

VET4APPS

Desk research regarding business
and design skill needs in the
mobile apps field
(O1-A2)

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1 Introduction

The industry of mobile apps is one of the fastest growing segments in the information technology market in Europe, with more than 750,000 individuals employed in apps economy. As of 2013, smart phone adoption among mobile users in the EU is around 50% and growing at around 10% per year, the EU mobile app market is expected to be in the lead by 2015 with a 30% share of the global market estimated at US\$ 32 to 35 billion¹.

This increasing adoption of smart phones and tablets shifting the entire ICT ecosystem towards mobile and apps, has brought fundamental changes on job profiles, competence needs and training requirements. Mobile apps entrepreneurs and employees, apart from technical excellence and up-to-date software development skills, require business skills in order to adapt their idea to users' needs, and advanced design skills to make the mobile app attractive and easy to use.



The **VET4APPS project** forms a Strategic Partnership that will modernise VET for mobile apps entrepreneurs, employees and freelancers in terms of relevance of VET provision to the requirements of the labour market. The first output of the project aims at defining the requirements and specifications for the VET program, and comprises among others of this report "Desk research regarding business and design skill needs in the mobile apps field", which involves the collection of information about sector's skill requirements and training needs.

Evidence drawn from desk research will be used complementary to primary research data that VET4APPS will gather, to establish a satisfactory degree of comprehensive pre-

¹ Deloitte Consulting, Citadel Consulting, Tech4i2, The Castlegate Consultancy, (2011) Pricing of Public Sector Information Study Apps market snapshot.

analysis. UCBL, as leader of this activity, will analyse the data gathered to identify VET program requirements and formulate VET4APPS curriculum learning outcomes.

The scope of this document is to be used internally by the consortium to assist in the formulation of the VET program requirements; however the fruits of the research can be also utilised by the wider educational community to increase the labour market relevance of current VET provision in mobile app development.

Overall, the report is structured as follows: section 2 describes the methodology employed for data collection; section 3 documents the most valued design and business skills as identified through desk research; and section 4 reviews the availability and content of existing mobile app training programs.

2 Research approach

Desk research was conducted, for the collection of evidence on the most valued design and business skills in the field as well as on the availability and content of existing mobile app training programs. The data was gathered from relevant sources of information such as the European e-competence framework, and agencies of vocational training like the CEDEFOP². Other sources of information were the outcomes of other relevant European programmes, the context of existing national, European-level and international analyses, existing academic and commercial mobile application development and design courses, expert opinions and articles, case studies and surveys conducted for business organisations, governments and training providers as well as job advertisements. The full list of supporting sources of information can be found in the last section of the report.

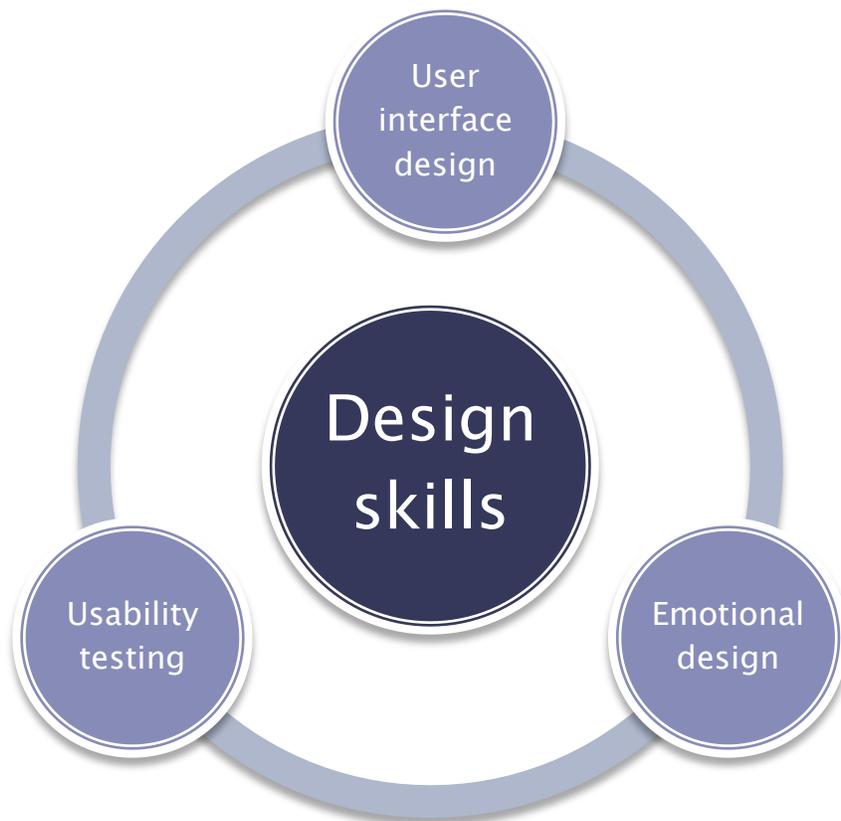
² <http://www.cedefop.europa.eu/>

3 Skill requirements in the mobile app field

3.1 Design skills

According to Pierce and Wooldridge (2010), design is the most critical component in creating an attractive and successful mobile application. Good ideas need be combined with design excellence to attract users' attention and increase application's value. An application with a well - designed user interface supported by eye-catching visual elements has the potential to create positive impressions to users and increase their retention and engagement. In the same context, the strategic use of experience-centric details and emotional design elements (animation, humoristic notifications, etc.) in the design assists in developing a connection with users, evoking sentiments and improving user experience (Smashing Magazine, 2013).

The EU Skill Panorama (2012) stresses the demand for advanced design skills in ICT sector, stating that design skills have become increasingly important for ICT professionals engaged in software and hardware development. Consequently, in order to meet the labour market requirements, mobile app designers, apart from technical excellence and up-to-date software development skills, need to acquire a new set of up-to-date design skills. Crafting an intuitive and friendly user interface, applying iterative usability testing and integrating experience-centric details are the fundamental components that enhance an application's value.



3.1.1 User interface design

User interface design refers to the process of crafting a visual environment focusing on user experience and interaction and incorporates elements and concepts from interaction design, visual design, and information architecture. According to the committee of the Best Mobile App Awards³, an attractive, friendly and practical user interface design is essential to the success of a mobile application.

To increase users' engagement, the interface should be as simple and efficient as possible while the structure and design of the application should meet or exceed users' needs and expectations. To accomplish this, a user-centred design approach should be employed; a concept where the desires, needs, tendencies and limitations of end users should be taken into account at each stage of the design process (Garret J., 2011).

³ <http://www.bestmobileappawards.com/>

Decoding target user profile and minding users' preferences every step in the design process is vital to ensure that the application will be successful and users will end up with a positive experience.

To design an attractive user interface, mobile app developers should be able to perform efficiently the following tasks:

- Realise what the user desires and incorporate user preferences into basic models of design;
- Organise lots of complex information to be contained on the interface in a way that is simple, user-friendly, logical clear and elegant. Different sizes, fonts, and arrangement of the text can help increase readability and legibility;
- Sketch, create a spectrum of solutions, collaborate with target users and user interface researchers, iterate and validate;
- Select user interface elements in a consistent and predictable way. As users are familiar with elements acting in a certain way, the appropriate utilisation of interface elements will improve the usability of the application and increase their satisfaction;
- Create an eye catching icon and visually appealing front page; and
- Use HTML, CSS, jQuery and Photoshop/Fireworks.

3.1.2 Usability testing

Usability testing refers to the process of executing systematic test procedures for customers' usability requirements to establish compliance with design specifications (European e-competence framework 2.0). It is a technique for ensuring that mobile application performs to expectation so that users have the potential to execute the predefined intended tasks efficiently without limitations and constraints. The ultimate objective of testing is to identify any usability problem before they are coded and determine participants' level of satisfaction by receiving valuable feedback and comments. A successful usability test diminishes the number of bugs experienced by users in the interface and increases the reliability and usability of the application.

Usability tests are usually carried out pre-release so that any identified problem can be addressed at the pre-commercial stage.

To organise and execute successful usability tests, app designers should be able to:

- Identify representative end users to participate in usability testing;
- Create and manage a test plan;
- Author usability test scenarios to stress test potential vulnerabilities and to uncover key problems and bugs in the current design;
- Document and report test results to enable data analysis;
- Review, analyse and interpret behaviour patterns and feedback from target users; and
- Adjust the development process to reduce usability problems in the future.

3.1.3 Emotional design

David Norman (2004), who firstly introduced the concept of “emotional design”, argues that the emotions change the way human’s cognitive system operates and hence how the human mind understand the world and assess situation and things. The reason is that aesthetics have the capability to induce emotions in people affecting the way they consider and evaluate products. An aesthetically appealing product appears to the customer to be more functional and useful due to the emotional connection developed between the customer and the product.

In mobile apps, emotional design refers to the process of designing an application, both functionally and aesthetically so that it will have a major impact on how users feel about the final outcome. A well-designed and visually appealing application produces a series of positive emotions and sentiments (joy, pleasure, surprise, attention, expectation, and anticipation) that make users want to interact with the application again in the future.

Before launching an application, developers should make sure that their outcome is appealing and pleasurable to use, has intuitive and intelligent interactions and can efficiently evoke positive emotions. To incorporate emotional design elements that will

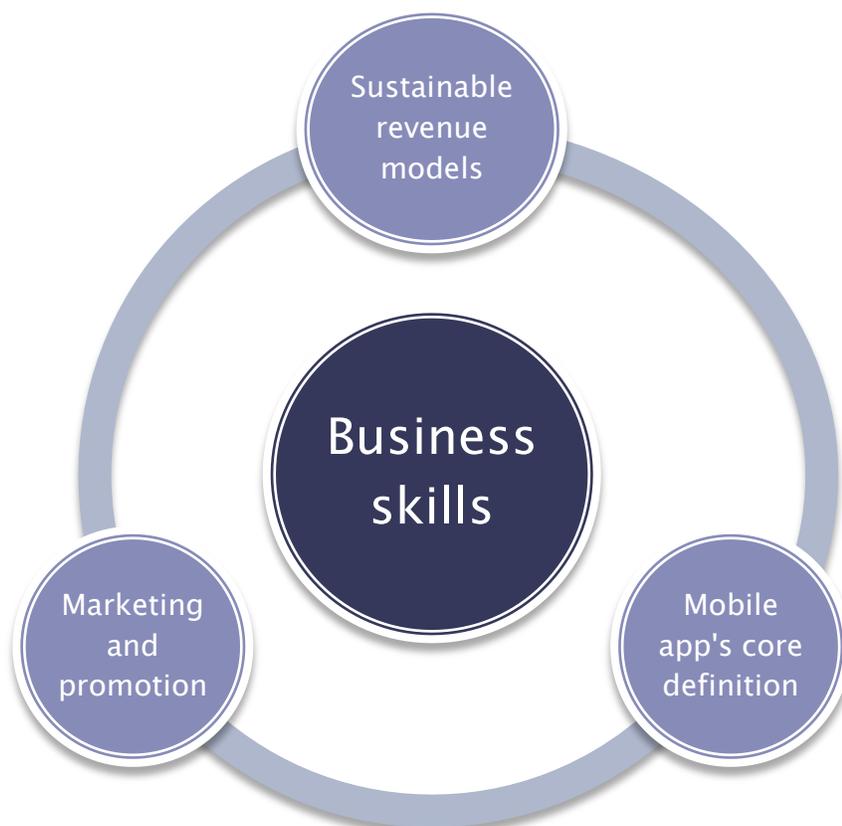
make their application remarkable and memorable, mobile app developers and system architects should be able to:

- Use animation, humoristic notifications, create a strong, fun personality to accompany the app, connect it with the unique identity of the product;
- Create habits about the use of the mobile app to improve user retention, e.g. gamification, curated content, sense of involvement;
- Remove unnecessary elements and provide users a limited set of options prompting them to take action, experience the application and finally get engaged; and
- Include customizations in the app so as to build a connection with the user and make the application personal.

3.2 Business skills

The expanding mobile app development sector has placed business and customer-oriented skills at the very core of app developers and designers skill set. The need for high level job-specific skills of ICT professionals combined with managerial and customer oriented skills has been systematically documented and analyzed .The EU Skills Panorama (2012) highlights the increasing demand for soft and transversal skills, stating that business and customer oriented skills are considered key non - IT skills for succeeding in the ICT sector. Cattaneo et al. (2009) argue that the industrialization of ICT development has changed the mix of skills and capacities required by ICT professionals; bringing at the forefront the skills and capacities related to business management and customer service. Alike, the Ireland's policy advisory body reports that ICT professionals need to have a T-shaped skill set whereas hard technical skills should be combined with business related and management skills (Forfas, 2013).

To deal effectively with the full range of the issues involved in the commercially successful creation of mobile apps and survive market competition, app designers and system architects need to acquire up-to-date business and customer oriented skills. Adopting sustainable revenue models, creating an appropriate app definition statement and marketing the value of the application are considered critical components in creating and launching a successful mobile application.



3.2.1 Mobile app's core definition

Mobile app's core definition constitutes a concise, concrete declaration of an app's main purpose and its target market / audience (Apple, iOS Human Interface Guidelines, Feb 2012). Creating an app definition statement at an early stage in the mobile app development process is essential for defining the identity of the application, deciding on its context and features, and determining its target audience. The creation of an effective app definition, which will explain the basic value of the idea, should be set on the following parameters and answer the subsequent questions⁴: i) purpose (what is the main problem you are trying to address?); ii) audience (who will be the end users or else the target market?); and iii) functionality (what is the application going to offer?). By clearly stating the application's main purpose, target audience and main characteristics

⁴ <http://blog.universalmind.com/the-application-definition-statement2/>

through this approach, a guiding principle for designing and developing the application is being made available.

To efficiently create the mobile app's core definition and hence increase the chances to succeed in an intense market competition, designers and developers should be equipped with the following skills:

- Define the nature of the application and its target market and choose the most relevant category for the application;
- Create the mobile app's core statement in such a way that the basic value of the idea is easily understandable;
- Explore the App stores for similar apps and find your app's differentiations; and
- Optimise the app content with specific keywords to make the mobile application more searchable.

3.2.2 Knowledge and application of sustainable revenue models

Even though the app economy is growing at an annual rate of 27% and the revenues from apps and apps related products are estimated at 110 billion euro worldwide (EU28: 21.5 billion euro)⁵, developing a mobile application that will make money is really hard and challenging.

The financial dimension of app development lies in the process of creating a revenue stream from exploiting commercially the application (mobile app monetization). There are several revenue models that are currently practiced with mobile apps (e.g. pay per download, subscriptions, freemium, inter-application advertising, inter-application purchase, etc.),⁶ and which are designed to take into account the existing differences among business cases.

When defining the business case for launching an application, it is important to determine which revenue scheme leads to sustainable revenues even if more than one

⁵ Vision Mobile's App Economy Forecast 2013–2016 report

⁶ <http://opera-mobile-store.com/10-mobile-app-revenue-models/>

model need to be employed. For example, a sustainable revenue scheme suggested by David Barnard (App Cubby)⁷ relies on the idea of giving away as much value as possible and empowering users who receive more value using the application to pay more for it. These types of creative monetisation ideas (provided by available revenue models) can ensure the sustainability of mobile application development and lead to the development of even better and sophisticated ideas.

To ensure the financial sustainability of mobile app development and before launching the application in the market, developers should be able to perform the following tasks:

- Develop a business model and conduct a cost-benefit analysis including ROI timeframe;
- Evaluate the market competitive landscape and mature;
- Understand and assess the different revenue models, and select the most appropriate model(s); and
- Estimate monetisation activity and take informed decisions about revenues based on statistics.

3.2.3 Marketing and promotion

With over 500,000 mobile applications available in the global mobile applications market⁸, making your application known, discoverable and eventually popular is the key to user acquisition and distribution success. This is why mobile applications require a well-defined marketing communication strategy to reach their target market and survive the market competition.

To accomplish this, marketing and communication activities should initiate before releasing the application (and continually develop) so as to ensure that the release will propel the application into the top charts, which means that the application will be easily discoverable and visible to most customers and end users.

⁷ <http://www.smashingmagazine.com/2012/11/07/succeed-with-your-app/>

⁸ Appli, “The Essential of Mobile App Marketing”, White paper

The secret to avoid an application ending up being just another one of the thousand releasing every day is to create buzz around the application and draw end users' attention. Regular releases and updates, exposure to media, social networking, and advertising as well as dissemination material (press-releases, tutorial videos, ads, etc.) are some of the several ways⁹ to market and communicate the value of the application.

To successfully promote an application to its target audience and improve its visibility and popularity, developers and designers should be capable to execute the following tasks:

- Build a fan page to easily promote a mobile app;
- Create a structured press release to announce the launch of the application;
- Effectively manage and administer social media;
- Create incentives to prompt users share the application;
- Run a private beta to promote the app from the very early stage;
- Create an attractive video, high quality images and screenshots; and
- Track and analyse the mobile app using analytics.

⁹ http://wip.org/download/GuideToTheParallelUniverse_1stEdition.pdf

3.3 Available mobile app training programs and courses

This stage of research involved identifying available mobile app academic and commercial courses and training programs and assessing whether they have the potential to equip app designers and developers with the design and business skills (as identified in the previous section) required to develop and launch successful mobile application.

Desk research yielded a list with 20 academic and commercial courses worldwide (the number of available courses in the EU is rather limited) dealing with mobile app development and app related issues. The details of identified courses as well as a brief description of their learning content are presented in table 1 and table 2.

To begin with, commercial training courses are more focused on mobile application development than academic ones, provide hands-on training and cover different levels of expertise (introductory, intermediate, etc.). They have a more technical focus and usually cover the basic programming principles, software architecture and user experience considerations underlying the environment of mobile application development. User interface design and business related issues are not covered or covered at an elementary level, leading to a shortage of essential “soft” skills among app developers and system architects.

The profile of available academic programs suggests that mobile application development is largely seen as a specialty that requires prior technical education. Evidence shows that the number of undergraduate programs focusing on mobile apps is relatively low; mobile app development is usually included as a module within a broader academic degree such as computer science or information technology. As regards the content of academic mobile app related courses, the vast majority are predominately technical. Modules of coding, programming and software engineering are at the heart of these programs, while design and business related aspects of mobile app development, even if included, are not sufficiently covered.

Table 1: EU training programmes and courses

Title	Type	Provider	Learning content
Mobile Application Design	Master programme	University of Kent	HCI for mobiles; Android/iPhone Design; Mobile web development; research methods and project design for mobile apps; Java.
Mobile Device Application Development	Master programme	Leeds Beckett University	Mobile application development; Mobile games prototyping; Network architecture; Project management; User experience design; Web development
Mobile App Development	Master programme	Teesside University	Mobile App Programming; Mobile Web Services; Object Oriented Programming; Research Methods for Computing; Systems Analysis and Design; UX Modelling.
Mobile Device Application Development	Undergraduate programme	Leeds Beckett University	Architectures, Platforms and techniques; Mobile games prototyping; Systems, designs, innovation; Network & convergence architectures; Project management; User experience design.
Mobile Computing and Application Development	Undergraduate programme	University of Wales	Computer Architecture; Information Engineering; Scripting; Interaction Design; Mobile Application Development; Software Engineering Principles; Mobile Graphics and Games; User Experience Design.
Mobile App Certificate Program	Professional Development Program	Northwestern University	App design prototyping; Mobile optimised user design; Analytics for applications; Coding; Entrepreneurship.
iPhone App Development Course Outline	Course	Alison.com	Mac OS X operating system; Objective-C programming language; Design of iPhone applications, scroll views, table views and handling data in the application; Testing and localization and the OpenGL ES.
Mobile Application Development	Course	Birbeck, University of London	Mobile app design, Mobile app content management and delivery; Content formatting and presentation; Forms; JQuery Mobile; HTML5 enhancements; Mobile app distribution.
User experience	Course	Webcredible	Information architecture; Interaction design; Interface design; Axure training; User research; Usability testing; Analytics; Digital project management.
Android mobile app development	Course	Bermotech	Android Operating System, architecture and application components; Explicit and Implicit Intents; User Interface Design and Development; Event Handling; Notification Status Bar and Toast; Audio and Video; Animation.
iPhone and iPad Application Development	Course	ICT Academy	Apple Developer Program; Application development process presentation; Features and characteristics of mobile terminal hardware; Development environment establishment; Introduction to objective C, Cocoa/Cocoa Touch; User interface elements; Application testing and distribution.
Mobile Application Development	Module	University of Buckingham	Mobile phone/platform overview; Mobile app development tools and emulators; User interface and user experience; Data and network services; Reading structured data; Getting the application to the Market Place.

Table 2: US training programmes and courses

Title	Type	Provider	Learning content
iOS App Development	Certificate program	New York University School of Professional Studies	Programming and coding; GPS Interface; Visual Interface; Graphic design; Marketing.
Mobile App Development Training	Course	Tonex.com	Core OS; Programming Languages; Networking; Security; Graphics and Media; Internet & Web; Hardware Integration.
Mobile Applications Business Analysis	Course	Tonex.com	Interface/functional requirements; Communication plan; Change management; Scope statement; Application analytics; Business analysis.
Web and Mobile Applications Development	Course	San Diego State University	Programming and Scripting Languages for Web Applications; Human Computer Interfaces; Advanced Web Application Development; iOS/Android Mobile Application Development; Emerging Web and Mobile Technologies.
iOS App Development with Swift Essential Training	Course	Lynda.com	Installing Xcode and the iOS SDK; Creating basic interaction; Connecting UI elements to code; Creating and customizing table views; Exploring storyboards; Understanding the differences in iPad development; Altering views and constraints, with size classes; Adding application icons and launch images.
Building a Mobile App with Feathers and Starling	Course	Lynda.com	Downloading the frameworks and the AIR SDK; Configuring the project; Implementing a theme; Creating the screen classes; Adding a navbar component; Building the classes; Returning saved files; Installing and running the app.
iOS App Training	Course	Silicon Beach Training	X-code; Basics of an iPhone/iPad application; Web View Controller; Multimedia functions; GPS and Map kit functions.
Programming Mobile Applications for Android Handheld Systems	Course	Coursera / University of Maryland	Android development environment; Application fundamentals; Permissions; User Interface classes; User notifications; Networking; Graphics and animation; Multimedia; Data management.

4 Conclusions

Literature review indicates that mobile app designers and system architects require an enhanced skill set to develop successful mobile applications. Technical and up-to-date software skills should be combined with advanced design skills needed to make an application attractive and easy to use and business skills to adapt ideas and concepts to users' expectations and needs.

To attract users' attention and increase app's value, mobile app designers should acquire advanced **design skills** in the areas of user interface design, usability testing and emotional design. Developers should be equipped with skills required to understand user interface conventions, and incorporate design elements that correspond to users' needs and expectations (**user interface design**); organise and perform usability testing against the mobile app specifications and take remedies in case of bugs (**usability testing**); and use experience-centric details and emotional design elements to develop a unique connection with users (**emotional design**).

Moreover, mobile app designers need to develop **business and customer oriented skills** to ensure user acquisition and distribution success. Literature suggests that the most valued business skills related to mobile app development lie in the areas of sustainable revenue schemes, mobile app's core definition and marketing and promotion. Developers need to be able to assess the different categories of mobile apps in terms of revenue models and select the most appropriate (**sustainable revenue schemes**); define mobile app's core statement in a way that the app's basic value is understandable to users (**mobile app's core statement**); and market the value of the application through social networking, advertising, exposure to media and regular releases (**marketing and promotion**).

Finally, the information collected about the availability and content of existing mobile app training programs and courses indicates that the vast majority of both academic and commercial courses are mainly technical and with limited focus on design and business related aspects.

Table 3: Design and business skill needs in the mobile app field

Type of skills	Thematic area of skills	Skills required
Design	User interface design	Realise what the user desires and incorporate user preferences into basic models of design; Organise lots of complex information to be contained on the interface in a way that is simple, user-friendly, logical clear and elegant; sketch, create a spectrum of solutions, collaborate with target users and user interface researchers, iterate and validate; Select user interface elements in a consistent and predictable way; create an eye catching icon and visually appealing front page; Use HTML, CSS, jQuery and Photoshop/Fireworks.
	Usability testing	Identify representative end users to participate in usability testing; create and manage a test plan; Author usability test scenarios to stress test potential vulnerabilities and to uncover key problems and bugs in the current design; Document and report test results to enable data analysis; review, analyse and interpret behavior patterns and feedback from target users; Adjust the development process to reduce usability problems in the future.
	Emotional design	Use animation, humoristic notifications, create a strong, fun personality to accompany the app, connect it with the unique identity of the product; Create habits about the use of the mobile app to improve user retention, e.g. gamification, curated content, sense of involvement; Remove unnecessary elements and provide users a limited set of options; Include customisations in the app so as to build a connection with the user and make the application personal.

Business	Knowledge and application of sustainable revenue models	Develop a business model and conduct a cost-benefit analysis including ROI timeframe; Evaluate the market competitive landscape and mature; Understand and assess the different revenue models, and select the most appropriate model(s); Estimate monetization activity and take informed decisions about revenues based on statistics.
	Mobile app's core definition	Define the nature of the application and its target market and choose the most relevant category for the application; Create the mobile app's core statement in such a way that the basic value of the idea is easily understandable; Optimise the app content with specific keywords to make the mobile application more searchable.
	Marketing and promotion	Build a fan page to easily promote a mobile app; Create a structured press release to announce the launch of the application; Effectively manage and administer social media; Create incentives to prompt users share the application; Run a private beta to promote the app from the very early stage; Create an attractive video, high quality images and screenshots; Track and analyse the mobile app using analytics.

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