ICT for Development

How to make technologies work for people in low resource environments

Guest Lecture at UNIMAS
12 September 2022
Anna Bon
Topics of this guest lecture

• What is ICT4D?
• How can we make it work for people in low resource environments?
• What are the different approaches to ICT4D?
• How can we design technology in a user/community-centered way?
• How should we position ICT4D in a rapidly changing/digitizing society?
How do we define “ICT4D”?

• Serving local needs and objectives of people and communities in low resource environments through useful digital solutions.

• ICTs should be designed to fit the local context and user self-expressed objectives
Responsible global citizenship: Sustainable Development Goal (SDG))

No. 9c: “Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2030.”

However, how do we make sure that it benefits all people/regions/countries?
Why ICT4D?

• There is (still) a very big *Digital Divide*: urban-rural, north-south, etc
• Many people have local needs or constraints which can be related to information sharing/communication etc.
• The (Global) Society is changing/globalizing very rapidly – in which digital technologies play an important role
• Ethical aspects play a role: ICTs should not be harmful
• We (as researchers, professionals, policy-makers) have a responsibility as global citizens to care for *people and planet*
Let’s look at the Digital Divide – the OECD definition

The "Digital Divide" - a term that refers to the gaps in access to information and communication technology (ICT) - threatens the ICT "have-nots", whether individuals, groups or entire countries.
Development/innovation is not the same in different contexts
There are no “blueprints” for how to the Digital Society
Different people have different interests
# Internet World Stats 2020 - 2022

## WORLD INTERNET USAGE AND POPULATION STATISTICS
### 2020 Year-Q3 Estimates

<table>
<thead>
<tr>
<th>World Regions</th>
<th>Population (2020 Est.)</th>
<th>Population % of World</th>
<th>Internet Users 30 Sept 2020</th>
<th>Penetration Rate (% Pop.)</th>
<th>Growth 2000-2020</th>
<th>Internet World %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>1,340,598,447</td>
<td>17.2%</td>
<td>631,940,772</td>
<td>47.1%</td>
<td>13,898</td>
<td>12.6%</td>
</tr>
<tr>
<td>Asia</td>
<td>4,294,516,659</td>
<td>55.1%</td>
<td>2,555,636,255</td>
<td>59.5%</td>
<td>2,136</td>
<td>51.8%</td>
</tr>
<tr>
<td>Europe</td>
<td>834,995,197</td>
<td>10.7%</td>
<td>727,848,547</td>
<td>87.2%</td>
<td>593</td>
<td>14.8%</td>
</tr>
<tr>
<td>Latin America / Caribbean</td>
<td>664,287,232</td>
<td>8.4%</td>
<td>467,817,332</td>
<td>71.5%</td>
<td>2,480</td>
<td>9.5%</td>
</tr>
<tr>
<td>Middle East</td>
<td>260,991,090</td>
<td>3.3%</td>
<td>184,856,813</td>
<td>70.8%</td>
<td>6,527</td>
<td>3.7%</td>
</tr>
<tr>
<td>North America</td>
<td>368,869,647</td>
<td>4.7%</td>
<td>332,908,868</td>
<td>90.3%</td>
<td>208</td>
<td>6.6%</td>
</tr>
<tr>
<td>Oceania / Australia</td>
<td>42,690,838</td>
<td>0.5%</td>
<td>26,917,600</td>
<td>67.7%</td>
<td>279</td>
<td>0.6%</td>
</tr>
<tr>
<td><strong>WORLD TOTAL</strong></td>
<td><strong>7,796,949,710</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>4,929,926,187</strong></td>
<td><strong>63.2%</strong></td>
<td><strong>1,266</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

**NOTES:**
1. Internet Usage and World Population Statistics estimates are for October 20, 2020. (2) CLICK on each world region name for detailed regional usage information. (3) Demographic (Population) numbers are based on data from the United Nations Population Division. (4) Internet usage information comes from data published by Nielsen Online, by the International Telecommunications Union, by GfK, by local ICT Regulators and other reliable sources. (5) For definitions, navigation help and disclaimers, please refer to the Website Surfing Guide. (6) The information from this website may be cited, giving the due credit and placing a link back to www.internetworldstats.com. Copyright © 2020, Miniwatts Marketing Group. All rights reserved worldwide.

## WORLD INTERNET USAGE AND POPULATION STATISTICS
### 2022 Year Estimates

<table>
<thead>
<tr>
<th>World Regions</th>
<th>Population (2022 Est.)</th>
<th>Population % of World</th>
<th>Internet Users 30 June 2022</th>
<th>Penetration Rate (% Pop.)</th>
<th>Growth 2000-2022</th>
<th>Internet World %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>1,394,588,547</td>
<td>17.6%</td>
<td>652,865,628</td>
<td>46.8%</td>
<td>14,362</td>
<td>11.9%</td>
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<tr>
<td>Asia</td>
<td>4,352,169,960</td>
<td>54.9%</td>
<td>2,934,186,678</td>
<td>67.4%</td>
<td>2,467</td>
<td>53.6%</td>
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<tr>
<td>Europe</td>
<td>837,472,045</td>
<td>10.6%</td>
<td>750,045,495</td>
<td>89.6%</td>
<td>614</td>
<td>13.7%</td>
</tr>
<tr>
<td>Latin America / Caribbean</td>
<td>664,099,641</td>
<td>8.4%</td>
<td>543,396,621</td>
<td>81.8%</td>
<td>2,907</td>
<td>9.9%</td>
</tr>
<tr>
<td>North America</td>
<td>374,226,482</td>
<td>4.7%</td>
<td>349,572,583</td>
<td>93.4%</td>
<td>223</td>
<td>6.4%</td>
</tr>
<tr>
<td>Middle East</td>
<td>268,302,801</td>
<td>3.4%</td>
<td>211,796,760</td>
<td>78.9%</td>
<td>6,378</td>
<td>3.9%</td>
</tr>
<tr>
<td>Oceania / Australia</td>
<td>43,602,955</td>
<td>0.5%</td>
<td>31,191,971</td>
<td>71.5%</td>
<td>309</td>
<td>0.6%</td>
</tr>
<tr>
<td><strong>WORLD TOTAL</strong></td>
<td><strong>7,934,482,631</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>5,473,055,735</strong></td>
<td><strong>69.8%</strong></td>
<td><strong>1,416</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

**NOTES:**
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Different models to ICT4D policy

- In International Development programs/actions - **interventions**
- Free market ideology – private sector led **market development**
- Participatory – grassroot/**bottom up initiatives**; open source movements
Interventionist model of ICT4D

- If possible: leave it to the private sector (telecom sector, currently “Big Five”)

- If not solved my the market: *Intervention* by the International Community (because of market failure)
2. Neoliberal laissez-faire approach: Leave ICT solutions to the market

Although corporate ownership of the data seems a challenge in terms of unrestricted access, gaining the relevant qualitative information to inform the research is an even greater one. The convenience of conducting data analysis on a huge scale in the comfort of the offices of international institutions may be outweighed by the damage which can be done by underinformed quantitative research and resulting policy interventions. The human toll of policies such as structural adjustment or forced rural displacement in Africa (Scott 1998) illustrates that this problem is neither new nor confined to big data.

Participatory approaches – bottom up initiatives
What are the consequences of private market-led technology roll-out?

• Almost ubiquitous internet
• Domination of Big Tech (Amazon, Google, Facebook, Apple, Microsoft)
• Data as the new raw material
• Exploitation of user data for Surveillance capitalism
Can we draw an analogy between ICT4D the agricultural sector?

Large-scale agriculture versus Community-based agriculture
Modernity versus traditional
Large-scale versus family farm

Food Security versus Food Sovereignty
Where do these three model come from?

• Historic trends in international development and geopolitics
Different ideas about development

• Development through *Capital Investment* (1950s – 1970s)
Development through modernization: industrialization, automation
Development according to a “blueprint”

Rostow’s development Stages

- Preconditions for Take-Off
  - Commercial exploitation of agriculture and extrative industry
- Take-Off
  - Development of a manufacturing sector
- Drive to Maturity
  - Development of wider industrial and commercial base
- High Mass Consumption
- Exploitation advantage in international trade

Infrastructure installed, and emergence of political/social elite

- Triggers by external influences, interests, markets
- Limited tech., static society

Investment in mansfu, is >30% of nati income; development of modern social, political, economic institutions

- Triggered by external influences, interests, markets
- Traditional Society

https://www.theedgemarkets.com/article/cover-story-no-consensus-definition-developed-nation

https://nieuws.nl/economie/20220210/bedrijven-op-de-zuidas-gooien-kantoren-gelijk-open-als-het-kan/
3. Participatory design: ICT4D 3.0

“Can ICTs be designed as to be useful and meaningful for people in low-resource environments?”

• Such that the technology is **adapted to the complexity** of the local context?

• Such that the technological solution **meets the needs** of the users?

• Such that it takes into consideration social & ethical consideration
  • (such that the proposed solution is not harmful for the user in an intended or unintended way)
Participatory model: ICT4D 3.0

Sustainability Analysis
- Which application can we build given the priorities?

Collaborative decision-making
- What are the possibilities and constraints of the situation?

Use case & requirements analysis
- How does this translate into information needs?

Needs & context analysis
- What do users need and want to improve their livelihoods?

...engineering, deploying, testing, evaluating, iterating....
Examples of ICT4D stories from the field:
2006 – 2010 projects/programs

2006 – 2010 Nuffic & EU projects: Ghana
Transfer of technologies: often not a success
ICT4D in different contexts, different communities, requirements
Since 2009 W4RA program – grassroots Community-centered approach Action Research/education

W4RA team and researchers from the University for Development Studies, Ghana held a Living Lab workshop in the rural community of Guabuliga, Northern Ghana.
Examples of student ICT4D projects at VU

**Article in AdValvas**

June 12, 2019 by Marc Hegeman

AdValvas invited me and Bandro to come and talk about our project. AdValvas is the university newspaper of the Vrije Universiteit Amsterdam and had heard about the project we are working on. We talked about the homeless application that is currently being developed to ensure that homeless people can easily see where they can eat,...

**Final Test Session**

June 6, 2019 by Wouter de Boer

Last Monday (03-06-2019) I had my final test session in Amersfoort. Just like in the previous sessions I was attending a language class for...
How does it work? ICT4D in a community approach (From real world use case to ICT4D artefact)
What did we learn from all these ICT4D projects in the field?

• Waterfall model (1)
• Agile model


(2) From: https://github-wiki-see.page/m/younasgithub/UTMAgileRep/wiki/UTM-AGILE-PAGE
How is our model different from the linear model of innovation used in “Conventional International Development” projects?

Question: Why is the waterfall model still so widely used in International Development?
Agile development model for ICT4D: 3.0

**Understand context in depth**
- Field research
- Partnering
- Collaborative workshops

**Elicit and assess needs**
- Collaborative workshops
- Stakeholder/user stories
- Tech demo roadshows
- Portfolio construction

**Engineer, deploy, evaluate the system**
- Living Lab field experimentation
- Agile approach - iterate & adapt
- Impact evaluation

**Specify use cases and requirements**
- Use case modelling
- Requirements elicitation
- Prototyping

**Assess sustainability**
- e³ value network modelling & analysis
- Scenario modelling & simulation
- Participatory Technology Development PTD / PRA

**Social & Ethical Considerations**
- Iterate & adapt
- Fielding

Start
- Iterate & adapt

Stop
We discovered the importance of *user-centered design* in ICT4D.
2. Needs assessment and collaborative goal construction, with the users

- Who are the users? What are their operational goals?
3. Collect use cases, and find together user requirements

Kofi logs into the system and his language of choice is recognized. The voice guides him through the different questions.

“Welcome farmer Kofi, please select the species of your sick animal”

Cow

“No, enter whether the symptoms can be seen on the body or not. Red means no, green means yes”

Yes

...etc
4. Build, test, evaluate – iteratively
Alternative models for ICT4D in international development

• User-centered design, collaboration, adaptation, iteration
  • Living labs, Agile development methods
• Action research/design science
• Local innovation Participatory Technology Development
• Transdisciplinary action research (e.g. working with local communities, farmers, women groups etc).
Final reflections and future concerns: Ethical considerations for ICT4D?

- Question:
- What are the ethical issues we should start to discuss?
Thank you!