Interview Questions for Wachira June 26, 2018

The purpose of this interview is to contribute towards pluralizing understandings of what science and technology work around the world is. Feel free to answer this based on the scale you feel most comfortable - your own community of practice; network of scholars; at the level of the city / country / region / continent; etc.

The first section of the interview will focus on your engagement and lessons learned from iHub Research. The second half of the interview will focus on your current role and your thoughts on the general trajectory of science and technology research in the region. I will edit the interview and share it back with you to review. Once you okay it (and agree to its release), we will upload to PECE platform to be part of the iHub Research exhibit for 4S 2018 conference (and beyond).

1) Can you please explain who you are including your name, current title, and organization. In what capacity did you work with iHub Research?

Sylvester Wachira Ndaiga, currently a graduate (MSc) student at University College London in Robotics and Computation. I joined as an intern in 2013, progressed to hardware lead / build lab manager mid-to-late 2014.

2) Reflecting back now, 8 years later, what do you think was unique about the type of work that iHub Research conducted? iHub Research advanced (and arguably trailblazed) the application of intellectual rigour to innovation, evidenced by the growth of similarly oriented spaces and labs such as Strathmore University's *iLab Africa, IBM Research* as well as the *Phillips Africa Innovation Hub*. It created an avenue into Kenya's burgeoning technology sector for a new class of intellectual digital citizens beyond the typical trades of Entrepreneurship, Software Development/Engineering or I.T. The diversity of talent, background and perspective was instrumental to our task of discovering and promoting the underpinning fundamentals of societal change through innovation as understood through varied contextual lenses (culture, economic disparities etc).

More personally, as a recently graduated Engineering student who had studied abroad (Malaysia), iHub Research presented an opportunity to develop my talent, career and professional interests as fashioned by the realities present in Kenya. This 'reorientation' was pivotal to my understanding of the uniquely Kenyan condition and its' place in the global scheme of technology and innovation.

3) In your own opinion, what were the core aspects that made iHub Research what it was?

It's dedication to transparent, applicable and world-class research as a tool for policy generation and entrepreneurial execution was exemplary and a first in Kenya (quite possibly the Global South). The diversity present in its' team, focus areas and work ensured an equitable consideration of nuanced but exigent factors that would traditionally have gone unaccounted for, establishing iHub Research as a bastion against overzealous western market idealism.

4) Can you give a few concrete examples of how iHub Research embodied those principles (experimentality, open sharing of research, diverse forms of knowledge)? What was the modality of the experiment? Why was it pursued? Who was the intended audience?

One poignant example would be the Kids Hacker Camp Program and Curriculum Design. Having understood that there was a need for quality exploratory and educational platforms tailored to the needs of young children (9 - 12 yrs), iHub Research pioneered a study in the effectiveness of hardware hacking as a viable method of skills transfer (https://dl.acm.org/citation.cfm?id=2737873). Various partners were identified such as the MIT Media Lab, Raspberry Pi Foundation and IEEE with whom we worked with to develop both the tools and framework upon which Educational Technology (EdTech) instruction could be based. Experiments involved iteratively trialing the curriculum and tools over week long holiday camps over a 2 year duration, resulting in the development of an educational tool dubbed 'Panyabot'. The latter claimed praise and awards from the Africa Robotics Network (AFRON) 2014 Design Challenge, competing against world-class efforts from MIT and Harvard (https://spectrum.ieee.org/automaton/robotics/diy/20-robot-mit-wins-afron-design-challenge). Additionally, outreach and promotion through/of our work allowed for wide interest having presented our research at numerous forums such as ICTD '15 (http://ictd2015.org/) as well TEDx as а event

(<u>https://www.youtube.com/watch?v=613OPbNZenQ</u>). Our research went on to further assist similar programs in countries like Ghana.

- 5) Can you explain a bit more about what iHubR data science was? Why did you decide to set it up?
 - Build Lab was an internal research group dedicated to surfacing, developing and supporting early stage hardware initiatives across varying economic sectors. Initially established to better formalise iHub Research' long practised capacity in hardware product research, Build Lab additionally came to serve as a focal point for Nairobis' hardware enthusiasts and professionals alike to commune as makers (https://en.m.wikipedia.org/wiki/Maker_culture). Given then recent advances in electronics manufacturing (e.g. 3D Printing), electronics prototyping (e.g. Arduino) and the growth of DIY internet communities (e.g. Make, Hackaday and Instructables), opportunities in hardware innovation that once seemed near impossible were seemingly made much less so. The concerted governmental effort to advance and promote local manufacturing rekindled interest in and financial support of initiatives such as Numerical Machining Complex (NMC) and Kenya Industrial Research and Development Institute (KIRDI) with private sector efforts coming in the form of Mobius Motors, Gearbox and BRCK. This confluence of opportunity and timing gave life to the Build Labs' ambitious goal of serving as a testbed and launchpad for open, innovative hardware solution prototyping.
- 6) What kinds of groups did the build lab engage with? Who was/is interested in hardware development / engineering in Africa? What kinds of projects were you working on?

In addition to those previously mentioned, the Build Lab group collaborated with organisations such as Intel (Kenya), IBM Research and Blue Horizons Embedded Systems towards the research and development of platforms and workshops tailored to promote STEM education across socio-economic, age and gender backgrounds. Having built a repute of competence and integrity, the Build Lab's work positively perched the iHub as a regional nexus for hardware partners (https://www.raspberrypi.org/blog/more-on-raspberry-pi-in-africa/); evidenced in the various programs and workshops we designed and developed to better support young hardware entrepreneurs/innovators the Builders-In-Residence Program such as https://ihub.co.ke/blogs/22725/innovation-in-security-the-tale-of-a-team). Similar work was done in partnership with groups such as the MIT Media Lab with whom we developed and piloted a remote skills exchange platform dubbed HubLab in keeping with our mutual interest to identify talent and expand interest in building online communities for knowledge sharing across geographic and economic divides. Our clients included the Nairobi City Water and Sewerage Company who engaged us towards the proposal of a scalable and automated hardware solution to the water loss problem endemic throughout their piped network that culminated in an annual revenue loss of ~45% in 2014.

As evidenced, numerous parties from varied sectors engaged with the Build Lab towards a myriad of goals. These engagements can be thematically categorized as follows:

- International institutions seeking to develop inroads into Kenya's burgeoning potential as a regional technology hub.
- Local institutions seeking to contract the Build Lab for it's hardware expertise towards the development of locally designed solutions. This marked a growing shift in industries traditionally mired by vendor lock-in constraints that imposed strait capital and resource demands on their operation.
- 7) How did your initial work with iHub R as well as your experience building out the build lab help to bring you to where you are today? What were important lessons or values that you picked up along the way?

The 'reorientation' that I previously alluded to proved instrumental in reconstituting numerous perspectives I held in regards to the health and standing of Kenya's varied social and economic sectors. iHub Research provided a rich environment to holistically consider, apply and iterate on assumptions I held with invaluable critique offered from and through the team in day to day work. The innumerable opportunities provided fertile ground to entrench new and validated hypothesis on entrepreneurship & innovation and the pivotal role research plays in traversing between the two. Of note was the need for intellectual rigour in Kenya's innovation sector to which I sought to exercise through various mediums (iHub Quarterly, iHub Research Medium, Youtube and Interviews much like these). In a lot of ways, this deeply instilled appreciation for the scientific process provided further encouragement to advance my studies, focussing in on Robotics and Computation as a constituent wave towards a forthcoming African Economic Revolution. I came to particularly value the nuances of ethical and appropriate technologies and its' implication for societal growth and cohesion. Additionally, working with conscientious individuals highly regarded in their own fields provided the mentorship and guidance I required having only just graduated.

8) Can you explain a bit more about your current work? What kinds of issues are you working on?

I'm currently undertaking my Masters in Robotics and Computation at UCL where I'm investigating the statistical variation of swarming algorithms as applied to field drones. Through the program, I have delved into cutting edge technologies and scientific principles such as Machine Learning, State Estimation and Affective Computing. I'm especially excited in this topical areas due to their wide applicability in veritably evolving how technology and society interact at scale. Ultimately, I am of the opinion that it is only by understanding the fundamentals of technology that it can then be appropriately adapted and advanced, shifting Africa from a consumption economy to one of creation.

9) What factors do you believe were important to give rise to iHub Research? Are there other groups doing work similar to iHub Research? If yes, who? If not, why not?

The need for verifiable data on and insights into the Kenya market and region strikes me as a key factor, the dearth of which is still notable today (https://uneca.org/stories/african-centre-statistics-urges-more-investment-statistics). Similarly directed work is undertaken by companies and institutions such as IBM Research, Phillips Innovation Hub as well as iLab. The key differentiating factor of iHub Research was that while the aforementioned groups produced work and research internal to their respective organisations and partners, iHub Research committed to a more ambitious goal of fostering Open Science. A goal that is proving even more relevant today in other countries and regions (http://openaccess.blogg.kb.se/2018/05/16/sweden-stands-up-for-open-access-cancels-agreement-with-elsevier/)

10) Related question - Where else has critical work on science and technology been happening in the Kenyan/African research context? Who is doing it?

I unfortunately have not adequately kept up-to-date with current trends in African research to authoritatively answer this question.

 Are there shifts in who is doing this work? If so, why do you think that is? Same as 10.

.

12) What themes/topics/ideas/concepts are garnering interest for future directions of science and technology studies in Kenya/East Africa / Africa at large? Why do you think that is?

Given governmental support, I believe the growing interest in off-grid energy solutions evidenced by the growth of companies like Mkopa and Mobisol could prove to be a viable direction. The moderately high availability of ideal energy harvesting conditions through large parts of the specified regions bodes well for the sector especially given the current trend towards sustainable sources. Additionally, the need for effective service provision at various governmental levels will fuel interest in scalable low-cost technologies such as low-bandwidth distributed sensor and communication networks, the effective deployment of which will require advanced knowledge of distributed network topologies. In the main, the key theme would be distributed technologies as they confer lower cost and maintenance overheads than currently centralised systems do while providing improved system robustness. This would also need new considerations around the ethics and legalities of such deployments (https://www.theguardian.com/cities/2018/jul/03/cities-need-to-stop-selling-out-to-big-tech-companies-theres-a-better-way).