

iOS Application Development

Lecture 1: Introduction

Prof. Dr. Jan Borchers
Media Computing Group
RWTH Aachen University

Winter Semester '22/'23

hci.rwth-aachen.de/ios



RWTHAACHEN
UNIVERSITY

Team



**Prof. Dr.
Jan Borchers**



**René
Schäfer**

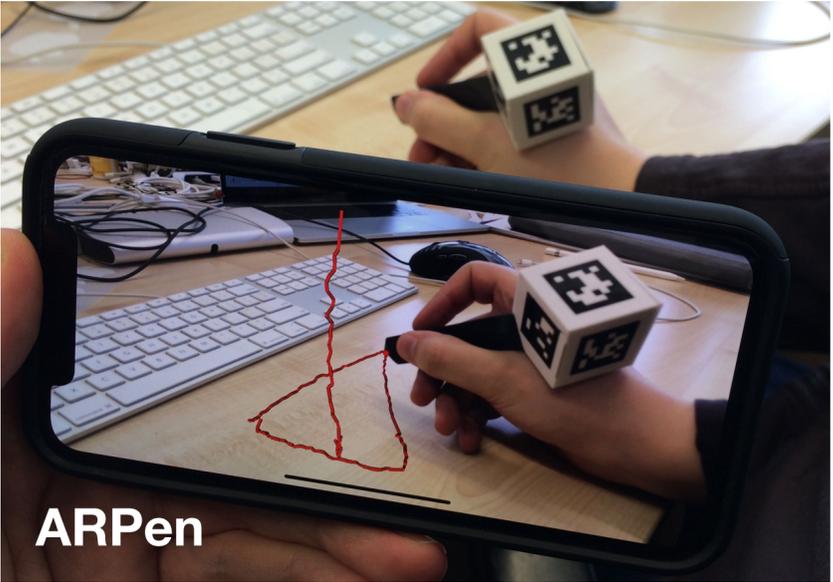
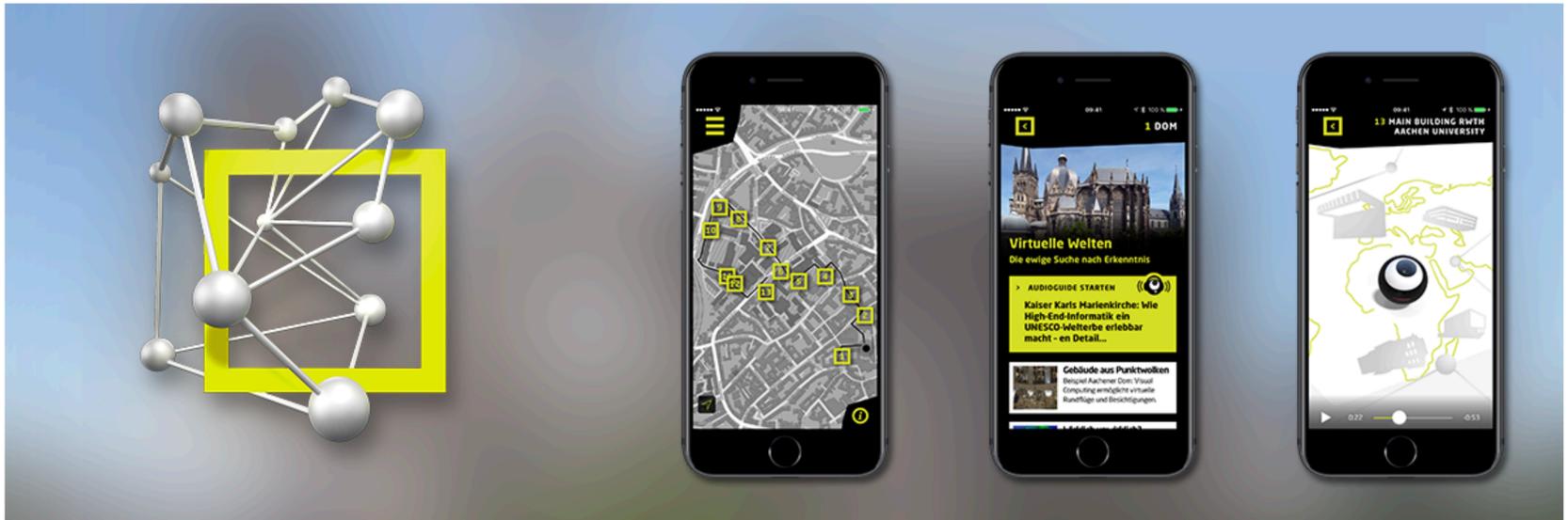
rschaefer@cs.rwth-aachen.de
E-Mail Subject: [iOS]



**Oliver
Nowak**

nowak@cs.rwth-aachen.de
E-Mail Subject: [iOS]

Some of our iOS Projects



CENTRE CHARLEMAGNE
Neues Stadtmuseum Aachen
Centre Guide



Corona



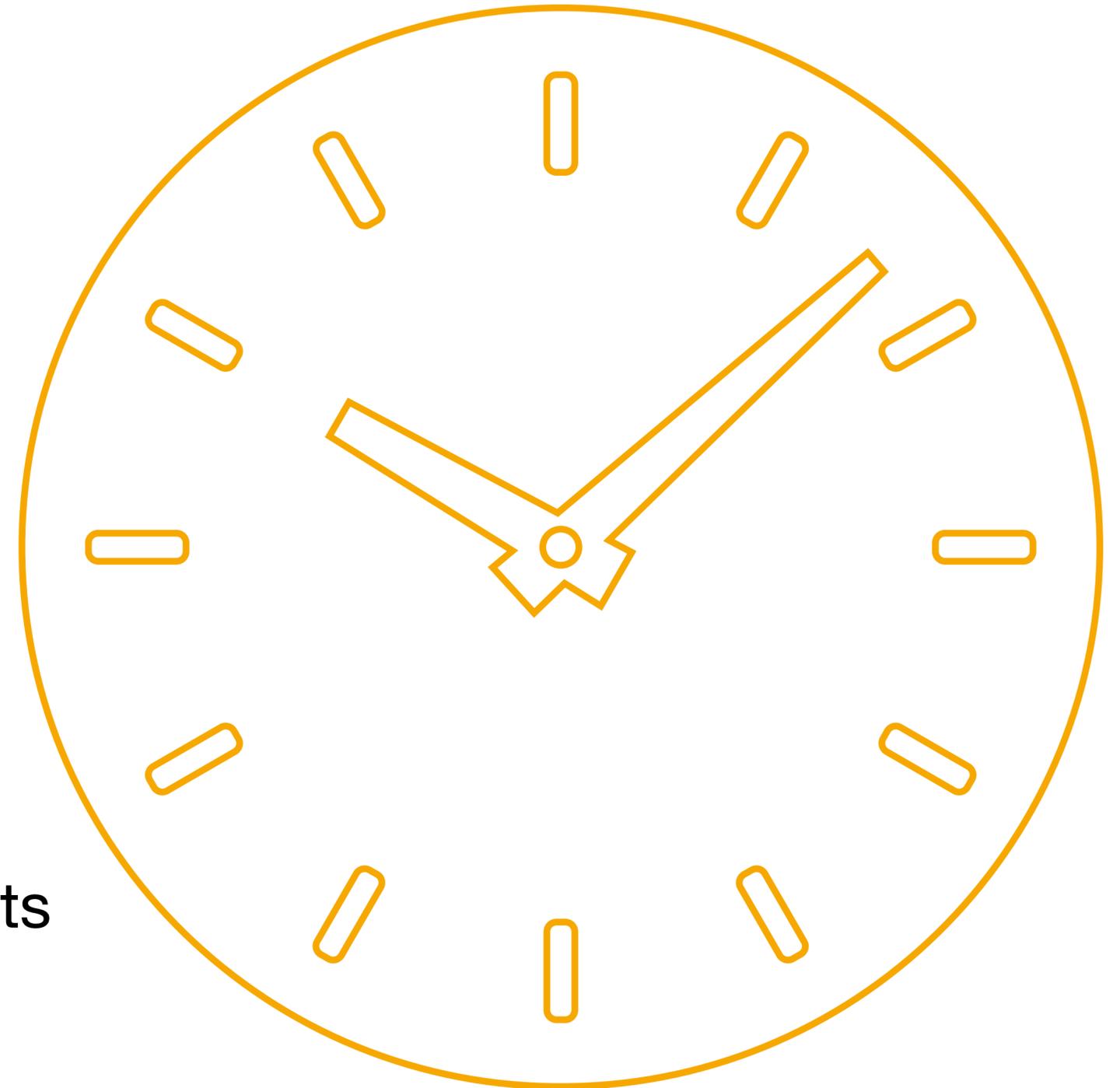
ForcePicker



Aixplorer

Administrivia

- 6 Credit points
- Class times
 - Mondays (12:30–14:00),
i10 seminar room 2222
 - Tuesday (10:30–12:00),
i10 seminar room 2222
 - Already over 160 registrations, but 42 seats
- hci.rwth-aachen.de/ios

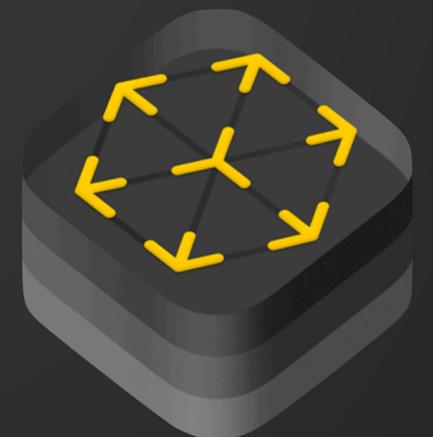


Course Requirements

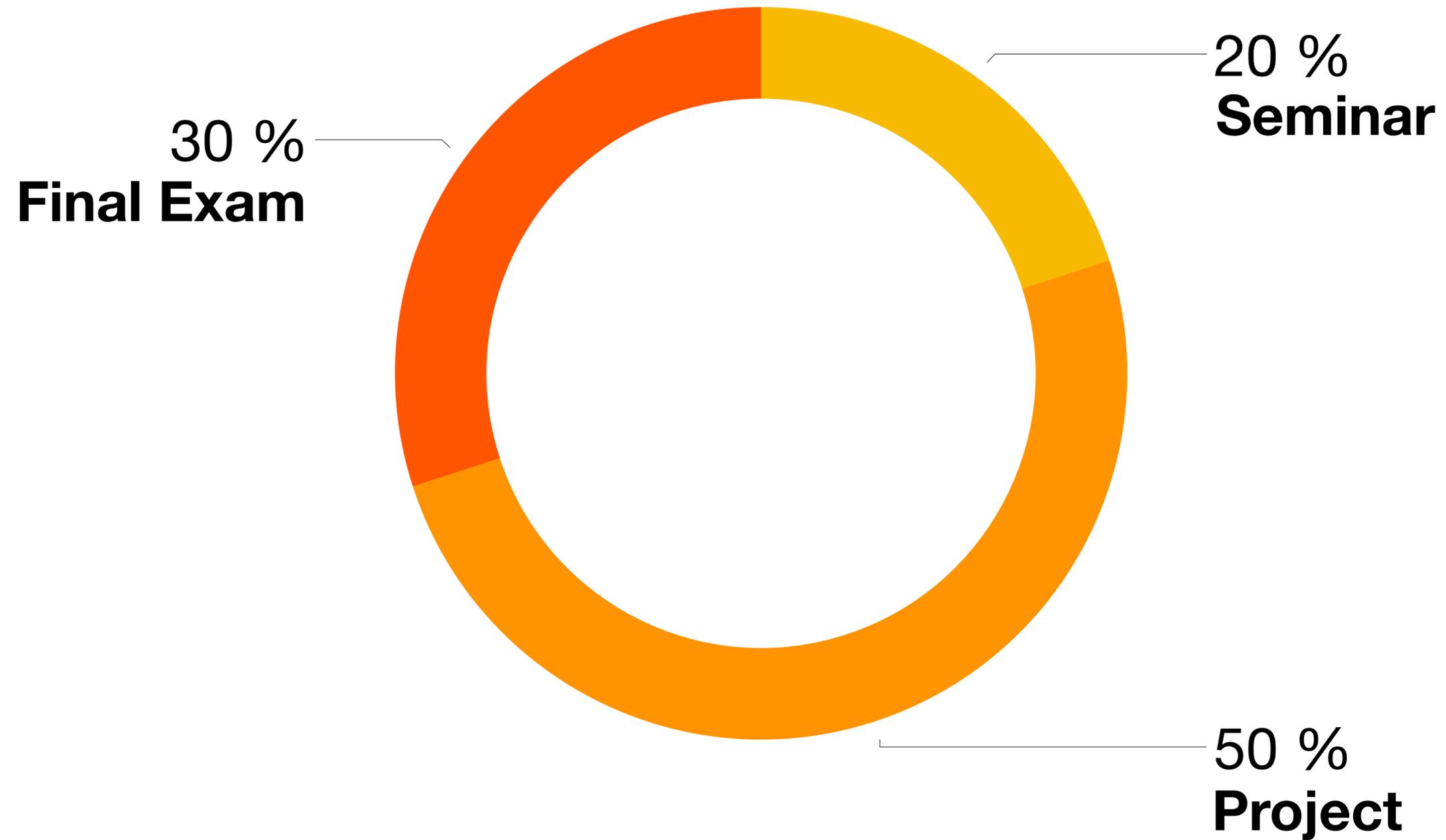
- Required
 - OOP experience
 - Apple Developer ID
 - You must be registered for this course in RWTHonline
 - Mac capable of running Xcode 14*
 - Optional (but helpful)
 - iOS device running iOS 16* (simulator sufficient for many tasks)
 - Previous experience with Swift or Objective-C
 - This course is only for students of:
 - B.Sc. and M.Sc. Computer Science
 - SSE / MI / DS / TK
- * We have a **FEW** time-share devices

Class Syllabus

- Part 1
Lectures: Introduction into Swift and iOS
- Part 2
Seminars: iOS Frameworks
- Part 3
Project: App Development



Your Final Grade (6 ETCS)



Lectures

- Introduction to Swift
- Xcode
- Introduction to UIKit
- Navigation, Animation, Customization
- Collections, AutoLayout
- Persistence and Networking
- Bindings, UIKit+SwiftUI, ...

Textbooks



Available for free on Apple Books

Seminar

Sample Topics:

- CoreAnimation
- Haptics and Sounds
- SpriteKit
- Working with Files
- Combine
- Debugging in Xcode
- WidgetKit and Siri
- WKWebView
- MapKit
- UIPresentationController
- CoreML & CreateML
- CoreData
- watchOS Apps
- SceneKit
- Advanced SwiftUI Layout
- Metal

- 15-minute presentations
- 22.11.2022–13.12.2022
- Overview of the framework
- Example applications
- Attendance is mandatory
- 20% of your final grade



Project

- Kickoff: 19.12.2022 (after the seminar talks)
- Topics announced at kickoff date

- Submittable app
- Final presentation with live demo
- Code documentation!
- 50% of your final grade



Written Exam

- Questions about:
 - Lecture content
 - All seminars

- Tentative exam dates:
 - 1st exam: Sat. 19.02.2022
 - 2nd exam: Wed. 16.03.2022
- 60 minutes
- 30% of your final grade



Limited Seating

- We only have **42 seats** available
- Attending the seminar and project meetings is **mandatory**
- **Only take this class if you are sure you can attend all classes**



How to Get a Seat

- **Register** in RWTHonline & send the **Declaration of Compliance** before **tomorrow (Wed, 12.10.) 13:00**
- We will invite everyone who did this to **Moodle** to **form groups**
- Form groups of **3 students**
 - There should be at least **2 students with a Mac** per group
- On **Friday 14.10. 13:00**, we will randomly select 14 **full** groups
 - Everyone else will be removed from RWTHmoodle

Lecture Slides and Videos



- All slides and lecture videos will be available online:
 - <http://hci.rwth-aachen.de/ios>

Developing for Mobile Platforms





VS.

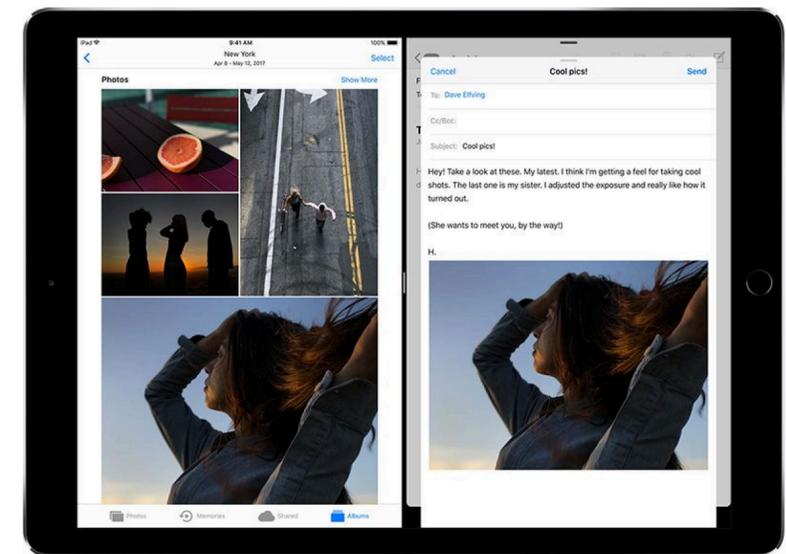






Mobile Device Characteristics

- Context is key: task, attention split, peripheral use, movement, interaction time
- Screen size is compact
- Users interact with one screen at a time
- Mostly users interact with one application at a time (iPadOS allows split screen)
- Onscreen help is minimal
- Direct touch or pen input



10 Golden Rules of Interface Design (see DIS 1)

1. Keep the interface simple
2. Speak the user's language
3. Be consistent and predictable
4. Provide feedback
5. Minimize memory load
6. Avoid errors, help to recover, offer undo
7. Design clear exits and closed dialogs
8. Include help and documentation
9. Offer shortcuts for experts
10. Hire a graphics designer

The iOS Family



Life as an App

- iOS is an app-centric environment
- One app per task!
 - Define the task that users want to accomplish with your app
 - Do *one* thing, but do it well
- Data is stored per app
- Data exchange between some apps is difficult



Designing the UI

- Make it obvious how to use your application
- Sort information from top to bottom
- Use visual weight for relative importance
- Use alignment for groupings or hierarchy
- Use multiple views for different parts of the app



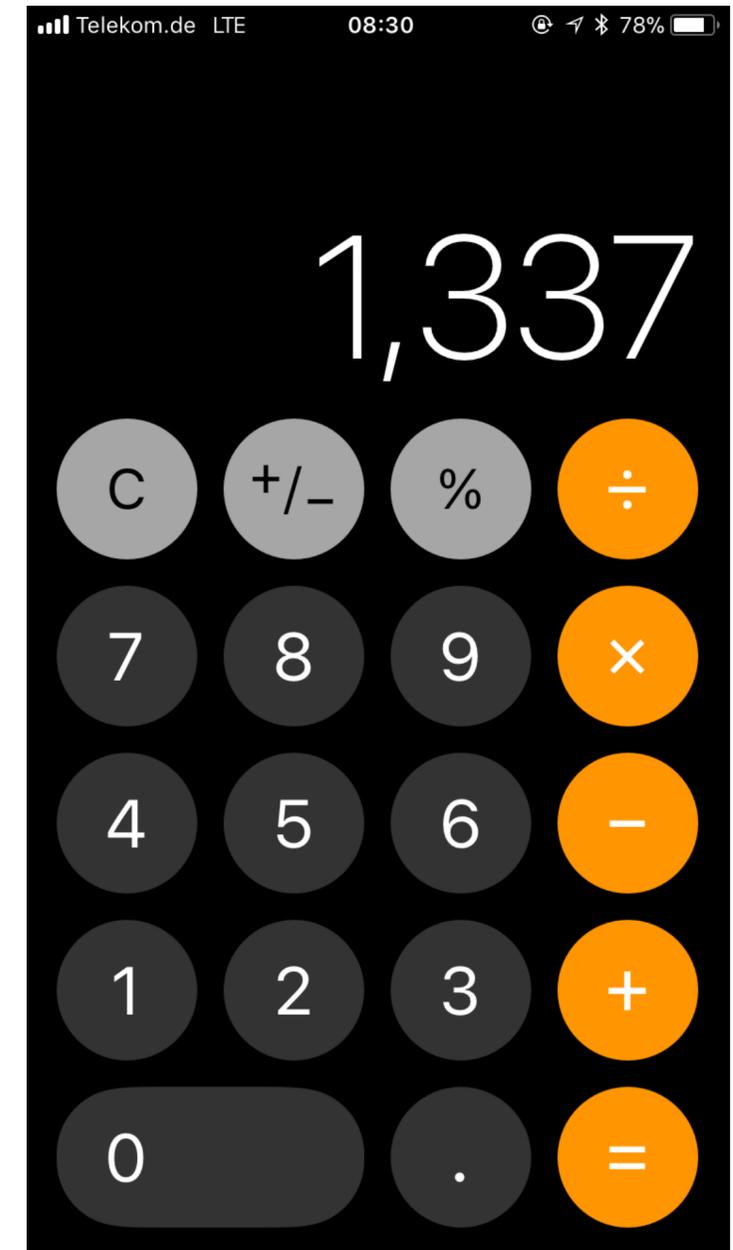


Notes



Designing the UI

- Text should always be legible
- Avoid inconsistent appearances
- Provide fingertip-size targets (8 x 8 mm)
- Minimize text input



Interaction Design

- Smartphones are mostly used with only one hand
- Not everyone is used to multitouch interaction
 - Only use multitouch if you need it
- Follow Apple's examples if possible
- If you use complex gestures, help the user

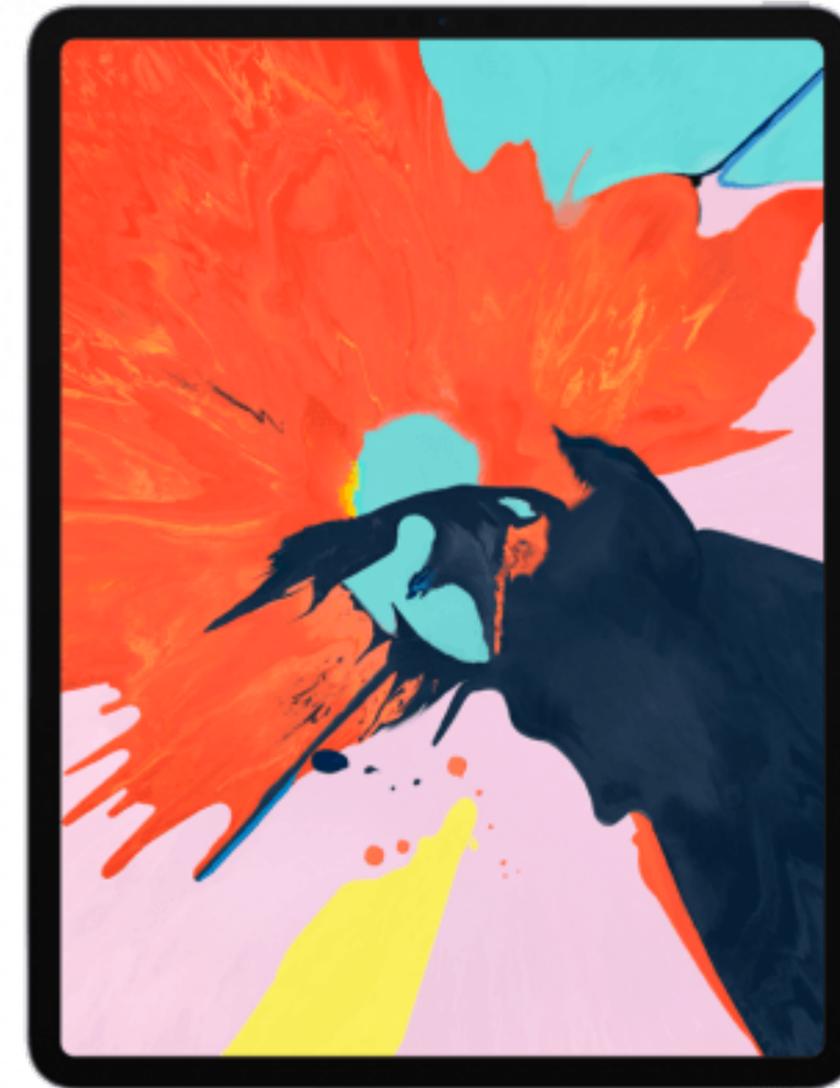


Standard Gestures

	Tap	To press or select a control or item (analogous to a single mouse click).
	Drag	To scroll or pan.
	Flick	To scroll or pan quickly.
	Swipe	In a table-view row, to reveal the Delete button.
	Double tap	To zoom in and center a block of content or an image. To zoom out (if already zoomed in).
	Pinch open	To zoom in.
	Pinch close	To zoom out.
	Touch and hold	In editable text, to display a magnified view for cursor positioning.

Designing the UI

- Several resolutions, about four aspect ratios:



- Device orientation: portrait or landscape
- Designing for the iPad requires more than increasing the resolution

Inbox

Search

Mailboxes: Inbox, VIPs, Drafts, Sent, Flagged

Sort by Date

UX / HCI Researchers	12:51
Quantified Heuristics?	Inbox - work
Is there any method for quantifying the data resulted from usability heuristics evaluation? I will be thankfu...	
Lorente Ruiz, Luis	10:40
Iphone programming registration	Inbox - work
Dear Mr. Voelker, I am an exchange student coming from Spain. I am not able to register in the course IP...	
RWTH - Gründerzentrum	09:56
AC ² - der Gründungswettbewerb	Inbox - work
START UP! Mit AC ² - der Gründungswettbewerb zum eigenen Unternehmen. Die GründerRegion Aachen u...	
Ehsan Poor Mohammady	09:45
PDUI Results	Inbox - work
Dear Simon, I am Ehsan Poormohammady a master student of SSE who took PDUI seminar with you las...	
Willi Geffers	09:24
Re: Fragen zum Mac Lab	Inbox - work
Hallo Simon, die Macs im Pool laufen mit der vorletzten Release des OS-X. Die aktuelle Release f...	
Nina Rußkamp	Yesterday
Anmeldung Proseminar	Inbox - work
Sehr geehrter Herr Völker, leider habe ich es verpasst, mich rechtzeitig für ein Proseminar anzumelden, wür...	
Alexander Theißen	11/10/14
iPhone Programming Lab	Inbox - work
Hi, I am interested in participating in the iPhone Programming Lab. My Problem is that I am not able...	
Chat Wacharamanotham	11/10/14
Re: Lab mac mini	Inbox - work
Ignore the "now". All Mac minis that are supposed to be in the pool are already in the pool. Cheers, Chat	
tomaz & zrbenst	11/10/14
[appledoc] Fix EOF token crash (...)	Inbox - GMAIL 4 >>
reStructuredText seems nice, but I didn't find C based parser and it's not supported on objc, s...	
Andrii Matviienko	10/10/14
Master's Thesis draft	Inbox - work
Hi, Please find attached the draft of Master's Thesis. Cheers, Andrii	
Stauch, Alexander	10/10/14
Veranstaltung am 19.03.2015: "Drittmitt...	Inbox - work
Newsletter Forschungsförderung Abt. 4.2 Sehr geehrte Damen und Herren, die Abteilung 4.2 bietet...	

RWTH - Gründerzentrum 13 Oct 2014 09:56 RG

To: rwth-mm@lists.rwth-aachen.de Cc: social@rwth-aachen.de
AC² - der Gründungswettbewerb

START UP!

Mit AC² - der Gründungswettbewerb zum eigenen Unternehmen.

Die GründerRegion Aachen unterstützt mit dem Geschäftsplanwettbewerb AC² - der Gründungswettbewerb Existenzgründer auf dem Weg zur eigenen Firma, mit besonderem Fokus auf das Thema „Innovation“.

Angehende Unternehmer erhalten mit einem kostenfreien Mentor, vier Gutachter-Feedbacks, sieben Fachinformationsveranstaltungen sowie attraktiven Geld- und Sachpreisen genau die Unterstützung, um ihre Gründungsidee ins richtige Licht zu setzen.

Kommen Sie zur Auftaktveranstaltung am

Dienstag, 11. November 2014,
in der Aachener Bank, Theaterstraße 5,
(Zugang über Wirichsbongardstraße)
Einlass: 18:30 Uhr, Beginn: 19:00 Uhr

und lernen Sie in ungezwungener Atmosphäre die Initiative, andere Existenzgründer, Unternehmer sowie die AC²-Experten aus Wirtschaft und Wissenschaft kennen.

Anmeldung zur Auftaktveranstaltung unter: <http://www.gruenderregion.de/gruenderkalender-alle-veranstaltungen.html>

Wie ist der Ablauf von AC² - der Gründungswettbewerb?

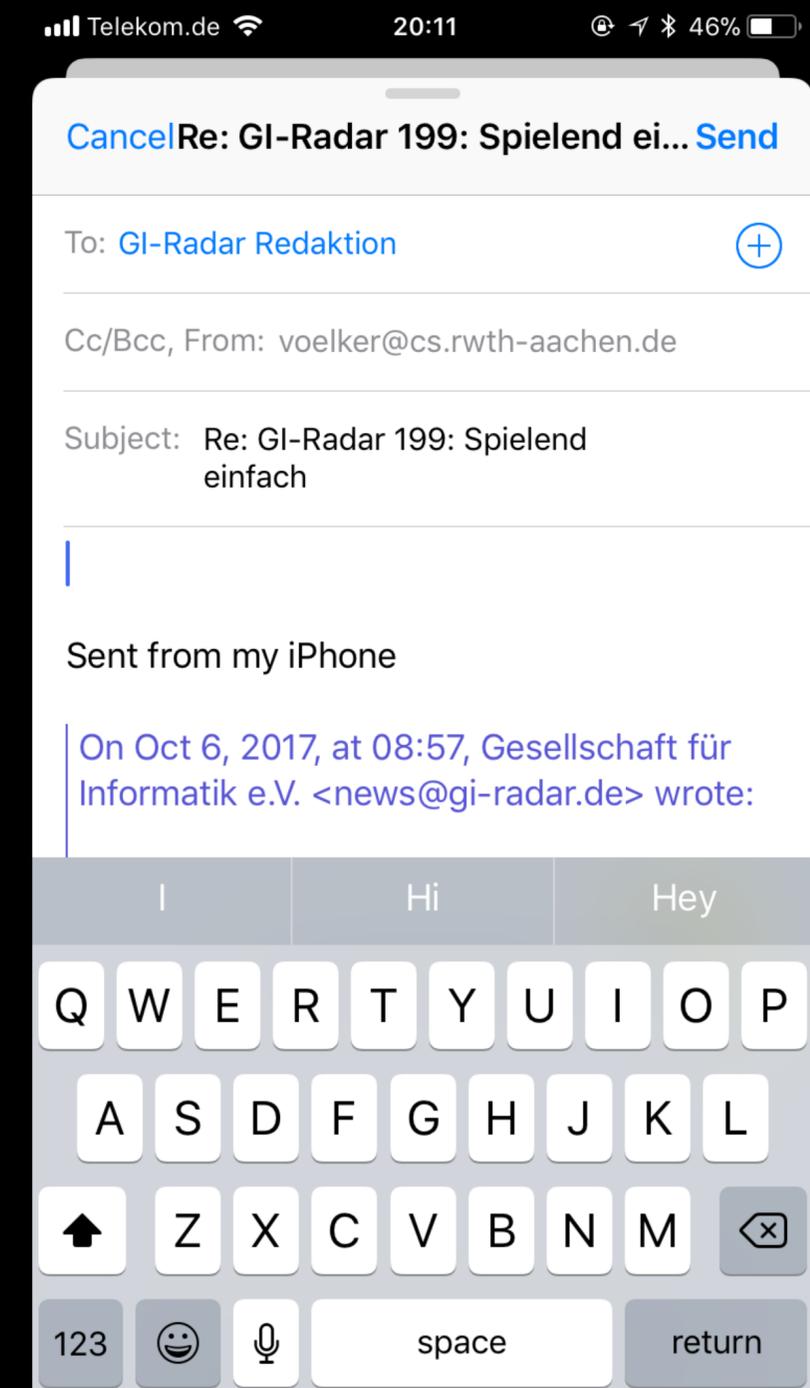
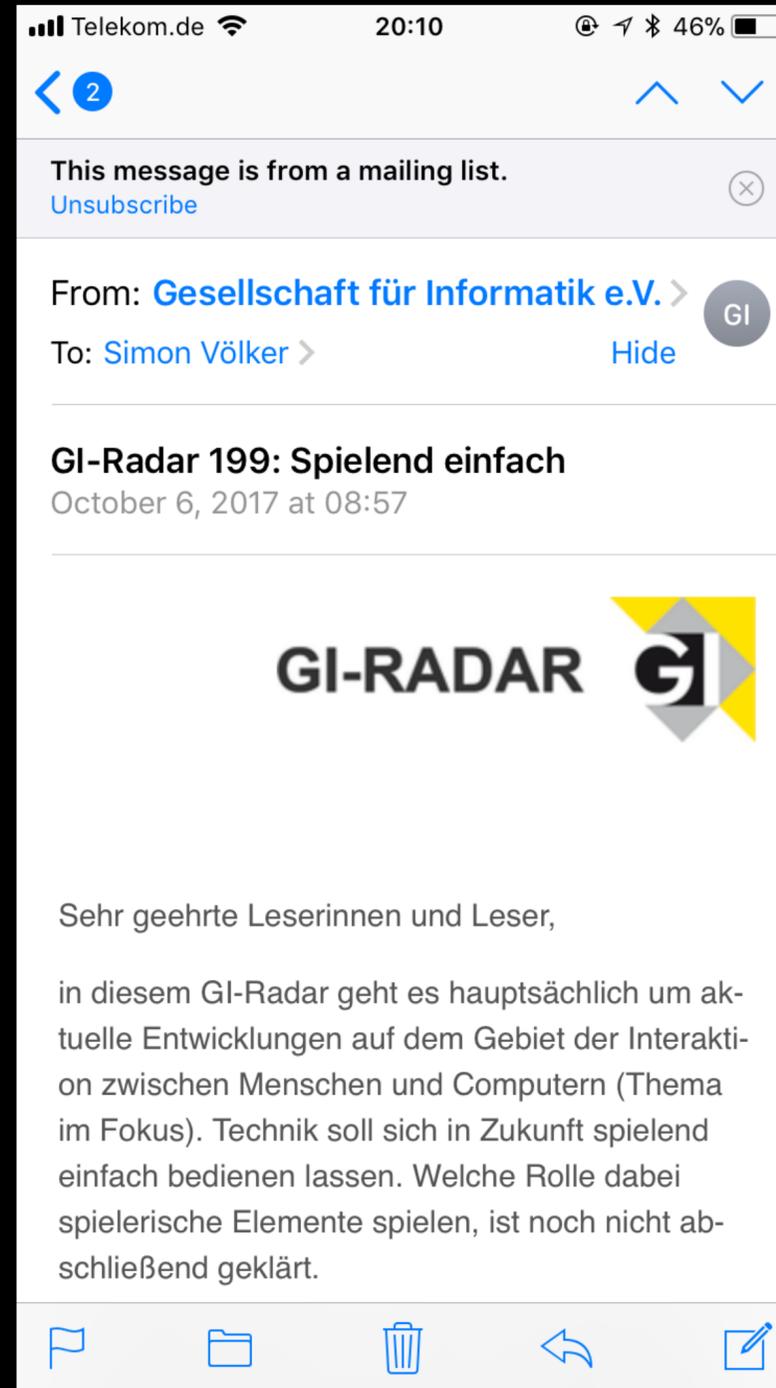
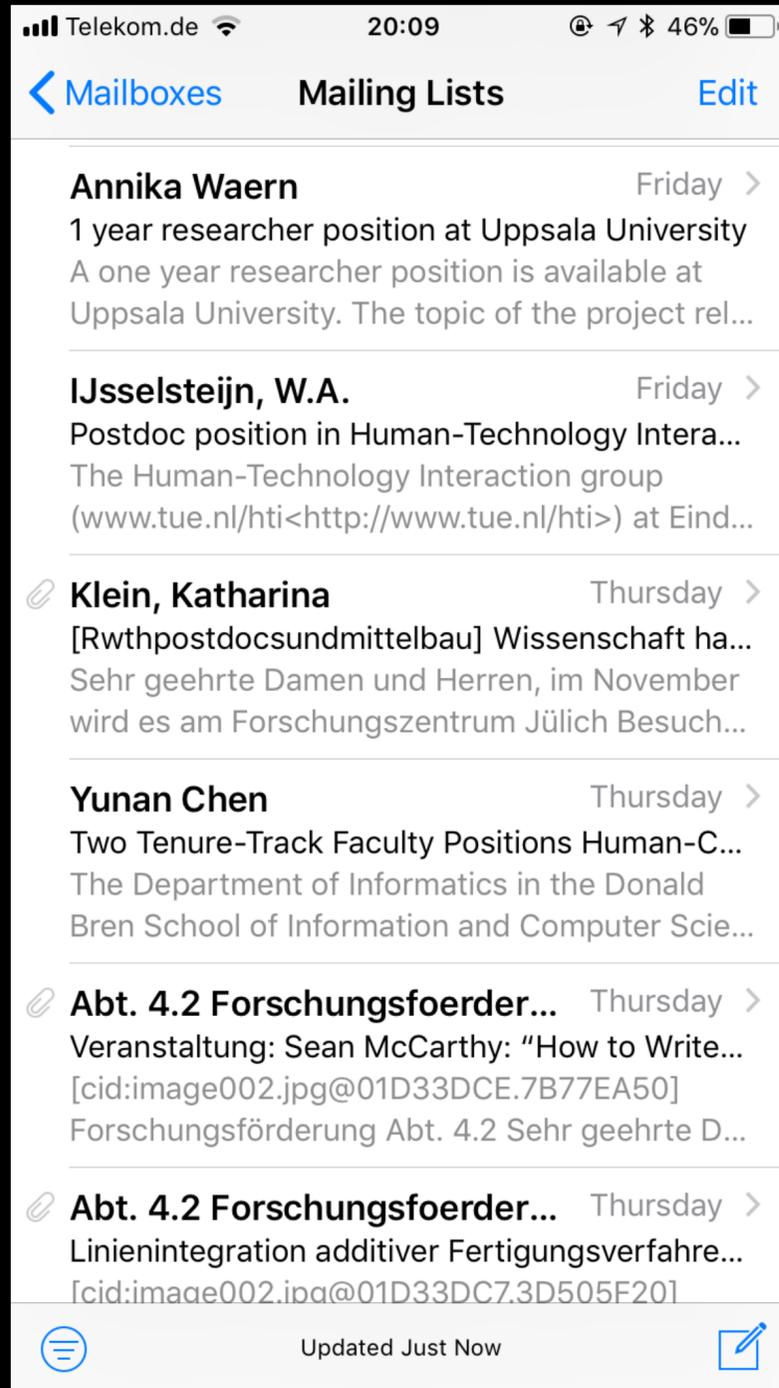
Der Geschäftsplanwettbewerb richtet sich an alle, die eine Geschäftsidee haben und eine Existenzgründung anstreben oder ein Unternehmen übernehmen möchten. Unterstützt durch einen Mentor aus dem AC² - Beraternetzwerk entwickeln Sie aus Ihrer Gründungsidee einen aussagekräftigen Geschäftsplan. Der Wettbewerb läuft in zwei Phasen ab. Grundsätzlich ist ein Einstieg in jeder der beiden Phasen möglich. In der ersten Wettbewerbsphase bis 5. Januar 2015 erarbeiten Sie mit Ihrem Mentor einen Grob-Geschäftsplan. In der zweiten Wettbewerbsphase bis 16. März 2015 entwickeln Sie diesen weiter zu einem Detail-Geschäftsplan. Am Ende jeder Phase steht die Begutachtung der eingereichten Pläne durch zwei unabhängige Gutachter. Die zehn besten Geschäftspläne der Phase 1 werden auf einer Zwischenprämierung am 10. Februar 2015 und die drei besten Geschäftspläne der Phase 2 im Rahmen der Verleihung des AC² - Innovationspreises der Region Aachen, Düren, Euskirchen, Heinsberg am 11. Juni 2015 mit Sachpreisen und Geldpreisen in einer Gesamthöhe von 32.500 Euro ausgezeichnet.

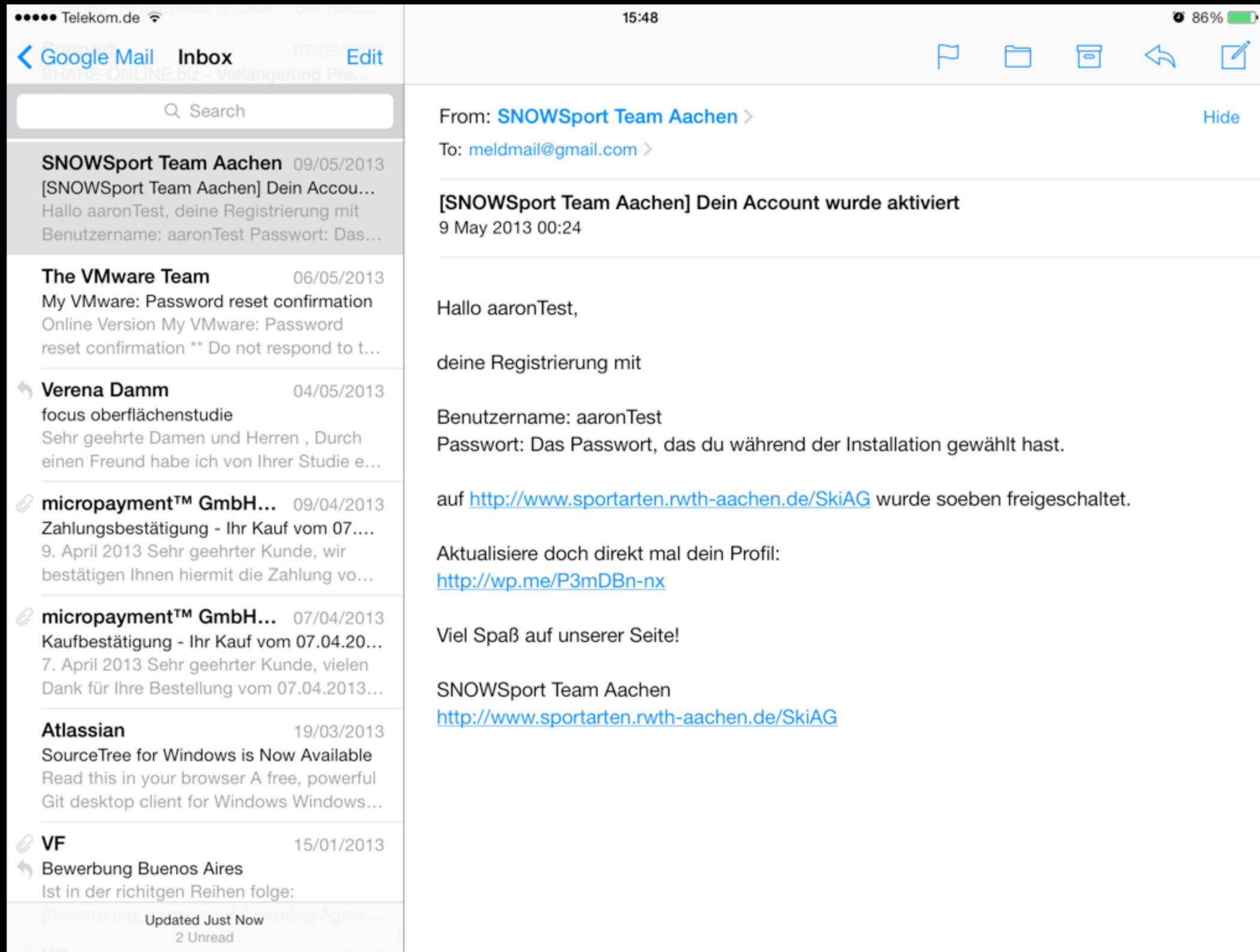
Fünf Gründerabende zu Themen wie Recht, Finanzen oder Marketing sowie zwei spezielle Veranstaltungen zum Thema Innovation runden das Programm ab. Im informellen Teil dieser Veranstaltungen besteht die Möglichkeit, mit anderen Gründern, den Mitgliedern aus dem AC² - Beraternetzwerk und Kapitalgebern in Kontakt zu treten.

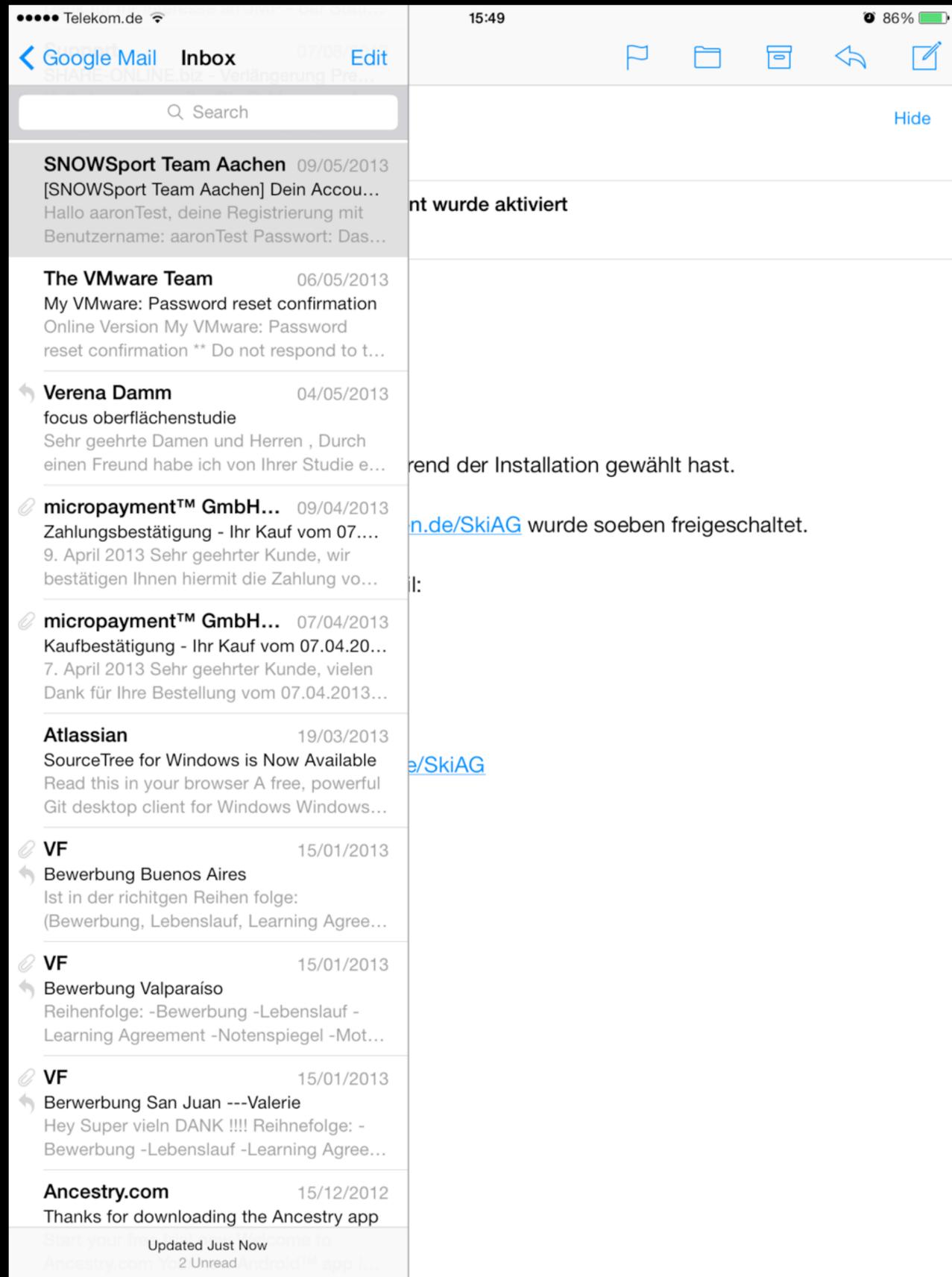
Informationen und Anmeldung unter:

Internet: www.ac-quadrat.de
E-Mail: info@ac-quadrat.de
Telefon: 0241 4460-350



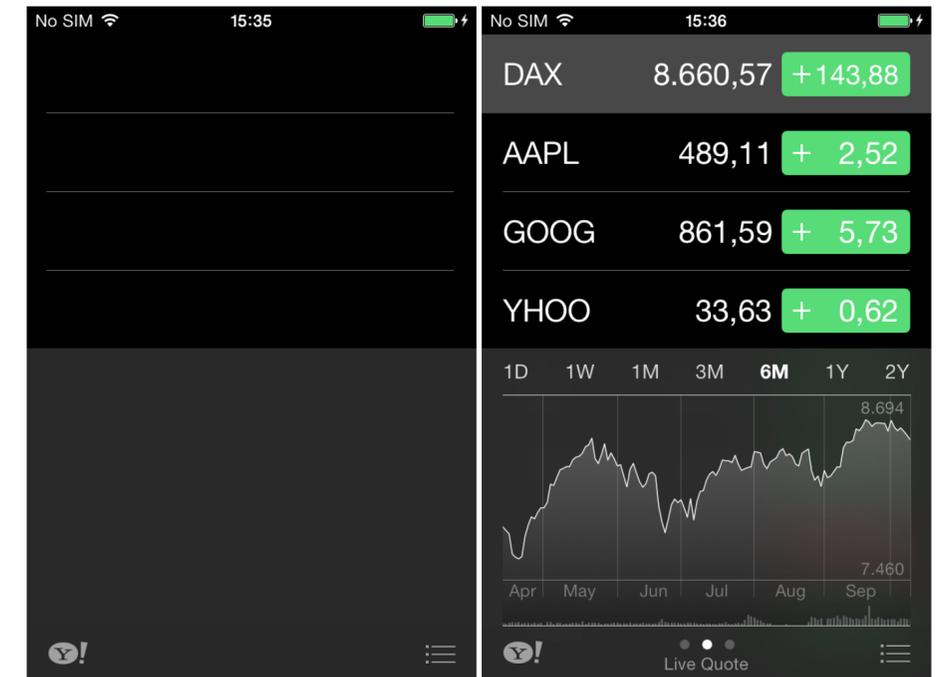






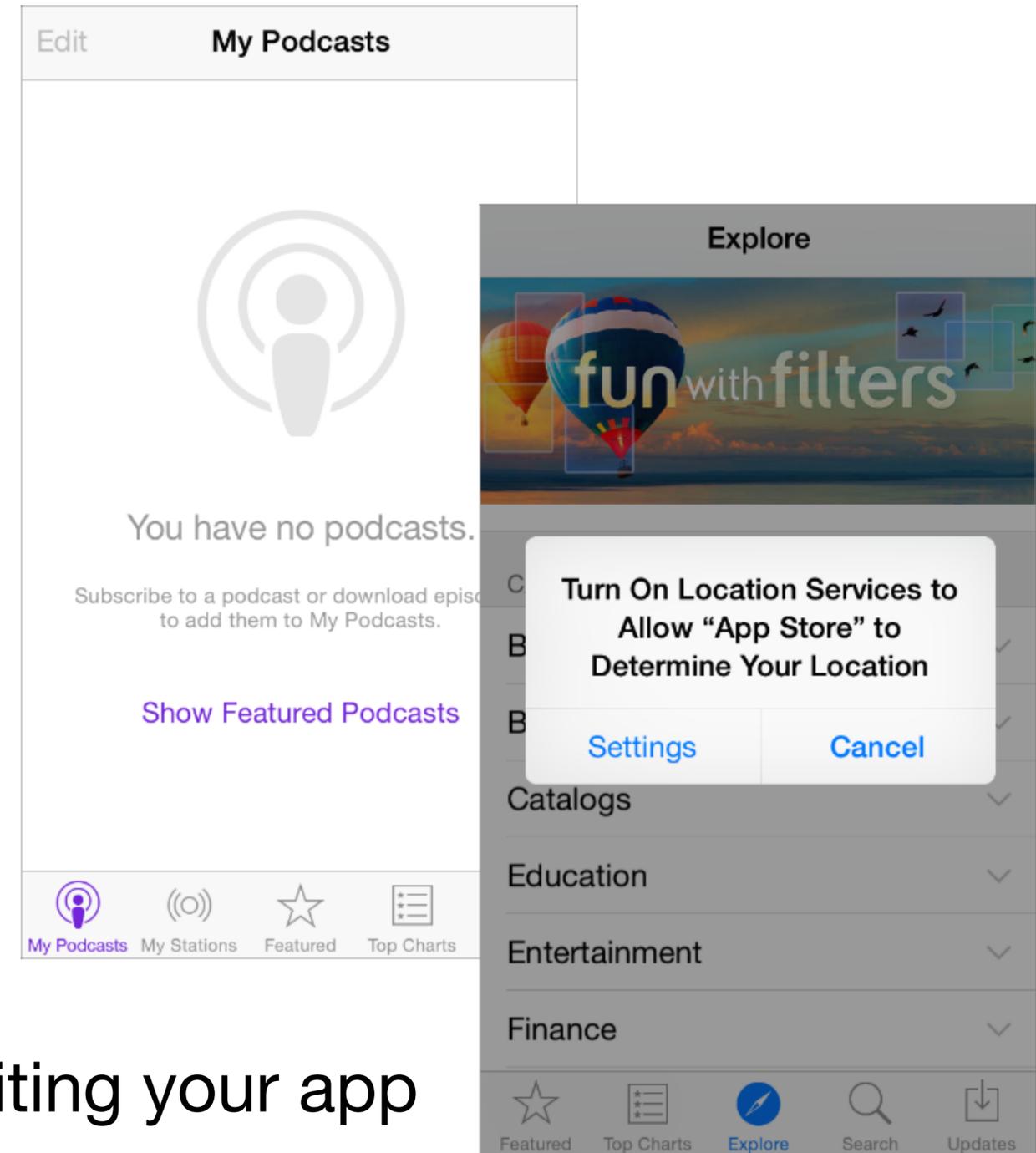
Starting

- Apps should start quickly to provide a fluid user experience
- Show a launch image that closely resembles the first screen of your app (launch file)
- Restore the state of last run (minimize user input)
- Delay a login requirement for as long as possible
- By default, launch in device's current orientation
- Think carefully before providing an onboarding experience



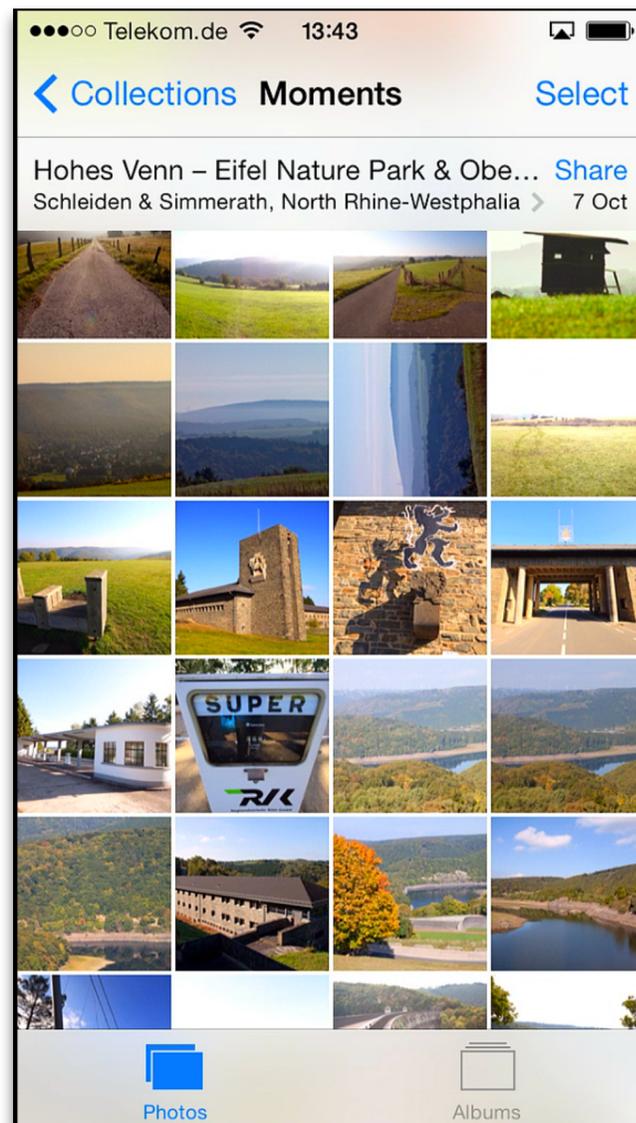
Stop

- No Quit button or menu item
- Be prepared to quit at any time
- Program flow interrupted by external events
 - Incoming phone call
- Store state when stopping
- Application moved to background
- Notify users what feature are unavailable and limiting your app



Application Styles

Productivity



Photos

Utility



Weather

Immersive



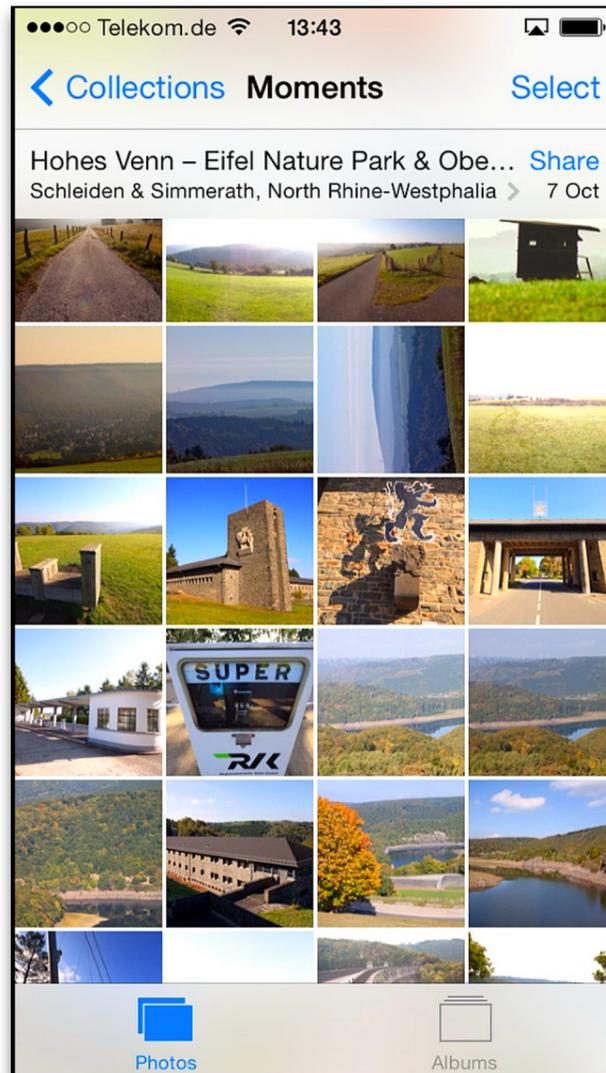
Seadragon

Productivity Applications

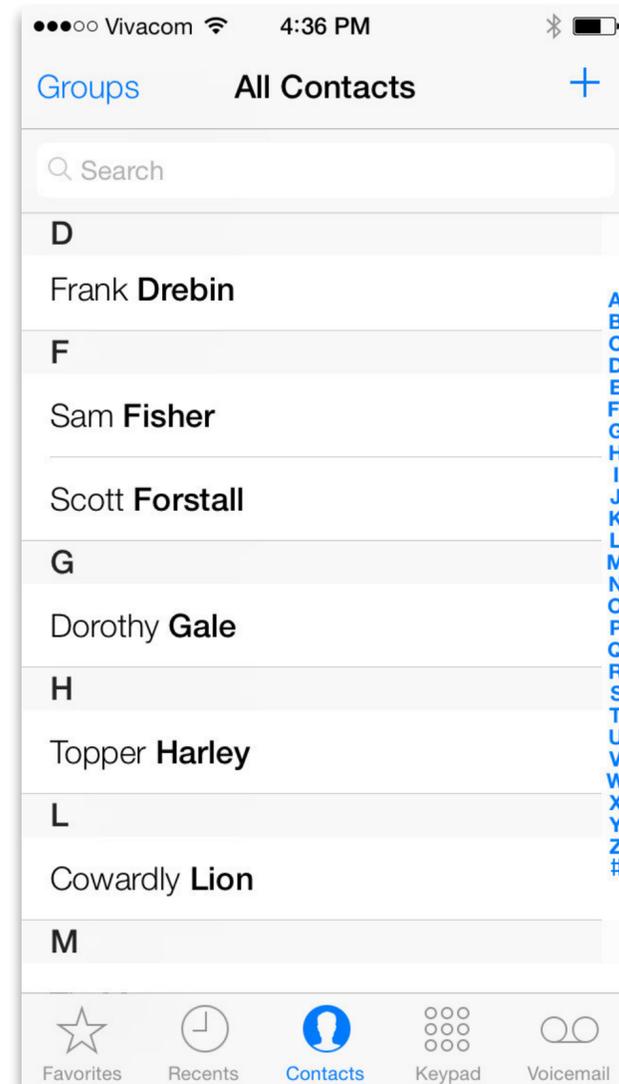
- Organizing and managing detailed information
- Often organize data hierarchically
- Organizing the list, add or remove items
- Examples: Contacts, Photos



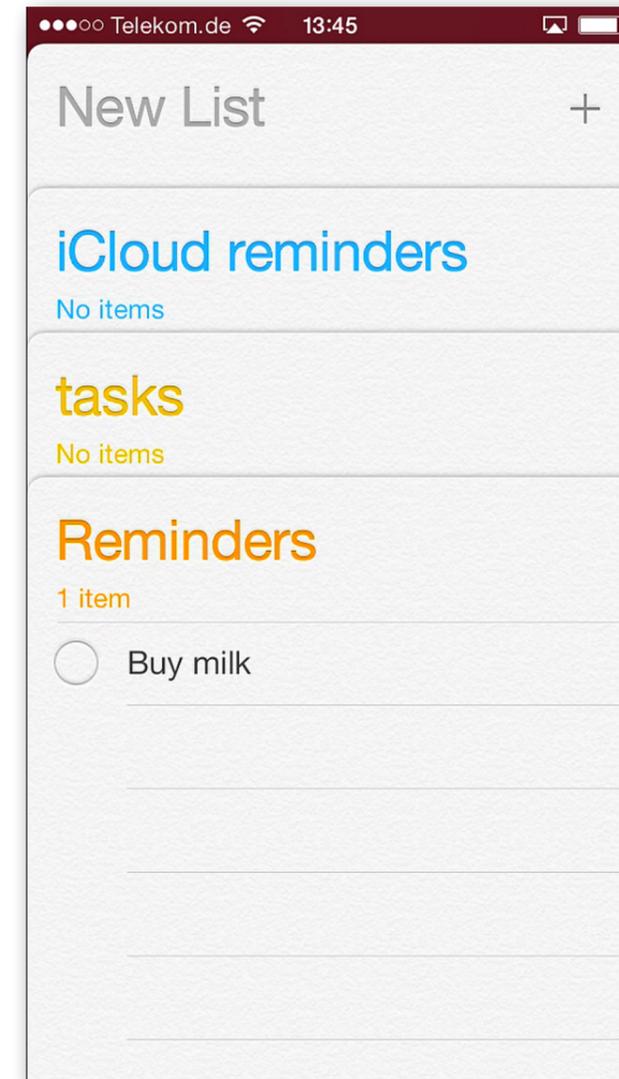
Productivity Applications



Photos



Contacts



Reminders

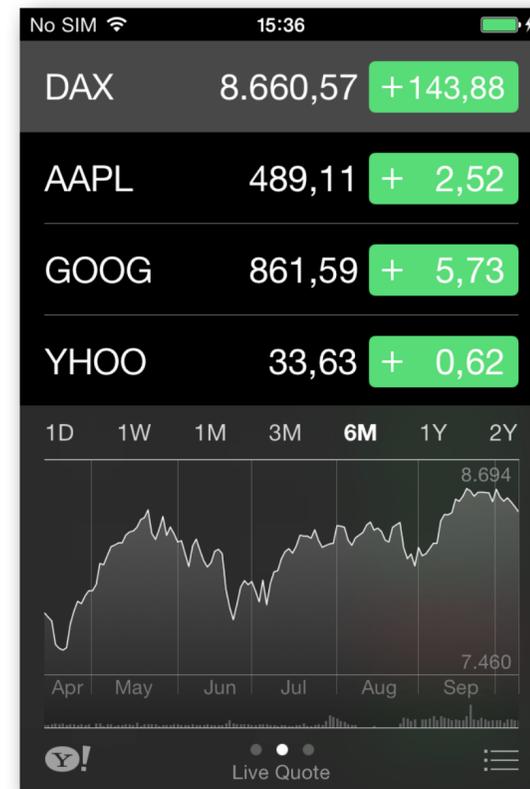
Utility Applications

- Simple task, minimum user input
- Customized, visually attractive UI that enhances the displayed information
- Data is organized in flattened list of items
- Examples: Weather, Stocks

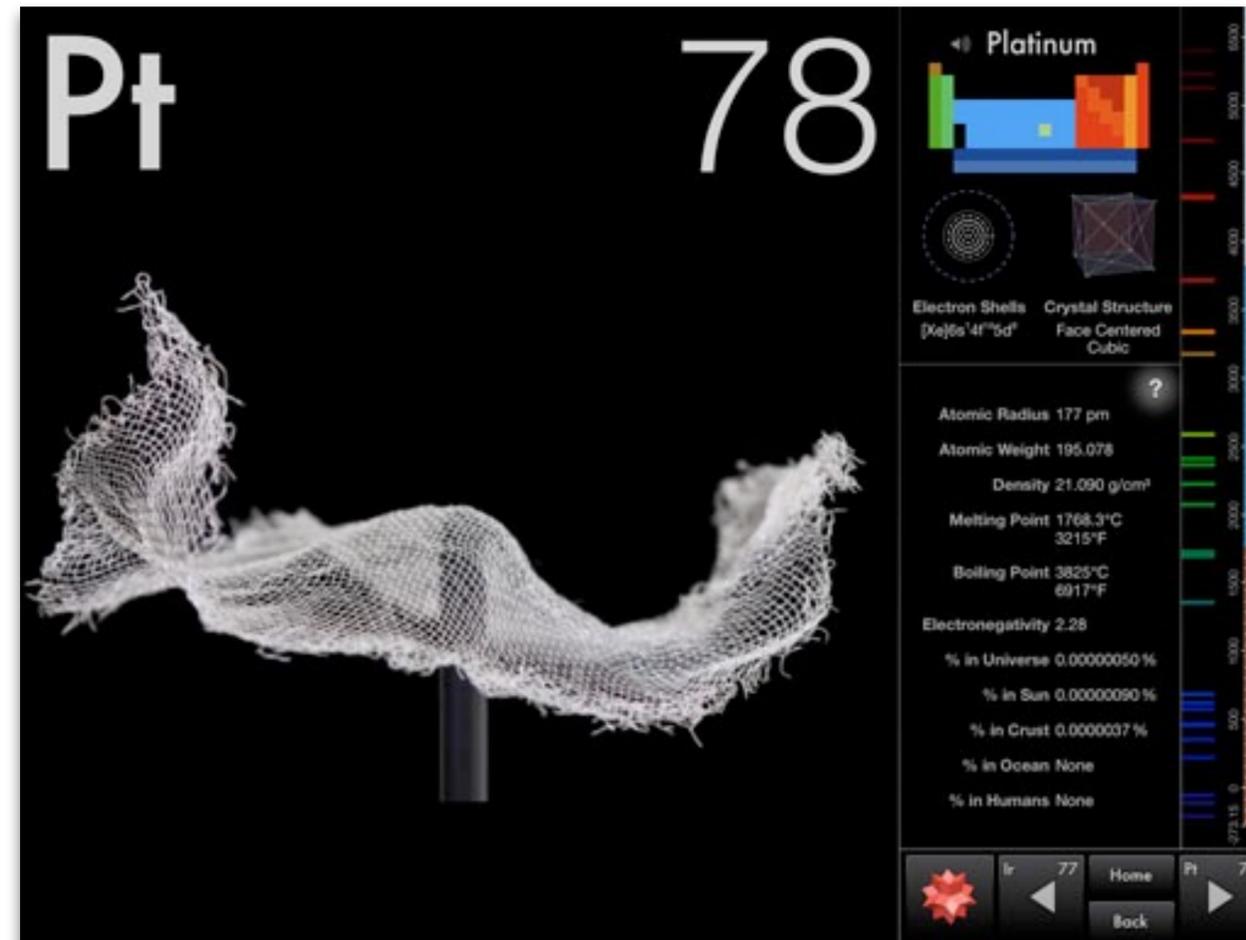
Utility Applications



Weather



Stocks



Elements

Immersive Applications

- Full-screen, visually rich UI
- Focussed on content and user experience
- Tends to hide much of the device's user interface
- Custom navigational methods
- Examples: Living Earth, Carpenter



Immersive Applications

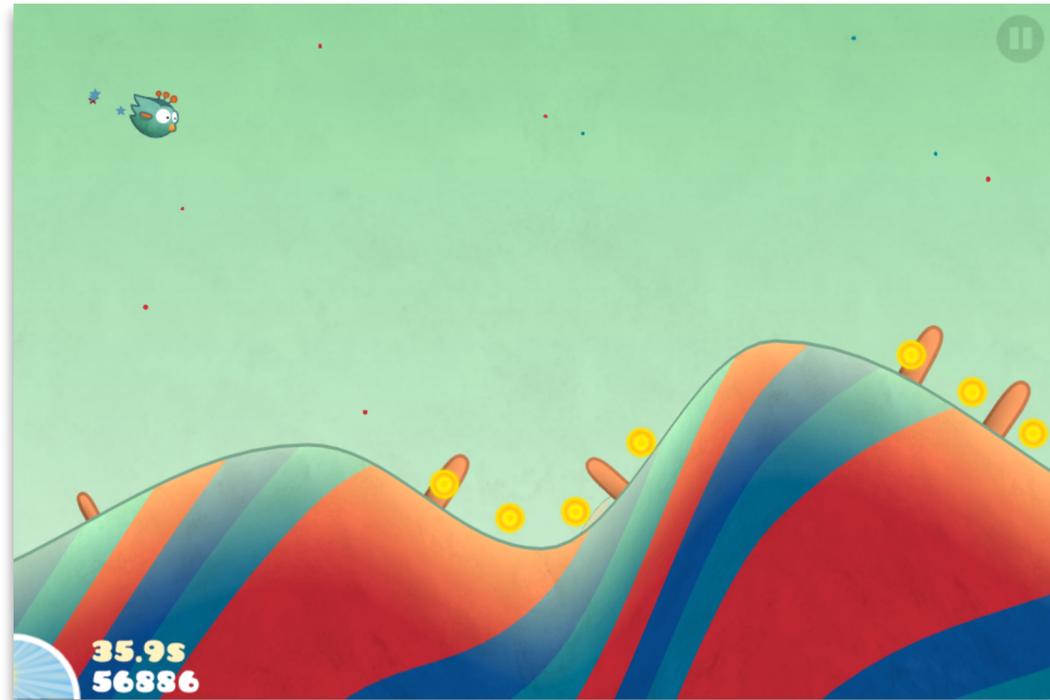


Living Earth

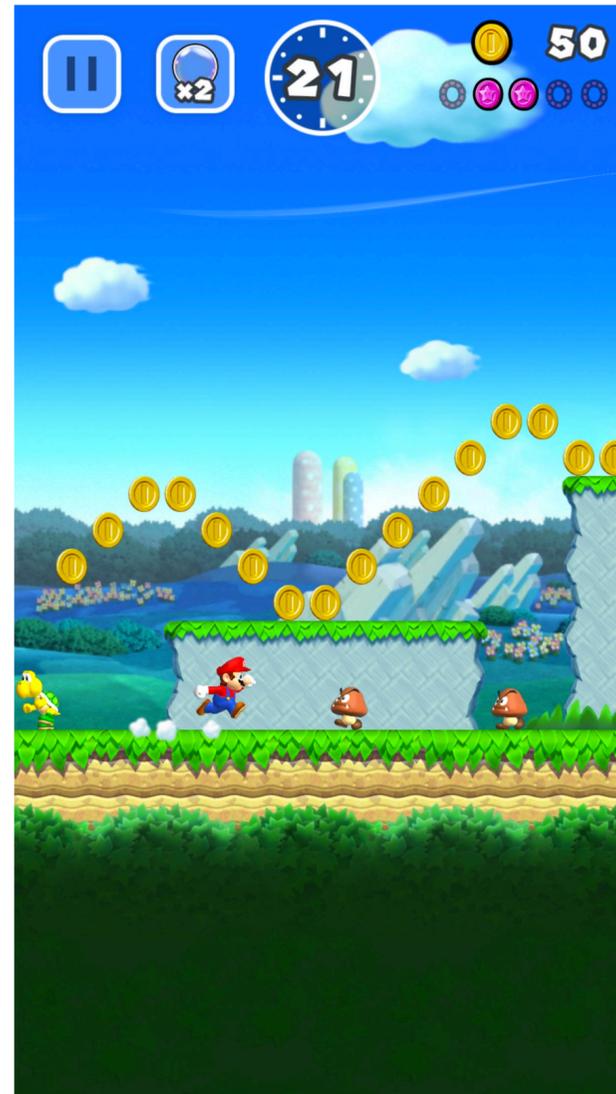


Carpenter

Games



Tiny Wings



Super Mario Run



The Machines

Summary

- Mobile vs. desktop apps: user, task, context
- Keep hardware restrictions in mind
- Application styles: productivity, utility, immersive
- Further reading material:



iOS Human Interface Guidelines:

<https://developer.apple.com/ios/human-interface-guidelines/overview/themes/>



<https://www.apple.com/everyone-can-code/>



What's Next?

- Register, and sign the Declaration of Compliance and send it to both—René and Oliver (<rschaefer, nowak>@cs.rwth-aachen.de)
- Next lecture: Monday, 17.10. 12:30-14:00
 - Presentation of seminar topics
 - Introduction into Swift
- Landing page: <https://hci.rwth-aachen.de/ios>

