Native-based RIA Development Using Mobile Phone Methodologies to Improve the Overall Project Functionalities

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Abstract—**In this article, a work at progress will be exposed on a study that is being elaborated by our investigation team regarding the working methods of Resource Intensive Applications (RIA) development. Using previous experience in software development for limited devices and applying our previous investigation work on collaborative component based development for web frameworks this work elaborates a complete workflow for RIA development, resulting in an improvement of the RIA functionalities and work development time. These improvements derived in an enhancement of the developing process by reducing time and increasing component recycling.**

Keywords—***Methodology; Optimization; Workflow; Collaborative; Benchmark.***

I. INTRODUCTION

The following article will expose in details a development methodology that originally was oriented to mobile phone's software development. The purpose of this is to obtain circumstantial statistic information on the functionality of Resource Intensive Applications (RIA) application that apply these methodologies, and as a consequence analyze the possible improvements to the overall development process that may allow the creation of an alternative working methodology.

Mobile phone's software development is well known in the computer science field. The most significant technology to cover this working environment was the Java 2 Micro Edition (J2ME) [11]. For many years, such a technology was used for mobile phone's software development, as well as other smaller technological environments like Symbian and Research in Motion (RIM) [12].

Apart from the available programming languages and the virtual machines that allowed the programs to execute correctly, to have a successful impact on the mobile phone's market, there was an urging need to cover the largest amount of targeted devices, and depending on the device's characteristics, the number of possible versions of the same program could have resulted on an average of 30 different versions.

The creation of a methodology to reduce the developing cost was in place and as consequence such methodology was designed, coming hand in hand with tools that allowed the correct functionality of the established steps [1]. The results were significant reducing the cost in time and work effort of software development for mobile devices.

This success was rapidly studied and as a result derived in the study of its availability for other technological fields, in particular RIA development, which is being explained in this document. The work in process described in this project has taken place for the last year, studying many aspects of the software development life cycle, applying it on real cases, and collecting the results for further analysis. It aims to expose this investigation work, and its future objectives.

The paper will initially describe the environmental pre-requisites, following a detailed explanation of the available components as well as the problem at hand, and ending with the exposing a few results of the practical experiment.

II. LIMITED RESOURCES DEVICES METHODOLOGY

As it was stated in the introduction, the motivation for this investigation work is to reduce considerably the development time of RIAs as well as improve their functionality to make the resulting software optimal for network based activity.

At first it was decided, based on experience and statistic results to promote the native software development, which consists in adapting the resulting software application to each hardware, in contrary with developing in automatic multi-platform adaptability, originated from the Java basic motto: "Develop it once and run it anywhere" [10]. This significant decision in the approach may not seem optimal, but we can confirm that this new limitation opened other alternatives and new needs to ensure the software functionality and quality in the targeted devices.

RIA development in the present day is as diverse as the mobile phone's market. To ensure maximum impact on the market RIA projects require the developers to manufacture a PC version as well as a mobile version, which include mainly 3 different dominant technologies, Android, Cocoa and RIM [12].

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Regardless the specific native technology, the development in each different technology is what will ensure a correct and fully powerful functionality of the resulting RIA. The project will cover the largest amount of devices and will allow an optimized feedback.

Software development for limited resources devices forces the developer to pay more attention to details, improving his development skills and requiring the highest experience to ensure that the application will correctly work with the variety of limitations. One of the main obstacles in the current market is the large amount of flaws in the resulting applications, and even though the common excuse is the difficulty of developing in such devices, there is no excuse in not using the past experience to avoid repeating those same mistakes. The definition of a methodology intends to offer a solution to this problem.

Some of the characteristics that form this optimized methodology consist of debugging, which may sound trivial, but considering the limitations of each device it end being more complicated. Not to mention that the debugging requires passing through 2 experienced developers. Debugging and testing are strongly linked, and as more documentation is available, the better [2].

Documentation is another characteristic of this methodology. Once a device is fully documented, and a great database with all the limitations, hardware bugs, and tricks is established, the developing process will reduce its dependency on experienced developers and allow a high level development for more less experienced developers.

An example of this characteristics are either JMEPolish, which offers a consistent online mobile devices database with many of the possible flaws and problems a developer may encounter, as well as newer databases created by institutions like Adobe for graphical based development in devices, or Eclipse for raw JME development.

This same process will be adapted on a greater scale for the methodology of a RIA development, to improve the collective knowledge.

Another characteristic is the creation of common libraries, and the use of code pre-processing tools to allow a more dynamic composition of resulting applications, and so reducing the great effort of code modification in every existing version of the RIA.

As a result of applying this methodology, the impact was significant on mobile phone devices. The development process before the existence of such methodology, on a practical tested enterprise, was the creation of a base version on a specific device, followed by its adaptation on the variety of devices to which the software was targeted. The process was based on creating for each device an independent version, increasing the possibility for mistake and reducing the developer time to add new functionalities. The lack of resources affected the time the developers had to add and improve the common development library as well as improving the feedback in documentation.

Following the implementation of this methodology, and the consequent improvements based on experimental data, the process time dropped significantly, to a 300 percent average, in an exponential curve that stabilized. The program optimization to each targeted device was also significantly improved, allowing the programs to run fluently.

Figure 1 describes a resulting developing process based on the established methodology.

III. RIA NATIVE DEVELOPMENT METHODOLOGY

As a result experience from the mobile phone devices methodology and the gradual evolution of the RIA market in the last few years, we stumble upon the fact that much of the used characteristics in the mobile phone device methodology could be migrated to RIA development considering the new network types and its application on a broader devices network.

The market has evolved to include a various number of electronic devices that come along with its specific native technology, which will serve us greatly if we applied the already developed and tested methodology detailed in the previous section.

Our work in the actual phase consist in applying the methodology developed for mobile device on RIA development of a prototype program, so we can evaluate the time, functionality, and improvements to the methodology as well as the organization that lays behind it.

While in limited devices software development we had to consider as the highest priority the limited resources, in RIA we have to reorder the priorities to turn the development on multiple devices as a united modular project resulting in managing the RIA as a compendium of modules [4]. Those modules represent many of the functionalities required from the RIA, and each will have in its time a representation in a device.

The possible structure may be described as followed: (Figure 2)

- RIA structured as a collection of modules.
- Module is a collection of version modules.
- Each version module is a representation of the module on a specific device.

The creation of a united database from which the members of the development team may acquire information will be similar as in the case of limited devices development. The difference will consist that in the RIA case we seek to cover more than limited devices, but also a variety of devices from PCs to TVs and etc.

The impact on the functionality of each module version will be proportional to the experimental experience joined by the documental database gathered. Our speculations point that an improvement will be most significant on the optimization level of the program allowing the RIA to function substantially better and take advantage of the maximum resources accessible in each device for the RIA.

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IV. INVESTIGATION WORK OBJECTIVE

One of the reasons for which we started with the study of this methodological alternative is because of our past experiences with RIA applications. From this we have noticed in many fields of work a lack of organization, and we couldn't find an already established agile methodology to apply in our case.

We have been working with SCRUM [3], and a developed collaborative components methodology that was design as well by our team, but still it was mainly oriented to light applications and not intensive.

Our team has also worked on mobile phones methodologies, and we saw a much more adequate methodology in these than in the agile alternative. The main reason is because in this case we are dealing with multiple devices for RIA, which require by itself a custom made organization.

So the objective for which we are working is to obtain metric information on the impact of this kind of methodology over RIA applications. To obtain a possible derivative of the mobile phones methodology as well as the collaborative components methodology, that will permit the establishment of a more adequate working method for the development of RIA.

The wished result is that the methodology will allow the investigator to begin a development work on a RIA, but underneath the RIA will be oriented and targeted to a broader network of devices, which will form a feedback network and improve the functionality of the RIA by taking advantage of the maximum capacity of each device in the network (native based development).

V. EXPECTED METHODOLOGICAL STRUCTURE

The resulting methodology is expected to form a dynamic structure that will allow a constant modification system. In addition to the standard working methods that abound, this methodology pretends to depend on a number of tools and standards that will establish the necessary steps to successfully create a complex RIA.

In the assumption that the basic steps of development, analysis, design, and maintenance will be fulfilled, we consider the need to add some basic roles, to ensure the quality of the methodology [5].

To implement a rich and optimized documentation database a documentation expert should be considered for the workflow. The role of Documentation Engineer is a possible option to certify the quality of the resulting support documentation and its administration.

Developers with experience in limited resources devices are recommended for the development steps of the working method. Their experience is always welcome, and their developing methods will significantly affect the resulting optimization of the RIA.

In addition, we are studying the possibility of adding collaborative based roles, to improve the recycling of modular components [6]. Being the case of RIA, and the necessity of ensuring the development quality of each module and its module versions, the sharing of existing modules and distribution of the developing work, reducing the developing time and allowing a more detailed feedback of the work taken place will improve the functionality results of the upcoming RIAs.

An international communication manager (ICM) as well as a global project manager will be an adequate incorporation to the working team [1].

Tools to control the versioning of the RIAs have been developed and are now on prototype stage, but can be confirmed as very useful and growing in importance inside the workflow.

VI. DOCUMENTATION DEPENDENCY

Documentation in our upcoming methodology will have a main role. Its impact on previous mythologies stated in this work, in specific the mobile devices methodology had seriously effect on the resulting data, improving the overall work process, and allowing the users of this work process to adapt its steps in a variety of targeted software.

The reason for adopting this step, regardless the extra resources needed to invest in it consists in the need to maintain a certain control on the manufacturing of the RIA product. Eventually even if in this particular case, the documentation process may take place depending on the targeted devices; it is always recommended, based on our previous experience on mobile methodologies, to execute an exhaustive documentation process, which will allow a rich feedback for both the methodology as well as the project life cycle.

VII. OVERALL PROGRESS

In the last year of work, the results were the following. The first step of achieving an initial prototype for modules and modules version was successfully completed, and in consequence we achieved favorable results of RIA modules operating on a variety of devices.

A structural design was established for the creation of such RIA projects, complying with the need for documentation and first steps of the resulting new work method. The technology and previous methodology required us to adapt the development steps to comply with the characteristics of a RIA project, and a first glance of this was successfully achieved not long ago.

Our effort to achieve a unified local development environment for native software development began to show a logical structure. Adding to this environment the development rules established for each module and native context, enforced a number of changes to the original hypothesis that had to be applied to comply with the overall compatibility.

Following the defined development structure in Model-View-Controller MVC, each environmental technological

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context (layer) covered a certain percentage of the Model, the View and the Controller modules.

Database information would be treated under a database native technological script, example MySql. This technological context would be limited to Model treatment, even if database scripts in general can manage Controller actions, this action was associated with the management script on the server side, example PHP scripting technology.

Both database and script management technologies will be treated on the server sides, and will comply with the overall Model and Controller requirement of a global project in our methodology.

On the Client side we will end up having the intensive application, RIAs that will comply with the View and Controller requirements of the global project.

This general structure will ensure an independent technological development for each native context, and as a result allow the creation of a component based development methodology, requiring the expertise of members in each of the native context, and establishing a successful communication channel on a technological level between the layers as well as between the members of each layer.

The development requirements will be the core on which our methodology will thrive, complying with the general characteristics of an Agile Methodology, basing most of the productive work on the developing teams.

The use of limited resources development methodologies in each of the layers will result in a trust worthy system, improving the execution result in each layer individually, and enhancing the overall result of the global project in general.

These results were documented, and allowed the creation of a working connection between the lately known IOT "Internet of Things" development methodologies and RIA based development methodology, establishing that for each native system in its appropriate development context by combining those systems in an unified global project using the necessary roles and developing steps acquired from the previous investigation works, the reach of the overall projects increase substantially[5].

Possible example devised from such connection may be RESULTA, a project developed in the context of the ministry of industry in Spain with the purpose of improving the companies work effort in general developing project. RESULTA was a project developed in multiple entities, and on multiple platforms and native contexts, and successfully we were able to combine the multiple scenarios and create a unified project applying the concepts detailed above.

At present, we are proceeding with the enrichment of the modules and the modules database, the creation of a feedback system to allow upgrades and the establishment of other development steps in the out coming methodology.
We expect to achieve a working prototype that complies with the steps achieved in the following months, we had as an objective to achieve it during the month of November, but we encountered some structural difficulties, which will postpone our results.

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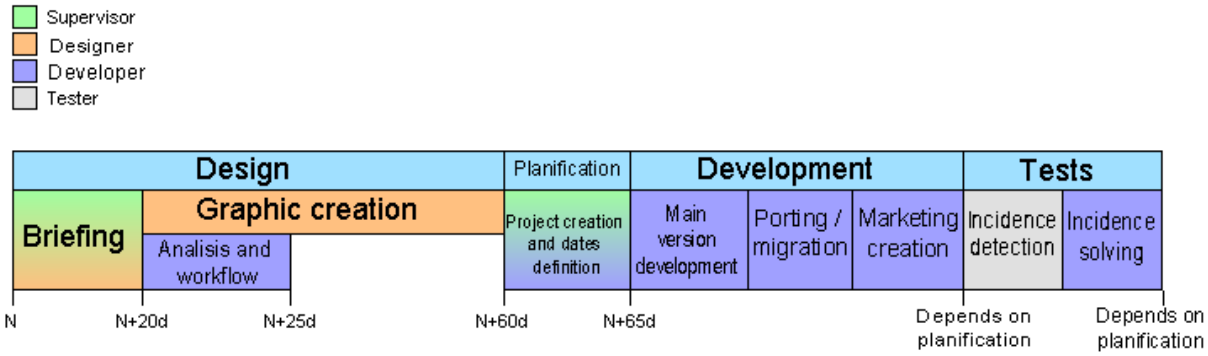

Figure 1: Practical workflow for a prototype RIA based on optimized methodology development.

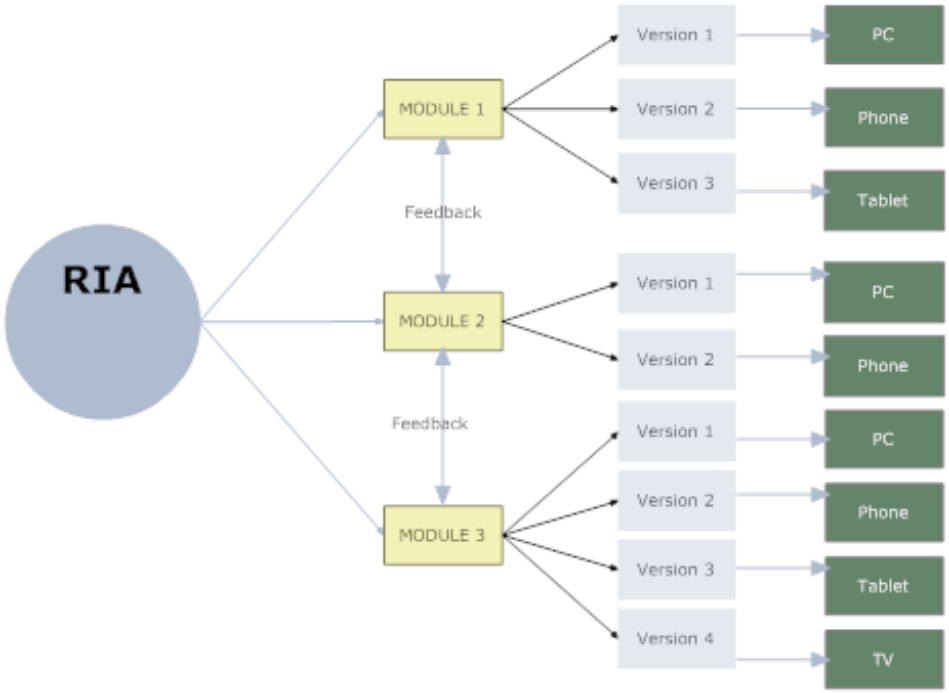

Figure 2: Modular distribution of an RIA.

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