Toward App Studies

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Do we need an App studies? We have had Media Studies for decades, and in recent years, it has been followed by Game Studies, Internet Studies, Software Studies, Platform Studies, and probably more that I have forgotten. With the introduction of Apple's iPhone in 2007and the App store in 2008 (Flueckiger), apps have become extremely popular, more popular than web sites, Chris Anderson argues in his much-debated Wired article on the death of the Web.

If apps really are taking over, and the Web will be of little importance, then it is inevitable that we internet researchers will direct our attention to mobile apps. What would we want of an app studies?

I have limited time, so I will focus on apps for Apple's iPhone in this talk.

I will attempt to sketch a description of the iPhones Apps as an Actor Network, following the exampels of Bruno Latour and Michel Callon (). Then I will analyze three iPhone apps from the Software Studies perspective suggested by Lev Manovich, Matthew Fuller and David Berry.

But first: What would an app studies study? What is an app? The word *app* is short for *application*. Application software is traditionally software designed to do a specific task, as opposed to system software. In the last three or four years, however, most people would probably have thought of applications for mobile platforms, if asked what an *app* is, due to the popularity of Apple's *App store* and Google's *Play* (former *Android markets*). Within the media industry, book publishers, newspapers, TV stations and social network sites have all rushed to develop apps to make their material

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As it is work in progress, please comment, and do check back for later versions.
Available from http://fagerjord.no/blog/?page_id=95

available on mobile devices. A commonsense definition of an app could thus be «a software applications for a mobile device».

There is a huge variation between different apps, from complex games to very simple utilities.

Proponents of game studies has for years argued that to understand computer games require different theories and methods than those used to explain film and literature. This argument can be multiplied in the app store, where popular games sit next to books and films, but also to map applications (studied by all kinds of geography), medical diagnostic tools (social medicine and psychology), exercise journals (sports medicine) and recipe books and diet journals (nutrition).

Then, if you ask a person on the street what an «app» is, my guess is he or she will reply it's a something you download from App store to your phone, which becomes a square icon on the phone. This points to the *distribution* of apps, and the network in which designers, telephones, users, and Apple are parts.

App Store

iPhone owners find apps in the App store, a huge catalogue of more than 600, 000 apps. An app can be downloaded by clicking a link on the screen, and submitting the user's private Apple ID and password. Paid apps are charged to the credit card that the user registered in order to create an Apple ID account.

This week, there are 696 054 apps available in the U.S. Store. These are made by 182 249 different publishers, which means each publisher has made 3.8 apps on average (see table 1). It is a place for small businesses, as discussed by Pelle Snickars and Barbara Fluckiger. It is also well known is that Apple approves every app before it is published in the app store. This requirement has spurred a debate on censorship, as the company has rather strict requirements on what it will allow.

For the app creators, there are several other limitations. An iPhone app can only be created with a mac Apple's developer software, called Xcode. To test the app on an actual iPhone also requires a paid developer license from Apple. With a normal license, the app can be tested on only five iPhones, and can only be distributed further via the App store.

Category	
Games	125 193
Education	71 921
Entertainment	65 010
Lifestyle	58 662
Books	52 645
Utilities	42 559
Business	39 743
Travel	36 098
Music	26 728
Reference	22 789
Sports	20 101
Productivity	19 183
News	18 760
Healthcare & Fitness	17 604
Photography	16 561
Finance	15 587
Medical	14 382
Social Networking	13 575
Navigation	10 748
Food & Drink	3 111
Weather	2 944
Catalogs	2 134
Newsstand	14
Total	696 054

Table 1: Distribution of apps in Apple app store by category as of 17 October 2012. Source: *148apps.biz*

A fee must be paid before the app can be submitted to the App store, and the review process begins. The app can be distributed for free, or the developer can choose to sell it, in which case Apple keeps a cut of the price.

Apple's App store is what Michel Callon calls an obligatory passage point. Users, developers, apps, money and Apple as a company all meet in the App store.

The regulations and opportunities in the meetings of Apple, developers, software, registration fees and credit card companies, their *trials of strength*, as Bruno Latour calls them, are already studied by economists, scholars of law, and proponents of free speech. It is obvious that Apple has power in these trials of strength, as the company directs development with the XCode software, with limits to distribution built into the code, and on top of that deciding whether an app is allowed into the store or not. Developers also have power, however. The iPhone had not been the success it is without this

tremendous creativity on the part of the developers, as Pelle Snickars has shown. Developers test and try out their ideas and the capabilities of XCode and the iPhone, and have been able to push the uses of the polished piece of technology far beyond the imagination of its creators. Users also have power. They decide, one by one, which apps they want to install and use, in a trial of strength involving all the other actors.

Since the App store is so central to the App phenomenon, it is tempting to offer another definition of an app: An app is an application distributed through an integrated, monopolistic outlet.

There are other actors in the network too: Cell phone carriers and press and web site reviewing apps, for example. But right now, I would like to focus on another obligatory passage point we haven't discussed yet; the iPhone itself.

iPhone

When the iPhone was introduced, Steve Jobs announced it as three new devices combined: An e-mail device, a music player, and a phone. And there is a possibility that we still tend to think of the iPhone as a remediated telephone (to use a term coined by Bolter and Grusin), or perhaps a tablet for reading and gaming.

The technical specifications of an iPhone makes it very clear that the iPhone is more complex. We could put it this way:

An iPhone is a pocket-sized computer with a rechargable battery, running Apple's iOS operating system, and having several network connections, sensors and input/output channels.

- Its network connections are GSM mobile telephony network, a 801.11 Wi-fi network, and Bluetooth
- Input can be given via a 4-inch touch screen, a button on the front, a button on the top edge and two buttons on the left edge, a microphone and a camera on either side.
- Output is given through the screen, tow loudspeakers on the bottom edge, a loudspeaker at the front, a jack cable, a vibrator, or a powerful LED light. It is important not to forget the sensors: Global Positioning System (GPS) receiver, proximity sensor, an accelerometer, a three-way gyroscope and an ambient light sensor.

The operative system includes host of services that can be used by a developer:

- A framework for selling extra features and advertisments inside the app
- Bluetooth multi-player gaming framework
- Systems for accessing databases on the iPhone, such as contacts, music, films, and other apps
- Access to Apple-built network services, such as Game center, Push notifications, iMessage services, and iCloud storage.

With this in mind, we can define an app in yet another way: An iPhone app is a small program distributed via Apple's App Store, which orchestrates the networks, input/output and sensors for a purpose the user finds useful or entertaining, or both. An app can make calculations, based on input from the user or the sensors, send and receive data over a network, and output the results to the user, and simultaneously send the results over a network.

In the following, I will analyze four popular apps by describing them according to this simple model of input, calculation, network and output. By this analysis, I hope to demonstrate that the model is robust enough to handle a wide variety of apps, and to point out some directions where apps research is underway, or perhaps needed.

Flashlight

Let's start with a simple app, Flashlight. When the Flashlight App starts, it turns on the LED light (output). Pressing «off» or the round «signal light button» on the screen (input) turns the light off. When the light is off, a press on «signal light» will turn on the light for as long as the finger is on the button.

In this very simple app, any input is immediately translated to a corresponding output. But even if it is simple, it is very useful, for example when changing the headlamps of your car, something you often want to do when it is dark outside.

Sleep Cycle

My next example involves other sensors than the touch screen: Sleep Cycle is a popular app that monitors your sleep patterns.

Figure 1. Flashlight.

Figure 2. Sleep Cycle

With a scroll wheel icon the user can set a wake-up time, and press the start button icon to activate the sleep monitoring.

When «start» is pressed, the app takes the desired wake-up time and the phone's clock as input, and then constantly records information from the phone's accelerometers, monitoring when the user moves (assuming that the phone is place on his or her mattress as instructed). The movements are recorded, and an average sleep cycle is calculated based on periods of inaction and movement. When the desired wake-up time approaches, it is compared to the average sleep cycle, and the app outputs a sound through the

loudspeakers at the time when the user is likely to sleep most lightly in the half hour before the set wake-up time.

Pressing the «Statistics» tab icon outputs a graph of the user's sleep cycle the last night, the total time of sleep in hours and minutes and an calculated «sleep quality» measured in percent. The user can then e-mail the statistics or publish them to a Facebook account over either a wi-fi or a GSM network.

To sum up, this app takes input from the touch screen and the accelerometers, performs calculations on the input, and outputs the results through loudspeakers, the touch screen, and a network connection. It can potentially help the user to sleep and wake up better.

Input	*Calculation*	*Output*	*Network*
Accelerometer	Sleep cycles	Graphs on screen	Graphs via e-mail or Facebook
Touch Screen	Matching sleep cycle to wake-up time	Sound through loudspeakers	

Table 2: Analysis of Sleep Cycle

Facebook

The Facebook app is, of course, the mobile version of the world's largest social network site, and the most complex app in this study. As of February this year, it was the most downloaded iPhone app ever.

When the app launches, it uses a Wi-Fi or GSM network connection to access Facebook's servers via the internet.

As I am sure you know, the Facebook servers carry out complex calculations to produce what is known as the News Feed. From the total of all the updates made by all my subscribed friends and pages, Facebook's servers runs the «EdgeRank» algorithm posts I am likely to want to read.

The freshly calculated and downloaded News Feed is too large to be displayed on the iPhone's screen at any one time, so the app allows the user to control the display via touch screen input. A wide variety of screens are organized to give the user the impression that the iPhone screen is a movable window onto a large canvas, as shown in the figure.

Via button icons, I can write a short message with the on-screen keyboard and publish it. I can take a picture with the camera on the device and upload it, or, alternatively, upload a picture from the iPhone's image database. And I

Figure 3. Map of the Facebook app

can «Check in», using the device's GPS and Wi-Fi receptors to calculate my location, and upload it to Facebook.

Each post in the news feed contains a link to a separate screen for the post, and a link to the user who posted it. I comment on the post by pressing «comment», which brings up a on-screen keyboard, or press «like».

If a user has written an URI in her status, a link to the Web page is created, together with a thumbnail image. Pressing the link will open the Web page within the Facebook app.

Pressing the link to a user brings up that user's «timeline».

To the left of the news feed is the main menu, with a host of different options.

Only a little of all this information is stored in the app itself. The app is a terminal into the Facebook service, giving access to most, but not all, of Facebook's features.

If we compare the app with the Web version, the most obvious difference is that the real-time «Ticker», birthday reminders, and advertisements are missing.

The Web version also allows a few actions that are not available in the app, such as sharing other user's posts, and, editing and highlighting your own post's and hiding posts form others..

If you visit Facebook with the Safari browser on the iPhone, however, you are redirected to m.facebook.com, which in Safari looks almost entirely like the Facebook app, and offers exactly the same functionality (if your browser allows access to the camera. The current version of Safari on iPhone does not).

To analyze the Facebook app as an app alone will thus only show parts of the Facebook phenomenon. Rather than an app, it is a terminal among several into the Facebook service. A mobile app allows you to take Facebook with you, and record photos, videos and statuses as you are moving around away from you computer. It also allows you to use Facebook to kill time while commuting, waiting, and being away from the computer desk. Thus, it expands the reach of the Facebook service, but it does not radically alter the experience.

This is very much the point Tim O'Reilly brought forward in a comment to Chris Anderson's much discussed *Wired* article 'The Web is Dead':

> «´[W]eb sites' like Google, but also now Facebook, Twitter, Amazon, PayPal, LinkedIn and many others, have been quietly building those enormous data back ends that drive their web sites, but more importantly, also drive a vast array of web services. […] What the mobile ecosystems of today have done is to unmask the reality that it's the back end that matters. […] It's easy to focus on the apps themselves, down on the phone, and to forget just how many of the key apps are the same networked apps that we see on the web, just with a different front end.»()

This analysis of the Facebook app can be summed up in the table below.

Table 3. Analysis of the Facebook app

Network	*Server-side calculations*	*Output*	*Input*
	Calculate News Feed		
Download News Feed and other pages.	Serve News Feed and other pages	ShowNews Feed and pages on touch screen. Play sound from film clips through loadspeakers	Touch interactions with button icons.
Upload new postes.	Add new posts to the database		New status updates from touch-screen keyboard GPS and Wi-Fi location data Camera images Images from device's image database

Conclusion

I hope to have demonstrated that apps are developed in a network of developers, Apple's Xcode application, Apple's approval service, Apple's App Store, users, and the iPhone itself. I further hope to have shown that apps can be described and analyzed as small applications that put the iPhone's computing facilities, network connections, sensors and output devices to use for purposes that users find meaningful.

To view apps from this perspective makes it very clear that apps do not harbinger the death of the Web. Access to web services is only a fraction of the app universe. I find Gunnar Liestøl's perspective more interesting: That we are moving into an era of sensory media.

The network I have sketched is already being studied by researchers using insights from several disciplines. The relations between developers, App Store and the approval service is studied by economists and political economists. The many different uses of iPhones are studied by sociologists, and anthropologists, and scholars of different fields study apps when they are used within their fields, such as game studies, and journalism studies, or medicine.

In order to give a broader account, I have drawn on vocabulary from computer science and software studies in the analyses I have reported on today, and I have stressed the importance of the iPhone's many sensors and input devices. The possible uses of these inputs is a field of its own, with the Mobile Human-Computer Interaction conference as its main venue. I was present at the conference last year, and heard papers on how the accelerometers can be used to measure distance walked or to discern between a light tap and a hard tap on the screen, and how the camera can be used to help blind people discover pedestrian crossings. Other researchers at the same conference report on usability studies, finding out how to make complex interfaces such as the one on the Facebook app easy to use.

I find it unlikely that all these disciplines will come together to form one App Studies, as their methods and epistemologies are quite different from each other. Still, I hope that the description provided here can be used for cross-disciplinary studies of the app phenomenon.

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