Research Paper Science

The Design of Mobile Learning solution

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ABSTRACT

The convergence of mobile technology and learning theories offers the opportunity to propose a learning anytime, anywhere.In this article we describe a framework design to handleanM-Learning solution. We start bystudying representative architectures of M-Learning in order to identify and compare different designs.From the theory that the M-Learning as a specific E-Learning, to the one describing it from the academic point of view, surrounding the thesis focusing the wireless communication mode of the M-Learning, we take position ourselves and highlight significant criteria

KEYWORDS M-Learning, context, Profile, Learning Object.

1. INTRODUCTION

M-Learning stands for all forms of mobile devises supported learning. It's been defined as an anytime, anywhere learning. It refers to the use of wireless technologies to deliver, manager and support the learning resources.

In this article, we present and analyze different architectures of M-Learning. We identify and compare different designs. From the theory that presents M-Learning as a specific E-Learning, to the one describing it from the academic point of view, surrounding the thesis focusing the wireless communication mode of the M-Learning, this led us to take position ourselves and highlight significant criteria.Based on the retrieving criteria we describe a framework design to handle an M-Learning solution

2. ARCHITECTURE REPRESENTATIVE

2.1. Http, backbone of the architecture

[Sharlpes, 2002]presumes that the convergence of mobile communications and handheld computers offers theopportunity … to learnanytime, anywhere. Therefore the environment cannot be pre-specified.

The architecture of the future system according [Sharlpes, 2002] had to meet the following criteria:

- Highly Portable
- Individual
- Available Anywhere
- Adaptable To The Context
- Persistent
- Useful
- Easy To Use

This was translated by:

- Use a pen tabletcomputer.
- Communicate via a wireless LAN
- Learning environment is separated from its physicalinstantiation.
- Work on management tools

Suggest an intuitive design

At the end of his reflection, [Sharlpes, 2002] present the following architecture:

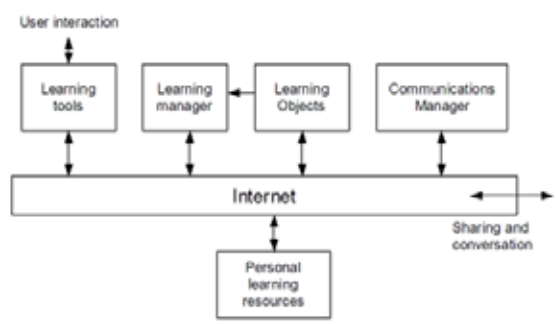


Figure 1: mobile learning platform architecture according to Sharlpes

The http protocol provides the core communications system, it allows the various components to be physically distributed. Users interact with a set of *learning tools,* such as integrated camera and mobile phone. The *personal learning resources* are links to learning objects. *Learning objects* are distributed XML pages. The *learning manager* a local cache stores learning objects, search, filter and organize objects. The *communications manager* enables collaborative communication between users.

2.2. M-Learning platform as an E-Learning interpolation.

[Trivonova, 2004] defined mobile learning as an E-Learning through a mobile terminal. Therefore the challenge then becomes to transfer the services provided by an E-Learning platform to an M-Learning platform. The deal becomes the properties that differsbetween a mobile terminal and a fixed station, namely the size of the display screen, processing power, storage space...

It is therefore appropriate to use an E-earning platform and interpolate to an M-Learning platform. He proposes an architecture with the following characteristics:

- An extension of the traditional LMS that provides additional and/or adapted to be used for mobile
- The system must be able to support all E-Learning AND M-Learning services.
- He must ê be easily expandable to diff e rent mobile devices.

Up to now, [Trivonova, 2004] was able to identify three services:
"Discovery of Context" service: can automatically detect the capabilities and limitations of the mobile terminal.

*"Mobile Content Management and Presentation Adaptation"*service*:* is able to adapt learning materials for a mobile scenario.

"Packaging and Synchronization" service: is a mechanism for selecting the activities necessary to ensure coherence of the system in offline use.

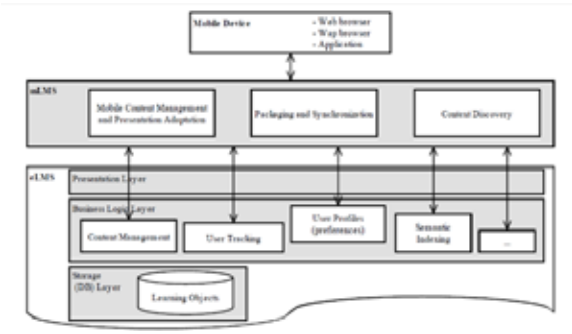


Figure 2: mobile learning platform architecture according to Trivonova

2.3. M-Learning, a wireless / handled E-Learning
[Motiwalla, 2007]goes on the hypothesis of[Trivonova,2002], he based his work on the M-Learning as an E-Learning using Wireless / Handled devices (W/H). He based his architecture on two levels of analysis and research:

E-learning; studying the use of the Internet and other ICT (information and communication technologies) in education.

Mobile connectivity; provides an update on the technologies used to extrapolated E-Commerce. His choice was the Wireless Access Protocol WAP, its main advantage it to be available on a wide variety of (W / H) devices without modification.

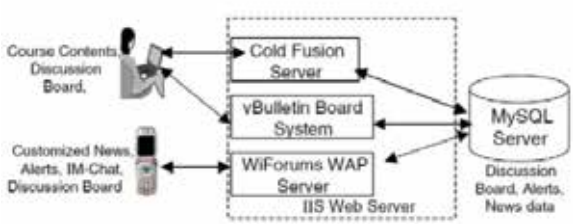


Figure 3: mobile learning platform architecture according to Motiwalla

[Motiwalla, 2007] proposes an architecture that uses a common data server for both learning via PC or (W / H) devices. To extract data, different applications are used according to whether one or the other learning is involved.

2.4. M-Learning architecture based on TCP/IP model
"M-learning is a special E-learning supporting mobility. M-learning takes wireless communicationinstead of wire communication in E-learning to buildthe network platform.Since both M-learning andE-learning are the systems on Internet networkenvironment, we can reference TCP/IP layer model" [Anani, 2008]

It separates the M-Learning system to four layers
- Learning Application Layer
- Transport layer
- Network layer
- Data Link layer (physical communication platform).

Each one can be identified to a layer in TCP/IP model.

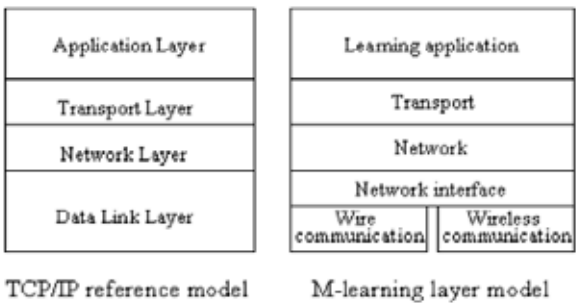


Figure 4: General mobile learning platform architecture according to Anani

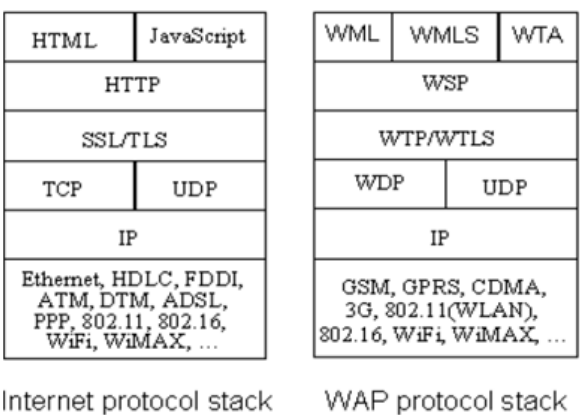


Figure 5: Protocol stack comparison between WAP and Internet according to Anani

Mobile devices are ableto support an IP network regardless the operating system, that's why [Anani 2008] proposes a general model for both E- and M-Learning. In the other hand,M-Learning is the grouping of data service and mobile service; WAP is the standard for data mobile services. By that a specific model to each of the learnings was proposed, according to the applied standards.

3. SYNTHESIS PREVIOUS ARCHITECTURES
To summarize, we chose to compare the different architectures discussed in the previous section using significant criteria. What interests us particularly is the management of learning objects (1), learner profile management (2), sensitivity to the learning environment (3) and connectivity management (4) to identify if the learning process takes place in online, offline or hybrid mode, during the learning process.

The following table evaluates the previous architectures based on these criteria:

Table 1: Architectures comparison of Mobile Learning System

Architecture	(1)	(2)	(3)	(4)
Sharlpes	+ XML metadata tags	Yes	Not	Hybrid
Trivonova	Pieces of content metadata +	Not	Yes	Hybrid
Motiwalla	N / A	Yes	Not	N / A
Anani	Based on SCORM XML Format	Not	Not	Online

The learning object is the backbone in our vision of the mobile learning system. We found that XML is the best choice to structure learning objects; it's the most adapted to different platforms.

Profile management represents an essential section; for us it is the main guarantor of a personalized learning.

The future architecture should definitely be sensitive to the context for a specified learning content for defined profiles.

Connectivity detects whether or not the learner can still learn when offline. To ensure the learning anywhere, anytime, we choose the hybrid model; the learning objects are stored on the server and therefore accessible in online mode, a "light" version can be downloaded to the mobile device.

From the above we propose an architecture for our coming system.The system architecture provides the main components of the system andtheir interconnections

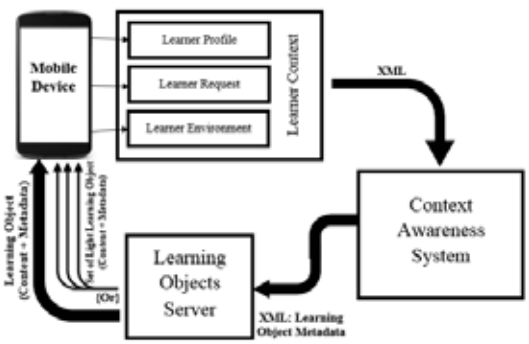


Figure 6: mobile learning system architecture

The learner interfaces with "*Learning Context*" that collect all information about the learning context via three sub components:"*Learning Profile*": To offer a personalized learning content, the M-Learning system should "know" the learner."*Learner Environment*": Includes technical constraints and spatio-temporal background. "*Learner Request*": Learner can express directly his wishes. The result of the three, provides the context described in xml file.

The xml is transmitted to "*Context Awareness System*", it translated its input to a formatted mean full metadata to be sent to the "*Learning Objects Server*".

The "*Learning Objects Server*" selects a set of learning objects where the metadata corresponds. The learning objects are sent to the learner (content + metadata)

Ether a learning object is send synchronously when the learner is online, on asynchronously by choosing to download a light version of an entire learning scenario.

4. CONCLUSION

In this article we studied four architectures that have proposed to design anM-Learning system. [Sharlpes, 2002] highlights the Wireless communication mode of the mobile and center the architecture over http protocol.[Trifonova, 2004]presents the M-Learning as a special E-learning, he proposes his architecture as an interpolation of an E_Learning platform.[Motiwalla, 2007] continued on the launch of his predecessors but he presentsM-Learning as a complement of an E-Learning activity. [Anani, 2008] based his research around the TCP / IP model. He identify every element of its architecture with a layer of the TCP / IP model.

In the second section, we position ourselves highlighting significant criteria.We analyze the functionalities that an M-Learning architecture should cover to satisfy our needs. We define the main component and introduce the schema of the architecture.

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