



# MAGnUS Training Course

University of Derby  
UK

July 1<sup>st</sup> – 4th, 2019



[derby.ac.uk](http://derby.ac.uk)



Co-funded by the  
Erasmus+ Programme  
of the European Union

# EU Partners



**ipt**  
Instituto  
Politécnico  
de Tomar



TALLINN UNIVERSITY OF  
TECHNOLOGY

# Partners - Russia & Azerbaijan



Astrakhan State University



Voronezh State University



Baku Engineering University



Azerbaijan State Oil and Industry University

# Wider Objective

- To Share best practice of MSc Design
  - From QAA Benchmark Statements
  - Through Programme Learning Outcome Statements
  - To Module Learning Outcome Statements
- 
- Validation Documentation – What is it?
  - How is it structured?
  - Validation Events



# Strapline:

“I looked through your program MSc Mobile App Development and Computer Games courses. I think it is just a fine example of what we want to develop”.

**Yana Demyanenko**

Associate professor of  
Institute of Mathematics, Mechanics and Computer Science,  
Southern Federal University, Russia.





# Why are we here?



[derby.ac.uk](https://www.derby.ac.uk)

# Objectives

- To develop double diploma interdisciplinary Master curriculum in Mobile applications and Game Design with regard to labour demands and Bologna provisions at **Russian** and **Azerbaijan** universities.
- To enhance professional skills of teachers
- To embed a comprehensive and crosscutting QA system
- **To set up a joint enterprise-university game lab/studio**

# Magnus at Derby

## The role of UoD in Magnus

[needs analysis](#) to ensure that new programmes will meet the needs of modern business environment

The EU partners will [present trends](#) in mobile and game development.

- ❖ best European practices for both [programme development](#) and [project management](#).
- ❖ study of the practices of modular programme design
- ❖ Teaching & Learning Methods



# MAGnUS 3 tracks

Mobile applications in education



Mobile application in healthcare



Game development



# Mobile App Development History

- 2004 Java ME – “it will never catch on!”
- 2007 iPhone – Xcode, Objective-C.... Hmm.
- 2010 Mobile Device Software Development Degree Designed
- 2011 MSc Mobile Device Software Development Implemented – **146 Enquiries**
- **Sept 2011 – 3 UK students started**
- **2018 – 19 10 students**



# 2011 - Programme Structure – 7.5 ECTs

Studying at  
Masters Level &  
Research  
Methods

Computer  
Networks and  
Architecture

Client-Side  
Development

Mobile Software  
Design &  
Architecture  
(open platforms)

Entrepreneurial  
Management

Emerging  
Architectures

Mobile Device  
Forensics

Mobile Software  
Development  
(Closed  
Platforms)

# Masters Phase

Independent Scholarship  
30 ECTS



Industrial Project (Placement)  
30 ECTS



# Entry Requirements

- A Degree with some programming expertise
- The first module would begin with 3 weeks of AppInventor
- Objective-C was very very tough





# Studying at Masters Level and Research Methods



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# Studying at Masters Level & Research Methods



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## Mobile & Client-side User Experience

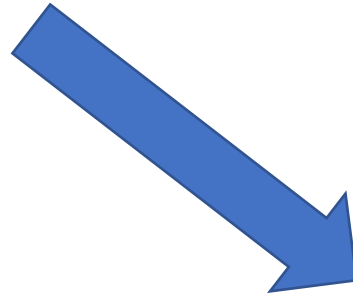




# Mobile & Client-Side User Experience

There's a lot of **art** and **science** behind  
creating a lovable user interface

## UX Theory



## Cross Platform Solutions



# Mobile & Client-Side User Experience



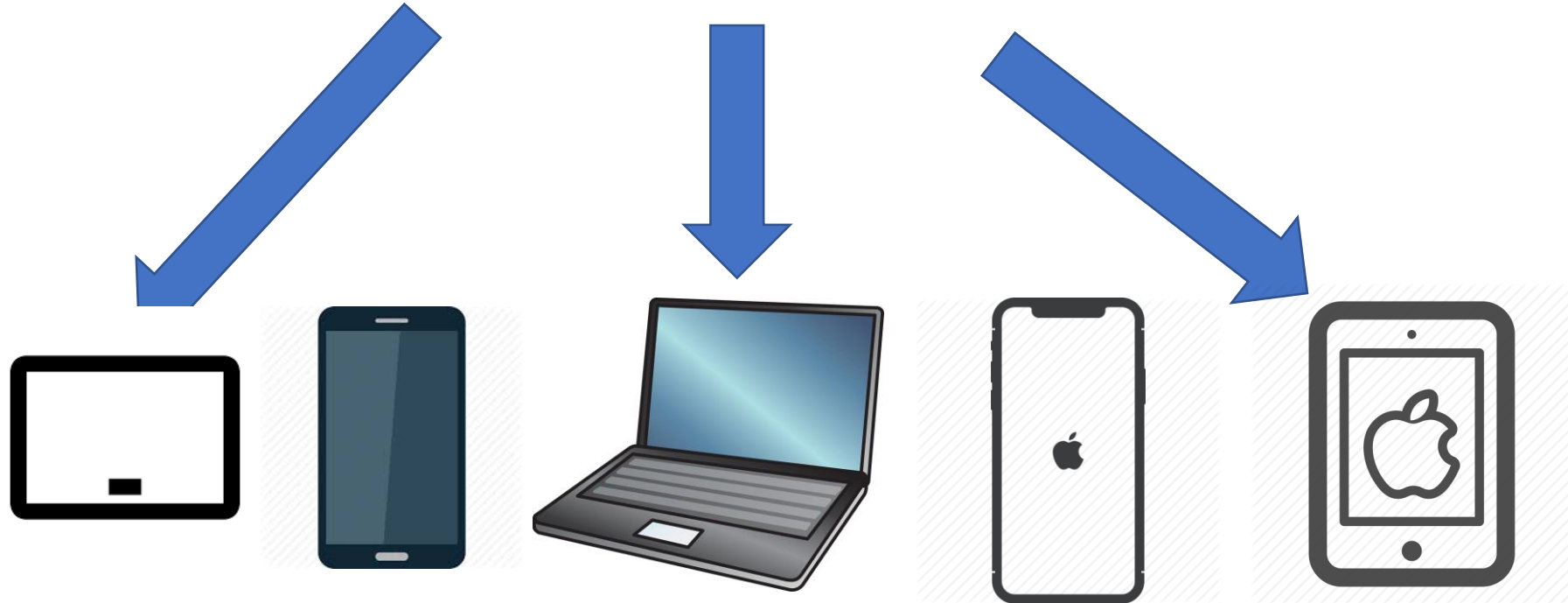
**User  
Experience,  
Not User  
Interface**

“while I was focused on trying to make the usability of editing data as easy and functional as it could be; Mint was focused on making it so you never had to do that at all”.

Marc Hedlund, UX Apprentice

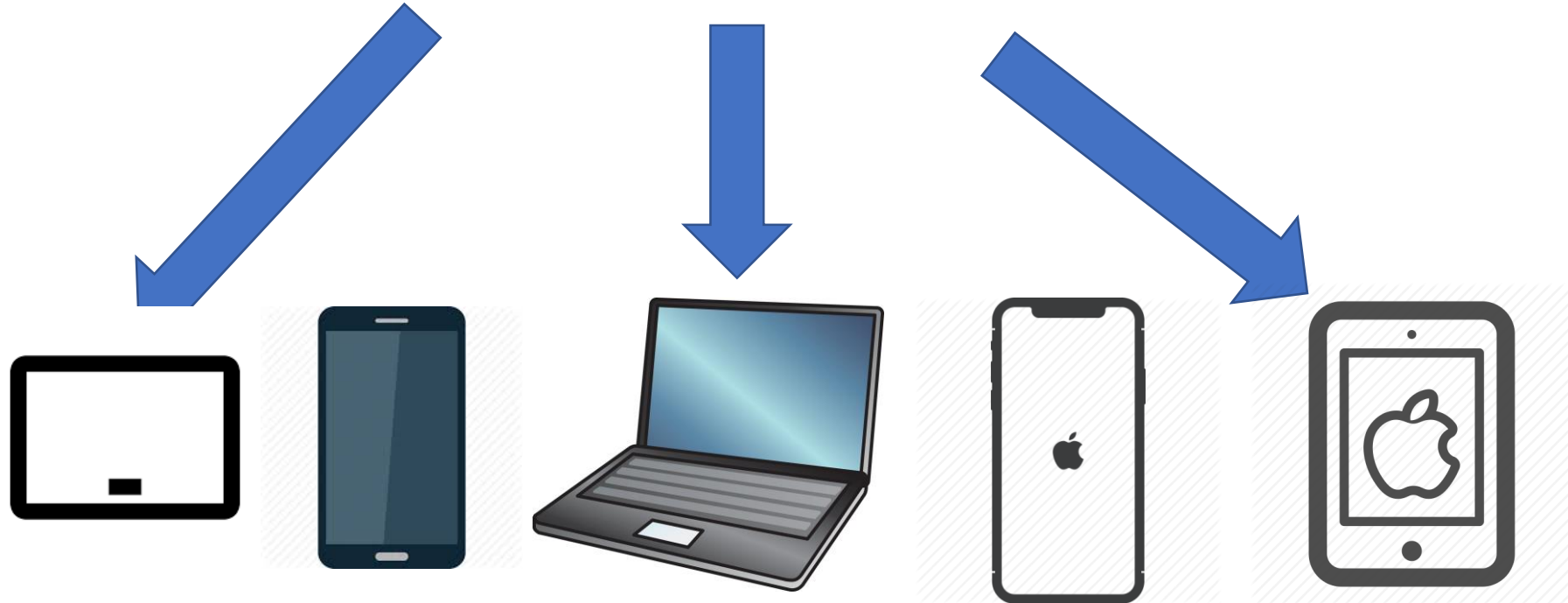


## Cross Platform Solutions





## Cross Platform Solutions

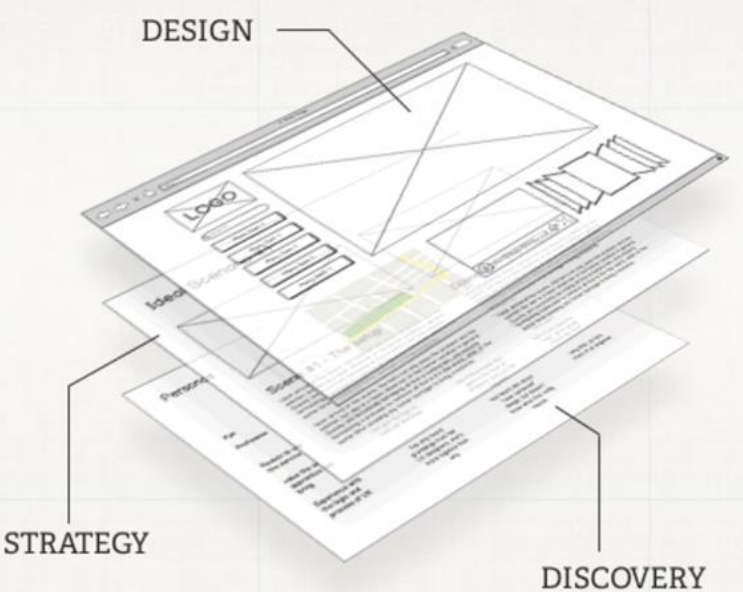


# Mobile & Client-Side User Experience

## UX Apprentice



**UX APPRENTICE**    Discovery    Strategy    Design    Score: --%   



# Go deeper than sketches

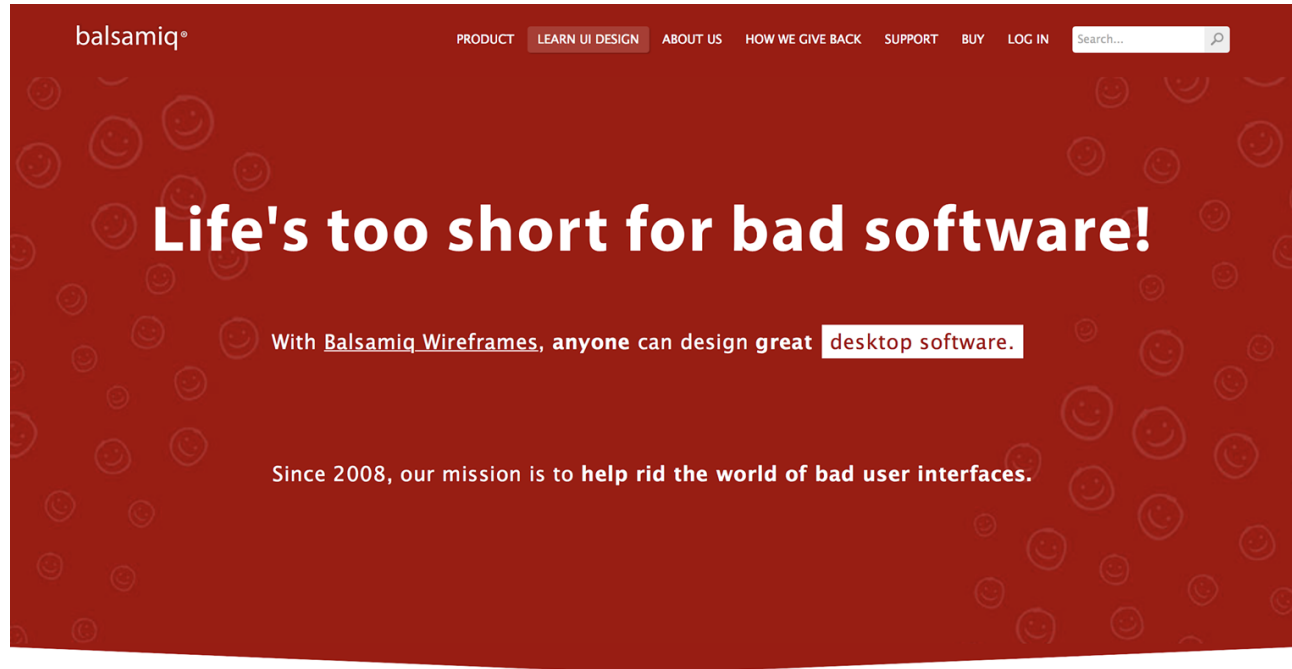
Intrigued by the process of UX design? Want to learn the basics? You've come to the right place!

**I'M READY. LET'S GO!**

# Mobile & Client-Side User Experience



## Balsamic:



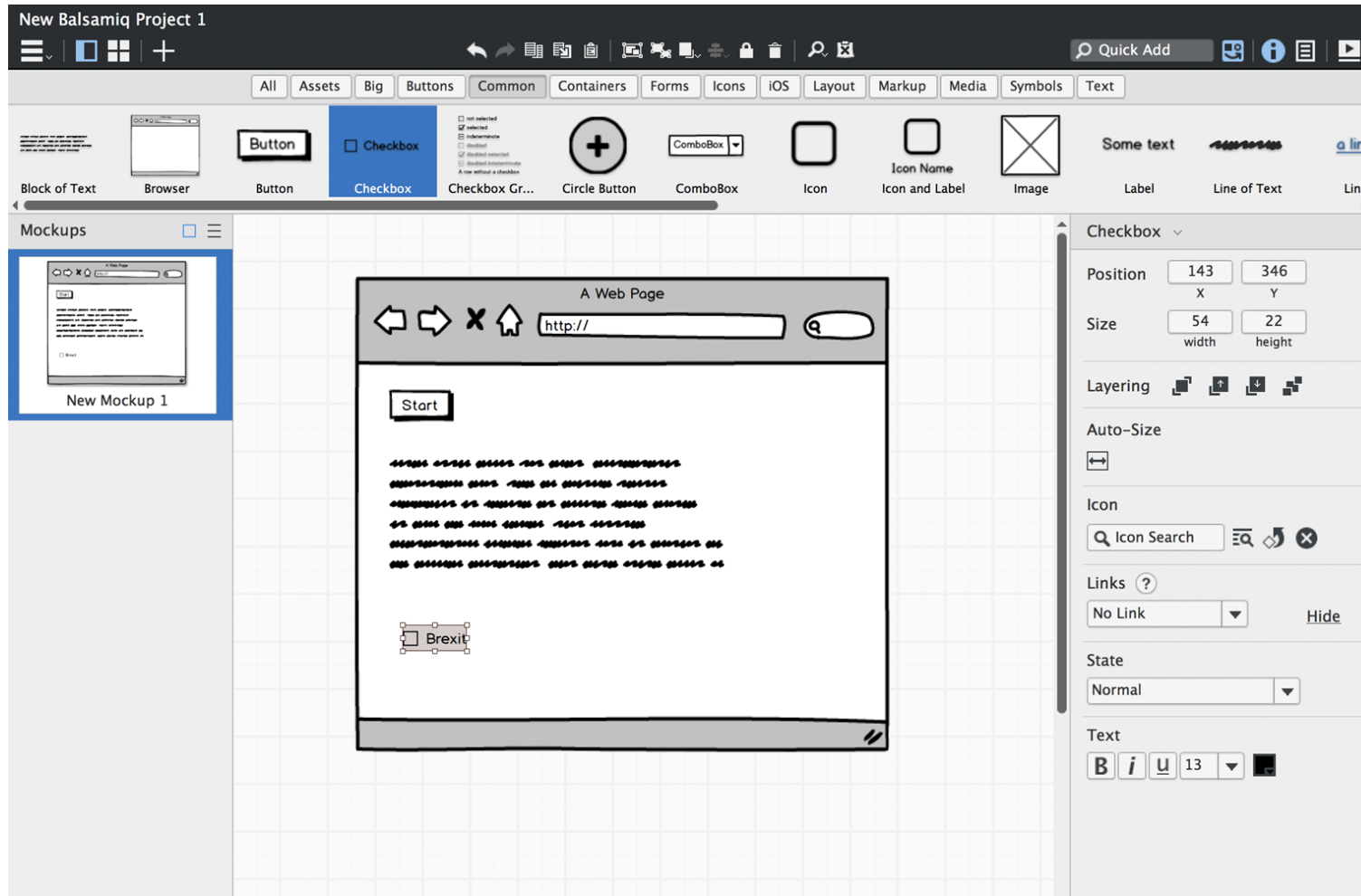
The screenshot shows the Balsamiq website with a dark red background and a pattern of small smiley faces. The navigation bar at the top includes links for PRODUCT, LEARN UI DESIGN, ABOUT US, HOW WE GIVE BACK, SUPPORT, BUY, and LOG IN, along with a search bar. The main content area features the headline "Life's too short for bad software!" followed by the text "With [Balsamiq Wireframes](#), anyone can design great desktop software." and "Since 2008, our mission is to help rid the world of bad user interfaces."

**We make UI Design Accessible to...**

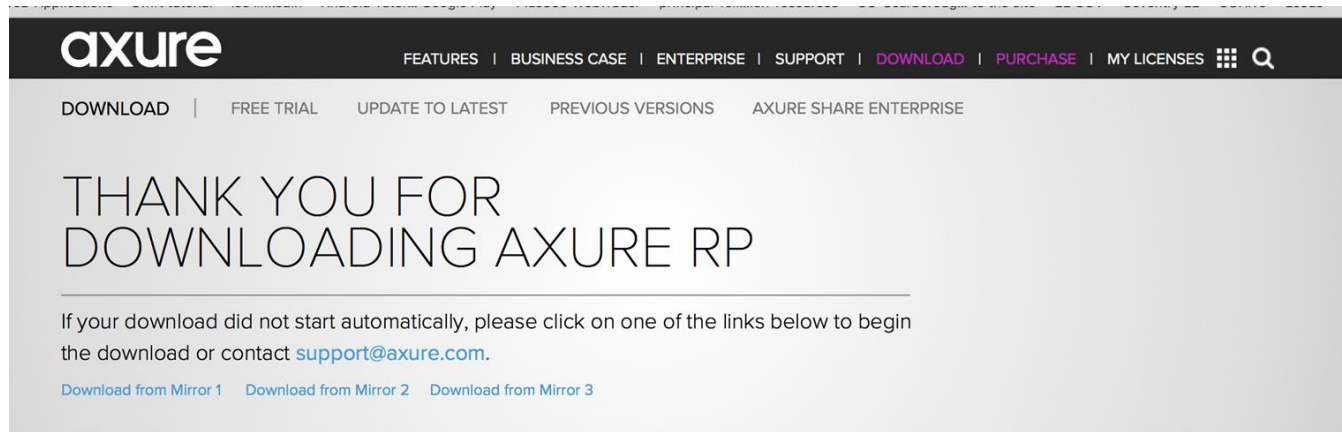
**Business Owners** , **Product Managers** , **Business Analysts** ,  
**Developers** , **Agencies** , and **anyone getting into UX** .



# Balsamiq - wireframing

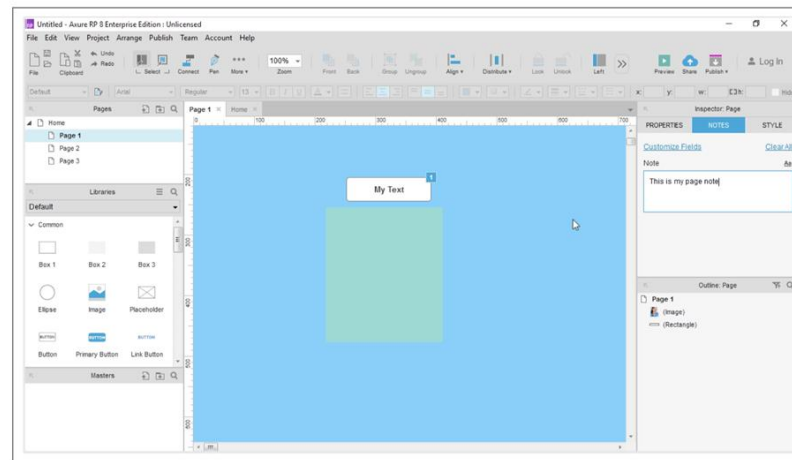


# Axure - wireframing



The screenshot shows the Axure website homepage. At the top, the 'axure' logo is on the left, and navigation links for 'FEATURES', 'BUSINESS CASE', 'ENTERPRISE', 'SUPPORT', 'DOWNLOAD', 'PURCHASE', and 'MY LICENSES' are on the right. Below the navigation, there are links for 'DOWNLOAD', 'FREE TRIAL', 'UPDATE TO LATEST', 'PREVIOUS VERSIONS', and 'AXURE SHARE ENTERPRISE'. The main heading reads 'THANK YOU FOR DOWNLOADING AXURE RP'. Below this, a message states: 'If your download did not start automatically, please click on one of the links below to begin the download or contact [support@axure.com](mailto:support@axure.com).' Three download links are provided: 'Download from Mirror 1', 'Download from Mirror 2', and 'Download from Mirror 3'.

## LEARN AXURE RP



## AXURE RP: GETTING STARTED

This video will guide you through the basics of Axure RP. Explore the UI, learn how to manage pages, drag widgets to the canvas, style and add interactivity to widgets, add and read notes, and publish to your own computer or Axure Share (our free cloud service).

For a hands-on experience with the core features, follow the in-tool tour: Open Axure RP on your computer and begin the tour from the Welcome Screen or from "Help > Getting Started Tour..." in the main menu.

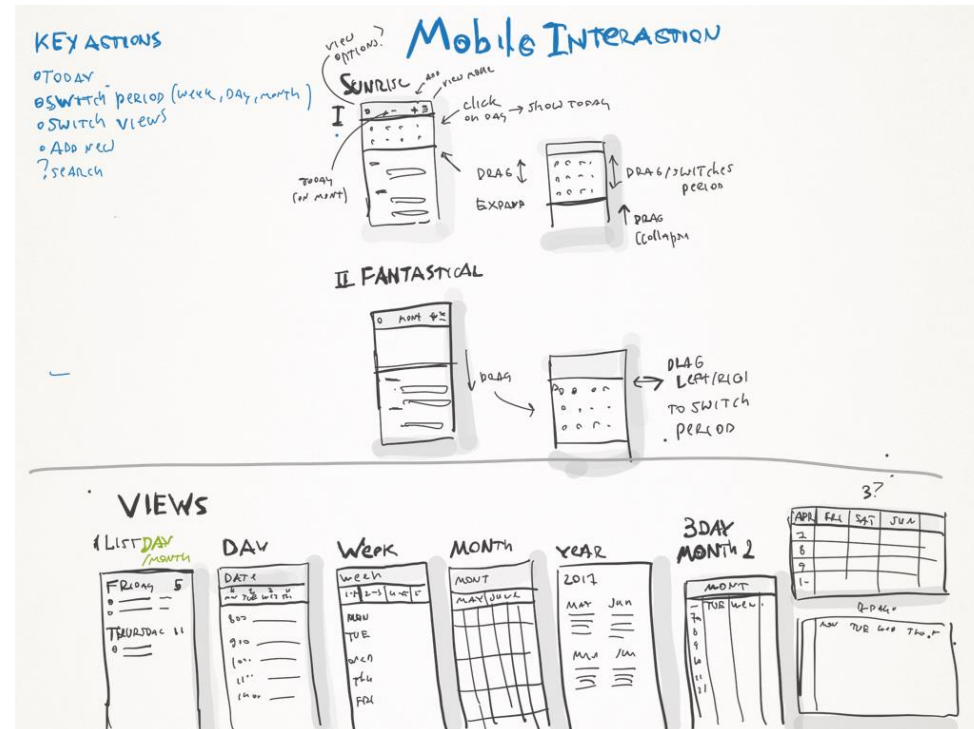
For additional RP training, documentation, and contact information for our support team, go to:

[TRAINING AND SUPPORT](#)



# Robust Academic Discussion

## You must design UI on paper first... by hand!



# Essential Text

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# Assessment

Was 70% Coursework, **30% Examination**

Modified this year.

International Students particularly fared badly despite getting Distinctions everywhere else.

Not enough emphasis on application

Now 70% Design, **30% Implementation**



uk



# Cross Platform Solution

- ❖ Appcelerator – generate native code from HTML 5 Webapps
- ❖ Great Frameworks: **Titanium & Alloy**
- ❖ **Great Libraries – Kitchen Sink App**
- ❖ Required customization
- ❖ Ok for first 3 years then problems
- ❖ Didn't keep up with Apple Updates after Swift
- ❖ Didn't keep up with Android Updates either
- ❖ Looking for another

# Module Overviews

## Mobile Software Design & Architecture



# Mobile Software Design & Architecture

2011 Open Architecture Mobile Software

All Advantages of Java

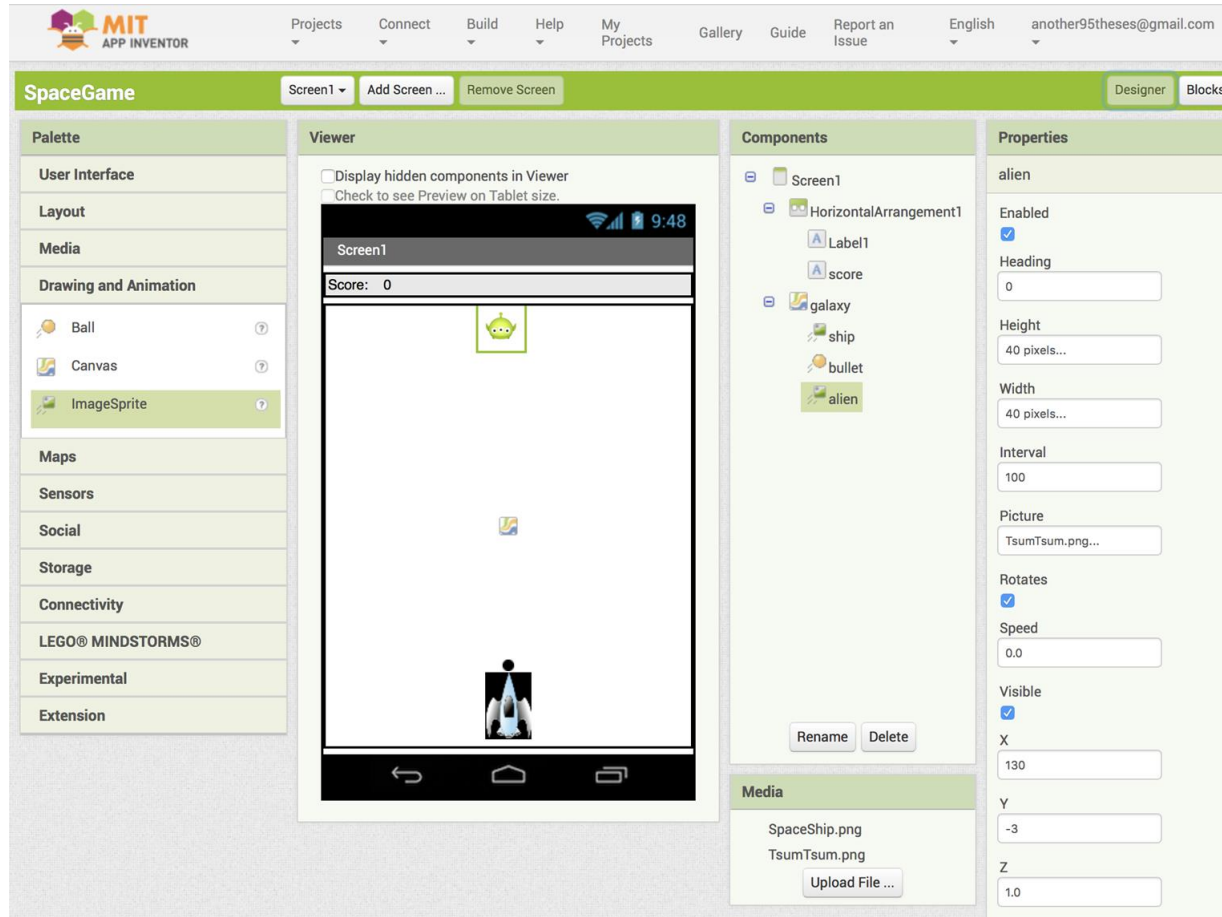
Any device

Any IDE

Similar to C++ and C# (Originally J++)



# AppInventor

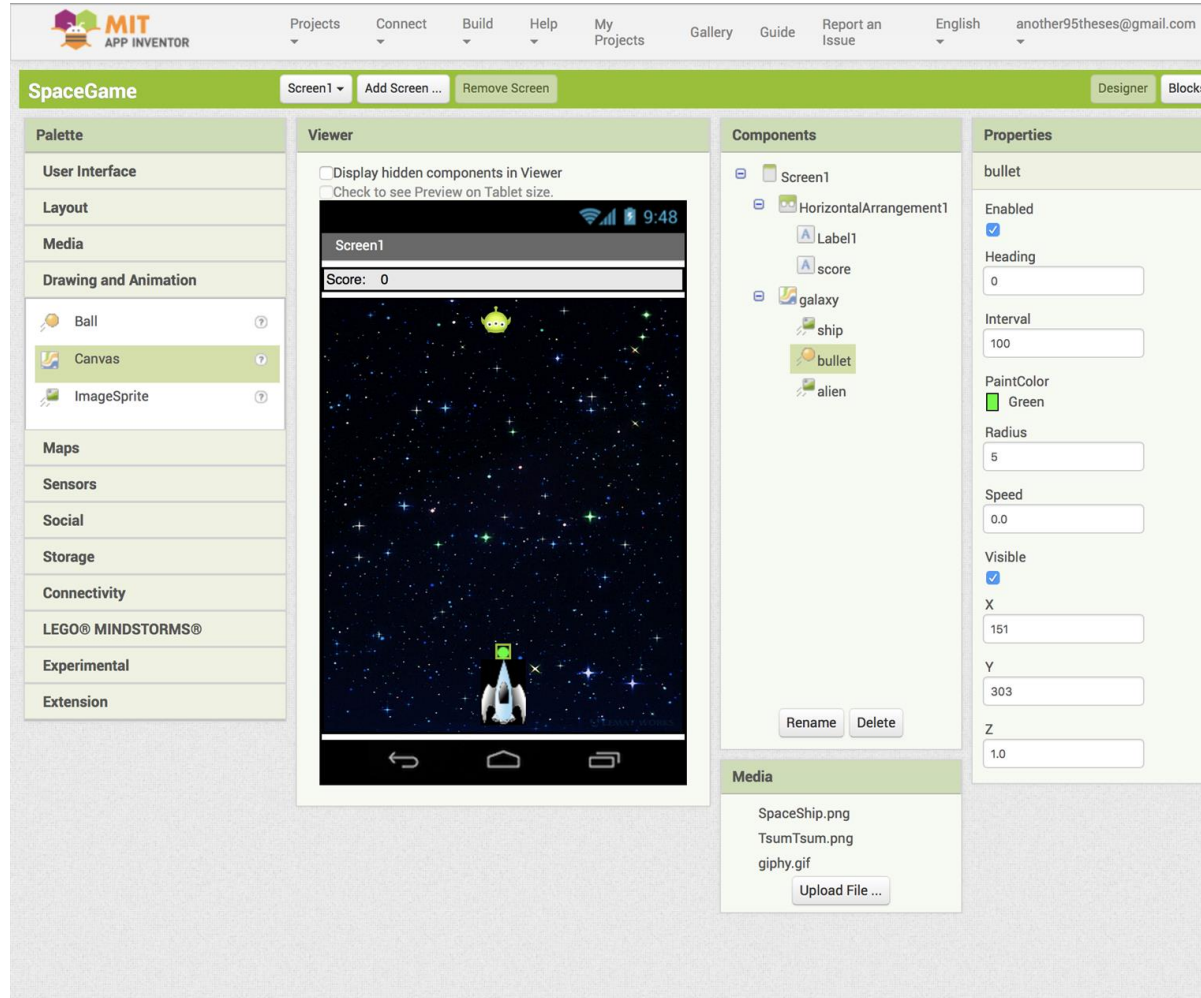


The screenshot shows the MIT App Inventor web interface. At the top, there's a navigation bar with 'MIT APP INVENTOR' logo, 'Projects', 'Connect', 'Build', 'Help', 'My Projects', 'Gallery', 'Guide', 'Report an Issue', 'English', and 'another95theses@gmail.com'. Below this is a header for the current project, 'SpaceGame', with 'Screen1' selected and options to 'Add Screen ...' or 'Remove Screen'. There are 'Designer' and 'Blocks' tabs. The interface is divided into four main panels: 1. Palette: A list of components categorized by type (User Interface, Layout, Media, Drawing and Animation, Maps, Sensors, Social, Storage, Connectivity, LEGO® MINDSTORMS®, Experimental, Extension). 'ImageSprite' is currently selected. 2. Viewer: A central window showing a preview of the app on a mobile device. It displays a 'Score: 0' label and a rocket ship at the bottom. 3. Components: A tree view showing the hierarchy of components on the screen: 'Screen1' contains 'HorizontalArrangement1', which contains 'Label1', 'score', 'galaxy', 'ship', 'bullet', and 'alien'. 4. Properties: A panel for configuring the selected 'alien' component. It includes checkboxes for 'Enabled', 'Rotates', and 'Visible'. Input fields for 'Heading' (0), 'Height' (40 pixels...), 'Width' (40 pixels...), 'Interval' (100), 'Picture' (TsumTsum.png...), 'Speed' (0.0), 'X' (130), 'Y' (-3), and 'Z' (1.0). There are also 'Rename' and 'Delete' buttons for the component, and a 'Media' section with 'SpaceShip.png' and 'TsumTsum.png' and an 'Upload File ...' button.





# Prototyping - RAD

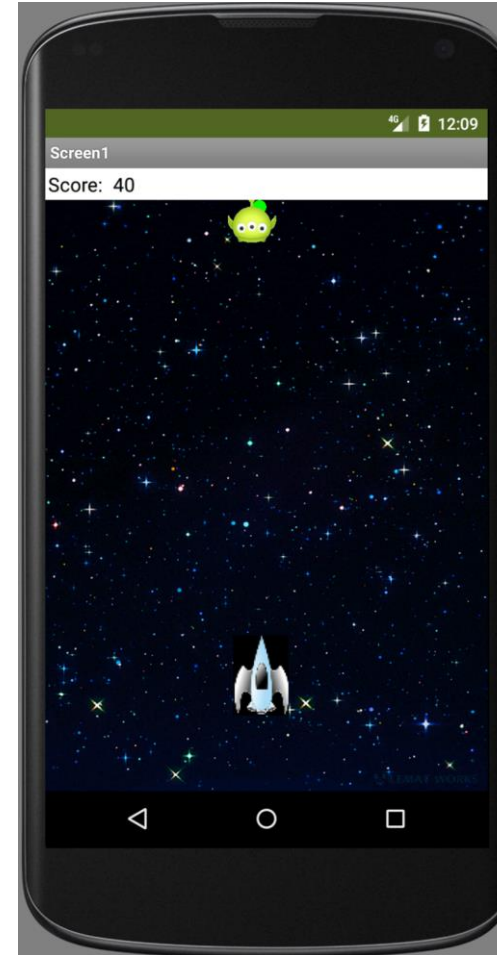
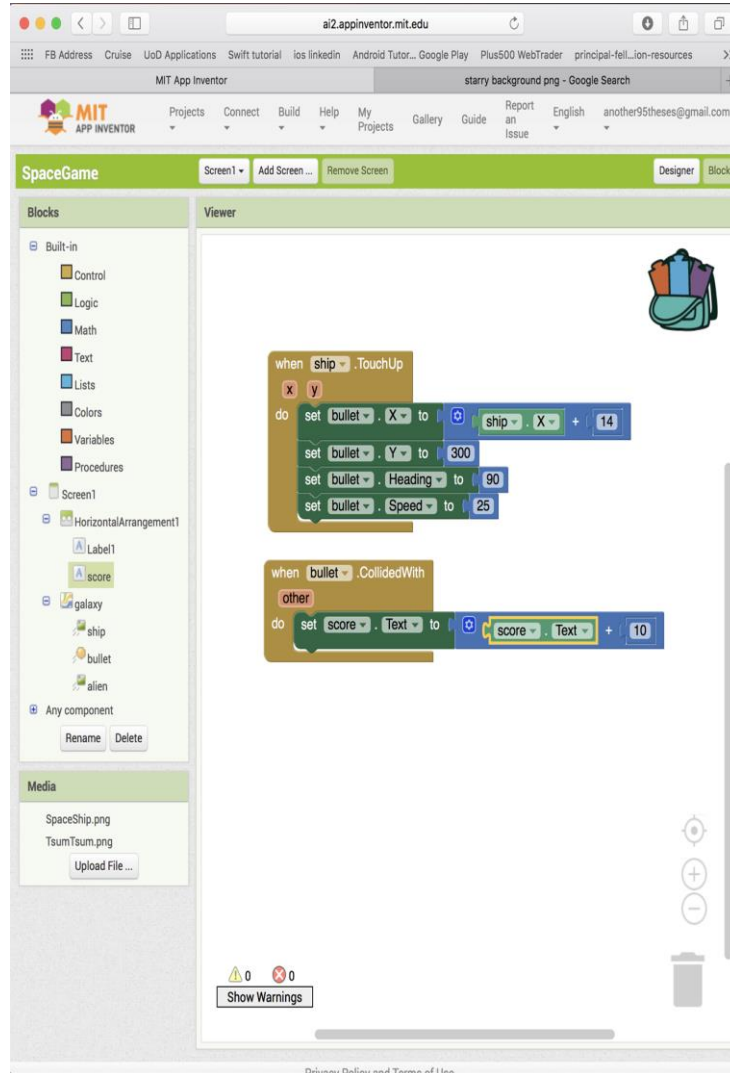


The screenshot shows the MIT App Inventor web interface for a project named "SpaceGame". The interface is divided into several panels:

- Top Bar:** Includes navigation links for Projects, Connect, Build, Help, My Projects, Gallery, Guide, Report an Issue, English, and a user profile for another95theses@gmail.com.
- Project Header:** Shows "SpaceGame" with a dropdown for "Screen1", buttons for "Add Screen ..." and "Remove Screen", and tabs for "Designer" and "Blocks".
- Palette:** A vertical sidebar on the left with categories: User Interface, Layout, Media, Drawing and Animation (containing Ball, Canvas, ImageSprite), Maps, Sensors, Social, Storage, Connectivity, LEGO® MINDSTORMS®, Experimental, and Extension.
- Viewer:** A central window showing a mobile app preview. It displays a "Score: 0" bar at the top and a space-themed scene with a rocket at the bottom and a green alien at the top. It includes checkboxes for "Display hidden components in Viewer" and "Check to see Preview on Tablet size".
- Components:** A tree view on the right showing the hierarchy: Screen1 > HorizontalArrangement1 > Label1, score, galaxy, ship, bullet, alien. Buttons for "Rename" and "Delete" are at the bottom.
- Properties:** A panel on the far right showing the properties for the selected "bullet" component, including: Enabled (checked), Heading (0), Interval (100), PaintColor (Green), Radius (5), Speed (0.0), Visible (checked), X (151), Y (303), and Z (1.0).
- Media:** A panel at the bottom right showing a list of media files: SpaceShip.png, TsumTsum.png, giphy.gif, and an "Upload File ..." button.



# AppInventor

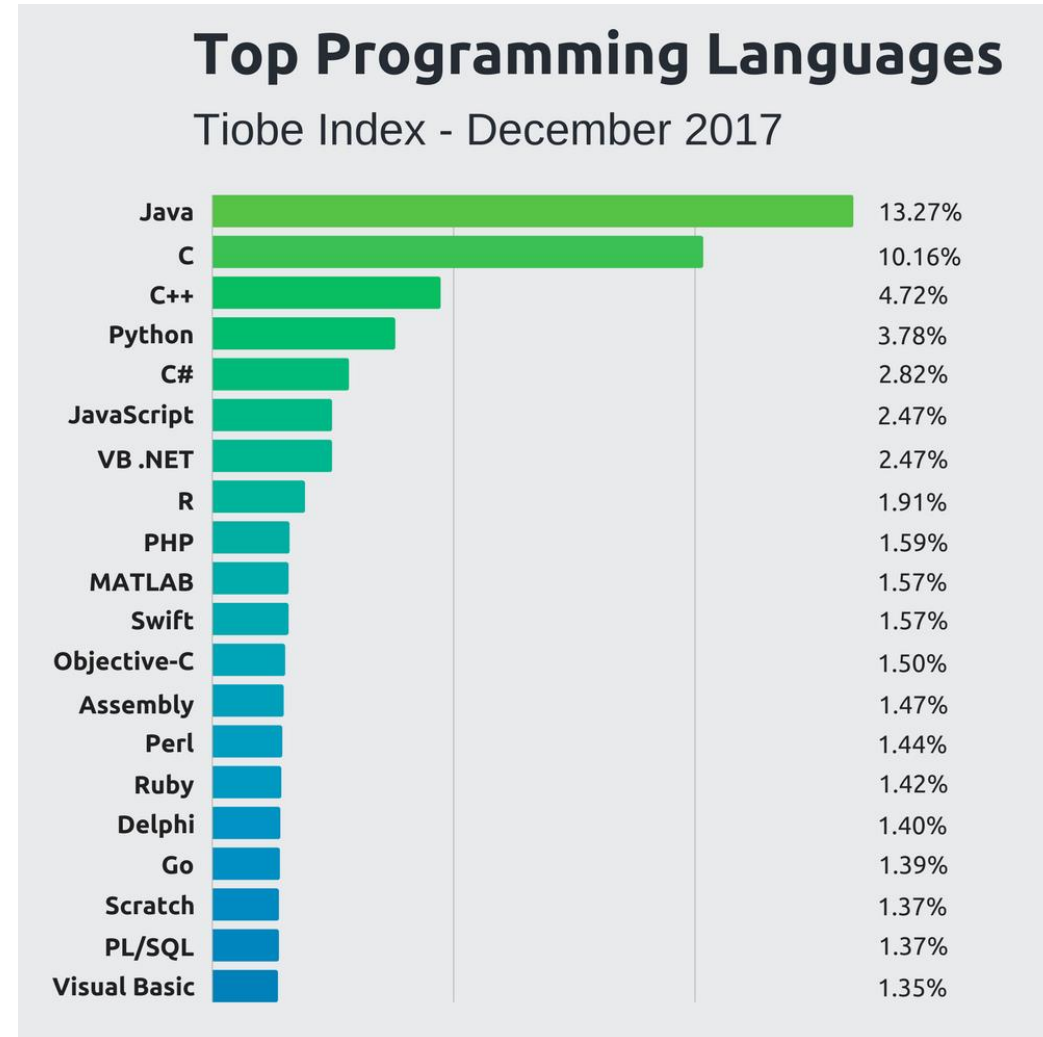


# Java

Currently, Java has one of the most important and largest communities in the world.

Prepare a list of Java features that are missing or annoying.

Explain each one in no more than 60 words.



# Most In-Demand Languages



**Java**

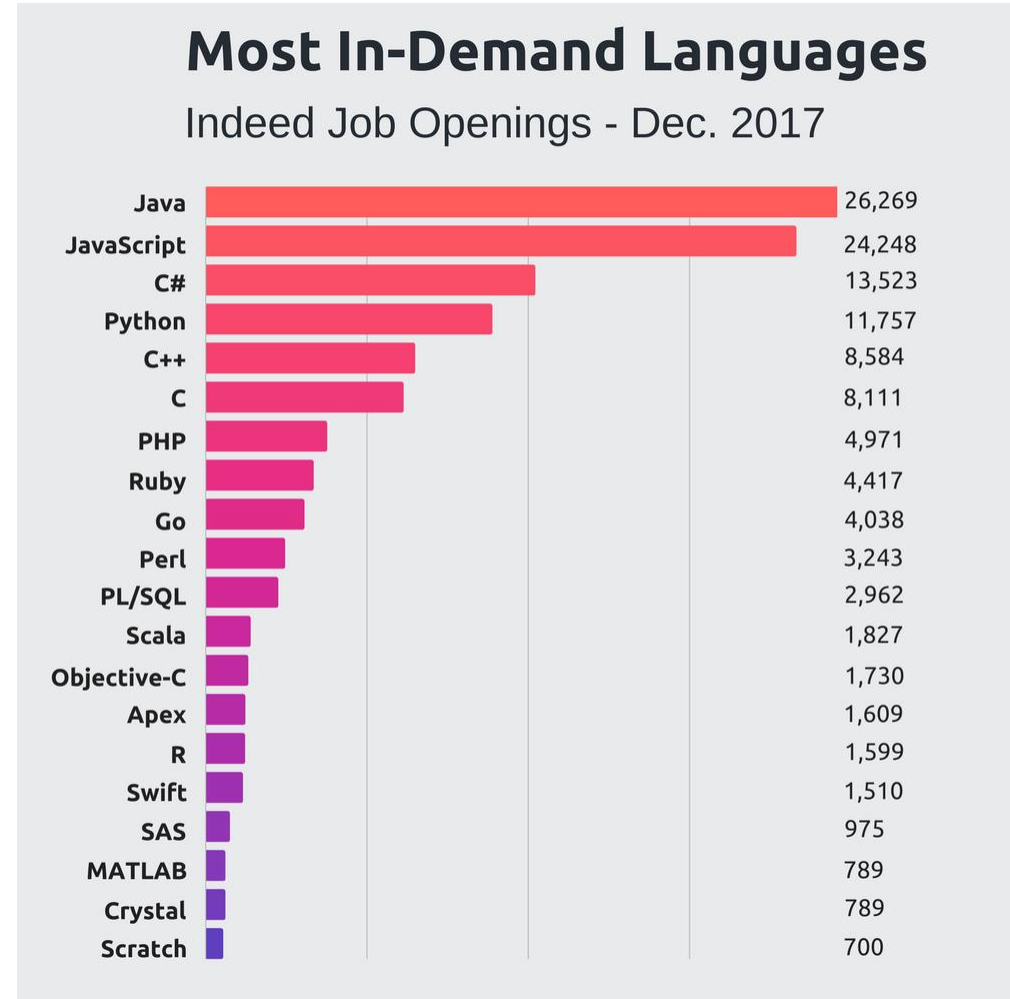
Top language – **Why?**

**JavaScript**

2<sup>nd</sup> Top – **Why??**

**Kotlin??**

**Never heard of it!**



# Java -> Kotlin Sept 2017

By Dec 2018 all new Android software is expected to be written in Kotlin.  
<https://dzone.com/articles/kotlin-will-overtake-java-in-december-2018>



# Kotlin

The Emulator only solution is not adequate

Must have actual devices



Students asked what they wanted to learn?



All selected Kotlin, knowing there might be gaps in the tutorial notes.



Students: All delighted in 2017

**Many angry in 2018!**



“If you are an Android developer, you should start using Kotlin immediately”.



<https://dev.to/erajasekar/java-is-too-old-what-should-you-learn-in-2018-45p9>



Some Kotlin Developments were released prematurely, others discontinued.

# Assessment

Produce an App and incorporate at least 3 Advanced API's, e.g.

Network

Bluetooth

Gestures



# AppInventor

## Android Development Only

Students with Web Development  
Experience

could use AppInventor for their Assignment

OR

Android Development with Java

**ALL** selected Java

Why?



# Mobile Software Development



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# Mobile Software Development



- ❖ **Objective-C Tough 1<sup>st</sup> Language**
- ❖ **Not a language to learn if you are not a good programmer**
- ❖ **Prone to software error - major errors!!**
- ❖ **Memory Leaks!!!**

# Objective-C to Swift

Swift Adopted in 2016

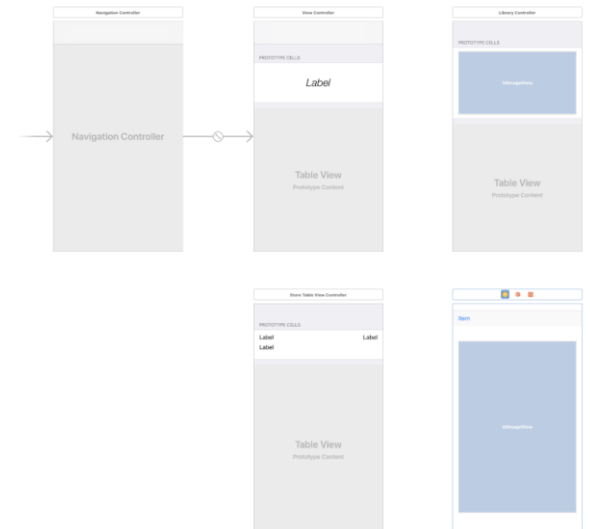
Swift is much more accessible!

No explicit pointers

Storyboard for rapid design of UI Screens, and to some extent the UX, is really good.

**Note:**

App Screens are a good way to capture app IO (consider Jackson Structured Diagrams)



# Assessment



Same as Mobile Software Design & Architecture.

Not allowed to do the same project  
Helps generate a portfolio of apps

**Has to be approved!**

Formative Feedback

Week 3 Title

Week 6 Plan & UI

Week 9 Progress against Plan

Week 12 Demo in class – **last week**

# Many Apps...

## Apps

- Track parcels from delivery company
- Social Event Manager
- Video security detection
- Purchase “Likes” and App “Ratings”
- Education exercises, tests, results...
- Interactive Web Apps – quite a few
- Find a bus in Derby.

## Games

- Badminton
- Camel jump
- Snakes & Ladders
- Exercise app providing time on game
- Star Trek – Augmented reality



# Entrepreneurial Management



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# Why research?

Educational content, Mobile App.....

+

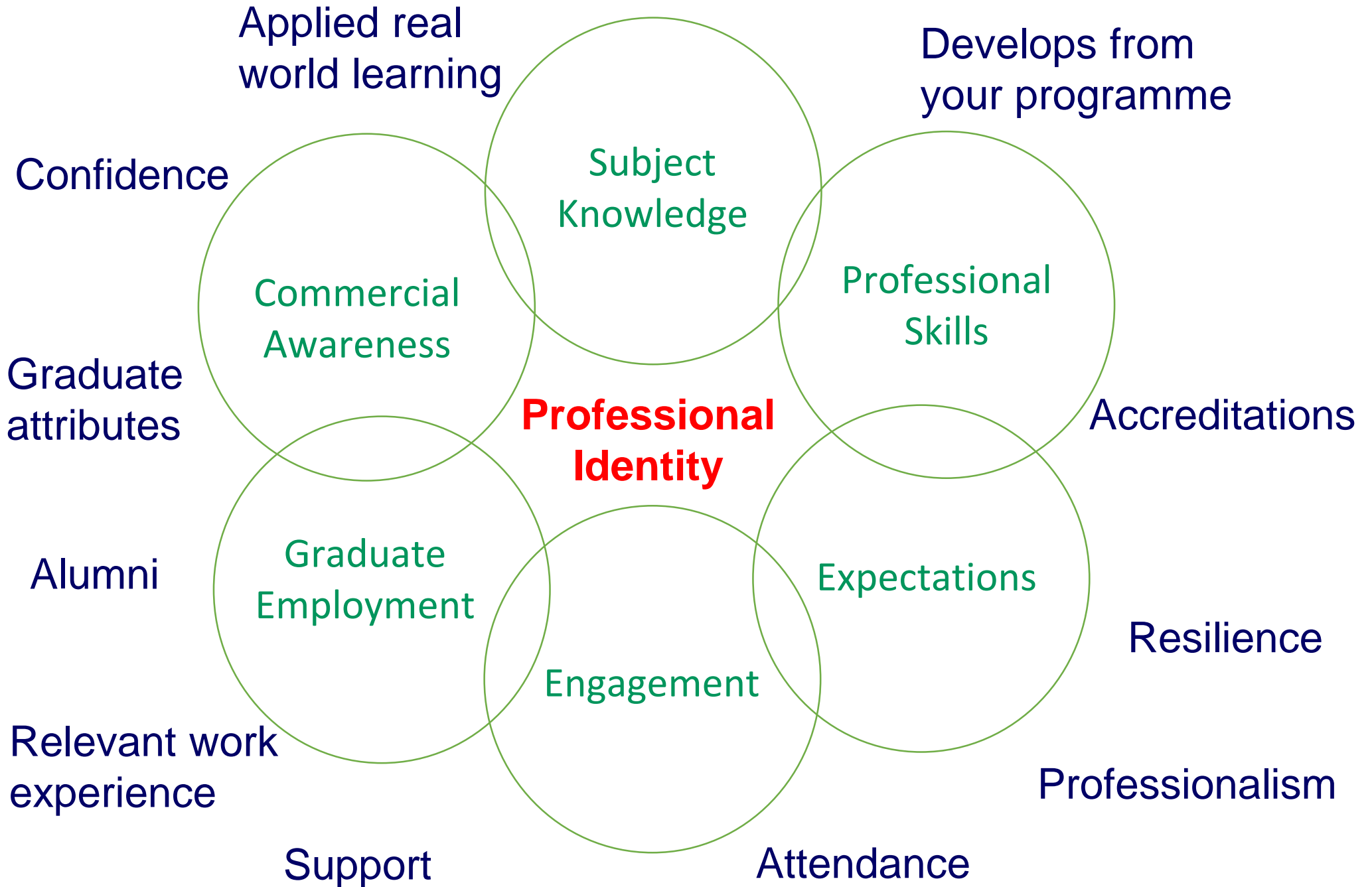
Entrepreneurial Ethos

+

Organisational requirements

= Enterprising Graduates and impact

But what does that look like? What could we be searching for.....







# Entrepreneurial Management...

Entrepreneurship – **the pursuit of opportunity**

From new / small business – to large organisations

**“A primary driver of economic growth”**

Gordon Brown, former UK Prime Minister

A blend of strategic Management and Entrepreneurial theory



# Entrepreneurial Management Module

The Module explores:

- ❖ the importance of entrepreneurial activity within the economy
- ❖ the opportunity it creates
- ❖ the value and impact of entrepreneurs and intrenepreneurs

# Assessment

Students will investigate an opportunity for

- a new venture either within an organization or stand-alone,
- develop a strategy for exploiting it,
- supported by theoretical models of entrepreneurship and growth
- present this as a **business proposal** to **potential investors**





# Emerging Architectures



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# Emerging Architectures

Client/Server Programming

Network Programming

Distributed Computing

Cloud Computing

Machine Learning

Virtual Machines



# Assessment

Amazon Web Server – **Check (AWS)**

Research Area of tutor:

Video object detection – **many students struggled**

**More flexible now:**

Implement and apply something learnt on the module

**Has to be approved**



# Independent Scholarship



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# 30 ECTs – Project or Scholarship

Loosely Supervised

Proposal Agreed

Product Encouraged





# Industrial Placement



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## 30 ECTS

Students encouraged to find a placement

They have to:

Agree a project with company with objectives

Write a reflective account of the placement:

- ❖ Tools
- ❖ Techniques
- ❖ Processes
- ❖ Results Were the objectives met?
- ❖ Impact

# Flexible Course Design – Small Credits Best

Studying at  
Masters Level &  
Research  
Methods

Computer  
Networks and  
Architecture

Client-Side and  
Mobile User  
Experience

Mobile Software  
Design &  
Architecture  
(open platforms)

Entrepreneurial  
Management

Emerging  
Architectures

Mobile Device  
Forensics and  
Security

Mobile Software  
Development  
(Closed  
Platforms)

# MAGnUS - 2 Years – 120 ECTs

Year 1 60 ECTs

Studying at  
Masters Level &  
Research Methods

Computer  
Networks and  
Architecture

Client-Side and  
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Entrepreneurial  
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Mobile Device  
Forensics and  
Security

Mobile Software  
Development  
(Closed Platforms)



• Year 2 60 ECTs

Education

Games

Industrial

Health



Master Project  
Or Placement



# MAGnUS - 2 Years – 240 UK Credits

Year 1 120 Credits

Studying at  
Masters Level &  
Research Methods

Computer  
Networks and  
Architecture

Client-Side and  
Mobile User  
Experience

Mobile Software  
Design &  
Architecture  
(open platforms)

Entrepreneurial  
Management

Emerging  
Architectures

Mobile Device  
Forensics and  
Security

Mobile Software  
Development  
(Closed Platforms)



• Year 2 120 Credits

Education

Games

Industrial

Health



Master Project  
Or Placement



# MAGnUS Design - modules

- Employers want?

- Students want?

- Lecturers want?

# Education Optional Modules

**Timetable**

**Calendar / reminders**

**Animation – Sciences & UX**

**touch, tooltips,**

**compression**

**graphic and video**

**hierarchical structure**

**Modelling**

**Clock related skills apps**

- Teaching Mobile Development in School
- Mobile Programming: Thinkable, AppInventor
- HTML-5 & JavaScript





# Health Module Overview

## Integrating Sensor APIs

### Accelerometer

motion, movement.  
perform, location

**Gyroscope** – posture, position

**GPS – Where are you?**

Directions/ Locations

**Proximity Sensor – accessibility**

Microphone – breathing

Touchscreen – interface

Clock & reminders

- Fingerprint – security
- Pedometer
- QR Code – auto links
- Barometer – air pressure, some weather
- Heart rate Sensor
- Thermometer
- Humidity
- Geiger Counter
- Others?



# Mental Health Module Overview

- **Social – web apps**
- **Networking - community group updates**
- **Advice**
- **Memory Games**
- **Medical Records**
- **GP – Appointments**
- **Hospital Appointment**
- **Booking a consultation**
- **Viewing Medical records**
- **2<sup>nd</sup> Opinion**
- **Drug info & Side Effects**



**TOP 30**  
**GUARDIAN**  
UNIVERSITY GUIDE 2019

# Internet of Things

**Car Play Apps**

**Car monitor Apps**

**Automation**

**Home Automation**

**Security**

**Efficiency (Lighting, Heating)**

**Entertainment**





# Games Development

Sensors

Accelerometer

Gyroscope – Augmented reality

Treasure Hunt



# Education and Games Modules

Explore more this  
afternoon



# Mobile Themes

Term	Lifelong Learning			
4	Dissertation	<b>OR</b>	Placement	
3	Options: Health Options: Health & Sensor Development	Education	AI	Internship
2	Entrepreneurial Management	iOS Development	Cloud & Distributed	Security & Forensics
1	Studying at Masters Level	Android Development	Client & Mobile UX	Network

# Games Themes

Term	Lifelong Learning	Development	Nets & Security	UI & Web
4		Dissertation	Placement	
3	Options: Health & Sensor Development	Education (Serious Games)	AI	Internship
2	Entrepreneurial Management	Cross Reality (XR)	Interaction Methodologies	Advanced Programming Tech
1	Studying at Masters Level	Mobile game Engine Devt.	User Interaction	Prototyping

# Health & Education

Term	Lifelong Learning	Development	Nets & Security	UI & Web
Health	Sensor Interaction	High Risk	Integrating Devices	Health (Serious Games)
Education	Options: Health & Sensor Development	Internship	AI	Education (Serious Games)
Games	Studying at Masters Level	Mobile game Engine Devt.	User Interaction	Prototyping





# LUNCH



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