app combining environmental protection (tree planting) with the creation of job opportunities for communities in rural areas through ICTs in a context where residents often struggle with income generation³⁶ and where only 8 percent of land is covered with forest. According to the Armenia Tree



Project, Armenia will be left with no forest by the year 2030 if the current rates of deforestation continue. Microforester has already gained nine planting permissions in the country, which points to good traction. The application shows good prospects to contribute to reforestation, building environmental awareness, and decreasing poverty and unemployment through microwork.

Clean H2O aims to allow community leaders, individuals, and companies to measure the quality of drinking water and generate open data access information on water quality. The project integrates a strong hardware component: the team designed an innovative water device that transmits data to mobile phones. The application is designed to store information in the cloud, contributing to the creation of openly available statistics on water quality. The application wants to fill the current supply gap in water device applications between cheap disposable water devices and expensive professional ones. Clean H2O constitutes a promising tool for nongovernmental organizations (NGOs) and international organizations working on water and sanitation in countries with particularly low access rates to improved water resources.

Clean H2O and Microforester have not yet been launched, but they point at promising impact prospects in Armenia and abroad.

34 · Also see <http://www.infodev.org/articles/mobile-usage-base-pyramid-kenya> and <http://www.infodev.org/articles/mobile-usage-base-pyramid-south-africa> for studies on user behaviour at the BoP commissioned by infoDev.

35 · <http://www.eif.am/eng/resources/report-on-the-state-of-the-industry/>.

36 · Armenia had a 35.8 percent poverty ratio in 2010 and a 17 percent unemployment rate in 2013.



Applications with Development Impact in South Africa

Poverty reduction, improved access and quality of public services (including transport improvements), environmental protection, and employment are among the main national priorities supported by the World Bank's strategy in South Africa. Notable opportunities for impact on governance and social problems arise from mLab Southern Africa's partnerships with government agencies.

For example, the Department of Science and Technology, one of the major partners of the mLab, has a road map for the development of mobile applications in key areas, such as education, health and green economy, and recently pledged continuous support for the mLab³⁷.

The mLab can link entrepreneurs with relevant government programs and match developers (that do not necessarily have knowledge about social development challenges) with existing problems. An example for the tie-in of provincial government priorities and innovation enabled by the mLab over the last few years is the Gauteng Innovation Competition, jointly organized by mLab Southern Africa and the Province of Gauteng, during which developers create solutions to specific topics and existing challenges.

GoMetro is one example of a startup that entered the mLab as a winner of the Gauteng Innovation Competition. The company offers a mobile service that provides Metrorail commuters with updated information on travel routes, reducing delays in users' daily commutes.

The app has been operating for more than a year and it is gaining substantial market traction and reach.

Three aspects indicate that the impact of the application is remarkable: the initial magnitude of the problem—600,000 people using the Western Cape Metrorail³⁸ and suffering from delays in getting to work, school, or back home; the considerable size of the user base (450,000 application downloads); and the qualitative improvements reported in the life of the users (such as improved time management for Metrorail commuters) and in the quality of the Metrorail service (GoMetro creates a positive feedback loop that improves the quality of the service). See box 2 for details.



GoMetro is a major contribution to closing the information gap between public service providers and the consumer in emerging markets.

37 · <http://www.infodev.org/highlights/south-africa-and-world-bank-pledge-ongoing-support-mlab-southern-africa>.

38 · Information on Cape Town Metrorail, July 2013: <http://futurecapetown.com/2013/08/cape-town-deserves-a-reliable-and-predictable-train-service/#.UsyAnrQf7Mo>.

BOX 2: GOMETRO



FACTS

600,000 people use the app in the Western Cape Metrorail.

450,000 app downloads with a monthly growth rate of 10-15 percent.

90 percent of users reported using the service at least once a week, pointing to the popularity of the app. The number of GoMetro users after only the first 30 days was 19,159.

EVIDENCE OF IMPACT

To date the application has collected more than 10,000 customer complaints and suggestions (about 800 complaints per month), which has helped Metrorail to improve its operations.

According to GoMetro, Metrorail responded to each of these complaints and sought to resolve them. GoMetro has also received 1,150 crime tipoffs through its CrimeLine service.

ESTIMATES OF IMPACT

Before the rollout of GoMetro, Metrorail services were characterized by cancellations and schedule fluctuations combined with the lack of real-time, consumer-facing information, leaving consumers with uncertainty and strongly affecting their daily activities. Metrorail was perceived as an organization with an indifferent attitude to customers, a problem exacerbated by insufficient communication and misinformation, not allowing users to make alternative arrangements to get to work, school, and home on time.

Since the launch of GoMetro, the situation has improved significantly. According to GoMetro, information gaps have been limited substantially: Metrorail keeps users informed through the app, making the commuter experience less of a hassle. GoMetro aims to give commuters a voice through a built-in feedback service, creating a feedback loop that improves the quality of service.

The application has helped close the information gap between public service providers and the consumer in emerging markets—a major problem, especially in the transportation sector. GoMetro provides commuters with accurate information to plan their daily activities, which makes Metrorail a more convenient means to commute and results in improved time management for users. No clear estimates are available on the economic benefit generated through time saved for users, but given the depth of the problem before the app launched and GoMetro's large user base, the impact is likely to be substantial.

Aftarobot, another app focusing on mobility and transport, entered the mLab as a result of the Gauteng Innovation Competition.

Whereas GoMetro improves Metrorail's mass railway transit, Aftarobot's attention is on minibuses—also referred to by South Africans as taxis. The app is currently in the pilot project stage³⁹, only operating in Gauteng, one of the country's nine provinces. The app started less than a year ago and its focus is now on data gathering to understand patterns in the usage of minibuses, later informing the delivery of accurate waiting time information to users.

Aftarobot aims to cover 32 to 40 percent of the market of taxi associations, which cover 65 percent of all public transportation and serve 14 million passengers daily with an estimated 120,000 vehicles, thereby constituting the primary means of transport in South Africa. If Aftarobot's plans succeed, the aggregated economic impact of reductions in waiting periods and improvements in customers' ability to plan their days could be significant.

The aggregated economic impact could be outstanding should Aftarobot expansion plans succeed.

Geekulcha shows promising prospects to contribute to addressing two major problems of the IT sector in the country.

Geekulcha is one of the illustrative examples of solutions that do not directly address the MDGs or application users at the BoP but has transformative potential. The web-based app works through Internet platforms where the IT communities get to interact, have discussions, debate on IT-related subjects, and share knowledge with each other. The application, launched in March 2013, is showing promising prospects to contribute to addressing two major problems of the IT sector in the country: its relatively small pool of skilled workers and the fact that the industry lacks efficient means to reach out to and connect talented students, as well as the grassroots developer

community. In response, Geekulcha has built a community of IT professionals connected with the industry and other IT stakeholders. Approximately 20 companies have contacted Geekulcha to headhunt students, offering them participation in specific projects. Thirty students thus far have found jobs as a result of their involvement in the community. Data on outreach and immediate results hint at good future prospects: Facebook statistics show 1,200 and 1,700 users in the two platforms, with engagement rates revealing 500 active users. Geekulcha also organized ten workshops with an average attendance of 30 to 40 people, and in less than a year 30 students obtained jobs through Geekulcha platforms.

39 · Among the 30 to 40 routes within one taxi station, Aftarobot is currently studying the frequency of only one route.

Afroes is a social enterprise that develops educational mobile games that address important social issues in Africa, such as gender violence, political violence, and child abuse. Its applications are examples for transformative potential in MDG-related areas. Extensive quantitative data on the impact of the company's applications are not available but there is indication that the apps make a difference for users.

There are indications that Afroes applications are promoting behavioral changes, which could be sizeable given the number of downloads.

ChampChase (Afroes) is a game that raises awareness about the safety and security of children. It started as an initiative of the Nelson Mandela Children's Fund.

The game features 180,000 downloads in a country where, according to UNICEF, 54,225 crimes against children were reported in 2010/2011, with half of the cases being sexual offenses, and around 30 percent of sex crimes against children involving victims under 10 years of age.

Haki 1 and 2 (Afroes) address social rights and justice and the protection of environmental rights, respectively, with Haki 1 featuring 285,000 downloads and Haki 2 having generated 38,000. Both mobile applications aim to change the mindset of society on cultural practices and seek to empower youth so that they are capable to defend their rights.

Moraba (Afroes) addresses gender-based violence, a major problem in South Africa, where according to police records, 154 women were raped per day between March 2010 and March 2011 and 78 percent of men admit to perpetrating some form of violence against women. Moraba, an initiative prompted by UN Women, has 58,500 downloads and is likely to produce behavioral changes.

“

The most powerful thing I can take from this game is what the young people write in the comments section of the game saying they have learned that they have a voice, that they know they don't have to be taken advantage of as young people and that they realize some of what they were previously doing was wrong.

(Nathan Muema, software engineer and designer of Moraba)

”

Applications with Development Impact in Kenya

According to the Kenya's development agenda Vision 2030, the country aims to transform itself into a middle-income country, based on enhancing agricultural productivity, access to health care, education, and basic infrastructure services⁴⁰. In 2013, the average Kenyan had increased access to health services, education, and social rights, but contrasts and widespread inequalities remain⁴¹. The slow pace of development in small cities, towns, and rural areas is one of the biggest challenges in a country where most of the wealth and access to quality services are concentrated in the capital city of Nairobi.

Many applications are being developed for use in regions of Kenya other than Nairobi, mostly applications for regular cell phones instead of smart phones.

There has been progress in the ICT sector: Internet access has increased from 1.3 million subscribers in 2007 to 14.3 million in 2011, with 80 percent of Kenyan adults owning a mobile phone; communications costs have dropped and the use of Internet information has increased (CPS Kenya report)⁴².

The mLab has supported the development of a number of applications in financial inclusion, education, health care, and agriculture that can improve users' quality of life not only in Nairobi but also in other cities and rural areas. Given the great number of application cases that will be illustrated, the following is divided into the sectors: mobile education, agriculture, financial inclusion, health, employment creation, and environmental protection.



One of the clearest examples of impact in the mobile education sector is **Eneza Education** (previously branded "MPrep"), which offers mobile technology tools to schools in remote regions. According to findings of the MPrep 2012 Impact Study Report (which analyzed three slum schools in Nairobi and measured impact in a controlled environment) and

taking into account the current coverage of the application, it could be estimated that, in the best of cases, 33,000 Kenyan students are likely to improve their grades in all subjects and 700 schools are likely to increase their Kenya Certificate of Primary School scores by 15 percent on average (see box 3 for details).



Through the use of Eneza Education, 33,000 students and 700 schools are likely to increase performance.

40· All of them are supported by the World Bank and included in the Country Partnership Strategy.

41 · <http://www.worldbank.org/en/country/kenya/overview>.

42 · http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2012/04/13/000386194_20120413011910/Rendered/PDF/672240CASP0P1200Official0Use0Only090.pdf.



FACTS

100,000 users of which 60 percent are active; 700 primary schools integrated; 33,000 students using the SMS system.

EVIDENCE OF IMPACT⁴³

Students using ENEZA have increased their exam scores more than the average student in nearly every subject, by an average of 5 percent overall.

80 percent of students in schools were found to study more when using ENEZA.

67 percent of ENEZA students were found to study more than four hours after school per day compared to 55 percent of students who are not on ENEZA.

Schools using ENEZA feature a 15 percent increase of the Kenya Certificate of Primary School scores of schools with high use of ENEZA.

ESTIMATES OF IMPACT

33,000 students are likely to increase their grades in all subjects and 700 schools are likely to increase their Kenya Certificate of Primary School scores by 15 percent on average.

700 schools and 33,000 students equal coverage of 2.68 percent of schools and 0.35 percent of students in the country, which is significant for a single mobile application.

ENEZA users are not evenly spread around the country; they are concentrated in slum schools, Daadab Refugee camps, and in primary schools of rural areas in Northeastern region of Kenya—areas where the poverty incidence is particularly high—for instance, in the Northeastern region, 55 percent of poor girls and 43 percent of poor boys have never been to school. Therefore, the likely impact on poverty alleviation is even higher.

Enrolment, retention, completion, and progression rates are a major challenge and a concern of the MDG on education for Kenya. The percentage of repeaters in primary school stands at a 6 percent and 65 percent of students abandon after primary school. In this context, ENEZA offers a tool that prompts students to study more and could help reduce the incidence of drop-outs and repeaters in cases where these are due to insufficient studying.

43 · MPrep 2012 Impact Study Report, which analyzed three slum schools in Nairobi in order to measure impact in a controlled environment.
See <http://enezaeducation.com/release-of-mprep-impact-report-2/>.

eLimu is an award-winning interactive application for children in the Kenyan Primary School education system, helping them to study and review for exams and making studying more enjoyable.

Although quantitative data was not available at the time of the assessment, several factors indicate that this application could have a tangible impact. The application features an individual follow-up process that motivates kids to continue schooling, in a country context with a 40 percent dropout rate, a 45 to 1 student-teacher ratio, and 10 percent of the standard eighth-grade students are not able to solve second-grade math problems.

Despite nearly 100 percent of kids enrolling in primary school, less than one third of primary school pupils possess basic literacy and math skills required for their age⁴⁴. In this scenario, an application that makes learning enjoyable has good prospects to make a difference.

Smart Blackboard is an application that is not yet operational but presents good prospects for impact. It allows students to access affordable tutoring while providing educators with additional income by means of micro-tutorials. The application is a response to a context where schools are overcrowded with

Our curriculum in Kenya is like a punishment to children, they feel they have to do it because it's compulsory. [...] With these tablets [featuring eLimu], our students really enjoy learning.

(Headmaster of Amaf Primary School)

extremely high student to teacher ratios and prohibitively expensive private tutors for the majority of families⁴⁵. Smart Blackboard could make a difference in lowering students' failure rates by facilitating a one-to-one support through the application.



Aside from education, enhancing agricultural productivity is another government priority in Kenya. Agriculture accounts for 23 percent of GDP and 75 percent of the workforce⁴⁶, with most food production in the hands of smallholder farmers.

However, the lack of proper information is a key factor preventing farmers from making a livelihood out of agriculture⁴⁷. A number of applications have focused on this gap. Some of them are already having an impact and others are on their way.



MFarm provides access to up-to-date agricultural commodity market information, links farmers to buyers through its marketplace, and provides analyses of current agriculture trends. The application offers access to pricing information for Kenyan smallholder farmers that usually have to sell farm produce at low farm-gate prices to middlemen, even when market prices are higher. According to MFarm data, the application has reached 6,300 users in its network. User testimonials show anecdotal evidence that a farmer can increase income from 30 shillings per kilogram of tomatoes to earning to 80 shillings with MFarm services,

indicating a 166 percent increase in the selling price. Extrapolating such information is difficult; this could be an extreme case associated to one particular agricultural product. Nonetheless, it is reasonable to assume that a significant number of farmers can substantially increase their income. Given MFarm's network size, aggregate farmer income increases are likely to be nonnegligible.

MFarm may double smallholder farmers' incomes.

The testing phase shows that the GreenHouse Pro can cut input costs by 11 percent.

GreenHouse Pro has the objective of raising productivity in farming, especially in greenhouse farming. It is an app on greenhouse technology providing information on how to produce greenhouse crops. Fifteen farmers in Kyambu are currently testing the application, and once launched it is intended

to cover the entire country. The application works as a virtual agriculture extension officer, and the testing phase has revealed that the cost of inputs can be reduced by 11 percent when the information is provided to the farmer with the app.

46 · In one revealing case, when the price of rice went up 20 percent in May 2011, it could have meant profits to farmers but the majority of the farmers experienced losses since they could not access reliable and timely information, according to the Economic Report on Africa 2012.

47 · In one revealing case, when the price of rice went up 20 percent in May 2011, it could have meant profits to farmers but the majority of the farmers experienced losses since they could not access reliable and timely information, according to the Economic Report on Africa 2012.

MkulimaBima helps farmers and insurance firms to track compensation claims in real-time in an environment where smallholder farmers are particularly vulnerable to unpredictable rainfall and where crop losses are common, leading to food shortages and even famine.⁴⁸ Farmers that participated in a pilot launch are already signed up to the platform. Two thousand farmers are subscribed to the platform, and two insurance companies have been engaged. The pilot started in July 2013 and concluded in February 2014. The testing phase revealed that the process between crop loss and the claim will be faster: The app enabled farmers to move away from a claim process that used

to take an average of five days (including one day of travel) to a process that now takes one day and does not require travel. This leads to a decrease in harvest loss, since the farmer can recover the funds to buy new seeds more quickly, and also important travel costs savings. Using conservative estimates and only taking into account farmers registered during the pilot phase, the app could result in savings of more than Kenyan schillings (KSh)15,000 of income a year, or about 7.5 income days per farmer per year.⁴⁹

Farmers can save up to 7.5 income days a year (conservative estimate).

FarmPal is another mobile agriculture application intended to increase income and productivity in farming. The app offers three main features: a marketplace for farmers to buy or sell second-hand farm equipment, a plant guide with understandable and relevant information for farmers, and an information desk where farmers can address questions

directly to experts. The application was launched less than a year ago and data on specific impact are not available. Currently, the app is undergoing further testing, with 39 enrolled users located mostly in the small town of Syokiamu. The application's prospects are promising, with features such as language options that enable users to choose between English, Kiswahili, Kikuyu, and Kikamba, among other local languages. Reportedly, farmers who have interacted with the app were impressed and called it "mobile extension officer."



Mobile money is seen as transformational for financial inclusion, which gains in importance given that exclusion from the formal financial system has been identified as a major barrier to a world without poverty.⁵⁰ Large segments of the population in developing countries have traditionally been excluded from basic financial services, such as depositing, withdrawing, and transferring money easily, because they simply did not have a bank account. In Kenya, several applications supported by the mLab have focused on financial inclusion for both people and businesses.

48 · In Kenya, two-thirds of the population depends on the crops they grow and the animals they keep for their livelihoods and survival.

49 · For the estimate, it was assumed that the travel costs of a farmer coming from a village three to five hours from Nairobi would be between KSh600 to KSh1000 Kenyan Shillings (return ticket), in a context where smallholder farmers earn a daily income of KSh200 to KSh400. With mKulimaBima, farmers pay KSh10 to send the SMS and save the time and cost of travel. Assuming that one farmer processes one claim per year and that the process takes her/him three days (in which her/his opportunity cost is KSh1,200), and the travel cost is KSh800, she/he could save an average of KSh2,000, which is the equivalent to between 5 and 10 income days (7.5 on average).

50 · World Bank Group. 2012. Maximizing Mobile. Available at www.worldbank.org/ict/ic4d2012.

Kopo Kopo is a platform that makes it easy, inexpensive, and convenient for a business to accept mobile money payments. In partnership with payment providers, Kopo Kopo aspires to create the “merchant operating system of choice” for businesses in emerging markets. It also helps clients move their business from cash to electronic payments, contributing to their integration into the Kenyan and East African markets. The app helps SMEs to expand their revenues and customer base. Quantitative

The number of SMEs using the app increased to 10,000 in 2013 from only 50,000 in 2012.

data is not available on these two variables. However, the number of SMEs using the app went up to 10,000 in 2013 from 50,000 in 2012, indicating the app is likely to have substantial economic impact.



mPayer, by Zege Technologies, is a mobile and web payment gateway that enables businesses to manage mobile money, cash income, and expense transactions. The app has been operational for over a year and approximately 100 companies and 3,000 low-income clients (of which many are part of the BoP) are using it. The application reduces time for payments to be reflected in a client's enterprise system and motivates clients to “go green” via paperless and cashless transactions. It has also proved to help small businesses track their income better and for rural users, the app meant companies sell more and farmers get farming inputs on time. Zege Technologies helps its clients adopt better accounting practices by linking payments to customers and providing valuable statistical analysis and reliable reports. The app also helps customers obtain external financing: the digitalized information makes it more likely to have correct figures when presenting applications for external financing. There is no quantitative aggregated data on impact, but anecdotal evidence and testimonials from companies using mPayer show it could be tangible.

“

[mPayer] has helped us manage our customers better. Now we can distinguish our payments better and make them secure. We would not have grown as much as we have without this solution.

(mPayer user)

”

Uhasibu is an Internet and cloud-based accounting package developed specifically for Kenyan SMEs looking for an affordable and easy-to-use accounting solution. The company estimates that it has served between 300 and 400 enterprise customers since its creation in September 2011, and it has plans to reach up to 7,000 businesses over the next five years.

Uhasibu can reportedly enable businesses to cut 50 percent on accounting fees costs, which could imply important aggregated cost savings.

Uhasibu can halve accounting costs. Given the company's plans for expansion that implies important economic potential gains.

Dairy Sacco is an app offering financial services to dairy farmers. It offers a mobile-based credit tool that is modeled on agricultural cooperatives, providing input and merchandise to members on credit against produce deliveries. The Kenyan dairy industry is a source of income and employment for over 1.5 million smallholder farmers in rural areas. However, small-scale farmers face

many challenges, in particular, difficulties in accessing credit. Dairy Sacco improves access to financial services tailored for agriculture purposes, and it is intended to increase income and trust for farmers by doing business in a more accurate way, for example, by controlling inventory and balance of money. Data on impact were not available to make concrete estimates.



According to the Vision 2030 government program, Kenyan health policy aims at the right to public and quality health care for all citizens. However, the country still faces a high shortage of physicians, with an average of 0.2 physicians⁵² per 1,000 people (as compared to 2.4 in the United States).⁵³ Moreover, Kenya is still struggling with high incidences of fatal diseases: HIV is responsible for 29.3 percent of all deaths, tuberculosis for 14.4 percent, and malaria for 5.8 percent.⁵³

An illustrative example of powerful mobile health applications is **MedAfrica**, developed to improve the health of communities by increasing access to health care-related information. The app also helps users to identify the nearest doctor, which is especially relevant for people in rural areas where the normal travel time to the nearest doctor can be one hour.⁵⁴ The application also offers drug information and the app provides precise information on purchased medicines, responding to the high share of pharmacies that are not legally registered to sell drugs.⁵⁵ In March 2012, MedAfrica recorded 70,000 users,

of which an average of 42,000 were active users who gained access to qualified doctors and health care self-management. The company continued to expand in the following years, but detailed usage and impact data were unavailable for this assessment.

MedAfrica has enabled 42,000 users to get access to qualified doctors and self-management of health care.

51 · Physicians include generalists and specialists medical practitioners (World Bank).

52 · <http://data.worldbank.org/indicator/SH.MED.PHYS.ZS>.

53 · http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_ken_en.pdf.

54 · <http://www.medafrica.org/>.

55 · Reportedly, only 33 percent of pharmacies are legally registered to sell drugs, <http://www.healthsystems2020.org/content/resource/detail/2760/>.

M-Chanjo seeks to reduce child mortality by creating awareness on child immunization among parents by sending text message reminders.

In Kenya, children under the age of five have a mortality rate of 73 per 1000.⁵⁶ One reason is that children are not sufficiently protected against life-threatening diseases during the first years of life. According to UNICEF, nearly 90 percent of un-immunized children in East and Southern Africa live in eight countries, including Kenya. Many of the cases are due to lack of information on immunization calendars or a correct follow-up of the next vaccination due.

M-Chanjo has reached 3,000 children and contributed to address a main cause of child mortality.

As a response, M-Chanjo sends vaccination SMS reminders as well as basic information on health guidance. The app has reached 3,000 children since it was launched, increasing at an average of 1,000 children per year.

Two more mobile health applications developed in Kenya complying with the assessment's selection criteria were Idaktari and MyLife. **Idaktari** is an application that helps doctors and private clinics manage patient registration, including payments and reminders for appointments. It is expected that the app will contribute to managing clinics more effectively and cut down on paper usage.

Contributing to employment creation through mobile technologies appears to be an important agenda in Kenya, which has a youth unemployment rate of 35 percent. **MobiAgent** is a mobile application that delivers small tasks to the underemployed. It allows any individual to become a reseller of products and services offered by other companies on the platform. The application offers low-cost services for startups or companies who want to push their products to the market. So far, 15 resellers working for hosting domain services have earned 10 percent commission on each

service provided to 15 companies. The most recent project is a solar lamp company seeking to launch its product to all regions of Kenya that have no electricity, especially in rural Kenya.⁵⁷ No resellers were subscribed for the project at the time of the assessment, as the product was still being advertised. Yet, if the product is accepted, there could be substantial gains for resellers as well as cost savings for the end consumers: resellers could earn half the minimum wage and households would save 10 times the costs of kerosene in the first year alone.⁵⁸

Impact estimates for MobiAgent are substantial: re-sellers could earn half the minimum wage and consumers reduce energy costs by tenfold in one year.

56 · [http://applications.who.int/immunization_monitoring/globalsummary/countries?countrycriteria\[country\]\[\]=KEN&commit=OK](http://applications.who.int/immunization_monitoring/globalsummary/countries?countrycriteria[country][]=KEN&commit=OK).

57 · 18.1 percent of population in Kenya has access to electricity (World Bank Data 2010).

58 · One lamp is sold at KSh600 at a 10 percent commission for the microworker, for a gain of KSh60. Each microworker can have 100 lamps to sell in one region, which means a gain of KSh6,000 (half of the minimum monthly income wage). The average cost for households spending on kerosene for lightning purposes is KSh500 per month. Alternatively, buying a solar lamp costs KSh600. Solar lamps are long-lasting items and therefore this entails substantial cost-savings.

Kenya faces a number of environmental challenges. Waste management⁵⁹ and the loss of biodiversity are among them. Gorecycler and Fishmate are two applications addressing environmental protection in these two areas.



Gorecycler is a web-based and mobile application with the objective to enable users to earn money while stimulating the mitigation of climate change effects. It aims to do so by providing a platform for people to find recycling resources and institutions near them on a map where they can sell recyclable waste. The app reported 200 active users during the first year of operation in 2012. It is currently online but it

is not operational, as its features are still being improved, for instance, through the inclusion of a routing system. Estimates point at the possibility of earning \$0.5 per kilo of plastic and \$2 per kilo of metal. The app does not feature a tracking system and the profile of the users is mostly unknown, which makes it difficult to produce aggregate estimates.

Fishmate connects fish farmers, fishers, fish consumers, and industry players in one marketplace. The application has a two-fold goal: fair trade when buying and selling fish and enhancing environmental awareness in a context where there is little aquaculture information, no online marketplace for fish trading, and a growing number of endangered fish species. The app has operated for less than a year and at present market research is being conducted to collect data on users. To date, no purchases have been made through the app, but the developer of Fishmate expects to sign

up about 500 users over the next year. If the app receives traction, farmers could potentially increase their income by 50 percent.⁶⁰ But the potential benefits of promoting fish-farming go beyond economic impact: the Kenya National Environmental Management Authority's State of the Environment Report 2010 highlights the suitability and potential of fish farming to accelerate the delivery of the economic, social, and political goals set forth in Vision 2030.⁶¹

Fishmate could imply doubling income for fish farmers and three-fold cost reductions for consumers while protecting the environment.



59 · <http://www.irinnews.org/report/97638/kenya-s-waste-management-challenge>.

60 · Fishmate estimates that a fish farmer could sell a kilo of fish at an average of \$3 using Fishmate via direct sales to end user, whereas they currently receive an average of \$2 when selling to companies/factories.

61 · Page 72, Chapter 4 (http://www.nema.go.ke/index.php?option=com_content&view=article&id=249&Itemid=613)

5.3

mLabs' Effects on Entrepreneurial Ecosystems

This section answers the third research question: "What have been the effects of mLabs on the entrepreneurial ecosystem?" While this type of effect was not anticipated in the design of the mLab program under CSBKE, the assessment revealed that mLabs contribute to a range of effects on entrepreneurial ecosystems. Of these contributions, four stand out:

Main outcome contributions of mLabs

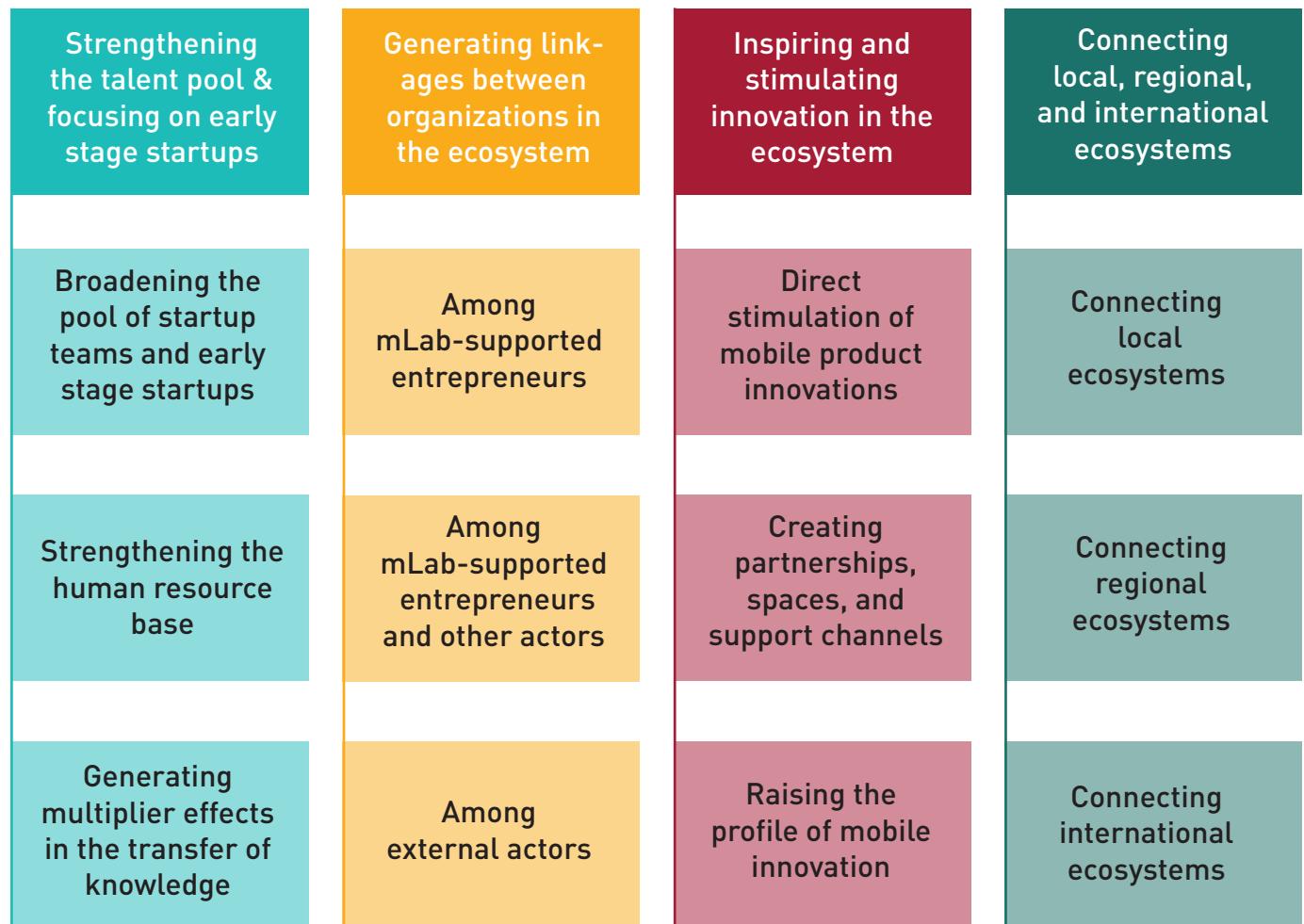
- 1 mLabs strengthen the local talent pool and support early and very early stage innovation.
- 2 mLabs generate linkages between organizations in the ecosystem.
- 3 mLabs inspire and stimulate innovation in the ecosystem.
- 4 mLabs connect local, regional, and international ecosystems.

The first three results have in common that they occur systematically and are substantial in each of the three analyzed ecosystems. The fourth contribution stands out not because of its magnitude but because it features effects for which mLabs have a notable potential for future contribution compared to other entrepreneurship enablers.

Each of the four subsections is organized as follows: A summary of key findings is followed

by a brief description of the outcome and its significance as well as an analysis explaining how mLabs contributed to these effects. The mentioned examples do not represent comprehensive depictions of all available pieces of evidence; they aim at providing the reader with illustrative snapshots of each outcome contribution. The total evidence base for the statements is the analysis derived from 116 interviews with representatives of 82 organizations in the three countries.

FIGURE 11: OVERVIEW OF MLABS' CONTRIBUTIONS TO ENTREPRENEURIAL ECOSYSTEMS





5.3.1

Strengthening the Talent Pool and Focusing on Early Stage Innovators

Key Findings

- mLabs have supported local talent pools and early- and very early- stage innovators. This has increased possibilities for young developers and entrepreneurs to initiate startups and to grow them into successful companies.
- Three main factors are at the heart of this contribution: the broadening of the pool of startup teams and early stage startups; the strengthening of the human resource base of the ecosystem; and multiplier effects in the transfer of knowledge.

One of the most tangible outcome contributions of mLabs in all three countries is that they have helped talent development and early stage innovators that otherwise would not be served by the ecosystem. They have done so by providing entry channels and capacity to young developers and entrepreneurs, thereby increasing the likelihood of startup creation in the mid- to long-term: more people entering the ecosystem, with more capacity and with incentives to create and develop startups. All in all, this means that the possibilities for young developers and entrepreneurs to initiate startups and to grow them into successful companies have been enhanced.

There are three factors that are at the heart of the contribution of mLabs to their enhancement of local talent pools and support of early stage innovators:

- 1) mLabs have broadened the pool of startup teams and early stage startups.
- 2) mLabs have strengthened the human resource base of entrepreneurial ecosystems through training, workshops, and event-based skill-building.
- 3) mLabs have generated multiplier effects in the transfer of knowledge from incubatees and other supported entrepreneurs to other early-stage innovators.



1. Broadening the Pool of Startup Teams and Early Stage Startups

mLabs have addressed early stage innovators and entrepreneurs that often start off with not much more than an idea and a rough business model for a mobile application. For example, in Armenia and South Africa, mLabs focused their activities mainly on young developers and entrepreneurs. In Kenya, while the mLab is also supporting more advanced startups, training programs for individuals have mainly targeted young developers, with a recent change of emphasis toward business graduates and non-technical entrepreneurs. Aside from training programs, mLabs have also experimented with events and competitions to create more concrete channels toward founding a startup (see box 4). This is different from the typical approach of profit-oriented accelerators and incubators that are usually much more selective and tend to

focus on set startups, either with initial market traction or with clear evidence of high payoff potential.

In other words, mLabs have widened the pipeline for startup market entries by including players that had been excluded previously, thereby broadening the pool of early stage startups and startup teams. For example, mLab Southern Africa created new channels to bring the previously isolated programmer student community into the entrepreneurial ecosystem. While it is not possible to say with certainty how many new startups are created in this way that otherwise would not have been created, it is likely that mLabs' emphasis leads to an increase in the overall number of potential and actual startups over the long-run.

BOX 4: CREATING INCENTIVES AND CHANNELS FOR STARTUP CREATION AND DEVELOPMENT THROUGH EVENTS AND COMPETITIONS



Events and competitions by mLabs have been a channel for developers to get interested in entrepreneurship and move into startups. The immediate objective for the majority of events and competitions is not startup creation, but rather to spur mobile product innovation and engage participants in competitive exposure. Yet, even if startup creation was more of a long-term rather than an immediate goal, it occurred in several cases.

The five teams generating revenues within mLab ECA at the time of this assessment were all formed at hackathons and competitions. Such events have not only contributed to the creation of startups but also to their evolution. For example, the idea of the Gardener Application (Nako Games) was generated in a hackathon before a revenue model was developed in the mLab. The startup Nako Games was then incorporated and incubated at the mLab and is today on the path toward becoming a promising game application development company.

In Kenya, a large number of young innovators are already seeing technology, including mobile and web based applications, as a way to make a living. 88mph, a well-known accelerator in Nairobi, received around 400 applications during their last program round in 2012, a number that would have been unthinkable a few years ago. As a reason for this change, mLab East Africa's Pivot East competition is widely considered to be a major driving force, complementing universities' efforts and the buzz prompted by the iHub. Data from a recent evaluation conducted by the University of Nairobi revealed that a number of Pivot East winners continued and grew their startup with the help of the mLab's incubation program, and also 80 percent of interviewed past participants who did not join the incubation program were still in business (as of June 2013), with the great majority of them (90 percent) feeling that their business was growing.

For mLab Southern Africa, there is anecdotal evidence that competitions have led to the creation of startups. An example is the case of MFactory. The founder joined the mLab based on his participation in a hackathon and has now created a successful service company. The same is true for GoMetro and Aftarobot, which joined the mLab having been selected as winning teams of the Gauteng Innovation Challenge 2012 (see section 5.2 for more information).

2. Strengthening the Human Resource Base in the Ecosystem

mLabs have particularly focused on providing skills, meaning they have strengthened the human resource base in the ecosystem, making it larger, more inclusive, and more apt for startup creation. The human resource base has mainly been strengthened by means of training programs and by engaging developers in hackathons and competitions featuring skill-development elements, such as hands-on coaching. Moreover, core incubation services have offered assets

such as workshops, mentorship, working spaces, and testing facilities, assisting developers to evolve into startups and helping early stage startups to further develop and consolidate.

As shown in table 6, mLabs have had considerable reach through their training and coaching programs for developers and entrepreneurs. In most cases, individuals reached and trained were young developers and entrepreneurs.

TABLE 6: DATA ON TRAINING AND COACHING DELIVERY



Teams applying for in-depth support through mLab	78	216	460	Total: 754
Teams that received in-depth one-on-one support	21	57	119	Total: 197
Number of people trained	223	260	462	Total: 945
Number of developers and entrepreneurs reached	1,578	1,000	5,000	Total: 7,578

Source: mLab scorecards, values as of June 2013.

The expectation is that at some point, some of the trainees will set up businesses. This important link between broadening and strengthening the human resource base, which later translates into startup creation, can already be seen in Kenya. An evaluation undertaken by the University of Nairobi revealed that 28 percent of the past participants to mLab East Africa's training program have created a startup and are involved in running it—more than half of them on a full-time basis. Together with qualitative evidence that mLab trainees value the training highly in its contribution to their skills, confidence, and market exposure, there is indication that the mLab contributes to creating incentives for startups to develop even through services focused on skill building.

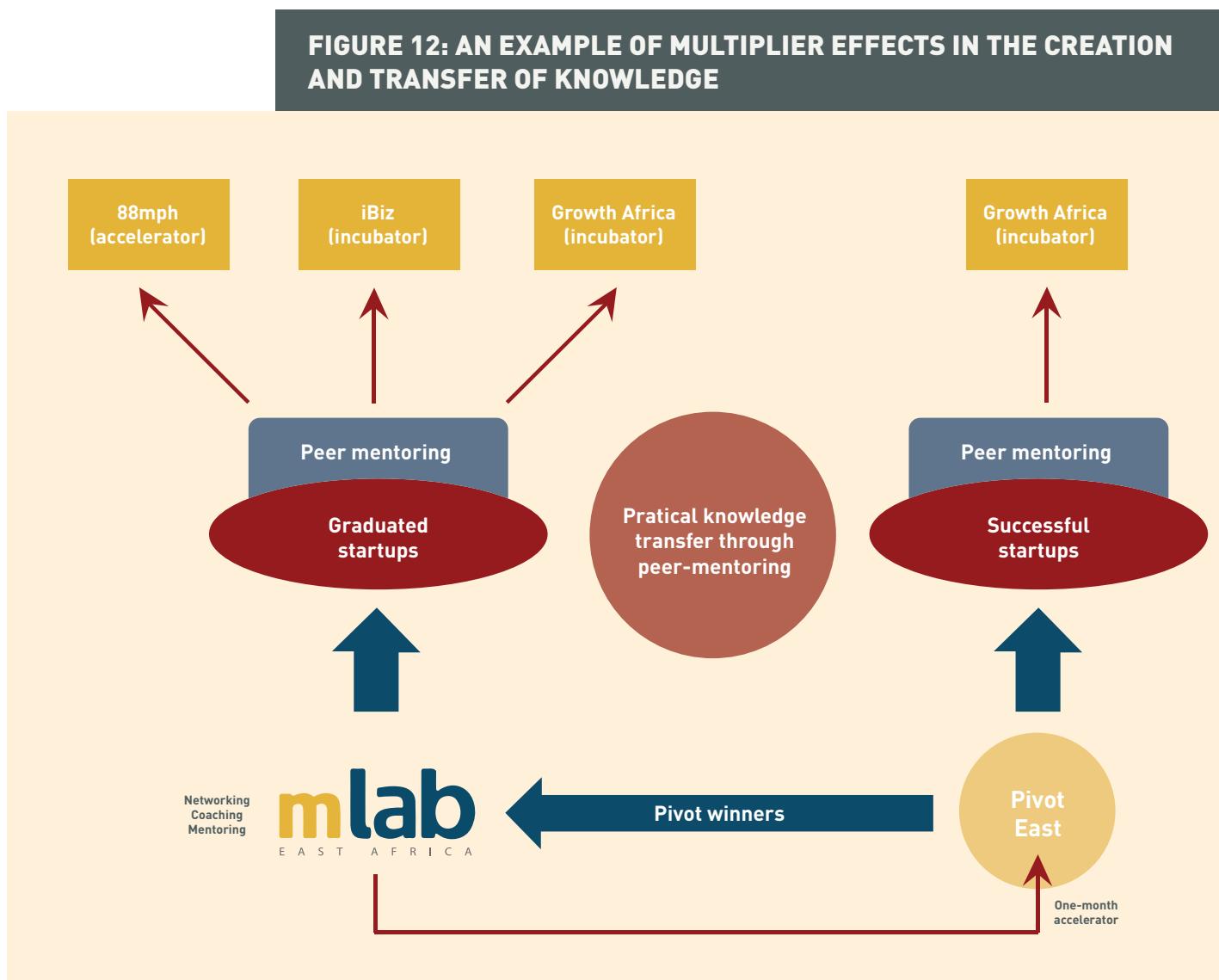
Moreover, according to the same evaluation, for all areas covered in the mLab East Africa's training program (technical, business skills, and others), past participants reported to have moved from average

skills and knowledge levels to overwhelmingly good and very good levels through the training. Moreover, subsequent to leaving the mLab, most trainees have maintained close contacts with their classmates and 68 percent of the interviewed graduates continue to attend mLab events, with the Wireless Wednesday series as the most commonly cited.

Moreover, mLab ECA offered two different types of capacity building: a four-month internship program where practical and theoretical training were combined as well as specific demand-oriented training sessions. Trainees considered the internship program unique in its offering of practical experience and job perspectives. There is a widespread perception that the mLab will not only contribute to startup creation but also to the development of highly qualified professionals ready to fit into other newly started companies searching for young and innovative talent.

3. Generating Multiplier Effects in the Transfer of Knowledge

The mLab pilot experiences have revealed that mLabs are also able to generate multiplicative knowledge flows where expertise acquired by startups and entrepreneurs during mLab support programs feeds back into the startup ecosystem at large.



An example such effects can be found in Kenya (see figure 12). The Pivot East competition identifies candidate teams that have potential to become successful startups. Some of the winners join mLab East Africa's incubation program and benefit from networking, coaching, and mentoring. Eventually, these incubatees graduate and often become successful startups (such as Kopo Kopo and mFarm). Importantly, some of the founders and employees of these startups then become mentors in other incubators and accelerators (iBiz, Growth Africa, 88mph), thereby allowing the knowledge and practical experience generated within the mLab to feed back into the startup ecosystem. Even Pivot East participants who did not win the competition and thus did not enter the incubation program at mLab

East Africa are part of this multiplier effect: during the competition, participants gain knowledge from the Pivot East one-month acceleration program, which some of them transferred as peer mentors in other incubation centers, such as the C4D Lab at the University of Nairobi. Therefore, entrepreneurs that received support from mLab East Africa—in one way or another—are transferring that knowledge back to the ecosystem through peer mentoring.

The cycle of practical knowledge sharing described above has an important characteristic feature: the networks and linkage that the mLab creates for client startups become the channels for the knowledge generated to be transferred inside the ecosystem and produce multiplier effects. In other

words, the high degree of exposure to ecosystem actors during mLab incubation programs facilitates the linkages that subsequently connect mLab graduate startups with other incubation and acceleration organizations in the ecosystem, enabling knowledge transfer to multiple parties.

The effects of significant knowledge transfer by mLab support alumni outside of the realm of mLabs have not yet happened in Armenia and South Africa, simply because no incubatee of these two mLabs has graduated yet. The emphasis on knowledge creation and the generation of linkages between startups and other ecosystem actors (that is, the precondition for the effects in Kenya) is also

in place in South Africa and in Armenia. Thus, it appears that it is a matter of time for these effects to reveal themselves for these two mLabs as well.

That said, knowledge transfer through peer mentoring and learning inside mLabs is already happening for mLab Southern Africa and mLab ECA. For instance, in Armenia, interns have often become trainers and team leaders that then mentored or trained new incoming interns. In this regard, mLab ECA has institutionalized peer mentoring and learning within the mLab—although this has not happened in the context of startup creation, as was the case for mLab East Africa.



5.3.2

Generating Linkages between Organizations in the Ecosystem



Key Findings

- mLabs have made a difference in creating linkages that increased the density of the ecosystem in contexts where the lack of connections to professional networks is a major hindering factor for startup development and resilience.
- Linkages created have been created at three levels: among mLab-supported entrepreneurs, among mLab-supported entrepreneurs and other players in the ecosystem, and among different actors of the ecosystem without involvement of client entrepreneurs.

A limiting factor for startup entrepreneurs in general⁶³ and in Africa in particular is isolation and lack of connections to professional networks, or “relational assets,” that make them prosper and more resilient. Most interviewees in the counterfactual group were active startups that had not gone through incubation. They often pointed out that the connection of the startup with other startups, partners, and funding sources (usually family and friends) is a key factor for continued entrepreneurship. A product or business model may be tweaked or redesigned relatively quickly, but a valuable network is not easily created.

mLabs in the three countries have all made a difference in this regard by generating linkages where isolation was a barrier for entrepreneurs to flourish and develop. mLabs have generated linkages at four levels:

- (1) mLabs brought startups together, that is, they linked incubatee startups with one another within the mLabs.
- (2) mLabs linked startups to actors in the ecosystem beyond the mLabs.
- (3) mLabs generated linkages between ecosystem actors outside of the mLabs.

1. Linkages among mLab-Supported Entrepreneurs

Bringing startups together in mLabs has proven to generate a series of intangible effects valued by startups across mLabs:

- Office and common working spaces as well as access to basic infrastructure (such as Internet or meeting rooms) under the umbrella of a recognized institution (the mLabs) have made a difference. Beyond the direct monetary value, it also had a motivational effect for most interviewed entrepreneurs, as it meant that they would take their startup seriously and work on it as a full-time business.
- Common workspaces and the fact that most incubatees come in through the same pipeline (hackathons, competitions or challenges) also

creates a collaborative environment and strong ties among co-incubatees. This effect is more tangible in mLab ECA and mLab Southern Africa.

- This collaborative environment at times goes beyond peer support and exchanges of ideas and translates into specific initiatives and even business deals. An illustrative example comes from mLab Southern Africa: GoMetro and other startups inside the mLabs subcontract fellow mLabs startups for mobile application development. Similarly, Jatamobile, another startup inside the mLabs, provides graphic design services to other incubatee peers, subsidized by the mLabs. This creates an internal market place within the mLabs.

2. Linkages among mLab-Supported Entrepreneurs and Other Actors

A second level of linkages brought about by mLabs is the linkage of entrepreneurs and startups to the ecosystem beyond the mLab. Most interviewed startups and entrepreneurs expressed that the most difficult part is to “enter the loop,” that is, to be effectively connected with the ecosystem. This is a role that mLabs have played very well. Through connections to the ecosystem, startups benefit from exposure to new actors and linkages with other organizations, for instance, through directed contract brokering or participation in fairs and events.

For instance, at mLab East Africa, meet-ups prompted by the mLab between education startups (both within and outside the mLab) have led a group of them (Eneza Education, Shoolbox) to work on establishing an association with the objective of doing advocacy, leveraging the interest of the sector, and stirring dialogue with the Ministry of Education.

mLab ECA also had an important role in integrating actors from the broader mobile app ecosystem. Eurasia Foundation and Kolba Labs are two important social innovators that want to integrate mobile technologies to develop solutions. They are not technology specialists and did not have any linkages with mobile developers before engaging with the mLab. Both organizations contacted the mLab to ask for technical support in order to transform existing ideas into app products.

In South Africa the mLab is connecting startups with established industry actors. For instance, the startup MFactory is working as a direct training service provider for Nokia. The contract has been established by the mLab, which provides the necessary credibility and legal liability to MFactory to be able to work for such a large firm. In the

opinion of the mLab manager, “in the past Nokia would have most probably brought companies from Finland to conduct training; now it is relying on local resources.”

mLabs have also had an important role in linking startups with contract opportunities. An example is GoMetro in South Africa that entered into a contractual agreement with the Gauteng province. This contract was directly brokered by the mLab and the Innovation Hub, which provided the necessary credibility and backing to the startup.

The link between startups accessing external funds and the mLabs is, at times, a clear direct link and at other times the result of a more indirect effect prompted by increased exposure to networks. Examples of indirect links usually entail that networking facilitated by the mLab increases the number of possibilities for new exchanges and interactions that may help startups to attract funds.

For example, at mLab East Africa, Eneza Education’s exposure to the mLab is one of the enabling factors that allowed the company to obtain resources from Savannah Fund. Similarly, Kopo Kopo sees a direct relationship between the increased exposure generated thanks to the iHub/mLab tandem and attraction of investment funds.

Microforester was developed during the m2work competition organized by mLab ECA. Microforester then decided to continue development of its prototype within the mLab’s facilities and with the mLab’s help. The app was awarded a grant by CRDF Global to support the continuation of the project. The application was also presented in the local government’s STEP competition where it won \$15,000.

3. Linkages among External Actors

The third level of linkage building occurs when the mLab (or any of its direct clients) generate linkages among ecosystem actors external to the mLab.

mLabs bridge and link external actors by several means: The most common are hackathons, innovation challenges, and competitions, which bring together developers, entrepreneurs, mobile operators, mobile device manufacturers, and potential investors.

mLabs have also created events specifically designed to link actors so as to broaden the ecosystem and enhance its quality. Wireless Wednesday in East Africa is a clear example. Wireless Wednesdays is an initiative that brings together the tech community, industry practitioners, and ecosystem actors (such as government agencies or investors) to discuss problems in the sector. By means of such integration, the events intend to contribute to generating channels, improve communication between industry and tech players, and ultimately bring about pertinent mobile solutions.

5.3.3

Inspiring and Stimulating Innovation in the Ecosystem



Key Findings

- mLabs have actively stimulated innovation across the three countries and they have done so in three ways: by directly stimulating product innovations; by creating partnerships, spaces, and support channels for innovation together with universities and innovation hubs; and by raising the profile of mobile innovation in the ecosystem.
- The increase in the profile of innovation in the ecosystem and the inspiration effects generate snowball effects of subsequent innovation processes. In many cases, these ecosystem stimulation effects arise from community-building activities.

A main outcome contribution of mLabs across the three countries is that they have actively stimulated innovation. They have mainly done so in three ways: by directly stimulating product innovations, by linking innovation stakeholders such as universities and innovation hubs, and by raising the profile of mobile innovation in the ecosystem.

1. Direct Stimulation of Mobile Product Innovations

With regard to product innovations that mLab-supported entrepreneurs have developed, data on application prototypes and applications brought to market indicate that mLabs have indeed had an effect in promoting innovation in the mobile space: innovation has happened within and around the mLabs.

Intermediate values
(either 2011 or 2012)⁶⁵



Final values
(Numbers for 2013 are until June/July 2013)



Source: mLab reporting scorecards.

TABLE 7: NUMBER OF NEW MOBILE APPLICATIONS BROUGHT TO MARKET⁶⁴

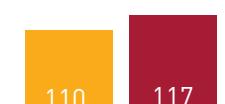
Number of new mobile applications brought to market



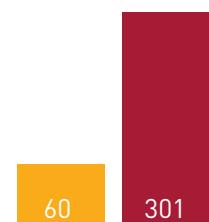
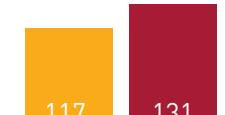
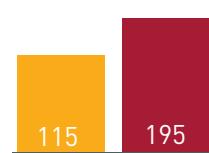
Number of mobile application prototypes



mLab ECA



mLab
EAST AFRICA



64 · Apps brought to market [438] and prototypes created [442] reported in mLab scorecards differ from the population of applications from which applications with development impact were selected (292, see section 5.2.). The former sample of applications includes a wider range of applications created at events and competitions (such as hackathons) as well as trainings and workshops; the latter includes only applications that mLab managers kept record of by name.

65 · Depending on the availability of the data.

Similar to startup creation in terms of absolute numbers, the extent of mobile product innovation varied depending on how mLabs positioned themselves in the process of translating ideas into customers' products. With regard to product innovation coming from mLab incubatees, the direct impact on generating ideas has been more discernible for mLab ECA and mLab Southern Africa, given that the generation of ideas has mainly happened inside the mLabs. In contrast, for mLab East Africa, incubatees' innovative ideas had in most cases already happened before clients entered the

mLab. Yet, mLab East Africa has indeed played a role in product innovation, only at later phases of the innovation cycle: it supported more advanced teams and focused either on bringing innovations to the market or in supporting the design of business models ensuring product innovations are better monetized. Moreover, direct product innovations have also happened outside the incubation program; for instance, mLab East Africa gave participants an incentive to develop applications in the training program and in the Pivot East competition.

2. Creating Partnerships, Spaces, and Support Channels for Innovation

mLabs have actively created partnerships and support channels for innovation in the ecosystem. The processes that they have promoted include, among others, research on new applications, the creation of spaces that stimulate the generation of new ideas, and the organization of challenges and competitions.

Often, what is enabling mLabs to be stimulators and prompters of innovation are their institutional or physical proximity to innovation hubs or universities, which can be the initial nodes for innovation processes within the ecosystem. For instance, mLab East Africa is located in the same building as the iHub, one of the four members of the mLab consortium and a reference organization for the tech community. This close physical and institutional proximity allows the mLab to develop innovation-related joint initiatives with iHub Research and the User Experience Lab (UX Lab), both linked to the iHub.

While mLab Southern Africa's location in Pretoria is far from ideal (complicated access for young developers without access to their own transport), the closeness to the Innovation Hub, a government-funded science and technology park that brings together high-tech industry, academia, and entrepreneurs, is a plus factor when it comes to generating innovation in collaboration with the provincial government (see example of GoMetro).

mLab ECA is located within the State Engineering University of Armenia campus, sharing the building with the Microsoft Innovation Center, other engineering laboratories, and several tech companies. This set-up allows the mLab to be close to its target group:

young entrepreneurs without access to professional labor markets but willing to develop ideas into businesses. Universities are foundational knowledge providers and laboratories transform this knowledge into marketable products. In this regard, the mLab is located right at the start of innovation processes.

“

There are several successful businesses in there (in the mLab): mFarm, Kopo Kopo. I think they all go through a mentorship program.

(Developer and hackathon winner in Kenya)

”

Community building initiatives have been a core activity for mLabs in promoting partnerships and support channels for innovation within the ecosystem. mLabs organized hackathons, innovation challenges, and competitions and also linked them with the incubation processes, which made it possible for winners to develop their innovation beyond the initial idea. Overall, community building activities turned out to be a versatile instrument with several positive effects (see box 5).

An example comes from mLabs East Africa. In 2011, Pivot 25 was the first regional startup competition in East Africa. It was launched at a very incipient stage of the ecosystem and has had an important effect in prompting software developers to innovate. For instance, Pivot East (which became the brand for the competition from 2012

For me the mLabs is a place, where I can learn from my peers. I want to learn from as many people as possible and the mLabs provides this space.

(An entrepreneur at mLabs Southern Africa)

“

After the Microsoft Innovation Center and mLabs were created in Armenia, if one follows the events that they organized, such as hackathons, mLabs competitions, you can see that the number of people that create social innovation is increasing hugely.

(Program Development Manager of an NGO in Armenia)

”

onwards) triggered the founder of Ma3route, an mLabs startup in Kenya, to delve into the software solution that became the well-known mobile/web/SMS platform helping citizens to share and access information about transport and traffic conditions. Ma3route is not the only example; there are several others such as Eneza Education, MedAfrica, or Zegetech, who started innovating around Pivot East and continued the process at the incubation program in the mLabs.

”

BOX 5: COMMUNITY BUILDING: A KEY EXPLANATORY FACTOR BEHIND SEVERAL EFFECTS



Community building, including competitions and events, has been referred to several times throughout the report. The reason is that hackathons, competitions, and innovation challenges are a main factor contributing to more than one outcome. Community building has been mentioned as:

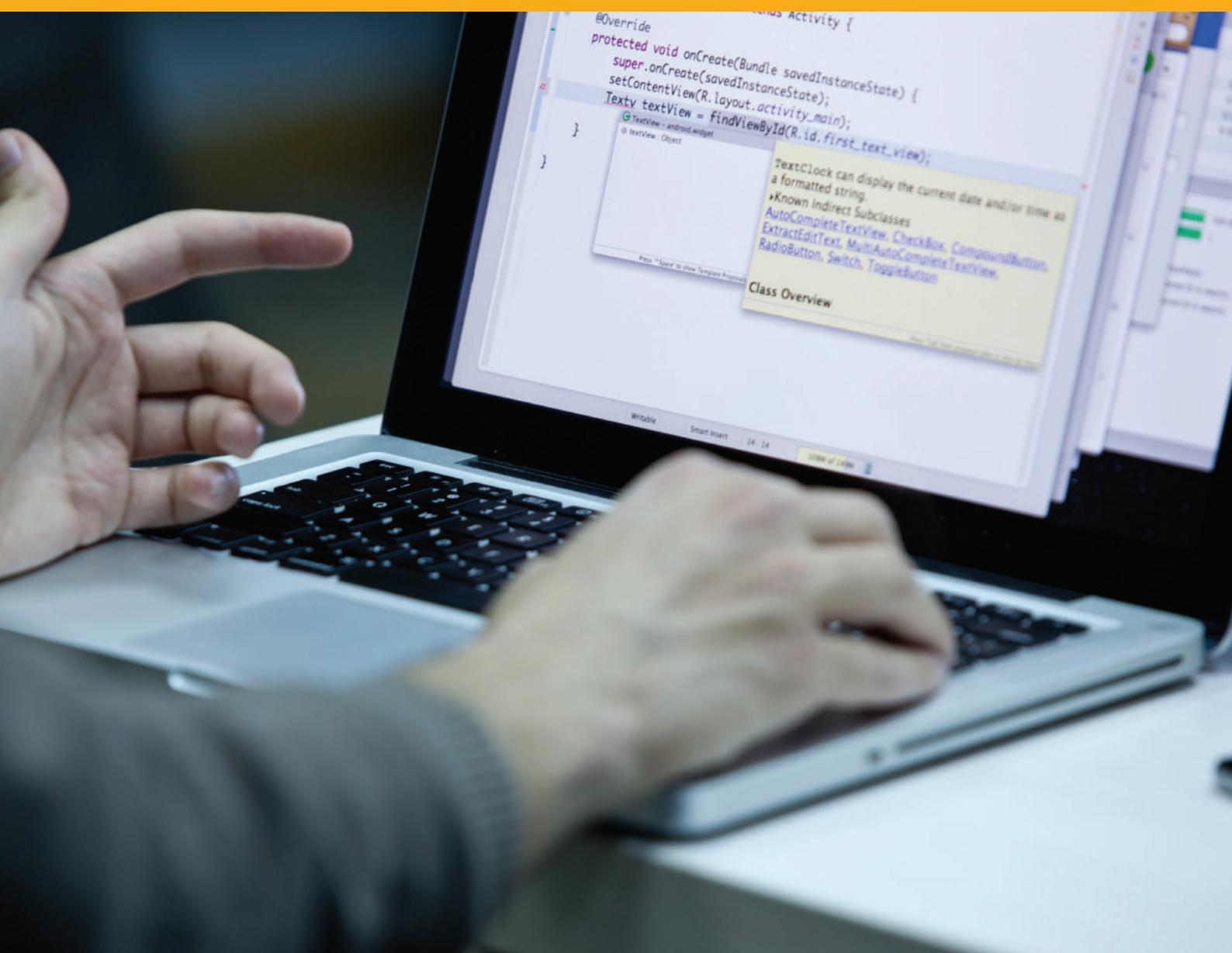
- 1) A mechanism that creates incentives and channels for startup creation and development
- 2) A means to strengthen the ecosystem's human resource base
- 3) As a core element enabling mLabs to promote innovation within the ecosystem, and in particular, as a factor that increases the profile of innovation in the ecosystem and generates inspirational effects that lead to further innovation.

3. Raising the Profile of Mobile Innovation

mLabs have also promoted innovation indirectly by means of two wider positive side effects of innovation challenges, competitions, hackathons, and other outreach. First, mLabs have been able to broadly raise the profile of innovation in the ecosystem, making the case for innovation in the media and putting mobile and software related innovation on the host countries' agendas. Second, events and competitions had important inspirational effects,⁶⁶ as they produce winners that eventually become successful entrepreneurs. Examples range from Mysales and Nako Games in Armenia to Kopo Kopo and Eneza Education in Kenya or GoMetro

and Afterobot in South Africa. These success stories have then inspired many other students and young developers and motivated them to embark on product innovation. The importance of locally relevant role model startups was widely cited.

It is clear that mLabs have increased the number of people working on innovations. What is less clear is to what extent these innovations have been of high quality. Whether the effects of competitions are viable market-based innovations or just pitches to win a prize without follow-up is a controversial aspect.⁶⁷



⁶⁶ Although inspiration is difficult to measure, in-depth interviews showed that the extent of this effect is present.

⁶⁷ Distractions from real market/product/business model development innovation processes are at times pointed out as adverse side effects of competitions. See <http://blogs.worldbank.org/psd/evolution-startup-competitions-case-pivot-east> and <http://www.infodev.org/m2Work>.

5.3.4

Connecting Local, Regional, and International Ecosystems



Key Findings

- Given their transnational scope, mLabs have a high potential to connect local, regional, and international ecosystems. However, this potential has not yet been fully realized.
- infoDev's global activities have shown promising ways to increase the recognition of mLabs through exposure to international ecosystems as well as to increase international recognition of local startups.

mLabs have a high potential to connect local, regional, and international ecosystems. Their core mandate is regional, but they have a local and an international dimension. This outcome can be expected to increase given mLab's regional mandate, initial palpable evidence from mLab East Africa as the longest running mLab, and mLabs' role as part of an international network (the four mLabs worldwide). Yet, at the time of this assessment, there was no widespread evidence of this effect occurring across the board yet.

The format of Pivot East, mLab East Africa's annual regional startup competition, has so far shown the best results for regional connection of ecosystems. The third edition of Pivot East in 2013 was held in Kampala, which increased the regional nature of the event and implied practical knowledge sharing between the mLab and Outbox Hub in Kampala.

The Pivot East Concept was also adopted and emulated in Nepal and in Vietnam as an example of international coordination, but this was not grounded in a structured knowledge exchange between mLabs. There are potential opportunities for experience sharing between Vietnam and Kenya, particularly with regards to the challenges in agriculture addressed by mFarm. However these potentialities and the ensuing mechanisms for sharing the experience have not yet been explored.

The two main factors explaining why regional activities have been relatively limited are insufficient funds available and mLabs' need to focus on the development of a viable value proposition for clients in the cities and countries that mLabs are located in. This is in line with the pilot and innovative nature of the mLab concept that first needed to be established locally before it would be able to start working regionally and internationally.

Yet, a number of promising regional activities illustrate the potential for future linkages between different ecosystems. Aside from mLab East Africa's approach based on Pivot East, mLab Southern Africa has also reached out into the ecosystems of neighboring countries. It provided coaching in the first hackathon ever held in Mozambique and generated a series of linkages. Young developers from Mozambique have visited the mLab in South Africa out of their own initiative and interviews in Mozambique showed an enormous interest in the mLab's activities.

mLab ECA's mandate covers over 10 countries in the region: Ukraine, Moldova, Belarus, Kazakhstan, Uzbekistan, Tajikistan, Kyrgyzstan, Turkmenistan, Azerbaijan, Georgia, and Armenia. mLab ECA organized a Regional App Mobile Contest in Armenia in 2013 where, for example, an innovator from Uzbekistan presented the

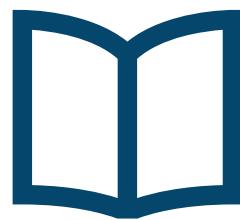


prototype of Be Healthy application that ultimately received funding of \$70,000 from the Ukrainian incubator, Happy Farm, which had been contacted by the mLab for the contest. Likewise, mLab ECA is working with enablers in two countries: it opened an office in the Ukraine and is also expanding to Moldova.

International linkages created by infoDev through its global activities as well as the Global Forum for Innovation and Technology Entrepreneurship show more potential of linking different ecosystems. Instead of facilitating a continuous exchange and collaboration between local enablers, infoDev supported mLabs through global activities, which include the Global Forum, as well as innovation competitions such as the m2Work project, and the mAgri and VentureOut challenges. In South

Africa, the Global Forum in East London enabled mLab Sothern Africa to establish relationships with a number of subnational regions within South Africa, especially the provincial governments of the Eastern and Western Cape, which would probably not have been aware of the mLab without this event. Moreoever, the possibility for local startups to participate in the VentureOut Challenge provided them with the possibility of promoting their products in international markets. GoMetro was one of the finalists of the VentureOut Challenge and had a chance to participate in a global infoDev event in Moldova. Such activities have been perceived as an added value of infoDev as they laid the groundwork to enable the mLab to devise an international strategy and to create awareness for the mLab within the local ecosystem.

6. SUMMARY AND CONCLUSIONS



This chapter summarizes the main conclusions and messages of this Outcome Assessment, providing high-level answers to the research questions posed by infoDev. For reference, the assessment examined (1) mLabs' effects on startup creation and development (as the best available proxy measures of increased competitiveness in mobile application enterprises) and (2) the development impact generated through the use of applications developed by mLab-supported developers and entrepreneurs, including the number of relevant

applications, as outcomes that related to the original objectives of the mLab program. The assessment also provided (3) an analysis of mLabs' effects on entrepreneurial ecosystems, since evidence pointed towards potentially substantial effects that were not originally envisioned under the CSBKE program. Broader goals of CSBKE, such as improvements in the knowledge economy or reaching disadvantaged populations with mobile innovations, were covered implicitly under these three effect types.

6.1

mLabs' Effects on Startup Creation and Development

The assessment shows that mLabs' interventions are positively associated with variables, such as startup revenue generation and job creation through the creation and growth of startups.

Indeed, after less than three years of operation, economic results generated by mLab-supported startups are tangible, even if the available data and the assessment methodology did not allow for precise specification of the net quantitative effect that mLabs have had on them. Over time, mLabs contributed to the creation of an increasing number of new startups through their interventions, and the startups supported in their incubation programs have managed to increase

revenues over time across the board, while creating high quality jobs and raising investments and seed funding.

At the same time, it is worth noting that only a rigorous impact evaluation could quantify the economic value that mLabs add. However, mLabs are interrelated with entrepreneurial ecosystems in complex ways, so the design of a reliable impact evaluation study would be a difficult task. Still, infoDev and mLabs need to continuously monitor quantitative results data, at the minimum allowing for intertemporal observations and the setting of benchmarks for comparative studies.

6.2

Development Impact through the Usage of Mobile Applications

About 10 percent of the 292 mobile applications identified as developed by innovators supported by mLab ECA, South Africa, and East Africa had actual or potential development impact, defined as a contribution to the Millennium Development Goals (MDG), addressing users at the Base of the Pyramid (BoP), or otherwise having a transformative potential in improving conditions for people and businesses.

Most applications with development impact analyzed are from Kenya. The main reason is likely that the total number of applications developed by entrepreneurs that received support from mLab East Africa is much larger than for mLab ECA and mLab Southern Africa. This appears to be the result of the expansive strategy adopted by mLab East Africa, promoting startup creation and growth largely via training programs and competitions (in addition to the incubation program), which have many participants and lead to application development as immediate outcomes.

Among the 29 applications analyzed, there were a few significant success stories, several companies generated satisfactory effects, and a majority of applications were still in pilot stages. The latter were found to not yet have succeeded in the market but to feature some potential for development impact. The fact that applications have not yet been launched in some cases, and the short time span elapsed since the applications were developed and launched in other cases, has led to limited depth of development impact observed to date.

In Kenya, direct development impact could be observed for some mLab-supported mobile applications that, for instance, improved users' access to fundamental services, such as health, education, and financial services. In South Africa, three applications are generating positive impact on mobility and employment opportunities, and another two are raising awareness on crucial problems, such as gender violence and child abuse. In Armenia, applications are at a more incipient stage and only potential impact could be considered.

In conclusion, there is evidence that the effects of mLabs also include contributions to development impact through the use of mobile applications supported by means of incubation, training programs, and competitions. As a caveat, the analysis was limited by the unavailability of data and the diversity of applications and development stages. Measuring the contribution of applications to development impact merits a separate impact assessment in the future, once a larger number of applications are launched and they have been used in the market for long enough to demonstrate usage results beyond early traction data.



6.3

Effects of mLabs on Entrepreneurial Ecosystems

The influence and effects of mLabs on entrepreneurial ecosystems varied across countries given that each mLabs has operated in a very specific and different ecosystem (see ecosystem snapshots in chapter 3). Yet, in all cases, mLabs made palpable contributions to the talent pool and early stage innovators, to the generation of linkages in the ecosystem, and to the stimulation of innovation.

It is difficult to discern any kind of net contribution to an entrepreneurial ecosystem, as one could argue that any actor in an ecosystem has a positive effect on it merely because they are part of it. However, the three mLabs stand out as deliberate contributors with a strong positive net effect. In other words, they have been ecosystem builders as a result of mLabs' business models⁶⁸ and value propositions that focus on an expansion of entrepreneurial ecosystems: mLabs have created new spaces for exchanges, brought in new actors, generated new linkages between

stakeholders, opened channels and pipelines for startups to emerge that did not exist previously, and stimulated new innovation processes in the ecosystem. All these contributions have meant adding actors, linkages, and features to the entrepreneurial ecosystem.

This conclusion is of relevance given that, in the first stages of implementation, "lack of insight into the local innovation ecosystem or a limited understanding of what an ecosystem support project should usually entail"⁶⁹ made it hard for some mLabs managers and consortium organizations to identify what activities should be prioritized. In this regard, it appeared that mLabs have been able to adapt timely.

Moreover, the pilot experiences have shown that the regional and cross-national nature of mLabs leads to a high potential to connect local, regional, and international ecosystems. However, this potential has yet to be realized in its full extent.

6.4

Overall Assessment

In sum, it was assessed that mLabs did make a difference. Importantly, the analysis was able to identify unexpected and indirect contributions, including for client and beneficiary groups that are only indirectly connected with the mLabs (such as mobile application users or innovators learning from incubation graduates). While this assessment does not present precise quantifications, overall, the evidence suggests that the direct net economic effect of mLabs through the creation and development of mobile application startups is only one part, and potentially not even the largest part, of mLabs' contribution.

The highlighted conclusions point to two important aspects to be considered for a decision whether to invest further in the mLabs concept. First, mLabs

have a high potential to establish themselves as ecosystem builders that fill the void among universities, mobile technology companies, and startup accelerators. In this vein, the evidence collected for this Assessment suggests that the return on investment for mLabs should not be measured only in terms of their direct economic effects represented in startup creation and access, but also account for the positive effects on entrepreneurial ecosystems. The mLabs grants turned out to be seed investments with substantial multiplier effects for mobile application innovation in the mid- and long-run. The model of mLabs as ecosystem builders presents good prospects for replication in countries and regions with incipient and latent yet promising mobile application and entrepreneurial ecosystems.

68. Refer to the Business Model Evaluation for more details on the notion of an "ecosystem builder," available at <http://www.infodev.org/mobilebusinessmodels>.

69. Quoted from the Business Model Evaluation, available at <http://www.infodev.org/mobilebusinessmodels>.

Second, mLabs have shown ability to foster the generation of mobile applications that in themselves have development impact; however, this ability has not yet materialized to its full extent as the lion's share of relevant applications are still in the pilot and testing stages. Moreover, through such activities as innovation competitions, hackathons, and training programs, mLabs support the generation of applications only at initial development stages (except for applications developed in the context of longer-running incubation programs). Only once these applications surpass testing and are launched to a wider marketplace can they generate more substantial impact. Yet, neither mLabs nor infoDev are providing substantial support for most applications in that critical transitional phase, which is ultimately a precondition to further increase the commercialization rate of applications that have the potential for significant development impact—one of the original objectives not yet achieved in full. Targeted commercialization support to socially and environmentally beneficial applications would offer infoDev the possibility of reaching further beyond its original goals.

ANNEXES

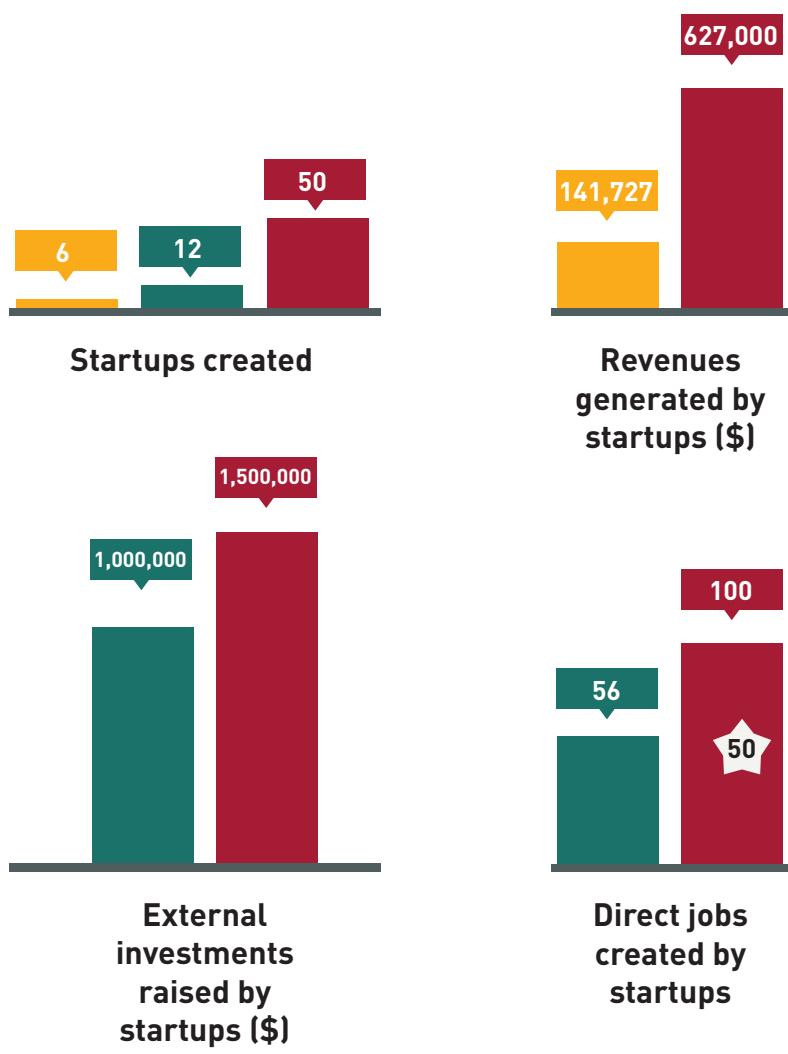


ANNEX A: CHARTS ON MLAB-SUPPORTED STARTUPS' CREATION AND DEVELOPMENT

1.1

Economic effects:

Results for mLab-supported entrepreneurs in East Africa, Kenya



KENYA

2011 2012 2013 [up to June, startups created up to September]

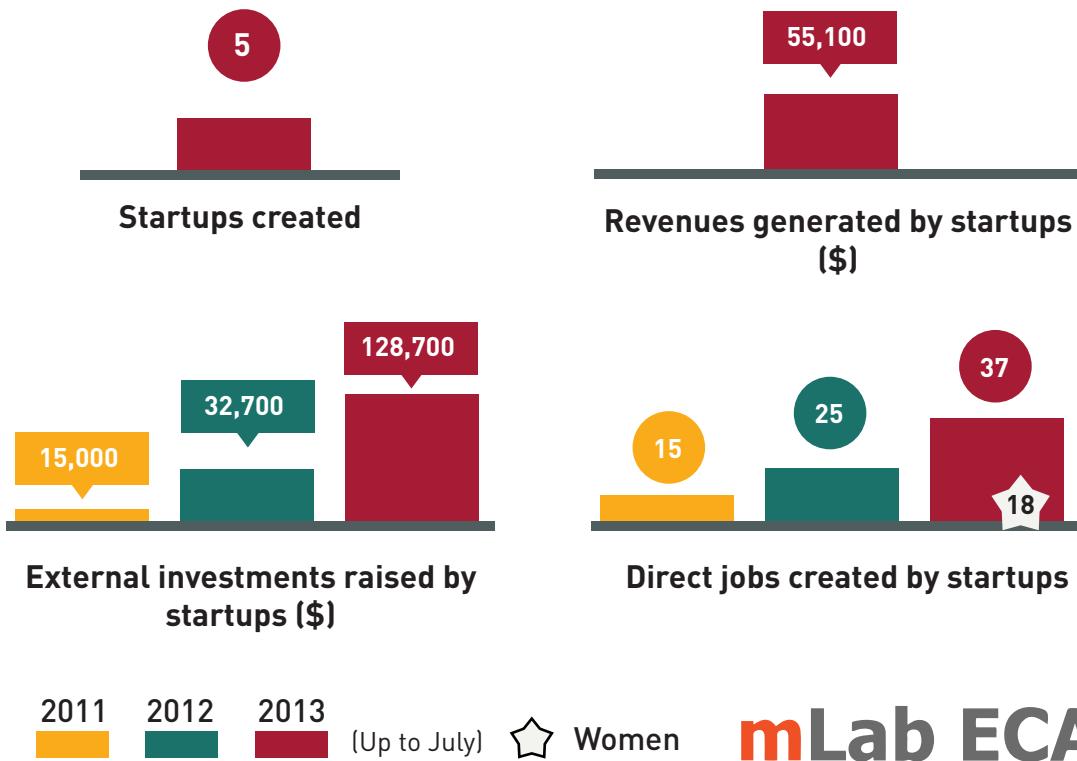
☆ Women

mlab
EAST AFRICA

1.2

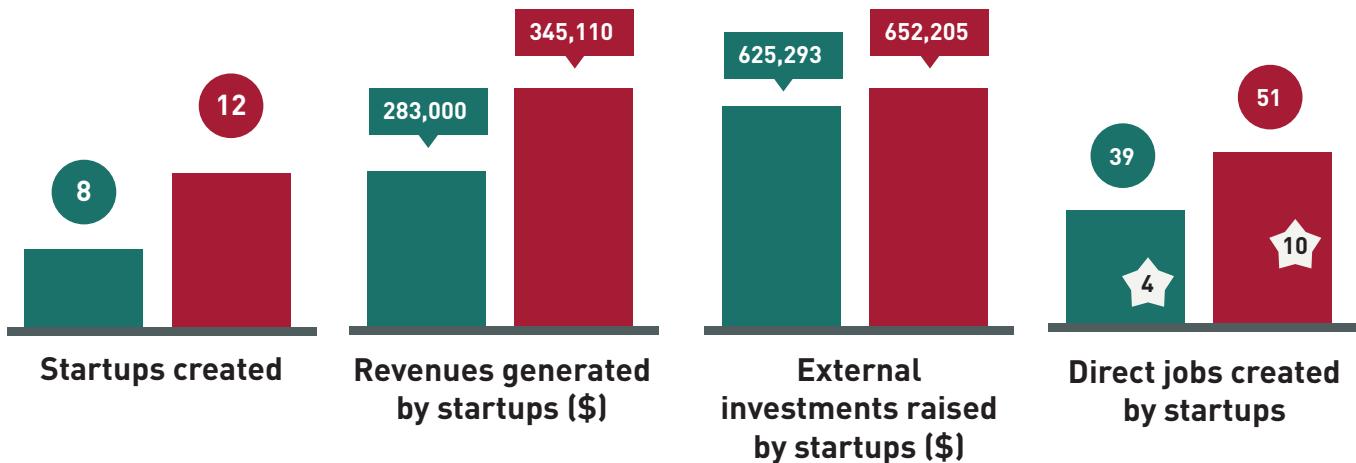
Economic effects:

Results for mLab-supported entrepreneurs in ECA, Armenia

**mLab ECA****1.3**

Economic effects:

Results for mLab-supported entrepreneurs in Southern Africa, South Africa

**mLab**
southern africa

2011

2012

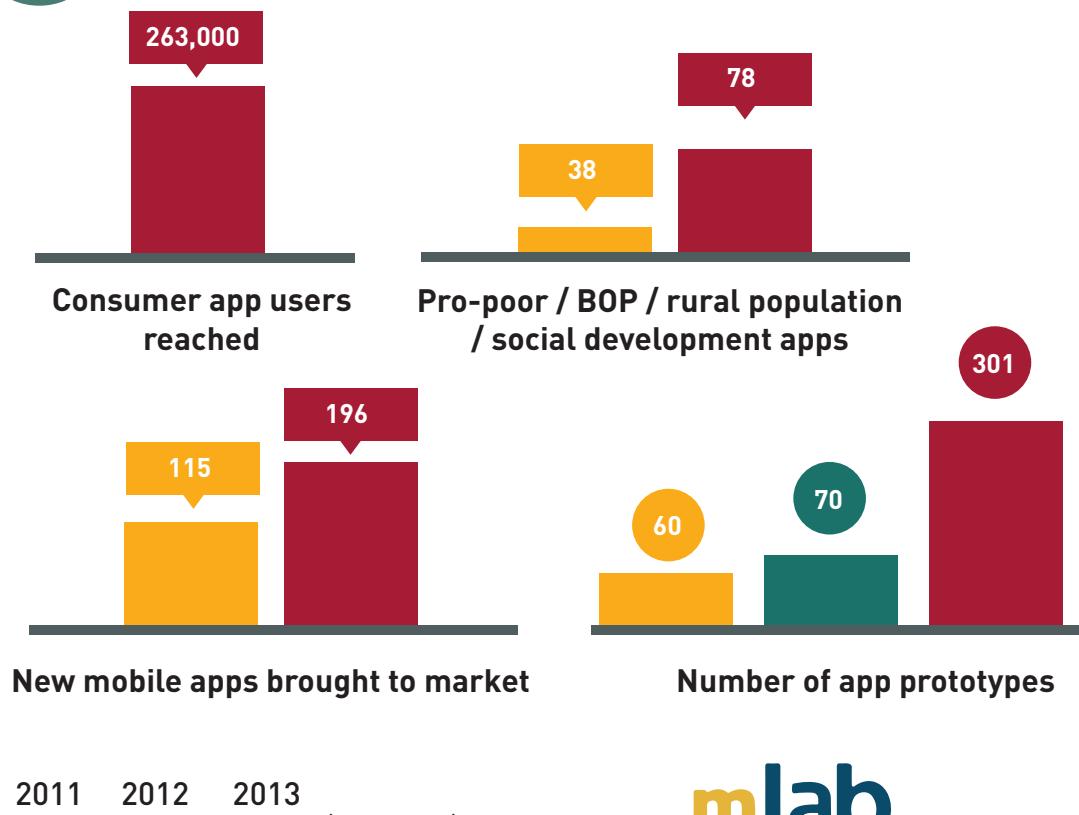
2013

(Up to September)

Women

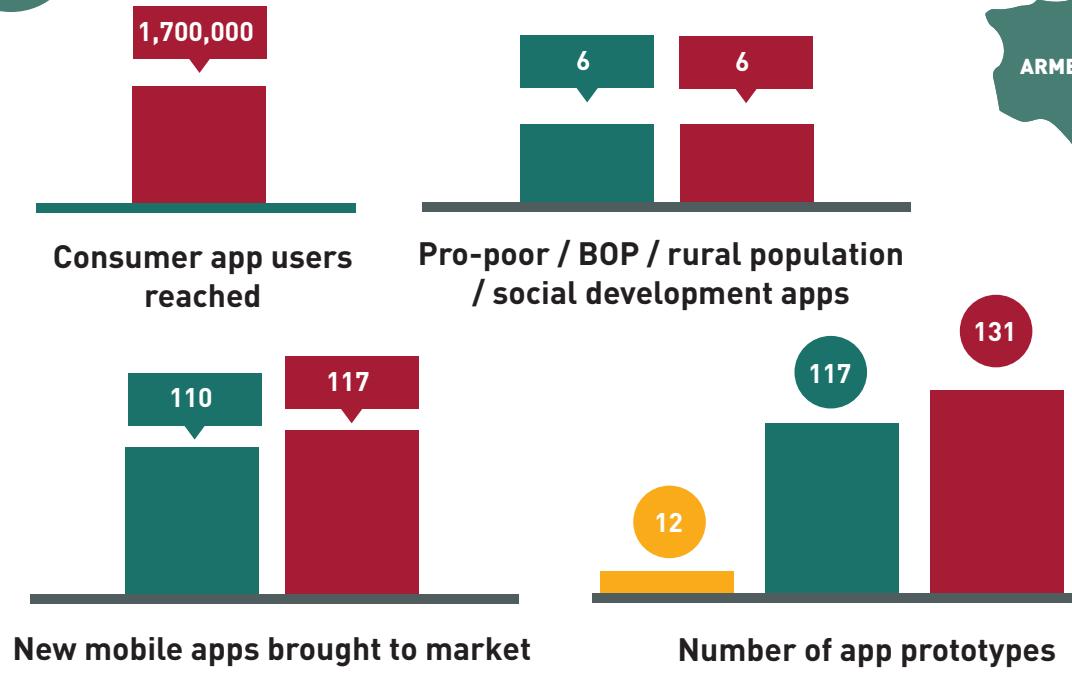
1.4

Mobile applications: Results for mLab-supported entrepreneurs in East Africa, Kenya



1.5

Mobile applications: Results for mLab-supported entrepreneurs in ECA, Armenia



2011 2012 2013
(Up to July)

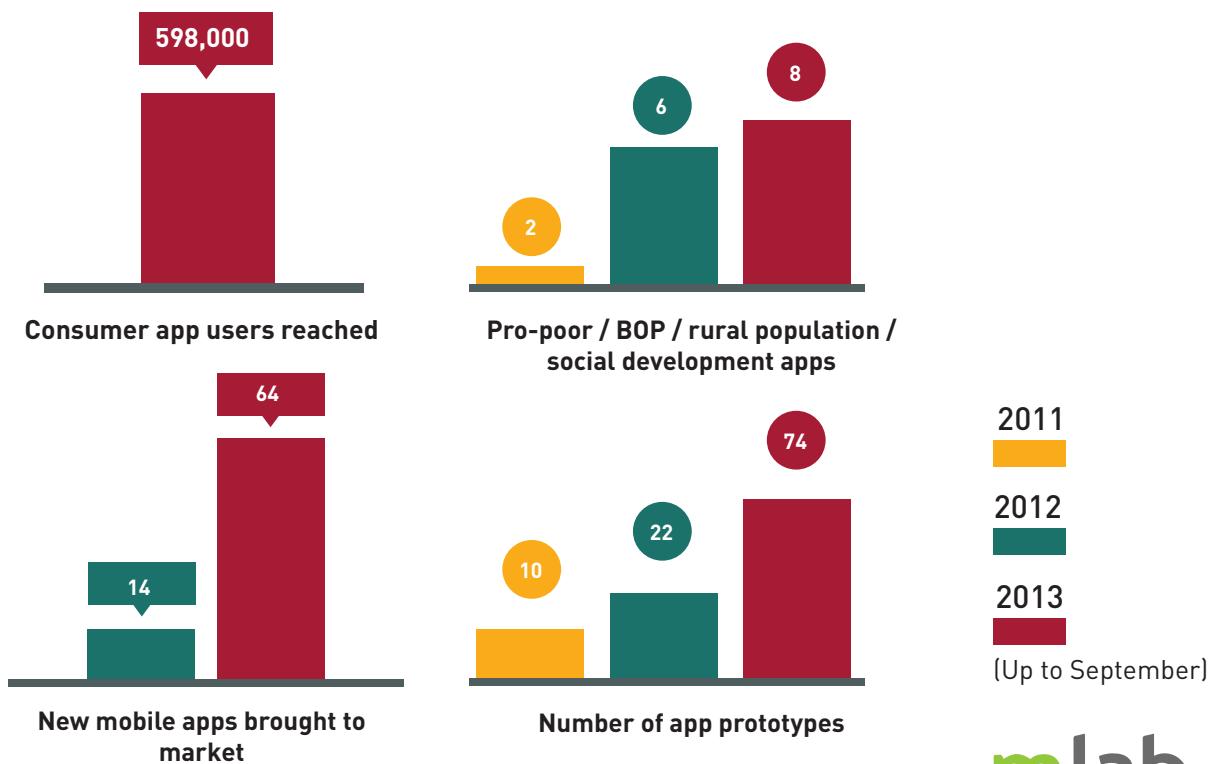
mLab ECA



1.6

Mobile applications:

Results for mLab-supported entrepreneurs in Southern Africa, South Africa



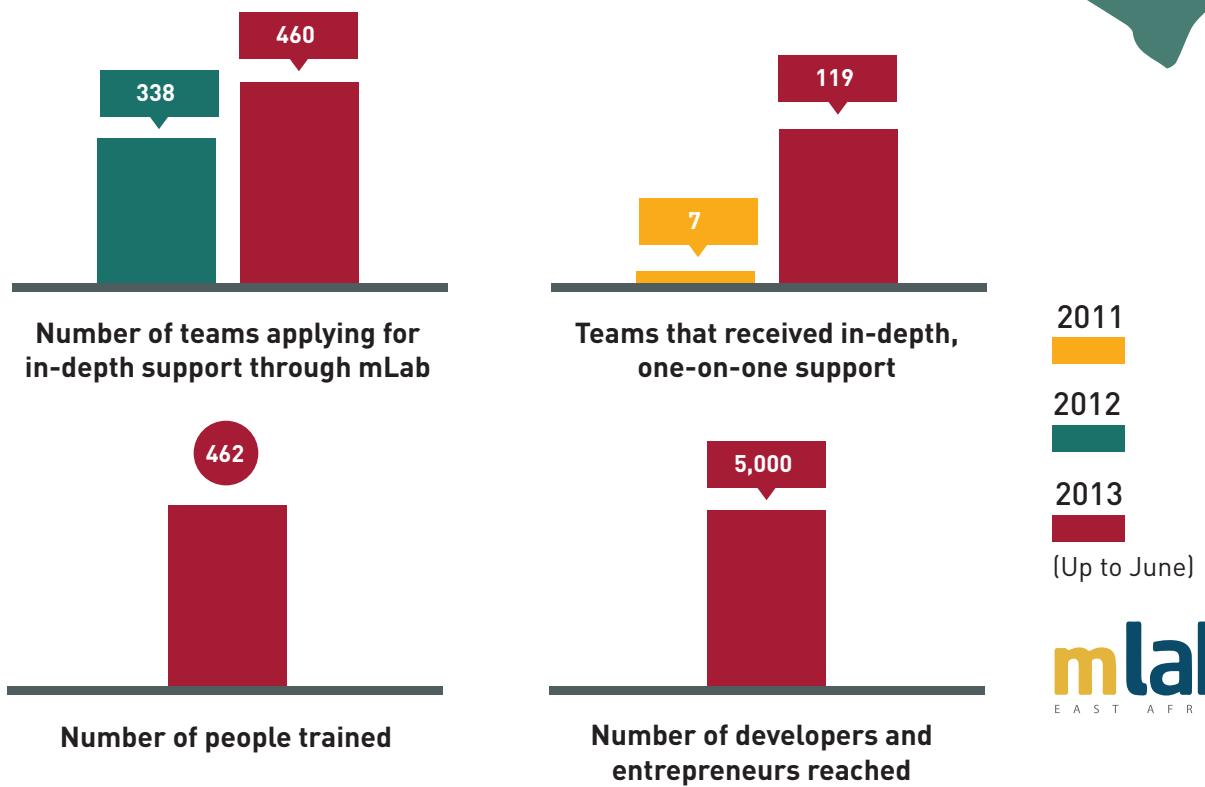
mLab
southern africa



1.7

Capacity and skill building:

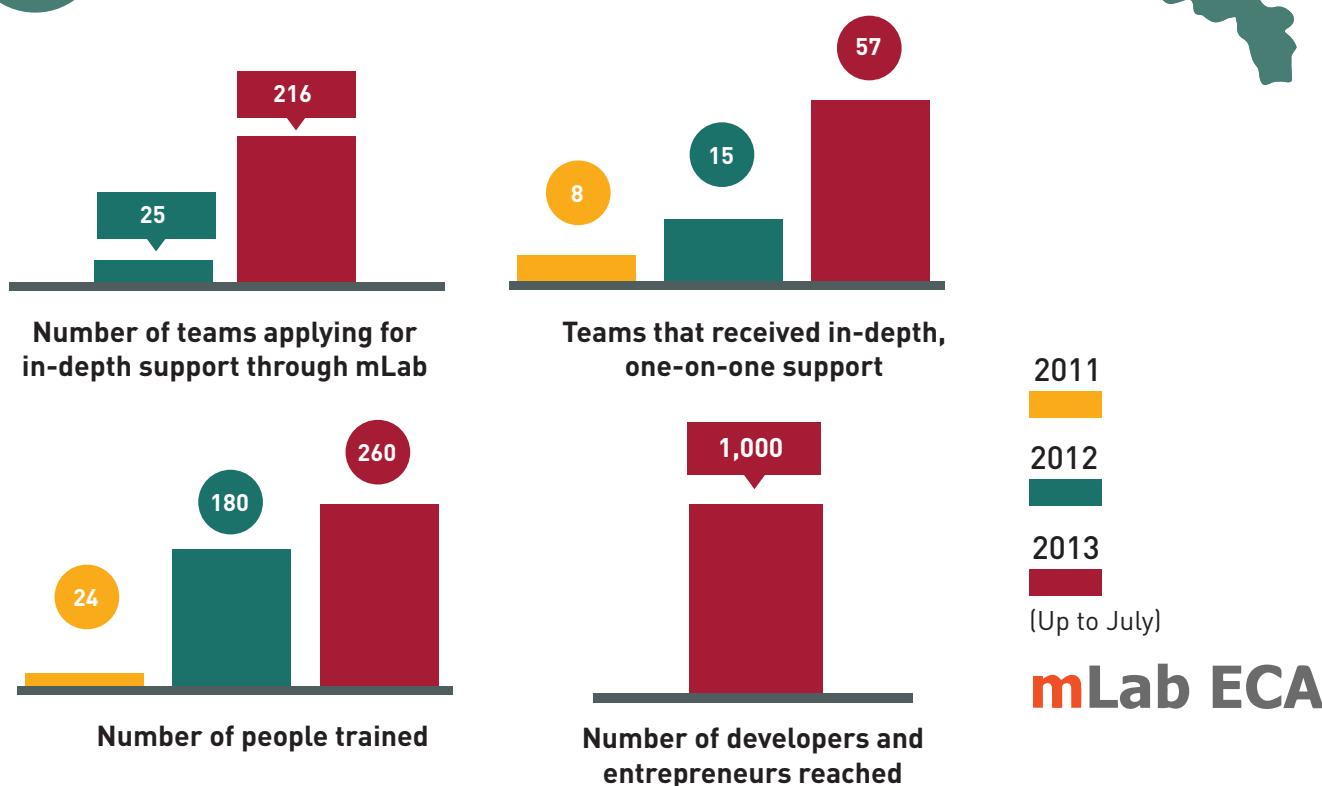
Results for mLab East Africa, Kenya



mLab
EAST AFRICA

1.8

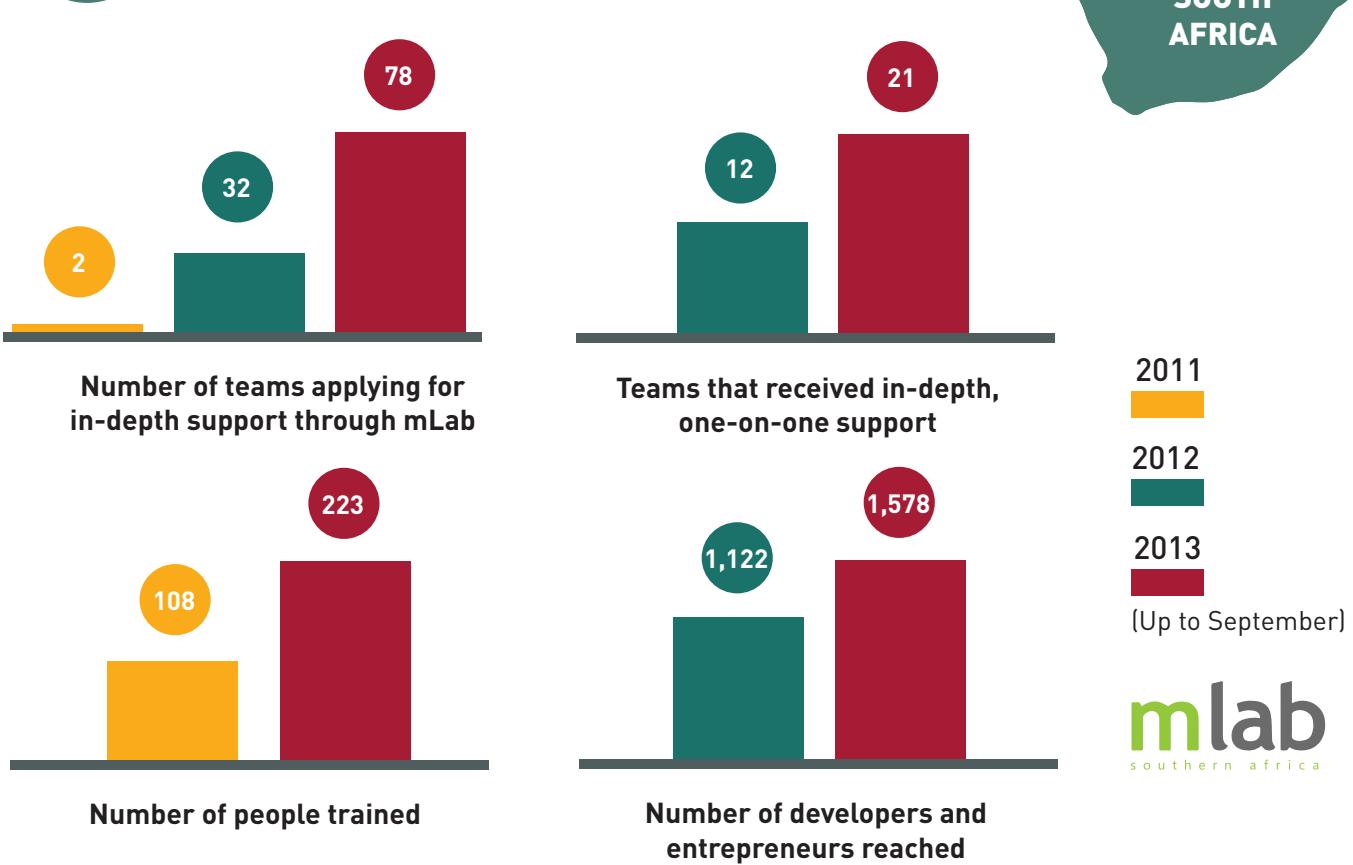
Capacity and skill building: Results for mLab ECA, Armenia



mLab ECA

1.9

Capacity and skill building: Results for mLab Southern Africa, South Africa



mLab
southern africa

★ ANNEX B: LIST OF INTERVIEW PARTICIPANTS



List of organizations interviewed: Armenia

TYPE	ORGANIZATION / INITIATIVE
TARGET GROUPS (10)	
Mobile Enabler	mLab ECA
Entrepreneur	Nako Games
Entrepreneur	MySales
Entrepreneur	Microforester
Entrepreneur	My News
Entrepreneur	Letsein Team
Entrepreneur	Users mLab
Entrepreneur	Clean H2O, Paint the Music
Entrepreneur	Stories Hub
COUNTERFACTUAL (6)	
Company	Unicomp (Buy.am)
Company	Idram Mobile Wallet app
Company	Appolosoft
Company	Ineed
Company	PICS'ART
Company	Altacode
COMPARISON (4)	
Company	X-Tech Team
Company	Instigate Mobile CJSC
Start Up	4 car
Incubator	GITC
ECOSYSTEM (5)	
Business association	UITE
Private sector	Orange
Foundation	Eurasia
Other	Google Development Group
International Organization	UNDP



List of organizations interviewed: Kenya

TYPE	ORGANIZATION / INITIATIVE
TARGET GROUPS (18)	
Mobile Enabler	mLab East Africa
Mobile Enabler	Akirachix
Mobile Enabler	eMobilis
Entrepreneur 1	Kopo Kopo
Entrepreneur 2	Kopo Kopo
Entrepreneur 3	Kopo Kopo
Entrepreneur 4	Kopo Kopo
Entrepreneur	Zegetech
Entrepreneur 1	Eneza Education
Entrepreneur 2	Eneza Education
Business Development	MedAfrica Technologies Ltd.
Entrepreneur	Sleep Out
Entrepreneur 1	Ma3route
Entrepreneur 2	Ma3route
Entrepreneur	Hackathon winner
Entrepreneur 1	Akirachix
Entrepreneur 2	Akirachix
Entrepreneur 3	Akirachix
COUNTERFACTUAL (4)	
Entrepreneur	JuaKatibaYako
Entrepreneur	Hackathon winner
Entrepreneur 1	Changa
Entrepreneur 2	Changa
COMPARISON (4)	
Incubator/Startup support 1	Growth Africa incubatee
Incubator/Startup support 2	Growth Africa incubatee
Incubator/Startup support 3	Growth Africa incubatee
Incubator/Startup support	88mph/Startup Garage
Incubator/Startup support	C4D Lab
Incubator/Startup support 1	Growth Africa
Incubator/Startup support 2	Growth Africa
Incubator/Startup support	Nailab Africa
Incubator/Startup support	iLab Africa
Incubator/Startup support	Savannah Fund

TYPE	ORGANIZATION / INITIATIVE
ECOSYSTEM (14)	
Ecosystem	Ushahidi, iHub
Private sector	Nokia
Private sector	Intel
Business Development	Viktoria Solutions
University	University of Nairobi
Private sector	Samsung
Research Consultant/Entrepeneur	iHub, Sprint Interactive (Research consultant) Girl Afrika (Cofounder)
Business Development	Afrinno
Journalist	Journalist in social innovation, technology, entrepreneurship, business
Public sector	Kenya ICT Board
Private sector	Microsoft
Private sector	Wayra
Incubator/Startup support	iHub Research
Private sector	GSMA Mobile for Development
FINAL USERS (9)	
User	Founder, Pete's Coffee
User	Founder, Kasap Butcherry Shop
User 1	Milimany Primary School
User 2	Milimany Primary School
User	Nurse
User	Volunteer at Afrikarsi Nursery School, Student at Akirachix
User	Volunteer at Health Center, Student at Akirachix
User	ICT Student at Akirachix training program
User	Eneza User



List of organizations interviewed: South Africa

TYPE	ORGANIZATION / INITIATIVE
TARGET GROUPS (13)	
Mobile enabler	The Innovation Hub
Mobile enabler 1	mLab Southern Africa
Mobile enabler 2	mLab Southern Africa
Entrepreneur	Geekulcha
Entrepreneur	Mfactory
Entrepreneur 1	Sowertech
Entrepreneur 2	Sowertech
Entrepreneur	Appchemy
Entrepreneur	Med-TechEngineers
Entrepreneur	Jatamobile
Entrepreneur	BookBay
Ecosystem	Angels Fair
Entrepreneur	GoMetro
COUNTERFACTUAL (3)	
Entrepreneur (counterfactual)	Expenza
Entrepreneur (counterfactual)	Tech4Africa
Entrepreneur (counterfactual)	Praekelt Foundation
COMPARISON (5)	
Incubator/Startup support 1	Blackberry Applications Lab
Incubator/Startup support	Jozihub
Incubator/Startup support 2	Blackberry Applications Lab
Incubator/Startup support	RIIS
Incubator/Startup support	88mph
ECOSYSTEM (9)	
Private Sector	Nokia
Private Sector	Microsoft
Government	Department of Science and Technology
Private Sector	Microsoft
Nongovernmental Institution	SAIN
Private Sector	Ungana Africa
Private Sector	Vodacom
Government/Founding Partner	CSIR
Private Sector	Abaphumeleli Business Consultants, EmpowerWeb, South African Black Entrepreneurs Forum (SABEF)

TYPE	ORGANIZATION / INITIATIVE
FINAL USERS (5)	
User 1	Geekulcha User
User 2	Geekulcha User
User 3	Geekulcha User
User 4	Geekulcha User
User	GoMetro User



ANNEX C: RESEARCH PROJECT TIMELINE

Start of the project	Background research	Questionnaires & Interview Guidelines	Field mission to Armenia, Kenya, South Africa	Post-field Research
Briefing with Task Managers and ToR clarification Inception Report	Desk Review (Internet, available documents) Identify & contact interviewees Agendas	Design templates	No. of interviews conducted (total): 111 In Armenia: 24 In Kenya: 53 In South Africa: 34	No. of interviews conducted (total): 5 For Armenia: 1 For Kenya: 2 For South Africa: 2
September 2013	September 16 th - 27 th (2 weeks)	September 20 th - 27 th 2013 (1 week)	September 27 th - October 11 th (2 weeks, 1 week each country)	October 13 th - 19 th (1 week)

