

Bundesamt für Sicherheit in der Informationstechnik



E-Government Phase Plan

Phase 6 "Introduction and Initial Operation"

The current text forms a module of the

E-Government-Manual

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6 Phase 6 “Introduction and Initial Operation”

Following conclusion of Phase 5, the new e-government service is available as a functional and tested application in its, at least provisionally, final¹ form. The primary objective of the phase plan has thus been achieved. However, to be able to reliably use the new application in practice, that is to render it so to speak “mature for placing on the market”, there is still a series of activities that must be undertaken; these activities form the content of this final Phase 6.

Concluding measures to render the e-government application ready for practical use

At the start a strategy should be defined for the procedure during the introduction of the e-government service (Activity 6.1). Among other aspects, it is necessary to decide whether the new application is to be activated as a whole on a specific date (so-called “big bang”) or whether sub-applications are to be enabled for use step-by-step.

Strategy during the introduction

A key prerequisite for successful initial operation of the new e-government service is that all future users understand how to use the application effectively. Careful training of the specialists as well appropriate instruction for other users is therefore the content of Activity 6.2. Here the issue is the practical implementation of the training plan prepared in Activity 4.13.

Training measures for the users

Prior to initiating pilot operation, further preparatory measures are to be taken. First any organisational changes necessary in the administrative processes must be made in Activity 6.3 so that the processes can be performed electronically. The procedural rules, staff regulations and procedural instructions must be changed or adapted as necessary.

Organisational adjustments

Like the organisational workflows, the IT environment must also be adjusted to suit the new e-government service. Activity 6.4 is therefore used to migrate existing electronic procedures (e. g. the budget system) to the new hardware and software.

Migration of existing procedures

In Activity 6.5 the master data are finally entered or any existing old data migrated to the new application. With this last step, the preparations for the first practical test of the e-government service are complete.

Migration of old data

Of central significance during Phase 6 is Activity 6.6. In pilot operation all components of the application, and particularly their interaction, are tested for the first time under productive conditions. The objective here is not so much to track down errors in the hardware and software (these should have already been found in Activity 5.6 and rectified), but instead to obtain experience in relation to the efficiency and suitability of the overall procedure, and to find any weak spots, e. g. timing problems (so-called “bottlenecks”), in the processes.

Pilot operation

¹ This statement refers to the functional properties of the application, their correct implementation as per the schedule of specifications that the client has definitively acknowledged to the contractor by means of the acceptance (Activity 5.6). In the context of the existing contractual conditions with the contractor, changes to the application can then only result from the rectification of minor deficiencies as part of the assertion of claims under the guarantee. For extensive changes that could prove to be necessary during the life cycle of the application (see Activity 6.8), a new tender process is required.

Based on the practical experience from pilot operation, the entire system should again be subjected to a final revision in Activity 6.7, here special attention is to be paid to the security aspects.

Final revision

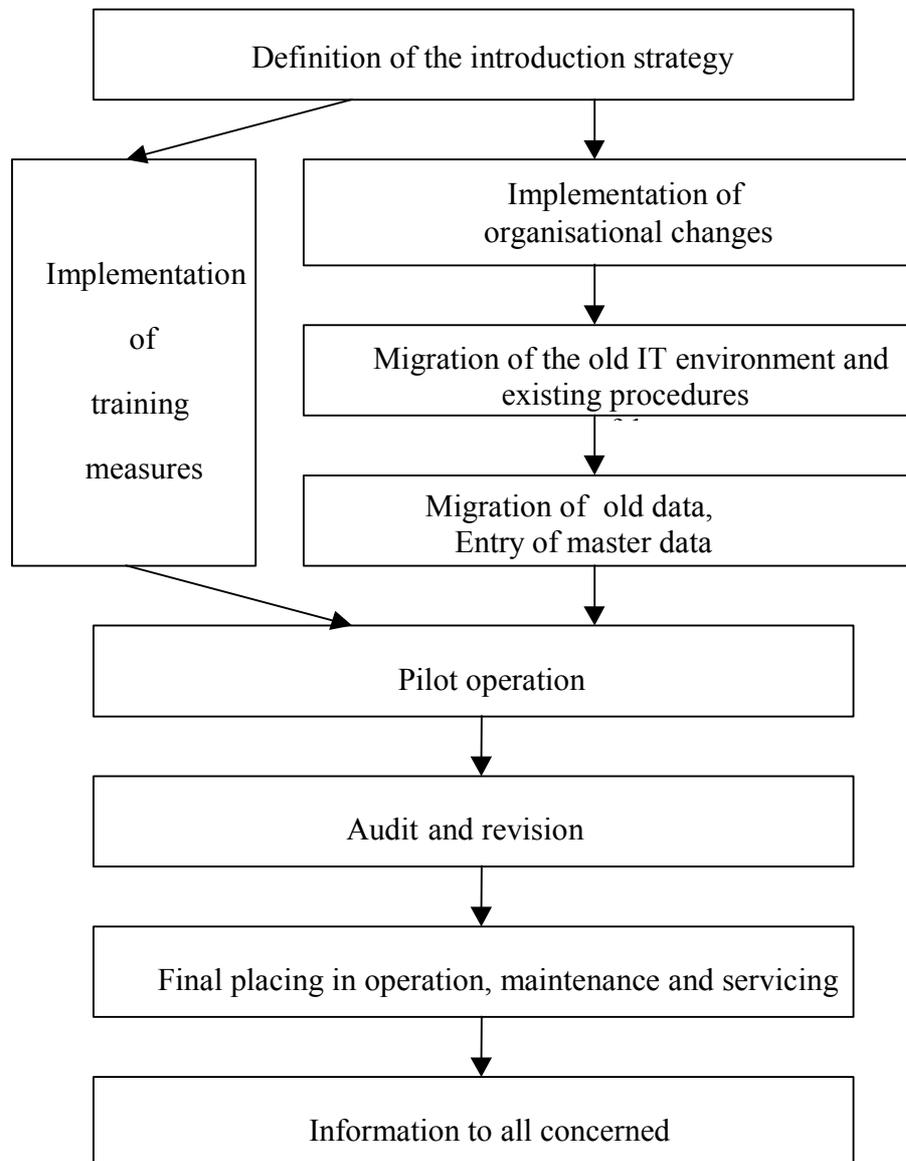
Then the new e-government service is ready for the initial operation (Activity 6.8).

Initial operation

The phase is concluded as always with comprehensive information to all involved (Activity 6.9). This should include in particular also PR and marketing campaigns with which the customers (e. g. the public, companies) are encouraged to use the new e-government service.

PR and marketing campaigns

Phase 6 – Introduction and Initial Operation



6.1 Activity “Definition of the strategy for introduction”

Initiation responsibility: Head of the E-Government Team

Implementation responsibility: E-Government Core Team, Senior management of the public agency, Persons in charge of organisation, Technical managers

Whether it is better to introduce the new application immediately as a whole or instead to proceed step-by-step most certainly depends on the nature of the related e-government project. The same applies to the timing for the decision on the strategy for introduction. While for some projects, a decision should be made here as early as the high-level design phase, in other cases it can be advisable to first await the results of the test phase. The start of the introduction phase is however the point when it is necessary to make a decision on this aspect *at the latest*¹.

Step-by-step introduction versus “big bang”

Introduction of the application as complete package (“big bang” solution)

The introduction of the complete e-government service on a specific date offers a range of advantages:

- The external customers and the staff in the public agency can use all the functions of the new application from the start.
- Old and new procedures do not need to be operated in parallel.
- It is not necessary to create interfaces for the introduction phase that permit the exchange of data between sub-processes that are performed using the old or new procedure.
- Rationalisation effects can be realised more quickly, as all processes are run on the same platform across departments from the start.

Advantages of the “big bang” solution

As for every “all or nothing” strategy, the “big bang” solution also involves significant risks: if unforeseen problems occur, in the extreme case this can result in the entire public agency no longer being able to perform its core tasks for weeks, or only being able to perform them to a limited extent.

Risks of the “big bang” strategy

Step-by-step introduction

The possible advantages of a step-by-step introduction of the new e-government service are:

- Lower introduction risk
- The critical introduction phase initially only affects a few areas.
- The experience obtained in the initial phase can be utilised in the subsequent phases; earlier errors can be avoided later.

Advantages of a step-by-step solution

¹ As already mentioned earlier, for certain e-government projects it can be advisable to work through the individual activities in a somewhat different order to that given in this phase plan.

- The organisational effort for the introduction remains manageable.
- The users of the application find it easier to convert step-by-step.

The advantages of the “big bang” solution can of course also be formulated as disadvantages of the step-by-step introduction: increased effort due to parallel operation, interface problems, longer introduction period for the complete procedure.

Possible disadvantages of a step-by-step introduction

Decision criteria

As already mentioned, the strategy for which the decision is finally made depends on the nature of the related e-government project. If the application is comparatively simple and hardly affects the ability of the core of the public agency to operate (e. g. an information service for the public), the advantages of introduction as a whole significantly outweigh the possible risks mentioned above.

For complex applications on the other hand, it is generally advisable to decide for step-by-step introduction. The disadvantages of parallel operation and the interface problems should in this case be minimised in the planning phase by seeking maximum modularisation of the application. The more independently the sub-applications operate in relation to each other, the less will be the effect on the overall system of any failures in sub-components during subsequent productive operation.

Complexity of the application

Often the strategy for introduction is however pre-defined by practical external constraints. Thus for an e-government service that incurs charges, e. g., budgetary framework conditions can make it necessary for the entire application to become operational at the start of the budget year. On the other hand, the lack of specific technical prerequisites (e. g. the full availability of signature components) can make it necessary to initially place an e-government service “online” with correspondingly reduced functionality.

Budget and technical framework conditions

From experience the following can be stated in general: Introduction using the “big bang” model signifies a very “intensive, traumatic phase” for all involved. If the initial difficulties are however successfully overcome in a “show of strength”, then the feeling that the job has been done the right way rapidly becomes established.

High stress factor with “big bang” solution

During the step-by step introduction, the stress factor in the initial phase is certainly lower. However, on the other hand there is a risk that a certain degree of frustration rapidly sets in when the individual steps are not worked through with the necessary pressure and the completion of the overall project is continually delayed. Here appropriately forceful management must ensure that incomplete individual steps do not become permanent temporary solutions and thus the application as whole remains incomplete.

Risk of “permanent temporary solutions” with step-by-step introduction

6.2 Activity “Implementation of training measures”

Initiation responsibility: Senior management of the public agency, E-Government Team

Implementation responsibility: Persons in charge of organisation and technical managers (public agency)
Training staff (public agency and/or external)

At the end of the design phase (Activity 4.13), planning of training measures for the future users of the new e-government service was prepared. This training plan is now to be implemented in practice at the start of the introduction phase. As based on experience such training measures require a certain amount of time, this activity can be implemented in parallel with other organisational preparations (Activities 6.3 to 6.5) during pilot operation and subsequent full operation.

Training measures in parallel with organisational changes

The relatively large amount of time between planning and implementation of the training measures is due to the following reason: the preparation of training documentation is generally part of the realisation of the application. Accordingly, the training plans must already be available on contract award. The training measures themselves should be implemented as closely as possible to the initial operation of the new e-government service to avoid users forgetting what they have learnt before they have the opportunity to apply it in practice.

As already addressed as part of Activity 4.13, there is a major difference in relation to the training measures for the users of a new e-government service compared to the “conventional” IT applications that are in use otherwise in the public agencies. As the vast majority of the users of e-government services, specifically the public on home PCs, are not staff at the public agency, training measures in the “classic” sense are scarcely relevant for these users. Training measures also for this the largest user group are however imperative due to the often significant level of complexity of the e-government applications. The training program must therefore have a “two-track approach”, i. e. be based on both using the classic form and also using modern teaching methods, such as computer-based and web-based learning¹.

Classic and computer-based training measures

Classic IT training

“Classic” IT training in the form of seminars and courses is in general only of relevance for staff at the public agency itself for organisational reasons. In exceptional cases, if e. g. the e-government service is only of significance for a very limited group of external users, it can be useful to also involve the e-government customers in the “classic” training measures. This would be conceivable, e. g., in an area such as electronic procurement, if due to a very specific need on the part of the public agency, only a very small number of

Seminars and courses for public agency staff

¹ Due to the importance of these new teaching methods particularly in the e-government area, they will be addressed in more detail as part of this activity 6.2. Valuable suggestions for the design of teaching programs for new e-government services can be obtained from existing examples, such as the “ELSTER” application. This will therefore be discussed briefly in the “E-learning” section.

suppliers can be considered potential suppliers from the start. Furthermore, it could be useful to also involve external users of the e-government service in direct training measures if the users are in a closed group. Such a closed group of e-government users is formed for instance in the case of electronic legal correspondence for the approved lawyers for a court.

The organisational workflow for the training measures is generally already defined by the stipulations made in Phase 4. If the e-government application was developed by an external contractor, it is generally best if the contractor also trains the future users. The precise modalities for the implementation of the training, e. g. whether this takes place in the public agency itself or externally in a training facility provided by the contractor, will then have been defined in the contractual agreements with the contractor as part of Activities 4.12 and 4.13. If, on the other hand, the e-government service has been developed in-house at the public agency, it can generally be assumed that the public agency will also have in-house training capacity.

External seminars or in-house training

The content of the training has already largely been defined in Activity 4.13. As this should be based on the target group, the composition of the groups of seminar participants (technical staff, non-technical staff, non-specialist users) is defined by the related teaching content. During the preparation of the seminar events it is however to be ensured that these groups are also as homogeneous as possible in relation to qualifications and prior knowledge. If it is necessary to compensate for large differences in the knowledge held by the participants during the training events, time will be lost and there will be deficiencies in conveying the actual teaching content planned.

Homogeneous composition of the training groups

The motivation of the seminar participants depends of course on how well the training is organised. This includes, among other aspects, that the participants are advised of the dates for the events in good time. In addition, the senior management at the public agency should be interested in holding the training in a pleasant environment, so as to foster the objective of high acceptance of the new e-government service among the staff.

Motivation of the seminar participants by good organisation or the training events

E-learning

Similar to e-government itself, unorthodox paths must also be taken to convey the knowledge necessary for using the new services. Although teaching methods such as CBT¹ and WBT² have been established in business for a number of years; the use of these methods also by public agencies to make it easier for the public to access the “authority’s virtual office” is a relatively new development.

However, first it must be stated that computer-based teaching aids are not only useful for the public. These can also certainly form a useful addition to the “classic” IT training for staff in the public agency addressed in the previous section. Conceivable here would be an HTML-based “information exchange” for the e-government service in the intranet at the public agency that enables users who have already received “classic” training to increase their knowledge by self-

Supplementing “classic” training with computer-based teaching methods

¹ CBT = abbreviation for “Computer Based Training”, that is learning with the aid of a computer

² WBT = abbreviation for “Web Based Training”, that is learning with the aid of the Internet

study at the workplace. Furthermore, this information exchange could also be used as a communication forum for the users in which, for instance, tips and tricks on the day-to-day use of the system could be exchanged.

The most important application for electronic teaching aids in relation to e-government is however the provision of the necessary information on the use of the services provided to the public by the public agency via the Internet. Here the primary issue is make the access to the e-government service as easy as possible for the public by means of an understandable presentation on the content that is also in an attractive form and in this way also ensures high acceptance.

E-learning for e-government users

The information that must be made available to the public covers two topics: on the one hand instructions on how to use the content of the e-government service, on the other hand specific technical help on the use of the user frontend. For these instructions on content, the public must be able to easily understand what exactly the user must do when using the electronic administrative procedure, i. e. which forms the user must complete, which tasks the user needs to perform and their legal basis, what evidence and certificates the user must provide, etc. In this point the e-government is scarcely different to the form-based written procedure.

Technical instructions and instructions related to content

However, the form of the electronic frontend offers much better opportunities for design than the paper version where the user is mostly limited to a clearly laid out or not so clearly laid out “leaflet on the form”. With the electronic input forms improved clarity for the user can be achieved by simply providing context-related explanations at the points where the related inputs must be made in the fields. It is thus easier for the user to decide which areas of the input forms are of relevance to the specific case and which can be skipped.

Far reaching freedom of design for electronic application help

The specific design of the technical application help, which thus relates to the use of the frontend itself, depends largely also on the content of the related e-government service. In the following two examples, scenarios of different levels of complexity are explained in more detail:

- A simple application procedure based on an electronic form
- A complex application procedure with several forms and attachments (based on the example of the electronic tax return, ELSTER)

E-government-services with different levels of complexity

In the first case, the simple application procedure, the electronic form should be largely self-explanatory for the user. Help on input can, as in the paper form, be integrated in context as descriptive text on the data entry fields in the form. Other possibilities are to offer additional help in the shape of popup windows or so-called tool tips¹. Frequently asked questions on the e-government service should as such be compiled in a FAQ².

Popup windows and tool tips in electronic forms

The complicated application procedure as per the second category listed above is as a rule no longer self-explanatory. The ELSTER electronic tax return for instance (see: www.elsterformular.de) involves numerous multi-page forms from which the tax-paying public must select those relevant for the specific case. This

Example: ELSTER

¹ Tool tips are small windows with a description that are displayed when the mouse pointer is left over a certain area of the form, e. g. a data entry field, for a period of time.

² Abbreviation for “Frequently Asked Questions”

e-government service places relatively high demands on the user both in relation to the editing of the content of the tax return and also in relation to the technical use of the application itself.

Prior to downloading the program package, the user can become familiar with the application in a step-by-step process using a Java-based demo version. The tutorial also prompts the user for direct interaction so that the user can immediately also practice using the forms with the instructions (e. g. the entry of data).

Complicated processes are presented visually using Java applets in the form of small demo sequences. In this way the user learns about the technical details related to the use of the application prior to downloading the program; details about which he would not initially think but that are however of great importance for correct use. The tax-paying public thus learns for instance, how the authenticity of the program package downloaded from the Internet can be checked so that the user can be certain that it is actually the official software from the public agency that is being used and not malware¹ that may have been injected for elsewhere to spy on the user's private data.

Java applets and demo sequences

A further important point that is conveyed to the user by the tutorial is the fact that each time the program is started, the program will check over the Internet with the tax authorities' server as to whether an update has become available for the software in the meantime. This ensures that the user always uses the latest version of the program.

Security by means of automatic checking for the latest version of the program

To convey important technical details of which the user should be aware *prior* to downloading the software for the e-government service to the home PC, a WBT tutorial with demo sequences to show complicated procedural steps, as in the case of ELSTER as described, is the most suitable method. However, consideration must always be given to the fact the use of WBT results in online costs for the user. The user should therefore also have the opportunity to become familiar with the e-government application offline. For this purpose the user should be able to either download the teaching program onto the home PC or, if the amount of data is excessive, a technically less complex help file but with complete content (e. g. in HTML format) should be included in the program package for the client software.

Limitations of WBT due to online costs

The latter is the case for ELSTER. After downloading the software the user can become familiar with the program in a step-by-step process with the aid of an "electronic manual" (currently in Microsoft Help format). Working with this manual is not as convenient as the WBT tutorial, however it saves the user online costs.

Electronic manual as offline teaching aid

Along with the electronic manual, ELSTER uses another technology for context-sensitive help: every form has a window at the bottom of the screen in which tax regulations and rules related to the completion of the specific form are explained. In this way the user always has context-related help required at exactly the related point in form. Although the user can page back and forward to other topics within the help window, on each new entry of data in the form the help text is returned to

Context-sensitive help

¹ Malware: English expression for malicious software such as trojans, viruses, etc.

the related point. The user thus does not run the risk of “drowning” under a flood of information.

Rules for e-learning modules in e-government

During the design of e-learning modules for new e-government services, numerous useful suggestions can be obtained from already existing teaching programs such as the ELSTER tutorial described above. A few rules should also be observed as compiled in the following overview:

- The teaching modules must be orientated on the target group. Accordingly, a differentiation is to be made between e-government services for the “public in general” (e. g. ELSTER) and those for business (e. g. VAT number as WAB service) or limited groups of users (e. g. lawyers and solicitor for electronic legal correspondence).
- In the technical implementation, open standards such as HTML (which is also the most suitable tool for WBT applications anyway) should be used.
- Animations can be used to make complex content easier to understand. However they should not be used for their own sake, but only where useful and where they can make a contribution to the teaching objective. Open standards (e. g. Java applets) are also to be preferred here over proprietary plug-ins.
- Long-winded text for explaining complex content fatigues the user. Often the facts can be explained more succinctly using easy to prepare diagrams and graphics. The explanatory text should be as short and understandable as possible.
- By clear breakdown and suitable navigation aids, it must be as easy as possible for the user to orientate him/herself.
- The role of the learning user must not be limited to a passive reception. Instead the user should be prompted to interaction by giving the user the opportunity to immediately practically apply what has been learnt using examples.

Summary from the examples for teaching programs

Current developments in relation to e-learning in e-government

Due to the increasing importance particularly in the area of e-government, e-learning is also a current research topic in universities. Thus under the title "eGOV-Learning@Komm" at the German University of Administrative Sciences Speyer a web-based learning program¹ has been developed that is designed as a basic introduction to e-government. Staff in the public agency can learn how to initiate and implement successful e-government projects based on a “virtual city” using this WBT module. Even though the program was primarily designed for the municipal sector, useful suggestions can also be obtained here for e-learning projects related to e-government at the federal and state level.

eGOV-Learning@Komm

¹ More information on the program is available in the Internet at:

http://www.dhv-speyer.de/HILL/Kooperationen/eGOV_Learning.htm

6.3 Activity "Implementation of the organisational changes"

Initiation responsibility: Senior management of the public agency, E-Government Team

Implementation responsibility: Persons in charge of organisation and technical managers

The introduction of e-government in a public agency does *not* as a rule simply signify that the previous administrative procedures are now offered in electronic form. Instead the transfer of a "classic" administrative procedure to an e-government service mostly also involves a fundamental re-organisation of the procedure itself. The design of this process was the content of Activities 3.3 and 3.6: the organisational processes related to the administrative procedure were first optimised and then modelled to form a process chain suitable for online implementation. At the latest on the now imminent initial operation of the online service, the related organisational changes must therefore also be implemented in the public agency.

Organisational changes due to online processing of the procedures

Re-structuring of the organisational processes

The re-structuring measures that need to be implemented in the specific case are given by the workflow organisation defined in the detailed technical concept (see Phase 4). To ensure that this re-structuring work does not cause serious problems in the workflow as a whole, the measures must be carefully planned and agreed by the senior management in the public agency in close collaboration with the persons in charge of organisation and technical managers. This will be all the easier the more rigorously the concept of a modular structure for the process chain has been implemented. In this case specifically, changes in a sub-process only have a minimal effect on the workflows in other modules.

Minimisation of the organisational effort by means of modularisation

In detail, measures such as the following are to be implemented:

- Re-definition of the tasks
- Change in the responsibilities and distribution lists
- Definition of new security and control mechanisms
- Conversion of the interface to other procedures
- Issuing transition rules
- ...

Organisational measures

Important for the co-ordinated implementation of these measures is a carefully prepared schedule. This must include an adequate, realistically calculated time span for each of the sub-steps.

Schedule

Adaptation of administrative regulations

The modified organisation structure must of course be reflected in the internal administrative regulations in the public agency. The related changes therefore include as a rule:

- Modification of the procedural rules
- Adaptation of staff regulations, procedural descriptions, manuals, etc. to the new e-government procedure
- If necessary modification of the key list in the public agency
- If necessary modification of job descriptions

**Modified
procedural rules
and regulations**

All these changes can of course only be made with the involvement of the staff representatives. The staff affected by the changes must be informed in good time. For this purpose it must be ensured that an adequate number of all modified procedural instructions are distributed to the staff prior to the changes coming into force.

6.4 Activity "Migration of the old IT environment and existing procedures"

Initiation responsibility: E-Government Team

Implementation responsibility: Persons in charge of organisation and technical managers

Once the organisational prerequisites for one or more of the public agency's administrative procedures to be offered as an e-government service have been met in the previous activity, this procedure itself must now be moved to the new hardware and software platform. However this first requires approval by the responsible technical departments.

Approval for productive operation

Based on the acceptance that was provided at the end of the test phase (see Phase 5, Activity 5.6 "Test execution and acceptance"), the responsible technical departments must approve the new e-government service for productive operation. This is of course only provided after any minor errors¹ still present after acceptance have been completely rectified by the contractor. With the provision of the approval, the technical departments take over the entire responsibility for the correct function and security of the procedure. Certification of approval as part of the procedure documentation must include²

- The name of the procedure
- The reason for test and approval
- The date for the first use of the related version of the process
- The exact description of the program approved with version numbers
- Confirmation that the stipulated tests have been performed
- The declaration of approval

Provision of approval by the technical departments

Content of the approval certificate

After an approval it is to be ensured that no more changes are made prior to transfer to production.

¹ As was explained in the last section of Activity 5.6, acceptance by the client must also be provided even if the application still has "minor deviations" from the requirements in the specification. However, these are to be rectified by the contractor without delay as part of the guarantee.

² Cf. section 3.4.5.5 in: "Datenverarbeitung in der Bundesverwaltung II", volume 5 of the series of publications from the Bundesbeauftragten für Wirtschaftlichkeit in der Bundesverwaltung, Verlag W. Kohlhammer, Stuttgart (1993)

Moving to the new hardware

For a public agency that has not previously operated any online services, the entry into e-government will generally make significant changes to the IT environment. An example scenario has already been outlined in Activity 4.8: while in the old IT environment the transition from the intranet to the Internet was protected with a firewall (see Figure 2 in Phase 4, Activity 4.1), the new network plan (see Figure 8 in Phase 4, Activity 4.8) now has a de-militarised zone, protected by at least two firewalls, routers, etc., this contains the Internet server accessed by the users of the e-government service.

New interfaces between internal network in the public agency and the Internet

Depending on the nature of this application, there will also be major changes in the intranet: new servers (e. g. database and application servers), new workstations and new network components (switches, routers, hubs, etc.) may be added.

New network components

This hardware was procured in Activity 5.2 and the software for the new application was also installed as part of this activity. However, the new system has up to now always been operated in a test environment (see Phase 5, Activity 5.6). Following conclusion of the tests and approval, this tested configuration must now be transferred to productive operation.

The transition is implemented as per the strategy defined in Activity 6.1. With the “big bang” solution, the old systems will be completely shutdown on a defined date and the new configuration immediately takes over the tasks of the old systems. With step-by-step introduction on the other hand, the new and the old system work in parallel at least for a time before the old components are then taken out of operation in stages.

Transfer from the test environment to productive operation

Independent of which strategy is used for the transition, it must be ensured that the new system is transferred in exactly the same configuration as in the test environment; the configuration that served as the basis for approval. Setup for operation of the procedure should be automatically logged and is only allowed to be performed by personnel specifically authorised to perform this task¹. If it is necessary to make changes to the system parameters or changes to procedures on the transfer from the test environment to productive operation, these must be documented in detail. At a later date it must be possible to exactly reproduce the configuration at each stage of the operation of the system. The responsible technical personnel must also at all times have available all the information necessary for the operation of the system (see on this topic also Phase 5, Activity 5.4 “Documentation”).

Exact documentation on changes to system parameters and procedures

Moving existing procedures

The same applies in principle also for the procedure software as for the newly installed hardware. In addition, it is also often necessary to make more extensive changes, if e. g. parts of the new system also become the basis for already existing applications. Specifically, this could be the case if e. g. at the same time as the introduction of the e-government service, a new database system is also introduced in the public agency and this new database system is also to be used in

Interaction with other procedures and applications

¹ Cf. also Section 3.4.6 of the publication already referenced: “Datenverarbeitung in der Bundesverwaltung II”

future as the basis for the old procedures, for instance the budget and human resources administration system. Changes may then be necessary also on servers and workstations that are actually completely unrelated to the actual e-government application.

All changes to the existing procedure are to be as carefully documented as the configuration of the new software. In particular, it is to be recorded which processes are performed with which program version. It must be possible to unambiguously identify every program version via a version number and an approval date.

**Documentation of
the version
numbers of
software used**

6.5 Activity “Migration of the old data stocks, entry of master data”

Initiation responsibility: E-Government Team, Technical managers

Implementation responsibility: System and database administrators, Technical department staff

Once the new IT system is available for productive operation, prior to initiation of pilot operation the old data sets must be migrated on the new system. If master data is also required for online processing, data that was not necessary for the “classic” administrative procedures (e. g. e-mail addresses), then this data must be entered from scratch.

Preparatory measures

It has already been highlighted in relation with the change of existing procedures in Activity 6.4 that during the introduction of such complex IT procedures as an e-government service, frequently the complete database system in a public agency is replaced. This is necessary in the majority of cases because the amount of additional data due to the online procedure as well the processing speed in general place higher requirements on the backend than was the case for the previous processes. As it is mostly ineffective to work with several different database systems in a public agency, such a change normally more or less presents itself on such an occasion.

Consequences of a change in the database system

However this then results in the problem that not only the data necessary for the e-government service itself needs to be migrated, but also the data for all other applications must also be migrated to the new (database) system; as a rule this undertaking involves considerable effort.

Migration of the old data also from other applications

Some old data (in anonymous form) was copied across to the new system during the test phase. From a purely technical viewpoint there is thus already experience with how such a data migration is to be achieved in detail. The large amount of effort caused when large volumes of data need to be transferred is due to the corrections to these old data sets that in the majority of cases is necessary first.

Experience has shown that the quality of collections of data reduces with time. The reasons for this situation are numerous. On the one hand there are straightforward errors made by the specialists when entering data: names, addresses and other information are typed incorrectly or data sets are incomplete because all the necessary information was not available at the start or because the entry of the data was interrupted for some reason and never completed later. Errors of this type accumulate with time, this can result in corrupt indices and thus render a large number of records impossible to find.

Cleaning up the old data

But it is not just the users who produce erroneous records. Much more unpleasant for the migration of data are the mostly small “workarounds” that have been built into the backend over time by the database administrators and programmers. Such situations are always produced when technical necessities make modifications and extension to the applications necessary, however due to lack of time or funds the

Cleaning up the databases

related basic changes to the database design actually necessary are to be avoided. Often in this case, e. g. data fields have two uses or are filled with content for which they were originally never intended.

The most important measure for the transfer of the old data to the new system is therefore the correction of such errors in the records. The senior management in the public agency and the technical departments are mostly unaware of the existence of “workarounds”, as discussed above, (even though they usually are ultimately responsible for them), which is why the effort for rectifying the data is often underestimated. It is therefore important that this work is started in good time and that adequate time and human resources capacity are planned.

**Planning
adequate human
resources
capacity for the
data migration**

Following conclusion of the rectifying work, the data records should again be checked for completeness and correctness prior to transfer to the new system.

Data transfer to the new systems

The actual transfer of the old data to the new system is in general implemented automatically and should, provided the cleaning up has been completed successfully, not produce any further problems. Here it is important that all steps during the transfer are logged in detail.

**Documented
automated
transfer of the old
data**

In the case of the “big bang” introduction of the e-government service, the transfer must be performed on a specific date. With the step-by-step introduction strategy the old and new systems continue to operate in parallel for a time. The migration of the old data is then implemented at the latest with the successive decommissioning of the old applications. During parallel operation, new records should if possible only be added to the new databases.

**Scheduling the
data transfer**

The same of course also applies for data that are required by the new e-government application, but that did not arise in the previous procedure. The entry of this new master data must also be planned and adequate human resources provided (which as a rule is generally found to be easier than cleaning up old data, as the volume of new entries is considerably easier to estimate than the number of possibly erroneous records in old data sets). These new entries can also be made by external temporary staff (e. g. student staff).

**Entry of new
master data**

6.6 Activity "Pilot operation"

Initiation responsibility: Senior management of the public agency, E-Government Team

Implementation responsibility: Technical departments

Following conclusion of the preparatory activities for this phase, the new e-government application is now ready for the initiation of productive operation. However, this should initially take place in a restricted form as a pilot phase so that initial experience with the online procedure can be obtained under realistic working conditions.

Initial experience under realistic working conditions

Objectives of the pilot phase

Often pilot operation is regarded as part of the test phase on the introduction of new IT applications and not considered part of productive operation. However, in general these are procedures that are only used locally within a public agency or a company. Here it is relatively straightforward organisationally to define that only one technical area or one department works with the new procedure while the majority of the staff continue to use the old system. Any errors that arise in the new application during pilot operation are then relatively limited in the damage they can cause and can be treated similarly to the way errors are treated during the test phase (see Phase 5, Activity 5.6).

An e-government application on the other hand inevitably interacts with the exterior. Errors that arise, for instance if the personal data entered by a member of the public are not encrypted or inadequately encrypted and thus made accessible for unauthorised persons, can cause far reaching damage and place the public confidence in the e-government service in question. Pilot operation in the e-government area can therefore not be used for finding errors in the procedure. These must have already been found during the test phase in Activity 5.6 and rectified.

Serious consequences of errors in e-government applications

The purpose of the pilot phase is instead to obtain practical experience in the use of the system under real operating conditions. In particular, information is to be obtained on:

- Process performance: do the system components interact smoothly or are there bottlenecks caused by the system?
- Level of utilisation: is the utilisation even or are there capacity bottlenecks (e. g. system not available over the Internet) due to unexpectedly heavy demand from the users?
- Data volume: is the volume of data within the framework planned or are there capacity bottlenecks when saving, archiving, maintaining, etc. the data?
- Efficiency and suitability: does the system fulfil the tasks completely or is it necessary to process parts of the e-government service by "bypassing the system" (e. g. in writing or by telephone)?

Test criteria during pilot operation

- Behaviour: does the system always behave as expected or does it produce “incorrect results” in certain situations?
- Knowledge held by the users: are the training measures implemented in Activity 6.2 adequate or are there deficiencies here (e. g. incorrect use by the user)?

Implementing pilot operation

The amount of freedom available for designing the pilot phase depends of course on the introduction strategy defined in Activity 6.1. If it has been decided to adopt the “big bang” solution (for instance because it is necessary for budgetary reasons to place the application in operation as a whole on a specific date), the use of complex procedure can prove to be extremely difficult at the start. Here it is then all the more important to avoid possible bottlenecks as far as possible from the start by careful planning. This relates particularly to the human resources: if problems arise, additional specialists must be made available to rectify the difficulties. Other staff should be available for the documentation of events and the results of the pilot phase.

Increased human resources effort during the pilot phase

If, on the other hand, the strategy of step-by-step introduction of the new e-government service is adopted, then during pilot operation it is of course possible to first trial sub-applications before the entire procedure is then switched online in stages. In this way the effects of any problems that arise can be kept within limits and can be rectified as rule with “less stress”.

The duration to be planned for the pilot phase of course depends on the introduction strategy. In general it can be assumed that on step-by-step introduction, more time is required for pilot operation than for the “big bang” solution. This applies at least if there are no serious unforeseen problems during the “big bang”. If, however, this situation arises, it may even be necessary to interrupt the pilot phase if there are so many errors that they cannot be rectified while the application continues in operation.

Duration of pilot operation

To be able to start the pilot phase at all, there must also be e-government users (i. e. the public, companies. etc.) who are prepared to take part in such trial operation. As already mentioned, the difference between pilot operation and productive operation is only characterised by the situation within the public agency: the new procedure must be reviewed for any remaining weak spots during the initial phase. To the exterior, i. e. for the customers using the new service, this pilot character does not need to be obviously apparent. If therefore depends on the public agency whether it wants to publicly announce the operation of the system as a pilot phase. If the public agency announces the pilot phase, there is of course the risk that many potential users will take a waiting posture and not use the new e-government service until supposed “teething troubles” or actual “teething troubles” with the application are rectified.

Involvement also of the e-government customers in the pilot phase

On the other hand, it can certainly be desirable for the system not to be subject to full load straight away in the initial phase. The public agency should therefore carefully consider how the initial operation of the new e-government service is to be announced to the public (see also on this topic the discussion on the subject of “Public relations” in Activity 6.9).

Public relations in advance of pilot operation

So that the objectives for pilot operation formulated in the last section can also be implemented, it is above all necessary that the course of events is exactly documented in all phases, similarly to that already performed during the tests in Activity 5.8. This documentation should cover:

- The documents and logs produced during pilot operation, e. g. accesses to web, form or database servers
- If bottlenecks are apparent in the processes: logs on the sequences over time of all activities
- Criticism from specialist users related to ease of use, speed (performance) of the system, clarity of inputs and outputs
- Criticism from the e-government customers (the public, companies, etc.) related to the ease of use of the application

**Documentation of
pilot operation**

To give specialist users and the public the opportunity to express their criticism of the e-government service, it is recommended to setup a dedicated e-mail address for this purpose.

6.7 Activity “Audit and revision”

Initiation responsibility: E-Government Team

Implementation responsibility: Persons in charge of the system, Persons in charge of organisation and technical managers

Based on a comprehensive analysis of the results of the pilot phase, prior to placing the service in initial operation, a concluding review of the new e-government service should be held.

Analysis of the results of pilot operation

The logs and reports collected from users in the last activity are to first be evaluated. During the analysis of these results, the following is to be critically reviewed:

- The correctness of the content and formal correctness of the processing of the e-government service as a whole
- Efficiency and speed
- Ease of use and operation
- Cost-effectiveness
- Susceptibility to errors
- Security problems

Criteria for an analysis of the results of pilot operation

Consequences of the auditing

As a consequence of the analysis of the course of events during the pilot phase, changes may become necessary to the procedure:

- Changes to the organisational processes: this may become necessary, e. g. if it has been found during pilot operation that there are processing problems in sub-processes (“bottlenecks”). In addition, organisational changes to improve the cost-effectiveness and efficiency of the e-government service may be necessary.
- Rectification of errors in the hardware and software for the system. The “usual” errors of this type (e. g. incorrect values output by a program routine) should have already been found during the test phase and rectified. However, there may be errors in the hardware and software that only become apparent when the system is operated under heavy load in productive operation. An example of this problem could be insufficient sizing of the memory for the storage of temporary files or spool files that overflow.
- The rectification of deviations to the requirements defined in the detailed technical concept (see Phase 4) (e. g. if the design foresees that a certain minimum number of transactions are to be processed per day, however the

Possible changes to the process due to the errors found during the pilot phase

system in the form realised by the contractor is not capable of achieving this figure).

- Extension of the system with additional functionality: often it is only found during the practical use of an application that some additional system functions would allow certain processes to be made significantly more efficient.
- Changes to the IT security concept (see below)
- Extension of the training measures: if it is found that certain user errors occur frequently, they should be explicitly addressed during the training and other educational measures (see Activity 6.2).

Provided the above-mentioned points relate to errors in the hardware and software or deviations from the specifications in the detailed concept, they must be rectified by the contractor under the guarantee.

Improvements under the guarantee

In relation to extensions for functionality that was not foreseen in the original concept, a formal change request procedure must be initiated. This may make a new tender and subsequent award process necessary. If very extensive and substantial extensions are to be made to the e-government service, it may even be necessary to run through the phase plan again as part of revised project planning.

Change requests

Revision of the IT security concept

Particular attention during the review of the results from the pilot phase should be paid to any IT security problems that have occurred. Although after the comprehensive security-specific tests in Activity 5.6 all technical gaps in security should have been closed, similar to the hardware and software errors it can also occur that certain technical deficiencies only become apparent when the system is operated under heavy load in working conditions. Examples of this problem could be, similar to that already described above for the hardware and software errors, overflows in buffers or similar that only occur in very specific conditions or when the system is under high load. If such deficiencies are found during the pilot phase, these are of course to be rectified by the contractor under the guarantee.

Possible security deficiencies in the system under high load

However, a further possible source of errors should be paid special attention, specifically the users of the e-government service. Here it is to be carefully reviewed whether the users actually use the security functions implemented in the system as intended. Often it has been found here that security features, e. g. the encryption of e-mail, are bypassed intentionally or unintentionally by the users.

Security deficiencies caused by the users

On occasion, poor user guidance in the programs results in the user making specific objective errors, although subjectively the user has the impression of having performed everything correctly. As often such security gaps do not become apparent during the tests performed in Phase 5 because the tests are not performed by “lay” users but by staff with IT skills, special attention should be paid to such “human” sources of error during pilot operation.

Gaps in security due to poor user guidance

If deficiencies are found here, then corresponding improvements in the user prompts in the client are to be implemented. A further approach for addressing incorrect user behaviour is the training and training measures (see Activity 6.2).

Improved security training

Finally, during the review of the results of the pilot operation, it is also to be checked whether any organisational processes involve security risks. For example, it could be found that during a processing step, a member of staff unintentionally obtains access to data that are not destined for that member of staff. Such deficiencies are also often very difficult to find during test operation (see Activity 5.6) and only become actually apparent under the realistic working conditions of pilot operation. In these cases the organisational processes (see Activity 6.3) are of course then to be changed appropriately.

Security risks due to organisational processes

6.8 Activity “Initial operation, maintenance and service”

Initiation responsibility: Senior management of the public agency, E-Government Team

Implementation responsibility: Persons in charge of the system, Persons in charge of organisation and technical managers

Following conclusion of the pilot phase and the review performed as part of the previous activity, the new e-government service can now be finally placed in full operation.

Initial operation

The transition from the pilot phase to the actual productive operation should generally be seamless¹. As already mentioned in Activity 6.6, from the point of view of the public agency the pilot phase is nothing more than a special “controlled form” of productive operation. The effort that is applied during this period over and above “normal logging” of the processes is used to obtain additional data material that forms the basis for the review in Activity 6.7. The transition to “normal operation” primarily means that this additional control effort is no longer required.

Transition from the pilot phase to normal operation

Changes to the application or the organisational processes that result from the review in Activity 6.7 should be designed such that they are implemented without major interruptions in ongoing operation, for instance by installing a new release over the weekend. Prior to implementing updates, it is of course necessary to also run through a test and acceptance procedure² (see Activity 5.6).

Implementation of updates

From the point of view of the external users of the new e-government service, that is the public, the transition to from the pilot phase to productive operation should be hardly noticeable. Only when operation is limited in the initial phase (strategy of step-by-step introduction of the system) does the availability of all functionality indicate to the user that the application has been finally placed in initial operation.

Transition to productive operation from the point of view of the external users

¹ The term “seamless” is here not to be misunderstood to mean “at an undefined time”. The conclusion of the pilot phase and the start of productive operation must be precisely scheduled. The transition is seamless if it is mostly unnoticed from the exterior as any changes necessary due to the review are integrated in the procedure in stages.

² Of course, the amount of effort required will in general be considerably less than the tests on the complete application described in Activity 5.6.

Maintenance and service

The IT project for the development of the new e-government service is complete when it is placed in productive operation. Nevertheless, various maintenance and servicing tasks will still be necessary in the future; these tasks will be briefly addressed here.

Complex IT applications are in general not static objects and must be changed to suit modified conditions during their lifecycle. The reasons for such changes may be:

- Changes in the law
- Changes to the hardware and the operating systems
- Version changes to the standard software and database systems
- Further development of the e-government service itself

To implement such measures, which will also in the long-term keep the application “up to date”, a controlled procedure must be implemented in the public agency. The technical changes in the DP are in general implemented by the responsible IT department. Should the capacity of this department be inadequate, it is recommended to conclude a maintenance contract with the contractor who developed the e-government service.

It is also to be defined which department is responsible for the initiation of technical changes. Here it is recommendable to follow the change management procedure already described in Activity 5.3.

Possible reasons for the need to change the e-government service

Controlled procedure for the implementation of changes

6.9 Activity "Briefing of all those concerned"

Initiation responsibility: Senior management of the public agency, E-Government Team

Implementation responsibility: Senior management of the public agency, E-Government Team, Public relations

Briefing of public agency staff

The initial operation of the new e-government service marks the conclusion of an IT project that has kept the staff in the public agency as a rule busy for a number of months (possibly even one or two years). During the planning phase, numerous decisions must be made by the senior management in the public agency and the E-Government Team with the involvement of the staff representatives; these decisions are then conveyed to the staff in one-to-one meetings, staff meetings as well as the usual communication paths within the public agency (e. g. intranet, e-mail).

Decisions when placing in initial operation often easier to understand than in the planning phase

The measures related to the initial operation of the new application should, on the other hand, have been well known to the majority of the staff for sometime. Nevertheless, a series of decisions have also been made in this concluding phase about which the public agency staff must be officially informed and that are summarised once again in the following:

- Dates for training measures
- Organisational changes: e. g. new task distribution, new staff regulations, modified procedural rules, new job descriptions
- Dates for moving existing processes as well for the migration of old data
- Dates for the start and end of the pilot phase
- Date for the start of normal productive operation

Information to the external users: public relations

Already upon conclusion of Phase 5 (Activity 5.8) the public agency should have started to inform the public in detail about the e-government service and to encourage its use. The objective was initially predominantly to win over the public for active participation in the pilot phase. At the start the number of active users of the new e-government service should still be manageable, as based on experience it takes some time until the PR measures have widespread effect. For the pilot phase this is however certainly not a disadvantage as during practical trials on the new IT application, it is generally certainly desirable for utilisation to increase slowly at first.

Advertising encouraging use of the new e-government service

After the end of the pilot phase and initial operation of the application, the PR actions for the new e-government service should be given a somewhat different accent compared to the strategy adopted in Activity 5.8. In the initial phase the issue was to convince the customers of the advantages of the online processing of

Strategy change for public relations

the administrative procedure and to win customer's confidence in the security of the online processing. While it was possible to justify this trust also in practice with a successful introduction phase with an initial "Avant Garde" of pilot users, it is now necessary to make the e-government service known to a group of potential users that is as wide as possible.

To achieve an optimal widespread effect, access to the application must be made as convenient as possible for the public. If, e. g. it is necessary to use access software with a volume of several megabytes, the public agency should also make this available free of charge on a CD to the e-government customers to save the customers the online costs for the download. As the new e-government service is placed in initial operation, this CD can be used to "push" user demand by distributing the CD in large volume as part of a special campaign as an insert in print media. The distribution of the CD should be supplemented with advertisements and information material that make the e-government service known in public and convince the public that the use of the service is personally advantageous.

**Distribution of the
access software
on free CDs**

7 Checklists

The following checklist can be used to ascertain whether all the essential results of the present phase are available. It can also be used where the above activities have been carried out in a different order or in a different form.

7.6 Checklist for Phase 6

Outcome(s)	Who?	When?	Done?
Introduction strategy defined			
Training measures have been implemented			
Organisational changes necessary due to the online processing have been implemented			
The IT environment and existing procedures have been changed over			
The old data have been transferred, new master data entered			
Pilot operation has been performed			
Review based on the experience during pilot operation has been performed			
The e-government service has been finally placed in full operation			
The e-government users have been informed			

8 Author Profile

Dr. Herbert Blum, BSI



Herbert Blum studied physics and electrical engineering at Saarbrücken University. After graduating, he moved to the University of Mainz where, in 1992, he was awarded a doctorate in nuclear physics. The many calculations he was required to perform as part of his thesis resulted in a concentration on IT-related issues. He subsequently spent several years working on large-scale IT projects in industry and the public services with a special focus on the development of client-server database applications. As a project manager, one of his achievements was to implement an electronic procurement system for Mainz University. In 1998, Herbert Blum took up a position in the Bundesamt für Sicherheit in der Informationstechnik where he was initially responsible for providing IT security training. As of September 2001, he has been contributing to the development of the E-Government Manual in the field of "application concepts and consultancy".

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