

# DSDM and Process Improvement

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# 1 Introduction

This paper provides a process that can be used to introduce, customise and improve the use of DSDM or similar processes in an organisation. The process used to improve such processes is the DSDM process itself.

The introduction of DSDM into an organisation requires careful management. This involves an assessment of the organisation's current development capability and identifying what key process areas need to be improved to gain the maximum benefit from DSDM. This paper is intended to assist in this.

The process described in this paper is generic and can be used for any process improvement from major initiatives to small changes. It is not confined to the application and improvement of DSDM on projects.

## 1.1 Audience

The primary audience for this paper is:

- the central group in an organisation responsible for process improvement
- the programme or project support office
- the group responsible for methods and standards.

The secondary audience is project managers, developers (this includes all team members), and staff responsible centrally for quality assurance, metrics and estimating.

## 1.2 Contributors

This White Paper was originally written by a Task Group reporting to the Technical Work Group. The following people made active contributions and comments.

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The White Paper was updated in 2003 for conformance to DSDM V4.1 by Jennifer Stapleton.

## 1.3 Section Structure

Chapter 2 provides an overview of DSDM for Process Improvement.

Chapter 3 discusses briefly how the DSDM principles apply to process improvement. It also provides a very useful set of additional principles which will assist in identifying where to focus activity and to monitor that the activity is not veering from the correct path during development and enhancement of development processes.

Chapter 4 describes the DSDM for Process Improvement lifecycle, looking at the objectives of each phase and providing guidance as to how to achieve those objectives.

Chapter 5 looks at the normal DSDM products and defines any changes necessary for process improvement activities. Some new products are added.

The process and products defined in Chapters 4 and 5 need people. Their roles and responsibilities are defined in Chapter 6, together with some key groups that should be set up for major process improvement initiatives.

Process Improvement relies on people working effectively: this needs infrastructure. The software process infrastructure is discussed in Chapter 7.

Chapter 8 provides a Suitability/Risk List to be used before and during process improvement work.

There are numerous references throughout this paper to the Capability Maturity Model (CMM) and SPICE. Appendices A and B contain brief overviews of these two process assessment approaches.

## 2 Overview

The lifecycle and products presented in detail in Chapters 4 and 5 are adaptations of the lifecycle phases and products in the DSDM manual for use in process improvement activities. The description is intended to be scalable from small process improvements to full scale initiatives, including the introduction of DSDM across an organisation.

The first step as always is to assess the risks using the Suitability/Risk List. A Process Improvement Suitability/Risk List is given in Chapter 8. This is a modification of the Suitability/Risk List in the DSDM manual to focus on the questions needed for process improvement. Many questions are the same but their rationale is explained differently.

As in DSDM for development projects, the Feasibility Study should be kept as short as possible, since the main foundations are laid in the Business Study. The Process Improvement Feasibility Study assesses the current position with respect to the quality of processes in existence in the organisation including their (measured) outcomes. On the basis of this assessment, it goes on to scope the possible process improvement activities if the business case for improvement activity is sound enough. The main product as always is the Feasibility Report. A Feasibility Prototype is unlikely to be useful in process improvement, unless there is a need to provide a proof of concept for the technical infrastructure to support process dissemination across the organisation.

The Business Study takes a high-level view of the processes which need to be introduced or changed. It prioritises these processes in order of their benefit to the organisation and establishes measurable targets for improvement. Having identified who should be responsible for the development or enhancement of the processes, a Development Plan is produced for the development of the processes, together with any necessary deployment platforms. The structure of process improvement teams to carry out the plan together with the related roles and responsibilities is discussed in Chapter 6. As always, the Visionary role is an important one in keeping the focus of the work aligned to the needs of the organisation.

As usual in DSDM, facilitated workshops should be used as much as possible during the Feasibility and Business Studies to gain understanding of the issues across the development community and to achieve consensus on the direction needed to address those issues.

During the Functional Model Iteration, first-pass descriptions (Functional Prototypes) of the new or changed processes are produced for refinement and trialling (Design Prototypes) on pilot projects during the Design and Build Iteration. Throughout the development and trialling of processes, feedback is used to evaluate and refine the processes so that they can be rolled out to the wider development population with confidence that they will achieve the benefits expected of them.

Implementation of processes is not a trivial task and involves significant communication and training of the development staff who will move to the processes. Because communication is important throughout the development of improved processes and their final delivery, a Communication Strategy is added to the usual DSDM product set.

## **3 Principles of Process Improvement**

### **3.1 The Underlying Principles of DSDM**

All the principles of DSDM apply to process improvement. The following principles require some clarification as to their application in process improvement programmes.

#### **Active user involvement is imperative**

This principle is as important as ever. Too many process improvement initiatives have failed ultimately because they were carried out without ongoing feedback and comment from the people who were to apply new or changed processes. The feedback mechanisms described in this paper should help initiatives to succeed.

#### **The focus is on frequent delivery of products**

Processes and infrastructure should be delivered for review frequently within the process improvement teams and then subsequently packaged for delivery to the organisation. Processes should be delivered to the organisation in one chunk wherever possible to minimise the possibility of change fatigue among the development staff.

Even though the programme is not delivering work products to the organisation as frequently as in DSDM development projects, it should communicate regularly what is happening to the wider community.

#### **Fitness for business purpose is the essential criterion for acceptance of deliverables**

Fitness for business purpose means keeping process documentation appropriate to how and when it will be used. Processes which are inaccessible or indigestibly large in their documentation become shelfware rather than part of the way that the organisation works.

Also it is important to focus throughout process improvement on its objectives and on the metrics which will prove that those objectives have been met.

#### **Testing is integrated throughout the lifecycle**

Testing in process improvement takes the form of paper reviews and feedback from pilot projects. It is important that these take place as early and as frequently as possible.

### **3.2 Principles of Process Improvement**

In any programme of process improvement, it is useful to have principles in place, which help ensure that effort is directed to best advantage. The following principles are recommended for those involved with process improvement that is related to DSDM or other development processes. The list can be used as a checklist at review points throughout the process improvement work to ensure that the correct focus is being maintained.

#### **Process Ownership**

1. Every process should have a specific process owner and should aim to address that owner's requirements. It follows that any proposed improvement to the process should be seen as an improvement in relation to the requirements of the process owner.
2. Every process improvement should be seen to add value to the process owner or to the organisation. The test for added value is whether or not the process owner would be prepared to pay for the improvement.
3. Each process owner should be responsible for a complete process from end to end. Process improvements should not result in fragmentation of the processes for which process owners are responsible.

#### **Process Design**

1. Any process improvement should ensure that all necessary information and controls are available at the right time and to the right person who is responsible for carrying out the work.
2. Any process improvement should avoid unnecessary duplication of information, generation of hard copy or transformation of information from one medium to another.
3. Wherever possible, process improvements should result in management information being captured as a by-product of the work rather than as an additional activity.
4. As required, process improvements should provide for paths through the process that suit all types and sizes of project.
5. Without sacrificing any other design principles, or the primary aims of the process, improvements should provide as much flexibility as possible in the application of the process.
6. Process improvements should not compromise any required controls. However, controls should be the minimum necessary to adequately address the risks.

### **Process Improvement Aims**

1. Process improvements should capitalise on the benefits of automation whenever it is cost effective to do so.
2. Wherever there is potential to do so, process improvements should aim to reduced the elapsed time for the overall process by:
  - Removing unnecessary activities
  - Performing necessary activities more productively
  - Eliminating rework as far as possible.

## **4 Process improvement lifecycle**

### **4.1 Introduction**

This chapter proposes an approach to initiating, developing and deploying software process improvement using the DSDM Development Process Framework. There are necessarily some changes to the generic framework in objectives, activities and products. The products emanating from the processes defined here are contained in Chapter 5.

The Process Improvement Suitability/Risk List in Chapter 8 should be considered before setting out on a process improvement initiative and (as always in DSDM) monitored regularly throughout to ensure that the activities are not at risk.

### **4.2 Pre-Project**

The process improvement project will have been proposed on the basis of some quantitative or qualitative assessment of the quality of the current process. This could be in terms of the quality of the products (defect and failure rates), the satisfaction of the customers, identified bottlenecks in the development process, a third-party process assessment (e.g. a CMM assessment), etc. On a more positive note, the drive for process improvement could be due to the presence of new tools or techniques that the organisation would like to introduce. Whatever the reason, a clear brief needs to be produced to avoid the trap that is fallen into by many process improvement activities – that of gaining a life of their own.

### **4.3 Feasibility Study**

#### **Objectives**

- Assess current position and knowledge
- Define problems and opportunities
- Produce initial business case
- Define scope and prioritise (initial)

#### **Assess current position and knowledge**

"Software process improvement is not a destination, it is a journey" [Sami Zahran]. The journey needs to know what its starting point is and what will aid or hinder it reaching at least a midpoint. The journey will depend on the infrastructure to support it. So in order to achieve success it is necessary to assess what the existing process infrastructure enablers and inhibitors are. These will come from:

- The existing organisational culture and any potential resistance to change contained within that
- The organisational hierarchy which could include restrictive management practices
- Current roles and responsibilities and the enablers and inhibitors with respect to introducing new or changed roles and responsibilities (e.g. workload or headcount strategy)
- The existing process enforcement mechanisms and how effective and/or respected they are
- Outside influences such as external customers demanding different practices such as the use of a particular requirements management tool or the ability to work at a requested level of the CMM.

Much of this will not be documented but will be understood by the members of the organisation. It will be difficult to capture all of this information in a reasonable timescale, so the focus needs to be firmly placed on what is important for the current (and any immediately foreseeable) initiatives. It is important to start small and grow the process improvement over several iterations and increments. However the difficult choices are in identifying where to start. In any organisation there are things which cause problems to newcomers who have a more open attitude to how things should be done. They are less likely to be trapped in the following mindsets:

- That's the way we have always done it here
- We've tried this sort of thing before and it hasn't worked
- Changing anything is difficult round here.

So a possible strategy would be to hold a series of workshops preceded by a series of interviews and discussions in the organisational area under consideration including the relevant stakeholders together with some experienced newcomers. Stakeholders could include the users of the processes, their managers, providers of feedback on process performance (such as the Quality Assurance Department) and the process improvement champions.

## **Define problems and opportunities**

A major result of the workshops would be a list of areas needing improvement. This would result in the ability to formulate definitions of the problems and opportunities that the organisation faces. The opportunities could involve the selection of a process assessment model (e.g. SPICE and CMM) if such an assessment model was not the trigger for the decision to introduce a programme of process improvement.

*Note: The CMM Level 2 KPAs discussed in section 26.6 of the DSDM manual are particularly important both when introducing DSDM and when improving existing DSDM processes to gain maximum benefit from using the framework.*

For each of the problems/opportunities identified, it is necessary to identify a Process Owner (see Chapter 6 on roles) who will be responsible for the actions taken during the process improvement project. Their first responsibility will be to participate in the production of the business case. The people assigned to these tasks must be very willing to undertake the work and firmly believe that it is the right thing to do. Committed leadership is necessary in any change programme.

If no formal process improvement infrastructure is in place, the requirements for the start-up infrastructure should be identified and costed in both soft and hard terms. (See Chapter 7 on Process Improvement Infrastructure.)

## **Produce initial business case**

The business case should be based on the expected beneficial impact of improvements on the overall process or on individual processes. Such improvements should be measurable and if none of the current metrics can be used to justify the improvement activities, then new metrics should be identified now in the business case. The introduction of any new metrics should be considered as part of the improvement process and the case for their introduction included in the business case.

## **Define scope and prioritise (initial)**

The scope of the work should be decided based on the business strategy of (the part of) the organisation undergoing improvement.

The aim should be to have something visibly improved in the short term so that the impetus for improvement will become part of the organisational culture. So initial prioritisation will depend on what can be achieved most easily as well as cost and long-term impact. Many organisations have foundered in their process improvement projects through taking too long-term a view and the staff just see what is happening as "another initiative" which is going nowhere. If DSDM is being used as the underlying process for improvement then we should see quick improvements which are incrementally built on.

## **4.4 Business Study**

### **Objectives**

- Identify and prioritise key processes that need to be improved (the requirements)
- Identify new or redesigned processes to prototype
- Confirm process owners and process participants



- Establish target for improvement (including benefit)
- Plan the next phases
- Consider (and possibly define) platforms for development and delivery

The main objectives of this phase are the elaboration of the process requirements identified in the Feasibility Study, and the development of a plan of deliverables (including any prototypes) to be produced and tested within the project's timescales and costs. This planning aspect of managing the change process is of paramount importance in assessing the maturity of an organisation (Ref. CMM Level 4 maturity).

### **Identify and prioritise key processes that need to be improved**

The identification and modelling of current practice in an organisation's processes is an important activity in its own right. CMM's Level 3 organisations have 'Defined' and documented processes.

As the next phase will produce prototypes of some of the processes, it is important to ensure that an overview of the processes and their interfaces with other processes is defined and understood.

The various facts, opinions, beliefs and wishes, relating to the development processes, identified during the Feasibility Study must now be examined, evaluated and integrated into a prioritised set of change requirements that should result in real improvements to existing processes, or by new envisaged ones.

An estimate of the business benefits and costs to deliver each of the changes will have to be made as an aid to prioritising these requirements.

It is necessary to establish the **importance** and **scope** of the change to a process in order to determine the appropriate way to introduce it.

In terms of **importance**, changes may be categorised as:

1. A change that needs to be implemented across all affected projects as quickly as possible. Hopefully this would be exceptional but might result from some "disastrous project" that has highlighted an unacceptable and risky practice amongst development teams. Implementation of such a change needs very careful assessment and planning since it may require rework for projects that are already in progress.
2. A change that needs to be implemented quickly to gain maximum benefit but does not carry the same level of risk as the previous category. In this case, it is necessary to examine work in progress to assess the implications in terms of cost and time delay. Only then can decisions be made as to which projects that are in progress should adopt the change and which should continue to follow the original development process.
3. A change that should be implemented as soon as possible but without causing disruption to existing projects. In other words, it is probably sufficient to introduce the change for new projects only. Most changes should belong to this category.

In terms of **scope**, changes may be categorised as:

- *Of a general nature*: potentially impacting all projects across the whole IT department
- *Of a specialist nature*: impacting only those projects that rely on that particular specialism, e.g. workflow.

The changes should be prioritised using the MoSCoW rules once the importance, scope, costs and benefits have been thought through.

### **Identify new or redesigned processes to prototype**

Adopting a prototyping strategy for redesigned or new processes greatly reduces the risks and costs of introducing changed processes across an organisation. Whenever possible prototypes that simulate or animate processes should be considered. These will identify the data requirements of the process, its bottlenecks and will clarify the metrics needed for effective process management.

Another useful strategy to adopt is not to attempt to improve activities that add little or no value to a process. Concentrate on high value activities and processes and deliver them first. DSDM is ideal in distinguishing between Must Haves and the rest of the requirements.

The method to be used, like everywhere in DSDM is to use facilitated workshops where knowledgeable and empowered representatives from all affected areas gather to identify, design (high level) and plan the production and evaluation process of prototypes.

### **Confirm process owners and process participants**

Every process should have a specific Process Owner as stated in Section 3.2. Appointing a Process Owner ensures that a process' activities and improvements are co-ordinated across the organisation. See Chapter 6 for the Process Owner role definition and for other roles that are necessary in a process improvement programme.

### **Establish target for improvement**

The specific criteria for measurement and targets should be defined now and relate to the objectives of the improvements (see the section on Measurement in Chapter 7). The metrics should be defined within the process to show what needs to be measured to evaluate the effect it is having. The metrics are refined at the same time as the process itself is refined. Quality assurance checkpoints should be built into the process to allow audit of the process itself.

- The basic **productivity** metric is effort, which should be collected at as low a level of detail as is necessary and practical for this evaluation. The usual issues apply, e.g. include actual effort, collect only what is needed, make collection simple or automated.
- The other main area of metrics is the **quality** of the system produced, i.e. defects found and corrected. As above the usual issues apply, e.g. defects classified according to severity and type, at what stage of the process they were found, and at what stage they were introduced. In this type of project where the aim is to improve the development process itself, these defect analyses may be one of the main tools to evaluate the success. For example, an objective could be to reduce the number of defects of a certain type by modifying the process so that it avoids their introduction in the first place. Other measures of quality, such as iteration, such as mean time to failure, which apply to the installed system are less relevant.
- One area of improvement to the development process may be to reduce **risk**, e.g. using an early technical pilot. This is what the DSDM process itself aims to do, but an organisation may want to improve its procedures for, say, the technical pilot. Measuring risk in a way that enables the effects of changing the process to be evaluated can be difficult: relative changes may be more useful than absolute measurements.
- There are also more **'soft'** measures. For process improvement these might relate to the views of the development team, e.g. whether they prefer the changed process to the old one. A questionnaire may be devised to assess these issues. These assessments can be used along with the 'hard' metrics but are generally not enough on their own to evaluate any benefits achieved.

It is worth noting that when setting improvement targets, it is often more useful to set targets on *trends* rather than on *volumes*. Trends measure incremental improvement, e.g. defect rates, and hence they imply the volumes, e.g. the annual cost and effort of corrective/perfective maintenance work. This is also essential to create an environment amenable to continuous improvement as a positive trend metric is for all time, whilst an end-point volume implies we can stop changing once we achieve the target.

Additionally, changing targets is psychologically unacceptable as it gives people the impression of trying to reach a moving target set arbitrarily by management.

Because process re-design often coincides with the introduction of new tools, some attempt should be made to distinguish between improvements accrued from technology change and those achieved by the new or changed process.

### **Plan the next phases**

The Development Plan should attempt to minimise risk during the development of new/changed processes by ensuring that the supporting infrastructure is established and tested early on in the first few Functional Prototypes.

The Development Plan should identify the projects that are likely to be involved in the pilot studies. The process may be piloted from end-to-end if suitable projects are available. Alternatively, it may be more appropriate to run the pilot solely on that part of the development process that is being improved.

Possible criteria for selecting pilot projects are as follows:

- The project manager supports and understands the need for Software Process Improvement
- The project lasts more than 8 weeks and is in the stage of development appropriate to the process(es) being piloted
- The elapsed time of the project is not so great that a timely result of the trial will not be possible
- The business accepts the potentially negative impact of their project(s) piloting a process improvement. (The pilot activities may mean that the project cannot be totally time-constrained.)
- The project has sufficient members to effectively pilot the new process(es), e.g. 4 or more
- The team as a whole has an awareness of Software Process Improvement, since anybody on the team who has not bought in will endanger the successful trial (and later implementation) of the improvements
- In general, the project is not mission-critical but on the other hand it is not of such low priority that it may be pulled or may be subject to delay etc. due to lack of resources.

It is valuable to plan for usability prototypes of the process to assess aspects such as ease of understanding of the process as defined, navigation of the process, ease of use of the process documentation.

The plan should cover the Process Improvement Infrastructure needed to support the pilot projects, including who will provide the support and how much effort this will involve.

## **Delivery mechanisms**

This is the means by which the development processes are to be disseminated across the development teams. The main choice is between hard copy and some form of electronic version. Probably the main criteria for choosing an option are cost, availability of suitable technology, access to the technology by developers and ease of distributing revisions of the processes.

Changes inevitably mean new releases of the processes, either amendments or complete processes. The more frequently changes are made, the more important is the ease with which they can be issued. However, it is also important that process participants are informed when changes are introduced. Apart from avoiding confusion, this is necessary so that development teams can evaluate the level of impact for their projects.

If the changes are not to be universally applied at the same time, it will be necessary to maintain multiple versions. If changes are introduced frequently, this could become complex to manage. It is therefore recommended that new releases should be constrained, perhaps to once or twice a year. Given the recommended size of a DSDM project, this should obviate the need for too many versions.

## **Platforms for development and delivery**

Possible prototyping tools to use during development of processes include:

- Paper
- A graphical process management tool
- A CASE tool for process models
- The organisation's Intranet.

A likely scenario for prototyping would be a paper-based prototype for use with pilot projects that could later be automated during the Design and Build Iteration. However, it is possible that if an automated prototyping platform is selected with care the prototype can evolve into the working system.

Attention though, must be paid to the 'scalability' of the prototyped process and to the IT infrastructure required to benefit from potential integration of workflow and organisation-wide data.

Internet technology permits an implementation strategy that lends itself naturally to a gradual evolution and integration of processes via planned introduction of additional tasks and links.

The Internet/Intranet also allows process knowledge and help to be accessed on demand but care must be exercised to control individual access privileges. It may be necessary to add a new role: Process Administrator (directed by the Process Owner) to define which users can link, access, create and delete information.

## **4.5 Functional Model Iteration**

### **Objectives**

- Model the process, participants, triggers, outputs, mechanisms (iteratively with process owners and process participants)
- Plan implementation

It is envisaged that, once the Feasibility and Business Studies have been conducted for a process improvement programme, each individual improvement project would commence with a Functional Model Iteration. This means that sometimes the iteration will be for a major improvement and sometimes it will be for a smaller, incremental improvement. For a major process improvement project it is likely that the FMI can be followed quite closely, but for a smaller project only certain elements of the iteration will be required.

Typically, the aim of the first Functional Model Iteration should be to set up the process infrastructure. Subsequent iterations will fill the gaps in the infrastructure as necessary.

### **Model the process**

It is important that the iterative involvement required of Process Owners and Process Participants with standard use of facilitated workshops and reviews is maintained just as it would be for a software development project.

The **first iteration** for a new process improvement programme will require a static outline of areas to be improved covering:

- Processes and interfaces between them, i.e. the overall model
- Participants e.g. Project Manager, Process Specialists, Process Users
- Triggers e.g. project kick-off, completion of FMI, completion of Object Model
- Mechanisms e.g. CASE tool, automated testing tool
- Outputs e.g. models, test plan

It is important to also consider the creation of processes to verify the improvements. One important process is clearly that of capturing measurements. It is important that such measurement processes cause as little disruption to the projects as possible. As far as possible, measures should be derived as by-products of other activities. Other processes will cover the provision of information to the people who will pilot the new processes and the wider dissemination of information about the aims and activities of the programme. To facilitate the communication of issues to all early adopters of the processes, consider what technology solutions would be useful, such as discussion databases for team interaction.

**All iterations** will build or refine a **functional prototype** of the process(es). A functional prototype will include:

- For each (sub)process, a process definition covering what the process is for, its inputs and outputs, the activities which make up each process, any specific behaviours e.g. triggers (often temporal) which will affect the activity and the role that will carry out the activities
- Links between processes
- The flow of the above elements and cross references between them
- Templates for outputs
- Validation for triggers
- Working examples of the mechanisms.

The initial approach to modelling processes will depend on personal preference. Some may start with a diagram and then move to text to describe the detail of processes. Others may start with the text and then create a diagram to demonstrate the written processes pictorially. The following models are most likely to be used for designing processes:

- Business process maps
- Data flow diagrams
- Textual process descriptions.

## **Plan implementation**

An important product of this phase is the Implementation Plan (see Chapter 5) for the redesigned and new processes. The choice must lie somewhere between a high-risk 'Big Bang' simultaneous introduction of all changed processes (No backing out) and a gradual transition to new processes (Less risky but may add to the cost and to prolonged frequent disruption of operations).

In addition to how the processes will be put in place and who will be responsible for getting the processes published, the methods of both communicating the processes and providing any training have to be decided. The people who will provide support once the processes are in use should also be identified together with estimates of the time required from them as projects take on the changes.

Use the appropriate process support group and at least one member from the development team to review a particular process.

Identify and consider the people implications of the process improvement, such as:

- Skills analysis for new roles
- Skills gap analysis within the organisation
- Training and education programmes
- Changes to measures and rewards.

For change to succeed, communication is compulsory in order to generate understanding and commitment, to reinforce messages, to counter fear, and to build community. Hence, part of the Implementation Strategy is the Communication Strategy. This is often a significant enough document to be treated separately so an additional product is defined for this (see Chapter 5).

## **4.6 Design and Build Iteration**

### **Objectives**

- Pilot the (new, modified or customised) process
- Refine the functional prototype up to the point that it can be rolled out to all process users
- Evaluate the degree of achievement of benefit.

## Pilot the process

Apart from those process changes that could be described as cosmetic, most changes need to be tested in practice, probably on one or more pilot projects. It is essential that there be commitment for this policy at the highest level and a recognition that there is likely to be a cost or time penalty, albeit often small.

Piloting the process allows it to be tested and modified if necessary to demonstrate that it meets its requirements. The functional prototype of the process has to be refined to include the non-functional requirements, i.e. to make it suitable for real use. This could be to:

- *Build it in a new environment.* Although the aim should be to build the functional prototype in the same environment as the delivery one this may not have been achieved, perhaps because of time or cost constraints. For example, the functional prototype may have been developed using a word processor, with the Design and Build Iteration then making it available on the Intranet, or in a process management tool.
- *Refine the prototype by adding more detail to meet non-functional requirements.* Improving the usability of the process could include the provision of working document templates for the process products, the provision of automated links between templates, or making available further information on techniques. In order to improve the reliability of the process extra crosschecks and validation may be necessary between its components. If the process improvement is primarily to be achieved by changing the way of working (defined in the Functional Model) then it may be appropriate to provide definitions for roles and procedures to support these.

Throughout the pilot there has to be commitment from the users, i.e. those who are actively using the process. They have to feel that it is improving the development process for them, i.e. making it easier, faster, or delivering better quality systems. The process owner and visionary have an important role in making clear why the process improvement is being done – particularly if the reasons are not immediately visible to the practitioners.

The process users should be trained in the new processes before they need to apply them. They should not be expected to take on new processes when development activities have already begun using the old processes.

## Refine the model

This step is very much the same as the ‘standard’ DSDM. The process users and process experts review the prototype and their feedback is used to refine the model. The usual timeboxing and prioritisation rules apply. If the users identify any major changes, i.e. to the model itself, then it has to go back to the functional model iteration.

Training materials and methods should be piloted as well as the processes themselves. This means that the training should also be amended, if necessary, based on the pilot project feedback, even if the processes themselves are deemed successful.

## Evaluate the degree of achievement of benefit

The main aims of improving a software development process are to improve the quality of the software systems that are developed by that process, and to improve the productivity of the teams developing them. There are also related issues such as consistency, repeatability and reduced risk. It follows that, to evaluate the degree of improvement of the process, it is necessary to measure both the quality of the software produced by it, and the productivity of the development team. (That is, unless the objectives relate only to one of these, or even a particular aspect of one of them).

The measurements from the pilot projects should be collated and analysed. They should be compared with the improvement targets defined during the Business Study. The degree of improvement of the software development process cannot be evaluated unless the metrics from the pilot projects are compared with those from similar projects using the unimproved process. This implies that a good metrics programme should be in place before attempting to improve the development process.

## **4.7 Implementation**

### **Objectives**

- Roll-out (including training)
- Prove the target was met
- Feedback to continuous improvement

### **Roll-out**

Implementation needs to take account of the two recognised paths through the process improvement process, namely:

- Initial Customisation of DSDM (or other development process framework) to suit the particular requirements of the organisation
- Ongoing evolutionary changes to the development process to cater for changing needs of the organisation or to capitalise on opportunities for improvement.

The tasks needed for Implementation depend on the chosen path and are listed below. These are followed by descriptive notes on the activities.

### **Path - Initial Process Customisation**

- Use publicity to keep everyone informed of process introduction
- Prepare training materials for new processes
- Populate the delivery mechanism with new processes
- Inform process users of the availability of new processes
- Provide training in the new processes to coincide with the take up of new processes
- Monitor use on projects and feed back issues as necessary
- Provide consultative support to new users of the processes
- Capture metrics to monitor effectiveness of new processes
- Feed issues into evolutionary improvement cycle

### **Path - Ongoing Evolutionary Improvement**

This path could include any combination of tasks from process customisation or infrastructure development, depending on the size and nature of change being introduced. However, for introduction of frequent, small changes (i.e. the concept of evolution), the typical list of tasks might be:

- Accumulate small changes for release at the same time
- Pre-inform users of changes
- Identify any implications of the process change(s) for customisation of product templates, use of tools and implementation of organisational changes
- Apply changes to existing processes and re-load onto delivery mechanism
- Amend training materials to reflect change(s) to processes
- Provide training on an as-required basis
- Provide consultative support to users of changed processes

### **Roll-out activities for both paths**

It is important to closely monitor the impact of process changes on early projects. It is usually unwise to expect the development teams to perform this function alongside their other responsibilities and the danger is that the pilot project will be completed with little or no information on the value of the change being fed back.

Hence it is important during rollout to record progress of the changes and to consider the implications for prioritisation of outstanding work.

Throughout careful attention should be paid to choosing the most appropriate methods of publicity and training (see Chapter 7).

It is important that the effectiveness of the metrics in use is reviewed on a regular basis alongside the introduction of process changes.

### **Grouping changes**

Group changes together according to aspects of DSDM or by urgency or some other criteria that allow a number of ideas to be incorporated into a single release of the development process.

### **Prove the target was met**

A prime vehicle for proving that the target was met is to perform a Post-Implementation Review: this is strictly speaking a Post-Project phase activity in DSDM, but with many small changes being implemented over a period of time they can be absorbed into the project itself. The scope of the Post Implementation Review should be consistent with the size and level of risk of the change(s). It could be appropriate to conduct a review soon after the introduction of the change (an Increment Review), to assess how successful the definition and implementation of the change has been. In addition, a further review may be desirable, some months after Implementation, that assesses the actual process change itself and its impact on those development projects that have used it. However, in the majority of cases, this two-stage approach will be inappropriate.

What should be reviewed in all cases is the degree to which the improvement target/benefits, defined in the Business Study, have been achieved.

As with the Increment Review Document of DSDM, consideration should be given to any further work that needs to be carried out in association with the recently introduced process change(s).

For the majority of process improvements, most of this will appear to be OTT. However, it is still worth conducting a review, even though it might only take “minutes”, to ensure that genuine improvements are being introduced, rather than the whole process becoming absorbed with mere “good ideas” – the equivalent of implementing “Want to have but Won’t have this time” in a DSDM project.

### **Feedback to continuous improvement**

The results of any review should be fed back into the process improvement plans for further iterative and incremental delivery of changes.

It may be worth reviewing what implications, if any, the revised process has for the company’s position on the CMM (or SPICE) Model.

## **4.8 Post-Project**

### **Objectives**

- Assess whether or not the process changes are still in place
- Evaluate the benefits of the process changes
- Recommend changes

### **Assess whether or not the process changes are still in place**



All too often, people will return to their normal way of working once the process improvement initiative has “completed” its tasks. It is therefore important to have periodic checks of whether the new/changed processes are still being used or whether they are being carried out in a mixture of old and new practices. Any “backsliding is not necessarily wrong – it may be that the old processes had more value than was originally realised. It is important to monitor what is happening in order to build “best of breed” processes in the future capturing the needs of the process users.

### **Evaluate the benefits of the process changes**

It may be some time before the processes become embedded in the normal ways of working so it is worth checking some months after the process improvement team have left an area that the expected benefits of the changes have indeed materialised and, if not, what corrective actions need to be taken.

### **Recommend changes**

If the process changes require any amendment in order to make them work better or to maximize the expected benefits, the required changes should be documented and a business case for further process improvement work should be created.

## 5 Products

This section lists the standard DSDM products, with notes on their use in the process improvement lifecycle discussed in the previous chapter. For any DSDM product not mentioned in this chapter, there are no special requirements for the process improvement version of the product. Two new documents have been suggested.

It is very important to keep all documents as light as possible, otherwise the process improvement project will slow down through bureaucracy.

### Feasibility Report

The Feasibility Report will show the following:

- that the proposed process improvement programme is possible (including the Suitability Filter from Chapter 8)
- the justification for investment in process improvement
- the objectives, based on the scope of the proposed changes
- the risks of not carrying out the improvement activities
- an initial prioritisation of improvements
- potential solutions to existing process issues.

### Feasibility Prototype

A feasibility prototype will only be applicable for any new technology planned to deliver the process to practitioners.

### Business Area Definition

Every care should be taken to keep this document as lightweight as possible. As always in DSDM, the detail will be in the Functional Model and Functional Prototypes.

It should include the current processes if they exist and show where they are expected to change.

### Prioritised Requirements List

The functional requirements in this product are the new processes or the changes to be made to existing processes.

When putting together the non-functional requirements for a particular process improvement, consider the following:

- *Measurability* As the new processes are developed start to identify measures that can be used to assess their success e.g. fewer defects in UAT, improved communication of analysis models etc.
- *Usability* The processes must be easy to access and contain the information users require in a structured way
- *Performance* Processes must be available when they are required
- *Reliability* Is there an acceptable level of non-availability of tool support for projects and/or for process dissemination?
- *Maintainability* How are change requests logged and reviewed? How easy are the processes to change? Are change control procedures in place?

### System Architecture Definition

This document defines one of the following two architectures depending on what activities are taking place:

1. The architecture of the technical infrastructure to support processes when this is the first instantiation of such an infrastructure.
2. The platform for deploying processes being developed during the current work given an existing technical infrastructure.

## **Development Plan**

It includes the outline plan for piloting the process in projects during the Design and Build Iteration.

## **Functional Prototype**

See section 4.5 for the content of this product.

## **Implementation Plan**

As usual, this document is produced at the end of the Functional Model Iteration. Implementation needs to address publicity and rollout to a potentially large user population. For this reason it should be supplemented by the Communication Strategy which should be produced at the same time.

The Implementation Plan should include the following:

- Identification of any strong sources of support for and opponents against the proposed changes
- Identification of potential champions for process improvement in significant areas of the business
- The speed with which the organisation can cope with change which the plan should reflect
- The cost and effort required by the affected areas
- The criteria to be used for reviewing success, e.g.:
  - The collected measures show overall improvement
  - All of the activities in the process add value
  - There are no fragmented processes
  - The processes are only documented once, even though there may be many entry points
  - The process encourages capture and sharing of knowledge wherever possible
  - Methods are defined to protect the processes from error wherever possible, e.g. the following are defined: checklists, templates, data validation on input or mentoring support
  - The level of flexibility built into the process allows for tailoring without losing the expected benefits
  - The technology used to support geographically dispersed users operates well.

Following the feedback from pilot projects in the Design and Build Iteration, the Implementation Strategy should be revisited and, if necessary, updated and re-issued prior to Implementation.

## **Communication Strategy (additional product)**

The Communication Strategy addresses the formal and informal ways in which the change will be communicated throughout the organisation, including:

- Executive and management communications: overall goals and the case for action, when and how employees will be impacted, support for new processes and roles
- Project team communications: status, day-to-day communications within the team
- Horizontal communication within the organisation: enthusiasm, success stories
- Customer testimonials

- Communication from the organisation and stakeholders back to management and the project team: feedback, input, issues, concerns, suggestions
- Communication processes that must be built and put in place to sustain the achievement of business goals (for example, customer or user group meetings).

The Communication Strategy should include:

- Objectives
- Target stakeholder groups, and messages to be communicated to each
- Styles of communication to be used (e.g. professional vs. "fun")
- Communication media (e.g. newsletters, databases, etc.)
- Responsibilities for managing and delivering the messages
- Plans for development and deployment of communication channels, mechanisms and messages
- Processes to support ongoing communications

### **Design Prototypes including Design Prototype Review Records**

In process improvement the Design Prototypes could take the form of piloting the process on projects, in which case the review records would consist of the feedback from these pilots. For DSDM projects which are working hard to meet their deadline, the feedback should be left until the Increment Review Document is produced for an increment of a pilot project. It may be possible to collect feedback at the end of lower level timeboxes, but this should not be allowed to endanger the project's work if at all possible.

### **Tested System**

This is the tested process together with any supporting tools.

### **Test Records**

This is either the feedback from the pilot projects or the records of tests for software support for the processes.

### **Evaluation Report (additional product)**

The Evaluation Report should be produced during the Design and Build Iteration. Its purpose is to describe the degree to which the benefits of the process improvement have been achieved – as far as can be assessed from the Design and Build Iteration. This will include metrics (soft and hard) collected from the Design and Build Iteration pilots.

The report should only be produced if more than two pilot projects have been used to test the process. Otherwise the Project Review Documents from DSDM projects should be used or similar documents from non-DSDM projects.

### **User Documentation**

The User Documentation is the description of the tested process(es).

### **Delivered System**

The Delivered System is as for the Tested System together with its supporting infrastructure.

## **6 Process Improvement Roles and Organisation**

### **6.1 Roles**

The following roles provide the core roles necessary for process improvement using the processes defined in this paper. As with any DSDM project there will be specialist roles called in as required by the activities of the programme and individual projects.

It is important to note that these are roles. In most process improvement activities, one person will hold the roles of Visionary, Process Owner and Process Expert.

In large-scale improvement activities, a Visionary is likely to be responsible for a series of process improvements. Each one of these may have a different Process Owner. Each Process Owner will be responsible for a group of process improvements in their own area of specialism supported directly by Process Experts, as required, and Process Developers with input from Process Participants in workshops, reviews and pilot projects.

#### **Executive Sponsor**

A key role to identify very early on is that of Executive Sponsor. The role is similar to the sponsor for a DSDM project. The main difference is that the Executive Sponsor will own the process improvement initiative rather than a system or application. Although the person with this role does not need to have technical knowledge of how process improvement is achieved, the Executive Sponsor must understand and endorse the benefits of process improvement.

The person who fills this role needs to be in a senior position and be able to encourage wide participation in process improvement through personal example and publicity. The Executive Sponsor could be at the corporate level but is more likely (in the initial stages at least) to be a senior person at the departmental level. The usual DSDM responsibilities apply to this role: authorisation of funding, ensuring decisions are made in a timely way and ensuring co-ordination across functional areas is effective. In addition to the responsibilities defined in the DSDM role, the Executive Sponsor may need to modify the organisation's reward system to encourage participation in change.

#### **Visionary**

The Visionary role could be held by a steering committee if process improvements are to be implemented across a wide area. The Visionary:

- Sets the strategic direction for the process improvement activities
- Ensures the process improvement activities remain aligned to the corporate policies and procedures
- Participates in key decision making workshops
- Monitors the progress of the improvement projects against the original vision as articulated in the Feasibility Study
- Negotiates as necessary with higher management and with management across the organisation
- Approves and monitors the plans for the various process improvement activities.

#### **Process Owner**

The role of Process Owner is fundamental to the success of any process improvement activity. Approximating to the DSDM team leader, but with ongoing responsibility for a process rather than limited to the duration of a development project. There is likely to be a number of process owners, each responsible for a part of the development process rather than the whole. Each process owner has a vested interest in ensuring the process they are accountable for operates as efficiently and effectively as possible and therefore must have a detailed understanding of the process and how it interfaces with other processes. The Process Owner must be fully supportive of the changes and have a vested interest in their successful deployment. The Process Owner leads a Process Improvement Group and will probably be assigned the task of managing the development and implementation of the process changes.

The Process Owner:

- Acts as the ultimate authority for the process
- Participates in all process (re)design activities
- Liaises with other functional areas impacted by the process
- Ensures the new/changed process is implemented successfully, including ensuring that the training is appropriate and that the necessary infrastructure is in place
- Monitors all related process development activities
- Manages the implementation of the changes
- Communicates the revised process(es) to the development teams
- Co-ordinates the activities of the Process Improvement Group.

### **Project Manager**

If process improvement is being undertaken on a large scale, for example when DSDM is first introduced to an organisation, there is likely to be need for additional planning and control. Under such circumstances, the Project Manager role may be required with responsibilities very similar to those defined for the DSDM Project Manager.

### **Process Expert**

Process Experts should be expert either in the overall area of Process Improvement or in the specialist areas that are being improved e.g. testing, configuration management, analysis, UML etc. Their responsibilities are similar to those of the DSDM Ambassador Users in that they:

- Provide key input to process requirements and design sessions
- Provide the detail of how processes currently work and how the new/changed process will impact the Process Users
- Define the new processes that the process users will apply.

### **Process Participants**

Process Participants operate in the same way as DSDM Advisor Users in that they:

- Participate in process prototyping and design sessions as necessary and as relevant to their expertise
- Review and test process prototypes on request through participation in pilot projects
- Provide feedback on their experience of the processes in pilot projects.

### **Process developers**

Process developers will be organised in a team of one or more people. Process developers:

- Build the process prototypes
- Ensure that the correct tools/techniques are made available to pilot projects
- Co-ordinate the development of any necessary training
- Collect and collate feedback from pilot projects and implement amendments to the processes and supporting materials as necessary.

## **6.2 Group Structures**

### **Steering Committee**

Whilst the above roles are probably adequate for most organisations, additional roles may be required if process improvements to DSDM or similar processes are particularly wide-ranging and must be closely integrated with processes and departments across the organisation. For example, under these circumstances, it may be necessary to set up a high level Steering Committee with representatives from across the organisation and from a variety of disciplines. Refer to the Visionary role for the responsibilities of a Steering Committee. In major improvement programmes across a large organisation, an additional responsibility is that of monitoring proposed changes for incompatibility with other parts of the organisation and of either vetoing such changes or imposing constraints on their adoption.

### **Process Improvement Group (PIG)**

The purpose of Process Improvement Groups is to gain information from all stakeholders on what is working and what needs improvement. The process participants are probably the best people to evaluate the effectiveness of all aspects of the development process but there needs to be formal, efficient and effective means to encourage their involvement.

The Process Improvement Group is brought together to review a proposed change to a process, or more likely a group of related changes. Their primary function is to evaluate proposed changes on the basis of understanding the process and also from personal experience of operating it. In this respect they are functioning as informed users. Consequently, the aim is to reach consensus between the Process Owner, who is responsible for the effectiveness of the process, and the Process Improvement Group that represents those who are to use it in practice.

### **Process Support Group (PSG)**

This is a permanent group of process-aware technicians with the function of deploying those changes that are proposed by Process Owners, agreed by Process Improvement Groups and developed through the Process Improvement process. In effect this group supports the Process Sponsor, Process Owners, Process Improvement Groups, pilot project teams, etc. by putting their decisions into action. Consequently, the Process Support Group has a practical part to play in:

- Implementing changes across the development teams via the chosen delivery mechanism
- Operating Configuration Management of the Development Process
- Collating metrics to measure the effectiveness of the processes
- Organising or actually undertaking publicity and training required by the changes
- Advising and providing administrative support for all aspects of process improvement.

## 7 Infrastructure

The first task is to gain policy support for process improvement and for the use of projects to pilot new and changed processes. Once this is done, the infrastructure can be put in place. Even when a process improvement programme is defined it does not just happen. There needs to be an infrastructure to enable and encourage it. The size of the task to set up the infrastructure may vary in line with the size of the organisation in which it is to operate, but in all cases the following elements should be considered for inclusion:

- Organisation
- Delivery Mechanism
- Assessment Instruments
- Feedback Mechanisms
- Quality Assurance
- Measurement
- Publicity and Training
- Funding (Budget)

### Organisation

A number of roles and groups need to be in place, although the number of people required to fulfil them will vary according to the size of the organisation. The roles and groups are explained in Chapter 7. The first activities with respect to the organisation of process improvement are as follows:

- Appoint key process improvement roles (Executive Sponsor, Visionary, and if appropriate, a Steering Group)
- Identify and appoint Process Owners
- Set up the Process Support Group

On an ongoing basis, Process Improvement Groups should be set up as required for particular areas of interest.

It will also be necessary to appoint a process administrator for ongoing support for implemented processes if this role is not already in place in an existing function, such as the Quality Department. The amount of effort required for this task should not be underestimated. It is rare in large-scale changes, such as the introduction of DSDM, that it can be a subsidiary part of somebody's work portfolio.

### Delivery Mechanism

This is the means by which the development processes are to be disseminated across the development teams. The main choice is between hard copy and some form of electronic version: a small handbook supplemented by more detailed on-line information may be suitable in some cases. Probably the main criteria for choosing an option are cost, availability of suitable technology, access to the technology by developers and ease of distributing revisions of the processes.

Changes inevitably mean new releases of the processes, either in part or the whole. The more frequently changes are made, the more important is the ease with which they can be distributed to developers. However, it is also important that process participants are informed when changes are introduced. Apart from avoiding confusion, this is necessary so that development teams can evaluate the level of impact for their projects.

If the changes are not to be universally applied at the same time, it will be necessary to maintain multiple versions. If changes are introduced frequently, this could become complex to manage. It is therefore recommended that new releases should be constrained, perhaps once or twice a year, except for any that are



of such severity that they must be implemented across all affected projects as quickly as possible. Given the recommended size of a DSDM project, this should obviate the need for too many versions.

Delivery mechanisms also cover the actual format in which the process is presented. Long, verbose documents should be avoided as far as possible. It is better to sub-divide the process into separate components in the form of checklists, guidelines, work instructions and standards. This improves usability, enables changes to be effected more easily and enables the components to be re-used.

## **Assessment Instruments**

An organisation may decide to commission an assessment of their development process to provide an accurate picture of their current capability against a reference model. Such an assessment can aid senior management in their decision-making and act as an encouragement toward process improvement. In some cases, it may also be a requirement for effective marketing of software development services.

Most assessment instruments result in a similar set of products, including:

- A report of the current capability of the organisation
- An indication of those areas that need addressing as a priority.

One important value of commissioning an assessment by an external body is that the resultant report is likely to carry more credence with senior management than something produced internally. Consequently, the important issues raised by the assessment are more likely to be actioned.

This paper cannot recommend a particular model. The most appropriate assessment instrument depends upon various factors:

- Experience within the organisation of a particular model
- Recommendations from contacts in similar organisations similar
- Recommendations from trusted consultants
- The availability of expertise in a particular model
- The organisation's plans for process improvement activities.

## **Feedback Mechanisms**

Feedback mechanisms are required to monitor the ongoing effectiveness of the development process and to gather suggestions/proposals for improvement. They ensure that the efficiency, effectiveness and usability of a process are reported to the Process Owner so that necessary changes to the process can be made. They can take many forms, including:

- Results of quality assurance
- Establishing measures of the processes
- Reporting of problem issues through line management or process-related groups (e.g. Process Improvement Groups, Process Support Groups).

Feedback mechanisms should not be added to any process as an afterthought. They should be considered and built in as the process is being developed so that, as far as possible, feedback is generated as a by-product of the process rather than as additional activities.

## **Quality Assurance**

Some means of Quality Assurance is required to ensure the development processes are being used effectively and also to ensure the Process Improvement process is producing genuine benefits.

Quality Assurance does not necessarily imply a separate QA team, but should be recognised as a distinct function. A variety of means can be adopted, for example:

- Feedback from reviews of the products generated by the development processes

- Post Implementation Reviews following the introduction of new or amended processes
- Establishing Measures of the processes.

## Measurement

It is highly likely that the introduction of a process improvement programme will require new metrics. It is essential that these are identified as early as possible and the methods of measurement are put in place.

Measurement is needed in process improvement just as it is needed within DSDM itself. Baseline measures are required in order to determine how successful a process improvement programme is or whether a new process has actually improved things. Organisations may already have some sort of metrics programme in place but the measurements taken may not always be suitable for the needs of the process improvement programme or task. If the organisation's software processes are immature and undisciplined then effective measurement is a challenge.

Measurement can provide valuable input both for the feedback mechanism and for quality assurance. The main reasons for measurement (adapted from the "Measuring DSDM Projects" of the DSDM manual) are:

- To establish a baseline for predicting what will happen in future. This is clearly desirable in an environment where the processes themselves are subject to frequent change.
- To provide evidence that the process is successful and working. There must be a means to ensure only those changes that bring improvement are introduced and that any detrimental changes are identified and reversed as quickly as possible.
- To investigate the process itself in order to highlight and quantify problems. This applies to the Process Improvement process as much as to development processes.

There is a comprehensive presentation of the whole subject of measurement in the *ami* method/handbook (see bibliography). However the following points are worth highlighting:

- Look for measures that can be easily obtained from existing processes and data, with a minimum of additional effort.
- Start with simple measures (e.g. cost, schedule, and size) and only go for something more complex if the simple measures prove to be inadequate in practice.
- Ensure it is processes that are being measured rather than people. Otherwise, the measuring activity will create resistance from the users of the processes and therefore prove to be counter-productive.

## Publicity and Training

A major problem to overcome is resistance to change on the part of development teams. To handle this, good communication is essential. By and large, people resist what they do not understand or cannot see the reason for. Consequently, it is essential that the Executive Sponsor and Process Owners be fully convinced of the benefits to be gained from process improvement and actively support the communication of those benefits to all concerned parties.

A plan for communication should be produced at the start of the programme. The document should include plans for education in why processes are important, how following good processes is important, etc.

People resist because they don't understand the need for change (among other reasons) so it is essential that the process improvement managers are aware of such things as the negative resistance cycle (the phases of human response to change: stunned paralysis, denial, anger/rage, bargaining, depression, testing, and acceptance).

It is vital to gain acceptance of process improvement by the Process Participants and this must begin with making them aware of the mechanisms in place for process improvement and the role/influence they have in what changes are made. Since this acceptance is fundamental to the successful operation of process improvement, every means available should be used to get the message across. Once process improvement is in operation, it is also needful that developers are kept informed about changes that are about to be implemented and their benefits.

The usual in-house communication channels should be used, such as newsletters, notice boards, etc. to inform users of new processes and the process improvement programme as a whole. For larger scale changes, it may be appropriate to schedule a series of briefings or open door sessions. For an emergency change, it may be necessary to make more direct contact with the developers, using e-mail or similar.

The primary training for DSDM development processes should follow the standard offerings from Consortium-accredited training providers. However, there is a high probability that additional training is needed to suit local customisation of DSDM or any non-DSDM aspects of the development process.

Training following the introduction of process changes may range from little more than publication of the change and notifying development staff of the new release, up to full blown training courses to introduce new techniques (e.g. UML). It may be necessary in some cases to provide for mentoring, particularly for those projects that are first to use the amended processes.

If a team that has already tried/used/pioneered the new elements has instigated the change, it may be possible to enlist the help of team members, as “experienced” users, to help with the publicity and/or the training. Alternatively, if the necessary support is not available internally, it may be necessary to import consultancy support from outside.

### **Funding (Budget)**

The issue of funding and resourcing must be sorted out before an improvement initiative begins (whether this is a major process improvement programme or a small local improvement initiative). Justifying funding for a Process Improvement initiative may prove difficult since senior management prefer to see justification in the form of direct cost savings. In practice, some process improvements may lead to direct savings but the Process Improvement process itself is more likely to be seen as an indirect contributor and therefore it may be difficult to assess the cost savings or to attribute them back to the process improvement activity.

One means of addressing this issue is by the use of an Assessment Instrument (see above). In addition, the project sponsor and process owners must be active in communicating the importance of process improvement and ensuring it is adequately funded and receives adequate priority.

If process improvement is not given the necessary priority and funding, the likelihood is that personnel will be poached from process improvement initiatives for use on other projects that are deemed to be “higher priority”, with the result that process improvement will eventually fall into disrepute.

## 8 Process Improvement Suitability/Risk List

When DSDM is used as a process improvement lifecycle, the following enhanced DSDM Suitability/Risk List should be used (assuming that DSDM is already accepted in an organisation):

	Suitability Factor	Suitable (Y/N)	Comments
1	(amended) Does the sponsor understand the need for process improvement and does s/he understand the concepts and implications of a process improvement programme?		Commitment and sponsorship are key. Without strong, informed and steadfast commitment and sponsorship from senior management, the effort is doomed from the start.
2	Will the team be empowered to make decisions on behalf of their communities?		An essential feature for process improvement as well as DSDM.
3	Is there senior user commitment to provide end user involvement?		It is essential that users of the process are involved in defining/improving it otherwise it will lack credibility and will be likely to be ignored.
4	Can the organisation accommodate the frequent delivery of increments?		Probably not relevant for process improvement - it wouldn't be a good idea to make changes to processes too frequently.
5	Will it be possible for developers to have access to users throughout the project?		Linked to factor 3 - developers shouldn't develop processes in isolation.
6	Will the development team remain the same throughout the project?		Stability possibly not as important in improvement initiatives.
7	Will the development team have the appropriate skills?		Process developers must be experienced in developing and implementing processes.
8	Will the individual development teams consist of 6 people or less?		The size of the team including users is probably best kept to about 6 people as with other DSDM projects
9	Is there a supportive commercial relationship?		The business may need to accept slight delays in the delivery of applications if a new process is being piloted.
10	Will the project use technology suitable for prototyping?		N/A
11	Is there a highly demonstrable user interface?		The process documentation is the user interface.
12	Is there clear ownership?		No changes from normal DSDM projects
13	Will the development be computationally non-complex?		N/A
14	Can the solution be developed in increments if required?		Same as for normal DSDM projects
15	Has the development a fixed timescale?		Some process improvement activities may be critical but others not. Fixed timescales are not necessary but note that those without deadlines are likely not to progress.

16	Can the requirements be prioritised?		Same as for normal DSDM projects
17	Are the requirements not too detailed and fixed?		Same as for normal DSDM projects
new	Will there be sufficient opportunities to pilot new processes?		Any new processes developed need to be piloted in real situations and reworked depending on the results of the pilot. There is no point in developing processes which can't be piloted soon after development.
new	Has enough thought been given to the alignment of the process improvement program with the organisation's business strategy?		The organisation's mission/vision and business strategy should be the driver of the process improvement programme. If the benefits to the business of the programme are not monitored, managed and made visible then sponsorship may be lost.
new	Is it the right time for a process improvement programme?		A huge percentage of process improvement initiatives fail. Make sure that the conditions are as favourable as possible before you start. Match the scale of the initiative to what can be achieved under current circumstances.

## 9 Glossary

capability	The range of expected results that can be achieved by following a process. A predictor of future outcomes.
key process area	A cluster of related activities that, when performed collectively, achieve a set of goals considered important for establishing process capability, e.g. all the activities related to project tracking and oversight form a key process area
process	A sequence of steps performed for a given purpose, including inputs, outputs and resources needed to perform the process.

## 10 Bibliography

Zahran, Sami, "Software Process Improvement: Practical Guidelines for Business Success", Addison Wesley Longman, 1998

*This is arguably THE book to read on process improvement. It provides excellent coverage of the topic both in breadth and depth and in practicality.*

Pulford, K., Kuntzmann-Combelles, A., and Shirlaw, S, "A Quantitative Approach to Software Management: The **ami** handbook", Addison-Wesley, 1996

*The **ami** Handbook provides a clear and easily understood approach to metrics. It uses a goal-oriented approach which fits very well with the similar mindset needed for successful use of DSDM.*

## Appendix A The Capability Maturity Model

The Capability Maturity Model (CMM) is a model developed in the USA at the Software Engineering Institute (SEI) to assess the capability of an organisation to produce software. It was originally developed so that organisations could assess the capability of their software suppliers but it has since been further developed so that the model can be used for self-assessment within a software organisation. This model defines five levels of maturity for an organisation:

- |                             |  |
|-----------------------------|--|
| <b>Level 1</b> (initial)    | Organisations are described as exhibiting heroic or fire fighting behaviour. Processes are at best invented on the fly and quality takes second place to a usually arbitrary schedule. Fire fighting on overtime is rewarded. There is constant finger pointing, mistrust and low morale at all levels. Organisations at this level are capable of producing good software but this is not the norm. Projects are usually completed late and over budget.  |
| <b>Level 2</b> (repeatable) | Organisations at this level have basic management processes and procedures in place and successes in projects can be repeated by other projects. Projects are able to make reasonable estimates, plans are made and projects are tracked against plans. Although processes are in place, different areas of the organisation may use different processes and procedures. Projects may often still be completed late and over budget but the average level of lateness or over spending is much less than at level 1. |
| <b>Level 3</b> (defined)    | At level 3 processes and procedures are common throughout the organisation (i.e. all projects use the same procedures and processes). Common procedures and processes are identified by selecting those which give the best results and projects are mostly completed to time, cost and quality. Because processes are common, this is the first level at which measurement can begin to be of full benefit to the organisation.   |
| <b>Level 4</b> (managed)    | Level 4 organisations use measurements to improve processes therefore implementing processes which can be proved to be best practice. Processes are under statistical control.   |
| <b>Level 5</b> (optimising) | Level 5 organisations improve processes as they go by identifying defects and putting measures in place to prevent those defects occurring the next time the process is used. Process improvement is institutionalised   |

### Key Process Areas (KPA's)

Above level 1, each level of the CMM defines practices which are understood to be key (Key Process Areas or KPA's) to achieving performance at that level. For each KPA the activities, policies, measurements and abilities which make up the KPA are defined. Examples of Key Process Areas are requirements management, software project planning, software project tracking and oversight, software quality assurance, and software configuration management.

### Assessments

Organisations choose to be assessed against a particular level of the CMM and the resulting report highlights which KPA's are being satisfied and therefore at which level of capability the organisation is currently (for example level 3). The report also details the strengths and weaknesses of the organisation in each assessed Key Process Area.

### Using The CMM To Help Process Improvement Initiatives

- Use the CMM to determine your organisation's strengths and weaknesses (find out where you are)
- Make plans so that the highest priority Key Process Areas are put in place as soon as possible
- When work on the highest priority KPA's is well underway, begin planning work on the next most important KPA's.



- Concentrate on process improvement - not levels.

## Appendix B Software Process Improvement and Capability dEtermination Model

The Software Process Improvement and Capability dEtermination initiative (SPICE) is an initiative sponsored by the International Standards Organisation to develop a standard for software process assessment (ISO 15504). The standard can be used to help determine the capability of a potential software supplier, improve an organisation's own development processes, and determine an organisation's ability to undertake a new project.

The SPICE model defines 5 process categories:

<b>Customer-supplier</b>	The customer-supplier process category consists of processes that directly impact the customer, support development and transition of the software to the customer, and provide for its correct operation and use of the software product and/or service.
<b>Engineering</b>	The engineering process category consists of processes that directly specify, implement or maintain the software products, its relation to the system and its customer documentation.
<b>Support</b>	The support process category consists of processes that may be employed by any of the other processes (including other supporting processes) at various points in the software life cycle.
<b>Management</b>	The management process category consists of processes that contain practices of a generic nature that may be used by anyone who manages any type of project or process within a software life cycle.
<b>Organisation</b>	The organisation process category consists of processes that establish the business goals of the organisation and develop process, product and resource assets which, when used by the projects in the organisation, help the organisation achieve its business goals.

### Capability Levels

The SPICE model defines 6 capability levels which apply independently to each process category:

<b>Level 0</b> (Incomplete)	The process is not implemented, or fails to achieve its defined process outcomes.
<b>Level 1</b> (Performed)	The implemented process achieves its defined process outcomes.
<b>Level 2</b> (Managed)	The previously defined performed process now delivers work products that fulfil expressed quality requirements within defined timescales and resource needs.
<b>Level 3</b> (Established)	The previously defined managed process are performed using a defined process that is based upon good software engineering principles and is capable of achieving its defined process outcomes.
<b>Level 4</b> (Predictable)	The previously defined established process now performs consistently within defined limits to achieve its defined process outcomes.
<b>Level 5</b> (Optimising)	The previously defined predictable process now dynamically changes and adapts to effectively meet current and future business goals.

### Assessment

A SPICE assessment results in a two-dimensional capability profile such that the capability of each process category is identified as being at a particular level. An organisation is therefore reported, for example, as being:

- at level 0 in the Customer Supplier process category

- at level 2 in the Engineering process category
- at level 1 in the Support process category
- at level 1 in the Management process category and
- at level 2 in the Organisation process category.