

So you want to...

be mobile

v.2



What is mobile learning?

Mobile learning happens when people use their mobile devices for learning so they are not limited by location.

This Trainer's Manual ver. 2.0 has been prepared as part of the "E-business Mobile Training - use of mobile Performance Support System for acquiring e-business management skills" project, co-financed by the Leonardo da Vinci – Lifelong Learning Programme. It is based on "mobile Performance Support System for Vocational Education and Training" project, and results developed during its implementation.

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We are living at the beginning of new Era of „Knowledge Society“ in which tremendous changes are happening in education. Ways of acquiring knowledge have been strongly influenced by the ICT we are surrounded with every day in almost every aspect of our life. The rapid growth of mobile devices has dramatically changed the way we communicate, and the way we obtain information. Without a doubt it has become an important driver of innovation in learning. Mobile computing is one of the fastest growing areas within the technology industry world-wide. It makes it possible to envisage an audience for mobile learning content which is media rich, collaborative and always available to the user. Nowadays the learning process can be characterized by a preference for receiving information quickly, the ability to process it rapidly, heavy reliance on ICTs for information access and communication and a preference for active involvement in the learning process over passive learning in lectures. Moreover, the traditional educational systems of VET should move towards job related training. Therefore, new methodological approaches are needed in order to make the best use of the potential of mobile devices.

This manual was prepared in the framework of E-business Mobile Training project, co-financed by the European Commission's Leonardo da Vinci programme. The project Manual is a combination of general textbook and a guidebook for trainers and coaches, designed as a summary of practical aspects of Mobile Training Methodology for E-business. It presents data and knowledge in graphic form, making it easy to search, understand and memorize. If a reader wants to know more about a subject, he or she can consult the methodology for a more profound analysis, using cases and investigations, as well as a detailed bibliography.

The trainer manual is a practical follow-up to the Methodology. Above all you will find here a clear and useful path which will lead you through the complete process of implementing mobile solutions in your organization. In what sense is this solution practical then?

We focused on particular steps which you have to take in order to travel the long way from initial concept around use of mobile devices at work, to specific, checked solutions that work.

This route is similar regardless of the industry you work in; however, these materials were drawn up aiming at the e-business in a broad sense. Whatever your sector is, the way you have to travel is very similar:

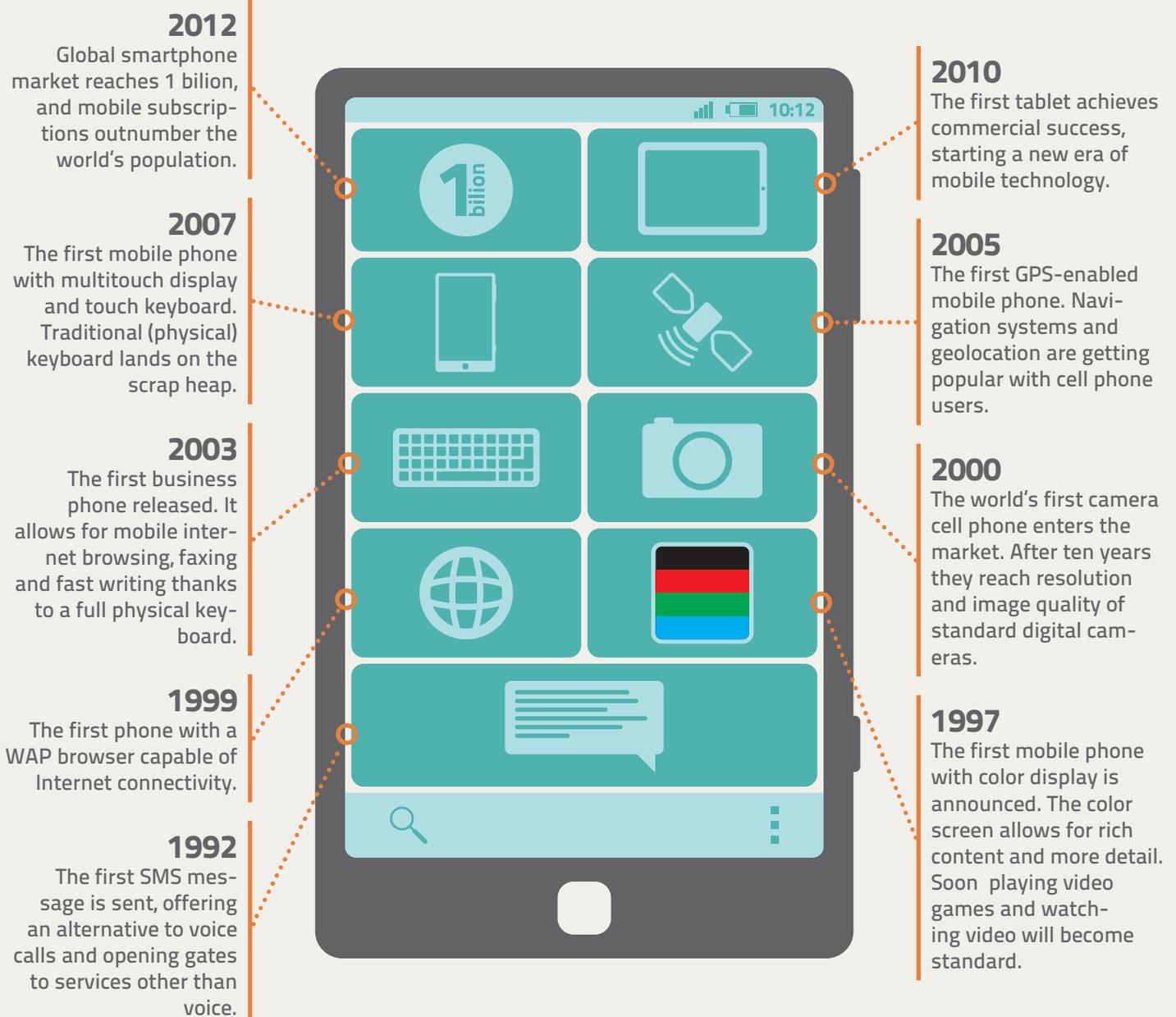
- Step 1. Welcome to the mobile world !**
- Step 2. Setting goals for Your mobile learning**
- Step 3. Assess the current situation**
- Step 4. Plan Your mobile learning approach**
- Step 5. Set or build mobile learning solutions**
- Step 6. Testing – an iterative process**

If you are an advanced learner, you can start from Step 2 or 3 but we encourage you to start from the very beginning. Remember that at the end you are supposed to achieve an efficient solution that works, so it will be better if you study everything thoroughly so as not to miss anything.

WELCOME TO THE MOBILE WORLD!

We are mobility evangelists

Mobile technologies are actually the only developed industry which was born alongside us and has such a big influence on our lives. We have been following the development of mobile phones since we were in the cradle up to the moment in which we are now. Before the first mobile appeared, we had no idea that the opportunities it would bring to us would be so great. Today, with almost 30-year-experience, we still do not know what the future will bring. We should qualify this intro by saying anyone born after 1990 etc.



So what can we expect in the near future? What mobile trends are we currently seeing?

Hybrid world

(on/off, phygital, blended reality): the line between the online and offline world is becoming more and more blurred. Suffice it to mention a Facebook app, where you click "Like" to trigger the mechanism of feeding real birds.

Big Data

This term refers to very large data sets and the accompanying need to gain further information. In practice, it often comes down to supplying the product before the consumer even becomes aware of it, or asks for it.

Second screen

The research shows that more and more people use a "second screen" (a tablet or smartphone), which allows interaction with the device, which they are using simultaneously (TV, video, music).

Augmented reality

A system that combines the real world with computer-generated worlds. We deal with it when, for example, we scan an historic monument with our smartphone or Google Glass (in the future), in order to obtain detailed information about it.

Internet of things

Common appliances connected to the Internet, e.g. fridges or lamps.

The future is therefore veering towards increasingly interactive forms of human cooperation with the device, less involvement in the process of use and greater integration with the digital world.

Mobile devices

Nowadays there are a lot of devices that can be categorized as mobile. Below is a list of some of the more popular tools employees may use in their work.

Mobile phones



(also known as cellular phones, cell phones and a hand phones) are used to make and receive phone calls and SMS text messages by connecting through radio signals to base stations that are linked in a cellular network. Most of today's mobile phones have a number of additional features like MP3 player, short-range wireless communications (Bluetooth, infrared), e-mail and internet access, or camera. They are sometimes called **feature phones** and lie halfway between low-end, simple mobile phones and smartphones.

Smartphones



While there is no standard official definition of the term "smartphone" (and it's sometimes hard to distinguish it from feature phone), we assume that a smartphone is a device that combines the functionalities of mobile phone, personal digital assistant and computer. It is based on an advanced operating system that allows to install and run various applications and offers access to the internet via mobile browser.

eBook readers



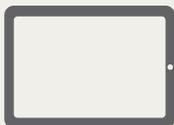
Devices designed primarily for the purpose of reading digital e-books and periodicals. They use electronic paper technology for better readability of their screens especially in bright sunlight. The disadvantages of electronic paper are that currently it can display content only in black and white and has no ability of displaying video content. Thus, its application for mobile learning is limited to mainly textual information.

Notebook and netbook computers



Not everybody considers laptop/notebook and netbook computers a part of the mobile ecosystem. But as they become smaller, thinner and easier to carry around they can be used as mobile learning devices that are generally more powerful than smartphones and equipped with full features of PC computers. On the other hand, they allow full-feature, "traditional" e-learning without design restrictions typical for mobile content.

Tablet devices and computers



Half-way between smartphone and laptop computer, they take advantage of both kinds of devices. Having screen big enough for browsing "traditional" e-learning content, they present some limitations (for example, many of them don't support Flash or other formats popular for Web) but also some advantages (like GPS or gyroscope) over regular computers. Their market share is still limited, but their popularity is growing very quickly and they are likely to substitute in some extent e-book readers and netbooks.

Portable media players



(such as iPods and MP3 players): are used for storing and playing digital media such as audio, images, video, documents, etc. Their clear advantage is the small size and light weight, but they have to compete in the market with mobile phones and smartphones, as well as other more specialized devices such as portable DVD players.

This catalogue is not closed. Every year new devices are introduced to the market and those which already exist change their parameters and usability features. Thinking about the devices which we should choose, the most reasonable method of selection seems to be the availability factor:

choose the device which is available for each of your employees.

Mobility is a chance, not a barrier. If somebody says, "I haven't got a tablet nor a media player", it means they will not be able to use the contents shared in these devices. Consider this.

Mobile solutions

At the moment, the most common mobile device beyond any doubt is the mobile phone and its successor – the smartphone. This is confirmed by the number of registered and active devices.

However, each device has a range of functional tools which we can use for e-learning purposes. Below you will find the most popular of them.

Some of them may seem uncommon or too obvious (e.g. SMS), but in certain circumstances they prove to be perfect solutions. Their application is at least worth considering.

To make the choice easier, we focused on:

- The costs of applying the solution
- The effort that must be made to make it work
- Checking the devices which support the given solution
- Showing sample solutions

PHONE CALL

Another simple solution that works for everyone and on every phone.

Cost: low

Effort: simple

Works on: any mobile phone

Sample solutions:

- communication between learners and teachers. Asking questions or providing feedback and motivation
- performance support. Establishing a support hotline



EXISTING TOOLS

There is a variety of off-the-shelf apps that you can use for learning, many of them are free or available in freemium model. It is more than likely that your employees already use some of them – like note-taking or productivity apps, office applications, or file sharing.

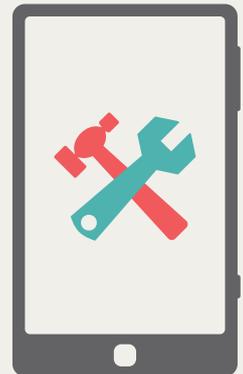
Cost: low/medium

Effort: medium

Works on: mostly smartphones and tablets

Sample solutions:

- quizzes and assessments (Quizlet, Easy Assessment)
- office applications (Google Docs, iWork)
- flashcards (StudyBlue, Mental Case, Quizlet)
- location-aware applications (Foursquare, DoubleDutch, Google Latitude)
- presentations (Keynote, Prezi, Slideshare, present.me)
- file sharing (DropBox, Box.com, iCloud)
- note taking and sharing (Evernote, Springpad)
- dictionaries (dictionary.com, Cambridge Business Dictionary)



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03



SMS

Short text messages are the simplest and cheapest way to deliver learning content. It is also easy – most people know how to send and receive text messages. It works on every type of mobile phone.

Cost: niski

Effort: proste

Works on: każdym telefonie komórkowym

Sample solutions:

- small pieces of text-based information. For example, daily pieces of advice or language lessons
- alerts and reminders. You can integrate a simple mobile solution to your existing LMS/e-learning course and have learners receive updates, deadlines or grading info right to their mobile phones
- assessment. Assess your learner's progress asking them questions via SMS
- fast communication channel between learners and teachers
- performance support. Send series of SMS guiding a worker through a procedure



EXISTING CONTENT

You can have your existing learning content delivered via mobile devices. Depending on content type and target devices, you can use it "as it is" or adapt it for mobile browsing.

Cost: low/medium

Effort: medium

Works on:

Some may require more advanced devices like smartphones; some (like audio recordings) may be used on wider range of devices; note that visual content requires bigger screen. Some mobile devices (like iPods or e-book readers) are developed for specific content types.

Sample solutions:

- existing e-learning modules
- formal learning content – presentations etc.
- supplemental content or review material as part of blended learning programs
- podcasts and video
- searchable references (like Wikipedia, or your company's database)
- job aids, checklists, and reference
- e-books or audio books

SOCIAL MEDIA

Use social media for communication, knowledge construction and sharing. Most of your employees are already using them for private purposes. Instead of banning social media in work, you should integrate them in your workers' activities. Be careful with sharing sensitive information with "outside world"! Establish a clear policy on privacy and information sharing.

Cost: low

Effort: medium

Works on: smartphones and tablets

Sample solutions:

- set up a Facebook group as a community of practice
- create a wiki for Frequently Asked Questions or collaborative knowledge base
- use Twitter for a fast performance support



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APPS

Creating a dedicated app allows you to best meet your learners' needs.

Koszt: medium (web app) to high (native app)

Effort: medium to high

Works on:

target smartphones and tablets (native app), all smartphones and tablets (web app)

Sample solutions:

- a **native app**.
- a **web app**. The difference between a mobile-friendly web and a web app is that the second has a touch-friendly, interactive interface that looks like a native app and in can be launched form a shortcut icon installed on the phone's screen.
- a **hybrid app**. The hybrid apps are developed with HTML5 wrapped in a native container. They look like native apps, but the content can be updated and modified easily.



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DEVICES' AFFORDANCES

Use your device's affordances to enhance learning. You can have your learners take pictures of their work (or document problem they encounter and share them with others asking for help), record voice notes for assignment, scan QR codes with information or instructions, or use built-in sensors for data collection.

Cost: low

Effort: medium

Works on: smartphones and tablets

Sample solutions:

- still and/or video camera
- internal microphone
- voice control
- data probes

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MOBILE WEBSITE OR LMS

Setting up mobile version of your website is an easy way to deliver existing content to mobile phones. Even simple phones have a web browser.

Cost: medium

Effort: medium/high

Works on: smartphones and tablets

Mobile applications

At the moment the most popular way to disseminate the training content via mobile devices is creating a suitable application. There are two main approaches to adopting the education environment to mobile devices: adopting the web version to the mobile devices' requirements or building a native implement in each compatible mobile phone. Each of these methods has its strengths and weaknesses, but there is also an in-between option. Analyze the following solutions in terms of the needs and practicalities of your organization:

Feature	native	hybrid	web
What is this?	An application which has to be installed on the user's device together with all included content. Thus it does not require an Internet connection, but any change in the content requires updating or re-installation	An application which has to be installed on the user's device; however the contents are downloaded regularly from the online database. It requires an Internet connection	An application which is accessed through a website, so nothing is installed by the user. It requires an Internet connection; however the application itself is not installed.
Type of mobile phone	Smartphone	Smartphone	Smartphone or any other mobile which has a web browser.
Constant Internet connection	Not required	Sometimes required	Required
Data updating	Requires software updating by the user	Generally does not require any actions from the user, though in some cases software updating is required.	It does not require any actions from the user.
Access	Installation through AppStore, GooglePlay or AppWorld.	Installation through AppStore, GooglePlay or AppWorld.	Access through any www browser without the need to install anything.
Creating	Requires the complete process of creating the application. The application has to be created individually for each platform and placed in the developer service of the operator.	Requires a complete process of creating the application. The application Has to be created individually for each platform and placed in the developer service of the operator.	Requires designing and creating a mobile WWW service which is shared by each platform, without the need to place anything in the developer service of the operator.

In this table, only the web application does not require the active participation of a team of programmers, as formally it is a website properly designed, created and secured. This reduces the costs substantially and enables content to be updated regularly. Yet, the problem is the need for constant internet connection (like in the case of browsing websites). However, in an era of increasing widespread access to the internet this is becoming less of an obstacle.

SETTING GOALS FOR YOUR MOBILE LEARNING

Five moments of learning

Before you take the decision about implementing mobile learning in your company, you should know your employees' learning needs. Bob Mosher and Conrad Gottfredson's Five Moments of Need is a framework that posits that there are five primary moments of need employees face in the learning and performance life cycle. The five moments occur:

Moment of Learning Need	Delivery Method	Applications in m-learning
When learning for the first time	<ul style="list-style-type: none"> ▪ Instructor-led training ▪ Web-based training ▪ Performance support ▪ Electronic performance support system 	Not recommended
When learning more	<ul style="list-style-type: none"> ▪ Instructor-led training ▪ Web-based training ▪ Performance support ▪ Electronic performance support system 	Mobile technology can be used as supportive tool for learning. They allow quick access to additional information (like corporative data bases, documents and procedures) in the exact moment and place where it is needed.
When remembering and/or applying what's been learned	<ul style="list-style-type: none"> ▪ Performance support ▪ Electronic performance support system 	It can provide knowledge refreshers, job aids or performance support any moment it is needed, especially when applying previously gained knowledge and skills in a real context, during the performance of a given action.
When things go wrong	<ul style="list-style-type: none"> ▪ Performance support ▪ Electronic performance support system 	Very helpful in situations of crisis, when quick access to critical information is needed. Therefore it allows instant reaction and effective problem solving.
When things change	<ul style="list-style-type: none"> ▪ Performance support ▪ Electronic performance support system 	Mobile learning can help employees in finding relevant data delivered just in time and always up-to-date.

The authors identified the best training delivery methods to meet each of the Moments of Need. The first and second moments are related to acquisition of knowledge and more traditional models of teaching. The other three deal with application of knowledge and are directly aligned with performance support.

What can you use mobile learning for?

At this time we are approaching the beginning of a new era – an era of society based on knowledge. Information and communication technologies affect every aspect of our life, including the ways we gain and assimilate knowledge. A fast development of mobile devices has radically changed the way of communication and gaining information in today's world and undoubtedly has become one of the motor drives in the development of innovative form of teaching.

What is the mobile learning needed for in your company then?

- **To catch up with your employees' needs.** Employees want to use modern solutions which they know well and use every day. The mobile learning tools go together with the development and popularization of the mobile technology.
- **To make a better use of the time for development.** Employees have less time to participate in training or traditional e-learning courses. Mobile learning allows them to be involved in mlearning during down time travelling on business trips, work breaks and all the daily situations where workers find they are not engaged on specific daily work tasks
- **To use the knowledge when it is really needed.** New skills are best consolidated in practice. Mobile devices enable using mobile learning courses every time it is needed.
- **To use the business opportunities.** An employee who has an easy access to the knowledge of the company and the product may all the time perform their duties on a high level. A salesman may use mobile devices without knowledge and configurators directly with the client to cut down on time wasting..
- **To make use of new trends.** The contents delivered through multiple platforms (whether you use Windows, MacOS or Linux) or the increasingly popular BYOD idea (Bring Your Own Device) prove perfect in the mobile environment.

What are the main advantages of using mobile learning?

Mobile learning opens completely new opportunities of accessing and providing knowledge transfer regardless of time and space. It enables us to develop our own skills or successfully use them in business. Mobile learning allows us to learn in any place, any time. It saves precious hours which we would otherwise have to devote to reaching our goal. However, those who think that applying mobile learning is limited to distance learning are wrong. It has its advantages also in classroom trainings or learning: it makes the knowledge acquisition more diverse and involves the participant.

The advantages of mobile learning:

- Unlimited access to information
- A wonderful way of consolidating and revising knowledge
- The possibility to learn in different places at different times
- A way of involving the recipient
- A perfect support of classroom trainings

Think about how you can use these values in your organization. Answer the following questions:

What is the current situation?	Facts which will help you to change it	Potential for organisation		
		Big	Medium	Small
In what way do your employees acquire new information at work?	The majority of the smartphones used have a constant connection to the Internet. Their users have, thus, a constant access to a great database which is the global network.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In what way are the new knowledge and skills consolidated?	The mobile phone is the most commonly used personal device. It is perfect not only in communication, but also as a multimedia reader, a browser or a platform for working tools.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do your employees have the chance to develop regardless of time and place and how do they use this chance?	Mobile devices can be taken anywhere and their use does not require a timely switching the system on. They are always ready to work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What training tools and methods make your employees involved?	Mobile phones and tablets ensure a two-way communication, thanks to which the employees may be involved more efficiently in the training process – they turn from recipients into partners.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the classroom trainings followed up and if yes, in what way?	Mobile phones and other mobile devices are now able to display without limitations the contents which were originally created aiming at desktop devices. They easily support various multimedia, files or documents formats. They enable the logging in to various services and working within the cloud.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The goals of mobile learning

The term “mobile learning” includes a sort of extension of the term “e-learning”. It does not mean, however that their goals are the same, but rather complementary and combined they create a concise whole.

Mobile learning focuses on gaining knowledge without the limitation of place or time. Its task is also to use many tools (games, animations, geolocalisations, SMS, quizzes etc.) to involve the participant in such a way that they make the most of this form of acquiring knowledge.

The basic goal of mobile learning is learning in a natural way with the help of mobile devices. There are, however, specific aspects which you have to consider if you want to carry out mobile learning in your organization correctly.

Considering all of its features that you already know, mobile learning will be effective if it fulfills the following goals:

Goal	How to reach it?
Availability	In order to use mobile learning efficiently, employees should have a relatively unlimited access to training contents and tools. Unlike in the case of classroom training or e-learning, they should not wait for the chance to use knowledge resources. They are free to decide when they want to learn and how much time they will devote to it.
Adaptability	Mobile learning should be adapted to the recipient in such a way that it becomes one of the components of blended learning. In such a case it will be possible to use mobile tools as a follow-up for other forms of learning. If, for some reason, the use of a mobile device is not possible, it will be replaced by another form.
Effectiveness	Using mobile devices can be effective, but it will not be effective by itself. Mobile learning should be designed in such a way that it uses the potential of mobile phones and not only processes the old training contents on a small screen.
Multiplication	An employee should have a reason for coming back to the contents of mobile learning and make the habit of going to work with the mobile phone. The contents must be updated and there must be an idea of what to do, so that mobile learning is not just a collection of closed courses.

This way we end the second step. You already know what to consider. Now let us focus on your organization and choose the solution which will be the best for you.

ASSESS THE CURRENT SITUATION

Before you focus on training materials or designing the interface, think about a problem which is absolutely crucial: do you really need mobile learning? Ask yourself if mobile learning will actually work in your company, considering the problems which you face in everyday life while operating your business. Study the learning process and its efficiency and carefully analyze if mobile learning is the best solution in this case. Studying the following areas will help you assess the situation:



You can find more information on this topic in our Methodology, in the chapter "Designing and delivering mobile learning", p. 70.

Let us now think about the particular elements.

Who are your users?

Begin with an assessment of your employees. Are they mobile enough to start learning in this mode? Have they got mobile devices? What do they use them for? What is their attitude to this novel approach to learning? Will the any time and any place access to the contents help them in reaching their training goals?

You should also make profiles of your target users.

- Who are they (employees, partners, clients...)?
- What mobile devices do they use?
- What are their main ways of spending time with mobile devices (games, texting, creating and sharing contents, contact with others, browsing the net...)?
- Are their devices connected to the Internet and if yes, in what way?

Finding the answer to these questions, even if they seem banal to you, is one of the key elements of organizing training. For if it turns out that your training with the use of mobile devices is attended by people who have never worked with them before, it will be difficult for you to focus on the very content of the training. The participants will ask technical questions which will make the program you have planned completely "blurred".

If you want to learn more about teaching adults, check in Methodology of carrying out training with the use of mobile devices for e-business, section "The andragogical aspects of mobile learning", p. 31.

Regardless of who the recipients of your trainings are, if they are adults, you have to consider the fact that:



They do not like pointless learning by heart. They would rather learn things which they are sure they will need in the future.

They like it when the theory is supported by specific examples.



It is difficult for them to set a fixed learning time and stick to it.

They are afraid of making mistakes and the consequences.



They learn more effectively when they can solve a problem themselves rather than when they are given the ready answer.

These are your employees. We already know who they are and what they are like. Now we will think about your role in this whole process.

What kind of experience have you got?

Regardless of the role that you play in your organization, you have to be aware of your assets as well as flaws which impact the numerous aspects of mobile learning in terms of different job positions:

Trainer or HR specialist

For sure experience in the area of training is an invaluable advantage. This experience tells you which solutions to use and which have not worked before. Feel free to use the lessons learnt in the previous activities even if they did not necessarily have anything to do with mobile devices.

However, try to be open to new solutions - this is the key to success during the training based on technology.

Not every method you used in previous projects will work in mobile learning. Remember, that in most cases it will be non-synchronic training, which means that your interpersonal skills will be of little avail.

Owner or director

If you are the decision maker and the fate of the whole company (or at least department) depends on your plans, try to find a person in your environment, who will help you implement mobile learning. You should certainly have a number of candidates open to new technologies.

First attempts are usually difficult and it is easy to be discouraged when it seems that the technology is complicated and there are no funds.

Remember that you do not need the whole programming or technical staff to implement mobile learning, but just a small team and a little time.

Together with your team, answer the questions:

- What form of mobile learning meets your needs?
- Will you use tools for cooperation, assessment or improving efficiency?
- What actions of the users would you like to evaluate?
- Who will deliver the content?
- Who will run the training?
- What competence should these people have?
- Will they need to be trained?
- Will they need additional materials?
- What support will you give them?

If you thought carefully about the problems included in the previous steps, you should now know already

what kind of mobile learning you want.

What are your resources?

The questions of technologies or budget decide on the success or failure of your enterprise. Thus, the results of your work depend on how seriously you approach these elements.

Budget	What budget have you got and how can you dispose of it? Can you spend funds on outsourcing? What elements can you buy additionally? Have you got all of the training materials required, the suitable specialists, or maybe you will have to buy some elements? Have you got the funds for the development of mobile learning?
Time	How much time have you got for designing mobile learning trainings, their implementation and the preparation of the evaluation of the first results? Is it enough time for the participants to reach the goals set for them?
Technology	Have you got the access to people who can work in JAVA, HTML5 or similar languages? Is there anybody in your company who deals with creating websites or has experience in applications or games? Will you be able to precisely define your requirements to the programmers?
Content	Have you already got the training material which can be converted to a mobile format? Are the contents suitable for the mobile mode? Who will deliver the required content? Will it be easy to process them into mobile devices? Who will deal with the updating and changes in the content if necessary? What about the intellectual property – who will have the rights to the content?

The devices are equipped with lots of options which can be used for learning. Think what tools and devices (sound and video players, clock, calendar, contacts list, GPS, maps, navigation, Bluetooth, e-mail, browser, text message, phone calls, sound and video recorder, text editor, spreadsheet, social networks, extended reality, detectors) will be most suitable for the training activities that you are planning.

The training does not have to be very costly – consider economical solutions plenty of which you can find on the market (delivering the contents using free programs, using SMS, social media, updating/implementing the mobile version on the website using a mobile RSS channel).

What are the security requirements and potential problems?

Define the security requirements:

Privacy and data security are main concerns and barriers in the implementation of mobile learning in many companies. Mobile devices can easily get lost or stolen. There is the risk of losing data or viruses or spyware which may gain access to the company data.

Identify potential problems:

A slow Internet connection and high transfer costs may be a problem. The problems with the Internet connection can happen even in developed countries, especially in the rural areas.

Problem	Hazard		
	Big	Medium	Small
No access to broadband Internet connection or no organization's policy in this area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Big diversification in access to mobile devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Big diversification in free use of mobile devices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Security requirement within data access, instead of through company computer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The company lacking experience of management of company mobile devices, licenses etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PLAN YOUR MOBILE LEARNING APPROACH

Potential use of mobile learning (scenarios)

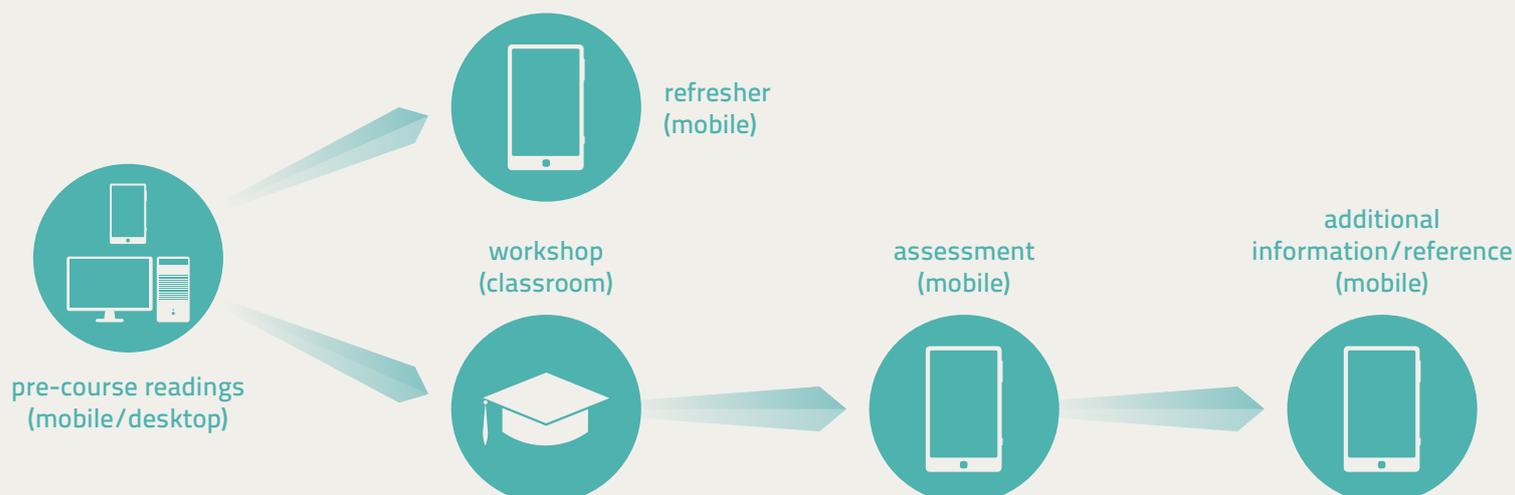
Blended learning



The basis of the training is an e-learning course, which can be additionally developed with such elements as webinar (an online training) or a workshop in the training room. In each of these cases mobile devices can be used effectively. The webinar can be recorded and shared on the mobile device for watching or listening. The mobile application can be used also for running a Q&A session. In the case of big classroom workshops or scientific conferences, such form of interaction with the speaker can be the only chance to ask a question.



In a different case, the mobile device can be used for getting familiar with the training materials for the first time or completing the pre-training tasks prepared by the trainer. The mobile device can also be useful when we want to come back to the training contents easily (refresh the knowledge) or extend the information on the topic which the training focused on. It is especially meaningful, as the participants often do not have enough time for in-depth learning. In business conditions there is actually no chance for the participants to be thoroughly trained, as they would have to spend a couple of days in one place, regardless of the scope and topic of the training. Thanks to mobile devices part of the materials can be available for later, e.g. when there is the need to use the knowledge. The mobile phone is a device which the user always has with them which enables immediate access to the knowledge needed.



100% mobile learning

scenario **3** Performance support

Performance support. The phone, as a device which the employee almost always has by their side, can serve them as a very effective learning tool. It is not about a typical teaching/learning process, but about a situation when the employee has an inner need to solve a problem or gaining information/knowledge necessary to complete a professional task. Thus we do not deal here with a typical training situation, but with using mobile learning tools in practice.



scenario **4** Workflow support

Workflow support. The mobile phone can also become an interesting tool to support the processes within the company. It is an application which might seem distant from mobile learning, but it also belongs to its scope. An employee who has a constant access to the resources can work more smoothly and faster in certain untypical conditions. It can take place without switching on the laptop or searching for an Internet access spot, as the mobile device can be constantly on and online.



You will find more on scenarios in mobile learning in our Methodology in the chapter "Andragogical aspects of mobile learning, Scenario in mobile learning and The theoretical structure of mobile learning"; p. 36-40.

Mobile performance support

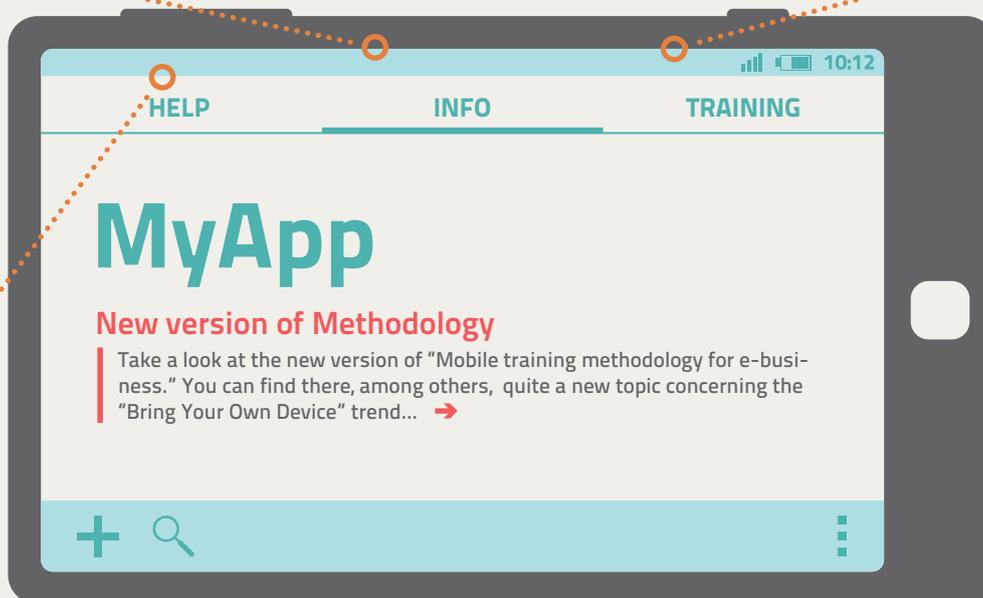
A performance support system (PSS) is a promising approach in business and industry training to empower workers to perform tasks with a minimum amount of external intervention or training. A PSS is a computer-based system that improves worker productivity by providing on-the-job access to integrated information, advice, and learning experiences by providing computer support just-in-time, just-enough and just-at-the-point-of need for an effective and efficient job performance.

A typical performance support is structured to provide immediate, individualized on-line access to the full range of information, software, guidance, advice and assistance, data, images, tools, and assessment and monitoring systems to permit job performance with minimal support and intervention by others. Most PSSs consists of four components:

An information component, that provides all the information the users require to do their job.

A training component, that helps them access training materials on demand.

An advisory component, that helps users find relevant, just-in-time information without having a deep understanding of the task.



The user interface component, that integrates all the components of the system and creates a seamless user experience.

How do you implement a performance-centered design in training? The performance-centered approach focuses on practical tasks rather than knowledge transfer. The training modules are composed of a set of activities or tasks. Each task is accompanied by information and instructions, but the learner is free to decide if he or she will consult them (and in which sequence) or use his/her own knowledge and skills to perform the task.

A typical structure of the course is:

Module 1

- Task 1
 - Task description
 - Task-specific training
 - Reference information
 - Instructions how to perform
 - Expert advice
- Task 2...
- Task 3...

Module 2...

Indicate solutions to be used

Mobile devices have a wide range of learning tools. In today's world providing knowledge does not need to be difficult and without attractions. On the contrary – thanks to new tools education is becoming an interesting and entertaining way of spending time, involving the user and full interaction with them. The days of mundane teaching have faded away for good due to mobile learning. You can decide which tool you are going to use during the training. Here are some examples of mobile learning tools:

Interactions	Mainly SMSs and MMSs. A fast and simple solution, though it does not mean the best one. Having many other tools at your disposal, focusing only on those interactions is not the best idea. The advantage of using SMSs is that every mobile phone can receive them. On the other hand you have to remember that mobile devices are not only smart phones, but also tablets or e-book readers, which do not have this function.
Animation	Animation involves the users and is a very interesting form of mobile learning. It can be combined with narration. Compared to videos, it generates lower financial costs and is not that complicated when it comes to system requirements. However, we should consider different screen sizes of mobile devices, which affect the perception of the animation.
Quizzes and surveys	Elements easy to prepare, which additionally do not require a lot of space. Thanks to them you can check learning progress, revise the material or increase the participant's involvement in the process of education. The forms, simple or complex, enable making contact with the user. However, in the older devices big amounts of text can turn out problematic to read.
Just-in-time tools	E.g. calculators, dictionaries, sources. Their name reflects the possibility to use them any-time they are needed. Especially useful for specialists, when they want to have access to specialist knowledge. Due to different scope and type of information, preferably they should be designed individually for each company.
Games and simulations	A very fashionable trend which is becoming increasingly popular in the e-learning area. Edutainment is nothing else but the combination of education and entertainment. The games involve the participant very much, yet there is the risk that education blends in the background. A disadvantage of this solution are also the relatively high costs.
Social tools	In this case access to the Internet is a must. Social media is very popular and their mobile versions are easy to operate. With their help you can send text messages to the users, share media (Wiki) or change the status (geotagging).
Virtual classes	The participation in virtual classes enables solving the tasks together in groups, access to the same documents or communication with the trainer and other participants. Also, distance meetings allow for directly assisting the student, if required. However, what is important here is a good Internet connection and the participants' discipline.

You will find more information on the mobile tools in our Methodology in the chapter "Mobile learning in corporate context, Mobile learning tools", p. 40.

Set goal for every proposed solution

SMS

- Quickly reaches the user
- Small chunks of necessary information

Animation

- Involvement of the participants
- Providing the training content through pictures and narration

Quizzes and surveys

- Quick feedback from the users
- Monitoring progress in learning
- Organization of the course

Just in time tools

- Providing specialist knowledge
- Enabling calculations

Games and simulations

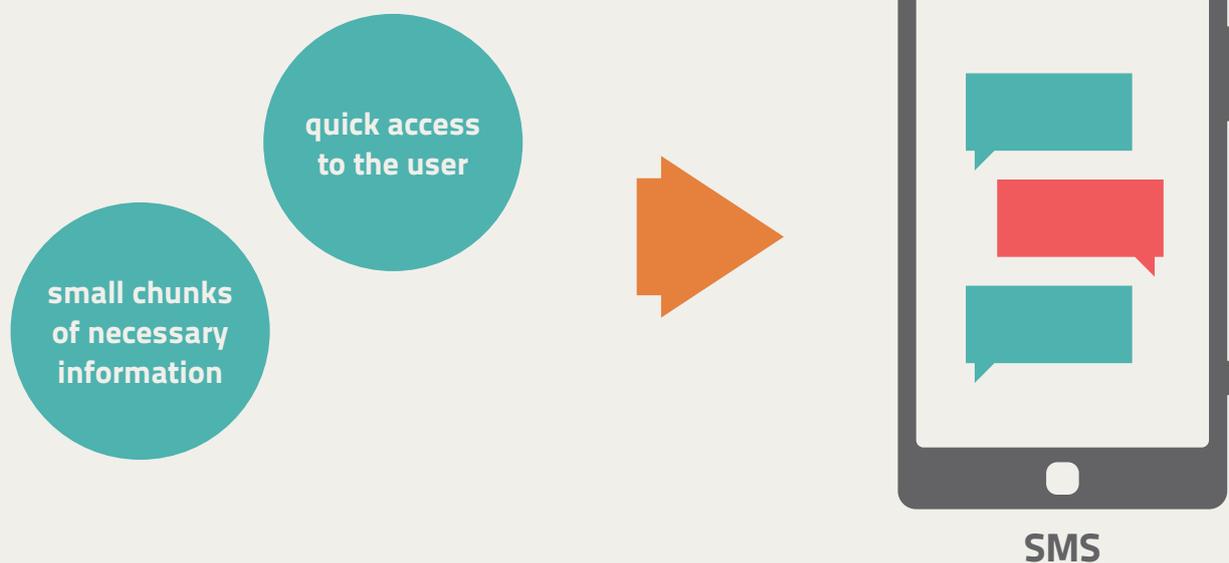
- Education with elements of entertainment
- Using games in spare time

Social tools

- Cooperation of a big group of people
- Sharing documents

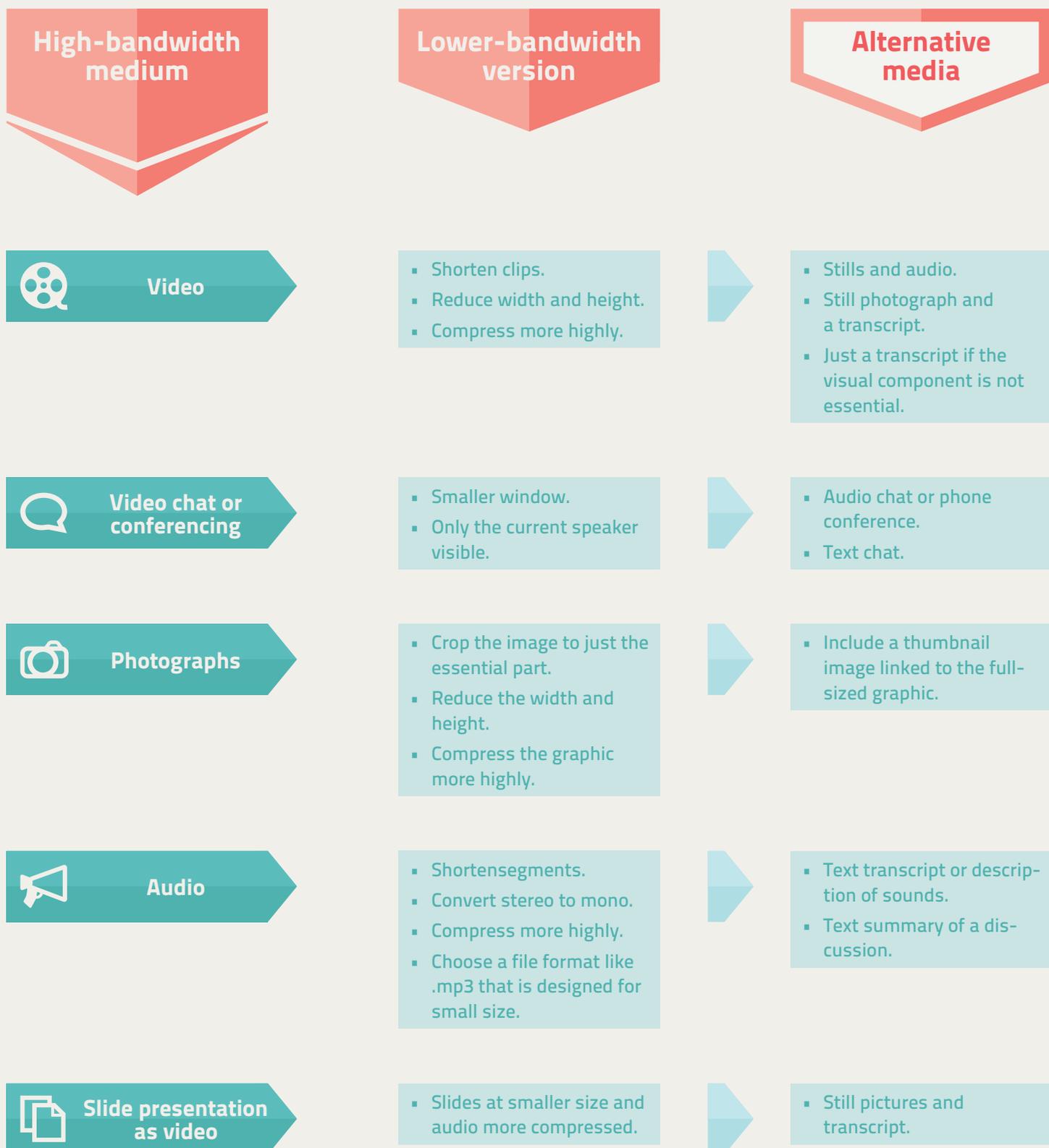
Virtual classes

- Trainer assistance if the students have problems with completing a given task
- Communication between the participants



Be careful about your choice of Media

You may find that not all multimedia solution fits available bandwidth. You need to take this into account and be aware of alternative more appropriate types of media.

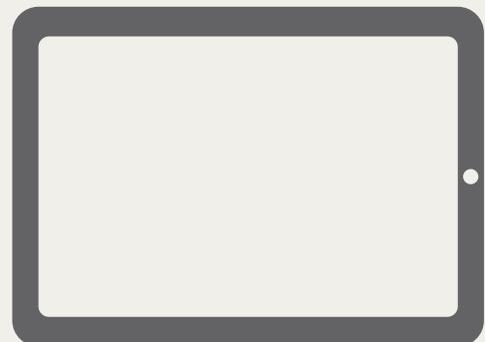


SET OR BUILD MOBILE LEARNING SOLUTIONS

Set learning environment

The time has come to make an important decision concerning technology. You already know what resources you have and what you can achieve. Now you must decide how to do this.

I want...	To create a web application...	To create a native application...
<p>...with my own resources</p>	<p>You will need the knowledge of creating websites, which is the knowledge of HTML and CSS and in some cases also PHP. The knowledge of popular CMS systems, such as Joomla or Wordpress can also be useful.</p>	<p>Generally it is not possible unless you know the Java language and IDE environments very well and have a lot of time to experiment. Object-oriented design is much more difficult than creating websites.</p>
<p>...with the help of professionals</p>	<p>You have to precisely describe the project which you want to create. Define all functionalities and the rules of the applications work. Otherwise it will impossible to estimate the time and costs of the project and you will lose control of all of this very quickly.</p>	



Build a prototype

Prototyping is an important part of the development life cycle of the solution. This will improve the user experience and if necessary modify the course. A prototype is an important part of interface design and it allows improvement of the solution in an iterative manner. Developers can go through a number of iterations of their design testing and fine tuning the solution before final release.

What do I need a prototype for?

- Modifications easier and less costly than on a ready product
- Requirements clearly defined by the client
- Allows collecting and clarifying any comments
- Avoiding disparities between the two parties concerning the design and functionality of the application
- The possibility of carrying out tests in order to identify errors in the application
- User-oriented

There are 4 types of prototypes:

- Paper (models)
 - + quick to create
 - + good in the case of team work
 - problems with introducing changes
- Static (graphic files)
 - + clear functionality
 - + good visibility of the contents of the website
 - lack of graphic design
- Dynamic (html)
 - + "clickable"
 - + very similar to the final version of the product
 - Time-consuming
- Modular (concept)
 - + focused on the user's goals
 - + good as a follow-up to other prototypes
 - do not involve graphic elements
 - no information architecture

Good practices in prototyping:

- Ask the future users for opinion – create usability tests and test on live users to see if the application meets their needs.
- Create prototypes regardless of the graphics – focus on interaction rather than on the design of the application.
- Use simple solutions – avoid spectacular forms which are not very visible for the recipient and may not function properly.

User interactions

While thinking about how you can optimally use the scope of mobile devices consider the fact that the modern phones and tablets allow a totally different communication with the user. There is no mice or trackpad anymore as it used to be in the computer. Instead we get many gestures to which the device touchscreen responds.

Tap



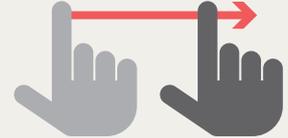
Briefly touch surface with fingertip

Double tap



Rapidly touch surface twice with fingertip

Drag



Move fingertip over surface without losing contact

Flick



Quickly brush surface with fingertip

Pinch



Touch surface with two fingers and bring them closer together

Spread



Touch surface with two fingers and move them apart

Press



Touch surface for extended period of time

Press and tap



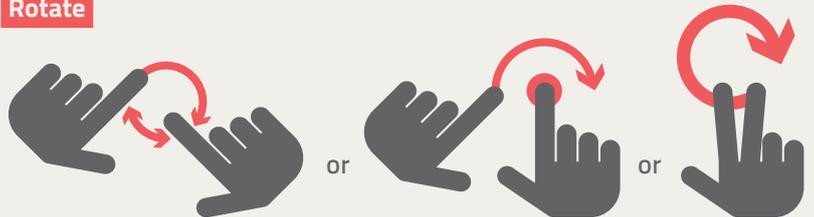
Press surface with one finger and briefly touch surface with second finger

Press and drag



Press surface with one finger and move second finger over surface without losing contact

Rotate



Touch surface with two fingers and move them in a clockwise or counter-clockwise direction

Today's mobile devices are mostly touch-based. Although the gestures supported depend on phone's model and operating system, there is a basic repertoire of touch commands that's becoming a standard for interacting with touch screen. To know more on how popular software platforms support core touch gestures see "Touch Gesture Reference Guide" by Luke Wroblewski, available at <http://www.lukew.com/ff/entry.asp?1071>

What is more, there are totally new ways of interaction and communication with the device. A good experiment polygon for the designer are mobile games which use devices such as gyroscope, GPS or compass. Even though not all devices are equipped with games, it is worth to follow the recent trends. As time passes the uncommon solutions may become a standard.

User interface guidelines

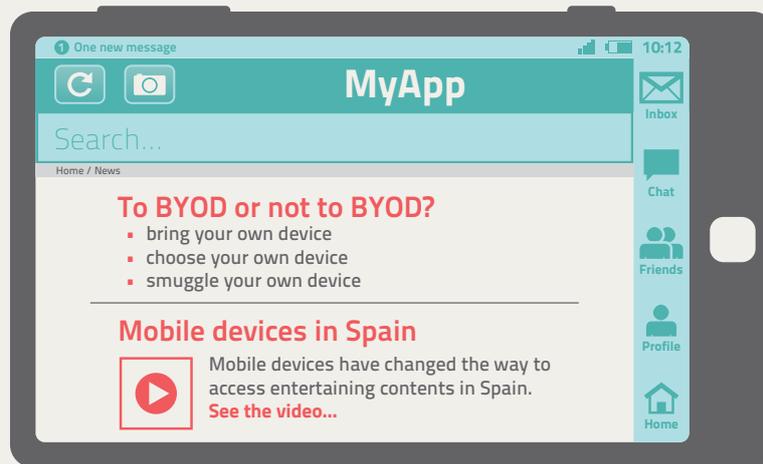
Like in the case of designing the look of the websites or computer applications, in the case of mobile applications there are also some instructions which will help the designer create a convenient and useful interface. It is not the design that determines the project's success, but its usability. Even though usability is a specialised area, you should in any case define the basic rules, so that you can prepare the requirements for these designers.



Simple interface layout

High contrast

Avoid scrolling



Fluid layout fits the screen to the orientation of the phone

Flexible display adjusts to different screen sizes

You should not underestimate the value of developing a prototype and testing and retesting with end users before a final release, as later changes are always very painful and costly. Designing a mobile tool is subject to quite different usability rules than designing for standard devices, such as computer. Example: while designing a standard application we usually place the main menu on the top of the screen. Here it is more visible and more easily accessible with the mouse cursor. However, in the case of mobile devices it is much more convenient to place the menu on the bottom of the screen, as it is the place which is most easily accessible when we operate the phone with one hand. The menu is then more easily within the reach of our thumb.

Tools for developing mobile learning content

Native applications

Native applications development

Most mobile devices provide development frameworks on top of which third-party developers can build applications. Applications available for mobile operating systems are usually native applications developed in their own Software Development Kit (SDK), which is only supported by each operating system.



In the case of the recently most popular Android, Google provides a special IDE package which consists of the appropriate SDK libraries and the Eclipse application for creating in the JAVA language. It is also required to register the application developer's account and paying a small annual fee. It looks very similar in the case of the suppliers of other operating systems.

You should remember that each operating system requires a separate preparation of application. An application created for Android cannot be automatically placed in IOS (iPhone) or BlackBerry. Also, each

operator applies slightly different rules of operating and releasing the created contents for sale – native applications generally can be installed only through an official repository, e.g. appStore for iPhone or GooglePlay for Android. Creating the application from scratch by yourself and then their updating and maintaining their ability to function may thus be very expensive

Application creators

A lot of tools have appeared on the market which allow creating applications without the need to configure the programming environment or the knowledge of the code. Special creators available online do everything which is necessary to create a ready application. The user only has to place it themselves in the repository for the given operating system so that it becomes available to the recipients.



Motorola Solutions' RhoMobile Suite is the HTML5 application development platform that works with any device type, operating system and screen size, including Windows® Embedded Handheld, Windows® CE, Windows® Phone 7, Apple® iOS, Android® and BlackBerry®.



Appcelerator's Titanium Development Platform allows for the development of native iOS, Android, hybrid, and mobile web apps as well as desktop applications from a single code base.



Open source and free HTML5-based tool, PhoneGap leverages web such as HTML and JavaScript.



The MoSync Mobile SDK is a complete, rich, cross-platform mobile application development SDK. It allows to build and compile apps for up to nine different platforms at once, using C/C++ or HTML5/JavaScript, or a combination of both to create hybrid apps.



Sencha Touch is a high-performance, mobile HTML5 application framework. It lets you create sophisticated web apps that work on iOS, Android, BlackBerry, Kindle Fire, and more.

Most of the applications of that kind require paying the appropriate fees, they amount, however, to several dozen dollars monthly, which is much less than the cooperation with a dedicated team of programmers. Yet in this case we are forced to use many ready solutions and, in consequence, we will not transfer all the ideas created in the prototyping stage to the application.

While using this type of solutions, you have to check carefully what approach will be used for updating content. For it may turn out that any small change requires another application updating by the users, which they may find irritating.

LMS and CMS

On the market we can find many solutions which allow creating mobile applications in the form of mobile websites. The contents are accessed then through URL, so the developer account in the operator of the operating system of the given device is not necessary. What is more – the content, once created, is available to every type of device, as it is generally a mobile website.

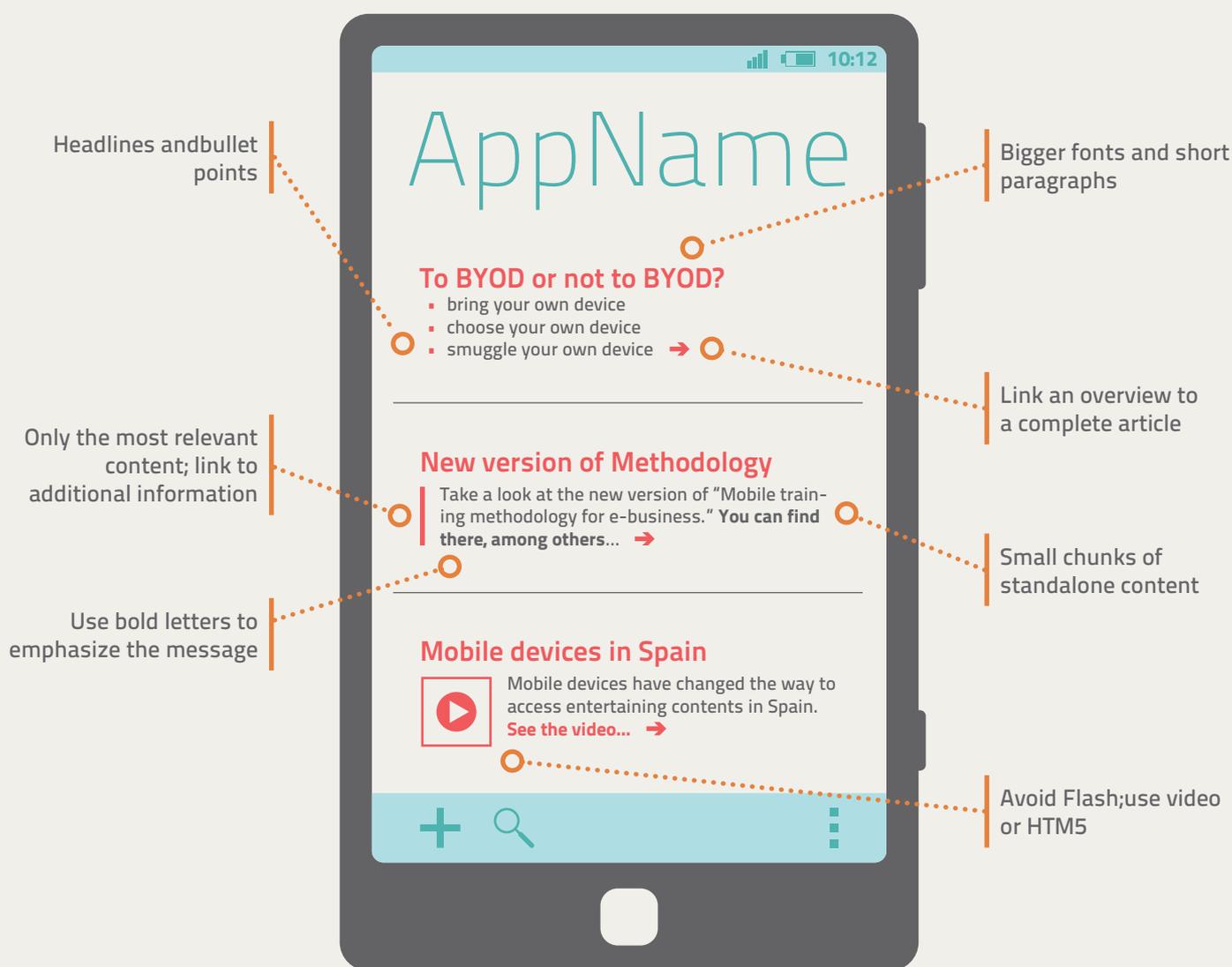
Program	What is it for?	How to use it	What do I have to know?		
			HTML	JAVA	Databases and servers operation
Moodle	Moodle collects and supports creating teaching materials and makes them available in the form of courses. It has got a flexible module structure. It cooperates with many types of databases and works with every computer which supports PHP. It has got a not too complicated interface and we can use it for online courses as well as traditional classes. Within the course it is possible to, e. g. upload entries to applications supporting the practice of a given topic (e. g. films, educational games).	Moodle allows generating courses according to the HTML5 standards. It has templates adapted to display the contents on mobiles and tablets. Thanks to this we can create courses, manage the participants and make the whole application available also to mobile devices.	Basic knowledge	Not required	Not required
Wordpress	A publishing platform. One of the most popular quality management systems in the world, used mainly to manage blogs, but not only (also www websites, portals). It functions based on PHP/MySQL and is easy to install. It has enormous personalization capacity and numerous plugs (some are for free and some paid)	Wordpress has got many plugins as well as a template for designing for mobile devices. Thanks to this we can create a mobile website which in its functionality resembles an application and add the appropriate teaching contents to it.	Basic knowledge	Not required	At least basic knowledge in the area of establishing databases and installing websites on the server.
Joomla!	Another CMS (Content Management System), which is very popular. Joomla! provides RAM for increasing efficiency, a forum, blogs, a calendar and different language versions of the website. It has a module structure and a big expansion potential.	Similar to Wordpress, Joomla! Also allows creating mobile websites, filling them again with a template to complete.	Basic knowledge	Not required	At least basic knowledge in the area of establishing databases and installing websites on the server.

Program	What is it for?	How to use it	What do I have to know?		
			HTML	JAVA	Databases and servers operation
Captivate	A tool for making interactive presentations or teaching materials. Content is created similarly to on Powerpoint – subsequent slides are added and the complete project is exported to the selected format. At each stage our material can be enriched by graphics or soundtrack. These objects are placed on a timeline, showing time of display.	The materials created with Captivate, Lector or Articulate can be provided in other programs or systems. For example Moodle supports them, with consideration of the SCORM standard.	Not required	Not required	Not required
Lectora	A complex tool for creating e-learning courses. It allows creating interactive content, texts or surveys as well as adding multimedia contents such as films or audio recordings. A complete course may be published in the Internet or recorded on a CD.		Not required	Not required	Not required
Articulate Storyline	A complex tool for creating e-learning courses. It allows creating interactive contents, texts or surveys as well as adding multimedia contents such as films or audio recordings. A complete course may be published in the Internet or recorded on a CD.		Not required	Not required	Not required
Dreamweaver	The editor enables you to independently create websites and applications – simple as well as complex ones. It requires at least basic knowledge of HTML though. Professional results will be achieved only by those who have experience in HTML, PHP or JAVA. In Dreamweaver you can write a site or a program from the first to the last line of the code. So we can provide it with an image and functionality exactly as we want it.	The contents created in Dreamweaver can be placed on websites. Those more experienced can write their own application by using the available libraries and plugs.	At least basic knowledge will help.	At least basic knowledge will help.	At least basic knowledge will help.

Program	What is it for?	How to use it	What do I have to know?		
			HTML	JAVA	Databases and servers operation
Any WYSIWYG editor	WYSIWYG (What You See is What You Get) is an acronym defining the methods which allow achieving an effect in publication which is very similar to the display on the screen. It allows those not familiar with HTML to create websites. Useful for those least experienced, but at the same time the least useful tool.	The created contents can be shared via www net. However, in most cases they will not be very complex.	Not required	Not required	Not required
Eclipse	A complete programming environment for creating independent applications in Java. It requires at least basic knowledge of programming.	Combined with SDK Android libraries it allows creating applications dedicated to this operating system. Eclipse is very often used by the producers of applications and games for mobile phones.	Good knowledge required	Good knowledge required	Not required

Content and presentation

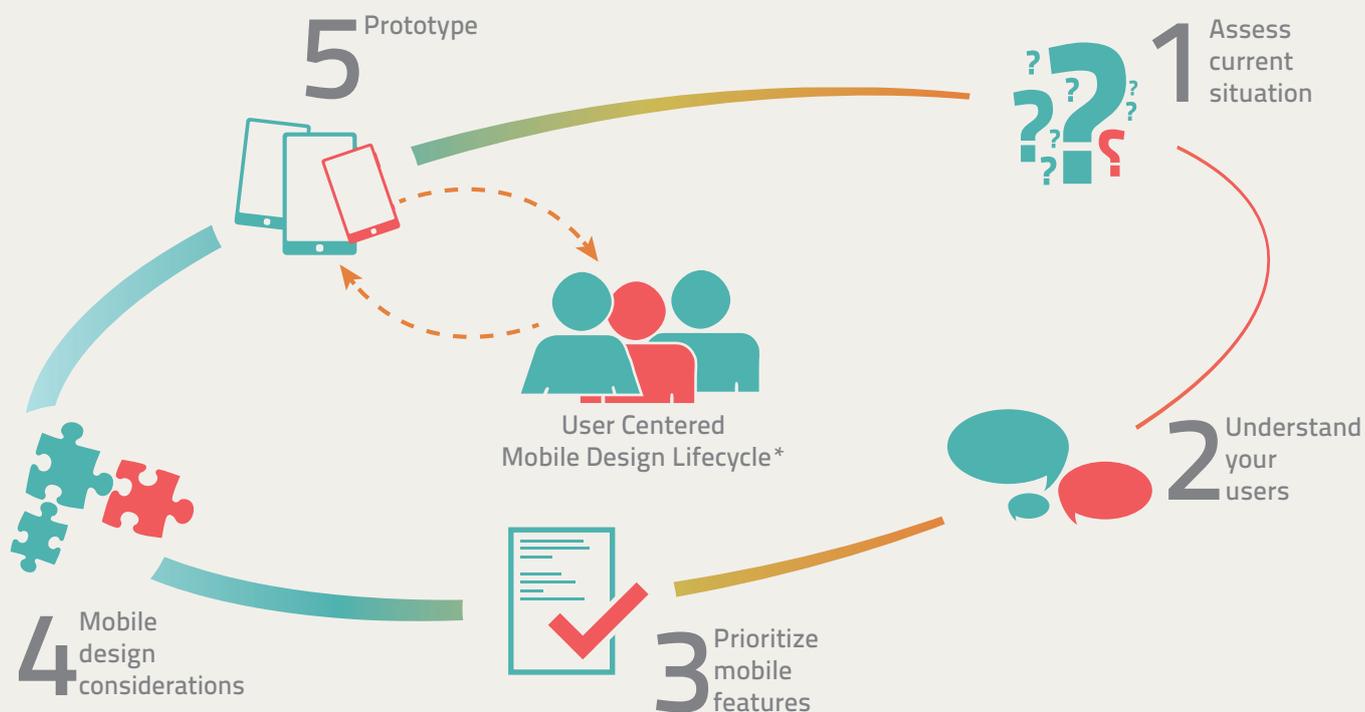
If you have already chosen the tool and are getting down to work, consider a few rules of presenting the content which differ from those in the classic applications or websites.



To address the specific characteristics of each device(s) you're targeting, see the official user interface (UI) and user experience (UX) guidelines from the manufacturers. Below you can find guidelines for most popular mobile operating systems:

- iOS Human Interface Guidelines (<http://goo.gl/1LSo6>)
- Android User Interface Guidelines (<http://goo.gl/FM6aw>)
- Blackberry Smartphones UI Guidelines (<http://goo.gl/mR6E4>)
- UI Guidelines for Windows Mobile (<http://goo.gl/he3gx>)
- Nokia Developer Design Portal (<http://goo.gl/8So8b>)

TESTING – AN INTERACTIVE PROCESS



Testing application is absolutely a key action, which may not be omitted in any case. It is this stage which decides on the success of the training with the use of mobile devices or mobile learning courses. For now you have the chance to spot any shortcomings or errors in the application, check if it meets your and the users' expectations and if it is intuitive and the potential training participants do not have trouble operating it.

Why should you carry out testing?

- If you want to create a good application, you have to test it. The mere fact that the course/application has been drawn up by a person who is good at it does not mean that it will be understandable from the user's point of view.
- Testing is a fresh look by people who are not involved in the work on the application. This is important to spot issues that might not be noticed by the developers. Whereas for you certain things may seem natural, for others it is not necessarily so.
- Testing is a very good starting material, which, combined with the trainer's experience and knowledge, will prove extremely useful.
- It is always better to correct the application at an early stage of its creation than later. This way we save ourselves extra work during training associated with the technology not functioning correctly, or not being user friendly.
- Even the easiest test (carried out with one person, taking several minutes and organized with small effort) is better than none.

Piloting

Create a functional prototype or a ready application and test it on devices which will be used by target users. Use exactly the same devices and configurations which will be used by your employees. Carry out tests with the users, in realistic conditions corresponding to those in which they will be learning. The number of testers does not have to be big, the important thing is that these persons are a representative sample of the future users of the training (e.g. if the target group are the state administration employees, testing application on project managers is not advisable).

What kind of testing do you need to carry out?

- First think about the selection of the group
- Invite a few persons to the test (in the case of a company, the employees for whom the training is being prepared may be the testers)
- Provide the testers with mobile devices, if they do not have any
- Once again explain (this information was provided for the first time during the recruitment for the testing) to the participants why they are here and what you would like to achieve thanks to this meeting
- Ask them to perform certain actions giving a time-limit for their completion

NOTE: If you do not have enough resources, funds etc. to organize such a test, nothing should stop you from involving yourself and your friends/colleagues/family. In the case of testing, any comment from a person with a fresh perspective on our product is valuable. For in the process of designing an application, the person responsible for this task loses the perspective of a “common user” and often something is obvious for them, but not quite for the user.

what should you test?

- An application should be written in language understandable for the user – so you should consider this while testing.
- Is the application/course intuitive (does the user know what to do next)?
- Does the application fulfill its goals set forth at the designing stage?

Where? When? How many?

- The tests may be carried out in your company or any other room which meets the basic requirements (equipment, furniture etc.)
- The sooner are the tests carried out, the more time for correction and carrying out further tests.
- The tester group does not have to be big (3-5 people).

Collecting the users' opinions

Watch the test participants carefully and write down the problems they had while operating the prototype/application. Also ask them to comment on the application or a mobile learning course on the spot or after the testing session. It is important to write down their comments, so that nothing escapes our attention. You can also record the meeting and then listen to it later. It is better if the test is carried out by two people – then one person can easily provide the instructions for the participant.

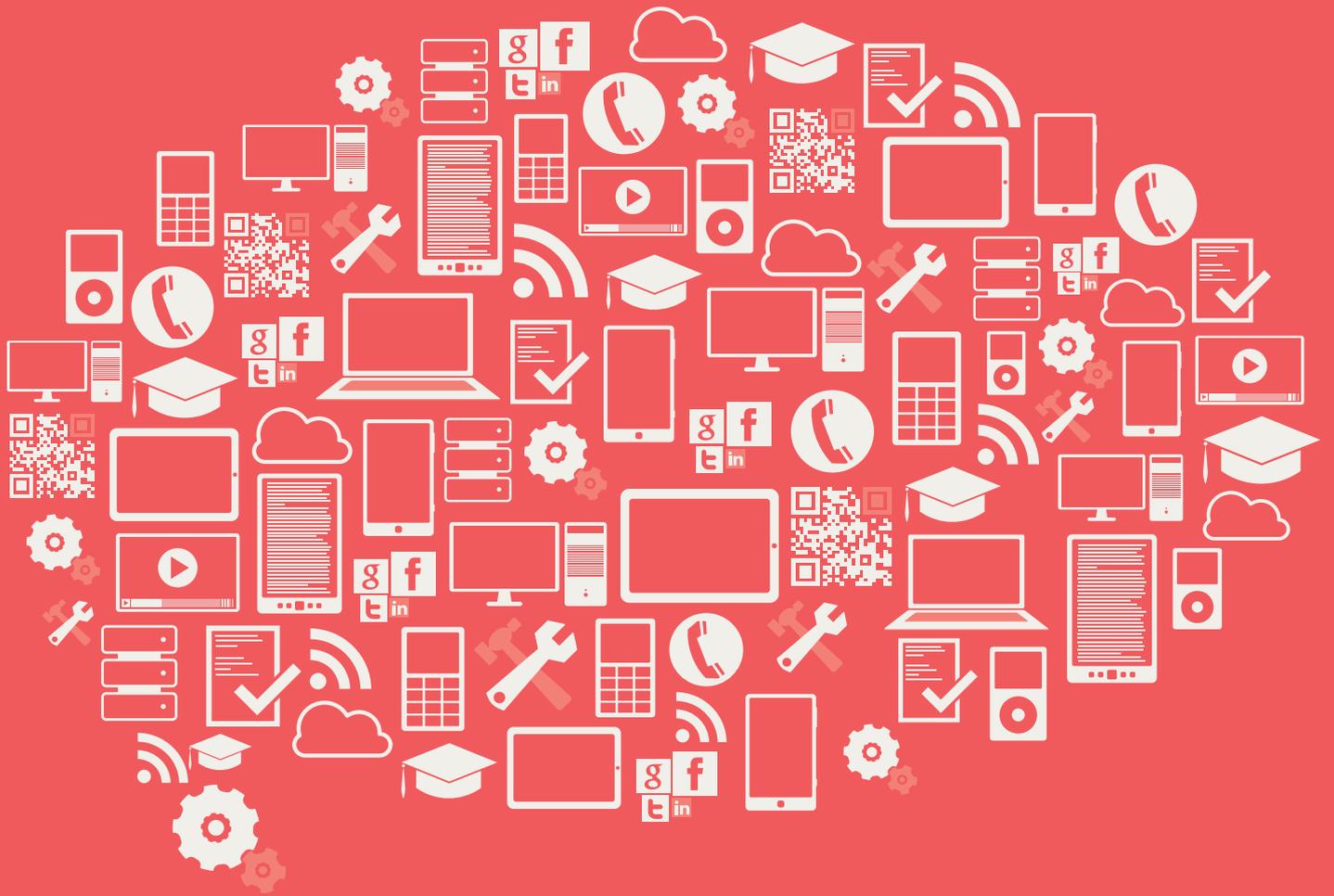
After the tests are carried out, it is good to organize a meeting with the team developing the application to discuss the results. After presenting your own observations, it is important to decide which elements require correction and to find a solution to the problem.

Corrections

When you already know what requires correction and what modification should be implemented, introduce the changes to the course/application.

Remember a few important points:

- Do not add too many new elements. If the users do not understand something, adding further functionalities may complicate everything even more.
- While modifying an element, think how it affects other elements.
- Remember that testing is a process, thus it is a repetitive action. After one test is carried out and the changes are introduced, further tests should be carried out. We do this not only to confirm the results of the modification but to detect other errors.



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