

Managing Mixed DSDM and Waterfall Projects

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1 Introduction

For the majority of this White Paper, it is assumed that DSDM is the framework of choice for the project but that there are parts of the system which are to be developed using waterfall approaches. However, there is some discussion of fitting DSDM into projects where DSDM is not the prime method of development. The assumption is also that all projects will have gone through the Suitability/Risk List when deciding to use DSDM. It is important not to fall into the trap of starting a waterfall project, ignoring the Suitability/Risk List and deciding arbitrarily that part of the system such as the user interface will be developed using DSDM.

1.1 Aim

The purpose of this White Paper is to provide guidance on managing projects which are a mixture of DSDM and waterfall approaches but which are working towards a single system implementation.

1.2 Audience

This document seeks to be of interest and value to project and IS managers who are familiar with DSDM and have access to a copy of the DSDM manual. Parts of it will also be of interest to the managers who are responsible for the non-IT staff who participate in a DSDM project.

1.3 Contributors

This White Paper was originally put together by the following people:

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The paper was updated for conformance to DSDM V.4.1 in 2003 by Jennifer Stapleton.

2 How mixed projects arise

2.1 Introduction

There are circumstances in which it may be necessary or appropriate to use both waterfall and agile techniques within a single project. There are three cases identified:

- 1) The project starts following a waterfall lifecycle but for some reason it is decided that aspects of DSDM would be of benefit.
- 2) The project starts in the expectation of using DSDM throughout but it transpires at some stage during the project that it should be done using a traditional waterfall approach
- 3) The project is suitable in part for DSDM but in another part to require a traditional approach which will run in parallel. This is classed as a hybrid project for the purposes of this paper.

In hybrid projects, it is important to have a cohesive approach to both the waterfall and DSDM developments. Hence the Project Manager and Technical Co-ordinator are responsible for both parts of the project. The integration of the two parts and their communication interfaces (both people and technical) are key to the success of these approaches.

The waterfall part of a hybrid project should be kept as small as possible. In essence, it should supply any necessary services to the business-centred work done in the DSDM stream of work.

2.2 Waterfall changing to DSDM

Experience has shown that the first of these three cases is particularly problematic, in that the change is often made for the wrong reasons – for example the waterfall approach has resulted in delays and DSDM is seen as a way of saving the day. This has led to unreasonable expectations being placed on DSDM, with the result that DSDM might receive a bad reputation within an organisation when in fact the problems were caused by the earlier failure to achieve the project's aims.

A typical reason for DSDM being an inappropriate saviour for a failing waterfall project derives from the fact that the project will have a set of requirements specified in some detail and with no prioritisation. Consequently timeboxing and user involvement, fundamental techniques within DSDM, will not work. Two options are open to such a project. Firstly some of the DSDM techniques may be of use (particularly Facilitated Workshops, possibly incremental development) – but not enough to be able to claim that the project is following DSDM. Secondly the project can be restarted as a DSDM project; it may be possible to shorten the Feasibility Study and Business Study stages, but the Suitability/Ris List must still be applied. It may well be possible to derive the bulk of the Business Area Definition from existing documentation, but in order for timeboxing to work, the requirements listed within it must be prioritised. The System Architecture Definition can probably be generated quickly from the existing waterfall documentation (e.g. an existing System Specification), while the Development Plan will need to be

started afresh, making sure that the various prototypes are properly identified and scheduled. The contents of the Risk Log (after updating on the basis of the new approach being used) may be still valid. Essentially, however, the project is being restarted from scratch as a DSDM project.

2.3 DSDM changing to waterfall

Given the nature of DSDM, it is possible to change over to a waterfall lifecycle for part of the project at virtually any time. At the early stages of the project, application of the Suitability/Risk List may highlight that part of the project is unsuitable for DSDM (for example because of a lack of user involvement/availability or because of computational complexity becoming apparent). Analysis of potential risks will highlight circumstances under which it will be necessary to transfer development from DSDM to a waterfall approach. These “de-commit criteria” should be clearly identified and monitored throughout the project. The need to de-commit from DSDM usually arises because of consistent failure to apply one or more of the DSDM principles despite all efforts to do otherwise.

At later stages, monitoring the risks affecting the project may show up a similar problem for all or part of the project. The work involved in changing over depends on the particular waterfall lifecycle model being followed, but it can be expected to include specifying requirements in more detail and possibly reverse engineering design documentation from developed prototypes.

Even if the whole project changes over from DSDM to waterfall, it is strongly recommended that the DSDM Increment Review Document should still be produced. If only part of the project moves over to waterfall, the remainder of the project can then proceed as a hybrid project, as discussed in the next section.

2.4 DSDM and waterfall throughout

It is assumed that DSDM is the framework of choice for the project, and the need to use waterfall arises solely because the application of the Suitability/Risk List has identified part of the project for which DSDM is unsuitable. It is critically important that the interfaces between the DSDM part of the project and the waterfall part are carefully defined; the parts should be decoupled as much as possible, to minimise the potential impact of one on the other. It may be difficult for the waterfall part to accommodate any impact caused by the rate of change inherent in the DSDM part, while the DSDM part may be impacted by any failure of the waterfall part to achieve promised delivery dates. These impacts must be fully understood at the outset and carefully monitored thereafter.

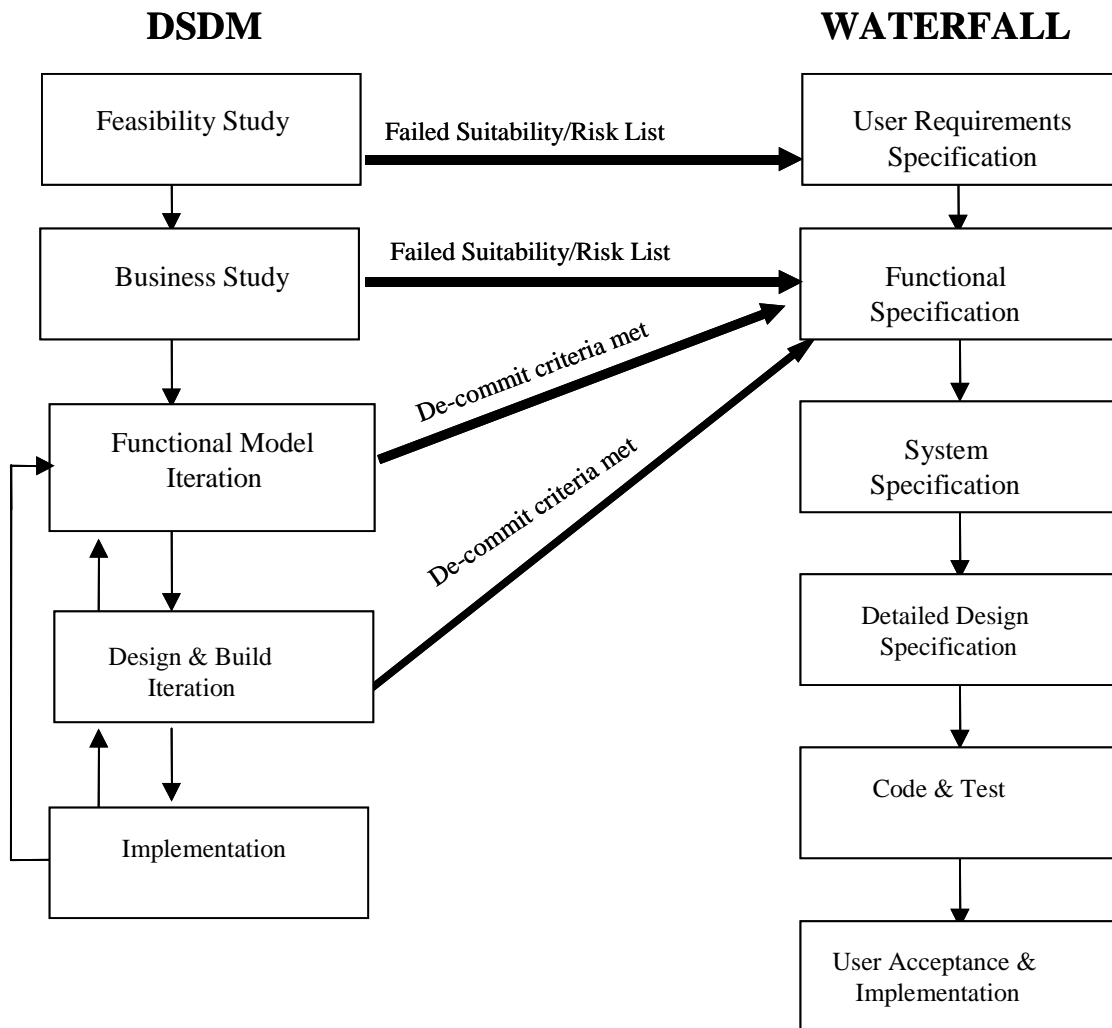
The obvious problem is that the delivered functionality from the DSDM part is not set in stone and this may impact the waterfall part which may

- 1) Require functionality from the DSDM part which is not delivered
- 2) Supply functionality to the DSDM part which cannot be used.

Decoupling the two parts as much as possible alleviates these two risks but they must be managed.

3 Points of cutover

3.1 Cutover from DSDM to waterfall



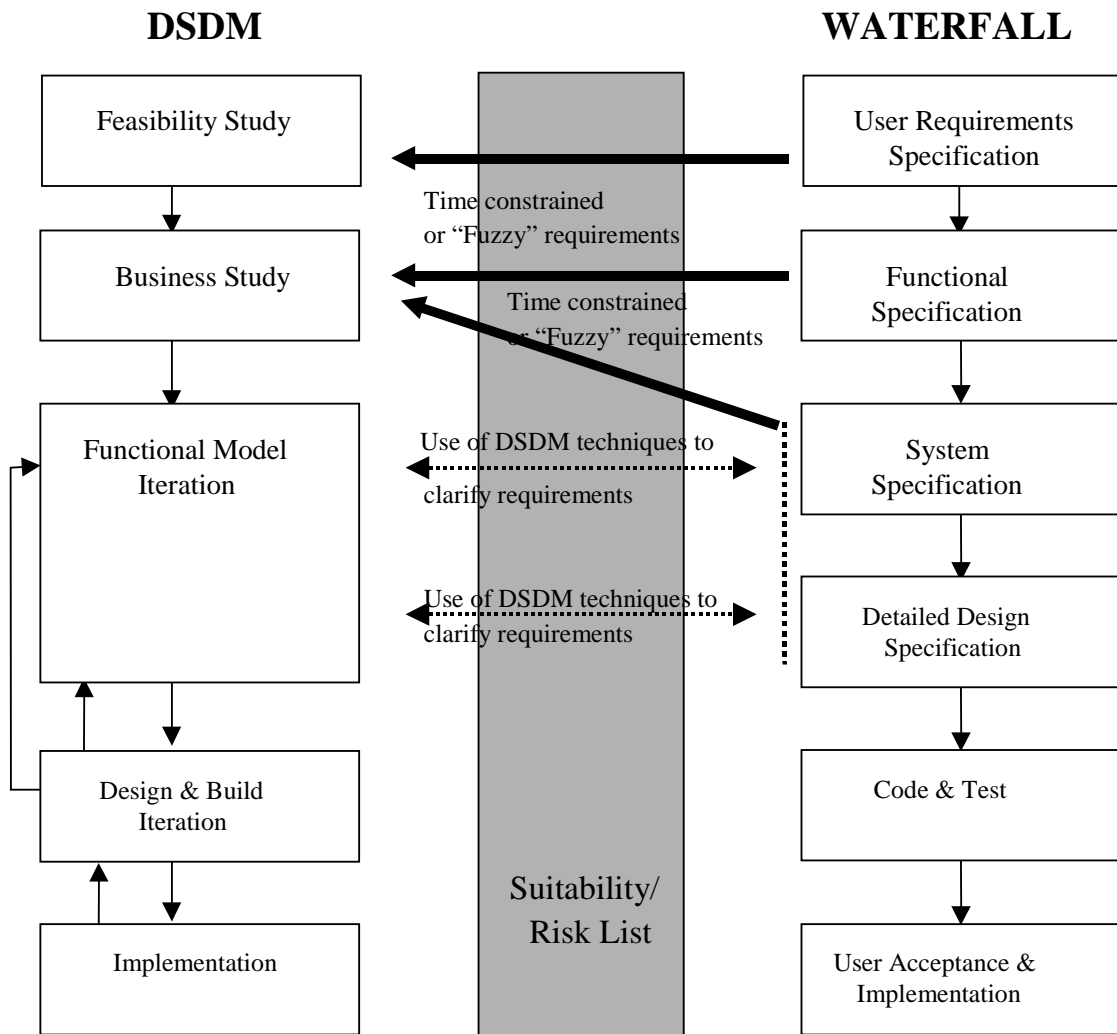
There are a number of cutover points going from DSDM to waterfall.

- 1) At the end of a Feasibility Study if the project fails the Suitability/Risk List. There should be sufficient information to convert the Feasibility Report into a Scoping Statement. The Feasibility Prototype (if produced) can be kept as required but the Outline Plan should be replaced with the appropriate plan that is required by the waterfall method being used.

- 2) At the end of the Business Study if the project fails the Suitability/Risk List criteria. The Business Area Definition provides the basis for a full Functional Specification. The Systems Architecture Definition forms the basis for the System Specification. The contents of the Prioritised Requirements List transfer to a Requirements Specification, which will need to be refined for the purposes of waterfall development. The Development Plan should be replaced with the appropriate plan that is required by the waterfall method being used.
- 3) During the Functional Model Iteration or the Design and Build Iteration, the decision will be made to abandon DSDM if any of the de-commit criteria identified during the Business Study are met. In this case, development should cutover to the System Specification stage of the waterfall lifecycle. This is the safest transition point available since it is necessary to re-plan and specify the system using the entire Prioritised Requirements List. The work done to date, such as the functional models, developed software and review documents, can and should be used as input in the production of the specifications. Any software already developed can be re-used to minimise the development timescale. The procedures and policies of the organisation(s) involved in the project relating to a de-commit scenario should be formulated either in advance of the whole project or during the Business Study.

There is no option to cutover after the design and build stage during implementation where there is a tested/delivered system, as there is no advantage to be gained.

3.2 Cutover from waterfall to DSDM



Whenever a cutover is considered the Suitability/Risk List must be applied rigorously to ensure that the cutover is safe.

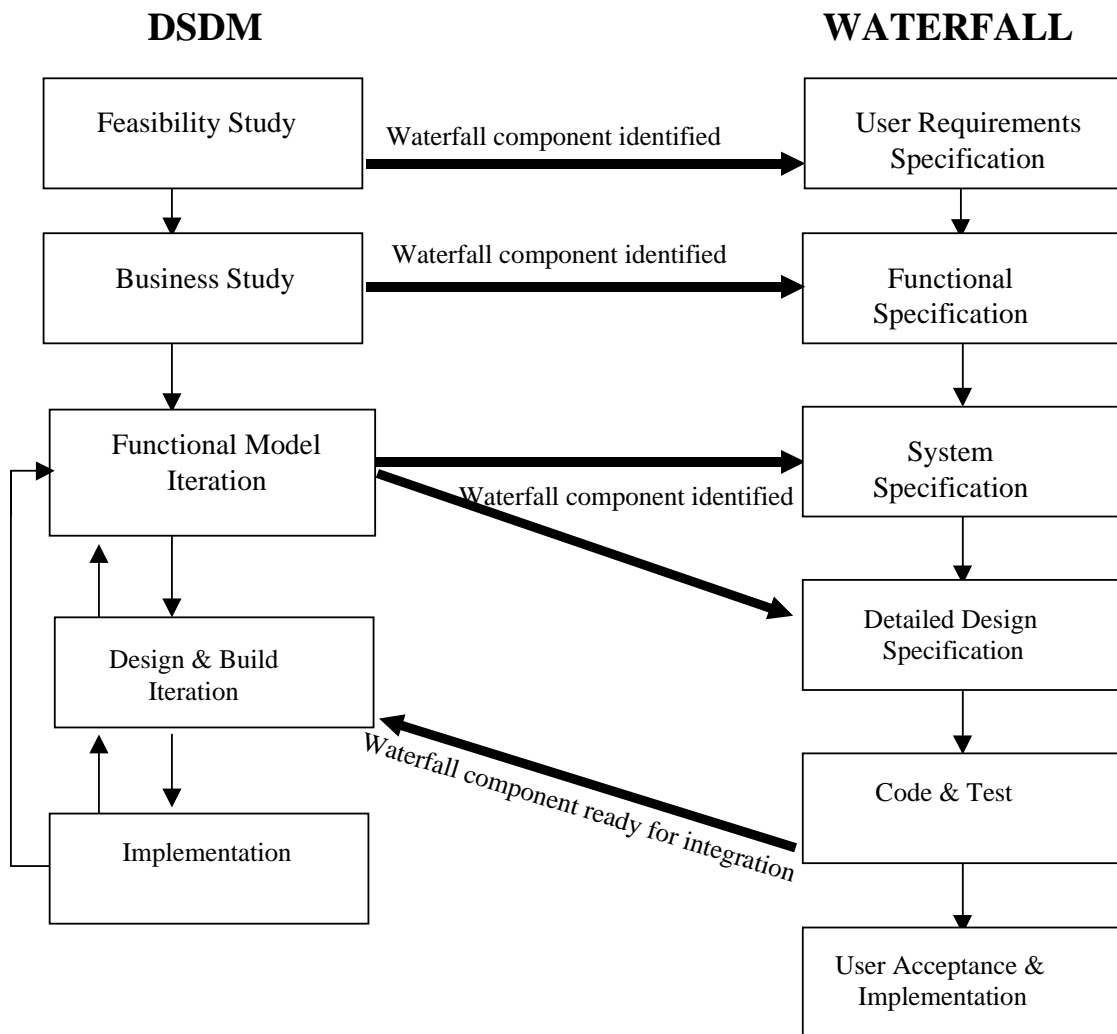
The opportunities to switch from waterfall to DSDM are fewer than for DSDM to waterfall. They fall into two main areas that are detailed below:

- 1) *There is a time or resource constraint or the requirements are “fuzzy”.* This can occur at a number of points during the waterfall lifecycle with the first being at the end of the User Requirements Specification stage. This is a “fairly” clean cutover point with only completion of the Suitability/Risk List along with an Outline Plan to be added to “convert” the User Requirements Specification into a Feasibility Report. It may also be possible to produce a first-cut Prioritised Requirements List, the scope element of the Business Area Definition and possibly a first-cut System Architecture Definition, depending on the requirements collected. The second cutover point is either at the end of the Functional Specification stage or at any time during either the System Specification or Detailed Design Specification stages. These cutover points require going to the later stages of the Business Study to estimate the functional elements and to create a Prioritised Requirements List and an Outline Prototyping Plan. It may be necessary to create a Systems Architecture Definition at this stage as well, if the waterfall development has not already produced the system architecture.
- 2) *DSDM techniques can be used to clarify requirements.* These are points of cutover and back where facilitated workshops and prototypes (normally business and usability) might be used to fix the requirements. This could be because the users are not sure of their needs or they are not prepared to sign off a traditional specification since they do not wish to commit themselves without “proof of concept”. Any prototypes produced for requirements clarification before Systems Specification will not generally be robust enough to be regarded as evolutionary.

If there is pressure to transfer to DSDM during Code and Test because of the timescale that the project is working to, the “cutover” should never be considered as a switch to DSDM. Certain techniques can be used to deliver more quickly but that is all they are - techniques – not DSDM. Useful techniques could be facilitated workshops to decide on the real imperatives for delivery or application of the MoSCoW rules to decide what must be delivered on the due date or to prioritise testing activities.

4 Hybrid DSDM and waterfall projects

Hybrid projects are divided into subsystems which focus on business and user-centred aspects and subsystems which focus on the supply of services which must be complete for an increment to be satisfactorily delivered. Such services are usually well hidden from the users and are unlikely to benefit from the strong user involvement which is inherent in DSDM.



There are a number of points at which it may be decided to move a part of the system over from DSDM development to waterfall development.

- 1) During the Feasibility Study, it becomes apparent that part of the proposed system would be more suitable to waterfall development. This is particularly true when integrating a new system with existing systems, for example it is often known very early on that particular interface elements will need to be in place for the integration to be successful.

- 2) At the end of the Business Study, a set of requirements is identified as being most suited to waterfall development. (An example of this might be a complex calculation.) There should be sufficient information in the Business Area Definition, the System Architecture Definition and the Prioritised Requirements List to commence the System Specification for the identified waterfall element. The Business Area Definition will probably need more detail added in order to provide the level of detail required for specifications to be adequate for the waterfall elements.
- 3) During the Functional Model Iteration or (less likely) the Design and Build Iteration, part of the system may be identified as more suitable for waterfall development than DSDM. A decision will need to be made to go to either the System Specification or Detailed Design Specification stages depending upon the nature of the work to be done and the amount of detail that has been gathered during the Functional Model Iteration. This decision will generally be a judgment call on the part of the project manager, team leader, the developer(s) working on the area involved and the technical coordinator. All previous work on the identified part should form the basis for further waterfall development.

Identified waterfall elements would be expected to “cut back” at the design and build stage of the sub-system that would use them. This is necessary so that a well-tested system can become a Delivered System at the appropriate point. The decision about when the waterfall elements need to be integrated will depend on their MoSCoW priority within the overall development. They may wait for integration in a later increment if this is possible, in order to minimise delays in delivery.

The waterfall development will need detailed “mini-specs” to progress safely through the lifecycle. Therefore the management of the development process may need to be adapted to allow the identified waterfall element(s) to proceed without the usual full User Requirements Specification, Functional Specification or System Specification that would normally come before the stage at which they cut over. Each element will have some level of specification at the point at which the need to cut over is identified.

The rest of this paper addresses this type of project.

5 Cultural Issues

Most of the cultural issues are particularly relevant to the users in the project, who will experience the different cultures, and to the project manager who must manage the different approaches.

Some of the misunderstandings that may arise due to the two development approaches could be alleviated by training the waterfall developers in DSDM, possibly at DSDM Awareness days during the early stages of the project. Conversely, the project may be the first time that the users have been involved in an IT project. They will usually have received DSDM training in order to understand their roles and responsibilities and the way that the project will depend on their skills and judgment. It may be necessary to make them aware of the way waterfall projects operate as well.

5.1 User Issues

The user issues arise because the users are inside the DSDM development and outside the waterfall development.

- Users may find it difficult to handle the different levels of requirements specification that are requested of them from the two streams of development. It may be hard to understand why vague requirements are acceptable to one set of developers and not to the other.
- The differences of user/developer interaction styles could be very marked. The interaction between users and developers should be co-operative and dynamic for the DSDM team but may be more defensive on the part of the waterfall team.
- The users will also have to have two mindsets as to what they should look for in products. When the users are initially shown a DSDM prototype, they must accept that it is not perfect. It might be easy to find faults and it may be buggy – but the point of the evaluation is to think about the business functionality. In contrast when users see waterfall elements (for the first time, this is often in user acceptance testing), they will be expected to be more concerned with the errors that they see. The difference in testing approaches needs to be made very clear.
- Integrated testing may cause problems. The users should not expect to be able to reject the system at the end of the project. They should be encouraged to accept the system incrementally, including the waterfall elements before they are integrated with the DSDM work. This approach to acceptance may be endangered by the fact that they have to wait for the integration of the two streams of development before a full view of the increment is possible.
- The users may well see two very different responses to requests for change from the different teams. This can cause confusion as to procedures etc and can cause the users to be unsure as to where their power to influence the direction of the project starts and finishes.

- Frequent delivery from the DSDM team means that users will see frequent system change and will need to be able to accommodate that change with new working practices, frequent but small training sessions, etc. They will not have the same demands made on them by the waterfall team. This could lead to some conflict of preference about what the users would like to see happen at any one point in the project.

5.2 Project Management Issues

- The different approaches to development will require two different styles of communication to the project board or steering committee. It is likely that the waterfall part will be reported against the planned activities whereas the DSDM part will be reported against the requirements. The speed of change in the DSDM work may seem chaotic when reported beside the formal steps in the waterfall process. Moreover the higher management will probably need to meet more frequently for the DSDM part than for the waterfall part in order to keep abreast of the status of the project. As always, the project manager will be responsible for setting and managing their expectations throughout.
- User involvement spilling over from the DSDM team into the waterfall team can cause problems because of the different personal focus of some waterfall developers. Also waterfall developers have been used to pressure coming from only one person, their immediate manager. The project manager may find it necessary to “protect” the waterfall developers from what they see as intrusion from the users.
- Developer envy in both directions. Waterfall developers feel that they are not being allowed to use the latest technology. DSDM developers are jealous of the perceived freedom of waterfall developers to participate in activities outside the current project.
- The different approaches to handling change requests.
 - The Project Manager needs to be very clear what a change request is: a change to something that has been previously agreed. This is more obvious in a waterfall project, whereas change is embraced by DSDM. However work that has been agreed from a much earlier timebox should not be changed without questioning the validity of the change.
 - Change requests that straddle the boundaries of the DSDM and waterfall teams need very clear procedures. It needs to be made clear for the project (either in the Quality Plan or in accordance with local practices) who agrees that such a change request will be accepted and the action that will be taken.
- DSDM teams are empowered to make quicker decisions, whereas the waterfall developers will be more likely to wait for decisions to be made before progressing. This can impact the ease of monitoring the progress of the two streams towards an integrated solution.

- Requirements management will be different for the two streams. The methods of traceability, etc. should be the same for both styles of development, but other areas of managing require modification between the two parts. For instance, the possibility of having requirements unclear and unsatisfied at the end of a DSDM increment should not cause any problems. It may be easier to manage the “clean finish” of the waterfall work but this should not force the project manager towards adopting the same approach in the DSDM work.
- Early waterfall testing (i.e. pre-integration of the two parts) may need to use DSDM elements. It is easy to freeze waterfall code for a period of testing but may not be as easy to freeze the DSDM bits that it needs because of the flexibility that DSDM requires. Wherever possible the DSDM parts should be left out of any waterfall testing activities.
- It may be necessary to hold separately managed libraries of configuration items in order to allow the more frequent change that is required in the DSDM part. At the very least a different approach to configuration management is likely, where the waterfall items are placed under configuration management much later in their development life.
- A common Risk Log should be kept. There are risks that are common to the whole project, risks that are specific to one or other of the lifecycles and risks that relate to the dependencies between the two.
- An important decision to make early on in the project is what to do if the waterfall team eats up the cost of the project. DSDM works with a fixed team for a fixed time and budgeting is therefore somewhat easier. However, if the project funds are dissipated as the waterfall team strives for completion of its 100% solution, the decision has to be made as to whether or not functionality will be lost from the DSDM stream of development.

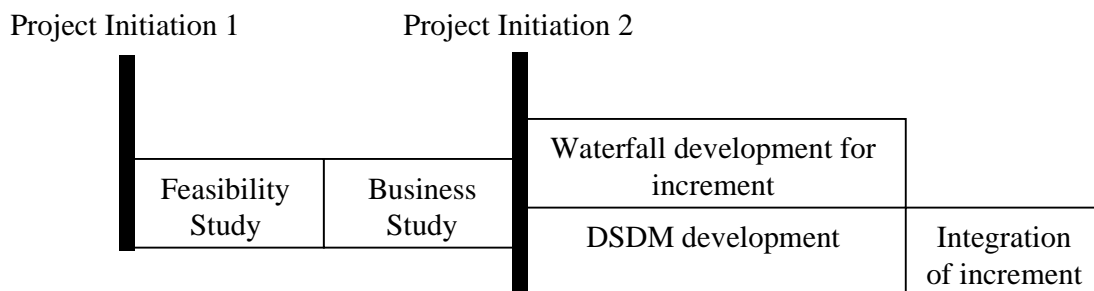
5.3 Organisation Management Issues

- It is strongly recommended that the organisation has a mentor when using DSDM for the first few projects. This becomes even more critical if an early project is a hybrid of DSDM and waterfall approaches. It can be very difficult to eliminate “waterfall thinking” in early dedicated DSDM projects: this becomes even more difficult if the lifecycles are co-existing within the same project.
- It is important that all developers are aware of the rules of the two different approaches. To achieve this, awareness training for both types of development could be provided. Alternatively, staff could spend some time in “the other camp”, if their skills can be used effectively there.
- Some organisations may find that the close working of the two team types leads to waterfall developers being so impressed by the enjoyment experienced by the DSDM team members working in a self-directed way, that they are clamouring to work on DSDM projects in the future. The converse is also possible, i.e. that “burnt out” DSDM staff want to move away from DSDM to a waterfall style of development

where the pressure to deliver is not so continuous. Both of these require careful management if the two styles are to co-exist successfully.

6 Project Initiation

Project initiation in a waterfall project usually encompasses most of the activities undertaken in DSDM up to the end of the Business Study. DSDM projects are usually under way on more scanty information available at the end of the Feasibility Study. This means that, for a given organisation, there are usually two approaches to project initiation: one for DSDM projects and one for waterfall projects. Given this scenario, if it is envisaged that a project is to be a hybrid, it could be useful to partition the DSDM project into two “projects”, one for the Feasibility and Business Studies, and one for the rest of the work as shown below.



Key points to consider when initiating hybrid projects include:

- *Empowerment.* For the workshops in the Business Study to be successful, all participants must be empowered to make decisions. It may be necessary to clarify for those participants who will be moving on to develop the waterfall part that such empowerment is only for the duration of the workshops. Experienced DSDM teams will expect more empowerment during the Business Study than traditional development teams.
- *The amount of information needed to accurately estimate the effort for the waterfall element when the requirements are generally fuzzy.* It may be necessary to extend the activities of the Business Study for longer than usual for the purpose of gaining sufficient understanding of the effort required for the waterfall element. It is essential to get the estimate as accurate as possible so that the delivery date that the project guarantees to meet is not endangered.
- *Delivery dates.* Every DSDM project should assess its risks against the Suitability/Risk List and any potential showstoppers will form the project’s “de-commit criteria”. These criteria are the circumstances under which DSDM cannot guarantee to deliver on time. If a project has a significant waterfall development running alongside the DSDM work, one of the de-commit criteria should be the late delivery of the waterfall element.

These are all specific examples of the risks from one type of development transferring to the hybrid approach. Care should be taken to ensure all possible risks from both types of development are considered for their applicability in a hybrid project.

A major part of project initiation is that of gaining approval for funding. This brings in the perennial issue in DSDM of fixed price versus fixed effort cost. In other words,

DSDM projects work to a cost for the effort required to deliver a working system that meets the requirements of the business at the time of delivery rather than quoting a fixed price for satisfaction of all the requirements stated at the start of the project. There needs to be agreement as to what will be acceptable by the end of the project: DSDM's "what you really need" versus the waterfall's "what you asked for in its entirety". On the basis of such agreement, a fixed budget can be agreed for the work. The project initiation process must be clear as to the expected outcome of the project.

7 Project Structures

7.1 Project Board

There will need to be a single Project Board covering the DSDM and waterfall development. This will require a difference of focus for the various project components. The major differences will be in accordance with the third and fourth principles of DSDM. Namely:

- The DSDM development will focus on achievements rather than tasks.
- The DSDM development will report against business benefits achieved rather than percentage of work complete.

There will also be a difference in monitoring progress with timeboxes completed being used in the DSDM part and the critical path being watched in the waterfall part.

For the potentially conflicting methods of monitoring and controlling the project to be successful, the Project Board should be made aware of the management philosophy of DSDM and should be fully committed to it. This is particularly important if the project started out as a waterfall project.

It is unlikely that the Board will have to sign off each DSDM phase as it is completed. Nor will they be asked to decide on minor changes of direction.

The Visionary will be on the Project Board, but is probably actively involved in the project more frequently than other Project Board members. As always in a DSDM project, participation by the Visionary in all key workshops is essential for the success of the project. However, the control of waterfall elements will be largely through participation in the Project Board.

7.2 Roles and Responsibilities

This part highlights additional/different responsibilities from those given in the DSDM manual.

7.2.1 Visionary

If the waterfall element is a reasonably large part of the overall project, the Visionary will sign off the Functional Specification for the waterfall development and will not normally be strongly involved with its subsequent development until User Acceptance Testing of the integrated elements.

7.2.2 Ambassador User

The Ambassador User role will cover both the DSDM and waterfall arms of a hybrid project. The role will be responsible for the detailed verification and validation of the waterfall Functional Specification, if all the material is contained within the business area from which the Ambassador User comes. If not, the users who are competent to review the content of the Functional Specification should become Advisor Users to the DSDM development team(s).

7.2.3 Project Manager

A major responsibility is to manage the interfaces between the DSDM and waterfall teams.

There should be a single project manager who will be responsible for all aspects of the project, both DSDM and waterfall. The majority of project management effort will be spent on the DSDM part of the project given the nature of the role, attending daily wash-up sessions, if the project is using them. The project manager will also set up a traditional hierarchical management structure for the waterfall part of the project, which will have a project leader and/or team leaders as appropriate for the size of the work being undertaken. The project manager will attend the regular team/project meetings, at the appropriate level, of the waterfall part of the project and in so doing will have full control over all aspects of the project.

In order to carry out this role, the project manager will primarily be an experienced DSDM practitioner but should also have experience of traditional waterfall development. The individual concerned will need to be flexible and competent to enable him or her to switch between the different methods and styles of working and to keep the two aspects of the project working towards the common goal. There are different skills required for waterfall and DSDM project management; it is essential that the project manager has experience of both styles of management. If not, a project mentor could be made available to help out as required.

The Project Manager should monitor the progress of the waterfall development very carefully. If there is any slippage, it will make it difficult to deliver the current increment on time.

7.2.4 Technical Co-ordinator

The technical co-ordinator will become the 'guardian' of the technical interface that exists between the products of the waterfall and DSDM teams. The holder of this role will be involved in the earliest stage of the whole project working to define those interfaces, the aim being to reduce dependencies between the teams as far as possible and hence reduce the delays and frustrations such interdependencies could cause. He or she will be the first person to be aware that a technical issue has arisen within one team that could affect other development teams. This combined with the predicted tensions, which may exist between the different team cultures, makes it especially important that the technical co-ordinator is a good communicator and has facilitation skills. Ideally the technical co-ordinator should have experience of working within waterfall and DSDM teams. It is important that the technical co-ordinator should be seen to be impartial, and does not devote more time and effort to the technical issues of one team to the detriment of another.

7.2.5 Developer and Tester

Developers and testers can switch between the DSDM and waterfall parts of the project but they should never be expected to work in them simultaneously, because they will not be able to focus effectively on the timebox to which they have been assigned.

8 Inter-team working

8.1 *Managing requirements*

Requirements identified in the DSDM team for waterfall development need to pass out of the DSDM team as soon as possible. The highest priority of the waterfall development team is to have a detailed investigation of such requirements to “nail down” what needs to be done by the waterfall team. Any requirements that are amenable to DSDM should be handed back to the DSDM team as soon as possible so that they can be accommodated in the DSDM work plan.

The approaches to traceability of requirements may be different in the two streams of development. It is important that the different approaches should not be allowed to damage the work of either team. The waterfall team will have to demonstrate full traceability of requirements through to the finished product, whereas the DSDM team will have requirements that may not have been satisfied, but which have been agreed for later delivery (perhaps never).

8.2 *Working environment*

The physical location of the DSDM and waterfall teams needs to be managed carefully. The message is “collocation with an element of segregation”. The teams need to operate effectively as one project but the different modes of working can be counter-productive if teams are too close. Teams should be as close as possible for good inter-team communication. However, the DSDM teams will have different requirements for their working environment. Sessions between DSDM Developers, Testers and Ambassador Users can be quite noisy and so disturb people working nearby. The best solution is to have a dedicated room for such sessions.

8.3 *Keeping the teams working*

A problem that often arises in hybrid projects is that of DSDM teams being idle as they wait for the waterfall teams to deliver. This arises because of the nature of the work requiring a waterfall approach, i.e. it must all be delivered or it is useless. The project will want to keep the developers on the project so that other useful work must be provided. They can be used to supplement the resource available in the waterfall team if they have the right skills. This needs to be managed sensitively, so that the waterfall developers are not made to feel that they are laggards who need assistance from the “hot-shot” DSDM team.

8.4 *Integration of work*

The waterfall part should be passed back to the DSDM team as a fully tested “black box” for integration testing. This means that acceptance testing of the waterfall part is complete and then handed over to the DSDM team. This is a change to the normal practice in waterfall developments where integration testing is done before acceptance testing. The acceptance testing should be done by the relevant “customer”. For instance, if the

waterfall work produces a business element (such as a complex calculation), then it should be accepted by the users. If the work is done for technical reasons (such as supplying a part of the system infrastructure), then it should be accepted by the Technical Co-ordinator.

Testing the integration of the DSDM and waterfall elements will be a Must Have for a Design and Build timebox and will be the responsibility for the Tester role. The designated timebox should be scheduled at a date that will allow for some slippage of the waterfall element. If the waterfall element is delivered early, then advantage should be taken of this and the integration testing undertaken as soon as possible.

9 Project Products

9.1 General

9.1.1 Quality Plans

Many system development organisations will require that a Project Quality Plan (PQP) be written for each development project. The PQP identifies:

- the project's products,
- the lifecycle to be used in their production,
- the approach to be taken to validation,
- the procedures and standards which are to be applied.

Project Quality Plans may go under some other name (such as Project Management Plan), or may for larger projects be split into several separate documents (e.g. addressing testing and/or configuration management separately) but the above points should all be addressed somewhere.

It is strongly recommended that any hybrid project should have a single Project Quality Plan (or equivalent) which specifically and explicitly addresses the issues surrounding the two different approaches and the interfaces between them. The document should not follow any rigid specification of its contents; it should however address those issues which arise from the presence of two different approaches.

9.1.2 System Documentation

The project should use the DSDM concept of Core Models and Support Models to decide the level of documentation required for the hybrid project. The tomes of documentation often required by waterfall projects should not be allowed to impede the progress of the DSDM part of the project. The focus should be (as always in DSDM) on documenting enough and no more. This is largely decided by what is needed for maintenance and support purposes.

9.1.3 Functional Model versus Functional Specification

The Functional Model from the DSDM part has a different audience from the Functional Specification produced for the waterfall element so they are constructed differently. The two sorts of "specification" should be kept quite separate otherwise either the nature of the Functional Model will be perverted through waterfall influences or the Functional Specification will not satisfy the needs of the waterfall development team. The two products should be clearly defined in Product Descriptions in the Quality Plan, together with the appropriate methods for their acceptance (incremental for the Functional Model and one-off review for the Functional Specification).

9.2 DSDM Products

Note: Only those products that will be affected by the hybrid development are discussed here.

9.2.1 Feasibility Report

If it is known this early in the project that a hybrid approach is necessary, then a risk to address specifically in the Feasibility Report is that of potential delay to delivery of the proposed system. This will be due to the nature of the work being undertaken in the waterfall part of the project.

The report should make clear why part of the project is not amenable to DSDM. This should relate to the Suitability/Risk List, which is addressed as a standard component of the Feasibility Report.

9.2.2 Feasibility Prototype

This optional product can be very useful as a proof of concept for the part to be developed using a waterfall approach. This is a prime example of using DSDM techniques to help the waterfall development move forward at the speed required.

9.2.3 Outline Plan

The split between the waterfall and DSDM parts of the project should be made very clear, as they will be monitored differently throughout the project.

9.2.4 Business Area Definition

There is very little impact in the content of the BAD but reference should be made to the services and calculations to be developed further in mini-specs for the waterfall development.

9.2.5 System Architecture Definition

This document needs to contain detailed definitions of the interfaces between the DSDM and waterfall elements to ensure that they are well understood by both sets of developers. Particular care should be taken with the **minimum usable interface**. The minimum usable interface defines the very least that will be acceptable for the elements to work together and to provide a system that will provide the minimum usable subset of requirements (the Must Haves).

If the hybrid nature of the project is discovered after the System Architecture Definition has been produced, it will need to be revisited.

9.2.6 Development Plan

The Development Plan should clearly show which parts will be developed using DSDM and which will be developed using a waterfall approach. This includes showing where completed work will be handed over to the team responsible for testing the integration of the system. It is necessary to show who is responsible for integration testing and when it will take place.

There may be a need to have a different emphasis in the testing strategy for the two parts in terms of depth and coverage. If the waterfall approach has been deemed necessary then it is very likely that a partial solution is not acceptable for that part of the project. This could mean a difference in the style of test records to ensure as full coverage as is possible. Every attempt should be made to keep the test documents, prototype review records as light as possible for the DSDM work.

The Project Manager should consider including a Service Level Agreement with the waterfall team leader(s) for delivery of the relevant parts, since it is likely that they will be on the critical path of the project.

9.2.7 Prioritised Requirements List

There is no impact on the content of the Prioritised Requirements List. There should be a common requirements list covering both styles of development. Since care should be taken to specify the necessary interfaces, it may be useful to have them available across the project using the PRL.

9.2.8 Functional Model

The Functional Model should have “stubs” in the diagrams, text and prototypes to allow for the future integration with the waterfall elements.

9.2.9 Implementation Plan

Particular attention needs to be paid here on the integration of the DSDM and waterfall elements.

9.2.10 Risk Log

The key risks to consider in a hybrid project include:

- the time to deliver
- the impact of changing requirements on the waterfall development. Such changes are expected to arise as the DSDM team gains a greater understanding of what the business requirements mean, rather than from changes occurring in the business.
- The possibility of the two parts not integrating
- Culture clashes.
- Please see the rest of this paper for further risks to consider.

9.2.11 Tested System

Where the project is largely DSDM with a smaller waterfall element, it would be a good idea to include the integration of the waterfall deliverable into a timebox that the DSDM team intends to devote mainly to testing. The waterfall team should be kept within the project until the Ambassador User is happy that all elements are working together. In this way, errors can be corrected quickly. After that, the waterfall team may disband or move on to another project. If that happens, then the DSDM developers need to be confident that they can maintain the system either by receiving training/documentation from the waterfall developers, or having a maintenance agreement with them.

The correctness of the interface between the two parts is the responsibility of the Technical Co-ordinator. If errors arise in the interface, the Technical Co-ordinator will decide who should correct them. Errors that occur in either the DSDM part or the waterfall part are the responsibility of the relevant teams.

If the waterfall development suffers slippage that will endanger the achievement of the Tested System, it may be necessary to sacrifice more of the DSDM functionality than would otherwise be necessary. This will enable effort to be transferred from the DSDM stream of work to the waterfall development.

9.2.12 User Documentation

Ambassador Users should be able to produce excellent system documentation during the project because of their heavy involvement in the DSDM project element. If the waterfall element requires user documentation too, this will prove more difficult to achieve. In these circumstances, the project plan should allow for the Ambassador Users to spend time with the waterfall developers and the new system so that they can gather all the required information before the final product is needed for the Implementation stage.

9.2.13 Delivered System

The delivered system will pass into maintenance. It is recommended that the waterfall element is maintained in a waterfall approach and the DSDM element is maintained using the approach defined in DSDM's Post-Project phase.

10 Glossary

Mixed project	Any Project where DSDM has been used as well as a waterfall method, though not necessarily at the same time.
Hybrid project	A project where part of it is running as a waterfall project at the same time as another part is running as a DSDM project
De-commit criteria	A situation that, if encountered during the project, would reverse the decision made to use the DSDM methodology.
Cutover points	Points during the development of a system, where a decision could be made to use an alternative method.
Project	Throughout this document, a project refers only to development work.
Project Board	High-level decision-making body concerned with overall project planning and direction.
Waterfall	A lifecycle that progresses from specification, through discrete steps to code and test and then acceptance.
Quality Plan	A document stating how the development will be carried out and what level of completeness needs to be achieved.
Stubs	Area of a system or document that has no real content but represents something that will exist in the future.
Minimum Usable Interface	Defines the very least that will be acceptable for the components to work together and to provide a system that will provide the minimum usable subset of requirements.
Mini-specs	Specifications for the areas of the system to be developed using a waterfall methodology. These will be smaller than the specs usually produced within this methodology as they are only for part of a system