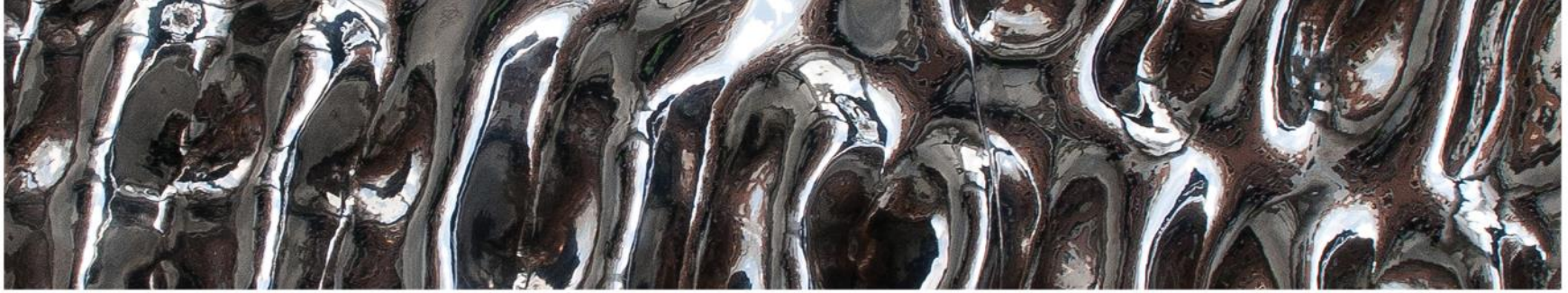

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Digital Innovations for Development

INF5850 ICT for Development: Building a better world?

Introduction

- What is *digital innovation* and in what ways can it be relevant for development?
- If talking the context is low- and middle-income countries, are theories/concepts/ideas on digital innovation relevant?
- Is digital innovation just a driver for another north-south divide?

- Aim:
  - Know what digital innovation is
  - Be able to discuss digital innovation related to the context of development countries and for development

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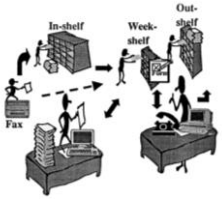
http://www.dhis2.org
http://www.hisp.uio.no
https://youtu.be/UqXSMaXBtD8

DHIS2: An open source and web-based software for collection, aggregation and visualization of routine health indicators in developing countries

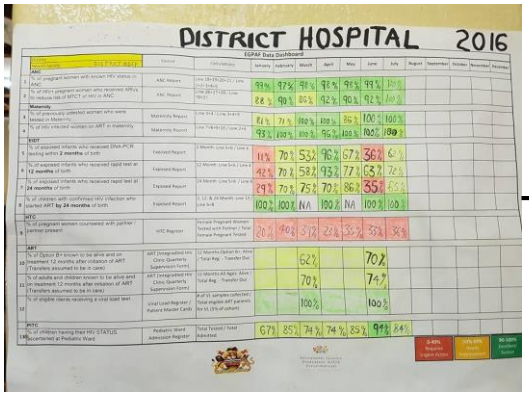
Digital Innovation: DHIS2 as an example

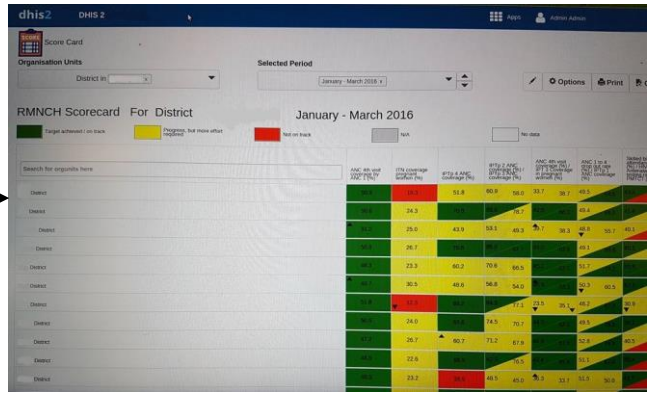
Digitization/digitalization is converting information into a digital format, i.e. bits.

Braa and Sandahl (1998)



«Front-end»
Health system





The "world of digitization"

Proprietary → **Open-source** Openness of software

Desktop → **Web-based** Networks

«Back-end»
Software development

Software → **Platform** Architecture

The "world of digital innovation"

t →

Digital platform ecosystem

Table 1.1 Core Elements of a Platform Ecosystem

Element	Definition	Example
Platform	The extensible codebase of a software-based system that provides core functionality shared by apps that interoperate with it, and the interfaces through which they interoperate	iOS, Android Dropbox, Twitter AWS Firefox, Chrome
App	An add-on software subsystem or service that connects to the platform to add functionality to it. Also referred to as a module, extension, plug-in, or add-on	Apps Apps Apps Extensions
Ecosystem	The collection of the platform and the apps specific to it	
Interfaces	Specifications that describe how the platform and apps interact and exchange information	APIs Protocols
Architecture	A conceptual blueprint that describes how the ecosystem is partitioned into a relatively stable platform and a complementary set of apps that are encouraged to vary, and the design rules binding on both	–

Tiwana 2014

Definition of Digital Innovation

2 Digital Innovation Processes

Innovation is distributed among different and different kinds of actors in terms of control and knowledge	Opportunities to combine a variety of resources on different levels

1 Digital technology attributes

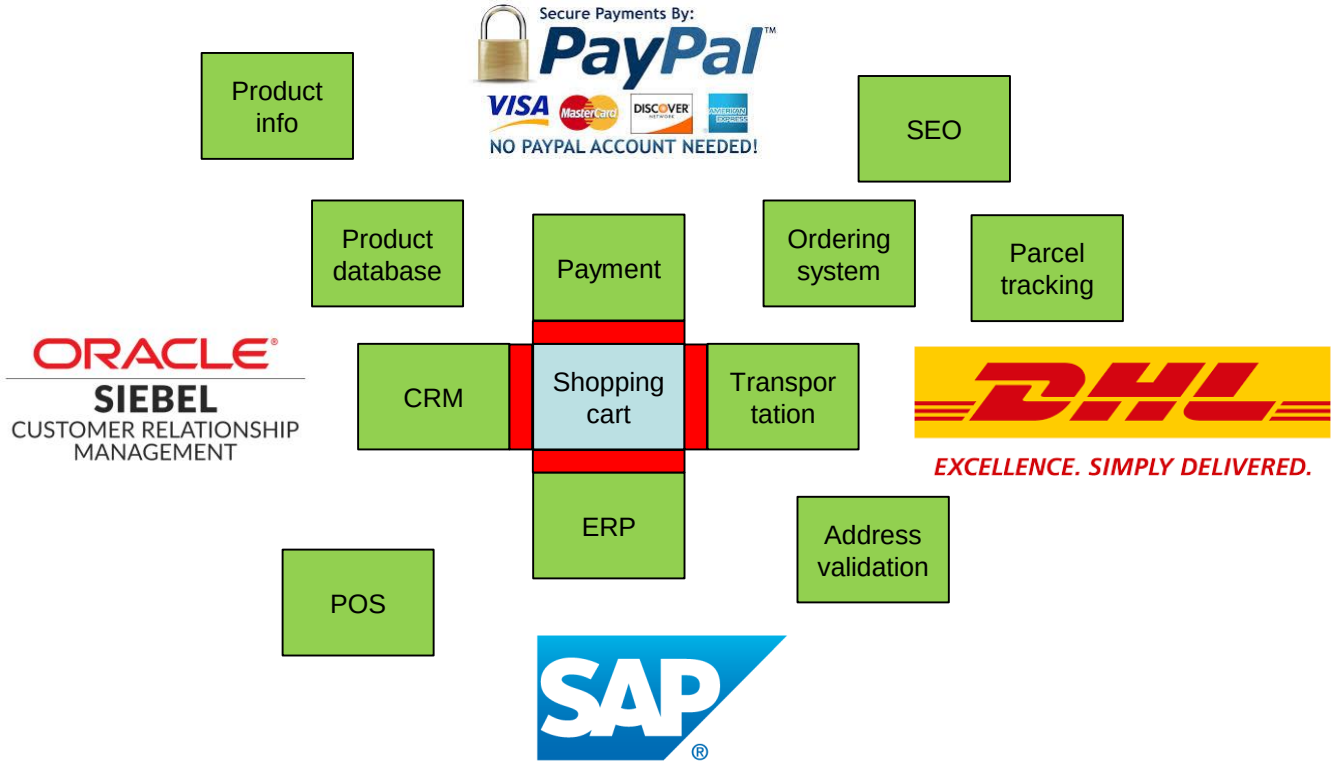
Layered and **modular** software architectures comprised of
- core **components**
- complementary components
- interfaces between these components

3

- Innovation is based on the ability to *mobilize other actors* to release the potential of platforms, to *combine and recombine* components*, rapidly respond* to changes in constellations of components and *attribute new meanings and usages* to existing technologies
- Innovation is not a finite, but an ongoing process
- Enabled by the improvements in the price/performance of computers and the emergence of the Internet

Yoo, Y., O. Henfridsson, and K. Lyytinen (2010)

Digital innovation example: Webshop



Digital Innovation Processes

- Require the ability to *mobilize other actors* to release the potential of platforms
  - Platforms/apps alone are without value
- To *combine and recombine* components
  - Mix and match, and remix
- *Rapidly respond* to changes in constellations of components
  - New opportunities
  - New actors
- *Attribute new meanings and usages* to existing technologies
  - Spot and leverage on the potential in new constellations of people, organizations and technologies

Digital Innovation = Development?

- Another north-south divide

or

- Offering multiple venues for multiple different actors in developing countries to participate in innovation and bridging ‘old’ gaps?

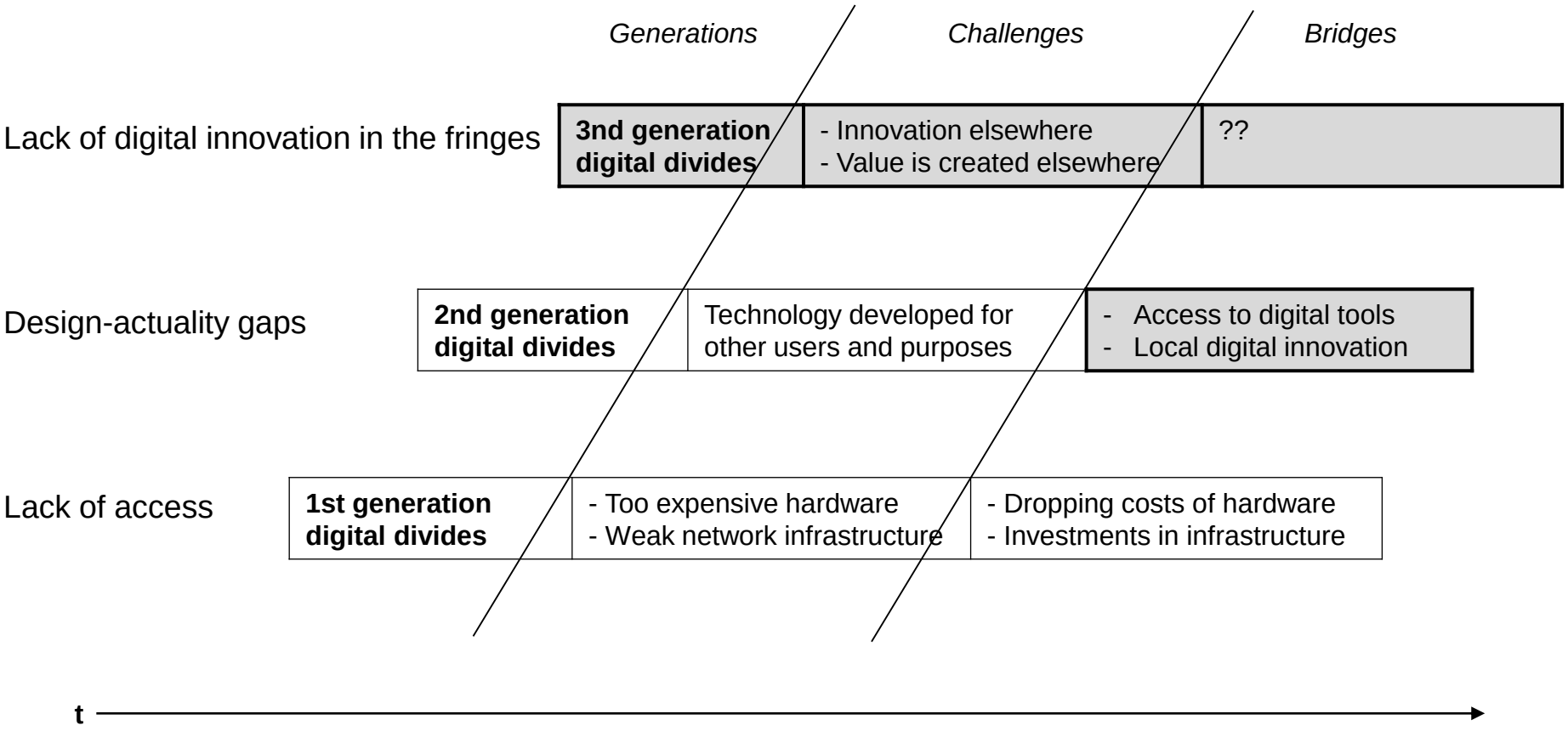
- ”Half products” - ”deferred innovation” - but who will be doing the other half/part?

- ”Digital technology has democratized innovation and almost anyone can participate” – is that really the case, and who is in the group that can’t?

Relevant «divides» in the literature

Divide	Ensuing inequality problems	Perspective on ICTs	Perspectives on knowledge	How to bridge?
Digital Divides: Lack of access to ICTs (computers and networks)	Organizations and individuals in developing countries not able to take part in the digital broadly.	Broadly considering ICTs including PCs, mobiles and Internet.	Has no prominent role – focus on access.	Reduced hardware and network connectivity costs and invest in infrastructure.
Design-Actuality Gaps: Technologies developed elsewhere and for other users and purposes	ICTs not relevant in the context of developing countries.	Particularly focusing on the match between ICT design and local contexts.	Designers of ICTs must acquire knowledge about local contexts.	ICTs developers taking into account the needs and context in developing countries.
Social Digital Divides: Lack of knowledge and opportunities to use ICTs purposefully	ICTs are implemented but not leveraged to support social inclusion in terms of information, skills, and economic democratic participation.	Broadly considering ICTs including PCs, mobiles and Internet.	Need for knowledge to use ICTs purposefully, as well as the outcome of purposeful use.	For-fronting social inclusion and using ICTs as a tool towards this.
Innovation Divides: Lack of participation in innovation by developing countries	Developing countries lack ownership, rights and capacity to use innovations.	Technology broadly and focus on patents. ICTs are positioned as a particular area where the divide is significant	Knowledge has a key role in innovation.	Attract foreign direct investments and intensive knowledge transfer.
Digital Innovation Divides: Developing countries not participating in digital innovation.	Developing countries are only users of platform and digital innovations, and not leveraging digital innovation for development.	The specificities of digital technologies are influential on digital innovation – interfaces, boundary resources, control points etc.	Different kinds of actors with different knowledge bases together shapes digital innovation.	Through research understand the barriers and opportunities for developing countries to take an active and relevant role in digital innovation.

Paradox of Digital Innovation: Solving the design-actuality gap and introducing another?



Digital Innovation in the Fringes of Software Ecosystems

- ”… spaces where innovation activities unfolds far away from and thus disconnected from the context where the central software components (typically, a software platform) in the ecosystem are developed. These are contexts where resources and human capacity for digital innovation are scarce”
  - Increasingly connected in terms of high quality and affordable Internet access, but
  - Lack of human capacity - lack of people skills, expertise
  - Lack of social relations - disconnected from innovation networks and lack of generative social relationships

Msiska and Nielsen (2018)

Thank you

References

- Braa, K and Sandahl, T. I. (1998). Documents in Infrastructure - Challenges for Design. *In Proceedings of the European Conference of Information Systems (ECIS*), Aix-en-Provence France, p. 1025-1041.
- Msiska, B. and Nielsen, P. (2018). Innovation in the fringes of software ecosystems: the role of socio-technical generativity, *Information Technology for Development*, 24(2), p. 398-421.
- Nielsen, P. (2017). Digital Innovation: A Research Agenda for Information Systems Research in Developing Countries. IFIP Advances in Information and Communication Technology.
- Tiwana, A. (2014). "Platform Ecosystems: Aligning Architecture, Governance, and Strategy", Morgan Kaufmann: USA. Chapter 1, pp 3-21
- Yoo, Y., O. Henfridsson, and K. Lyytinen (2010). The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research*. Information Systems Research*, 21(4), p. 724-735.