

Experiences with a Business Evaluation Model for Mobile Commerce Services

Thomas Flor¹, Walter Niess¹, Gabriel Vögler¹

¹DaimlerChrysler AG, Research Information and Communication
Software Architectures (RIC/SA), P.O. Box 23 60
89013 Ulm, Germany

Abstract. If business processes (business cases) for mobile applications (pervasive computing) are to be evaluated, it is necessary to arrange a portfolio of application scenarios. For this a methodical procedure is defined, which helps to receive a prioritized overview over possible business cases as well as further details regarding organizational and technical aspects. Due to certain criteria application scenarios can be selected, which are used for the evaluation. For these a detailed questionnaire is developed, which serves as decision basis for the realization of the business cases.

1 Introduction to mobile services

Personal Digital Assistants (PDAs) find ever larger spreading. If they first were used only as electronic alternative of a paper-based time schedule system for storing personal data, like calendar, contacts and notes, thus so-called PIM (Personal Information Management) data, today also more efficient applications such as word processing and spreadsheet can be run on them.

Also in enterprises PDAs find increasingly wider fields of application. They are not only applicable as single or off-line device, but are more and more integrated as clients in the distributed enterprise network. It is possible and in individual cases also advisable to execute larger applications on them and to access resources in the enterprise network. So not only the classical PIM data on mobile devices is available, but basically all information available in the enterprise network, e.g. files on file servers, contents of database servers and also dynamically provided data from application or portal servers.

In order to be able to make these information available for mobile devices, technical and organizational measures are necessary, e.g. the definition of appropriate architectures and providing several services, e.g. dial-in for mobile devices or synchronization services. In order to accomplish all these tasks, it is necessary to compile a prioritized overview over relevant mobile applications and business processes. The environment for pervasive computing must be evaluated before startup. For that it is helpful to categorize the applications according to a defined pattern in order to be able to judge the entire application field and the technical and economical success of the individual business cases in detail.

2 Architectural overview

All applications are to be rated by a certain schema with the same questions. Thus they are comparable with each other.

For the evaluation of the infrastructure a portfolio with test cases can be arranged. It should contain as many as possible different test cases, so that all functions of the infrastructure to be tested are evaluated. The evaluation phase has not to cause much expenditure. Therefore the evaluation portfolio should contain applications, which can be implemented without much technical expenditure, for which however a high economic success (business impact) is expected.

Thus it should be possible to identify business cases by a schematic procedure with which all functions of pervasive computing can be evaluated, both the infrastructure on the mobile client side as well as the server side and the connecting network.

2.1 Applications and service blocks

In order to determine the functionality needed by a business process, first of all the professional requirements (business view) must be analyzed. Based onto that the technical requirements at their implementation (technical view) are identified. Finally the needed technical functionality can be combined into architecture components (service blocks), in order to provide a uniform architecture for pervasive computing for all business processes according to the requirements (see figure 1).



Fig. 1. Business view, technical view and derived service blocks

The identified architecture components make thus available all functions defined in the technical view. With their assistance all professional requirements determined in the business view can be realized.

This correlation is important for the evaluation: In order to evaluate service blocks, business cases are used, that use the cross-section functions of these service blocks, e.g. administration, synchronization, transcoding, etc. The business cases of a portfolio have to be selected in such a way that functions described in the technical views of the business cases cover all the functions of the service blocks which have to be evaluated.

3 Analysis of Pervasive Computing Business Cases

Mobile applications can be judged on the basis of questionnaires. Depending upon which aspects of applications are to be judged, the list of questions can be more or less extensive. So applications can be regarded e.g. only from the professional view or also their technical implementation.

3.1 Professional Requirements

The professional requirements of a business case can be determined with the following questions:

- Who? Which circle of users uses the application? Are further persons affected through the operation of the application, e.g. administrators or data suppliers?
- What? Which data is the user supposed to work on with the mobile business case? Which information must be accessed from mobile devices? Which data will be modified or created and possibly must be synchronized with a central data server?
- When? When will the mobile application be used? At which time of day is information with mobile devices processed? Is this limited to certain times or is it necessary to make the data access possible all around the clock?
- Where? In which geographical range is the mobile application supposed to be used? Does it have to be available only on the ground of the own enterprise or also outside? Is an availability in areas with cellular phone network sufficient?

Through clarification of these questions the application is examined better. The business view of the application is determined. On this basis the technical view can be worked out.

3.2 Business case classification template

In order to be able to select business cases for a portfolio, it is beside the business view also necessary to receive information about the possible technical realization. It is recommended to collect all information, relevant for the selection task, in form of a template. Such a template for the classification of individual business cases contains therefore apart from the questions concerning the business view, in particular aspects of a possible technical implementation (see figure 2).

A more detailed description of the implementation is not necessary in this stage of the business case analysis. If necessary, the templates can be refined iteratively for defining a suitable architecture.

Type of the Business Case			
No.	Name of Business Case		
Description	Synchronous Data Flow	Asynchronous Data Flow	Annotations
general description of the specific business case including the advantages of a pervasive solution	always-on connections offering immediate access to information, may increase actual costs	connections built on demand, are removed if all information has been transmitted successfully	annotations specific for the particular business case
	Push Data Flow information (or part of it) are delivered directly to the user (e.g. SMS)	Pull Data Flow user checks for new information	
Distinctive Features: e.g.: minimizes delay, increases mobility, simplifies process			Device Support supported mobile devices
Who (people): Who could make use of the business case?			
Where (location): Where can the technology be used? Are there any constraints?			
When (time + availability requirements): When and how often may the system be used?			Bandwidth Required e.g. GSM, GPRS, UMTS, WLAN
What (information + average amount of data per transaction): What amount of data will presumably be transmitted? (estimated values)			
Performance Requirements To what extent will the network and infrastructure be loaded?		Feasibility Requirements How much effort has to be put into the realization of the business case?	
Data Security Requirements Will security relevant data be transmitted? If so, to what extent and how can the data be protected?		Business Impact (when mobile devices are used additionally): What kind of advantages can be expected from the realization of the business case?	

Fig. 2. Classification template for pervasive computing business cases

3.3 Business case portfolio

The portfolio for evaluation and prioritization of the most important business cases is constructed according to criteria specified before. The selection process is not trivial, since several assessment aspects are relevant usually. In order to simplify the selection of business cases, graphical representations can be used.

If for example in an evaluation phase the business cases relevant for the enterprise are to be realized with little expenditure, then a portfolio can be arranged after the following criteria:

- It must be possible to evaluate all functions which must be tested with the business cases, i.e. the business cases are supposed to use a possibly high portion of cross-section functions (service blocks).
- The business cases have to be implemented without much expenditure.
- The business cases must have a business impact as high as possible.

The criteria can vary depending upon the evaluation to be practiced and must be specified on an individual basis.

With a two-dimensional portfolio (representation of essential evaluation parameters of a business process in relation to each other, see figure 3) the selection of the business cases can be simplified. In order to determine e.g. business cases at high business impact and small implementation expenditure, these two parameters should be represented.

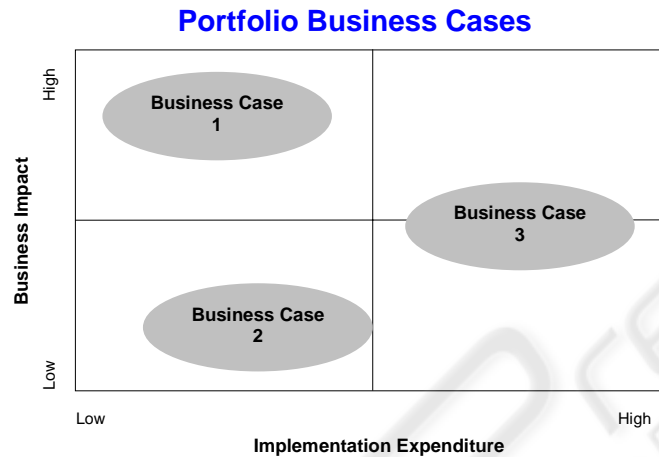


Fig. 3. Portfolio with implementation expenditure and business impact

Since usually not only two parameters are relevant for the selection, such a two-dimensional representation can only be an assistance for the selection task. Alternatively to multidimensional portfolios several portfolios can be provided in relationship to each other.

4 Analysis of technical requirements

For implementing the selected business cases of the portfolio additional information is needed. In order to determine these, a detailed and uniform questionnaire is compiled for each business case that has to be implemented. On basis of the templates it forms a strongly refined decision basis for the selection of architecture components and technologies to be used for realization.

With this questionnaire the functional requirements are regarded apart from more detailed business aspects, as well as technical boundary conditions and organizational aspects:

Business aspects: Through analysis of further business aspects the economic background can be better understood. Thus it is guaranteed that during the design of the technical solution the economical aspects are always the center of attention.

- First of all, the mission is described, which is pursued with realization of the business case. To reasons belong why the targeted mobile solution is needed and what is to be aimed with it.

- Furthermore the desired goals are discussed. For controlling the achievement of objectives measurable criteria must be defined, e.g. specific financial changes or measurable improvements of the satisfaction of users or customers in relation to possibly an already existing stationary solution.
- In addition all involved persons should be determined, thus beside users also administrators, data supplier, etc. Since possibly not only advantages are expected with a mobile solution, it should be determined whether the persons profit from the solution or whether disadvantages result. Such disadvantages can be e.g. a higher administration or data maintenance expenditure.
- It is important to clarify which changes are expected in defined process flows, if the business processes are mobilized.

Functional requirements: The functional requirements are refined with the background of the determined business aspects. They serve as basis for the draft of the technical solution and determine the architecture components relevant for implementation. Furthermore a first overview of the information processed in the system and necessary data flows results.

- The tasks to be done with the application are determined. For each task the user group is recorded that has to do the task. Beside the end-users also system users etc. are regarded.
- For each work routine the single steps are represented.
- Also an overview of the necessary data results from that. It is shown, who or which technical component processes which data and where the data comes from. Interfaces to external systems with which data is exchanged, result from that.
- Further the importance of certain system properties can be estimated, e.g. performance, security or service availability.

Technical boundary conditions: All boundary conditions to be kept according to possibly already existing technical infrastructures (concerns both server side and mobile client side and existing network) or architecture specifications are documented. Appertaining to that:

- the existing infrastructure, like system environments, operating system platforms, middleware systems and test environments
- enterprise standards, e.g. system management and operational concepts of applications
- network access and dial-in knots
- security standards

Organizational aspects: Certain organizational aspects are associated with the introduction of mobile business processes, like e.g..

- planning, operation and process of rollouts.

The above list shows only an overview with the most important aspects of the compiled questionnaire. It analyzes the business view and the technical view very detailed. With these informations the evaluation and prioritization of the business cases in the portfolio can be revised in an iterative process on the one hand and on the other hand the planned realization of the business cases can be executed more purposefully.

5 Pervasive Computing Service Blocks

After having analyzed the business cases, the functions needed to implement them, can be determined. The functions can be grouped to service blocks by the field of application. For applications of a pervasive computing environment, the service blocks could be (see figure 4):

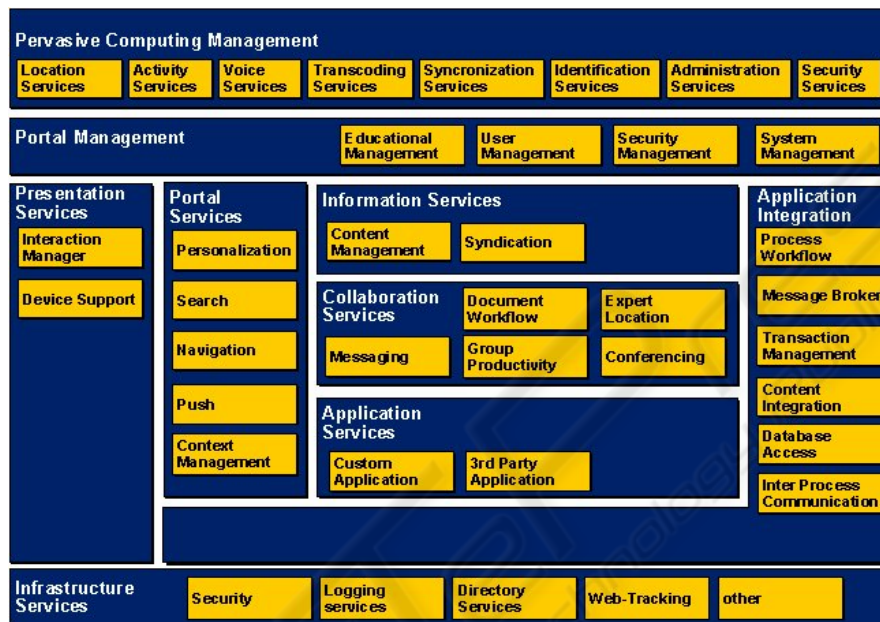


Fig. 4. Pervasive computing layer on top of other architecture layers

- location services: They are used to locate a mobile device, e.g. to offer location based services
- activity services: They are used to get information if a mobile device is active and connected
- voice services: They are used to access applications by voice
- transcoding services: They are used to transcode contents for the specific demands of different devices
- synchronization services: They are used to synchronize contents, e.g. for mail synchronization
- identification services: They are used to identify the user and the mobile device
- administration services: They are used to administrate the other services
- security services: They are used to transport data in a secure way to and from the mobile devices

The mobile services use the existing services of the applications to offer their contents to mobile devices. So they build an additional layer on top of the other architecture layers

6 Summary

If a portfolio must be defined for the evaluation and prioritization of pervasive computing business cases, then first the evaluation criteria relevant for the selection has to be determined systematically. Apart from essential aspects, like small implementation expenditure or high business impact, the coverage of the functions which have to be evaluated by the individual business case, belongs to this criteria. A systematic procedure is guaranteed by deriving the technical view from the business view and by the following alignment with the functions of the necessary service blocks. All evaluation criteria, relevant for the composition of the portfolio, is registered in template.

For the execution of the evaluation further details of the business processes are necessary, which are answered in a refined question catalog.

Through this iterative top-down procedure the information needed for the respective step of implementation of a pervasive computing business case is purposefully developed and analyzed also under economical points of view.

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