



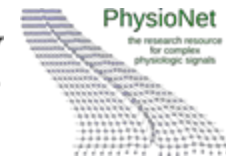
Department of
Biomedical Informatics



Wallace H. Coulter Department of
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Reflections of an out-of-place Engineer

Gari Clifford, DPhil, FIEEE, FAIMBE

Chair & Prof, Department of Biomedical Informatics, Emory University, Atlanta, GA, USA
Prof. Department of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, USA

Some ancient history

The New York Times

Dying Infants and No Medicine: Inside Venezuela's Failing Hospitals

By Nicholas Casey

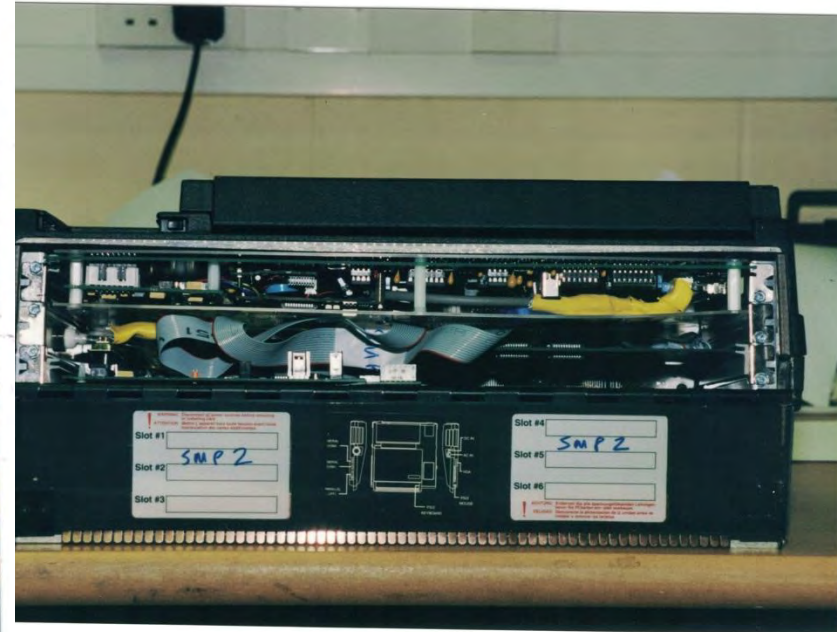
May 15, 2016



- A long, long time ago (in the mid 1990's, before the internet was available on a phone) a wayward physicist found himself in Venezuela

But what could I do?

- **Advice #1: Pick the right mentor:** By lucky coincidence, I emailed a newly minted professor in Oxford and asked if I could study neural networks in his research group.
- Who tasked me with building a patient monitoring device ...



Find out what others are doing and why

- **Advice #2: Do your background research ...**
- I asked Lionel if I could attend an new IEE (now IET) conference in London ...
- 1st IEE Seminar of Appropriate Medical Technology for Developing Countries (Ref No.00/014), 2000.



IEE Seminar on Appropriate Medical Technology for Developing Countries (Ref. No.00/014)

- Len Cornish and his centrifuge / car battery anecdote

A revelation



- **Advice #3: Nothing beats being ‘in the field’**
- In 2001, Lionel let me go to a conference in China and I spent a month traveling around.
- On my last stop I gave a lecture in Jiaotong University, and after many questions, my host asked me if I had any questions ...
- I mentioned that I had seen people using cellphones everywhere, even a monk on a bus in the foothills of the Himalayas, and I asked – ‘how extensive is cellular phone coverage in China?’
- The students conferred for a while, chatted amongst themselves, and then turned to me and the translator said “If there is a road you can drive a truck up, there is a cellular tower at the end of it”.
- It was then that I started to realise that this was how we might scale healthcare in LMICs

Teaching to learn

- After I graduated from my PhD, I took a postdoc at MIT
- Met a bunch of like-minded young people and a very free-thinking atmosphere
- Amy Smith invited me to co-create a new course on ICT4D
- **Advice #4: Try teaching – you learn what you don't know much faster and more comprehensively**



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MoCa: Mobile Diagnostics

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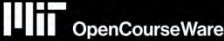
This content is provided courtesy of the MIT students listed in the Project Team table, and is used with permission.

About
MoCa Mobile Diagnostics is a mobile-linked web application that will allow doctors to diagnose and recommend treatment for cervical cancer patients in Zambia remotely via images.

Partners
[CIGIZ](#)

Project Team

ROLES	TEAM MEMBERS
Students	Santiago Alfaro Ted Chan Clark Firefield Samuel Virgo Crystal Mao
MIT technology collaborators	RJ Ryan & two anonymous MIT students
Video journalists (from Emerson College)	Nicole Prowell Ellen Higgin
Advisor	Gari Clifford



MAS.965 | Fall 2008 | Undergraduate

NextLab I: Designing Mobile Technologies For The Next Billion Users

Syllabus

Lecture Videos

Readings

Projects

Course Description

Can you make a cellphone change the world?

NextLab is a hands-on year-long design course in which students research, develop and deploy mobile technologies for the next billion mobile users in developing countries. Guided by real-world needs as observed by local partners, students work in multidisciplinary teams on ...[Show more](#)

Course Info

INSTRUCTORS

[Mr. Jhonatan Rotberg](#)
[Dr. Luis Sarmenta](#)
[Dr. Gari Clifford](#)
[Dr. Richard Fletcher](#)

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NextLab designs mobile technologies for the next billion users in developing countries.

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Rapid Prototyping

- **Advice #5: Team up with brilliant people**
- This is where I met Jose Gomez Marquez

José Gómez-Márquez is named 'Humanitarian of the Year' by Technology Review



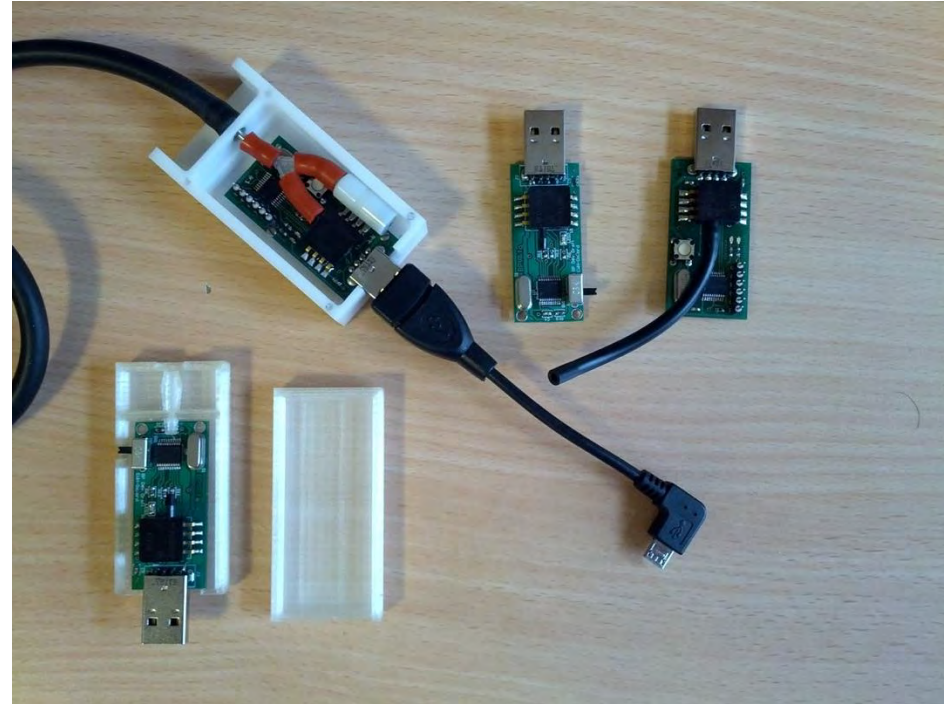
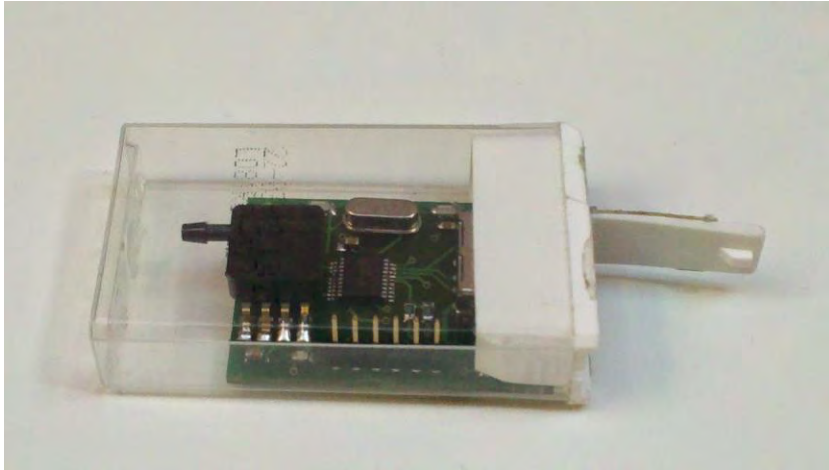
Rapid Prototyping

- **Advice #6: Rapid prototyping**
- 2nd idea: Stethoscope Car parts, soup ladle, ...



Rapid Prototyping

- **Advice #6: Rapid prototyping**
- The mBPCuff example



Field testing

- **Advice #7: Test it in the field over an over – nothing beats being ‘in the field’**
- Story of the south African RHD stethoscope



Adapting and pivoting

- Advice #8: Your first idea will not be the best. There will always be things missing.
- Example of Safe+Natal

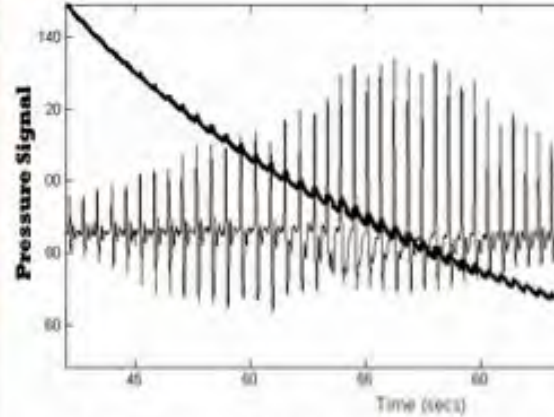


Enter competitions

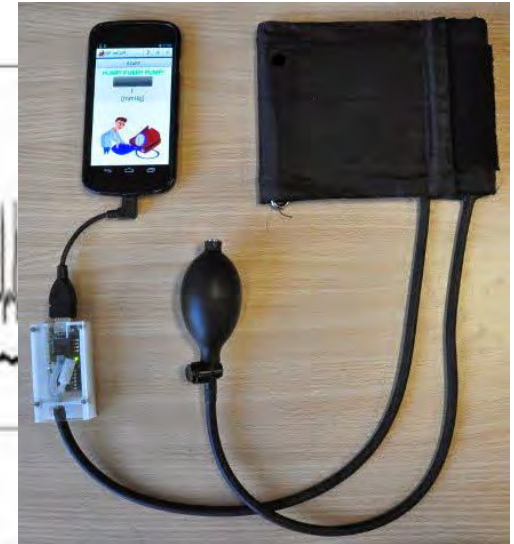
- **Advice #9: Don't be shy – helps to raise funds**



The smartphone-based Blood Pressure Monitor



- A - Smartphone app
- B & F - Inflation cuff & tubes
- C - Hand pump
- D - USB-OTG adaptor
- E - BP monitor peripheral



engineeringworldhealth



Co-design and knowledge transfer

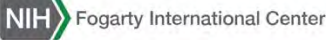
- Advice #10: Involve the community in the design and work to make sure they have (and feel) ownership the system
- Example of Safe+Natal



safe  natal
Every mother. Every baby.

Funding

- **Advice #11: Apply on lots of funding / be ambitious and forward thinking / be persistent**
- **Example of Safe+Natal – early wins – valley of despair – to success**



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LEVER FOR CHANGE

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Delivering Safer Births: Connecting Indigenous Mothers, Midwives, Navigators, and Hospitals in Guatemala

Maternal & Infant Health Award | Finalist

Maya Health Alliance | Wuqu' Kawoq

Maya Health Alliance | Wuqu' Kawoq and safe+natal are scaling a smartphone application and accompaniment program to support indigenous midwives and care navigators support timely access to care and healthy births in Maya communities in Guatemala.

Last Updated: October 2023



Courtesy of Bryan Watt, Photographers Without Borders



AI FOR THE GLOBAL GOALS

Let's build a better, more sustainable future for all

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Scaling up

- **Advice #12: Partner with a company to scale up, but be careful of the business model**



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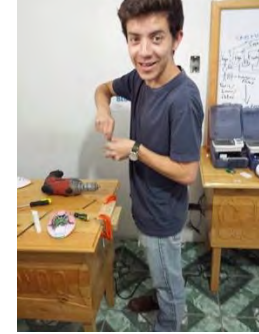
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safe heart

Summary of key lessons

- Co-design is essential
- Assemble a strong and experienced team including members of the target community
- Start with an idea to present to the community, but realise that it's going to change significantly because there are other problems to solve (e.g. Doppler+IUGR because a full perinatal system)
- Co-ownership is important (essential?)
- Communities should lead and take the credit
- Capacity building and knowledge transfer is important
- It's a long-term commitment – don't parachute in or create 'pilot' projects. Successful projects take a decade to really get going, even if you see early wins
- Sustainability – going beyond western business models (what if the consumer does not have enough money?)

Thanks ...



Thanks: Rachel Hall-Clifford, Patient 0, Peter Rohloff, Enma Coyote Ixen, Boris Martinez, Rosibely Sut, Edlyn Ramos, and the midwives of Tecpan and team at WK + Nasim Katebi, Lisa Stroux, Camilo Valderrama, Mohsen Shirzai, Samruddhi Kulkarni, Aaron Francis, Sepideh Nikookar, Mohammad Ahmad, Ellen Kolesnikova, Tom Brennan, Mauro Santos, Carlos Arteta, João Domingos, Marco Pimentel, and many others @ Ox/Emory/GTech

