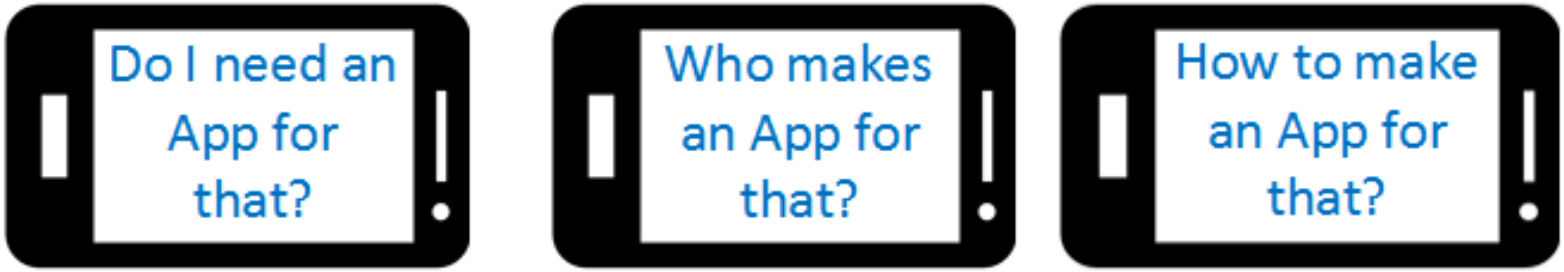
Isn’t there an App for that?

Smartphone Apps in (marine) resource management

- ✓The spectrum of Smartphone Apps in (marine) resource management
- ✓A guide for App Development
- ✓Open Data Kit for data driven marine management in Fiji as example

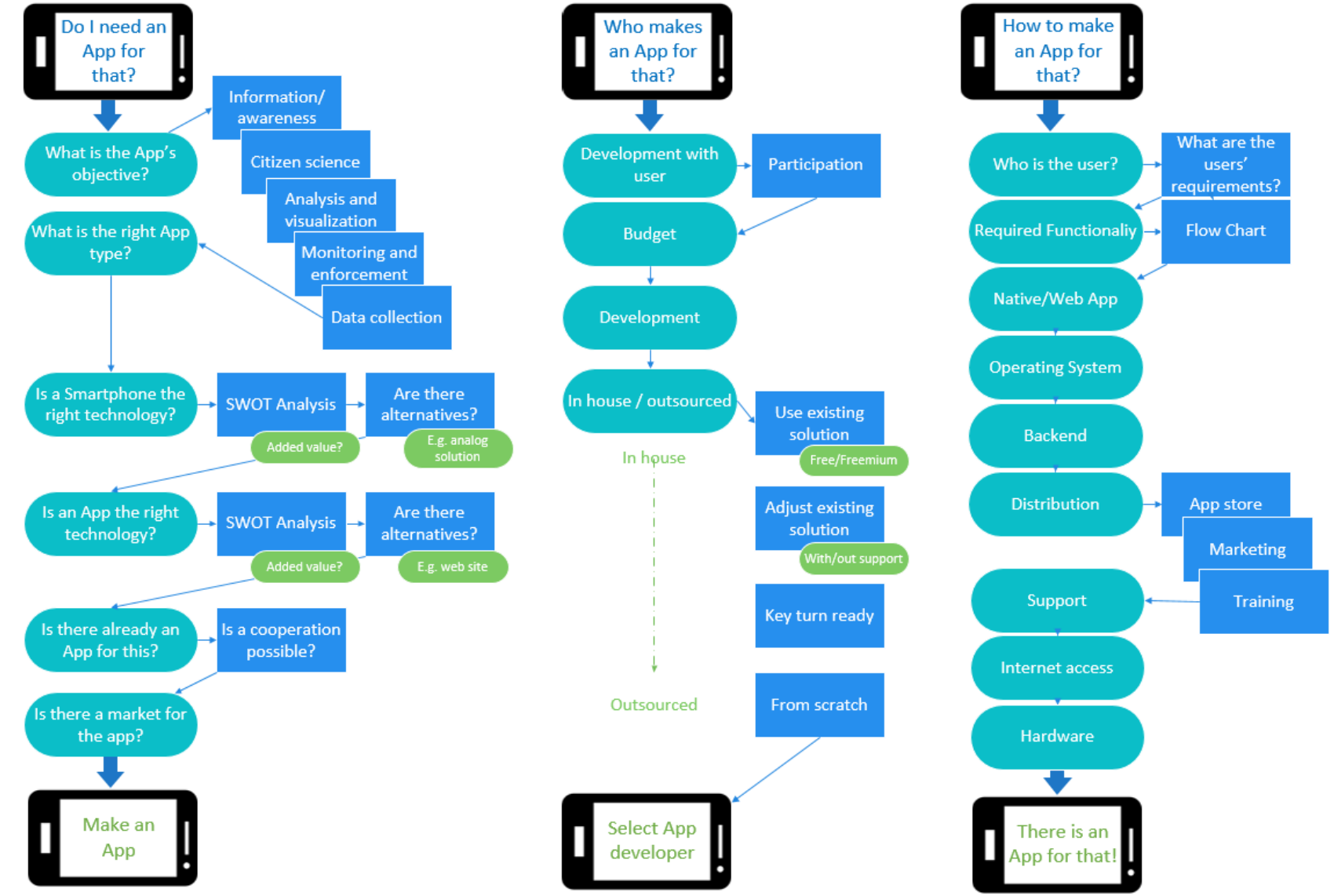
2. A guide for App Development

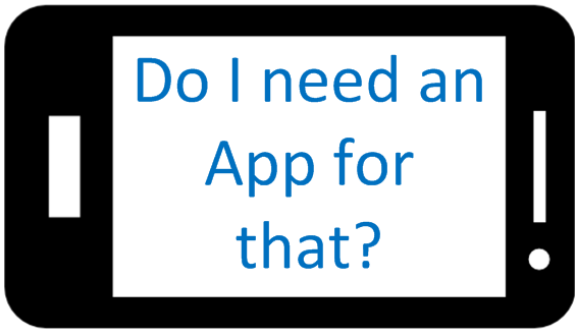


Isn't there an App for that?

Smartphone Apps for Development Cooperation and Conservation

Follow Digital Principles
digitalprinciples.org




Do I need an
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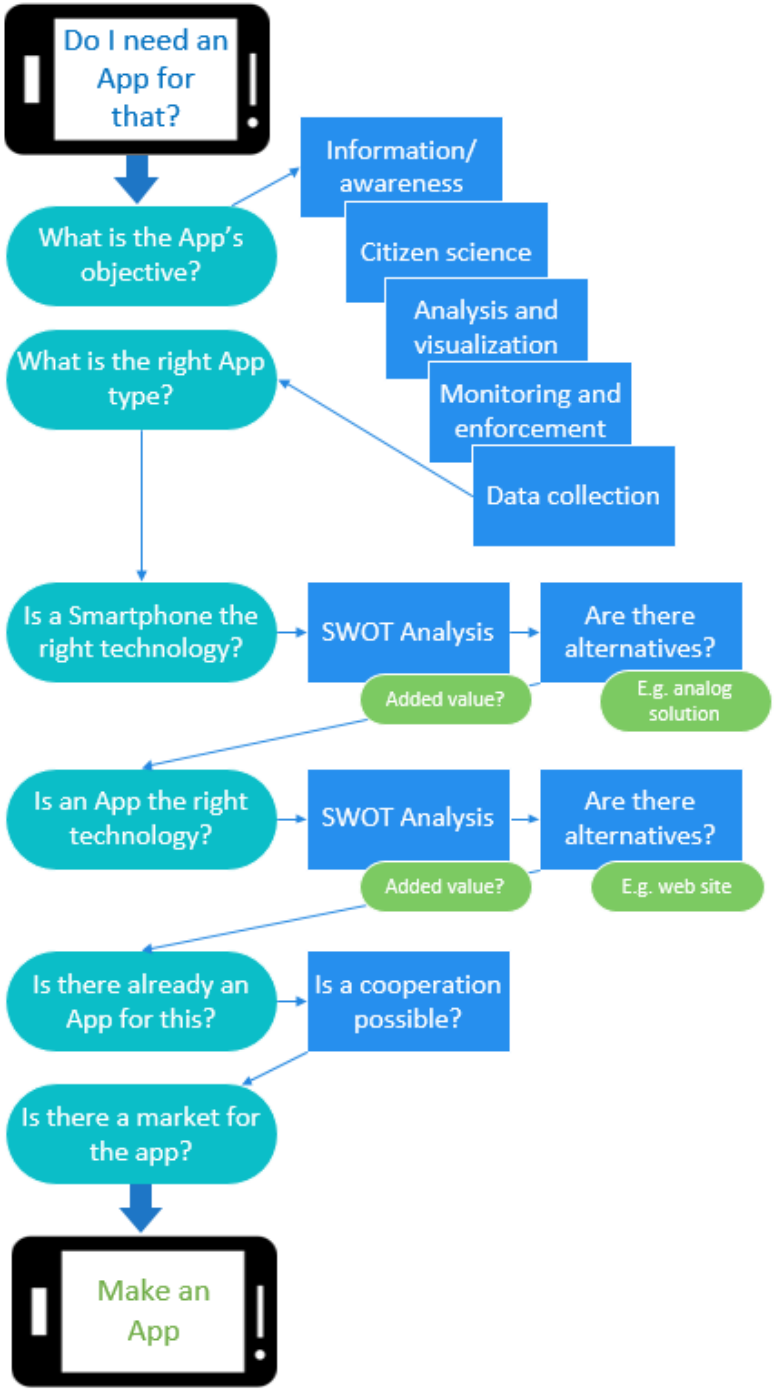
that?


Do I need an App for that?
What is the App's objective?
Information/ awareness
Citizen science
Analysis and visualization
Monitoring and enforcement
Data collection
What is the right App type?
Is a Smartphone the right technology?
SWOT Analysis
Are there alternatives?
Added value?
E.g. analog solution
Is an App the right technology?
SWOT Analysis
Are there alternatives?
Added value?
E.g. web site
Is there already an App for this?
Is a cooperation possible?
Is there a market for the app?
Make an App

App objective, types and examples

- Apps are widespread and can be powerful tools
- Often however, apps are perceived as a “knight in shining armour” - a new solution to an old problem
- Digitizing a solution often merely digitizes the problem, and doesn’t necessarily solve it
- Problem and objective of the proposed (app-) solution should be well defined
- Specific benefits of apps could be, e.g.
  - wide geographical reach
  - more efficient data collection or
  - more accurate data collection, making use of smartphone sensors

Further Reading:

- TEACHER, A. G. F., D. J. GRIFFITHS, D. J. HODGSON, and R. INGER. 2013. Smartphones in ecology and evolution: a guide for the app-rehensive. Ecol. Evol. 3: 5268–5278. Available at http://onlinelibrary.wiley.com/doi/10.1002/ece3.888/abstract

App Types

- The list in the previous slide show (The spectrum of Smartphone Apps in (marine) resource management) gives an orientation of different app types
  - Providing examples from marine management (cf. OpenChannels 2015a) and other sectors.
- At the same time this overview can help with the initial market research.
- Additionally: Search in the two biggest app market places
  - the Google Play Store and the App Store

- →There is no need to reinvent the wheel, if the answer to “Isn’t there an app for this” is **yes**.

SWOT Analysis

- A Strength, Weakness, Opportunities and Threats (SWOT) analysis can help to decide whether an App can truly add value to an approach or whether to consider possible alternatives.
- For this purpose hardware and software are analyzed separately.

SWOT Analysis

Is a Smartphone the right technology?

Strength • Smartphones are widely available and used • Low costs, as infrastructure already available	***Weakness*** • If smartphones need to be distributed, possibly costs involved, training needed, abuse possible
Opportunities • Reduced cost of outreach (travel costs etc) • Real-time data collection, monitoring and updates	***Threats*** • Acceptance may be problematic for certain audiences, not familiar with smartphones • Technical failures possible, leading to data loss/halt of approach

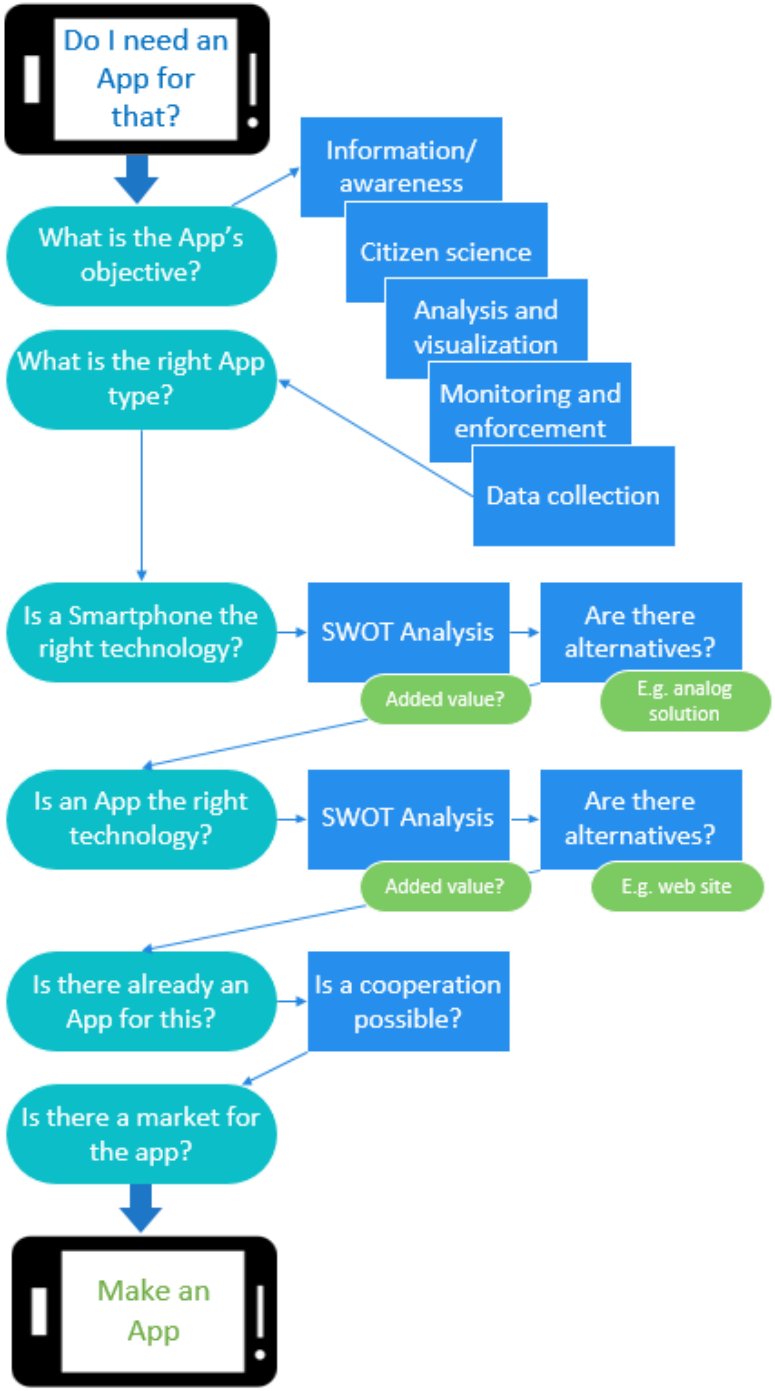
→**Possible Alternatives:** e.g. Paper based surveys, trainings, websites, SMS based approach, Laptops

SWOT Analysis

Is an App the right technology?

Strength	***Weakness***
• Commonly used • Novelty may be a unique selling point	• Development and maintenance costs • Development for different operating systems necessary
Opportunities	***Threats***
• Improved efficiency, effectiveness and quality • Wide reach and easy dissemination of approach • Build in incentives for use are possible • Offline use possible	• Limited access internet connectivity and electricity • Sustainability and long term use may be problematic • Technical failures possible, leading to data loss/halt of approach • Support of software versions etc. may be phased out • Data sensitivity issues, if not addressed

→**Possible Alternatives:** e.g. browser based apps, websites, SMS based approach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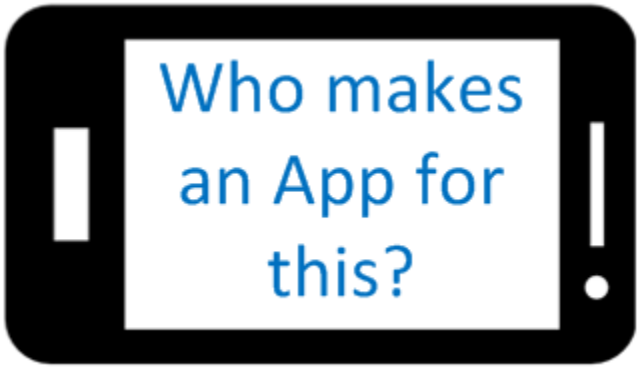
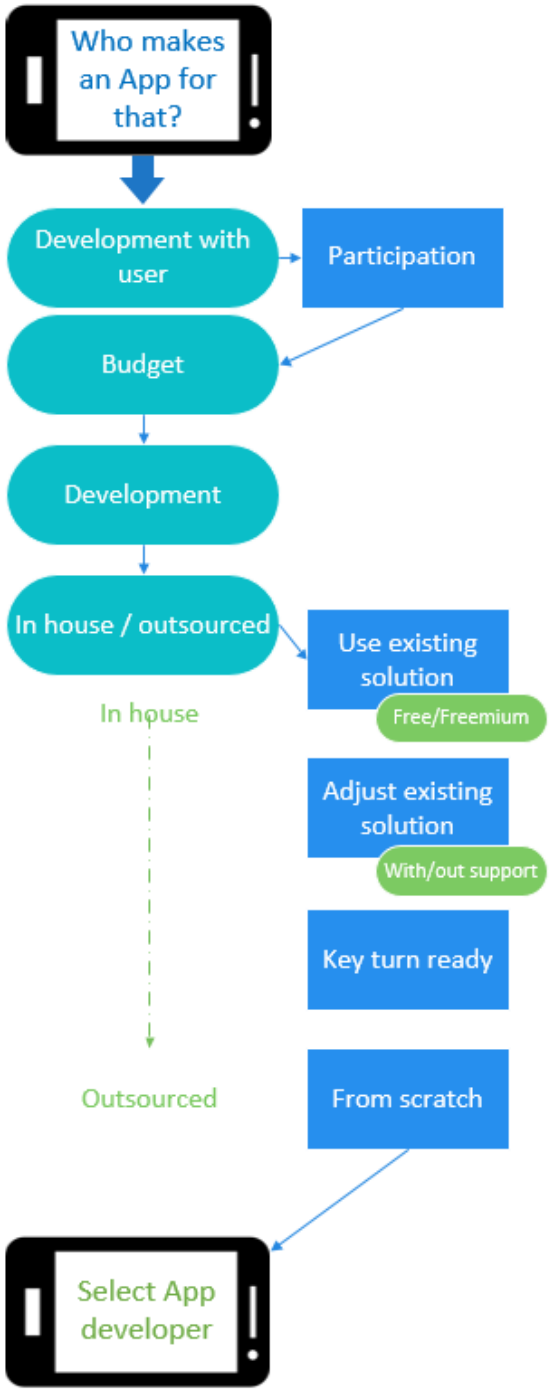

Who makes an App for this?


Who makes an App for that?
Development with user
Participation
Budget
Development
In house / outsourced
Use existing solution
Free/Freemium
In house
Adjust existing solution
With/out support
Key turn ready
Outsourced
From scratch
Select App developer

In house?

- Can make sense if the app is supposed to become an integral part of the approach or project
- Advantage:
  - Full control of the app and its backend
  - potentially reduce costs and increase flexibility, e.g. during the test phase, to quickly react to feedback or when changes need to be made.
  - Avoid “friction loss” in communications with external developers, especially in an iterative approach.
- Staff with the appropriate skill set and experience is necessary.

Using existing solution

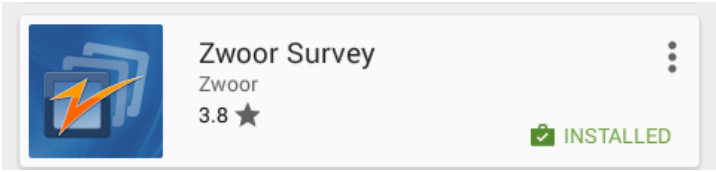
- Employ an existing app that already has the required functionality (market research), e.g.
- can add value without much effort and costs involved
- general digital principles also apply for using these solutions
- Generic apps
  - SpiderOakONE (Secure data storage and synchronization)
  - QR & Barcode Scanner
  - OpenStreetMap
- Specific apps like
  - Marine Debris Tracker (report trash on coastlines and in waterways)
  - Coastal Walkabout (recording of wildlife sightings)

Adjusting existing solution

- Collaborating with the provider of an existing app that e.g. could be adjusted to a certain country or context (open source standards important)
- Platforms that provide a building block system for apps, e.g.
  - Epicollect and iNaturalist allow the setup of specific projects to collect data from smartphones and view the data centrally via a website.

Adjusting existing solution

- Consider pricing model of customizable apps
- Often “Freemium”: App is provided **free** of charge, but money (**premium**) is charged for additional features and functionality
  - E.g. data or support
- Example: On- and offline mobile survey app
  - App and backend is free, as well as the fi
    - up to 1000 submissions are then charged with 50 USD etc…
- Beware of expensive lock in effects!
- Advantage: first tests and proof of concepts can be carried out at without cost and at low effort



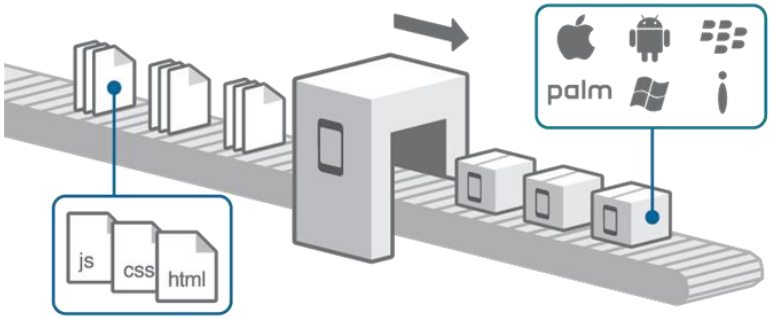
Key turn ready solutions

- If in-house capacities are limited or for more complex approaches, e.g.:
  - Not-for-profit foundation AKVO: "AKVO FLOW"*: multi-language tool for collecting, evaluating and displaying any quantity of geographically referenced data - using Android smartphones and an online dashboard.*
  - Applications: e.g.
    - National inventory of water points, Vanuatu, supported by UNICEF
    - Post Cyclone Pam rapid assessment, Vanuatu

- Higher cost e.g. the cheapest package "flow20": 20 devices, 4000 submissions, 3960 EUR/year
- May be a worthwhile investment: BUT: scalability, ownership & sustainability.?

Development from scratch

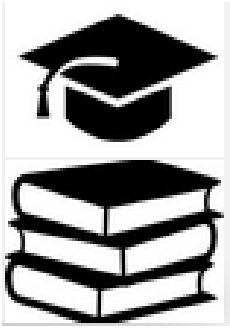
- If the required functionality of building block solutions cannot be met, the app needs to be developed from scratch
- New tools simplify app development
  - Building platforms and tools, like open source based PhoneGap



- Front-end development tools and Back-end servers

Collaborator or student

- Tools like PhoneGap enable developers with basic programming skills in HTML and CSS to develop an app
- Affordable way of app development can be the collaboration with students or lecturers of Universities' IT departments
- +Developing and strengthening local capacity
- +Ensuring ongoing support and local ownership of an app



Hired professional

- Directories for App Development Agencies that can be searched by Size & Pricing, Focus and Location, e.g. Clutch and appindex
- +Approach organizations that previously worked with app developers, who may be specialized on a certain sector
  - e.g. WWF Fiji “Watch our Seas” App was referred to Point 97, a company specialized on “mobilizing sustainable seafood”
- Likely cost between GBP 3000 and GBP 10,000 depending on its complexity; 1 - 3 months

Hired professional

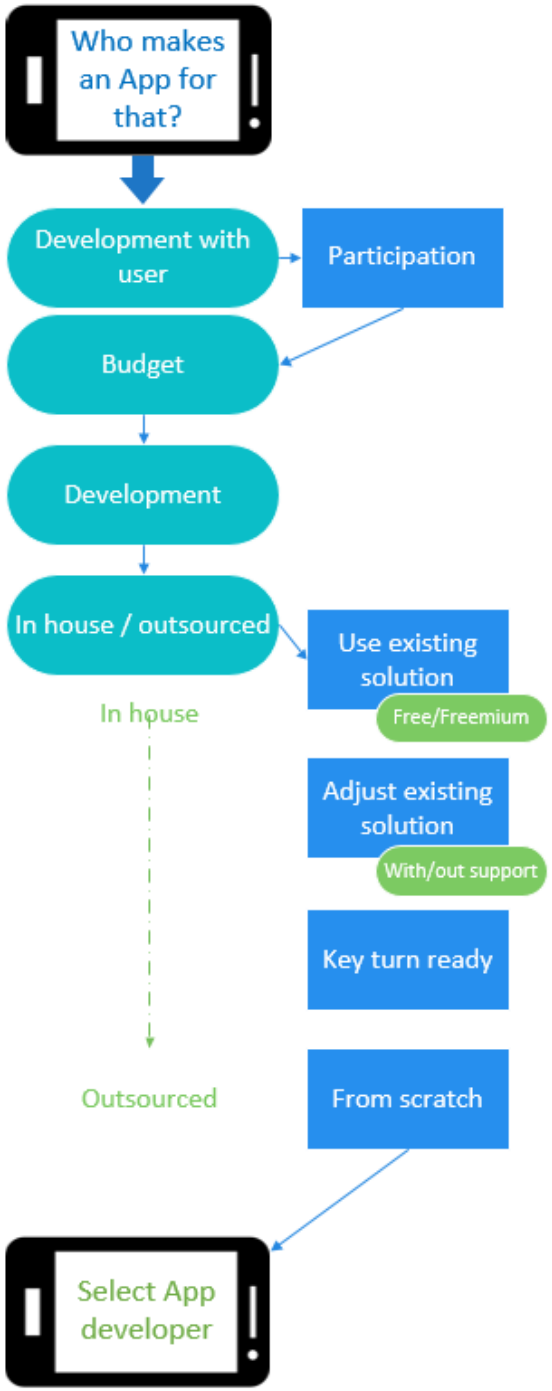
- Contract:
  - User-centered design
  - Test phases in the field
  - “Agile method of software development involving incremental development, where the requirements and solutions are adaptive”
  - Copyright: To provide open-source solution, this should be clearly agreed upon in the contract

Hackaton

- Event in which computer programmers and others involved in software development, including graphic designers, interface designers and project managers, collaborate intensively on software projects.
- Hackathons typically last between a day and a week.
- Educational or social purposes + create usable software
- Specific focus

Hackaton

- Example: Fishackaton 2016, Suva, Fiji
  - Annual global event
  - *“Volunteer coders, technologists, and designers spend a weekend developing usable solutions to problem statements solicited from fisheries experts around the world. At the end of the hackathons, teams presented their work and an expert panel of judges will nominate a winner from each site, eligible for worldwide grand prizes.”*
- →Affordable way to develop an app,
- +Vessel for education and awareness on a certain topic
- +Build and connect local capacity and IT networks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How to make
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that?

How to make an App for that?
Who is the user?
What are the users' requirements?
Required Functionaliy
Flow Chart
Native/Web App
Operating System
Backend
Distribution
App store
Marketing
Training
Support
Internet access
Hardware
There is an App for that!

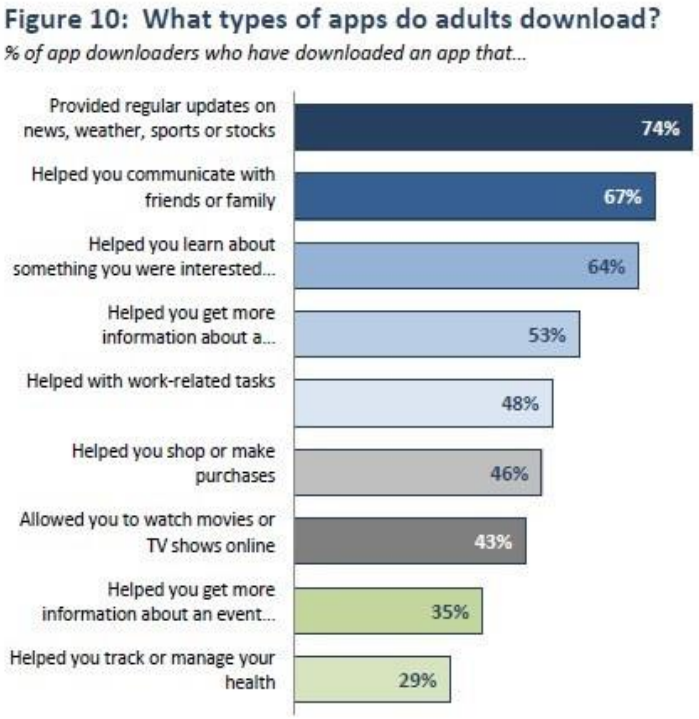
Principles for app development

- Underlying principles, independent of chosen approach
- DigitalPrinciples
  - “Ccapture the most important lessons learned by the development community in the implementation of technology-enabled programs”
  - Serve as a set of living guidelines, informing the design of technology-enabled development programs, such as apps

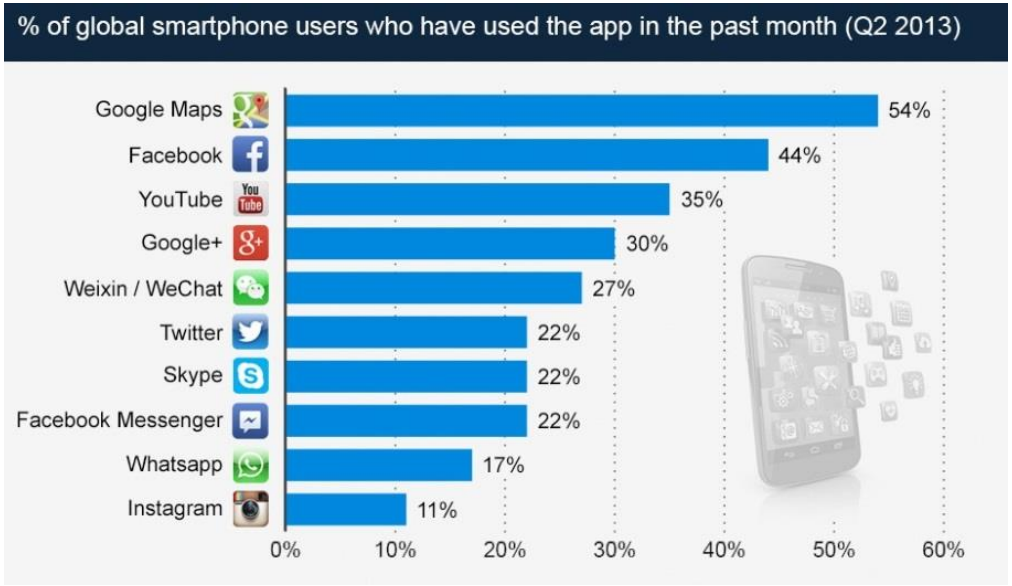
Design with the user

- User choice for apps and perceived added value based on:
- Access and use of phone utilities
- Interacting with the world
- News and update services
- Games and entertainment
  - To address a certain audience and use apps as a vessel for a subject, gamification – the application of game-design elements and game principles in non-game contexts - can be extremely powerful.
- Media management

Design with the user

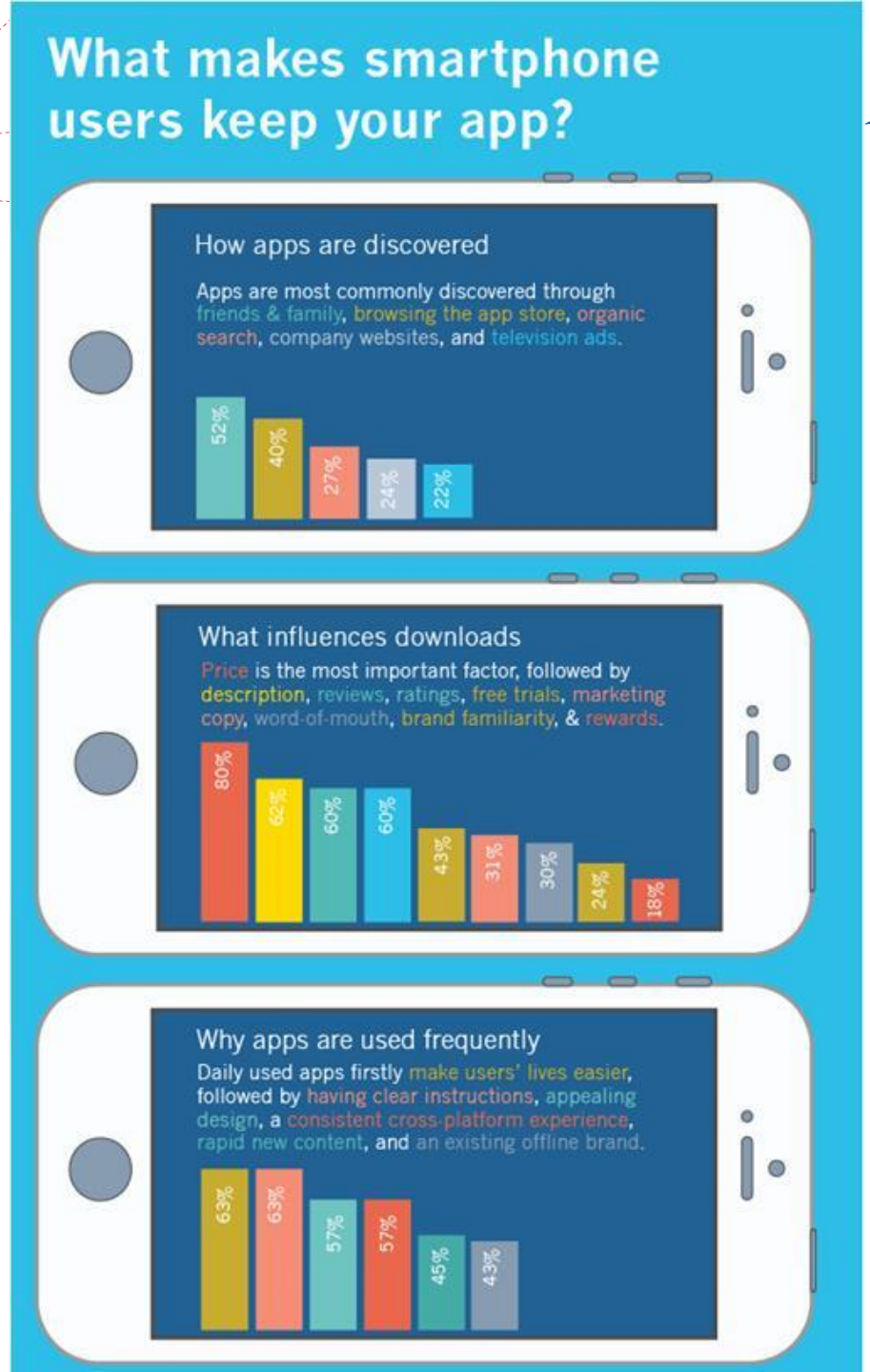


(Purcell 2011)



(Statsitica 2013)

Design with the user



(Business2community.com 2015)

Understand the ecosystem

- Technologies, like apps, are never isolated, but are part of an “ecosystem”
- This can be networks and communities of practitioners, which are an essential resource for exchange on lessons of app development
- Aligning to existing technological, legal, and regulatory policies and standards is equally important

Design for scale

- App solutions are easily scalable due to wide internet and smartphone penetration, and common software and platform standards.
- To reach a wider audience, the app should be design for scale from the start,
  - Replicable and customizable in other regions, countries and contexts, e.g. by including the option of translated versions.
- Before scaling however, impact needs to be demonstrated
  - e.g. in a confined test and learning site

Build for sustainability

- User requirements
- Ownership
- Administration
- Funding
- Utilizing and strengthening local communities and developers, as well as engage with local governments and organisations is crucial – beyond projects' lifespans.

Be data driven

- Smartphone apps: ease of collection of meta data.
  - E.g. real time data on usage can be monitoring and analyzed, and thus inform iterative improvement.
  - Data privacy should be taken seriously
- Outcomes rather than outputs
  - E.g. the actual change an App brings about, rather than the mere number of downloads

Open data, open standards, open source, open innovation

- Thanks to open standards, the development of apps has become much easier.
- Building block systems can be used to apply existing solutions to new contexts.
  - E.g. Open Data Kit
- Can improve the uptake and sustainability of an app, as well as harness community support.
- Documentation and providing access to code and APIs (Application Programming Interfaces)
- If possible, collected data should be made available for the public benefit

Reuse and improve

- Use, modification, and extension of existing tools, platforms, and frameworks utilize and contribute to the powerful dynamics of open source
  - E.g. an app plug-ins
- Iterative improvement of app versions benefits from test phases and tight feedback loops from the user

Address privacy & security

- Smartphones are pocket sized data collection machines
- Data privacy and security!
- Perceived abuse of app permissions and collected data can undermine users trust and endanger the success of an app or even put the reputation of the organization in charge at risk.
- Risks to the security of users and their data must be assessed and mitigated

Be collaborative

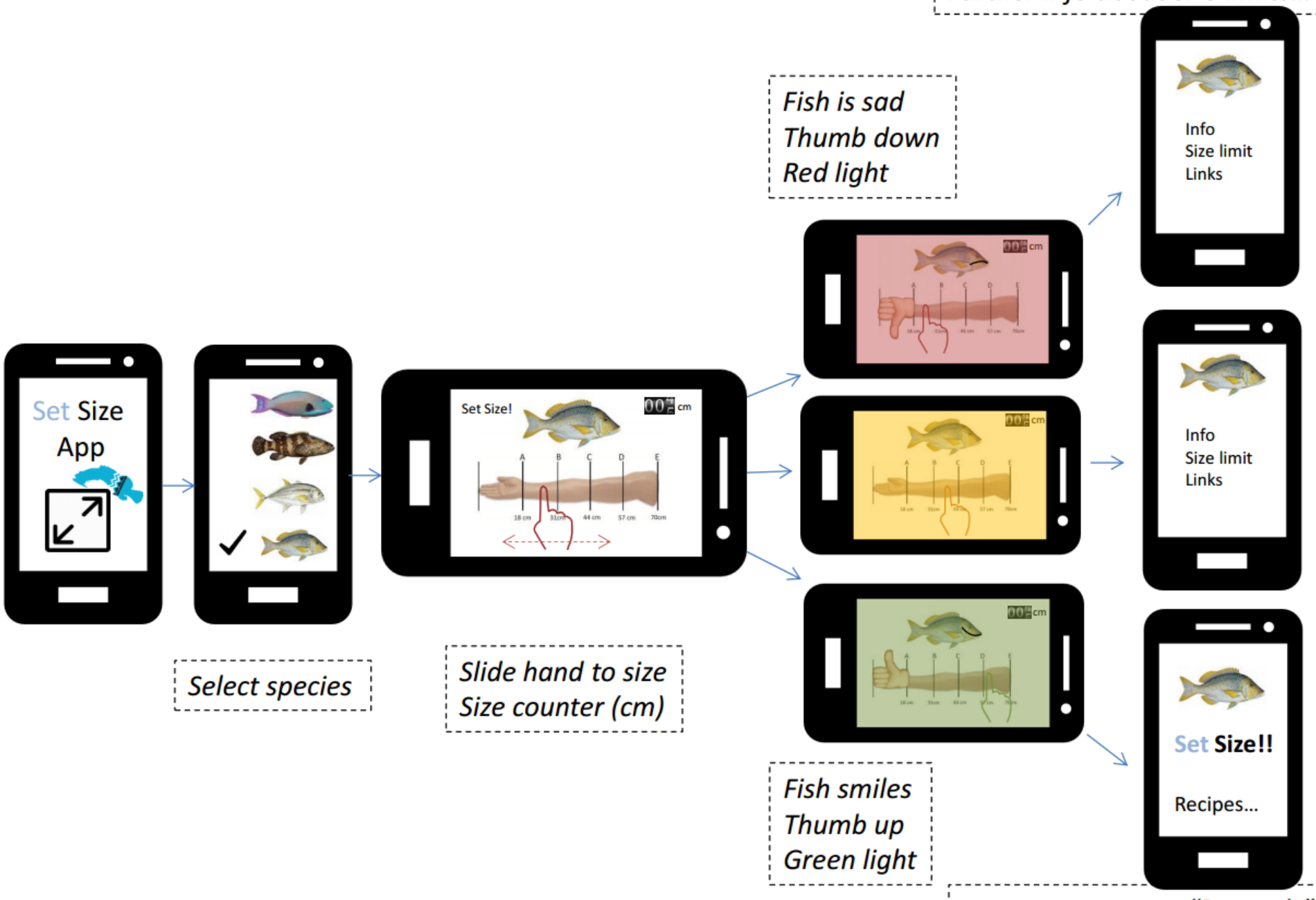
- Combining diverse expertise across disciplines and industries can help to overcome silo thinking
  - An app used in a fishery context may well work in an agricultural setting
  - Crucial aspects of app use may be overlooked by a small group of developers, but discovered through wider involvement of practitioners in the field
- The publication of materials under a Creative Commons license is good practise.

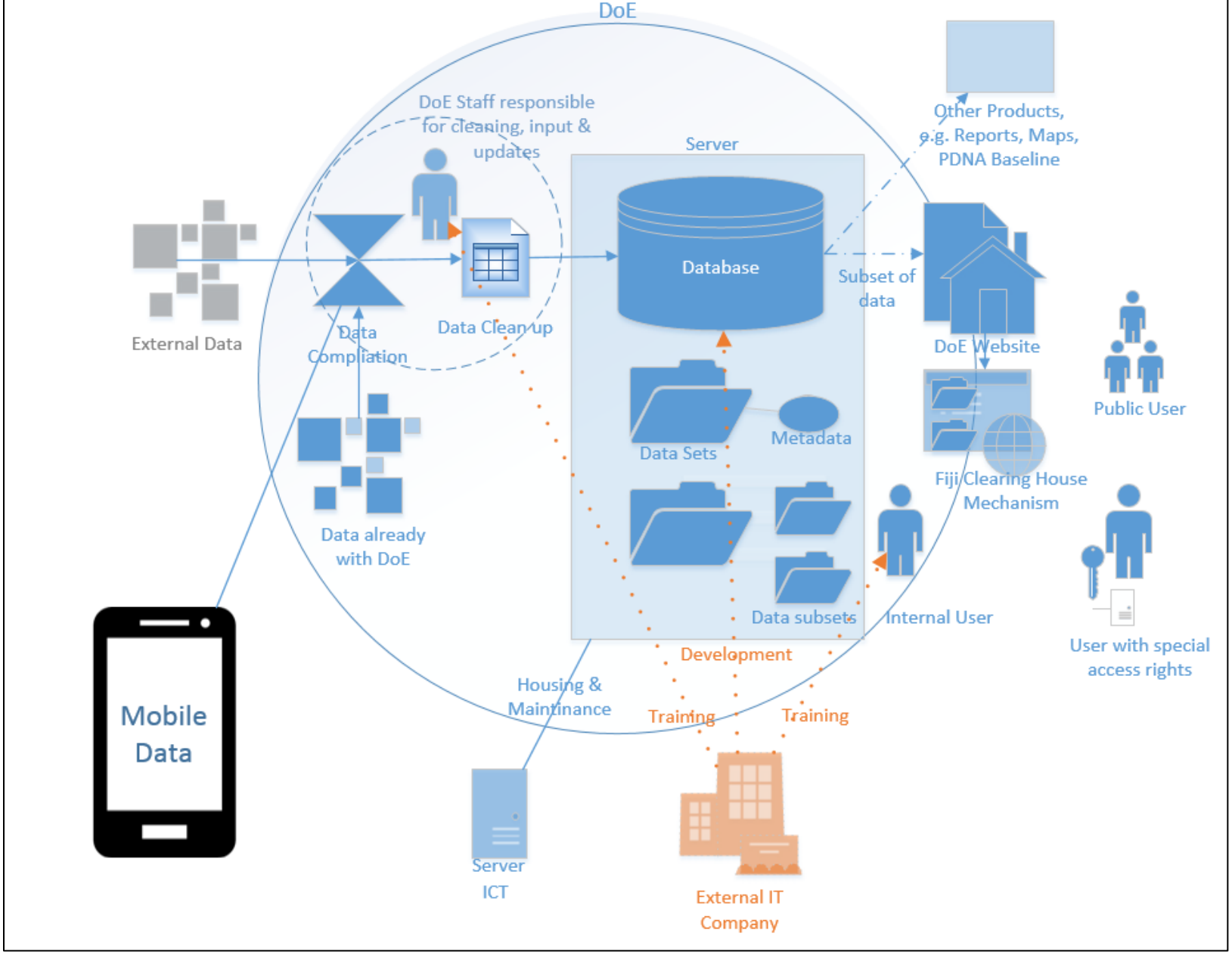
Further Reading:

- Digital Principles. 2016. Principles for Design & Development ICT4D. Available at: http://digitalprinciples.org/

Who is the user?

- Front and the backend user
  - Frontend users as primary audience of the app
  - Backend users are administrating data, authorizations etc. “behind the scenes”
    - In some cases the app use may be moderated by an enumerator, e.g. for data collection in the field
- For the involvement of the user from the very beginning, jointly developing a flow chart of the app functionality is a useful communication tool
  - Flow chart help to interpret the user’s ideas to the developer


Further info about size limits...
Fish is sad
Thumb down
Red light
Set Size
App
Set Size!
cm
Info
Size limit
Links
Info
Size limit
Links
Select species
Slide hand to size
Size counter (cm)
Fish smiles
Thumb up
Green light
Set Size!!
Recipes...
"Rewards"
e.g. recipe with fish species



For backend users: visualizing the ecosystem the app is feeding into, including staff responsibilities, server set ups and data retrieval

Required functionality

- **User interface** (UI): Hardware and software, e.g. contexts, screen, input, and mobility
- **Home page**: Instructions, dashboards, parallel Web Apps
- **One/Two-way communication**: Only display information vs. user input
- **On and Offline functionality:** In settings with limited connectivity
- **Back end**: Administration, data export or user access management…
- **User registration**
- **Scalability**: e.g. add-ons, language support
- **Media types**: e.g., Geo-Data, photos, video, audio

(readz.com 2016)

Native or Web App

- **Native apps:**
  - Installed directly onto a device itself, usually downloaded via stores
  - Developed for one platform taking full advantage of device features
  - Can work offline
- **Web apps**
  - Internet-enabled apps via the mobile device's web browser
  - Internet connectivity is necessary to use web apps
- **Hybrid apps**
  - Part native app, part web app
  - "Wrappers" for an existing web page with a presence in the app store
  - Significantly less effort for developing a native app

NATIVE APPS vs WEB APPS

PROS

- ✓ Allow function with no Internet connection
- ✓ Offer access to the underlying device platform for improved performance and additional functionality (push notifications, device camera, etc.)
- ✓ Distributed via app stores (Apple iTunes, Google Play, Windows Store, etc.)

CONS

- ✗ Developing only one native app excludes users on other platforms
- ✗ Can require considerably more time and money to develop for multiple platforms
- ✗ Require users to download and install updates

PROS

- ✓ Allow a single version to be developed and run on multiple platforms (Android, Apple iOS, Windows Mobile)
- ✓ May be updated instantly on the server side for rapid deployment

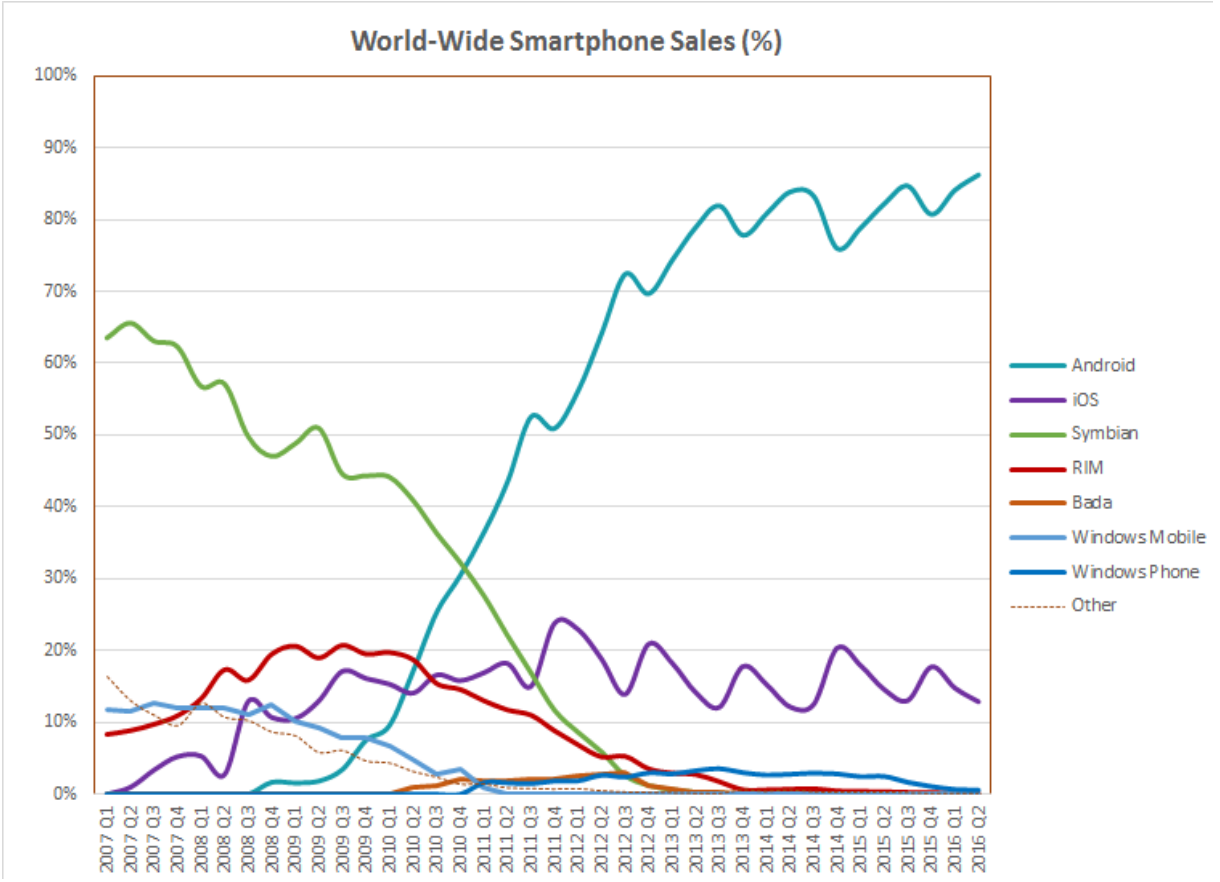
CONS

- ✗ Require Internet connection to function, and may perform erratically on low quality data connections
- ✗ HTML5 adoption is fragmented across platforms and web apps may not render consistently
- ✗ Do not support Digital Rights Management (DRM), background processing, or secure storage and push notifications

(signalinc.com 2016)

Operating system

- Especially in the context of developing countries, more affordable Android devices are more frequent
- Platform independent: web and hybrid apps



(Wikipedia 2016)

Backend

- Server, database, and website
- Key-turn ready solutions and building block systems may come with a fully curated server and database, while for individual development the backend is an important position to be discussed with the developer
- In general, Apps can be deployed either to curated **cloud services,** like Google App Engine or Amazon EC2 cloud services, or to **local webservers**.
- There are solutions that work completely offline, like ODK Briefcase

Distribution

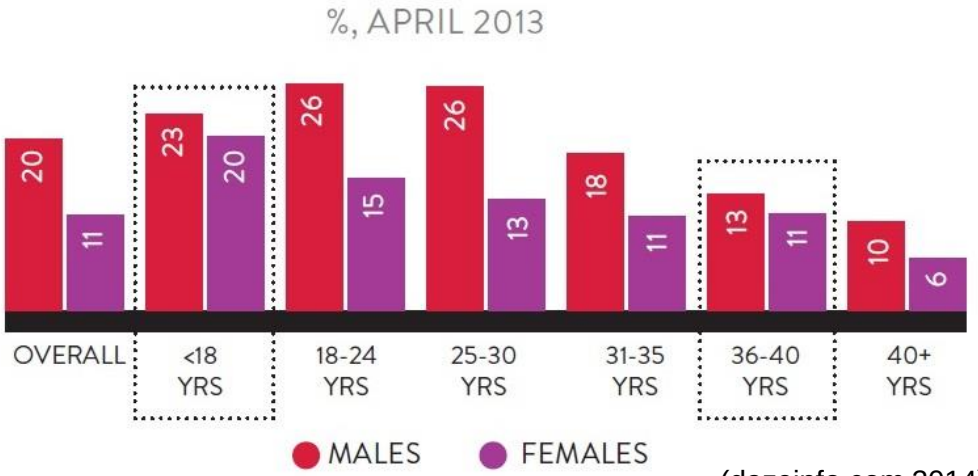
- Fore web apps: straight forward via sending a link
- Native apps are typically offered in an app marketplace

One-time fee of USD 25 USD 99/year

- Embed App in a communication and marketing strategy
- Unique **selling points** of app
  → packaged in appropriate **messages**
  → for envisioned **audience**
- Incentives, nudges and perks (e.g. free phone credit/badge system)

Distribution

- Training may be necessary
  - Previous experience with smartphones?



(dazeinfo.com 2014)

  - Providing documentation / face-to-face workshops in the field
  - Ongoing support
    - Technical difficulties, necessary updates, or staff turnover.

Internet access

- Typically, apps don’t use a large bandwidth end send only small amounts of data - dependent on media type
- Pre-exisiting mobile data plans or pre-paid data
- Provide the user with mobile data
- Subscriptions / (remote) on demand recharge
- Cooperation with local mobile phone companies (CSR)

(badcreditmobile.com 2016)

Hardware

- Smartphones or tablets (screen size, input)
- Basic smartphones are available for under USD 50
  - required functionality and user experience should be considered and tested
- Dual simcards
- Battery life
  - Additional chargers

(Goyam Solar 2016)

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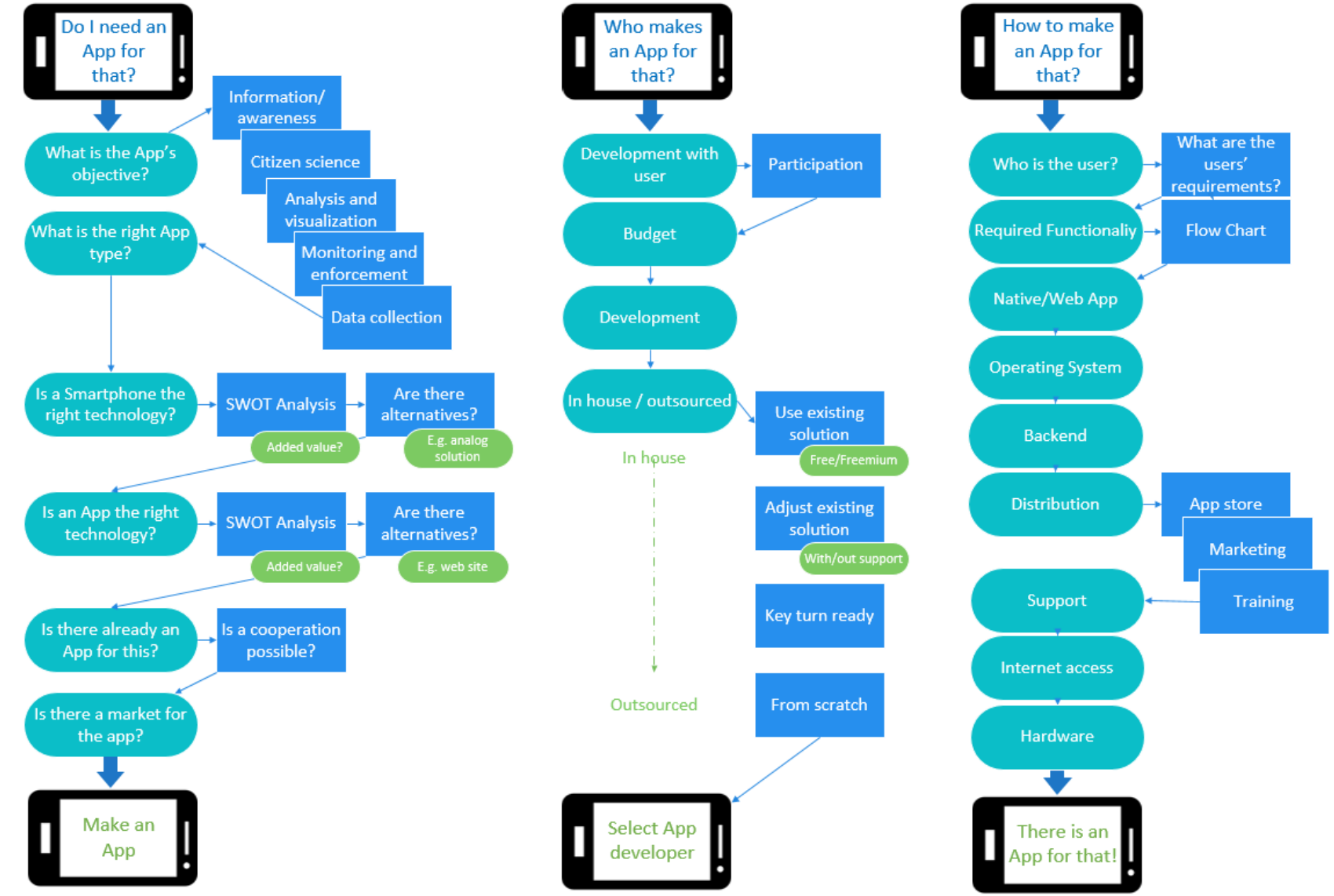
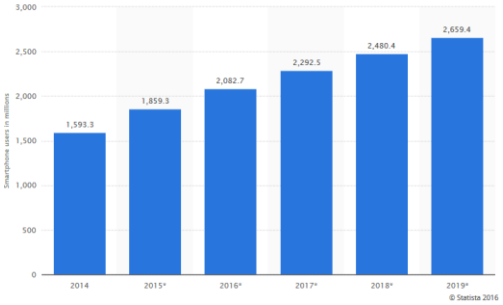


Outlook



- Increasing availability of smartphone and internet access, especially in developing world
- Cheaper phones and credit, e.g. Google Free Zone, “allowing basic feature phones
- New open operating systems like UbuntuTouch and Firefox OS phone
- Augmented Reality (AR), e.g. Google Glass
  - Optical head-mounted displays allow to present data directly in the environment it is derived→ app based engagement with broad audiences in completely new ways

- Challenges
  - Optimizing apps to settings with low available bandwidth/electricity
  - Integration with central, open, public data base infrastructure
  - Truly generic, open source platform for easy apps development