# computing for the “bottom billion”

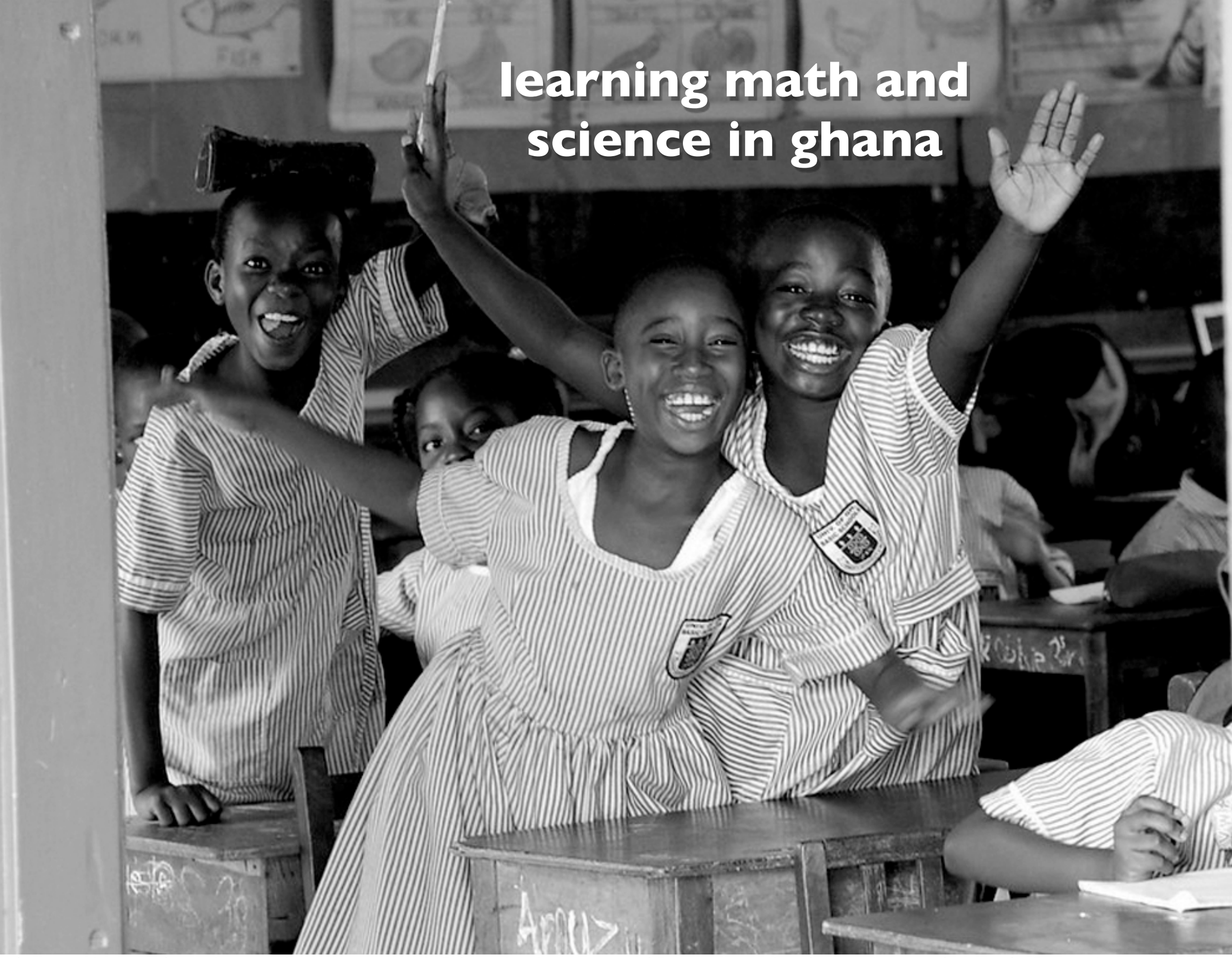
*yaw anokwa*

hey, my name is yaw and i am phd student in computer science at uw.

when helene asked me to come and speak with you, i didn’t really have a good sense of what we could talk about. so i thought about it for some time and i think that my path to computer science is pretty unique.

it’s not every day that someone born in ghana ends up in seattle doing computer science. so i’ve put together six slides that cover my journey into computer science. for each slide, i’ll tell you a story from that time and at the end it should explain how i got to where i am today.

if you have questions at any point, just raise your hand we can go from there. cool?




i was born in ghana in 1981 and lived there until 1990. during that time, i loved math and science and engineering. i didn't know what i really wanted to do, but i loved reading and taking things apart. even at a young age, they used to call me the professor. they also used to call me peanut head and chicken legs.

multiplication tables story

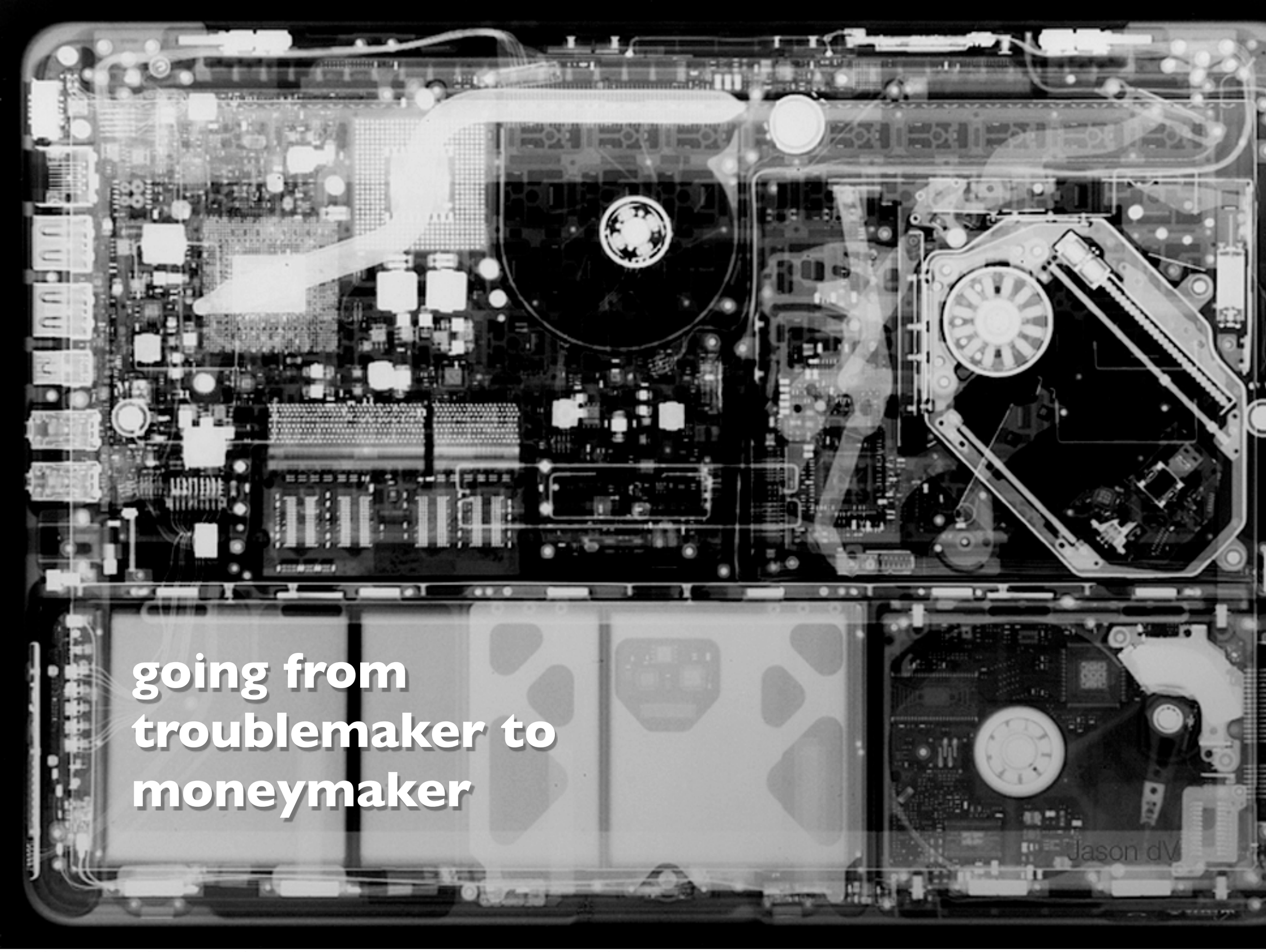
i left ghana when i was nine and moved to indiana. it was a huge culture shock. i had a british african accent and i was definitely not cool. didn't matter, i kept learning...

# discovering computers, the internet, and the power of programming

we came to the us because my dad was a professor, and so i spent a lot of time on campus. one of the first things i discovered was this macintosh se computer. attached to was a modem. and a modem was how you'd get on the internet. the thing was super slow and my dad was broke, so after a few months of playing with it, i decided to get a new modem.

sweepstakes story

winning the modem changed how i saw computers. i now understood that with a little bit of work, i could be unstoppable. i went to high school with that attitude.




in high school everything changed. by my sophomore year, i was pretty much an expert in apple computers. i did this all in my spare time, just reading online and playing around. i could take pretty much any computer apart and put it all back together. it came naturally.

unfortunately, i was bored and started fooling around with the schools network trying to get everyone's passwords. in a few days, i had broken in and a few days later, i'd been caught. i didn't do anything bad, but the act of breaking in got me expelled. everyone i knew was mad at me.

my parents begged and pleaded and eventually i was let back in -- but on probation. i worked with the computer team to really secure the network and soon word was getting around that i was pretty good. i started getting calls from people and companies and so i started a consulting company.

i was 15 and i was easily making $100 an hour. i graduated a few years later and decided to do computer science in college.

**applying computing to newspapers, to drag racing, to weapons of war**

i got to college when i was 18 and did both computer science and electrical engineering at the same time.

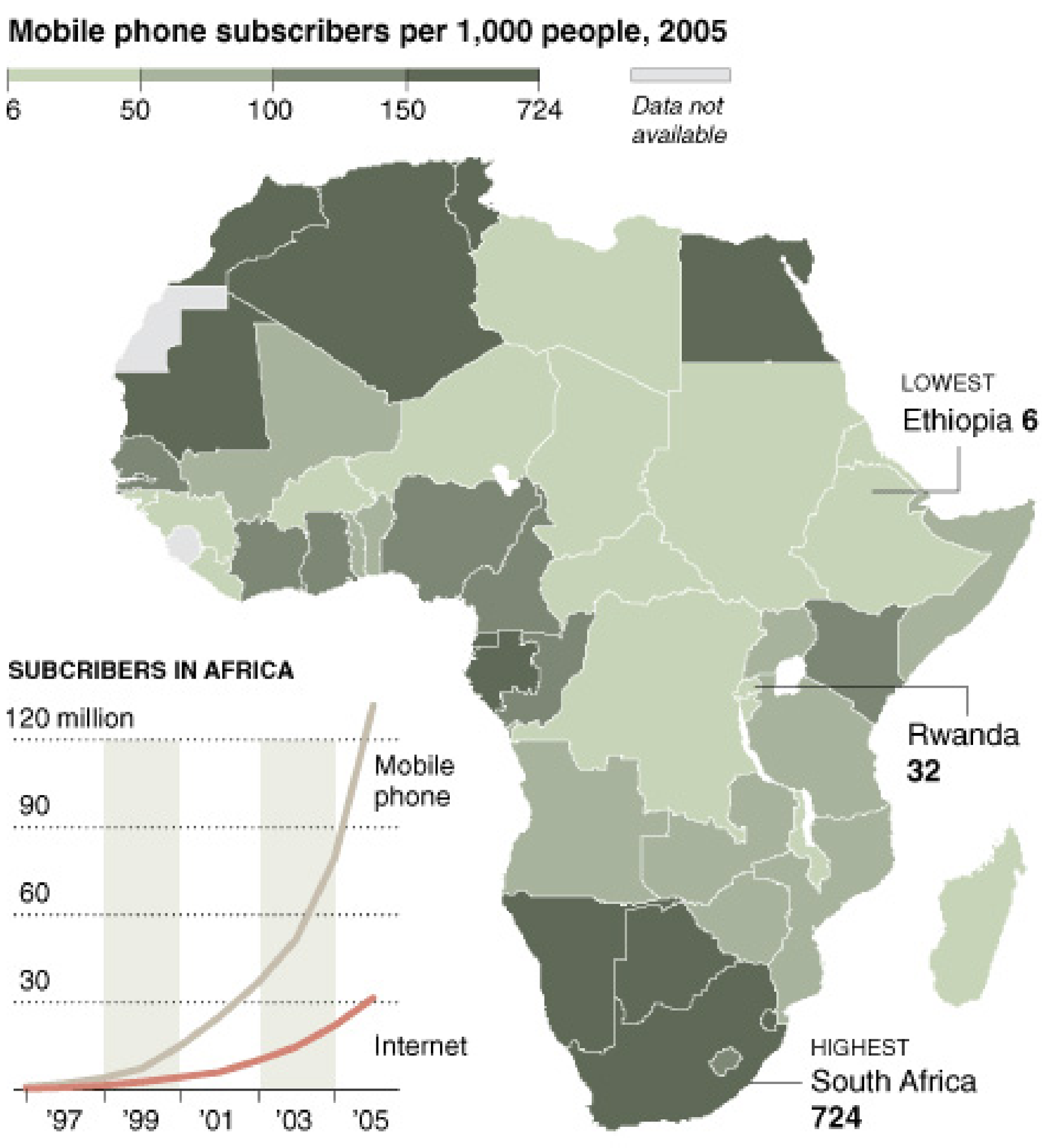
the combination of cs and ee meant that i understood both hardware and software. i started an online paper at the university and spent most of my time working on that. i also really got into cars and most cars have computers, so i used my computer knowledge to tweak the cars to go faster when i would drag race.

hondata drag racing story

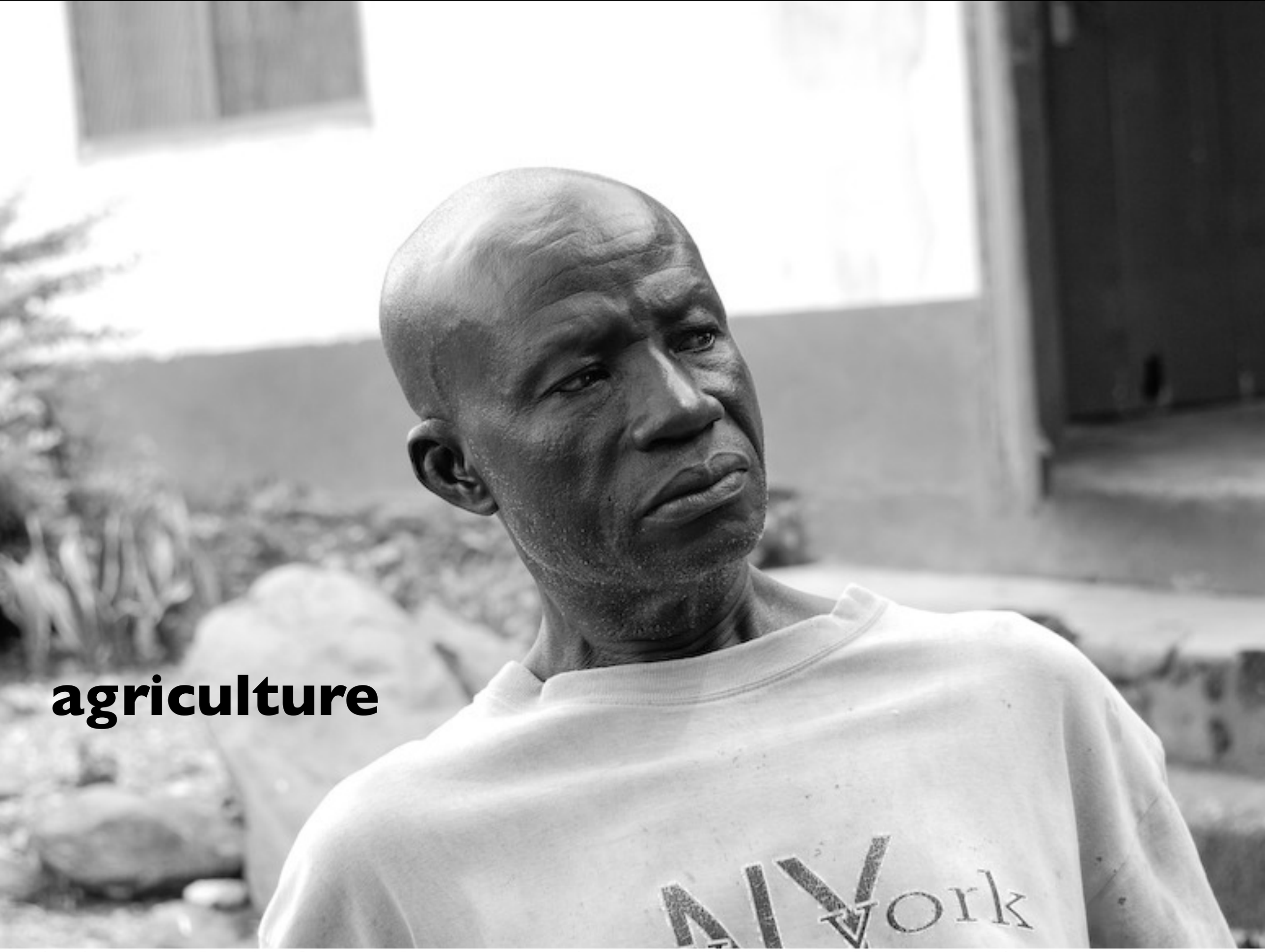
when in my last years in college i was hired by a defense contractor to work on a number of projects. one of them was f-18 radar, the other was a submarine detector. i worked there after graduation and didn't really love the job, so i quit. i focused on my company for a year and decided to come to grad school

grad school changed my life. instead of using computers, i was deciding what computers could be used for. i've done mostly computer science that changes the lives of poor people. these days i work for google to figure out ways we can use google technology on phones to help the poor.

a day in the life of a graduate student




if you take one thing away from this talk, it is that computers are in developing regions and they are changing the way people live. beyond the actual device, the infrastructure that comes with the phone is critical to solving some of these really big problems.



# agriculture

this is my uncle. he farms palm nut trees in ghana. he has a cell phone which knows how to use. that technology can can help him answer questions he has.

like, what are the best practices for growing palm nut trees? of the five near by markets, where should i sell my palm oil?

# education

this is a child at a rural hospital in rwanda. good teachers don't like working in rural places where children like these live. education is the key to surviving in the global market place.

how do we educate the children of the poor? could we give them phones with educational material? or ship video recorded from the best school in the country to them?

# microfinance

this is off the coast of tanzania where local fishermen are being squeezed out of their waters. to compete, they need to organize and maybe get a loan.

if they do, what are low cost ways for the microfinance agency to track payments? software automation and transactions performed over a cell network can help drive down costs.

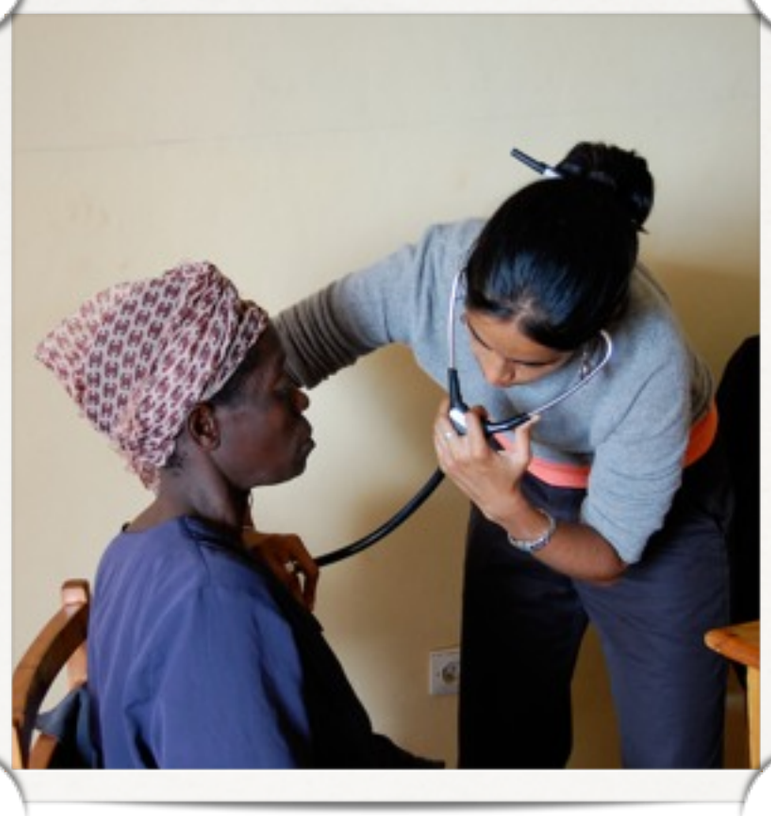
# healthcare

this child likely has an ear infection which can easily be treated. but what about his mother? if she has hiv an tb. how will her complex care by managed at a rural hospital? recording keeping is important and computers can help here.

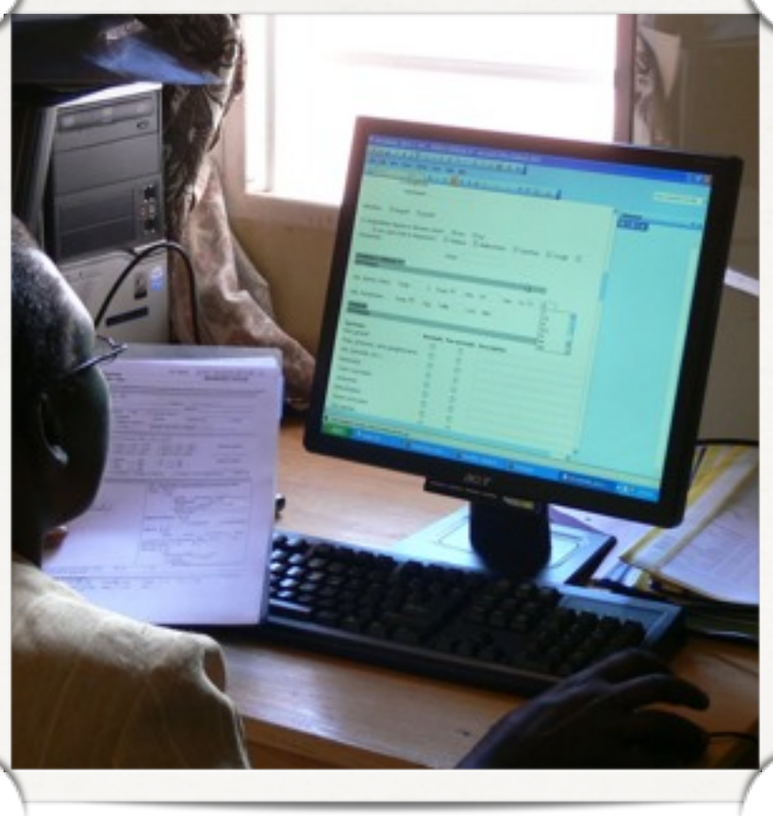
**Six months in rural Rwanda**

**Deploying infrastructure**

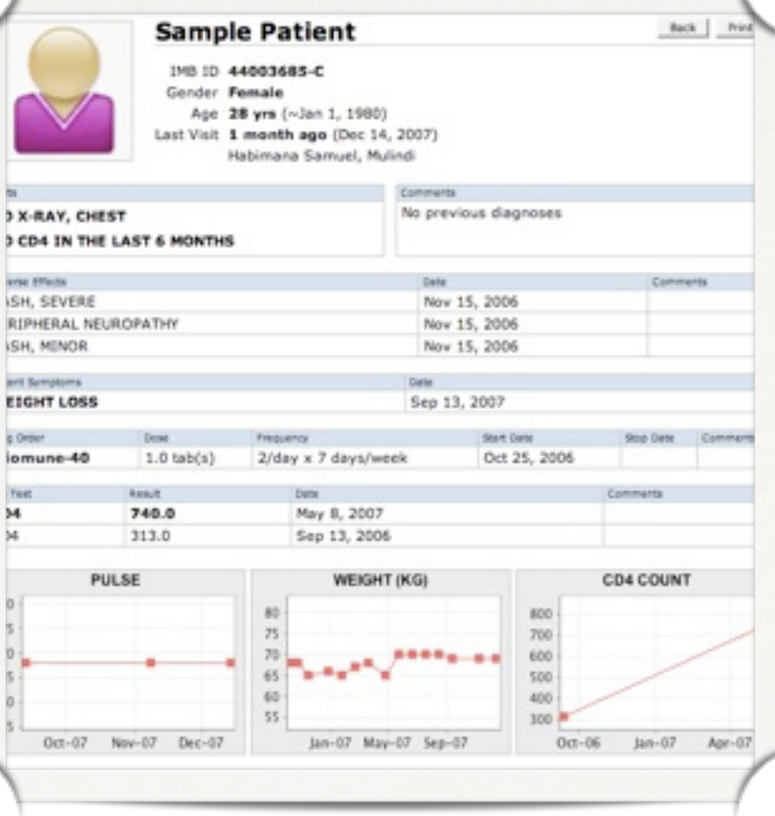
**Training ICT staff**



**Observing clinical care**



**Managing data team**




**Adding to OpenMRS**

4. AMOXICILLINE
5. ORS
6. PARACETAMOL
7. INJ PPF.
8. AMINOPHILLINE
9. METHYLDOPA.
10. DOXYCYCLINE
A KWA WINGI
A!
a vitamini A mwilini:
ha uwezo wa macho kuona;
kujenga kinga ya mwili dhidi
njwa;
kuimarisha ukuaji wa mimba.
ga za majani kwa mafuta ili
ha upatikanaji wa Vitamini A

Open Data Kit (ODK) is a suite of tools to help organizations collect, aggregate and visualize their data.

Touchscreen UI with swipe navigation and progress bar, XForms compatible GPS and photo support, question grouping, repeats and constraints, answer defaults and constraints, logic and branching in forms, adding and removing forms, and multi-language support.

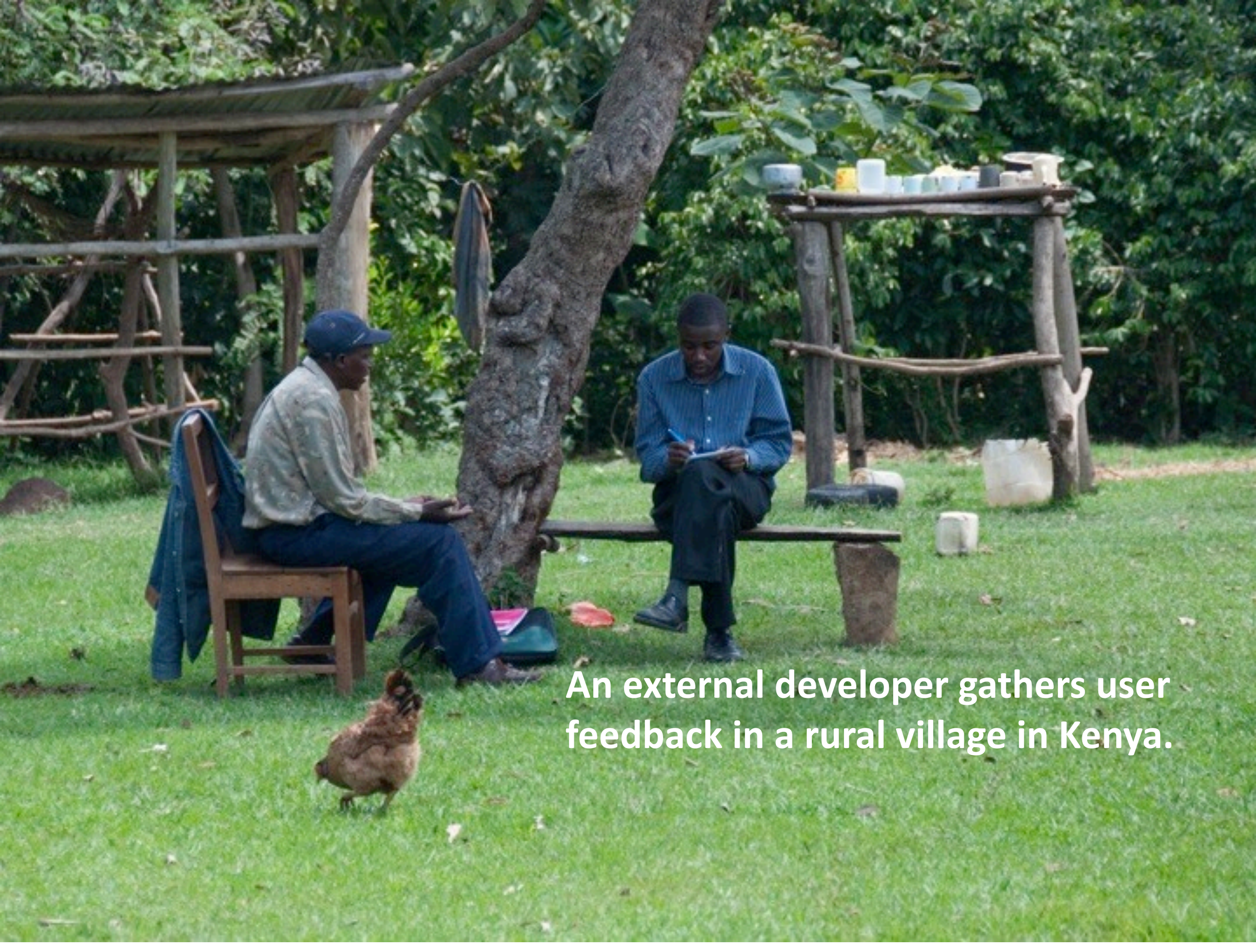
A shared phone operator in Uganda collects customer feedback.

- ODK Collect has been used by AppLab since November 2008 by shared phone operators (SPO) in rural Uganda collecting 1000s of surveys.
- The SPOs survey their customers about available phone-based services and the results are used to guide the development of services like Google's Clinic Finder and Farmer's Friend.
- One user noted that unlike their old paper surveys, "The survey process is real time as opposed to the paper forms where we had to wait for a month to be picked up...".

- AMPATH is the largest HIV treatment program in sub-Saharan Africa and is Kenya's most comprehensiv initiative to combat HIV.
- Over the next two years, ODK Collect will be used in a home-based testing and counseling program where hundreds of phones will be used to survey, train and follow up millions of people.
- The collected data will be submitted to OpenMRS, a medical records system, for analysis and followup

- The Brazilian Forest Service is piloting ODK for in-situ monitoring of the Brazilian rainforest.
- ODK Collect will be used to confirm satellite imagery of the forest and document forest structure throughout the Amazon.
- ODK Aggregate will be used to generate live updating Google Maps with geocoded images and survey data.

**Others include decision support for patients in Tanzania, documenting war crimes in the Central African Republic, and monitoring school attendance in India.**



An external developer gathers user feedback in a rural village in Kenya.

# questions?