Report on Innovation Spaces and Living Labs in IST-Africa Partner Countries

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1. EXECUTIVE SUMMARY

1.1 Context and Objectives

Innovation Spaces, and to a lesser extent, Living Labs, have gradually gained traction in African Member States. This is primarily as a response to the emergence of technology communities and growth in local ICT entrepreneurship. Living Labs started to emerge from 2005 as a mechanism to support co-design and community engagement, while Innovation Spaces become increasingly common since 2008.

The IST-Africa Consortium are undertaking an ongoing mapping of existing and emerging Innovation Spaces and Living Labs supporting technology-related community development as well as entrepreneurship across the 18 IST-Africa Partner Countries in Southern Africa (Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland), East Africa (Burundi, Ethiopia, Kenya, Tanzania, Uganda), North Africa (Egypt, Tunisia), West Africa (Senegal) and Central Africa (Cameroon).

IST-Africa has established a clear leadership role in promoting the adoption of Collaborative Open Innovation and Living Labs frameworks and methodologies adapted to the needs of end-user communities across Africa. IIMC (IST-Africa Coordinator) was responsible for instigating, designing and organizing the first Living Labs Working Group Meeting during IST-Africa Week 2011 in Gaborone, Botswana. This resulted in the establishment of the EC – AUC Living Labs Working Group for Africa of which many IST-Africa partners are de-facto founding members.

At the request of the European Commission and African Union Commission, IST-Africa was also responsible for authoring a comprehensive report "*Supporting the Evolution of Sustainable Living Labs and Living Labs Networks in Africa*" in 2011, and carrying out subsequent validation and training workshops. This has resulted in the launch of several Living Labs, particularly in East Africa.

This study provides definitions of Collaborative Open Innovation, Innovation Spaces and Living Labs, an overview of operational Innovation Spaces and Living Labs supporting ICT entrepreneurship and Innovation related activities in IST-Africa partner countries and an Innovation Landscape map. It addresses the need of interested African, European and other stakeholders to access comprehensive up to date information on Innovation Spaces and Living Labs across Africa.

It is clear that growth in Innovation Spaces tends to be quite organic, building on informal arrangements. Living Labs adoption is still quite dependent on initial direct subvention (such as the case of TANZICT in Tanzania – which resulted from participation in IST-Africa Week activities). It is recommended that Living Lab methodologies are leveraged in all community focused activities.

1.2 Methodology

This updated report which reflects developments up to the end of 2015 builds on the 2014 report and a previous study and body of knowledge collected by IST-Africa Partners 2009 – 2011.

Data was collected primarily through desk research, supplemented by qualitative data collection with relevant key stakeholders in Angola, Botswana, Burundi, Cameroon, Egypt, Ethiopia, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Senegal, South Africa, Swaziland, Tanzania, Tunisia and Uganda, supplemented where appropriate by follow up e-mails and phone calls.

IST-Africa Living Labs Working Group Meetings were organised in Tanzania (08 May 2012), Kenya (28 May 2013), Mauritius (06 May 2014) and Malawi (May 2015) as part of IST-Africa Week as a mechanism to bring together existing and emerging African Living Labs, introduce Living Lab methodologies to newcomers and share experiences with Innovation communities. IST-Africa Living Labs Workshops were organised in Burundi (26 - 27 September 2011); Tanzania (29 - 30 September 2011, May 2013), Uganda (06 - 07 October 2011), Malawi (17 November 2011), Zambia (22 November 2011), Ethiopia (24 November 2011, 06 December 2013), Swaziland (29 November 2011), Lesotho (12 November 2013), Namibia (15 November 2013), Botswana (22 November 2013), Mozambique (03 December 2013) and Tunisia (17 December 2013) to raise awareness of the benefits of Collaborative Open Innovation and to introduce Living Lab methdologies that can be included in Action Research.

Each Innovation Space and Living Lab identified in this report was contacted over the life of the study and invited to confirm background information and an overview of activities currently being supported.

1.3 What is Collaborative Open Innovation?

Chesbrough (2006) revised his 2003 definition of Open Innovation as "*the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology*."

Cunningham, P. (2013) defines Innovation as "*the improvement of products, services, processes, business models, policies and concepts in an existing context (whether social or economic) or their* adaptation *from one context to another, with the goal of increasing performance or achieving another desired impacts"*. Adaptation is defined as "*necessary changes required to achieve desired outcomes"*. Increased performance or other desired impacts can be measured through Return on Investment (ROI) and/or Return on Objective (ROO).

Figure 1 below illustrates some of the key Innovation Ecosystem stakeholders who can be involved in Collaborative Open Innovation. Internal collaboration between different business units within the

same organisation can be complemented by external collaboration with clients, supply chain, start-up innovators, competitors and universities and stakeholders from adjacent markets.

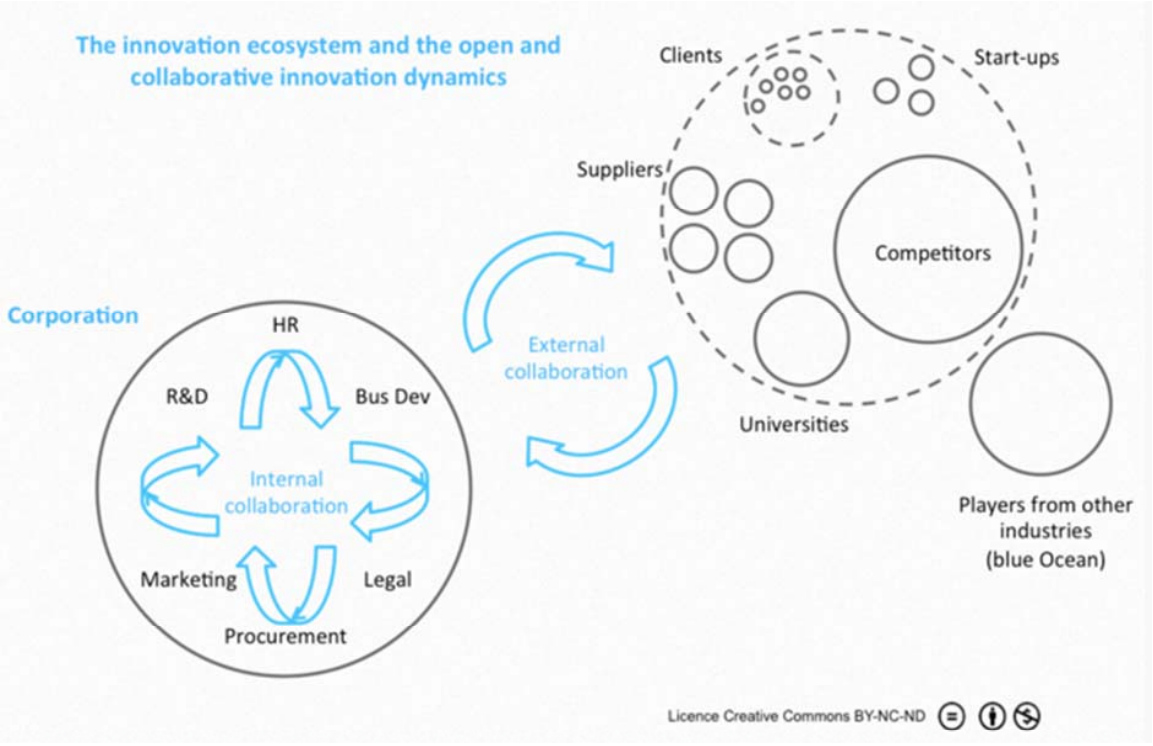

Figure 1: Innovation Ecosystem Stakeholders

1.4 What are Living Labs?

DG Information Society and Media, European Commission, 2009[1] defined Living Labs as "*open innovation environments in real-life settings, in which user-driven innovation is fully integrated within the co-creation process of new services, products and societal infrastructures*". It stated that Living Labs bring users into the creative process at an earlier stage of innovation "*to better discover new and emerging behaviours and user patterns, bridging the innovation gap between technology development and the uptake of new products and services involving all relevant players of the value network … [and] allowing for early assessment of the socio-economic implications of new technological solutions by demonstrating the validity of innovative services and business models*".

The European Commission report also identifies benefit statements for the stakeholder groups.

In a developing country context, where average income levels are low (particularly in rural areas), bank debt is expensive and capital availability is limited, there is considerable potential for reducing implementation risks associated with new services and solutions and maximising likely acceptance by adopting Collaborative Open Innovation and Living Labs techniques and methodologies.

Just as Living Labs methodologies can be applied in very different contexts, both thematic (e.g. eHealth, eServices in Rural or Developing Areas, eDemocracy and eGovernance, ICT for Energy

[1] European Commission, DG Information Society and Media, *Unit F4 New Infrastructure Paradigms and Experimental Facilities. Living Labs for User-driven Open Innovation. An Overview of the Living Labs Methodology, Activities and Achievements.* January 2009.

Efficiency, Food Security), and geographic (e.g. urban, suburban or rural, local community or regional, national or cross-border) Living Labs have been defined in a variety of ways. A representative sample of definitions of Living Labs is presented in this study.

One key dimension seen as critically important in an African context is the necessity of engagement with rural end-user communities, and adaptation of the innovation concept and process.

Cunningham, P. (2013) proposes that: "*Living Labs are environments, a methodology or an approach which caters for user-driven open innovation within real-life settings, where end-users collaborate with Innovation Stakeholders to become co-creators or co-designers of innovative products, services, processes, business models or policies. Successful deployments can be replicated (with necessary socio-cultural adaptation) to achieve wider socio-economic impact*".

The reality in a developing country context is that establishing and maintaining Living Labs is challenging and relatively expensive, explaining why many Living Labs have proven to be unsustainable once seed or donor funding is no longer available. It is more practical to embed Living Lab methodologies into the design of Action research and community engagement projects.

1.5 Overview of Innovation Activities

North, Central and West Africa

Egypt recognises the ICT sector and innovation as key contributors to the development of the national economy. The ICT Policy (2013 – 2017) is focused on achieving sustainable socio-economic development using ICT solutions and key ICT sectors planned to be supported include Digital Identity, Egypt Digital Hub, Basic Infrastructure (Broadband, Cloud Computing, Submarine Cables), Cyber Security & eSignature, Information Infrastructure & Digital Content, Electronics Design & Manufacturing, Legislative and Policies Framework. The Egyptian Government has made a significant investment in capacity building, digital literacy and certification of skills. As the level of interest in innovation and entrepreneurship grew in recent years a number of Innovation Spaces active gradually emerging from 2009, including: *Technology Innovation & Entrepreneurship Center* (TIEC)[2] in Cairo; *The District Co-working Spaces*[3] in Cairo and Maadi; *icecairo*[4]*, American University of Cairo (AUC) Venture Lab*[5] *(*first university-based incubator in Egypt), *Flat6Labs*[6]; Fab Lab[7]; *GESR*[8] Incubation and Innovation Lab; *Sustaincubator*[9]; *Ebni*[10]; *INJAZ Egypt*[11]; *Shekra*[12] crowdfunding solution; *Alexandria Hackerspace*[13]. In addition to the innovation spaces, many co-working spaces were established to support networking and coordination with the innovation stakeholders in the community. These Innovation Spaces range from supporting Pre-Incubation (icecairo, AUC Venture Lab, *Alexandria Hackerspace*), Incubation (TIEC, AUC Venture Lab, Fab6Labs, Sustaincubator) and Acceleration (The District, TIEC, Fab6Labs, Sustaincubator). Co-working and meeting spaces (The District, Fab Lab Egypt, Giza Hackerspace, El-Minya Hacker Space, Al Maqarr, Muqaddima Coworking Space - GrEEK CAMPUS[14], Rasheed22, 302labs[15], Innoventures Startup Circus).

Rapid Increase in Innovation Spaces since 2009 in Cairo, Giza and Alexandria, reflecting increased interest in Innovation and Entrepreneurship

[2] http://tiec.gov.eg/
[3] www.district-egypt.com
[4] www.icecairo.com
[5] http://schools.aucegypt.edu/Business/eip/Pages/AUC%20Venture%20Lab.aspx
[6] www.flat6labs.com
[7] http://fablab-egypt.com/
[8] http://gesr.net/
[9] www.sustaincubator.com/
[10] http://ebni.io/
[11] http://injaz-egypt.org/?page_id=16
[12] http://shekra.com/en/
[13] www.alexhacker.com
[14] www.thegreekcampus.com/
[15] www.302labs-coworking.com/home

National Programme of Incubators initiated in 2009, with Innovation Spaces starting to emerge from 2011

Tunisia considers the development of ICT to be a priority in terms of economic and social activities, health, e-learning, renewable energy and control of the natural environment. Tunisia has a National backbone based on fibre optical cables that covers its entire territory and has optical fibre submarine connections to Europe, Asia, the Middle East and America. Since 1999 Tunisia has been committed to a national programme to establish business incubators within Higher Education Institutions through an agreement between the Ministry of Higher Education and Ministry of Industry. The first incubators were established in 2011, and there is now a network of 26 incubators across the country. Innovation Spaces are gradually emerging to include WIKI Start Up[16], Reseau Entreprendre Tunis[17], Microsoft Innovation Center, Stanford Peace Innovation Lab[18], Elfabrika[19], Fablab ENIT[20], Tunis Fablab[21] and Fablab Solidarity Youth Science Tunisia.

Innovation Spaces emerging in the major cities of Yaounde, Doula and Buea

Cameroon plays an important economic role in Central Africa. In terms of Infrastructure, there is a national backbone of over 5,000 km of fibre optic cable laid down and financed by the Chinese Government, a fibre optic loop in Douala with a second being laid in Yaounde (Capital) and the establishment of a National Internet eXchange point (IXP) is ongoing, financed by the World Bank. The ICT Policy was adopted in 2007, with the Implementation plan published in 2009 and the Electronic Communications Law, CyberSecurity Law and Electronic Commerce Law adopted in 2010. There are a number of Innovation Spaces active around the country including: *Cameroon Innovation Hub*[22] (Yaounde); *Centre for Entrepreneurship, Research & Innovation* (CERI)[23] hosted by Catholic University Institute of Buea and *ActivSpaces*[24] (Buea and Douala). Agro-Hub is focused on agriculture. These Innovation Spaces are primarily focused on supporting pre-Incubation, Incubation and Acceleration. While CERI focuses on Science, Technology, Engineering and Maths disciplines, ActivSpaces is a tech hub focused on supporting web and mobile programmers, designers, researchers, and entrepreneurs. CIB is currently providing virtual support online.

Innovation Spaces are clustered in Dakar

Senegal considers ICT to be an essential contributor to national development. A National Strategy for developing ICT was defined in 2000 with the State Information Technology Agency (ADIE) created in 2004. There is a good legal framework in place with laws addressing Information Society, Electronic Transactions, Cybercrime, protection of personal data and cryptology enacted in 2008. In terms of

[16] www.wikistartup.tn
[17] www.reseau-entreprendre-tunis.org
[18] http://peaceinnovation.stanford.edu/field-lab-network/tunis/
[19] http://elfabrika.tn/
[20] www.facebook.com/FabLabENIT
[21] www.fablabtunisia.com
[22] www.cihub.net
[23] www.cuib-cameroon.org/home.php?office=14
[24] http://activspaces.com/

ICT Infrastructure, the national backbone is under construction, all regions are connected via optical fibre and three submarine cables connect Senegal to the rest of the world. Innovation Spaces include MobileSenegal Hub[25], which was established as a virtual tech hub in 2008 to support training in mobile technology; Jokkolabs[26] which was established as a co-working space in 2010 and CTIC Dakar[27], which was established in 2011 as a tech hub providing Pre-Incubation and Acceleration Services. Established by women in 2012, **JJiguene Tech Senegal**[28] is the first woman's tech Hub in Senegal. While a Living Lab was established in UNIDAF in 2006 there is no information currently publically available on recent activities.

East Africa

Limited donor funding key driver of the development of Innovation Spaces

Burundi is slowly building up its institutions and infrastructure following twelve years of crisis up to 2005. A fibre-optic project is currently running to provide ICT infrastructure across the country alongside development of the National Backbone. The National ICT Development Policy was adopted in 2004 and reviewed in 2011 and National Policy on Scientific Research and Technological Innovation and its implementation framework was launched in August 2014 including ICT as one of the focal areas. The *Burundi Business Incubator* was set up in 2010 and has received financial and technical support through USAID to supporting training programmes and local capacity building. During 2013 the Segal Family Foundation piloted the *Social Impact Incubator* in Bujumbura as a capacity building programme and the first cohort graduated in October 2013. During 2014 in partnership with CARE International Burundi, the Social Impact Incubator took in another cohort of 24 incubates. The *UNICEF Burundi Innovation Lab* is focused around technology for development; micro-energy rural entrepreneurship models and leveraging tools and mobile-based platforms to address national challenges.

[25] http://mobilesenegal.org
[26] http://jokkolabs.net/en
[27] http://www.cticdakar.com
[28] http://jjiguenetech.com

Strong public sector commitment to strengthen National Innovation Ecosystem

Ethiopia is one of the fastest growing non-oil economies in Africa but is heavily dependent on agriculture. In line with its ambition to become a middle-income country by 2025, Ethiopia views its ICT Policy and Strategy (2009) as integral to the country's larger development goals. The National Science, Technology and Innovation (STI) Policy (2012) aims to create a technology transfer framework to build national capacity. In terms of ICT Infrastructure, there is 12,000 km optic fibre cable radiating from central Ethiopia across the country and connecting all cities, with the capacity to transmit 40 Gbps along with the national backbone. To date, MCIT has established 230 Community Information Centres and 9 community radio stations across the country to provide information on new ICT technology transfer and implementations, healthcare, agricultural information and education issues. *Bahir-Dar ICT Business Incubation Center*[29] was established in November 2009 in Amhara Regional State to support ICT entrepreneurship targeting recent graduates. It provides office facilities, capacity building and advisory services. *iceaddis*[30] was established in two locations in Addis Ababa (hosted by EiABC and downtown) during 2014 to provide pre-incubation and Incubation support for technology graduates, final year students, professionals and entrepreneurs. EiABC also hosts a National FabLab next door to iceaddis. Other Innovations Spaces include xHUB[31] Innovative Society, Ethiopia Climate Innovation Center (ECIC)[32], SNNPRS ICT Business Incubation Center and Mekelle Information Communication Technology Business Incubation Centre.

One of the most vibrant Innovation Ecosystems on the Continent

Kenya recognises the importance of ICT and Innovation in achieving the Vision 2030 objectives. There are five key policy documents guiding the ICT and Science, Technology and Innovation (STI) sector in Kenya: Kenya ICT Policy 2006 (under review), eGovernment Strategy, Kenya ICT National Master Plan 2017, the National Broadband Strategy and Kenya Science, Technology and Innovation (STI) Policy 2012. In terms of ICT infrastructure, a national fibre optic infrastructure is in place and four submarine cables are online (TEAMS, SEACOM, EASSy, LION). In part due to its pro-Innovation Policy and Regulatory Environment, Kenya has experienced significant growth in Innovation Spaces (private, community driven and hosted by education and research institutions) since 2009 including FabLab[33] (2009) and Computing for Development Lab[34] (C4DLab, 2013) at University of Nairobi; iHub[35] (March 2010); @iLabAfrica (January 2011) and @iBizAfrica at University of Strathmore; m:lab East Africa[36] (June 2011); Chandaria BIIC (July 2011) at Kenyatta University; NaiLab[37] (August 2011); 88mph[38]/Nairobi Startup Garage (August 2011) and

[29] http://www.amhara-incubation.org
[30] http://www.iceaddis.com
[31] www.xhubaddis.com
[32] www.ethiopiacic.org
[33] http://fablab.uonbi.or.ke
[34] http://www.c4dlab.ac.ke
[35] http://www.ihub.co.ke
[36] http://www.mlab.co.ke
[37] http://www.nailab.co.ke
[38] http://www.88mph.ac/nairobi

GrowthHub[39] (May 2012), GearBox[40], Kenya Country Business Incubator - KeKoBI[41]; Jomo Kenyatta University of Agriculture and Technology Center for Business Innovation - JKUAT-CBI; Regional Centre for Enterprise Development – IUPS and Enterprise Kenya[42] (2015). These Innovation Spaces provide a mix of Pre-Incubation (iHub; @iLabAfrica; @iBizAfrica; Chandaria BIIC, Lakehub), Incubation (FabLab; ARO Fablab; C4DLab; m:lab East Africa; NaiLab; GearBox; KeKoBI; JKUAT-CBI; Regional Centre for Enterprise Development – IUPS; Sorghum Value-Chain Development Consortium - SVCDC[43], KIRDI) and Acceleration (88mph/Nairobi Startup Garage; GrowthHub, Enterprise Kenya) services (Cunningham et al 2014[44]).

National Innovation and ICT Policies under review

Tanzania recognises the importance of ICT and Innovation to support socio-economic development as part of the realisation of Development Vision 2025. The updated Science Technology and Innovation (STI) Policy has been reviewed will incorporate Entrepreneurship and the National ICT Policy of 2003 has been reviewed and is awaiting Cabinet approval. The digital infrastructure in Tanzania has improved significantly with the fibre-optic network, investment in local Internet Exchange Points, migration to IPv6 and construction of the National ICT Backbone (NICTBB). The eGovernment Strategy was put in place in September 2012. Innovation Spaces include Dar Teknohama Business Incubator[45] (DTBi) which was established in 2011 as a Public, Private Partnership between InfoDev and COSTECH; Buni Hub[46], which was established at COSTECH in October 2011 within the TANZICT[47] Bilateral project; KINU[48], which was established in July 2012 and University of Dar es Salaam ICT Incubator[49] (UDICTI) (Cunningham et al 2014). Innovation Spaces are focused on Pre-Incubation (Buni Hub, KINU), and Incubation (DTBi, UDICTI). An Incubator opened by Mara Launchpad in Q1 2013 was closed by 2014. Emerging Living Labs supported through the TANZICT Programme across the country include: Arusha Living Lab[50] (EcoLab); Elimu Living Lab[51] (Sengerema, Mwanza); Mbeya Living Lab[52]; Kigamboni Community Centre[53] (Dar es Salaam); RLabs Iringa and Tanzania Youth ICON (TAYI) Living Lab (Zanzibar).

Deregulation has successfully created a growing ICT sector

Uganda's ICT sector is one of the country's most vibrant, fastest growing sectors since market liberalization in 2010, based on a good ICT legal

[39] http://www.thegrowthhub.com
[40] http://gearbox.co.ke/
[41] www.kekobi.or.ke
[42] http://innovation.icta.go.ke/enterprise-kenya/
[43] www.sorghum3fs.co.ke
[44] Cunningham P., Cunningham M., Ekenberg L.. (2014), Baseline Analysis of 3 Innovation Ecosystems in East Africa, International Conference on Advances in ICT for Emerging Regions (ICTer 2014)
[45] http://www.teknohama.or.tz
[46] http://www.buni.or.tz
[47] http://www.tanzict.or.tz
[48] http://www.kinu.co.tz
[49] http://udicti.coict.udsm.ac.tz/
[50] https://arushalivinglab.wordpress.com
[51] http://www.elabs.or.tz
[52] http://mbeyalivinglab.blogspot.co.uk/
[53] http://www.kccdar.com

and regulatory framework (Science Technology and Innovation Policy 2009. ICT Policy 2003, which is under review, Rural Communications Development Policy and eGovernment Strategy 2011)**.** ICT Infrastructure is continuously improving with access to three Submarine cables, the National Data Transmission Backbone Infrastructure (NBI) and Electronic Government Infrastructure (EGI). Uganda experienced a rapid growth in Innovation Spaces supporting entrepreneurs from 2010 to include: *Hive CoLabs*[54] established as first tech hub in 2010; *Microsoft Innovation Cen*tre hosted by College of Computing and Information Science, Makerere University (established November 2011); *Outbox*[55] focused on mobile and web entrepreneurs (established July 2012); *Angels Hub*[56] (which took over Mara LaunchPad incubation space in September 2013); iLab@MAK[57] (established 2005), UN Global Pulse supported Pulse Lab Kampala[58], which focuses on applications of Big Data and the UNICEF supported Uganda Innovation Lab . The Innovation Spaces are focused on providing Pre-Incubation (Hive CoLab, Outbox), Incubation (Angels Hub, Pulse Lab Kampala, FabLab Kampala[59];, FinAfrica[60]), Co-working spaces (Hive CoLab, Outbox, The Hub[61]), Entrepreneurial Training (FinAfrica) and commercialisation of apps (*Grameen Foundation AppLab*[62]) (Cunningham et al 2014).

Southern Africa

Innovation Spaces are recent, but well aligned with public policy

Angola is an upper middle income country, with good infrastructure, fibre-optic networks and a National Backbone. The Policy Framework includes a White Paper on ICT (2006), National Policy on Science, Technology and Innovation (2011), National Strategy on STI (2011) and a Strategy on Development of Information Technology (2000 - 2010). The National Development Plan 2013 - 2017 aims to support entrepreneurship as a foundation for sustainable development. In this context the Government took measures to promote private investment, development of micro, small and medium enterprises and entrepreneurship including the Investment Law Private (Law 20/11 , of 20 May), the Regulation of Law 30/11 of 13 September on the Micro , Small and Medium Enterprises, the Support Program for Small Business (PROAPEN) and the implementation of the Single Window entrepreneur (BUE). The National Institute of Small and Medium-Sized Companies (INAPEM) established Angola's first business incubator in June 2014 and Fábrica de Sabão is planned as a hybrid incubator and accelerator.

Diversification of the economy is a key policy imperative

Botswana is a middle-income country with relatively good infrastructure, fibre-optic networks and a National Backbone. The first

[54] http://hivecolab.org/
[55] http://www.outbox.co.ug/
[56] http://angelshub.org/
[57] http://cedat.mak.ac.ug/research/ilabs.html
[58] www.unglobalpulse.org/kampala
[59] www.facebook.com/fablabkampala
[60] http://www.finafrica.org/
[61] http://thehubkampala.com/
[62] http://www.grameenfoundation.applab.org

National ICT Policy [Maitlamo National Policy for ICT Development 2007] was approved by Parliament in 2007 and the revised Research, Science, Technology and Innovation Policy was approved in 2012. The Government of Botswana decided at an early stage that it is necessary to actively support entrepreneurship. The *Local Enterprise Authority* was established in 2004 to support SMEs, provide training, mentoring, technology adaptation and support services. The *Botswana Innovation Hub* (BIH)[63] was conceived in 2008 within the Botswana Excellence Strategy to support economic diversification, job creation and transition towards a knowledge-economy by encouraging inward investment, research and training in the areas of ICT, Bio-Technology, Energy and Mineral Technology. Programmes include the First Steps Venture Centre, Microsoft Innovation Centre, Cleantech and KitsoWorks. The development of the National Science Park is due for completion during 2016. BIH is receiving support through the Southern African Innovation Support (SAIS)[64] Programme to establish a Global Business Lab[65] and Technology Transfer Office within the University of Botswana; develop a Demand Driven Supply Chain Business Incubation Model; and address youth unemployment and local communities through Living Labs and Training (RLabs Botswana).

Public sector a key driver of the evolution of Innovation Spaces

Lesotho has a good policy framework including the ICT Policy (2005), Universal Access Fund (2009), Science Technology and Innovation Policy (2010), Communications Act (2012) and National Strategic Development Plan (2013 - 2017). *Innovation Spaces are gradually emerging around* Basotho Enterprises Development Corporation[66] (BEDCO), the School Technology Innovation Centre (STIC), Vodacom Innovation Park. Living Lab Methodologies are used by the UNESCO - Science and Mathematics Educator's Federation (SMEF) Thakakhoali to support education activities.

ICT a public policy priority but at early stage of development

Malawi's Vision 2020 recognises ICT as a priority sector with the potential to turn around the economy. The ICT Policy (2005) was revised to include Universal Access Issues and re-published in September 2013. A National ICT Master Plan for 2014 – 2031 is awaiting approval by the Government. Three Innovation Spaces have recently emerged. In early 2014, the Global Center for Food Systems Innovation at Michigan State University established a regional Innovation Hub focused on agricultural and food systems innovation, in partnership with the Lilongwe University of Agriculture and Natural Resources, leveraging financial support from USAID. In May 2015 UNICEF cooperated with the Polytechnic of Malawi to set up an Innovation Hub in Blantyre. Lilongwe mHub[67] commenced activities in late 2015 as a pre-incubator and co-working space.

[63] http://www.bih.co.bw/
[64] http://www.saisprogramme.com/overview/
[65] http://globalbusinesslabs.com/office/botswana/
[66] http://www.bedco.org.ls
[67] http://www.mhubmw.com/

ICT a key economic pillar with strong public sector support

Mauritius has grown from an isolated mono-crop dependent country into a services-led economy enjoying sustained growth in just four decades. In line with the Government's vision to transform Mauritius into a Cyber Island and make ICT an important engine of economic growth, the Government has developed the National ICT Strategic Plan (NICTSP) 2007-2011 and 2011-2014, respectively, together with other policies and strategies such as the National Broadband Policy 2012 - 2020. However, with a view to take into account the maximum benefits and opportunities that an all-inclusive Information Society has to offer, the Government has initiated the development of a National Technology, Communication and Innovation Strategic Plan. The Strategic TCI Plan leverages five strategies categorised under five pillars: setting up of Smart Cities and Techno parks across the Island, the development of an ultra-high speed, safe and trusted telecommunications infrastructure, building a globally competitive workforce for Technology and Communication, the development of a National Innovation Programme and the making of Mauritius a Regional Hub and a gateway to Africa. Innovation Spaces currently supported by the Government of Mauritius include: Mauritius Research Council Business Research Incubator Center[68] (MRC-BRIC March 2011); NCB Technopreneurship Programme[69] (2011) and La Plage (initiated in 2016). These Innovation spaces offer a mix of Pre-Incubation, Incubation (physical and virtual) and Accelerator services. Living Labs include the Community Empowerment Programme. In 2016, the Government initiated the development of La Plage (Incubator-Accelerator in the BPML Cyber Tower 2 under a Public-Private Partnership), with the main objective of stimulating the establishment and growth of technology-based start-up companies and other compatible businesses. By fulfilling this mission, La Plage aims to promote innovation, contribute to job creation, and provide for enhanced economic growth in the sector. Living Labs include the Community Empowerment Programme, hosted by the National Computer Board and the Innovative Learning & Teacher Education Living Lab, hosted by the Virtual Centre for Innovative Learning Technologies (VCILT) of the University of Mauritius.

International donors key actors supporting Innovation Spaces

Mozambique depends substantially on subsistence agriculture, aluminium and foreign assistance. The National ICT Policy was approved in 2000 and the ICT Policy Implementation Strategy in 2002 providing the framework by which ICT would be leveraged as an enabler and cross cutting issue in all sectors and development programmes. Even though a Business Incubator Strategy is being developed through IPEME, traditionally there has been limited tech entrepreneurship support in Mozambique. Mozambique Information and Communication Technology Institute (MICTI) was initially established within the University of Eduardo Mondlane to provide an Institute for Research and Learning and a Business and Technology Incubator.

[68] http://www.mrc.org.mu/mrc_centres/business_research_incubator_centre
[69] http://technopreneur.ncb.mu

Mozambique is a beneficiary through the Southern African Innovation Support (SAIS)[70] Programme and STIFIMO Finnish Programme, both of which aims to strengthen the national Innovation ecosystem. Recent players include: MOZDEVZ[71] (2013) as a community of Application Developers and IDEARIO[72], which was launched in Summer 2014 as a tech hub and co-working space offering Pre-Incubation and a 30-day Acceleration Programme. IdeiaLab[73] is cooperating with the FemTech SAIS Programme in Mozambique. The Maputo Living Lab[74] was established in 2011 as part of a three-year project funded the Province of Trentino Italy to build capacity through Summer Schools for students and pre-Incubation through the Informatics Laboratory.

Public and international donor support for Innovation activities

Namibia is a middle-income country that is heavily dependent on extraction and processing of minerals and diamonds for export. As part of Namibia's Vision 2030, it aims to become a knowledge-based economy and sees ICT as the critical sector for the Economic Development of the country by 2030. The ICT Policy provides a framework to accelerate the use of ICT in Namibia and grow the sector. In terms of ICT Infrastructure, the telecommunications backbone was digitised in 1999 with underground fibre-optic cable and Namibia is linked to the rest of the world via the West African Cable System. Innovation Spaces include Bokamoso Entrepreneurial Centre[75] which provides Incubation services and cooperates with FemTech Programme supported by SAIS Programme; FABlab Namibia Technology Centre[76], which was established as a Centre of Excellence within the Polytechnic of Namibia in 2014; and Global Business Labs Namibia[77] which is supported by SAIS Programme since 2013 to provide Acceleration services. Stakeholders in Namibia are interested in setting up Living Labs following workshops organised by IST-Africa. An initial Living Lab has been supported as a project under the SAIS Programme since 2013 - RLabs Namibia - to provide training and community development in cooperation with Namibia Business Innovation Institute.

Sophisticated market, with FDI and multi-stakeholder support

South Africa's 2015 ICT Vision aims that South Africa will be an inclusive Information Society where ICT-based Innovation flourishes. The Department of Telecommunications and Postal Services is responsible for the ICT Policy, which is currently under review. The Department of Science and Technology is responsible for the ICT Research, Development and Innovation Policy and following a consultation process the ICT RDI Innovation Roadmap was adopted in 2013 to guide R&D investments over the next ten years. South Africa has experienced a

[70] http://www.saisprogramme.com/overview/
[71] http://mozdevz.idear.io/sobre-nos/
[72] http://idear.io/
[73] http://www.ideialab.biz/
[74] Ciaghi A, Villafiorita A, Chemane L, Macueve G, *Stimulating Development through Transnational Living Labs: the Italo-Mozambican Vision*, In IST-Africa 2011 Conference Proceedings, Paul Cunningham and Miriam Cunningham (Eds), IIMC International Information Management Corporation, 2011, ISBN: 978-1-905824-24-3
[75] http://www.cityofwindhoekcc.org.na
[76] http://www.fablabnamibia.org/
[77] http://www.globalbusinesslabs.com

growth in Innovation Spaces that support technology entrepreneurs across the country including: The Innovation Hub[78] (Pretoria), mLab Southern Africa[79] hosted within the Innovation Hub since 2011; Bandwidth Barn[80] (Cape Town); BinarySpace[81]; Codebridge[82]; Eastern Cape Information Technology Initiative (ECITI)[83] Incubation programme (East London); Invo Tech Incubator,[84] Durban University of Technology; FabLab[85] (now 7 locations); Impact Amplifier[86]; JoziHub[87] (Johannesburg); Softstart BTI[88] (Midrand, Johannesburg); Softstart BTI[89] (Midrand, Johannesburg); StartUp 90[90]; SmartXchange[91]; Workshop 17[92] in Cape Town; Start-Up Garage[93] (Cape Town)/ 88mph Accelerator[94]; LaunchLab[95] (University of Stellenbosch); Impact Hub Johannesburg[96] Wits Knowledge Hub[97]; Tech Lab Africa (Cape Town)[98].and a number of hardware oriented locations including The House 4 Hack[99], Maker Labs[100] in Johannesburg. These Innovation Spaces collective support Pre-Incubation (Bandwidth Barn), Incubation (The Innovation Hub; ECITI; InvoTech; Softstart BTI; LaunchLab), Co-working Spaces (Bandwidth Barn; JoziHub; Start-Up Garage; LaunchLab; Impact Hub Johannesburg) and Acceleration Services (mLab SA; StartUp 90, Impact Amplifier, 88mph Accelerator, Tech Lab Africa). A number of Living Labs were initially supported through the COFISA and SAFIPA Finnish Programmes, which are still making good progress. Some Living Labs were set up on a temporary basis as projects and some new Living Labs have been set established. The most active Living Labs include: Siyakhula Living Lab[101] which is operational since 2005 hosted by University of Fort Hare and Rhodes University (Eastern Cape); Reconstructed Living Lab[102] (RLabs), which has been operational since 2008 supporting community development and training (Cape Town) and Siyadala Living Labs[103], hosted by Centre for Community Technologies (CCT) in Nelson Mandela Mandela Metropolitan University, Port Elizabeth.

[78] http://www.theinnovationhub.com/
[79] www.mlab.co.za
[80] www.bandwidthbarn.org
[81] www.binaryspace.co.za
[82] www.codebridge.co.za
[83] www.eciti.co.za
[84] www.invotech.dut.ac.za
[85] www.fablab.co.za/index.php?option=com_content&view=article&id=11&Itemid=35
[86] www.impactamplifier.co.za
[87] http://jozihub.org/
[88] www.softstartbti.co.za
[89] www.softstartbti.co.za/
[90] www.startup90.com/
[91] www.smartxchange.co.za
[92] http://workshop17.co.za/
[93] www.capetowngarage.com
[94] www.88mph.ac
[95] www.launchlab.co.za
[96] http://johannesburg.impacthub.net/
[97] www.knowledgehub.wits.ac.za
[98] http://techlabafrica.com/
[99] www.house4hack.co.za
[100] www.makerlabs.co.za
[101] http://siyakhulall.org/
[102] www.rlabs.org
[103] http://sict.nmmu.ac.za/

Early stages of Innovation Space development activity

Swaziland is a low middle-income country with a good policy infrastructure focused on the adoption of ICT to support socio-economic development (ICT Policy 2004, National Information and Communication Infrastructure Policy 2006, Science Technology and Innovation Policy 2012 and Swaziland Communications Commission Act 2013). Swaziland has quite a good fibre optic backbone network and is connected to the SEACOM undersea cable through Maputo, Mozambique. An independent regulator, Swaziland Communications Commission, was established in July 2013. Swaziland recognizes the need for science and technological innovations in achieving its objections of Vision 2022. The National Science, Technology and Innovation Policy intends to provide the framework for the exploitation of opportunities in research and demand-driven innovations developed in the area of science and technology. The Royal Science and Technology Park (RSTP), through the policy, was established with the enactment of the Royal Science and Technology Part Act of 2012. The RSTP will provide a multipurpose platform for R&D, production, marketing and trading of IT and bio-related technologies. The RSTP has two sites, the Innovation Park, located at Phocweni, Matsapha and the Biotechnology Park, located at Nokwane, Matsapha. Both parks will incorporate entrepreneurship support services: pre-incubation, incubation and accelerator facilities for IT and biotech enterprises. RSTP began partial operations in October 2015 and will scale up its operations in the short term to medium term.

The Innovation Landscape map below (Figure 2) provides a visual representation of Innovation Spaces and Living Labs in IST-Africa Partner Countries.

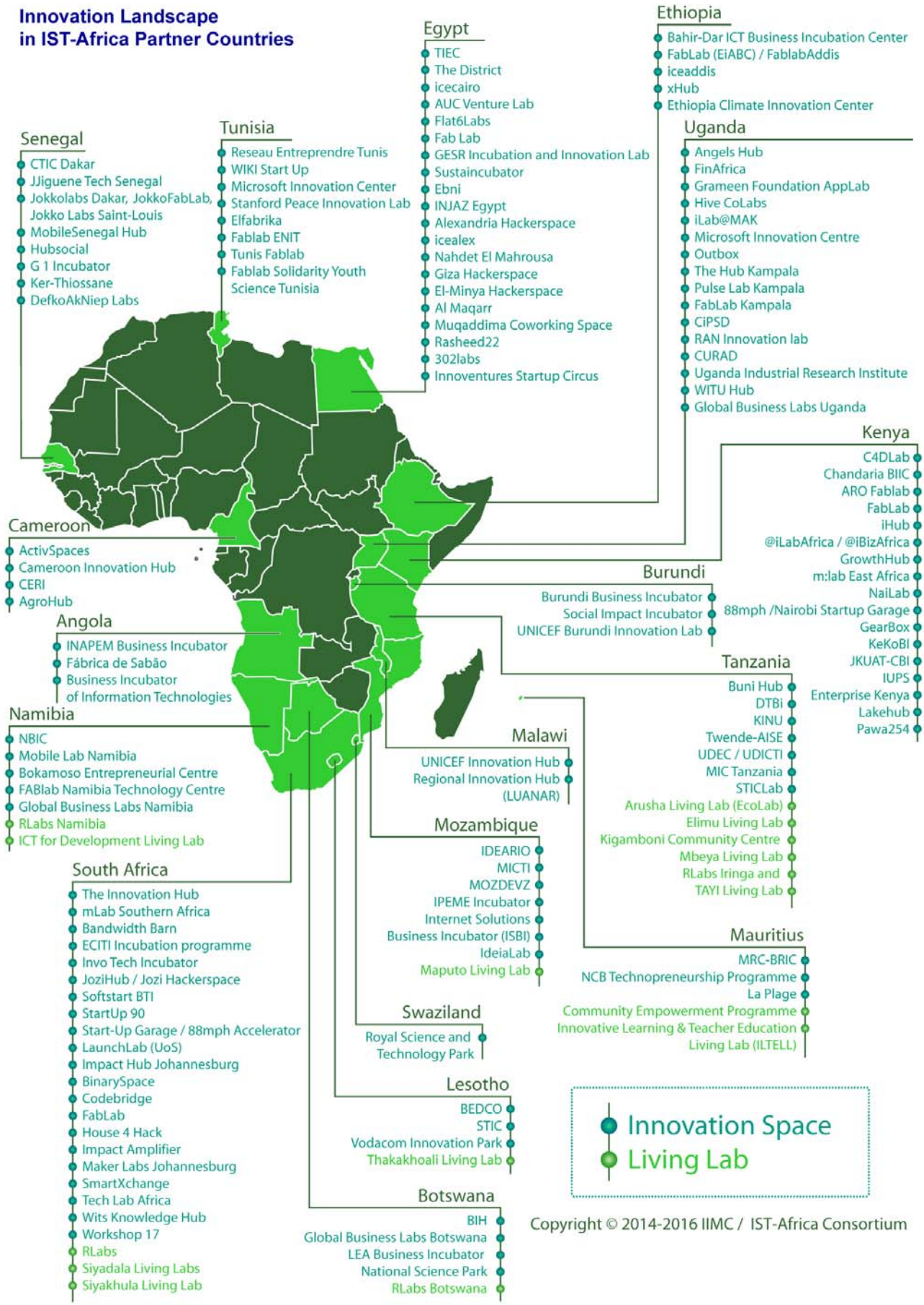

Figure 2: Innovation Landscape in IST-Africa Partner Countries

1.6 Conclusion

This report provides an overview of Innovation Spaces and Living Labs in IST-Africa Partner Countries, with a particular focus on those supporting ICT and Innovation related activities. The sub-section below outline main findings and recommendations.

Chapter 2 introduces Collaborative Open Innovation and Innovation Spaces. Chapter 3 provides an overview of operational Innovation Spaces in IST-Africa Partner countries. Chapter 4 introduces Living Labs and Chapter 5 provides an overview of operational Living Labs in IST-Africa Partner countries.

This study is complemented by two other IST-Africa studies entitled "Report on ICT Initiatives and Research Capacity in IST-Africa Partner Countries", January 2016, ISBN: 978-1-905824-47-2 and "Report on ICT and Innovation-related Bilateral & Multilateral Cooperation Initiatives in IST-Africa Partner Countries", January 2016, ISBN: 978-1-905824-48-9.

1.6.1 Main Findings

Clear public sector commitment to support ICT and Innovation

One of the most positive developments across IST-Africa Partner Countries is the demonstrable commitment of the public sector to putting the necessary infrastructure in place to leverage ICT to support socio-economic development, complimented by the priority given to regularly updating their legislative environment to address local needs while take account of international good practices.

Another positive development is the clear commitment of the public sector in many IST-Africa Partner Countries to establishing Innovation Spaces to support greater level of ICT entrepreneurship. In some countries, such Innovation Spaces are hosted directly by public sector organisations. The network of Innovation Spaces established across Tunisia by the Government is quite impressive in scope. In other cases, it is done in partnership with public sector universities.

Universities actively supporting Internal and external entrepreneurs

It is also striking how many universities have taken the step of addressing the employment opportunities needs of their graduates and the entrepreneurial tendencies of undergraduates by establishing internal Innovation Spaces. In some cases, the same institution has established Innovation Spaces affiliated with different departments or faculties that take a more thematically focused approach to the project ideas and interests of the potential or prospective entrepreneurs they support. What is most impressive, is that most university Innovation Spaces have taken the decision to set aside a percentage of places to potential entrepreneurs from outside the institution.

Approaches reflect national differences

It is clear that there are differences in the level of intensity and activity of Innovation Spaces and Living Labs within and between IST-Africa Partner Countries, reflecting differences in location (urban, rural, deep rural), differences in community priorities, level of socio-economic

development, availability of national resources and available support from the International Donor community.

Limited activities in rural environments

A common pattern is the relative concentration of Innovation Spaces and Living Labs in urban compared to rural and deep rural settings. This can be explained in a variety of ways ranging from population concentration, proximity to universities and government agencies and ease of access.

Common challenges exist across IST-Africa Partner Countries

While these explanations are easy to understand, it is important to note that common important threads exist, whether the location is urban, rural or deep rural, and whatever the relative level of socio-economic development of the country. These include high level of youth unemployment, significant educational gaps in some countries – in particular lack of access to appropriate entrepreneurship and ICT skills training, and in the case of Innovation Spaces, limited levels of differentiation and relatively high dependency on grants and funding by international donors. It is noticeable that while most Living Labs in IST-Africa Partner Countries have a strong focus on education (and in many cases on healthcare), they tend to be more well-tuned to local differences. There are a considerable number of under-differentiated Innovation Spaces, particularly those that are primarily co-working spaces rather true pre-incubators, incubators or accelerators.

Co-location of Innovation Spaces and Living Labs efficient

It is obviously advantageous from a sustainability perspective to co-locate Innovation Spaces and Living Labs with universities or innovation oriented government agencies. This facilitates re-use of existing infrastructure, equipment, personnel etc. as well as access to mentors and potential key account customers It is positive that the number of Innovation Spaces that are operating based on multi-revenue stream business models is starting to increase.

Growth in Innovation Spaces much faster than that of Living Labs

Growth in the establishment of new Living Labs is significantly slower than for Innovation Spaces. This can be explained by a relatively small number of factors. These include the relative simplicity of establishing a co-working space, a lack of understanding of the complexity of establishing and more importantly operating an effective pre-incubator or incubator and the reality that Living labs require active cooperation between different stakeholder groups, which requires significant time and effort.

Nevertheless, it is positive that the overall level of ICT entrepreneurship and innovation related activity across most IST-Africa Partner Countries has increased dramatically in recent years.

1.6.2 Recommendations

Regular legislative reviews essential

The reality is that ICT and innovation related legislative and regulatory environment in any country tends to lag behind the latest technological developments and end-user adoption trends. This is partly due to the time taken to draft legislation, the processes taken to inform that

legislation and subsequently to review, revise and enact that legislation. Sometimes by the time legislation is actually enacted, it is already out of date. That is why regular reviews based on multi-stakeholder engagement and fast tracking are essential to keeping legislation relevant and up to date. In this regard, it is certainly important to take account of good practices and experiences from other countries, particularly other African Member States. However, it is even more important to listen carefully to all relevant stakeholders at national level who can provide insight into opportunities to innovative and those who can contextualise how innovation and ICT can strengthen society.

Limited differentiation of Innovation Spaces

One point of potential concern is the relatively low level of differentiation between a significant number of Innovation Spaces, particularly in the case of pre-incubators and incubators. While this is not unique to Africa, generational leapfrogging can only be achieved by taking a more targeted approach to addressing societal challenges and commercial opportunities. Some incubators and accelerators are taking a more differentiated approach, usually with a focus on specific industries.

Consider cooperation between NRENs, HEIs and Innovation Spaces

It is recommended that National Research and Education Networks consider how they can cooperate with Higher Education Institutions, Innovation Spaces to support the National Innovation Ecosystem by providing access to virtual resources and tools to support research.

Consider developing National Technology Entrepreneurship Programmes

Many users of Innovation Spaces are undergraduates or unemployed graduates. Given the strategic importance of supporting entrepreneurship at national and regional level, it is recommended that a standardised national technology entrepreneurship programme is developed with certification that can be undertaken at the Innovation Spaces on a part-time basis as a modular blended learning curriculum.

Grant Funding to support prototype development

A significant challenge for entrepreneurs is to source funding to develop a prototype to test with potential clients. In an African context bank debt is inaccessible without a guarantee and government enterprise loans are too expensive. It is recommended that national Governments set up grant funding to support emerging entrepreneurs. A good model to consider is the ICT Innovation Fund established by the TANZICT project with COSTECH in Tanzania where grants of $7,000 to $10,000 were provided to fund development of a prototype, technical work and technical skills. It was a requirement that the recipient was hosted at an existing Incubator or Innovation Space that can provide mentoring and monitor their progress.

2. COLLABORATIVE OPEN INNOVATION AND INNOVATION SPACES

2.1 Collaborative Open Innovation

Open Innovation leveraging external and internal ideas to advance technology

The "Father of Open Innovation" Chesbrough (2006) revised his 2003 definition of Open Innovation as "*the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology.*"

Collaborative Open Innovation is clearly informed and influenced by previous research, including the work of Von Hippel. Von Hippel (1986) defined Lead Users as "*users whose present strong needs will become general in a marketplace months or years in the future. Since lead users are familiar with conditions which lie in the future for most others, they can serve as a need-forecasting laboratory for marketing research. Moreover, since lead users often attempt to fill the need they experience, they can provide new product concept and design data as well*."

It is interesting how Collaborative Open Innovation and entrepreneurship related characteristics are encapsulated in definitions of National Innovation Systems including Furman, Porter and Stern (2002) "*the ability of a country - both a political and economic entity, - to produce and commercialize a flow of new-to-the-world technologies over the long term. National innovative capacity depends on the strength of a nation's common innovation infrastructure (cross-cutting factors which contribute broadly to innovativeness throughout the economy), the environment for innovation in a nation's industrial clusters, and the strength of linkages between these two*", Nelson (1993) "*a set of institutions whose interactions determine the innovative performance ... of national firms*" and Metcalfe (1995) "*that set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process*."

Freeman (1995) argues that "*Whilst external international connections are certainly of growing importance [to innovation], the influence of the national education system, industrial relations, technical and scientific institutions, government policies, cultural traditions and many other national institutions is fundamental*".

Universe of contributing Innovation Stakeholders expanding

However, Cunningham, Cunningham and Ekenberg (2014) notes that "*Globalization and technological and social innovations has expanded the universe of contributing Innovation Stakeholders to include Public, Private, Education and Research, Societal, International Development and Funding Sectors, End-user Communities and Innovation Spaces (i.e. Pre-Incubators, Incubators, Innovation Centres, Entrepreneurship*

Centres, Accelerators, Science Parks, Research and Innovation Parks, and even Co-Working Spaces) inside and outside national borders".

Figure 1 (Cunningham et al (2014)) provides a summary of key Innovation Stakeholder Groups, each of which can potentially play a role in supporting Collaborative Open Innovation and Entrepreneurship through Living Labs and Innovation Spaces.

It is important to remember, that each Stakeholder Group at both a national and regional level can also be regarded as a potential End-User Innovation Community for ICT-enabled prototypes targeting the specific needs of *their* sector.

Figure 1: Key Stakeholder Groups

2.2 Innovation Spaces

Mix of pre-incubators, incubators, accelerators, co-working spaces

Innovation Spaces can be defined as physical or virtual environments that support entrepreneurs at different stages of development. Innovation Spaces can include Pre-Incubators, Incubators, Innovation Centres, Entrepreneurship Centres, Accelerators, Science Parks, Research and Innovation Parks, and to some degree, even relatively undifferentiated Co-Working Spaces.

While there are many different models of incubation, this report provides some basic definitions, which. In each case, should be understood to include both for-profit and not-for-profit approaches.

Pre-Incubators are focused on addressing the needs of potential and very early stage entrepreneurs. Pre-incubators should provide an environment and some degree of support to help potential early very early stage entrepreneur carry out sufficient comparative research of the market and existing and potential competitor to assess the potential for success. It also provides an opportunity to sensitize themselves to an entrepreneurial environment and assess their tolerance for risk. In most cases, pre-incubators in an African context are focused on students and recent graduates, typically offering three to six month programmes including training and mentoring.

Incubators focus their support, mentoring and other services on supporting entrepreneurs who are committed to building their existing small business and more experienced professionals who are establishing their own businesses. Typically, those accepted into incubators either have more experience or have successfully transitioned from a pre-incubator. Incubators offer a range of services including training, mentoring as well as office space from three months to two years.

While Innovation and Entrepreneurship Centres are similar to Incubators in terms of the nature and duration of support they provide, they also often offer more differentiated training and research services that can include market assessment, competitor positioning and support for licensing.

As the name suggests, Accelerators provide more intense support for a specific duration of time for start-up or early stage businesses that already have some revenue streams and reference clients.

According to UNESCO[104], Science and Technology Parks have been defined in a number of ways, but essentially includes any kind of high-tech cluster [including technopole, technopark, technopolis, science (and technology) park, science city/town, cyber park, hi-tech (industrial) park, research (and development/technology) park, university research park, science and technology park]. Both the United Kingdom Park Association (UKSPA) and the American Association of University Research Parks agree that basic requirements include a focus on technology innovation, partnerships between the public, private and education and research sectors and formal and/or operational links with one or more universities, higher education institutes and/or research organisations.

Co-working spaces are extremely common in an African context, and often are the pre-cursor to a Pre-Incubator or Incubator. They provide shared services and either dedicated or hot-desk space to provide entrepreneurs, start-ups and early stage companies with flexible, relatively low cost office space. In an African environment, where taking a lease often requires paying twelve months rent in advance, it is easy to understand the popularity and attraction of this type of property service.

The reality is that some so-called Pre-Incubators, Incubators and Accelerators do not warrant the description. Some offer little more than co-working space, while others are doing their best to provide a differentiated value proposition that addresses local market needs and is designed to foster the next generation of entrepreneurs in their location. Increasingly, Incubators and Accelerators are experimenting with virtual service delivery, where some training and mentoring is provided (either face-to-face or remotely) but no office space is provided. This both allows more entrepreneurs to be supported simultaneously (as available office space is both finite and expensive) and also enables service provision to those who are located too far from their location.

The next section provides an overview of operational Innovation Spaces in IST-Africa Partner countries.

[104] http://www.unesco.org/new/en/natural-sciences/science-technology/university-industry-partnerships/science-and-technology-park-governance/concept-and-definition/

3. INNOVATION SPACES IN IST-AFRICA PARTNER COUNTRIES

3.1 Innovation Spaces in Northern, Central and West Africa

Egypt

Innovation Spaces gradually emerged in Egypt from 2009 and the numbers have steadily grown since then. That having been said, not all are still operating (e.g., Tahrir Square hub, Cairo Hackerspace and Plug and Play Egypt). Most Innovation Spaces in Egypt are located in Cairo or Giza (just outside Cairo) with a small number also located in the Northern city of Alexandria. *The District Co-working Spaces*[105]*,* American University of Cairo (AUC) Venture Lab and *icecairo*[106] are all located in downtown Cairo, while the Technology Innovation & Entrepreneurship Center (TIEC), Smart Village, Flat6Labs[107], Fab Lab Egypt[108], and Giza Hackerspace are all located in Giza. icealex and Alexandria Hackerspace are located in Alexandria.

They range in focus from Pre-Incubation (icecairo, icealex, *Alexandria Hackerspace*[109]), Incubation (American University of Cairo (AUC) Venture Lab, Technology Innovation and Entrepreneurship Center – TIEC[110], Flat6Labs, GESR Incubator and Innovation Lab, Nahdet El Mahrousa, Sustaincubator) and Accelerator (Flat6Labs, Injaz Egypt, Sustaincubator) and Co-working and meeting spaces (The District, Fab Lab Egypt Giza Hackerspace, El-Minya Hacker Space, Al Maqarr, Muqaddima Coworking Space - GrEEK CAMPUS[111], Rasheed22, 302labs[112], Innoventures Startup Circus). Some innovation centres focused on specific issues, for example Ebni which focused on incubation and acceleration around hardware innovations and Sustaincubator, which is specifically supporting innovation in Food, Renewable Energy and Water.

Some are described in more detail below.

The District was established in November 2011 as a commercial co-working space for established entrepreneurs after the ideation stage, offering co-working space, private meeting space, Internet access, and since October 2013, a café. As well as offering paid training programmes onsite, The District received support from the Dutch Embassy to launch an entrepreneur support programme in September 2014 focused on knowledge transfer and peer-to-peer skills sharing.

Affiliated with the international co-working space company **icehubs**[113] and the **AfriLabs Network**[114], **icecairo** was established in 2012 as a not-for-profit green-tech innovation hub, with a focus on both services delivered via a physical venue (with Internet access, co-working and meeting

[105] http://www.district-egypt.com
[106] http://www.icecairo.com
[107] http://www.flat6labs.com/location/cairo
[108] http://www.fablab-egypt.org
[109] http://www.alexhacker.com
[110] http://tiec.gov.eg/
[111] http://www.thegreekcampus.com/
[112] http://www.302labs-coworking.com/home
[113] http://www.icehubs.com
[114] http://www.afrilabs.com

space, fab-lab facilities, events, training and the GIZ Responsible & Inclusive Business Hub funded under the GIZ Employment Promotion Programme) as well as online, including a blog and online training. Icecairo is “focused on turning environment and social challenges faced by Egyptian communities into opportunities for the creation of green businesses.” icecairo has been heavily dependent on funding from GIZ and is now trying to diversify revenue streams to achieve sustainability.

The **Technology Innovation and Entrepreneurship Center (TIEC)** was established in September 2010, focusing on pre-incubation, incubation, acceleration and entrepreneurship and business support. To date, it has incubated 32 companies and supported over 100 startups and early stage companies, and is currently incubating 16 entrepreneurs, half graduates, half experienced professionals. Government funded, it has a national mandate to “stimulate an innovation-based economy through promoting innovation, supporting entrepreneurship and the creation of intellectual property in the ICT field.

AUC Venture Labs (V-Lab) was established by the American University of Cairo in 2013, as the first university-based incubator in Egypt. It incubates early-stage and growth-stage startups providing training sessions, mentors, student internships and engagement with the AUC School of Business. In 2014, AUC V-Lab has been selected among the top five most promising university incubators in Africa by Sweden-based UBI-Index. Currently 5+ startups are supported by AUC venture lab.

Flat6Labs is a regional startup accelerator program that provides seed funding, strategic mentorship, a creative workspace, entrepreneurship-focused business training, and access to investors. Flat6 labs has now 4 locations, 80+ mentors, 180+ entrepreneurs, 75 companies benefited from the acceleration program with 400+ jobs created.

GESR is a technology-based, social business incubator focused on Water, Energy, Food, Health and Education. It provides both an Incubation and Acceleration programme. The Incubation programme includes a one year incubation period and funding up to 500,000 LE for registered social enterprise with a functional prototype, a vision of the market, and a solid business plan. The Acceleration programme includes a six month incubation period and funding up to 200,000 LE to support social entrepreneurs to develop their prototype further. The lab includes a mechanical workshop and embedded systems lab. Innovators are provided with co-working space, technical support, hand tools and electronic kits.

Fab lab Egypt is a not-for-profit, co-working space and digital fabrication Lab, and member of MIT Fab Lab Global Network. Established in 2012, it offers paid access to co-working space, machines and tools for digital fabrication and prototyping, hands-on MIT accredited curriculum-based training, workshops and events.

EBNI (EITESAL Business Nurturing Initiative) is focused on incubation for hardware. It provides mentoring, networking, access to experts and funding to develop hardware.

Sustaincubator is an incubator focusing on innovative sustainable development in the areas of water, food, renewable energy and IT-enabled solutions supporting sustainable causes.

INJAZ Egypt provides incubation and acceleration services for about 29 companies.

Shekra works with entrepreneurs to assist them to crowdfund.

302 Labs is a co-working space which supports networking and community activities including hackathons and workshops.

Tunisia

In 1999 Tunisia launched a national programme to establish business incubators[115] within Higher Education Institutions supported by Ministry of Higher Education and Ministry of Industry. The first incubator commenced operations in 2011. There is now a network of 26 incubators across the country located in Higher Institutes of Technological Studies (ISET), engineering schools, research centres and science parks.

Tunisia has also established a Centre for Innovation and Technological Development (CITD) as a support structure within the Agency for Promotion of Industry and Innovation. Its mission is to assist companies in their innovation efforts by providing relevant advice, high value services and assist them to identify technological innovation requirements.

Tunisia is a member of the Enterprise Europe Network since 2010

Innovation Spaces in Tunisia are relatively recent and include *WIKI Start Up*[116] which was established in 2011 as an Incubator, *Reseau Entreprendre Tunis*[117]*, Microsoft Innovation Center, Stanford Peace Innovation Lab*[118]*, Elfabrika*[119]*, Fablab ENIT*[120]*, Tunis Fablab*[121] and *Fablab Solidarity Youth Science Tunisia*.

Established in 2011 in Tunis, the **WIKI Start Up Business Incubator** focusing on helping entrepreneurs get from proof of concept to implementation through the provision of technical assistance, tailored coaching and other resources. Services offered at different stages include Venture Catalyst Services, Venture Fundraising Services and Business Development Services. WIKI Start Up and Carthage Business Angels organised a series of Innovation Workshops in 2013 and WIKI Start Up runs an annual UNIVENTURE competition for potential research spinoffs.

Established in 2012, **Reseau Entreprendre Tunis** (and Monastir) is part of Reseau Entreprendre International, an association of local business owners and entrepreneurs. Mentoring is available from experienced entrepreneurs, as well as monthly group training to build capacity and networks.

[115] http://www.tunisieindustrie.nat.tn/
[116] http://www.wikistartup.tn/
[117] http://www.reseau-entreprendre-tunis.org/
[118] http://peaceinnovation.stanford.edu/field-lab-network/tunis/
[119] http://elfabrika.tn/
[120] www.facebook.com/FabLabENIT
[121] www.fablabtunisia.com

Microsoft Innovation Center (MIC) is partnership between the Tunisian Government and Microsoft aimed to support the development of the software industry in Tunisia, stimulating innovation and entrepreneurship by developing intellectual capital and strengthening industrial partnership. The center aims to strengthen the competitiveness of enterprises in information technology by providing access to the latest technology.

The **Fablab Solidarity Youth Science Tunisia** was launched by Orange-Tunisia and the Association of Young Science. It is a digital fabrication shop that respects the Charter of Fab Labs set up by MIT. It is equipped with several 3D printers, laser cutting, vinyl cutting, a digital milling machine, a 3D scanner, open source software design to assist ideas to be transformed into prototypes. It supports innovation and provides the tools to entrepreneurs, researchers, designers, students, students, artists, young people without qualifications and / or unemployed.

Cameroon

There are a number of Innovation Spaces active around the country including: *Cameroon Innovation Hub*[122] (Yaounde); *Centre for Entrepreneurship, Research & Innovation* (CERI)[123] hosted by Catholic University Institute of Buea and *ActivSpaces*[124] (Buea and Douala). Agro-Hub is focused on agriculture. These Innovation Spaces are primarily focused on supporting pre-Incubation, Incubation and Acceleration. While CERI focuses on Science, Technology, Engineering and Maths disciplines, ActivSpaces is a tech hub focused on supporting web and mobile programmers, designers, researchers, and entrepreneurs. CIB is currently providing virtual support online.

Founded in September 2013 as a virtual presence by maooni e.V, a German not-for-profit, the **Cameroon Innovation Hub (Cameroon iHub)** is working towards establishing a co-working space focused on promoting ICT development and new technologies, and launching innovative web and mobile technology start-ups addressing societal challenges. Currently run by a three person team, it will focus on pre-incubation, incubation and Acceleration.

The **CUIB Centre for Entrepreneurship, Research & Innovation (CERI)** was established in June 2011 as the business and research arm of the Catholic University Institute of Buea founded in May 2010. CERI will evolve into a Research Park, and supports training and development of entrepreneurs, leaders and innovators within the science, technology, engineering and mathematics (STEM) disciplines. CERI is focused on fostering innovation and economic competitiveness through collaboration among national and international stakeholders from the education and research, public and private sectors. CERI hosted a Startup Weekend from 31 October – 02 November 2014 and a Training seminar on "Servanthood" Leadership in July 2015.

ActivSpaces has established two co-working spaces in Doula and Buea in the West of Cameroon, focused on web and mobile developers, designers, researchers and entrepreneurs. There are a number of business models being applied, including a monthly fee for co-working space offered to

[122] www.cihub.net/
[123] www.cuib-cameroon.org/home.php?office=14
[124] http://activspaces.com/

freelancers and entrepreneurs, free co-working space for innovative tech start-ups, and revenue share for start-ups accepted in their six month Activation Bootcamp (which started in January 2015). ActivSpaces is a member of AfriLabs Network. MTN partnered with Microsoft and ActivSpaces to launch a competition from July - October 2015 to identify software developers who can support local content development. The winners received a six month incubation period with ActivSpaces among other items. ActivSpaces has organised a number of events during 2015 focused on Java and training for start-ups.

Agro-Hub was founded in 2009 based on a recognised gap of marketing and distribution infrastructure for agriculture. During 2015 it has focused on inbound marketing for agriculture in Cameroon to provide content to person wishing to buy agricultural products or invest in agriculture in Cameroon. It works with small scale farmers and buyers to support resilient and sustainable supply chains.

Senegal

Innovation Spaces include MobileSenegal Hub[125], which was established as a virtual tech hub in 2008 to support training in mobile technology; Jokkolabs[126] which was established as a co-working space in 2010, followed by JokkoFabLab[127] and Jokko Labs Saint-Louis[128]; CTIC Dakar[129], which was established in 2011 as a tech hub providing Pre-Incubation and Acceleration Services; Hubsocial[130] was created in 2011 to promote social entrepreneurship; G 1 Incubator[131] established in 2014; Ker-Thiossane[132] co-working space and affiliated DefkoAkNiep Labs[133] (Fab Labs; and JJiguene Tech Senegal[134], which was established as the first technology incubator in Senegal for women. Both JokkoLabs and CTIC Dakar are members of AfriLabs.

Established in 2008 with support from Pace University in the US, **MobileSenegal** (now established as the Mobile4Senegal association) was the first Francophone mobile focused incubator in Africa. MobileSenegal focuses on training mobile developers - to date, over 450 participants have completed boot camps and competitions and developed more than 70 applications. To date, grant funding has been provided through Pace University (Google, NCIIA, IBM), and local companies.

Established in April 2011, **CTIC Dakar** is primarily focused on supporting high growth potential ICT entrepreneurs with support from the Government of Senegal, the Telecoms regulator, Orange, World Bank, GIZ and the European Union (Centre for the Development of Enterprise – CDE). CTIC Dakar provides hands-on-business development support and coaching for entrepreneurs, as well as training on financial and communication issues, organises events for young entrepreneurs and has

[125] http://mobilesenegal.org
[126] http://jokkolabs.net/en
[127] https://www.fablabs.io/defaralsalabo
[128] http://saintlouis.jokkolabs.net
[129] www.cticdakar.com
[130] www.hubsocial.org
[131] www.give1project.org/category/g1-incubator/
[132] www.ker-thiossane.org
[133] www.ker-thiossane.org/spip.php?article137
[134] http://jjiguenetech.com

also established in six month duration accelerator program for high potential impact startups. 25% of operating costs are contributed by companies supported (through revenue growth sharing), with 30% grant funding, 25% sponsorship and 20% through delivery of business development services.

Established in October 2010, **Jokkolabs Dakar** is part of a network of six co-working spaces in Mali, Burkina Faso, France and Senegal. Focused on addressing social needs in Agriculture, Health, Governance and Primary School Education, leveraging open source is part of its culture.

Established by women in 2012, **JJiguene Tech Senegal** is the first woman's tech Hub in Senegal. It has the objective of encouraging, inspiring and training more women in the tech ecosystem in Senegal through networking, training, mentoring and sharing knowledge. It also aims to increase the number of women in technology and entrepreneurship by encouraging more girls to take STEM (Science, Technology, Engineering and Maths) subjects in school and university. Pre-incubation space is provided, with an emphasis on businesses with high social potential impact. JJiguene Tech Senegal organising monthly meetings, school and university outreach programs, a mentorship program and ICT and entrepreneurial skills training for girls between the ages of 13 – 25.

3.2 Innovation Spaces in East Africa

Burundi

The *Burundi Business Incubator* was set up in 2010 and has received financial and technical support through USAID and the Dutch Embassy to supporting training programmes and local capacity building. It provides both pre-incubation and incubation services.

During 2013 the Segal Family Foundation piloted the *Social Impact Incubator*[135] in Bujumbura as a capacity building programme and the first cohort graduated in October 2013. During 2014 in partnership with CARE International Burundi, the Social Impact Incubator took in another cohort of 24 incubates. Remote support to partners was provided during 2015 due to local unrest but it is hoped that full scale operations will restart during 2016.

The *UNICEF Burundi Innovation Lab* is focused around technology for development; micro-energy rural entrepreneurship models and leveraging tools and mobile-based platforms to address national challenges. *Ideas Box*[136] was recently launched in Burundi as a UNHCR initiative, focused on addressing local thematic challenges, such as energy or education, with projects prototyped and tested in UNHCR operations around the world.

Ethiopia

Bahir-Dar ICT Business Incubation Center[137] was established in November 2009 in Amhara Regional State to support recent graduate ICT entrepreneurs. It provides office space, capacity building and advisory services. *iceaddis*[138] was established in Lideeta and Kazachise, Addis Ababa

[135] http://segalfamilyfoundation.org/social-impact-incubator/
[136] http://innovation.unhcr.org/labs
[137] http://www.amhara-incubation.org
[138] http://www.iceaddis.com

(hosted by EiABC and downtown) during 2014 to provide pre-incubation and Incubation support for technology graduates, final year students, professionals and entrepreneurs. EiABC also hosts a FabLab next door and the Ethiopian government proposes to establish a $250 million Ethio ICT technology park. FabLab Addis is being hosted by Addis Ababa University. xHUB[139] Innovative Society provides co-working space, training and research collaboration and networking opportunities with potential funders, with a particular interest in rural development. Addis Ethiopia Climate Innovation Center (ECIC)[140] is supported by InfoDev and targets entrepreneurs developing climate mitigation and adaptation solutions. The SNNPRS ICT Business Incubation Center(SICT-BIC) was established in Hawassa city in 2011. Mekelle Information Communication Technology Business Incubation Centre (MICT-BIC) was established in 2008 in Mekelle City.

Established in November 2009, the **Bahir Dar ICT Business Incubation Centre** is located in the capital of the Amhara Region in North-Western Ethiopia, and targets recent ICT graduates. The longer term objective is to develop BICT BIC into a sustainable technology park of over 11,000m2. The BIC provides co-working space with Internet access and advisory services focused on around marketing, entrepreneurship and financial management. Funding by the regional government, the facilities are used by startups as well as final year students doing internships.

Founded in May 2014, **iceaddis** is located on the Ethiopian Institute of Architecture, Building, Construction and City Development (EiABC) campus in Addis Ababa, in a building made up of six interlocking shipping containers, originally intended to host an art gallery. Iceaddis provides pre-incubation and incubation services, with an emphasis on ICT and green tech. A 12 week business plan training programme is delivered several times a year, with winners securing incubation space. While a social enterprise, most income generated goes to community support. Iceaddis is a member of icehubs and AfricaLabs. Challenges include limited Internet bandwidth and financial support.

Kenya

In part due to its pro-Innovation Policy and Regulatory Environment, Kenya has experienced significant growth in Innovation Spaces (private, community driven and hosted by education and research institutions) since 2009 including FabLab[141] (2009) and Computing for Development Lab[142] (C4DLab, 2013) at University of Nairobi; iHub[143] (March 2010); @iLabAfrica (January 2011) and @iBizAfrica[144] at University of Strathmore; m:lab East Africa[145] (June 2011); Chandaria BIIC (July 2011) at Kenyatta University; NaiLab[146] (August 2011); 88mph[147]/Nairobi Startup Garage (August 2011), GrowthHub[148] (May 2012), GearBox[149], Kenya Country Business Incubator -

[139] www.xhubaddis.com
[140] www.ethiopiacic.org
[141] http://fablab.uonbi.or.ke
[142] http://www.c4dlab.ac.ke
[143] http://www.ihub.co.ke
[144] http://www.ibizafrica.co.ke
[145] http://www.mlab.co.ke
[146] http://www.nailab.co.ke
[147] http://www.88mph.ac/nairobi
[148] http://www.thegrowthhub.com

KeKoBI[150]; Jomo Kenyatta University of Agriculture and Technology Center for Business Innovation - JKUAT-CBI; Regional Centre for Enterprise Development – IUPS and Enterprise Kenya[151] (2015) A small but notable actor is Pawa254[152], a collaborative space focused on dynamic creative industry fields. Lakehub[153] is based in Kisumu, Western Kenya. These Innovation Spaces provide a mix of Pre-Incubation (iHub; @iLabAfrica; @iBizAfrica; Chandaria BIIC, Lakehub), Incubation (FabLab; ARO Fablab; C4DLab; m:lab East Africa; NaiLab; GearBox; KeKoBI; JKUAT-CBI; Regional Centre for Enterprise Development – IUPS; Sorghum Value-Chain Development Consortium - SVCDC[154], KIRDI[155]) and Acceleration (88mph/Nairobi Startup Garage; GrowthHub, Enterprise Kenya) services (Cunningham et al 2014). Some of these are profiled below.

University of Nairobi has hosted **FabLab** for five years (focused primarily on rapid/3D prototyping) as part the Department of Mechanical Engineering and Science and Technology Park, and the **C4DLab** since 2013 as part of the School of Computing and Informatics. Since March 2014, C3DLab is incubating 8 startups and exploring virtual incubation.

Hosted by the IT Faculty, **Strathmore University, @iLabAfrica** was established in January 2011 as a Centre of Excellence in ICT Innovation, Entrepreneurship & Incubation, and Policy Research for Africa. It expanded onto a second floor of dedicated space in June 2014. @iLabAfrica has successfully built industry research partnerships and launched a Master's programme (MSc. MTI) in Mobile Telecommunications and Innovation. **@iBizAfrica** was set up in January 2012 as an Incubation Programme.

Kenyatta University (KU) launched the **Chandaria BIIC** in July 2011. BIIC aims to support up to 100 innovators per year (including 30% non-KU students), blending research with entrepreneurship training. Their strategy is to sensitize students and the population at large to the importance of job creation. 40 ideas had been nurtured by February 2013. A new building inside the KU Campus has been completed. Partners include NACOSTI, Youth Enterprise Development Fund and Orange.

Jomo Kenyata University of Agriculture and Technology[156] (JKUAT is supporting "uptake of research results by industry" by implementing the **Nairobi Industrial and Technology Park** in partnership with **Ministry of Industrialization**.

iHub launched in March 2010 as a Tech pre-Incubation and Collaborative Working Space, has three types of membership: White (Virtual – limited physical access); Green (free shared space for up to twelve months for 150 – 200 individuals) and Red (paid dedicated space for 12 months) members registered. Regular community events are hosted to encourage sharing of experiences. Over 50 companies have been established since its launch. iHub activities include iHub Research

149 http://gearbox.co.ke/
150 www.kekobi.or.ke
151 http://innovation.icta.go.ke/enterprise-kenya/
152 http://www.pawa254.org
153 http://lakehub.co.ke/
154 www.sorghum3fs.co.ke
155 http://www.kirdi.go.ke/centers/ict-software-incubation
156 http://www.jkuat.ac.ke

(March 2011), m:lab (June 2011), Pivot25/Pivot East (mobile app competition), UX Lab and Supercomputing Cluster (2012).

m:lab East Africa was launched in June 2011 as a mobile technology incubation centre by a consortium (eMobilis, World Wide Web Foundation, School of Computing and Informatics - University of Nairobi, iHub), with $725,000 seed funding from InfoDev (www.infodev.org). Services include business incubation, training, research and application testing. Up to June 2014 [24] m:lab supported over 60 startups through its four-month Mobile Application Development and Entrepreneurship Programme and office space for up to 24 months to five past and five current incubatees and Savannah Fund. m:lab supporters include Nokia, Samsung, Microsoft and SEACOM. m:lab is an implementing partner in InfoDev two year East Africa Virtual Incubation pilot ($180,000 funding from UKAid) running in Kenya, Rwanda, Tanzania and Uganda.

NaiLab is a Business Incubator supporting entrepreneurial teams with mobile/web space innovations. Launched in August 2011 with support from Accenture and 1% Club, it provides collaborative working space, Internet access and mentoring. NaiLab takes a 3% - 10% equity stake in return for incubation of three to twelve months. Nine start-ups have been incubated to date, with five more currently being incubated. NaiLab was awarded the $1.6 million Kenya ICT Incubation Program contract in January 2013 under which it was contracted to incubate 30 startups by 2016 and is an implementing partner in the InfoDev East Africa Virtual Incubation pilot.

GrowthHub is an incubator and accelerator targeting Clean and Green-Tech, Mobile and IT, Agro-processing, Professional services and Essential Services (health, education, water and sanitation). Launched by GrowthAfrica, a Danish consulting company in May 2012, services include shared desk and meeting space, wireless internet, peer to peer learning, advisory services, workshops, training, access to seed funding and monthly pitch meetings. The GrowthHub partnered with Village Capital to provide a three month Accelerator Programme for start-ups with prototypes (18 in 2012, 14 in 2013). GrowthHub is supporting 25 start-ups in two programmes (Agribusiness Accelerator Cohort, Agribusiness for Innovation Incubation Cohort) and has supported 24 startups since 2012.

88 mph rebranded its Kenyan accelerator as Nairobi Startup Garage in June 2014. Offering seed capital ($1.7 million invested in 19 startups) and accelerator programmes targeting mobile and web start-ups, 88mph was launched by Danish investors in August 2011. Start up Garage co-working space was launched in February 2012 by 88mph and Human IPO. To date 88mph / IPO48 has invested in 10 start-ups and started 5 companies. 88mph takes 15% - 35% equity stake for investment of up to $24,000. In August 2012, 88mph partnered with Google to provide extended support to local start-ups.

Kenya Industrial Research and Development Institute (KIRDI) is a national research institute established in 1979 under the Ministry of Trade and Industry and mandated to undertake multidisciplinary research and development in industrial and allied technologies. The KIRDI ICT Incubation program is focused on supporting an entrepreneurial culture to support the creation of enterprise start-ups; micro, small and medium-sized enterprise (MSME) and mentorship.

Enterprise Kenya is an initiative under the ICT Authority to develop a national accelerator which can provide mentorship, create ICT centres of excellence and establish an Equity fund to support ICT innovations. It was initiated in 2015 to contribute to the National ICT Masterplan 2017 and is yet to be formally commenced.

IBM set up a Research Lab[157] in Nairobi to undertake basic and applied research focused on addressing African challenges.

Tanzania

Innovation Spaces include Dar Teknohama Business Incubator[158] (DTBi); Buni Hub[159], KINU[160], and University of Dar es Salaam ICT Incubator[161] (UDICTI) (Cunningham et al 2014), Twende-AISE, The University of Dar es Salaam Entrepreneurship Centre (UDEC)[162], which also hosts the UDEC Business Incubator[163]. Innovation Spaces are focused on Pre-Incubation (Buni Hub, KINU), and Incubation (DTBi, UDICTI, Microsoft Innovation Center - MIC TANZANIA at University of Dodoma[164], Twende-AISE[165]). Some of these are profiled below. The Mara Launchpad Incubator opened in Q1 2013 was closed by 2014.

Established in October 2011, **Buni Hub** is currently focusing on capacity building and skills development of youths in innovation and technology entrepreneurship through 3 programs; internship program (targeting universities), mentoring program (for early stage ideas) and community outreach (for ICT4D projects and Social Champions). The hub has also piloted the first makerspace in Tanzania, Buni mini fabrication laboratory which is under COSTECH.

Currently there is another makerspace which has been piloted by a lecturer and students from Dar es Salaam Institute of Technology (DIT). The makerspace is called STICLab[166]. SticLab is a technology innovation centre that provides a futuristic technology development environment for scientists, makers and innovators. The center offers its users full access to lab and Workshop equipments that help them easily do their tasks, starting from idea conception to product and/or service development.

There is another innovation space in Arusha called Twende -AISE.

Launched in July 2012, **KINU** provides dedicated and co-working space, application testing facilities, workshops and training with a focus on technology start-ups and women. KINU cooperate in ICT entrepreneurship activities (e.g. hackathons) with TANZICT[167] and DTBi and are now

[157] http://www.research.ibm.com/labs/africa/
[158] www.teknohama.or.tz
[159] /www.buni.or.tz
[160] www.kinu.co.tz
[161] http://udicti.coict.udsm.ac.tz/
[162] http://udec.udsm.ac.tz
[163] http://udec.udsm.ac.tz/incubation.html
[164] http://mictanzania.azurewebsites.net/
[165] www.twende-tanzania.org/about.html
[166] http://sticlab.blogspot.com/
[167] http://www.tanzict.or.tz - bilateral project between the Ministry of Communications, Science and Technology, Tanzania and Ministry of Foreign Affairs of Finland 2011 – 2016 which supports the Buni Hub,

diversifying their revenue streams to achieve sustainability (e.g. hot-desks with mentoring and faster internet for a fee, setting up briefing sessions for clients with key stakeholders from specific sectors, recruitment services, sensitizing high school students) .KINU recently finalized an agreement with Vocational Education and Training Authority[168] (VETA) to certify entrepreneurship training programmes nationally in several entrepreneurship related areas. Community members are mainly students and startups during the day and professionals during evenings and weekends.

DTBi was established in June 2011 with the support of COSTECH, info*Dev* together with local academia as an autonomous entity in a Public Private Partnership framework to grow and nurture emerging ICT start-ups/entrepreneurs. DTBi is currently supporting a total of 37 incubatees/entrepreneurs categorized as: 6 Graduated Companies, 5 Growth Companies, 5 Pre-incubatees and 22 Start-ups. Out of these, 20 are supported virtually and 17 are resident at COSTECH premise. --. DTBi collaborates with the Buni Hub in particular in supporting Pre-incubatees i.e. entrepreneurs that are still in ideation stage and as such Buni has become an important breeding ground of DTBi incubatees. For the past 30 months, DTBi has assisted these incubatees to generate more than US$2.0 Million in annual turnover, and creating more than 400 direct and 10,000 indirect employment opportunities while the pre-incubation programs and app training for university students have served hundreds of youth. In addition, DTBi has forged strtategic partnerships with reputable local and international organizations to enable smooth delivery of its services – TiGO Tanzania, Microsoft, Airtel Tanzania and National Economic Empowerment Council to mention just a few. Tigo – DTBi collaboration was signed in June 2014 dubbed as Project Digitize to accelerate digital inclusion in Tanzania. Through this collaboration 10 undergraduate and Masters students have been awarded scholarships in 2015/16 academic year and 2 new innovative solutions have been channelled to Tigo subscribers. .

Uganda

Uganda experienced a rapid growth in Innovation Spaces supporting entrepreneurs from 2010 to include: *Hive CoLabs*[169]; *Microsoft Innovation Cen*tre[170] and iLab@MAK[171] hosted by College of Computing and Information Science, Makerere University; *Outbox*[172] focused on mobile and web entrepreneurs; *Angels Hub*[173] (which took over Mara LaunchPad incubation space in September 2013; the @TheHub[174] work space; FinAfrica[175] – which has a particular focus on training); Center for Innovations and Professional Skills Development (CiPSD) and RAN Innovation lab at Makarere University; CURAD – Consortium for enhancing University Responsiveness to Agribusiness

training for women entrepreneurs (FEMTANZ Program), community events and hands-on support to emerging Living Labs outside Dar es Salaam (in Iringa, Kigamboni, Mwanza, Mbeya, Zanzibar and Arusha).

[168] http:// www.veta.go.tz
[169] http://hivecolab.org/
[170] www.micuganda.com
[171] http://cedat.mak.ac.ug/research/ilabs.html
[172] www.outbox.co.ug/
[173] http://angelshub.org/
[174] http://thehubkampala.com/
[175] www.finafrica.org/

Development[176]; the UNICEF supported Uganda Innovation Lab and the UN Global Pulse supported Pulse Lab Kampala[177], which focuses on applications of Big Data; Business Innovation services provided by the Uganda Industrial Research Institute[178]; FabLab Kampala[179]; Women in Tech Uganda (WITU) Hub[180]; Telesat International[181] – a non-profit trade school in Kampala that prepares students for self-employment; Grameen Foundation AppLab[182]. The Innovation Spaces are focused on providing Pre-Incubation (Hive CoLab, Outbox), Incubation (Angels Hub, FinAfrica. FabLab Kampala, Pulse Lab Kampala), Co-working spaces (Hive CoLab, Outbox, The Hub), Entrepreneurial Training (FinAfrica) and commercialisation of apps (*Grameen Foundation AppLab*) (Cunningham et al 2014). Some of these are profiled below.

Makerere University is supporting Technology Entrepreneurship through the **Microsoft Innovation Centre (MIC)** established in November 2011 and **Global Business Labs Uganda**[183] established in March 2013 (both co-located in the College of Computing and Information Science), and **iLab@MAK**, established in the College of Engineering, Design, Art and Technology in 2005. **MIC** focuses on supporting skills development, fostering innovation and supporting job creation. It provides young entrepreneurs, students, developers and researchers with access to equipment for testing and development of technologies build on the Microsoft platform. **iLab@MAK** provides a low cost, flexible and reliable experimentation platform for digital electronics, communication theory and digital signal transmission which can be accessed remotely. They are also collaborating with secondary schools to promote Science and Technology incubation.

Launched in July 2010 and supported by Indigo Trust and Hivos, **iHive Colab** is an innovation and incubation hub which targets university graduate startups and web and mobile technology entrepreneurs. A founding member of **AfriLabs**[184], Hive Colab undertakes research, collaborates with local universities and is an implementation partner for InfoDev East Africa Virtual Incubation pilot [14]. The Hub provides co-working space and mentorship for emerging entities and entrepreneurs.

Outbox (member of AfriLabs) was launched in July 2012 as a technology incubator and collaborative working space for mobile and web entrepreneurs, supported by Google and Deloitte. It provides co-working space, mentorship and training programmes.

The founders of **Angels Hub** took over Mara Launchpad Incubator when it closed in September 2013, having been involved in its launch in January 2012. The hub provides residential and commercial work spaces for start-ups and SMEs.

[176] www.curadincubator.org
[177] www.unglobalpulse.org/kampala
[178] www.uiri.org
[179] www.facebook.com/fablabkampala
[180] http://witug.org
[181] http://telesatinternational.net/
[182] www.grameenfoundation.applab.org
[183] http://globalbusinesslabs.com/office/uganda/
[184] http://afrilabs.com/labs

Pulse Lab Kampala was founded in January 2015 as a data innovation centre, under the United Nations Resident Coordinator in Uganda to contribute to the UN "Delivering as One" process. It aims to support interaction between Government, UN, academics and private sector to develop big data analytics technologies to support sustainable development.

The UNICEF **Uganda Innovation Lab** was launched in 2010 to provide work spaces, a physical prototyping workshop, RapidSMS service development hub, video production set and environment to support co-creation. It aims to support technology development as products and mobile services to support information access for end-users and improved data collection methods.

Established in April 2011, **The Hub Kampala** rents collaborative and dedicated working space for freelancers, consultants and entrepreneurs, and collaborates with **FinAfrica** for training and **Mara Foundation** for mentoring.

FinAfrica was founded in 2009 as a not-for-profit training, enterprise incubation and advisory centre. A Cisco Entrepreneur Institute, it can also host up to 20 incubatees.

Grameen Foundation AppLab Uganda develops applications and information services tailored to the needs of the poor. Launched in 2009, the Community Knowledge Worker (CWK) Initiative has over 1,000 ICT-enabled agriculture extension workers trained as data enumerators. Organisations providing services to farmers have access to rural community data. The AppLab Money Accelerator has Gates Foundation funding to expand the mobile money ecosystem and deliver appropriate products and services to the poor. Grameen collaborates with Makerere and Victoria Universities.

Women in Technology Uganda was established as a NGO in 2012. It provides a three month Career, leadership and Life Skills training programme for young women in underserved communities focused on STEM, entrepreneurship, leadership and life skills. It runs a Tech Kids Program during school holidays and Secondary Code Girls Program to encourage children and teenagers to engage with STEM.

3.3 Innovation Spaces in Southern Africa

Angola

Launched in June 2014, funded by the government and managed by the National Institute of Small and Medium-Sized Companies (INAPEM), Angola’s first business incubator is located in Viana municipality, Luanda-Bengo Special Economic Zone to support innovative early stage SMEs. Companies can stay for up to three years and will receive training and business management consultancy. The first companies to join are winners of the INAPEM “Ideia Brilhante” contest.

A number of other initiatives to support entrepreneurship include the National Network of Entrepreneur's Desk (BUE) to support entrepreneurs to establish their enterprise, the Association of Entrepreneurs of Angola, Angolan Forum of Young Entrepreneurs and Federation of Women Entrepreneurs.

Inaugurated by the Ministry of Economy in March 2015, the Business Incubator of Information Technologies[185] was also established by INAPEM, with support from Chevron.

The Fabrica de Saboa[186] in Hoje Ya Henda em Luanda is due to be launched during 2016, incorporating an Incubator, Accelerator, Makerspace and co-working space in the largest slum in the country, with a local population of 800,000 people and very high population density.

Botswana

The Government of Botswana decided at an early stage that it is necessary to actively support entrepreneurship. The *Local Enterprise Authority* was established in 2004 to support SMEs, provide training, mentoring, technology adaptation and support services.

The *Botswana Innovation Hub* (BIH)[187] was conceived in 2008 within the Botswana Excellence Strategy to support economic diversification, job creation and transition towards a knowledge-economy by encouraging inward investment, research and training in the areas of ICT, Bio-Technology, Energy and Mineral Technology. Programmes include the First Steps Venture Centre, Microsoft Innovation Centre, Mining Technology Entrepreneurship Centre (MTech Centre), Cleantech Centre and KitsoWorks[188]. The development of the National Science Park is due for completion during 2016.

BIH is receiving support through the Southern African Innovation Support (SAIS)[189] Programme to establish a Global Business Lab[190] and Technology Transfer Office within the University of Botswana; develop a Demand Driven Supply Chain Business Incubation Model; and address youth unemployment and local communities through Living Labs and Training (RLabs Botswana).

The Local Enterprise Authority[191] (LEA) has four incubators in different locations around the country; Pilane Multi sector Incubator (2009), Leather Industries Incubator (2010), Francistown Industrial Business Incubator (2011) AND Glen Valley Horticulture Incubator (2011).

The University of Botswana is hosting three Innovation Spaces; Global Business Labs Botswana[192] (2013); Centre for Scientific Research, Indigenous Knowledge and Innovation (cESIki) and the DESIS Lab[193].

[185] www.angolamonitor.co.ao/en/news/science/2305-business-incubator-of-information-technologies-opened-in-luanda.html
[186] www.jeanclaudebastosdemorais.com/en/in-my-view/2015-11-17-fabrica-de-sabao-turning-luandars-defunct-industrial-space-into-a-creative-locus-of-growth-innovation-and-opportunity-for-angolans-40.html
[187] http://www.bih.co.bw/
[188] www.kitsoworks.co.bw
[189] http://www.saisprogramme.com/overview/
[190] http://globalbusinesslabs.com/office/botswana/
[191] www.lea.co.bw
[192] www.saisprogramme.com/global-business-lab-sets-up-shop-in-botswana-and-namibia/
[193] www.desis-network.org/content/university-botswana-desis-lab

Lesotho

Innovation Spaces are gradually emerging focused primarily around the *Basotho Enterprises Development Corporation*[194] *(BEDCO)* and the *School Technology Innovation Centre (STIC)*. The Vodacom Lesoto Foundation with support from BEDCO and UNDP is also funding the Vodacom Innovation Park[195] in Maseru Mall.

Established in 1980, **BEDCO** is a parastatal of the Government of Lesotho, with a mandate to support entrepreneurial capacity building programmes and delivery of business advisory and support services and business and technical training. BEDCO provides incubation space for start-up businesses as well as virtual incubation services, and in November 2014 launched an ICT-led business enterprise project, which it is hoped will lead to greater local entrepreneurial activity.

Established in May 2008, **STIC** is hosted by the Lesotho College of Education and targets in-service and pre-service teachers, learners and school principals. The objective is to inculcate basic scientific and technological literary, visual and cultural literacy skills of student and promote adoption of new methods of teaching.

Established in 2015, the Vodacom Innovation Park is a technology-based business Incubator for young entrepreneurs in Lesotho focused on leveraging technology and mobile communications to make their businesses more competitive and productive.

Malawi

Innovation Spaces are gradually appearing in Malawi since 2014: Global Center for Food Systems Innovation[196] at Lilongwe University of Agriculture and Natural Resources; Polytechnic Innovation Hub in Blantyre and Lilongwe mHub[197].

In early 2014, the Global Center for Food Systems Innovation[198] at Michigan State University, established a regional innovation hub in partnership with the Lilongwe University of Agriculture and Natural Resources, with financial support from USAID. This innovation hub is focused on agricultural and food systems innovation, starting with developing and introducing multi-purpose legumes, which produce both food for humans and fodder for animals and will supplement growing of maize.

In May 2015 UNICEF collaborated with the Polytechnic, University of Malawi to establish the Polytechnic Innovation Hub focused on engagement with youth, academia, government, private sector and development partners. It aims to support UNICEF's innovation efforts in Malawi. The hub is hosted with the Chichiri Campus of the Polytechnic with operational funding from UNICEF.

In late 2015 Lilongwe mHub was set up as a pre-Incubator and co-working space with funding from Hivos Southern Africa. It is specifically targeting young tech entrepreneurs - students and graduates

194 http://www.bedco.org.ls
195 http://theinnovationpark.co.ls/
196 http://gcfsi.isp.msu.edu/
197 http://www.mhubmw.com/
198 http://gcfsi.isp.msu.edu/

who wish to leverage their technical skills to set up start ups. It aims to support software development, mentoring and community building. It has signed a cooperation agreement with the UNICEF Innovation Hub hosted at Polytechic of Malawi.

Mauritius

Innovation Spaces currently supported by the Government of Mauritius include: Mauritius Research Council *Business Research Incubator Center*[199] (MRC-BRIC March 2011); *NCB Technopreneurship Programme*[200] (2011) and La Plage (initiated in 2016). These Innovation spaces offer a mix of Pre-Incubation, Incubation (physical and virtual) and Accelerator services.

Established in March 2011, the **MRC-BRIC** supports recent graduates and final year students, with office space, a monthly stipend under the MRC Traineeship scheme, access to mentors and exposure to business angels via a Business Angels For a organised by MRC.

The National Computer Board (NCB) is supporting entrepreneurship through the **Technopreneurship Programme**, Microsoft BizSpark Program and NCB/MICT **TechIdeaSpace Programme** launched in November 2014. Targeting secondary and university student, university graduates, young technology professionals and aspiring startups, it will use a competition based approach to shortlist team based proposals to participate in the Bootcamp programme to prepare a business plan, marketing plan, financial budgeting and enjoy access to one-one-one mentoring.

The Government initiated "La Plage" as an Incubator/Accelerator project. It aims to a) create conducive ‘ecosystem’ for high-tech entrepreneurship; b) boost the quality of competencies available in Mauritius as well as proper framing & resources; c) promote Mauritius as an international ICT destination and attract more investment and achieve higher growth rate and d) obtain the suitable visibility and accountability by demonstrating the ability of the Mauritian ICT sector to deploy Technologies able to challenge international contracts.

Mozambique

Even though a Business Incubator Strategy is being developed through IPEME, traditionally there has been limited tech entrepreneurship support in Mozambique.

Mozambique Information and Communication Technology Institute (MICTI) was initially established within the University of Eduardo Mondlane to provide an Institute for Research and Learning and a Business and Technology Incubator. Mozambique is a beneficiary through the Southern African Innovation Support (SAIS)[201] Programme and STIFIMO Finnish Programme, both of which aims to strengthen the national Innovation ecosystem. Recent players include: MozDevz[202] (2013) as a community of Application Developers; IPEME Incubator – which is operated by the Instituto Para Promocao Das Pequenas E Medias Empresas (IPEME[203]) IDEARIO[204], which was launched in

[199] http://www.mrc.org.mu/mrc_centres/business_research_incubator_centre
[200] http://technopreneur.ncb.mu
[201] http://www.saisprogramme.com/overview/
[202] http://mozdevz.idear.io/sobre-nos/
[203] www.ipeme.gov.mz

Summer 2014 as a tech hub and co-working space offering Pre-Incubation and a 30 day Acceleration Programme. IdeiaLab[205] is cooperating with the FemTech SAIS Programme in Mozambique. Status of Internet Solutions Business Incubator (ISBI)[206]

Namibia

Innovation Spaces include *Bokamoso Entrepreneurial Centre*[207] which provides Incubation services and cooperates with FemTech Programme supported by SAIS Programme; *Global Business Labs Namibia*[208] which is hosted by the University of Namibia and supported by the Finnish SAIS Programme since 2013 to provide Acceleration services and the *FABlab Namibia Technology Centre*[209], which was established as a Centre of Excellence within the Namibia University of Science and Technology (formerly the Polytechnic of Namibia) in 2014; NUST also hosted the Namibia Business Innovation Centre (NBIC)[210] and the Mobile Lab Namibia[211];

Global Business Labs Namibia was established in February 2013 in partnership with the University of Namibia. Primarily targeted at students and alumni, following screening four times a year, entrepreneurial teams are accepted in to the GBL accelerator program which provides access to co-working space, coaching and training, mentoring, networking and professional services from knowledge partners for 8 – 12 months. Regular lectures and networking events are organised.

Founded in 2003, the **Bokamoso Entrepreneurial Centre** in Windhoek provides incubation and co-working space for startups and early stage companies in the fields of crafts and jewellery making, clothing manufacturing, joinery and carpentry and innovative/solar businesses. The incubation programme includes counselling, ongoing mentoring, facilitation of business linkages, training and business seminars and access to IT. Discounted work space is provided for a maximum of 3 years.

South Africa

South Africa has experienced a growth in Innovation Spaces that support technology entrepreneurs across the country including: The Innovation Hub[212] (Pretoria), mLab Southern Africa[213] hosted within the Innovation Hub since 2011; Bandwidth Barn[214] (Cape Town); BinarySpace[215]; Codebridge[216]; Eastern Cape Information Technology Initiative (ECITI)[217] Incubation programme (East London); Invo Tech Incubator,[218] Durban University of Technology; FabLab[219] (now 7

[204] http://idear.io/
[205] http://www.ideialab.biz/
[206] http://www.bizmoz.net/home
[207] http://www.cityofwindhoekcc.org.na
[208] www.globalbusinesslabs.com/office/namibia/
[209] http://www.fablabnamibia.org/
[210] http://nbii.polytechnic.edu.na/
[211] http://nbii.polytechnic.edu.na/innovators/software/
[212] www.theinnovationhub.com/
[213] www.mlab.co.za
[214] www.bandwidthbarn.org/
[215] http://www.binaryspace.co.za/
[216] www.codebridge.co.za
[217] www.eciti.co.za/
[218] www.invotech.dut.ac.za/

locations); Impact Amplifier[220]; JoziHub / Jozi Hackerspace[221] (Johannesburg); Softstart BTI[222] (Midrand, Johannesburg); StartUp 90[223]; SmartXchange[224]; Workshop 17[225] in Cape Town; Start-Up Garage[226] (Cape Town) / 88mph Accelerator[227];; LaunchLab[228] (University of Stellenbosch); Impact Hub Johannesburg[229]; Wits Knowledge Hub[230]; Tech Lab Africa (Cape Town)[231]. and a number of hardware oriented locations including The House 4 Hack[232], Maker Labs[233] in Johannesburg. While having different characteristics to these other Innovation Spaces, the Cape Craft and Design Institute (CCDI)[234] (services to creative businesses in the Western Cape) and the Clubhouse Network[235] (targeting youth at five locations in South Africa) and Silicon Cape[236] are worth noting with their outreach to specific communities. These Innovation Spaces collectively support Pre-Incubation (Bandwidth Barn), Incubation (The Innovation Hub; ECITI; InvoTech; Softstart BTI; LaunchLab), Co-working Spaces (Bandwidth Barn; JoziHub; Start-Up Garage; LaunchLab; Impact Hub Johannesburg) and Acceleration Services (mLab SA; StartUp 90, Impact Amplifier, 88mph Accelerator, Tech Lab Africa). Some are profiled below.

Funded by the Gauteng Provincial Government and established in 2001, **The Innovation Hub** is located close to the CSIR and Department of Science and Technology (DST). Africa's first internationally accredited Science and Technology Park, and a member of International Association of Science Parks (IASP), The Innovation Hub hosts mLab Southern Africa, Maxum Business Incubator (co-working and dedicated space), the Climate Innovation Centre (providing access to finance and facilities and technical, business and policy advisory services) and BioPark (promoting health, agriculture and environment industries) which are all focused on enterprise development. Skills development programmes include CoachLab (nine month skills and leadership development programme preparing postgraduate students for industry), and FabLab, the eKasi Labs and Kusile Mobile Science Labs (focused on youth empowerment). OpenIX (like Demola) focuses on Open Innovation bringing together stakeholder challenges with solution providers, while Gap Biosciences, Gap Green, Gap Medical and Gap ICT are competitions for seed funding and incubation services.

mLab Southern Africa is a mobile solutions laboratory and startup accelerator focused on the development of innovative mobile applications and services. Based in The Innovation Hub in

[219] http://www.fablab.co.za/index.php?option=com_content&view=article&id=11&Itemid=35
[220] http://www.impactamplifier.co.za/
[221] http://jozihub.org/
[222] www.softstartbti.co.za/
[223] www.startup90.com/
[224] http://www.smartxchange.co.za/
[225] http://workshop17.co.za/
[226] www.capetowngarage.com
[227] http://www.88mph.ac/
[228] http://www.launchlab.co.za/
[229] http://johannesburg.impacthub.net/
[230] http://www.knowledgehub.wits.ac.za/
[231] http://techlabafrica.com/
[232] http://www.house4hack.co.za/
[233] http://www.makerlabs.co.za/
[234] http://www.ccdi.org.za/
[235] http://www.computerclubhouse.org/
[236] http://www.siliconcape.com/

Tshwane, South Africa, and a member of AfriLabs, it also has virtual programs in Southern Africa. It supports the development of mobile solutions in the consumer, design, enterprise, public and gaming sectors.

Launched in 2000 as the Telkom Bandwidth Barn (**TheBarn**), provides co-working space and professional services as well as an online and workshop based pre-incubation programmes and on-site incubation and accelerator programmes for entrepreneurs at different stages of development. It is part of the Silicon Cape Initiative.

Established in East London by the Eastern Cape Provincial Government in 2004, ECITI provides incubation services (Launch pad, Seed, eGrowth) to ICT and film oriented entrepreneurs. Its incubation programme is focused on providing infrastructure and business support services, early stage development of ICT and film entrepreneurs with a particular focus on women, youth and disabled.

InvoTech offers a ten week entrepreneurship programme based at Durban University of Technology, focused on the Green Technology, Digital Creative Industry, Software or Mobile Application Sectors. Launched in August 2011, the incubator is co-funded by the Small Enterprise Development Agency (Seda) and is currently providing services to over 75 client companies. InvoTech provides access to a Seed Fund in partnership with the Technology Innovation Agency, focused on Energy, Transportation, Advanced Materials, Environment & Waste related innovation.

Launched in February 2013, **JoziHub** is a Johannesburg based technology incubator supported by the Praekelt Foundation, IS Labs, Google Entrepreneur programme, Indigo Trust and the Omidyar Network, offering co-working space, mentoring, community events and conference facilitates. It is focused on supporting early stage innovation to assist in business growth and job creation in the teach and social impact spheres. There are currently 27 resident start-ups at the hub

Based in Midrand, Gauteng and launched in 2005, **Softstart Business and Technology Incubator (Softstart BTI)** is focused on ICT and electronics related startups, providing services including: co-working space; mentoring and training; human resource and payroll; communications and marketing; strategy, policy and research and development; legal support and fund raising.

Startup 90 in Capetown offers a three-month accelerator programme (primarily focused on the education, finance, healthcare and agriculture sectors) with mentoring and co-working space. It is primarily focused on start-up and early stage businesses.

Launched in October 2012, **Capetown Garage** offers co-working and meeting space. 88mph Accelerator provides seed funding and acceleration. It has invested in 36 companies in Kenya and South Africa between 2011 - 2014 and during 2015 - 2016 is focused on working with companies that they have already invested in to assist founders and investors to get a good return on investment.

Hosted by the University of Stellenbosch and launched in August 2013, **LaunchLab** is a business incubator that uses an Ideas Programme with workshops and Pitching Den before selecting the top

ten ideas for seed funding, mentoring and coaching and incubation space. This innovative programme is open to university students (not limited to Stellenbosch) and external entrepreneurs. It is primarily focused on assisting technology and innovation businesses in ICT (specifically Payments & Big Data and Paid Media), Cleantech, Agriculture and Education.

Part of ImpactHub Network, **Impact Hub Johannesburg** offers co-working space in Braamfontein, and offers a fee based three month Social Impact Accelerator Programme.

Tech Lab Africa is an accelerator programme supported by Barclays Africa. The South African chapter of the accelerator was set up September 2015 in Cape Town. It aims to support the most innovative, disruptive early stage ventures in the broad fields of FinTech and Health Tech. It provides a 3 month programme in Cape Town proving access to subject matter experts, industry leaders and senior Barclays Africa executives, subject matter experts and industry leaders. It aims to output a portfolio of businesses that Barclays Africa can further support during their growth phase.

Swaziland

The **Royal Science and Technology Park** (RSTP) was established with the enactment of the Royal Science and Technology Part Act of 2012 to assist in realising Vision 2022. The RSTP will provide a multipurpose platform for R&D, production, marketing and trading of IT and bio-related technologies. The RSTP has two sites, the Innovation Park, located at Phocweni, Matsapha and the Biotechnology Park, located at Nokwane, Matsapha. Both parks will incorporate entrepreneurship support services: pre-incubation, incubation and accelerator facilities for IT and biotech enterprises. RSTP began partial operations in October 2015 and will scale up its operations in the short term to medium term.

4. LIVING LABS

4.1 Living Labs Definitions

It seems clear that the concept of Living Labs falls within the overall definition of Open Innovation. Cunningham, P. (2013) defines Innovation as "*the improvement of products, services, processes, business models, policies and concepts in an existing context (whether social or economic) or their* adaptation *from one context to another, with the goal of increasing performance or achieving another desired impacts"*. Adaptation is defined as "*necessary changes required to achieve desired outcomes"*. Increased performance or other desired impacts can be measured through Return on Investment (ROI), increased productivity, increased engagement and/or Return on Objective (ROO).

While this proposed definition is more inclusive of other Innovation Stakeholders than the primary corporate innovation focus of work by Enkel et al (2009)[237], its underlying premise is supported when they suggest that an "*important source of innovation will be companies from other industries, because we know that* ***most innovation is based on a recombination of existing knowledge, concepts, and technology. Established solutions from other industries will enrich corporate product development*** *while reducing the related risks through reducing uncertainty.*" That is why multi-stakeholder engagement across different sectors is so critically important. Living Labs can be totally independent or can have either weak or strong relationships with other Living Labs.

This section outlines a variety of Living Lab descriptions and definitions from different sources.

DG Information Society and Media, European Commission, 2009[238] defined Living Labs as "*open innovation environments in real-life settings, in which user-driven innovation is fully integrated within the co-creation process of new services, products and societal infrastructures*". It stated that Living Labs bring users into the creative process at an earlier stage of innovation "*to better discover new and emerging behaviours and user patterns, bridging the innovation gap between technology development and the uptake of new products and services involving all relevant players of the value network … [and] allowing for early assessment of the socio-economic implications of new technological solutions by demonstrating the validity of innovative services and business models*".

The European Commission report also identifies benefit statements for the stakeholder groups. "*The benefits for the different types of stakeholders to deploy user-driven open innovation and Living Lab methodologies can be summarised as follows:*

- *For the users in their role as citizens and … community [representatives]: To be empowered to influence the development of services and products which serve real needs, and to jointly*

[237] Enkel, E., Gassmann, O. and Chesbrough, H. (2009), Open R&D and open innovation: exploring the phenomenon. R&D Management, 39: 311–316

[238] European Commission, DG Information Society and Media, *Unit F4 New Infrastructure Paradigms and Experimental Facilities. Living Labs for User-driven Open Innovation. An Overview of the Living Labs Methodology, Activities and Achievements.* January 2009.

contribute to savings and improved processes through active participation in the R&D and innovation lifecycle.

- *For the SMEs, incl. micro-entrepreneurs as providers: developing, validating and integrating new ideas and rapidly scaling-up their local services and products to other markets.*
- *For the larger company: making the innovation process more effective by partnering with other companies as well as end-users, which are rooted in active user experiences, increasing 'right the first time'.*
- *For research actors, the economy and the society: Stimulating business-citizens-government partnerships as flexible service and technology innovation ecosystems; integrating technological and social innovation in an innovative 'beta culture'; increasing returns on investments in ICT R&D and innovation*".

Figure 2, extracted from this 2009 European Commission Report, positions the Action Space for Living Labs in relation to three key Lifecycles - Technology Adoption (Orange), Research (Green) & Funding (Blue). In a developing country context, there are challenges associated with all three of these Lifecycles which must be recognised, assessed and addressed, while taking account of national or regional socio-economic, socio-cultural and policy context.

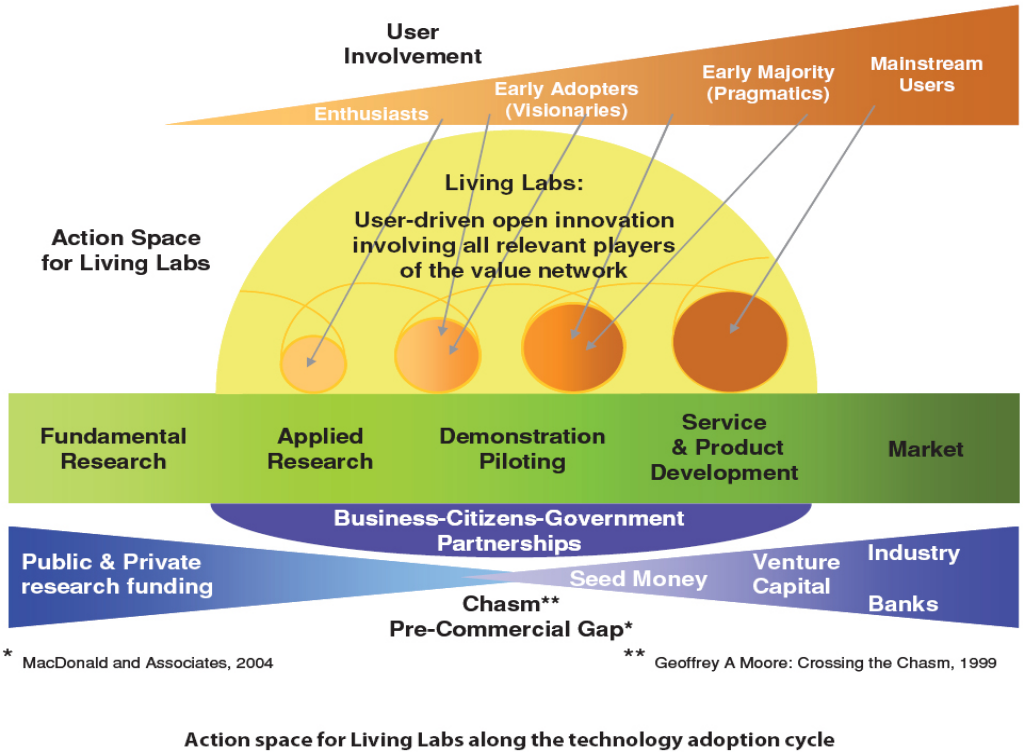

Figure 2 – Intersection of Living Labs with Technology Adoption, Research and Funding Lifecycles

Within the **Technology Adoption Lifecycle**, Living Labs can be a very effective mechanism to engage with what the European Commission classify as *Enthusiasts* (who could also be inventors or Lead Users), *Early Adopters* and the *Early Majority*, whose input can be critical to the successful evolution of a new product or service with mass market or niche market appeal.

Within the **Research Lifecycle**, Living Labs are clearly aligned with the phases after Fundamental Research and before Market Deployment: *Applied Research; Demonstration and Piloting* (of new products, services, processes or business models); and *Early Stage Market Assessment of Service and Product Development*.

The primary challenge associated with the **Research Lifecycle** in a developing country context, is that what the concept of "research" is understood to mean. The nature, focus and intensity of research carried out by different public and private universities vary enormously, both between departments in the same institution as well as between institutions in different countries.

Within the **Funding Lifecyle**, Living Labs both enable and leverage Public-Private-Partnership funding mechanisms to address not just that window where research funding is no longer available, and risk capital is not yet available (known as both Macdonald and Associates, 2004 "Pre-Commercial Gap" and Moore's, 1990 "Chasm"), but also close-to-market research and seed and early-stage funding, traditionally only available from "Friends and Family".

In a developing country context, where income levels are low, bank debt is expensive and capital availability is limited, the potential impact of Living Labs that reduce associated innovation and implementation risks and maximise the likelihood of success, is high.

Just as Living Labs methodologies can be applied in very different contexts, both geographic (or territorial – e.g. urban, suburban or rural, local community or regional, national or cross-border) and thematic (e.g. eHealth, eServices in Rural or Developing Areas, eDemocracy and eGovernance, ICT for Energy Efficiency, Food Security), Living Labs have been defined in a variety of ways. A representative sample of definitions of Living Labs is presented below.

Living Labs were developed as a concept in 1990 (Lepik, Krigul & Terk, 2010:1090[239]) and is referred to by Eriksson, Niitamo & Kulkki (2005)[240], Bergvall-Kareborn, Ihlström Eriksson, Ståhlbröst and Svensson (2009)[241] and Holst, Ståhlbröst & Bergvall-Kåreborn (2010)[242] *as a system, an arena, environment and/or a systemic innovation approach*. They argue that a Living Lab is both a milieu (environment, arena) and an approach (methodology, innovation approach).

Eriksson *et al*. (2005) defined a Living Lab as "*a user-centric research methodology for sensing, prototyping, validating and refining complex solutions in multiple and evolving real life contexts*" (p.

[239] Lepik, K-L., Krigul, M. & Terk, E. 2010. Introducing Living Lab's method as knowledge transfer from one socio-institutional context to another: Evidence from Helsinki-Tallinn cross-border region. Journal of Universal Computer Science, Vol 16 (8), 2010: 1089-1101.

[240] Eriksson, M., Niitamo, V.P., & Kulkki, S. 2005. State-of-the-Art in Utilizing Living Labs Approach to User-centric ICT innovation - a European approach. Centre of Distance Spanning Technology at Luleå University of Technology, Sweden, Nokia.

[241] Bergvall-Kareborn, B, Ihlström Eriksson C, Ståhlbröst A, Svensson J.: A Milieu for Innovation – Defining Living Labs. Proceedings of the 2nd ISPIM innovation symposium: Simulating recovery - the Role of innovation management, New York City, USA. 2009.

[242] Holst, M. Ståhlbröst, A. & Bergvall-Kareborn, B. 2010. Openness in Living Labs: Facilitating Innovation. Proceedings of the 33rd IRIS Seminar. 2010.

4). Ballon *et al*., (2005)[243] define a Living Lab as an experimentation environment in which technology is given shape in real-life contexts and in which (end) users are considered '*co-producers*'. Schumacher & Feurstein (2007)[244] describes a Living Lab as a systemic innovation approach in which all stakeholders in a product, service or application participate directly in the development process. Other concepts also evident from various definitions of Living Labs are open innovation ecosystems, territorial contexts, concurrent research and innovation processes, where users can play an active role in developing new services, products or processes (Følstad, 2008[245]).

According to Massachusetts Institute of Technology (MIT)[246] "*Living Labs brings together interdisciplinary experts to develop, deploy, and test* - in actual living environments - *new technologies and strategies for design that respond to this changing world*".

According to Bergvall-Kåreborn et al (2009) the key components of Living Labs are illustrated in **Figure 3** below, with Innovation at the Centre:

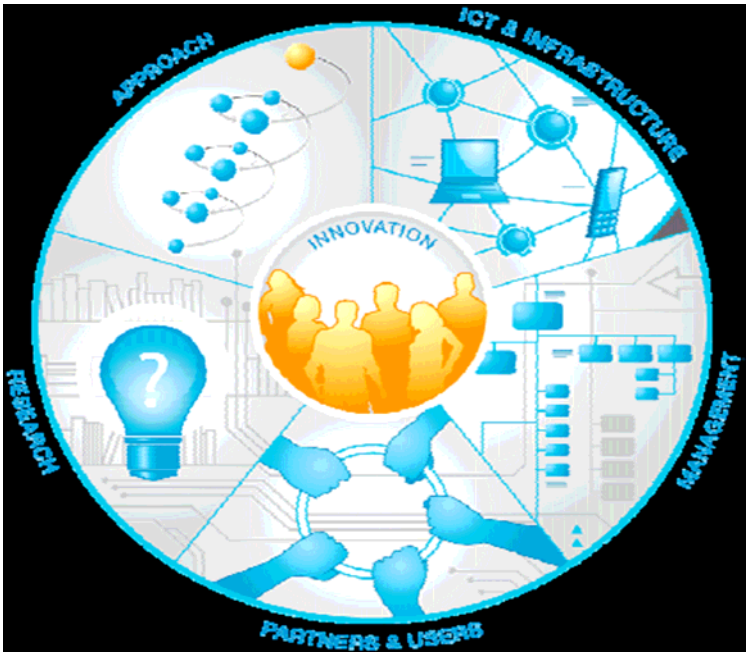

Figure 3 – Key Components of Living Labs

- *ICT & Infrastructure* outlines the role that new and existing ICT technology can play to facilitate new ways of cooperating and co-creating new innovations among stakeholders
- *Management* represents the ownership, organization, and policy aspects of a Living Lab, by which a Living Lab can be managed by e.g. consultants, companies or researchers

[243] Ballon, P., Pierson, J., & Delaere, S. 2005. *Open Innovation Platforms for Broadband Services: Benchmarking European Practices*. 16th European Regional Conference, 4-6 September, Porto, Portugal.

[244] Schumacher, J., & Feurstein, K. (2007). *Living labs - A New Multi-stakeholder Approach to User Integration*. Paper presented at the 3rd International Conference on Interoperability of Enterprise Systems and Applications (I-ESA'07), Funchal, Madeira, Portugal

[245] FØLSTAD, A. 2008. *Living Labs for Innovation and Development of Information and Communication Technology: A Literature Review*. The Electronic Journal for Virtual Organisations and Networks 10 (Special Issue on Living Labs,):100-131.

[246] http://livinglabs.mit.edu/

- The Living Lab *Partners & Users* bring their own specific wealth of knowledge and expertise to the collective, helping to achieve boundary spanning knowledge transfer
- *Research* symbolizes the collective learning and reflection that take place in a Living Lab, and should result in useful contributions to both theory and practice. *Technological research partners* can also provide direct access to research and research results that can benefit the outcome of a technological innovation
- Finally, *Approach* stands for methods and techniques that emerge as best practice within the Living Labs environment

Living Labs is a concept that refers to a Research and Development (R&D) methodology where innovations (services, products and application enhancements) are created and validated in collaborative, multi-contextual empirical real-world settings (Geerts, 2011[247]), and seen as a new character in the open innovation chain (Lepik et al., 2010:1091).

Tijus, Barcenilla and Vandi (2012)[248] define Living Labs as "*user-driven open innovation ecosystems based on a business-citizens-government partnership which enable users to take an active part in the research, development and innovation process*".

According to Living Labs Portfolio Leadership Group and the CORELABS project[249]; a "*Living Lab has one main role, and this is to engage and empower users to participate in the generation of valuable and sustainable assets towards objectives set-up by its partners and customers. Primarily, a Living Lab should have capability to;*

- *Form an appropriate organisation and partnership*
- *Motivate and empower large scale user engagement*
- *Establish adequate tools and infrastructure*
- *Form and execute case-dependent processes and manage IPR*
- *Disseminate a wide variety of results*"

ENoLL's (2011) definition of Living Labs identifies and qualifies five key dimensions of Living Labs, (1) innovation settings ("*open innovation environment*"), (2) operating environments ("*real-life settings*"), (3) affecting innovation processes ("*user-driven innovation"* and "*co-creation process*"), (4) related to user engagement and (5) from which innovation outcomes are expected ("*new services, products and societal infrastructures*").

[247] Geerts, G. 2011. A Design Science Research Methodology and its Application to Accounting Information Systems Research. International Journal of Accounting Information Systems. Retrieved from http://linkinghub.elsevier.com/retrieve/pii/S1467089511000200.

[248] Tijus, C, Barcenilla, J, Vandi, C (2012) Challenges and Ethical Issues in Living Labs for Open Innovation. eChallenges e-2012 Conference Proceedings. Paul Cunningham and Miriam Cunningham (Eds) IIMC International Information Management Corporation, 2012

[249] CORELABS, I. 2007. Building Sustainable Competitiveness - Living Labs Roadmap 2007 - 2010. Luleå University of Technology - Centre for Distance-spanning Technology.

Vandi, Tijus and Baccino (2010)[250] (**Figure 4**) have an interesting way of positioning Living Labs with relation to more traditional types of research (Research Studies, Research and Development Studies, Social Studies), based on the mutual roles of Users ("Citizens"), Researchers/Academic ("Scientist") and Industry ("Industrial"). While this is insightful, unfortunately, this perspective ignores the important role of the public sector ("Government") in the wider context of Living Labs.

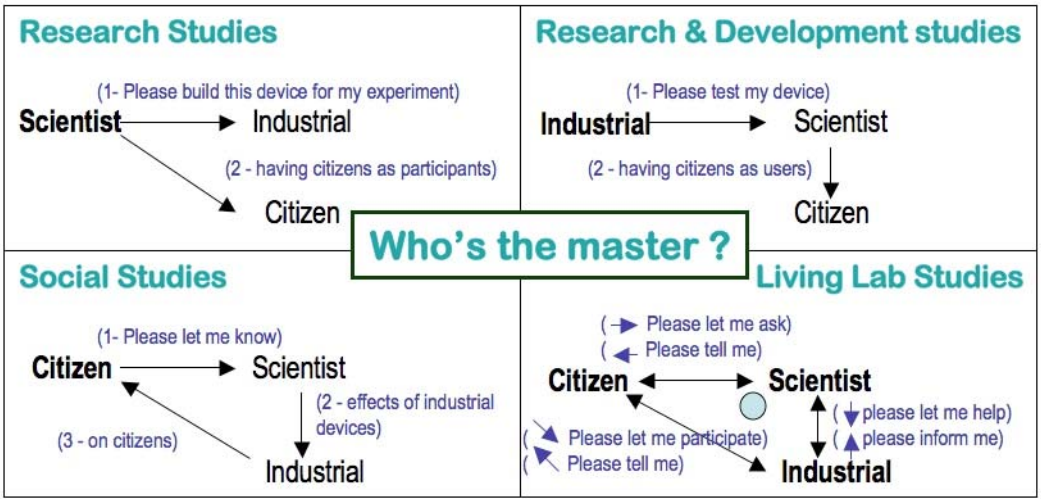

Figure 4: Roles of Participants in Different Types of Research (After Vandi, Tijus and Baccino, 2010)

Tijus, Barcenilla and Vandi (2012)[251] in their consideration of methodological and ethical constraints to be considered when involving users as early stage contributors and innovators, recognises that "*the innovation process needs governmental support for developing the future of technology and also the future of academic research, both fundamental and applied*".

While these definitions and proposed benefits are valid based on the development of Living Labs worldwide, there is a consensus (based on wide consultation during IST-Africa events) that in an African context, they are too focused on external tangible outputs of living labs (e.g. process, product or service) and not sufficiently focused on equally valuable but less easily quantifiable outputs and benefits at a community development, socio-cultural and socio-economic level.

One key dimension seen as critically important in an African context, is the rural community perspective and engagement, and proposed adaptation of the innovation concept and process, which is often misinterpreted as only tangible, ignoring knowledge or idea creation.

Based on the consensus of Members of the LLiSA Network who participated at the 3rd Annual LLiSA Workshop at Rhodes University, Eastern Cape, South Africa (20 - 21 June 2011), organised by the Siyakhula Living Lab, a successful Living Lab requires a strategic, mutually beneficial partnership between a minimum of two key stakeholders (e.g. government, industry/business,

[250] Vandi, C., Tijus, C., & Baccino, T. (2010). Serving three Masters: Citizen, Industrial and Scientific: a case study. Living Labs Summer School 2010 on Collaborative Innovation through Living Labs, 22-27th August, LUTIN, universcience, Cité des Sciences et de l'Industrie, France

[251] Tijus, C, Barcenilla, J, Vandi, C (2012) Challenges and Ethical Issues in Living Labs for Open Innovation. eChallenges e-2012 Conference Proceedings. Paul Cunningham and Miriam Cunningham (Eds) IIMC International Information Management Corporation, 2012

research/academia, community) with complementary expertise and experience, a common vested interest in the outcomes of enabling users (community) to actively participate in the research, development and innovation process, and at least one stakeholder ensuring the necessary methodological rigor is applied so that results are valid.

There was universal acceptance that the minimum requirement for a successful Living Lab in an African context includes a clear focus/vision, credible community champion(s), the potential for sustainable community development and a strong sense of community ownership.

Africa has particular challenges in relation to rural socio-economic development and sustainable quality of life, due to the current state of evolution of infrastructure, educational and employment opportunities and the resultant migration - particularly of youth, to urban environments and sometimes to other countries or even different continents. The multi-stakeholder partnerships on which Living Labs are based can provide the necessary foundation for addressing some of these challenges, but only when communities are fully engaged.

Cunningham, P. (2013) proposes that: "*Living Labs are environments, a methodology or an approach which caters for user-driven open innovation within real-life settings, where end-users collaborate with Innovation Stakeholders to become co-creators or co-designers of innovative products, services, processes, business models or policies. Successful deployments can be replicated (with necessary socio-cultural adaptation) to achieve wider socio-economic impact*".

Monitoring and Evaluation and the ability to replicate or scale a successful pilot is key to the concept of Living Labs, and why it is such a powerful concept in the field of Innovation.

The next section provides an overview of operational Living Labs in IST-Africa Partner countries.

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5. LIVING LABS IN IST-AFRICA PARTNER COUNTRIES

5.1 Living Labs in Northern, Central and West Africa

Senegal

While a Living Lab was established in UNIDAF in 2006 there is no information currently available on recent activities.

5.2 Living Labs in East Africa

Tanzania

As a result of IST-Africa Living Labs Workshops and IST-Africa Week 2012, Emerging Living Labs were supported through the TANZICT Programme: Arusha Living Lab[252] (EcoLab); Elimu Living Lab[253] (Sengerema, Mwanza); Mbeya Living Lab[254]; Kigamboni Community Centre[255] (Dar es Salaam); RLabs Iringa and Tanzania Youth ICON (TAYI) Living Lab (Zanzibar).

Founded in 2012, **Arusha Living Lab (EcoLab)** is located 16km east of Arusha City Centre, focused on innovation and entrepreneurship in partnership with the Nelson Mandela African Institute of Science and Technology. EcoLab is focused on supporting local primary schools and SMEs.

Established in 2012, **Elimu Living Lab (Sengerema, Mwanza)** is focused on supporting education and vocational skills development, with a view to creating employment opportunities and capacity building. There is a strong focus on continuing education, ICT skills and social entrepreneurship for youth and women, and collaboration with Sengerema Informal Section Association for Agriculture and Food Security. Target communities include vulnerable youth, farmers and animal keepers. The strong focus on education and vocational training is due to 2009 – 2011 statistics showing 69.4% of Sengerema secondary student failing their final exams, and 86.1% of Sengerema primary students not having the opportunity to go to secondary school due to financial problems, lack of trust, early pregnancies and truancy. This has resulted in mass youth unemployment and social problems.

Established in 2012, **Mbeya Living Lab** is focused on youth empowerment and community development, with a focus on arts and crafts entrepreneurial opportunities leveraging digital media. Training focuses on leadership, entrepreneurship, ICT skills and social media. There is considerable interest in establishing an Innovation Space to support local entrepreneurs.

Kigamboni Community Centre in Dar es Salaam was established in 2007, with a focus on creating local employment opportunities, and facilitating arts and sports activities as well as education for children and vocational training for youth.

Established in 2012, the **Tanzania Youth ICON (TAYI) Living Lab** in Zanzibar is focused on youth empowerment, capacity building, creation of employment opportunities, ICT training and out-reach

[252] https://arushalivinglab.wordpress.com
[253] http://www.elabs.or.tz
[254] http://mbeyalivinglab.blogspot.co.uk/
[255] http://www.kccdar.com

programmes. TAYI is at the planning stage of establishing an Innovation Space Programme in cooperation with the State University of Zanzibar and a number of governmental agencies.

Established in 2012, the **Rlabs Iringa** follows the Rlabs model with its focus on capacity building, social entrepreneurship, use of ICT and creating employment opportunities. Local problems being addressed include high youth unemployment, poor nutrition, poor education and pollution. Programmes include GROW Leadership Academy focused on youth empowerment, entrepreneurship training, introductory computer and social media literacy skills and pre-incubation. There is initial collaboration being explored with Finnish and Danish universities to do local projects.

5.3 Living Labs in Southern Africa

Botswana

Botswana Innovation Hub[256] (BIH) is receiving support through the Southern African Innovation Support (SAIS)[257] Programme to address youth unemployment and local communities through Living Labs and Training (RLabs Botswana).

Lesotho

Founded in 2010 and supported by UNESCO, the **UNESCO-Science and Mathematics Educator's Federation (SMEF) Thakakhoali**[258] is focused on school skills capacity building and career awareness raising in the areas of Mathematics and Science. Using a Living Labs based approach, UNESCO-SMEF Thakakhoali promotes Science, Engineering and Technology in secondary schools through the Edu-Reloaded Science Educational TV Program on LTV (supported by Vodacom), the PhET Simulation Product (DVD) of simulations across all sciences for Secondary and tertiary sciences (featured in Edu-Reloaded Episodes). In November 2014, funding was secured from UNESCO for a Science Clubs Pilot program in 5 primary and 10 secondary schools.

Mauritius

Mauritius is using a Living Labs approach within its **Community Empowerment Programme (CEP)**. CEP aims to build an Information Society by enabling and sharing of information and knowledge for community development and promote development of local content. This includes a community portal, establishing regional Computer Clubs (270 till date classified with 23 Youth Centres, 15 Women Centres, 128 Community Centres, 53 Social Welfare Centres, 20 Day Care Centres and 31 NGOs/Municipal councils/Village Hall) in Mauritius, Learning Corners in Mauritius and Rodrigues (island part of Mauritius) and Public Internet Access Points (PIAPs) to facilitate wider eAdoption. There are approximately 1,300,000 registrations, including recurrent users, in Computer Clubs who benefit from free access to ICT tools and Internet. In addition, access to ICT infrastructure and Internet was further accelerated by the availability of PIAPs in 95 post offices in Mauritius and 5 in Rodrigues with a total number of 246,059 users.

[256] http://www.bih.co.bw
[257] http://www.saisprogramme.com/overview/
[258] http://sciencecapacitybuilding.weebly.com/

Living Lab: Innovative Learning & Teacher Education Living Lab (ILTELL) of the University of Mauritius (UoM)

The Innovative Learning & Teacher Education Living Lab (ILTELL), developed and led by the Virtual Centre for Innovative Learning Technologies (VCILT) of the University of Mauritius is based on education research philosophy for social change through action research and the Living lab paradigm for Teaching and Learning. The MISP model fits in the 4P innovation framework where the Public sector is represented by the University, the Private Sector is represented by Microsoft Indian Ocean and French Pacific or other actors in the future, with the People being academics, educators, and Youth volunteers (students). The beneficiaries and the partnerships among these actors are mediated through a collective social movement called Helping Our People. The Research and Development Model is based on a practitioner-oriented concept where research and development essentially become the drivers for practice-oriented enquiries to improve teaching and learning systems. It leverages field experimentation to test new practices, which are then formalized into teaching methods that can be cascaded down to educators for classroom application. The educators at the receiving end also become engaged in an action-reflection cycle where the feedback is fed into the system for continuous improvement and refinement of teaching techniques and the application of ICT tools in day-to-day practice. The Microsoft collaboration is through its PIL program which aimed is to promote the integration and the use of information and communication technologies in the classroom, with the main focus on the primary and secondary education sectors. The Microsoft PIL network provides educators with on-going training and free tools as well as access to a broad range of technologies and lesson plans to improve classroom practices.

Mozambique

The Maputo Living Lab[259] was established in 2011 as part of a three-year project funded by the Autonomous Province of Trento Italy, Bruno Kessler Foundation and University of Trento with the Mozambique Ministry of Science and Technology. The focus is on building capacity by carrying out specialised ICT courses to students from universities of Mozambique and young professionals through Summer Schools, providing scholarships at the University of Trento, implementing research, developing ICT projects addressing local needs and supporting ICT enterprises. The objectives and activities were inspired by Government of Mozambique strategic priorities in the areas of higher education, science and technology, ICT, agriculture, health and empowerment.

Namibia

Stakeholders in Namibia are interested in setting up Living Labs following workshops organised by IST-Africa. An initial Living Lab has been supported as a project under the SAIS Programme since 2013 - Reconstructed Living Lab (RLabs) Namibia[260] - to provide training and community

[259] Ciaghi A, Villafiorita A, Chemane L, Macueve G, *Stimulating Development through Transnational Living Labs: the Italo-Mozambican Vision*, In IST-Africa 2011 Conference Proceedings, Paul Cunningham and Miriam Cunningham (Eds), IIMC International Information Management Corporation, 2011, ISBN: 978-1-905824-24-3

[260] http://rlabs.org/tag/rlabs-namibia/

development in cooperation with Namibia Business Innovation Institute. The Namibia University of Science and Technology (former Polytechnic of Nambia) which hosts the Namibia Business Innovation Institute also hosts Rlabs Namibia and the ICT for Development Living Lab.

Established in April 2013, **RLabs Namibia** is hosted by the Namibia Business Innovation institute (NBII) and focused on training and development for youth empowerment, community development and social innovation. Through the RLabs Academy, free training on entrepreneurship and ICT skills are provided to the primary target community are unemployed youth (18 – 35), with tertiary training programmes accredited by the University of Cape Town offered at an additional cost. Community Workers execute assignments for clients at a cost through the Digital Factory, and support Community Development targeted at the needs of the local community. RLabs Namibia is currently funded by the Finnish Southern Innovation Support Programme (SAIS).

South Africa

A number of Living Labs were initially supported through the COFISA and SAFIPA Finnish Programmes, some of which are not still active (e.g. North West Living Lab, Sekhukhune Rural Living Lab, Overture Living Lab & PatHS Living Lab, Nongoma Mobile Rural Living Lab, Limpopo Living Lab, awareNet Living Lab) which others are still making good progress. A major reason for this is that some Living Labs were set up on a temporary basis as projects, while some long standing Living Labs are still functioning and a small number of new Living Labs have recently been established. The most active Living Labs include: Siyakhula Living Lab[261] which has been operational since 2005 hosted by University of Fort Hare and Rhodes University (Eastern Cape); Reconstructed Living Lab[262] (RLabs), which has been operational since 2008 supporting community development and training (Cape Town) and Siyadala Living Labs[263], which has been operational since 2011 hosted by Centre for Community Technologies (CCT) in Nelson Mandela Mandela Metropolitan University, Port Elizabeth.

The **Siyakhula Living Lab** was established in 2005 by the University of Fort Hare and Rhodes University. The target community is the Desa-Cwebe Nature Reserve in deep rural Eastern Cape. It is primarily focused on ICT4D and action research activities. The Siyakhula Living Lab acts as the field site from which the Telkom Centres of Excellence (Fort Hare and Rhodes respectively) in ICT4D and Distributed Multimedia derive their research projects. SLL has established 17 communal, distributed Digital Access Nodes at schools. They share a fixed and mobile WiMAX broadband island and are connected to the internet through three shared satellite connections. Activities currently supported include computer training, a low-maintenance service-oriented telecoms infrastructure, eService development for mobile devices and establishment of an ICT solution provider to commercialise software prototypes developed.

[261] http://siyakhulall.org/
[262] http://www.rlabs.org/
[263] http://sict.nmmu.ac.za/

Reconstructed Living Lab (RLabs) was established in a disadvantaged part of Cape Town, Western Cape in 2007, which is plagued by gang activity and drug abuse and has very high levels of unemployment. RLabs now employs 18 people full-time and also has a team of 18 volunteers, working on a number of programs focused on community transformation, up-skilling and empowerment. RLabs uses a value-based model to develop and train people in disadvantaged communities in the use of ICT and social media (e.g. Facebook, Twitter and others), focusing on using innovative ICT solutions to address social problems in communities. RLabs carries out work in a number of distinct areas, with the RLabs Academy (20 week training course) at the core. The Innovation Incubator is currently primarily focused on internally generated ideas, but is open to incubating ideas generated by graduates of the RLabs Academy. The RLabs Research Institute is currently focused on providing access to grass roots communities by conducting research and development for government agencies, commercial businesses, foundations, academia and other organisations. RLabs Products and Services are currently selling social media consulting and online services, based on an internally created product, which is in the process of being commercialised.

The **Siyadala Living Labs** was founded in 2011 at the Centre for Community Technologies (CCT) in the Faculty of Engineering, the Built Environment and Information Technologies, Nelson Mandela Metropolitan University in Port Elizabeth, East Cape. Siyadala now incorporates four Living related activities located at Motherwell and Northern Areas, Port Elizabeth (urban), and Cofimvaba (rural) and Willowvale (deep rural – isolated with limited infrastructure). Focused on ICT4D, capacity building, skills and leadership development, thematic areas addressed include education and healthcare. Target communities include vulnerable women, children, youth, the disabled and elderly, community healthcare workers and school nurses in rural areas. A number of health and education related mobile applications have been developed and tested based on local needs. Living Lab methodologies are used as part of community engagement activities.

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