DIVISION OF COMPUTER SCIENCE

A Frame Work For Business Process & Information Systems Reengineering (BP&ISR)

Version 0

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Introduction

Despite wide spread interest, a growing body of work in the field, and the emergence of a number of business process reengineering (BPR) 'gurus' such as Hammer, Harrington and Davenport, very little guidance is currently available outside the large consultancy organisations on how to carry out BPR programmes (Childe *et al.,* 1994). Few articles on reengineering provide guidance on how to do it (Mumford 1994). Earl (1994) suggests that although a number of BPR methodologies are currently being used and developed, more research is required to evaluate alternative approaches. Maull *et al.,* (1994) report that they have identified over 20 business process reengineering approaches from case study visits to practitioner companies. Although this confirms that different organisations prefer to use different approaches for conducting business process reengineering work, Maull *et al.*, also points out that most of these BPR approaches are centred around process identification, analysis, reengineering and implementation.

Most BPR initiatives will also include reengineering of supporting information systems (ISR). There is even less guidance on how to conduct this ISR work. Often, the ISR work in BPR projects is the more difficult part and case studies have revealed that there is a compatibility gap between business process models and information system models. (Childe *et al.*, 1994, Weerakkody, Tagg & Bennett 1995). Two main reasons for this are, BPR and IS development often proceed independently (Weerakkody, Tagg & Bennett 1995); and process modelling may use different techniques from IS development (Childe *et al.*, 1994). Therefore, it is important to use an approach, method or framework which addresses the ISR element of process reengineering appropriately. Case studies by Wilcocks (1995) have revealed that ISR will be successful when the political and human issues surrounding IS developments are well understood and explicitly managed through adoption of an incremental, prototyping, user-led approach. Davenport & Short (1990) suggest that process flows, particularly manufacturing processes are often the result of historical circumstance and should usually be redesigned before further automation is applied. They also suggest that the IS/IT unit can develop a methodology for IS/IT- enabled redesign which will be influenced by a methodology such as Information Engineering (IE).

This report synthesises current research on business process reengineering and information systems design and incorporates new ideas in a framework of activities to help business process and information systems reengineering (BP&ISR). The framework proposed is based on six phases: project initiation; strategic planning; process identification; process analysis; process reengineering; and process deployment. Each phase is divided into a number of activities which describe how to carry out the BP&ISR work. The framework was developed with particular emphasis on Sri Lankan organisations and the business and IS/IT environment in Sri Lanka. Factors such as the work environment, IS/IT environment, climate for team work, the level of human resource skills, management and employee attitude (i.e., towards change, IS/IT, team work etc.), the financial strength of the organisation, and organisational politics, policies and culture were all taken into account in the design of the overall framework. Therefore, application of the framework will depend on the particular context within which it is applied. Depending on the relevance of any of the factors mentioned above to a particular organisation, the BP&ISR team could adapt different methods or approaches to complete each activity in the framework.

The framework proposed in this report is not a formula for successful business process reengineering. However, it provides comprehensive and useful guidance on a set of activities which can help a prospective BPR team to successfully conduct a business process and information systems reengineering project. This report describes the first version of the framework to be piloted in Sri Lanka.

A Frame Work for BP&ISR

PHASE 1 : Project Initiation
Act 1 : Set the stage for change
Act 2 : Appoint/select the project team
Act 3 : Define project aims
Act 4 : Identify resources required
Act 5 : Obtain authorisation & management commitment
Act 6 : Create a project plan

→ Statement of Authorisation
→ Project Plan

PHASE 2 : Strategic Planning
Act 1 : Examine & confirm/change corporate goals & objectives
Act 2 : Identify stake-holders & examine their requirements
Act 3 : Examine business & IS/IT strategies
Act 4 : Identify strategic problems & opportunities
Act 5 : Change/create business & IS/IT strategies

→ Strategic Objectives
→ IS/IT Strategies

PHASE 3 : Process Identification
Act 1 : Understand & map the current business activities
Act 2 : Identify core business processes & support processes
Act 3 : Identify & prioritise target process(es) to reengineer
Act 4 : Refine/ produce a detailed project plan
Act 5 : Develop an overview/definition of the target process
- Name the process & draft a brief description of it
- Develop a high level 'As Is' map of the target process
- Identify IS/IT elements supporting the process
- Identify key inputs & outputs to the process
- Identify the process participants

Act 6 : Appoint process & sub process owner(s)

→ Target Process Overview
→ As Is map of Target Process
→ Detailed Project Plan
→ Project Goals & Objectives

PHASE 4 : Process Analysis
Act 1 : Identify problems & opportunities for improvement
- Identify & interview key stake-holders
- Refine 'As Is' map of the target process

Act 2 : Evaluate IS/IT support
- Identify IS/IT problems & opportunities.
- Refine 'As Is' map

Act 3 : Benchmark the target process

→ Refined 'As Is' map
→ Problems & Opportunities
→ Benchmark results

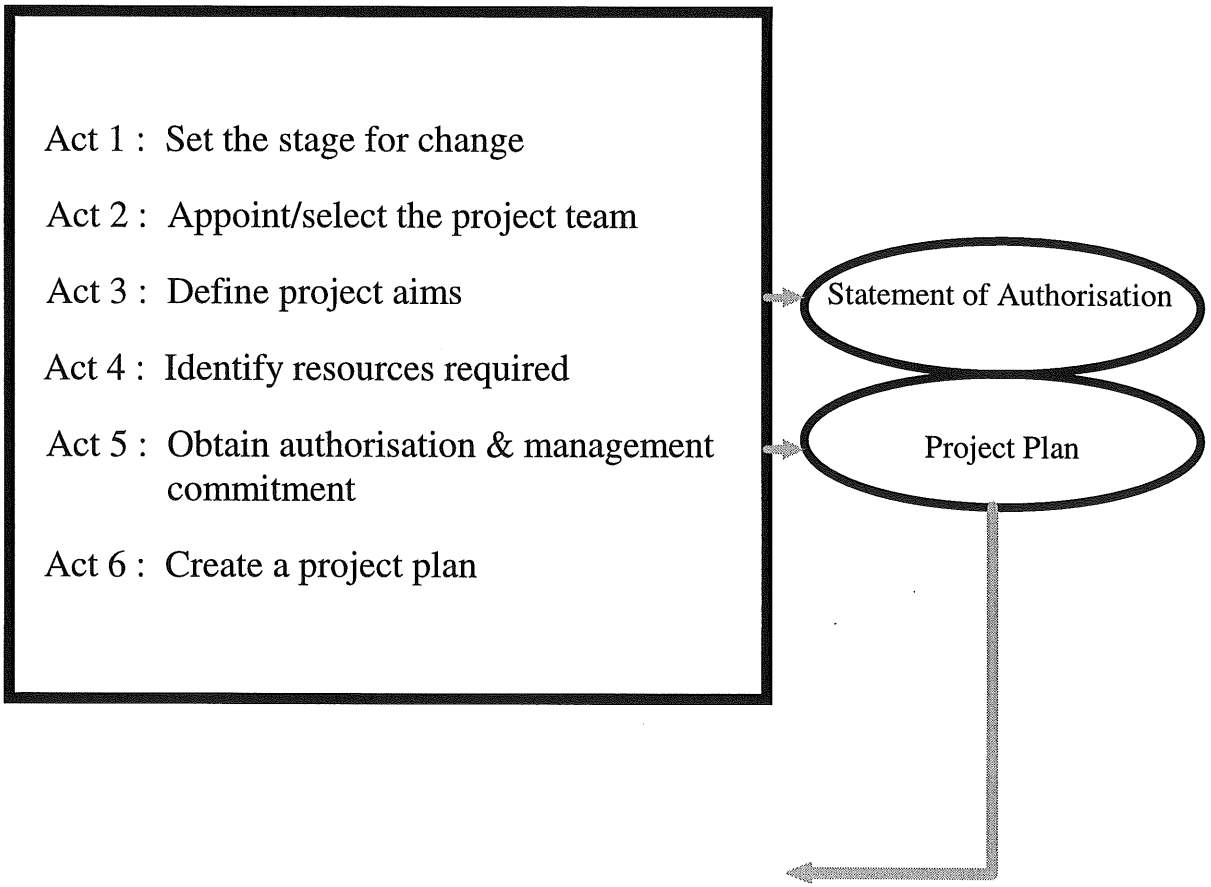
PHASE 5 : Process Reengineering
Act 1 : Define the target process boundaries
Act 2 : Model alternative 'To Be' scenarios of the process
Act 3 : Select & standardise final 'To Be' blueprint of process
Act 4 : Develop business case & obtain commitment
Act 5 : Incorporate / Reengineer IS/IT systems
Act 6 : Develop a process & IS/IT deployment plan
- Identify resource requirements
- Define new staff roles & prepare training programme

→ Final blue print
→ Deployment plan
→ Staff Education Plan

PHASE 6 : Process Deployment
Act 1 : Begin staff training workshops
Act 2 : Finalise process deployment plan
Act 3 : Prototype 'To Be' blue print
Act 4 : Install & test IS/IT systems & procedures
Act 5 : Deploy 'To Be' blue print & IS/IT systems
Act 6 : Introduce & monitor process measurements
Act 7 : Review & continuous process improvement

→ Results of Prototype
→ Performance Details
→ Further Improvements

PHASE 1 : Project Initiation



PHASE 1 Project Initiation

The need to embark on a BP&ISR initiative can arise due to a number of reasons, however the overall objectives of BP&ISR usually revolve around improvement and change. Therefore, during the project initiation phase both the BPR practitioners / consultants and senior management should have a sound knowledge of the overall aims and objectives of the proposed BP&ISR project. The first phase of the framework involves: preparing the background required for organisational change; selecting part of the project team; defining the project aims; identifying resource requirements; and planning for the project ahead.

Activity 1 : Set the stage for change

Management will be initially responsible for setting the stage for organisational change. This involves good communication and conducting an employee awareness programme on change and BPR. This can be started well in advance to the actual BPR work and the main objective should be to create an environment in which business process improvement is encouraged and nourished (Hunt 1996). Case studies have revealed that in successful BPR projects the BPR team begins staff education programmes as soon as the decision to introduce BPR is finalised. The purpose of setting the stage for change is to raise the awareness of BP&ISR in general and the changes associated with it. This should help to minimise the resistance and rejection of the project. (Weerakkody 1995, Weerakkody, Bennett & Tagg 1996).

BPR involves the transition of an organisation from a functionally based one to a process focused one with a strong emphasis on team work, quality and meeting customer needs. Changing an organisation which has been functionally based over the years into a process oriented organisation is one of the most difficult tasks in BPR. (Davenport & Short 1990, Weerakkody, Tagg & Bennett 1995). In most BPR environments the organisation structure remains functionally based while the work environment changes to a process oriented one. (Classe 1995, Jain et at., 1994). One of the first priorities of the process reengineering team should be to induce strategic and middle management to accept BP&ISR as the most appropriate method to improve their organisation. A sound education and training programme should be initiated at this stage to prepare the different stake-holders for the paradigm shift. This education programme should continue throughout the BPP&ISR initiative and in parallel with the six phases of the proposed framework. It can be run solely by the BP&ISR team or jointly by the BP&ISR team and strategic management. However, the later approach would be more effective in the context of convincing stake-holders and obtaining their commitment. It is important that the employees understand why changes are made and the education/training programme should be tailored to prepare the employees to face the following :

- Changes to the organisation structure (i.e. from functional to process).
- Changes to jobs and positions.
- Changes to the work and reporting structure.
- The creation of new roles, responsibilities and teams.

Throughout phases 3, 4, 5, and 6 the BP&ISR team should collect and analyse information regarding the new roles/job requirements, skill requirements, prepare training material and arrange the necessary resources for the new roles. The team should also be responsible for

educating the new role players on their responsibilities, their relationships with employees and customers, and the systems and technology used to support their jobs.

Activity 2 : Select the project team

In order to start a BPR project the organisation has to have the human resources and skills required for process and systems reengineering. In the Sri Lankan context this may be rare and on most occasions the company concerned will have to hire BPR consultant(s). Once the appropriate BPR specialists are identified from within the organisation or from externally (consultants), the next step is the selection of rest of the team. In this context, the BPR consultant or specialist should have the authority to identify and select appropriate members of staff for the team. Strategic management should also have a say in this selection process as they may want to appoint certain key managers to the team. Usually a typical BPR team is made up of around 5 to 10 people and should not exceed 8 to 12 members (Hunt 1996, Ould 1995). The following is an example of a list of individuals that make up a good BP&ISR team:

- One or more BPR specialist / consultants. (essential)
- A senior or middle manager with an overall knowledge of the business. (preferable)
- A key junior executive with an overall knowledge of the business. (essential)
- A key employee with sound experience of the different operational aspects of the business. (preferable)
- One or two IS/IT professionals with knowledge and preferably experience of using BSAD methods/tools and a sound knowledge of both the business activities and supporting IS/IT systems. (essential)
- A middle or operational level manager representing the target process area (selected during phase 3). (essential)
- A key employee representing the target process (process participant) who has a sound operational knowledge of the process. (essential)

NOTE : The above individuals should be efficient, hardworking and committed people with stature that commands the respect of their subordinates. This is significant as these individuals are the 'drivers' or 'movers' of change and they should be capable of convincing and obtaining the commitment of their subordinates for BP&ISR. Most importantly the team should be made up of creative individuals and radical thinkers (Hinterhuber 1995, Watts 1995). Although it is essential to include in the team certain individuals with particular backgrounds, some are optional as suggested in the list above. However, the size of the team will largely depend on the size of the organisation and the BP&ISR project.

The BPR project should also have a project sponsor, ideally a person in a strategic management position with the decision making power to start and terminate projects, and the authority to allocate and withdraw financial and other resources. (Hammer & Champy 1993, Hunt 1996). The other important management role is the process owner. The process owner owns the target process to be reengineered and is overall responsible for seeing that the reengineering work is successfully accomplished. The process owner will act as an intermediary between his subordinates and the BPR team. He or she will also be responsible for meeting process performance measurements and targets after the completion of the project, and for co-ordinating and encouraging the employees participating in the process. The process

owner will have the authority to take any immediate decisions effecting the process. (Weerakkody 1995). The other important role is that of the project team leader. The team leader should be a person with a proven track record of project management skills in addition to experience and knowledge of BP&ISR work, preferably a business person with IS/IT knowledge. Finally the rest of the team should be made up from cross functional disciplines (Hinterhuber 1995, Hunt 1996).

According to Hunt (1996), although there may be differences in a BPR team's tasks, structure, and makeup, they should share the following key characteristics:

- A common vision of what they are committed to achieve.
- Have a well developed strategy for realising its value.
- Have procedures, systems and methods that are appropriate, clear, efficient and adaptable.
- Team members collectively possess the necessary skills, are open, challenging and supportive.
- There is active participation and communication between the team and rest of the company.

Activity 3 : Define project aims

The project team in consultation with strategic management should define the overall project aims and objectives. Both management and the project team must have a clear vision of what it wants to accomplish from BPR and where it wants to go. Similar to the strategic aims and objectives of the organisation, the project aims should be clearly defined. Very often to succeed in BP&ISR the aims and objectives of process reengineering itself should be part of the strategic goals of the organisation (Hinterhuber 1995). Some examples of process reengineering aims are, overcome competitive threat, reduce cost, improve quality, increase speed of service, improve throughput, reduce cycle time, reduce hierarchies, remove functional barriers, remove redundant activities, and most importantly move from a functionally based to a process based organisation and to improve the overall business operations of the organisation. However, whatever the aims it is recommended that management focus more on medium and long term goals in the context of BP&ISR (Edwards & Peppard 1994). Having defined the overall project aims, it will make the BPR team's task of convincing middle and operational level managers and lower level employees of the potential benefits of BP&ISR much easier.

Activity 4 : Identify resources required

The project team will be responsible for identifying the financial, human, IS/IT and other resources required for conducting the BP&ISR work. Once the resources are identified, the project sponsor will be responsible for making available the requirements through one of his managers in the BP&ISR team or the process owner (if one is already appointed at this stage - refer activity 6, phase 3). This activity is particularly important in the light of keeping the variance of estimated costs and actual costs of the project to a minimum. Although it may be difficult to estimate the actual resource requirements at this initial stage, it is important to do so, particularly in the context of encouraging management commitment.

The identification of human resources and the demands on their time and commitment need to be planned properly. The project team leader should make sure that the appropriate managers relieve the team members from part of their day to day work responsibilities. In this context, it

is important to organise the project work plan taking into account the human resources, the level of skills available, and the availability of time etc. Accordingly, the project boundaries, goals and target deadlines may need to be adjusted to suit the time and resource availability.

Activity 5 : Obtain authorisation & management commitment

One of the critical success factors for reengineering success is top management commitment. (Earl 1994, Booth 1992, Edwards & Peppard 1994). Therefore, it is important that the project team secure the CEO's and other strategic management (i.e. the board of directors) approval and backing for the BP&ISR project. It is recommended that the project team seek written authorisation before commencing the project. This authorisation will empower the project team to seek the co-operation of other employees, interview process participants and stake-holders and recruit skilled employees into the project team.

In order to achieve fundamental changes and critical improvements both the initiative to reengineer and the approach to process and systems design work should be top-down, while the implementation of the new designs should be a collective bottom-up approach (Carr & Johansson 1995). Therefore, top management should be committed to drive the BPR concept and the changes sought by process reengineering through the bottom layers of the organisation.

Activity 6 : Create a project plan

It is the responsibility of the project team leader to work with the rest of the team, particularly with team members representing management and the IS/IT unit, to prepare an outline project plan. It should include the resource allocations, tentative time frames for starting and completing sub-projects, project boundaries, deadlines and targets etc. The activities in the framework itself can be used as the foundation for preparing the project plan at this stage. The outline project plan should be refined during phase 3, activity 4, once the target process(es) are identified for reengineering. Therefore, at this stage the plan will be a high level one which will offer an outline idea of the extent of work and resource requirements for the overall project.

Depending on the organisation and the availability of project management skills, the organisation can utilise a established project management methodology such as PRINCE or computer based tool such Microsoft Project. Some large organisations may also have their own project management methods. Although these methods are useful particularly in the context of large scale BP&ISR projects, basic common-sense combined with good planning and forecasting can be helpful when creating a project plan.

DELIVERABLES

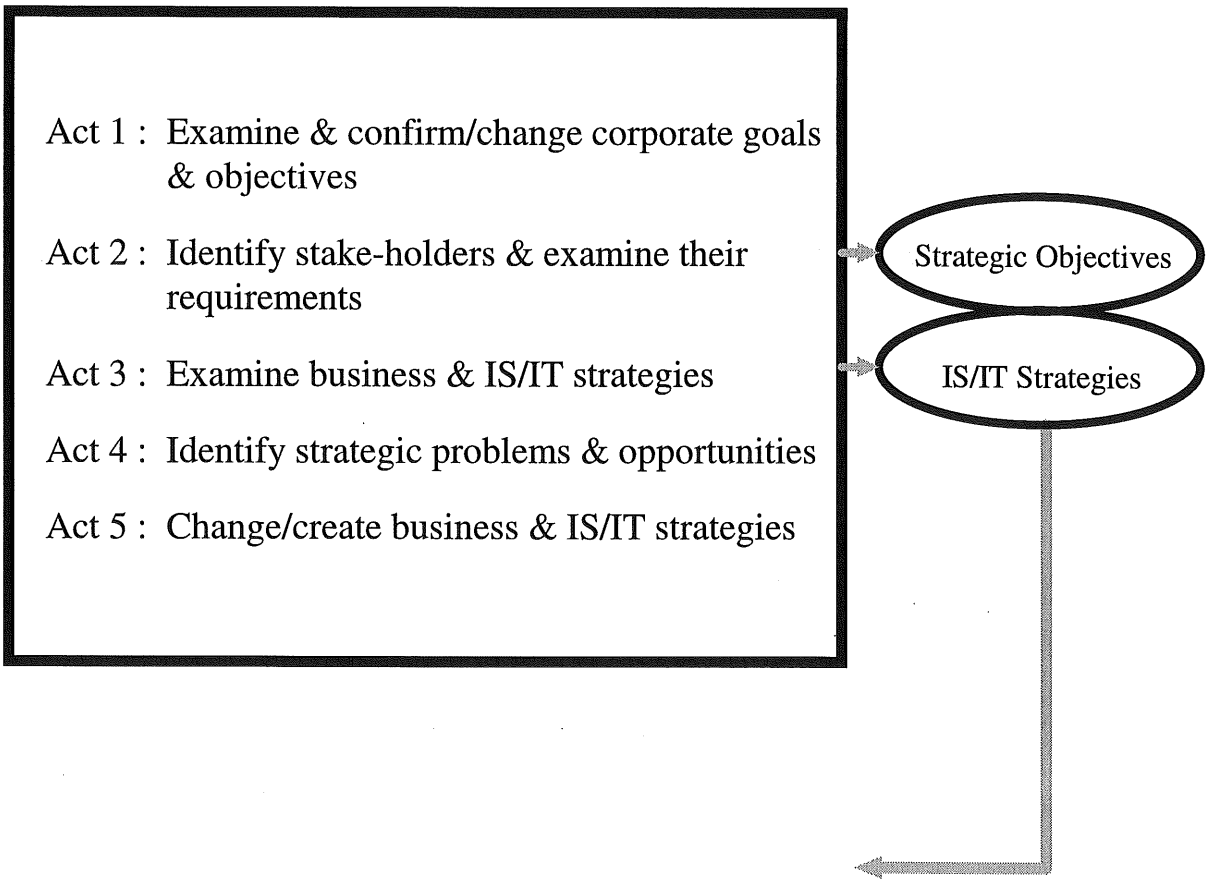
Statement of Authorisation

The statement of authorisation is a document granting the board of director's permission for the BP&ISR team to carry out the BP&ISR work, and to use the company's resources. It can also include the names of team members, resource requirements (i.e. human resources, finances, IS/IT and other assets), and time allocation for the project work.

Outline Project Plan

Refer Activity 6 above.

PHASE 2 : Strategic Planning



PHASE 2 Strategic Planning

This phase is more to with corporate management rather than the BP&ISR team. If the BP&ISR team gets involved in this phase it will usually be to examine the strategic goals of the company and the application of IS/IT in the strategic context. The work of the BP&ISR team will therefore mainly involve, identifying stake-holders and their requirements, examining IS/IT strategies, and identifying strategic problems and opportunities for improvement.

Activity 1 : Examine and confirm/change corporate goals & objectives

During this activity the BP&ISR team has the chance to identify and recommend opportunities for improvement and thereby create an environment for corporate change. However, the decision to implement these improvements/changes will usually depend on the board of directors. This will often depend on the policies and politics of a particular organisation, and the opportunity to carry out this activity can be rare in the Sri Lankan context. It will also depend on the level of changes or improvements sought from process reengineering. If 'business reengineering' is sought (which means changing the direction of business itself), it is then appropriate to change the corporate goals and objectives of the company. However, if cross 'functional' or 'operational' level reengineering is desired, it may only have a negligible influence, or may not have any impact at all on the corporate goals and objectives of the company. In this context, the decision to change the corporate goals can often depend on the current financial and competitive state of the organisation.

Activity 2 : Identify stake-holders and examine their requirements

During this activity the BPR team needs to determine who the stake-holders are (both internal and external, i.e. employees, shareholders, customers and suppliers). Before beginning the actual BPR work it is important that the team identify what information (key inputs and outputs) the stake-holders receive, what their expectations are, to what extent the present business activities satisfy them, and what level of performance the stake-holders would like to see. Useful examples of data gathering methods for this activity are:

- interviews
- questionnaires
- customer satisfaction surveys
- and market research.

It is also important to establish whether the existing information systems meet the customer and user requirements, and identify future IS/IT requirements. Depending on the process(es) selected for improvement, all or some of the supporting information systems may also require reengineering. Completing this activity appropriately will satisfy the stake-holders and will also help to avoid user resistance to new or changed processes and systems.

Activity 3 : Examine business & IS/IT strategies

This activity is connected to activity 1 above and can be done in parallel with activity 1. Before starting on the actual process reengineering work the BP&ISR team should have a good understanding of the organisation's business and IS/IT environment, and this activity will help

to obtain the required level of understanding. A combination of methods such as, interviews with key employees and examining documents such as annual reports, company profiles, mission and policy statements can all be useful in this context.

This exercise is particularly useful for evaluating whether the company's IS/IT strategy is in line with its business strategy. However, as described earlier reengineering business and IS/IT strategies will depend on the level of changes or improvements sought from BPR, and a range of other factors such as, availability of IS/IT skills, management attitude to risk, the competitive level and financial strength of the organisation, and company politics and policies.

Activity 4 : Identify strategic problems and opportunities

This activity is again associated with both activity 3 and activity 1 above. The BPR team should look for any problems or any areas that may cause future problems while examining the business and IS/IT strategies. They should also look out for any opportunities for improvement. At this stage of the project the team should look at the business at a high level and the detailed analysis of problems can be left until the process analysis phase (4). The purpose of this activity therefore should be primarily to identify potential areas of the business which may need reengineering. This will also help when deciding on which specific target process(es) to select for reengineering in phase (3). Once the problem areas or opportunities for improvement are identified they need to be prioritised before deciding on which area or process to improve. Simple criteria such as impact of the specific area on: the stake-holders; profitability; speed of service; cycle time; quality; improving work environment; etc., can be used for prioritising the problems. However, the final decision may depend on which business processes the management wants to reengineer.

Activity 5 : Change/create business & IS/IT strategies

As explained in activity 1 above (phase 2), this activity will mainly depend on the level of change expected from BP&ISR. If management decides to pursue strategic change in the context of high level business reengineering, this will involve business and IS/IT strategy change. However, if low level cross functional changes, such as, improvements to the current work procedures and modifications to information systems are the only type of changes sought from BP&ISR, this will not involve (or may involve only minor) change of business or IS/IT strategy. Therefore, the BP&ISR team on its own will have little influence over changes effecting business or IS/IT strategy, and their role at this stage would only be to convince the board of directors of the need for change in the context of business and IS/IT strategy.

DELIVERABLES

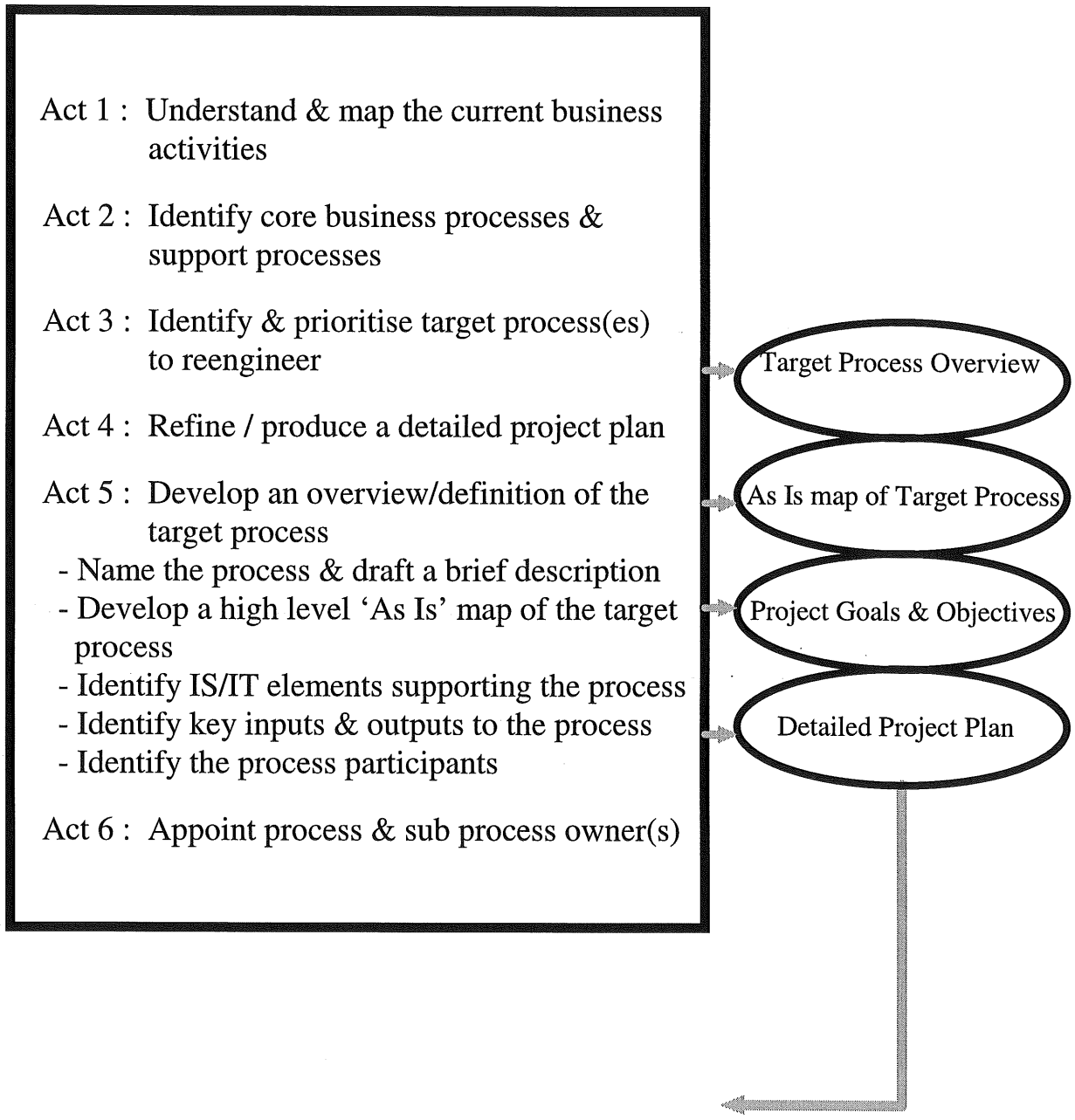
Corporate Objectives

If the company's corporate goals and objectives are changed or new ones introduced as a result of BP&ISR, a statement outlining these changes should be prepared and distributed among key stake-holders.

IS/IT Strategies

It is important that key stake-holders understand the company's IS/IT strategy and how it relates to the business. The new and changed IS/IT strategies can be outlined in a separate statement and distributed among key strategic, middle and operational level managers.

PHASE 3 : Process Identification



PHASE 3 Process Identification

If the organisation has had no previous experience of BPR, TQM or any other quality related initiative, it will very likely be functionally based and have a hierarchical organisational structure. Therefore, one of the main tasks of the BP&ISR team is identifying 'processes' in the context of the organisations current business activities and work procedures. Phase 3 also involves prioritising and mapping these business processes, particularly the ones which need reengineering.

Activity 1 : Understand and map the current business activities

Once specific areas of the business are established as requiring improvements (phase 2, act. 4), the BP&ISR team can start to identify the boundaries, examine and map the business activities perceived as problematic within the identified boundaries. At this stage of the project, any documentation about how the current business activities are performed can be helpful in the context of process mapping. However, an organisation without prior BPR experience is most likely to be functionally oriented, and may not have any documentation of the current business 'processes' readily available. Therefore, it is important to map the current business activities, at least within the identified boundaries, with a view to understand them before starting to reengineer.

The BP&ISR team can make use of one or a combination of the following approaches to gather information required for activity 1:

- Structured (employee) workshops
- Interviews
- document reviews
- Brainstorming sessions

Mapping / Modelling the Business Processes

Mapping of the current business and IS/IT activities can usually be done at a high level (context and level 1 process diagrams) at this stage. For this purpose, the BPR team can use one of a number of process mapping methods or tools currently available in the market (refer appendix A), structured business systems analysis and design (BSAD) methods, or a combination of conventional flowcharting and data flow diagramming techniques. This usually will depend on a number of factors, such as, level of business and IS/IT skills in the organisation, the availability of and the exposure to process mapping and BSAD methods, management attitude (commitment), and the financial capability to invest on these methods / tools and the associated training of staff.

With the increased interest in business process reengineering, a number of new process mapping software products are beginning to emerge. However, the simplest process mapping method is using pencil and paper, particularly when trying to begin a process mapping effort. After starting with pencil sketches that describe the business activities as boxes, this can then be expanded to writing the process block-diagram information on sticky labels and pasting them on large sheets of paper or a wall (Hunt 1996). This provides a broad picture of the overall process mapping effort and is often sufficient to begin process improvement. The sticky label method is flexible and the process mapping team can move the activity boxes

around and also identify priority areas for improvement. Some of the automated tools available vary from simple flow chart based to IDEF (Integrated computer aided DEFinition) where the ideas of process mapping is based on structured analysis, to ABC tools (Activity Based Costing), and process simulation products (Hunt 1996).

IDEF software tools provide a disciplined way of graphically representing the detail structure of both existing and proposed processes and how they relate to one another. They include a hierarchy as a basic element of its process mapping capability, and it can also be effectively linked to process simulation and process analysis efforts. The process simulation software provide an effective means to examine potential process improvements and implementation issues before investing on resources for BP&ISR - once the 'As Is' map is modelled the simulation software will help to answer the 'What-If questions. The other widely used process modelling software based on Activity Based Costing provides techniques that are capable of measuring both the cost and value of processes, activities, resources and objects (Hunt 1996).

Activity 2 : Identify core business processes and support process(es)

Once the business activities are documented in a process map it is easy to recognise which activities make up which 'processes'. After identifying the different processes and their boundaries, the BPR team will have to work with senior management to distinguish what the core business processes and the support business processes are, the interrelationship between these processes, and the key activities involved in each process. The core business processes are usually the ones which the company's business is centred around and which are critical (key) to achieving the company's mission and objectives. The support processes are the ones which help to sustain the business activities in the core process by providing inputs and resources to them.

In some BPR environments, particularly when an organisation is faced with performance problems or the threat of competition, often management will have an idea of where the problems are or which areas of the business needs improvement. The problems or opportunities for improvement can be within or outside the core process boundaries. However, most successful BP&ISR initiatives are centred around core processes or sub-processes that are directly related to the core process. Yet, small or medium size BPR&ISR projects can also be centred around non-core processes (operational and cross functional), particularly in the context of improving day to day work procedures and IS/IT systems.

Activity 3 : Identify & prioritise target process(es) to reengineer

The BPR team leader together with strategic management should decide on the process(es) and the products or services on which to focus the reengineering effort. When selecting the target process(es) the team can focus more on identifying known problem areas, prioritise them, and choose the business areas that provide the most significant opportunity for business survival or improvement (Hunt 1996). In some cases the initiative to introduce BP&ISR originates as a result of performance problems or competitive threat. Therefore, on these occasions management will be aware of which processes to focus the reengineering effort on. If the BP&ISR project is focused in the context of solving performance or work related problems the target process(es) can be prioritised depending on the nature and severity of the problems. However, if the objective of the BP&ISR effort is improving performance, speed or quality of

services and products etc., the following criteria can be helpful in the context of prioritising the target process(es):

- Its impact on improving customer satisfaction
- Its impact on increasing company profits
- Its impact on gaining competitive advantage
- Its impact on improving the quality of products
- Its impact on improving the quality and speed of service
- Its impact on improving the work environment
- Its impact on improving the IS/IT environment

Activity 4 : Refine/produce a detailed project plan

Once the target process(es) are identified for reengineering the team can either concentrate on amplifying the initial project plan produced during activity 6 in phase 1, or producing a new detailed project plan of how to proceed with the actual process reengineering and deployment work. As described in phase 1, a separate project management method can be used for this purpose. This will be helpful particularly in the context of large scale BPR projects involving a large number of processes, resources and which extend across organisational (subsidiary) boundaries. The detailed project plan should include the following:

- A breakdown of sub-projects and details of plans.
- Consolidation of sub-project plans into the overall project plan.
- Targets (both normal and stretched), deliverables and milestones for each sub-project and the overall project. (A stretched target is usually a contingency measure which provides the project team with a couple days/weeks grace period to meet project targets in the event of being behind schedule due to unavoidable circumstances).
- The time, effort and resource requirements for achieving the targets and milestones.
- Commencement and completion dates for each sub-project and the overall project.

The framework itself can be used as a project plan by allocating targets, resources, time and effort for each phase and activity in it. Similarly, commencement and completion dates can also be assigned for each phase and activity in the framework which can then serve as a typical project plan to the BP&ISR team.

Activity 5 : Develop an overview/definition of the target process

This activity establishes the objectives and functions of the target process. This will involve identifying the inputs and outputs to the process, the source of inputs and the destination of outputs, the departments and individuals that are involved in executing the process, and the information systems that support the process.

- Name the process & draft a brief description of it

It is important to identify the target process(es) by a meaningful name which depicts the business activities within the process. Abstract names such as marketing, accounting and sales should be avoided, but a name that illustrates the business activities in the context of any one of these business areas selected for reengineering should be used instead. In summary a single glance at the name of the process should clarify what business activities the process represents.

- Develop a High level 'As Is' map of the target process

This can usually be done by using the experience and business knowledge of the team members. If the team feels that this is inadequate, key employees can be interviewed at this stage in order to prepare a correct process map.

The current work flows should be mapped to help understand where the bottlenecks and trouble spots are. The level of detail represented in the 'As Is' model will usually depend on how radical the objectives of the BPR project are. If management prefers incremental improvements, a detailed 'As Is' map can be used as the basis to which improvements are made. However, if fundamental changes are sought, the BPR team should invent new ways of carrying out the work and less emphasis should be placed on mapping and analysing the current work flow. During this activity the BPR team should be aware that, whether it is radical change or incremental improvements that are sought, the 'As Is' map should only be used as a vehicle for understanding the current work flow and not as the only source driving the 'To Be' model. (Refer appendix A for process modelling tools/methods).

- Identify IS/IT elements supporting the process

Modern day business processes are supported by information technology and systems and these IS/IT elements should be identified and recorded in the process overview. Watts (1993) reports that although one should not assume that BPR always involves IS/IT, the implementation of most redesign options usually involves some IS/IT to support the new processes. Often the ISR part of process reengineering can be the most difficult part in the context of technical change (Weerakkody, Tagg & Bennett 1995). Therefore, this activity is significant particularly in the context of identifying legacy systems that require change or the need for new systems to support the target process(es).

- Identify key inputs & outputs to the process

The key inputs and outputs to the target process(es) should be recorded together with their source and destinations respectively. It is likely that some of these inputs, outputs and their destinations will be changed in the light of BP&ISR. Identifying and recording these inputs and outputs will help the BPR team to understand the target process(es), the supporting processes and their inter-relationships better.

- Identify the process participants

This involves recognising the individuals involved in executing the process (i.e. carrying out the activities and work in the context of the target process). The human resource factor is often neglected in BP&ISR projects, as a consequence of which repercussions such as resistance to change, or rejection of new and reengineered processes and systems arise. Therefore, by identifying the process participants the team has the opportunity to concentrate on BP&ISR which results in minimum disruptions or discomfort to the individuals concerned.

Activity 6 : Appoint process & support-process owners

The process owner should ideally be the manager or director in charge of the business function presently responsible for executing the activities that make up the target process. Support or sub process owners can also be appointed depending on the size or extent covered by the core process. Support process owners can be either assistant managers, junior executives or key players involved in performing the activities that make up the support process. The process

owner should be a person who has the authority to take decisions effecting the process, should represent the key process participants, and be involved in and have a thorough knowledge of the day to process operations. He or she should also be a person with innovative ideas who would be able to participate effectively in team work and process improvement efforts.

The process owner should :

- be accountable for process performance results
- co-ordinate with the team to identify support process owners
- allocate process specific resources
- identify the impact of change on his department and individuals and prepare them to face these changes
- initiate and lead the organising of staff education and training workshops
- initiate process reviews and monitor process performance (IBM 1991).

DELIVERABLES

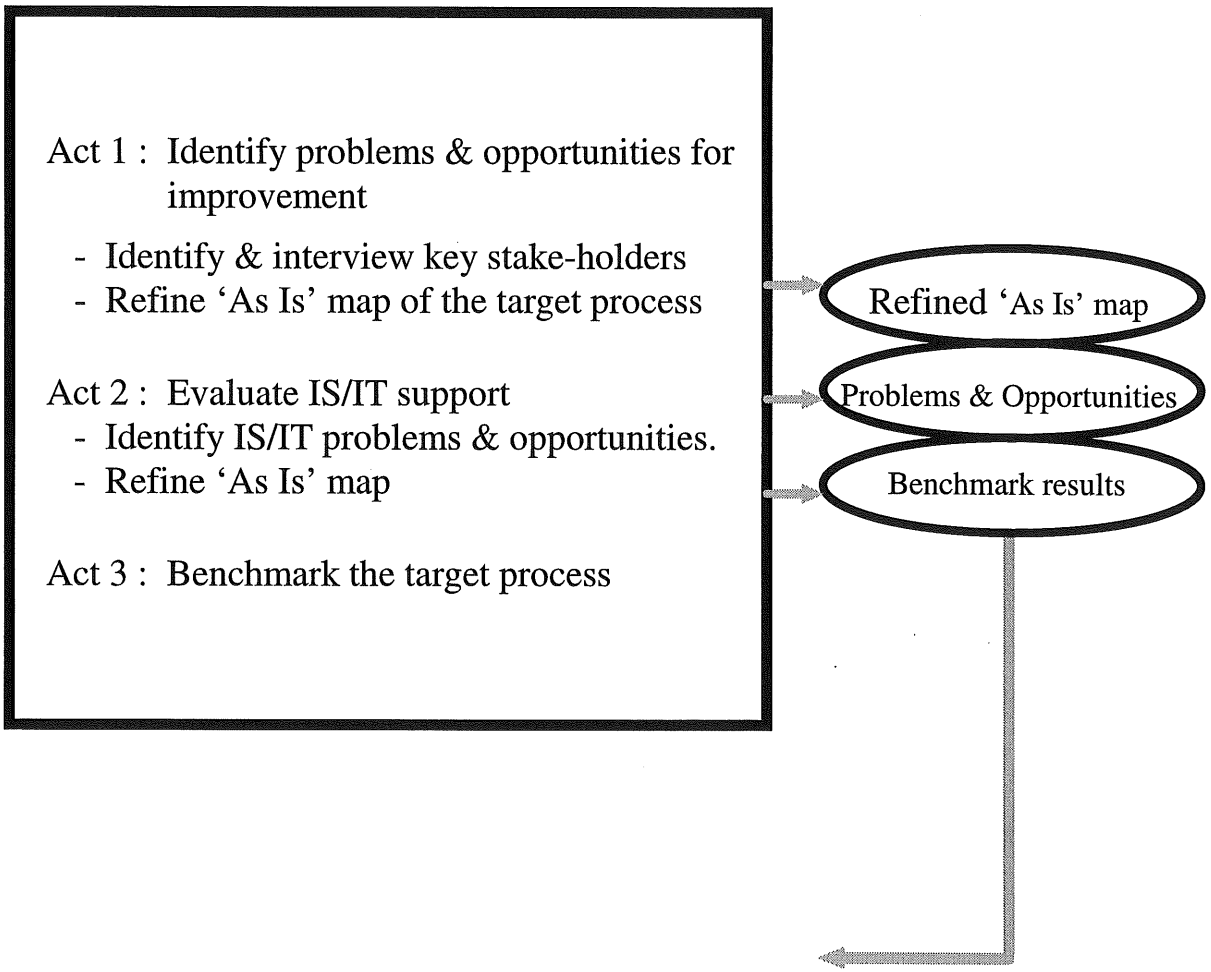
Target Process Overview
This is a statement which describes the overall purpose of the process. As explained in activity 5 above, it describes the key business activities in the process, how they interrelate to each other and other processes, the inputs, the outputs, their source and destinations, the IS/IT components supporting the process, and the human resource elements participating in the process.

'As Is' map of the Target Process
This is a diagrammatic representation of the current business activities within the context of the target process.

Detailed Project Plan
Refer activity 4, phase 3.

Project Goals & Objectives
This statement can be divided into two sections: one describing any changes to corporate goals, objectives and current business and IS/IT strategies, and the introduction of new strategic goals and objectives as a result of the BP&ISR project; and the other outlining the goals and objectives of the BP&ISR project itself.

PHASE 4 : Process Analysis



PHASE 4 Process Analysis

Once a process is targeted for improvement, the team should understand the impact of the target process on the stake-holders, its interactions with other processes, the level of IS/IT involved in the process, and potential opportunities for improvement. The process analysis stage should involve understanding the stack-holder needs and documenting and refining how the process is currently performed (Hunt 1996).

Activity 1 : Identify problems & opportunities for improvement

Activity 1 involves using the data collected in phase-3 to identify problems and opportunities for improvement, and to analyse and evaluate the current state of the process(es) to be reengineered. Some of the data for this activity may have already been collected during phase 2, activities 2 and 4. During this stage the process team should look for typical process problems and non value adding activities and steps, and identify the stake-holders effected by these problems. The team should also identify the root causes of these problems and start thinking of suggestions to improve them. They should also identify the obstacles/bottlenecks that may prevent improving them. This will make the reengineering phase much easier.

The approach and methods that can be used to identify the information required in this activity will depend on factors such as, employee attitude towards supporting the BP&ISR team and their work, red tape, bureaucracy and politics within the organisation, and the skills and experience of the team to conduct interviews, workshops and brainstorming sessions etc. Depending on how much the organisation is handicapped by these factors and the level of influence they have on the organisation, one or more of the following approaches can be adapted: employee interviews; structured workshops (with process participants and key employees); surveys; questionnaires; and participative observation. Simple tools or methods which may assist at this stage are flow charts, process models, fishbone diagrams etc.

- Identify & interview key stake-holders

All important people or organisations who are directly or indirectly involved, or have any stake in the context of the target process or any one of its support processes should be recognised and interviewed. Considering the views of the stake-holders, both internal (process participants, IS/IT users and other employees) and external (customers, suppliers and shareholders), is significant particularly in the context of obtaining their support for the project. Good relations with the stake-holders may also help to safeguard the BP&ISR team against harsh criticism in the event of the BP&ISR initiative failing to meet initial expectations. The stake-holders, particularly the process participants and the IS/IT users are the 'masters' of the respective processes and systems. Often, process participants will be aware of the problems and opportunities for improvement within their processes. Therefore, these interviews results are significant for understanding the target process activities and for developing process maps of both the current and future business processes.

- Refine 'As Is' map of the target process

It can be useful to use a fairly detailed map of the target process in order to understand how the process is actually performed today. This can be helpful particularly in the case of external consultants involved in the BPR work who may need to understand the business before actually embarking on process reengineering. The customer and internal data collected during

this phase, together with similar process information of competitors can be used to refine the current process map. According to Hunt (1996), process mapping should begin with a functional process representation of what the problem is. Hunt suggests that the process should be fully understood before embarking on the design of how the problem will be solved. Hunt points out that without understanding the current environment it is hard to determine how to get to your destination. A good process definition statement according to Hunt should provide a consistent base from which to begin change, and a process map of the current work flow (As Is map) will assure that vital steps have not been missed as well as help to understand the business activities. However, according to the founders of BPR Hammer & Champy (1993), reengineering is about inventing new approaches to process structures that bear little or no resemblance to those of the past. Yet, analysing an 'As Is' map is a significant part in most of the BPR approaches, methods and frameworks used by recent BPR practitioners such as, Hunt 1996, Carr & Johansson 1995, Maul *et al.* 1994 and Mills & Mabey 1993.

Activity 2 : Evaluate IS/IT Support

This involves evaluating the current level of IS/IT support and the performance of the respective systems supporting the target process. The IS/IT professionals in the project team need to play the lead role during this activity. Following are some examples of key activities that needs to be performed by the systems people :

- Identify and understand the information systems in the context of the target process.
- Identify and understand the programs, files structures, data base relationships, and the systems and program boundaries in the context of the target process.
- Establish the inter-connections and relationships between these systems, sub-systems and programs and with other systems beyond the target process boundaries.
- Establish the technical complications such as different hardware platforms and network configurations (seek the assistance of technically competent people if required).

These IS/IT systems (legacy systems) can be evaluated by comparing their performance against user expectations and against original performance targets and deliverables. The legacy systems can also be evaluated against similar information systems / application packages of competitors. By combining these internal and external benchmarks, a set of comprehensive criteria can be formulated by the process team members and other key IS/IT users which can be used to evaluate the IS/IT systems supporting the target process(es).

- Identify IS/IT problems & opportunities.

A part of the IS/IT evaluation process should be to identify problems and opportunities for improvement in the current systems. Therefore, while examining the legacy systems the objective of the project team should be, not only to understand the systems but to identify the problems and opportunities for improving them. These can be either problems or opportunities related to: overall performance; response time and processing speed; quality and contents of outputs; usefulness of the outputs; fulfilment of user requirements; and the overall usefulness and relevance of the system, sub-systems, programs and outputs.

- Refine 'As Is' map

Once the IS/IT elements supporting the target process(es) are identified, the 'As Is' process map (process map showing the current business activities) should be updated with these IS/IT elements. The 'As Is' map as explained in activity 5, phase 3, is useful in the context of

understanding the current situation, and the level of details drawn in this map will depend on whether the BP&ISR project seeks radical change or incremental change. Depending on the process modelling methodology and tools utilised, appropriate symbols or identifications should be used to clearly display the activities that are supported or executed using IS/IT.

Activity 3 : Benchmark the Target Process

The final activity in the process analysis phase involves assessing the current state of the target process by rating its performance against similar processes within the organisation, and against similar processes of competitors. By measuring the current state of the process before reengineering, the team could assess the progress by comparing its performance at a later date.

Two types of benchmarking can be used. These are, *Result benchmarking* which involves determining what performance levels are currently being achieved by others, and *operational benchmarking* which identifies alternative approaches to performing a process. Benchmark data can be gathered from two sources: Internal benchmarking, which means benchmarking a process within the company such as analysing customer satisfaction results, financial performance etc.; and External benchmarking, which is reviewing publicly available data such as annual reports, sales promotion literature, customers and suppliers, seminars, newsletters, data bases, industry reports from stock analyst or consultants and advertisements (IBM 1991).

The process rating method used by IBM is as follows :

Rating	Description
Best	The process outputs are viewed by customers as substantially defect-free. Overall process performance is superior to comparable processes of competitors and other companies.
Healthy	Major process improvements have been made and measurable results have been realised. Environmental and process changes are anticipated to meet future customer requirements.
Stable	The process meets the customer's expectations and is cost effective and timely (effective & efficient). No significant operational problems exist.
Fair	The process may have some operational problems, but the resulting weaknesses can be corrected in the near future.
Critical	The process is ineffective and/or inefficient. The process has major performance problems that require immediate corrective action. (IBM 1991)

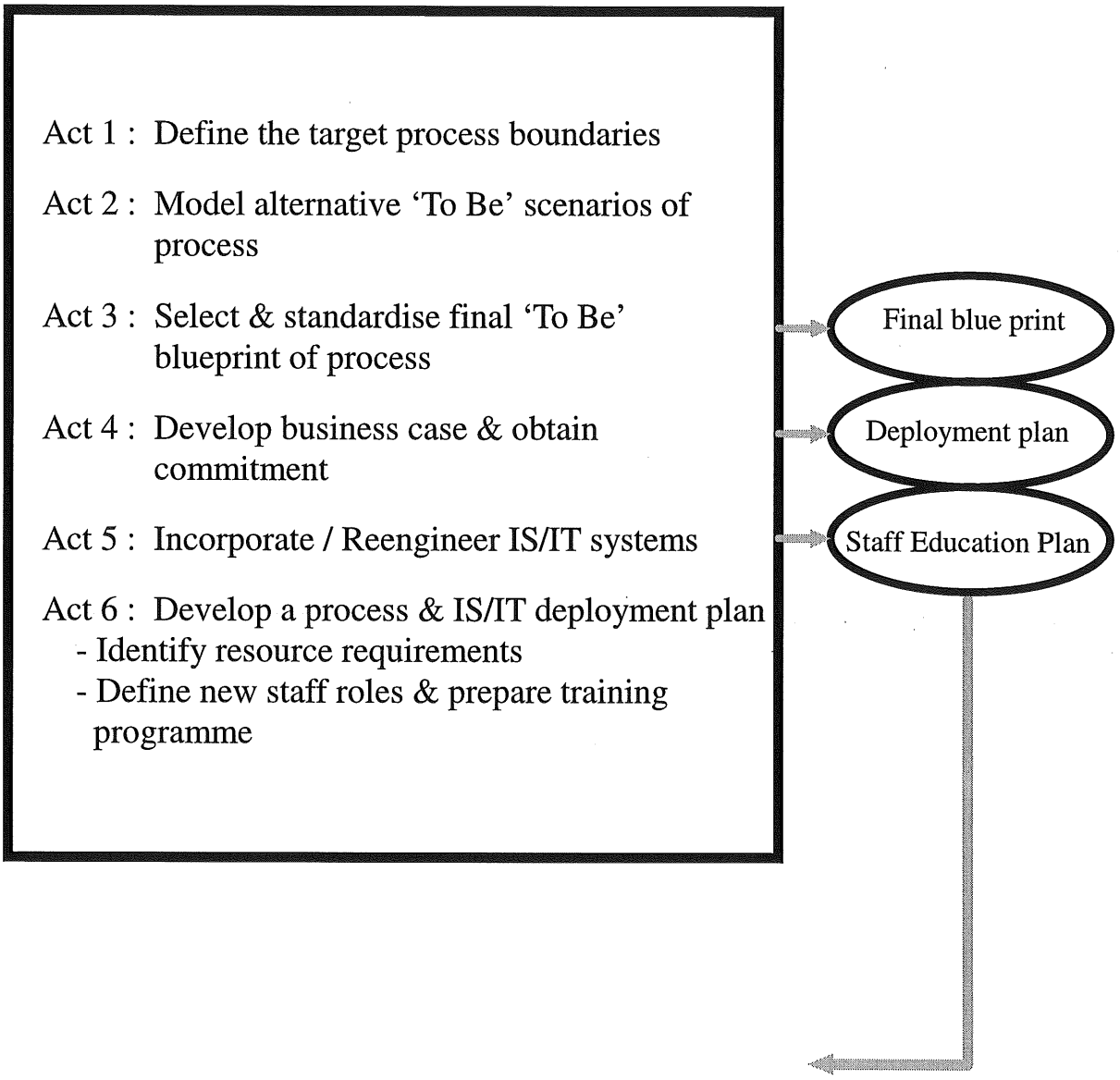
DELIVERABLES

Refined 'As is' map
The refined version of the business and IS/IT activities currently performed in the organisation.

Problems & opportunities
The BP&ISR team should prepare a list of problems faced and details of opportunities for improvement in the context of the current business and IS/IT activities. This list is used as input to phase 5 and can be helpful when prioritising target process(es) to be reengineered.

Benchmark results
This is a statement containing the benchmark results which can be used for evaluating the performance of current and future business activities.

PHASE 5 : Process Reengineering



PHASE 5 Process Reengineering

This phase involves carrying out the actual process improvement work and is the core of the BP&ISR project. The outcome of the overall project therefore will depend largely on the work carried out, and the methods and approach used during this phase. The basic aims of the process reengineering phase should be centred around inventing new ways of doing things, identifying and eliminating redundant activities, eliminating non-value adding activities and improving the remaining processes and supporting information systems.

Activity 1 : Define the target process boundaries

The BP&ISR team should attempt to keep the process and systems reengineering work simple and within a manageable size. Therefore, before starting to develop the 'To Be' process model the target process boundaries should be identified. The project team with the assistance of management if required, will have to decide the extent of the target process boundaries. This may be a difficult task in the light of most business processes being inter-related with each other. However, the project team has to be aware of the time frame and deadlines of the project and therefore will have to define feasible process boundaries. On the other hand, if it is management that decides the extent of the target process boundaries the team could request for appropriate resources and time to complete the project.

Activity 2 : Model alternative 'To Be' scenarios

Time and resources permitting, the process team can design more than one model of the 'To be' process map. This can be done either by an incremental - continuous approach or radical change to the target process. Although alternative designs of the target process will illustrate different ways of achieving the same or similar results, incremental process models and radical models are likely to produce different results even if they are of the same process. A simple example for the difference between two alternative process models would be the sequence of work flow (i.e. activities or steps) within a process. Alternative designs can depict different levels of change (i.e. fundamental or minor changes) to a process and they could also suggest different management and IS/IT systems. However, the decision to produce alternative designs would depend on a number of factors, such as, the availability of time, resources, the size and complexity of the project, management requirements, and the objectives of the BP&ISR team itself. If and when the alternative designs are ready the team should seek the assistance of key stake-holders and management in deciding which model to implement. In this context, it is useful if the BP&ISR team can explain verbally and/or prepare a statement outlining the benefits, advantages and disadvantages of the different options (alternative models), their resource requirements, level of IS/IT support and the time scales for implementing the alternative solutions. This will help management when deciding which model to implement.

Activity 3 : Select and standardise final 'To Be' blue print of the target process

If alternative process maps are available management and other stake-holders will have to evaluate and determine which model is most appropriate and /or desired. The BPR team can consult the stake-holders before deciding the final process model and the most popular model can then be selected. Methods such as brainstorming and group workshops can also help in

deciding the final model. Each alternative process model can be rated against criteria such as cost and ease of implementation, operational cost, quality and performance etc., before the final decision is made.

Once the 'To Be' process map is finalised it has to be standardised so that it will be established as the current best way of performing the business activities defined in the process. This is usually referred to as the 'best practice' way of performing the business process (IBM 1991, Hunt 1996). After the process is accepted as the best practice it can be standardised so that process participants will be doing the same thing and achieving the same results every time. When standardised, the business activities within the process will be treated as the standard way of doing things and therefore the outcomes will also be predictable.

During this activity the BP&ISR team can review with the process owner and other key stake-holders the following :

- Statement of improvement opportunities (Present vs. New).
- Detailed description of the new process(es), activities, steps and both management and IS/IT systems.
- Outline description of roles and responsibilities for each activity, training and resource requirements (further details can be clarified in activity 6, below).
- Outline description of the overall deployment plan with tentative time table.

Activity 4 : Develop business case and obtain commitment

Once the 'To Be' process model is finalised, the team members will have to obtain both strategic management, including the process owner's and sponsor's, and the process participant's commitment to the proposed changes. They should ensure that the proposed changes meet the stake-holders requirements. The BP&ISR team will have to formulate a business case outlining the benefits of the proposed process and why management should proceed with the proposed plans. The main aim of this exercise is to ensure that the new process and supporting IS/IT systems will improve the current situation and meet or exceed the stake-holders requirements. Meetings can be held with the key stake-holders in order to :

- Confirm that the proposed process and systems will meet customer requirements.
- Confirm that the process improvements will work as planned.
- Agree on long and short term performance targets.
- Agree on critical outputs and performance characteristics.
- Review planed changes to the process highlighting improvements and the potential impact on stake-holders.
- Agree on staff training requirements.

A good business case will help the BP&ISR team to convince management and confirm their commitment for the rest of the project which can also help to boost the team's confidence.

Activity 5 : Incorporate / Reengineer IS/IT systems

Often, in BPR initiatives organisations and teams face problems when they are faced with the ISR part of the project. A number of case studies, including one conducted by the author have revealed problems in the context of reengineering legacy systems. Other authors who highlight

the problems of ISR are Moreton (1995), Remenyi (1995), Willcocks (1995), Lissoni (1992), and Edwards & Peppard (1994).

Activity 5 involves reengineering the IS/IT systems identified in phase 4, activity 2. Once the 'To Be' 'process' model is developed the supporting legacy 'systems' can then be reengineered or new systems can be introduced to support the reengineered process(es). After reengineering these legacy IS/IT systems they can be incorporated into the 'To Be' process model. Many BPR practitioners argue that initially the processes should be reengineered which should then be followed by systems reengineering.

The IS/IT professionals in the team should play the lead role during this activity (5). The reengineered target process model has to be compared with the relevant legacy systems in order to identify compatibility gaps and the changes needed to bridge these gaps. Therefore, it is essential that the IS/IT people in the team have a good understanding of the current business activities as well as the legacy systems. Depending on the age of the legacy systems and the extent of process changes expected from the BP&ISR effort, some of the legacy systems may have already reached the stage where reengineering would not be as effective as a new system. In these circumstances it is unavoidable that these legacy systems be replaced by new ones. However, whether it is reengineering legacy systems or replacing them with new systems, both have their restrictions. For instance, information systems reengineering (ISR) will mainly depend on the availability of IS/IT professionals and their level of BSAD skills, while replacing the legacy systems will depend on the amount of money the organisation is prepared to allocate for purchasing new technology and systems, as well as the availability of skilled IS/IT people to develop new systems. In both these scenarios there are trade-offs to be made and the final decision should be taken by management. The BP&ISR team could assist by presenting management with the appropriate facts (i.e. pros and cons of modifying legacy systems and introducing new systems etc.). In this context, the IS/IT unit has to be involved and should provide whatever resources and skills available at their disposal.

In the context of having to reengineer the legacy systems or develop new systems one or more of the following methods / approaches can be helpful :

- Use a structured BSAD method to design and develop the appropriate IS support for the reengineered processes.
- Use a rapid application development (RAD) approach and prototyping, involving working with users, to develop the IS requirements.
- Make use of a defacto systems development (user specific BSAD method) to design and develop the IS requirements.
- Directly modify the software that provide the IS support to the reengineered processes.

In the event of having to purchase new systems, the organisation may have to depend on one or more of the following approaches :

- Purchase an off the shelf package which suits the reengineered business processes.
- Purchase and modify a standard application package to suit the reengineered business processes.
- Purchase a system which is tailor made for the reengineered processes.
- Arrange for external IS/IT consultants to study the IS/IT requirements for the reengineered processes and provide the appropriate solutions.

Activity 6 : Develop a process & IS/IT deployment plan

After the 'To Be' process model is finalised, the process team should draft the process deployment plan. This should include: a time table and detailed steps for prototyping and deploying the reengineered processes and IS/IT support systems; resource requirements for deployment; staff training requirements; and recommendations for measurements. The deployment plan should be reasonably flexible and provide adequate time for resolving process, system and procedural errors.

- Identify resources required

It is the responsibility of the BP&ISR team to identify the resource requirements for the deployment stage and it is the responsibility of management to provide them. These include both human and other resources. For instance, changes and upgrades to information systems (i.e. minor changes that may have been missed out in the earlier phases), new hardware (i.e. cables for networking, new PC's, printers etc.), and new power points, telephones, and furniture are some examples of resources that are often required at this stage.

- Define new staff roles & prepare training programme

The BP&ISR team should themselves be trained and familiar with the reengineered process(es) and standards before they could help the other staff to adapt it. A detailed timetable should be prepared for staff training and the new and changed staff roles should be defined and recommended to management. The staff should then be trained to perform their new roles through a well organised education programme. The education programme for the overall BP&ISR project should have already commenced by this stage, and the specific training requirements for this phase can be incorporated in this programme.

Depending on the complexity of the new and changed processes and the size of the BP&ISR project itself, a user manual can be prepared to help the employees. This manual could provide definitions for the new and changed roles and the appropriate instructions, guidelines and standards for performing these roles.

DELIVERABLES

Final Blue Print

This is the final model of the reengineered business processes and information systems. It should include a reengineered map of the target process(es), guidelines and work instructions for performing the new and reengineered business activities, and a brief description of the new roles and responsibilities in the context of the new and reengineered processes.

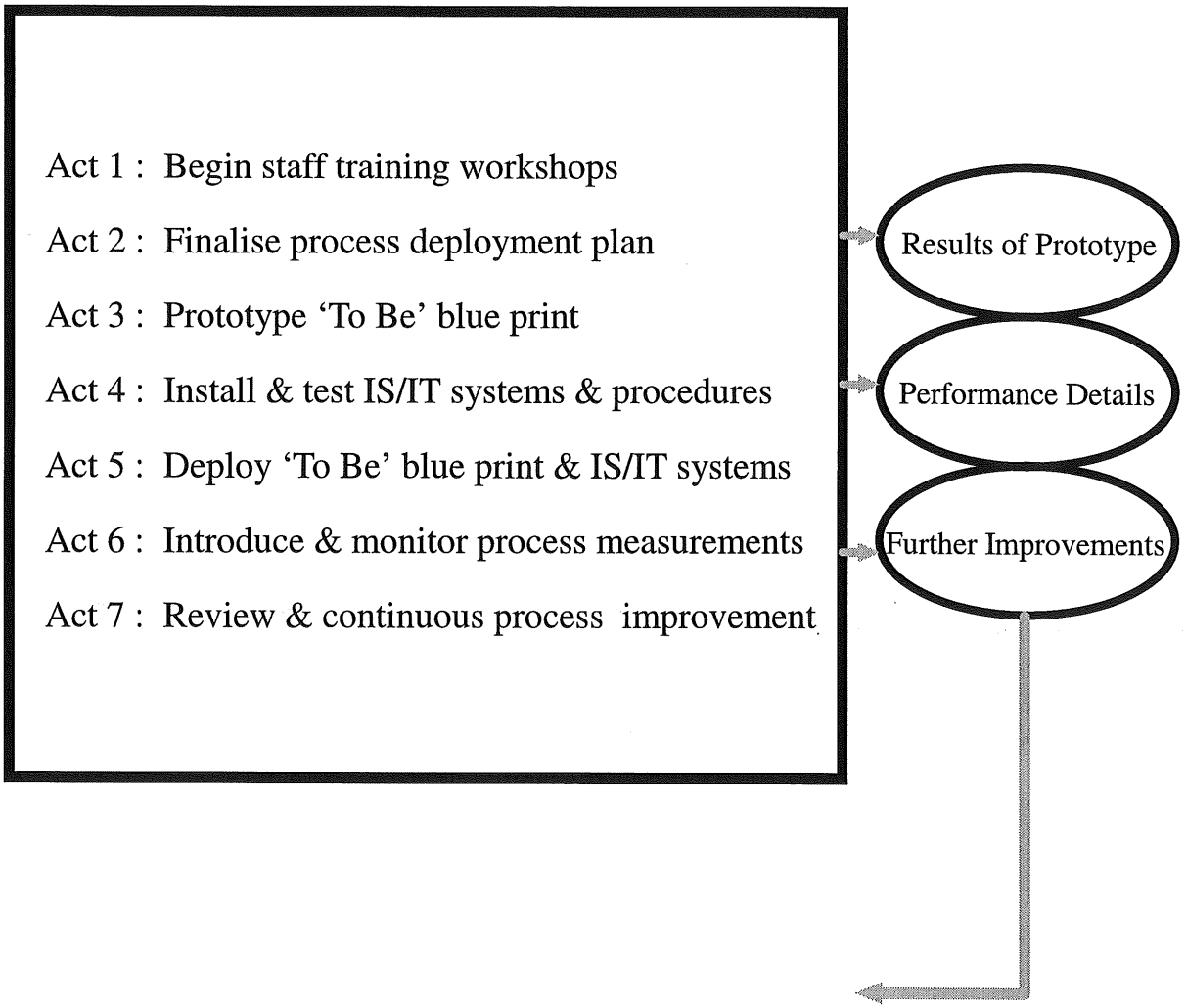
Deployment Plan

This is the document / plan describing the activities that needs to be performed during process deployment. It should also outline the resource (both human and other) and time requirements for the deployment. (refer activity 6, above).

Staff Education Plan

This is a formal document outlining the educational and training requirements and a plan of action to fulfil these requirements. The staff education plan should include a detailed schedule of the training and education programme (workshops) and identify the respective participants. A copy of the same document or parts of it can be used to inform the participants of the training schedule.

PHASE 6 : Process Deployment



PHASE 6 Process Deployment

Phase 6 involves deploying the final 'To Be' blue print of the reengineered process(es) and the supporting information systems. It also involves staff training, obtaining stake-holders (employees, customers, suppliers and shareholders) feedback on the new processes and systems, and then continuously improving them. The process deployment phase can be one of the most difficult in the business process and information systems reengineering cycle. Often, the BP&ISR team and management may have to face resistance and rejection from some process participants and systems users. Therefore, both the project team and management should be prepared to deal with this appropriately. One of the objectives of the ongoing education programme should be to minimise this negative effect by preparing the stake-holders to face the paradigm shift.

Activity 1 : Begin staff training workshops

In addition to the general BP&ISR education and training programme special workshops have to be conducted particularly for the process participants and IS/IT users. These workshops can be started as part of the general education programme and should be run in parallel with the process and systems deployment. Depending on the nature of the business processes and the level of IS/IT involved, part of the training may have to be conducted in a workshop (i.e. class room) environment while part of it may have to be conducted on-site. Team work would be made much easier if one member or part of the project team took responsibility for the general BP&ISR education, and one member (or part) of the team were accountable for the workshops during the deployment phase.

Activity 2 : Finalise process deployment plan

Before starting to test / prototype the reengineered processes and systems, the project team has to make the final adjustments to the deployment plan and obtain the commitment of relevant business unit managers, key process participants and the IS/IT unit. A copy of the process deployment plan should be distributed to the relevant business unit managers as early as possible prior to the test / prototype phase. This will enable these managers to organise the time and resource requirements for the prototype and thereafter the actual process and systems deployment.

Activity 3 : Prototype 'To Be' blue print

Once the process deployment plan has been finalised, the next step involves prototyping / testing the reengineered processes and supporting information systems. This exercise is a must in the context of reengineering projects involving fundamental change. It provides the opportunity to evaluate the new processes and systems as well as the deployment stages. The BP&ISR team could also use this opportunity to identify operational and deployment problems, record important milestones, measure the process performance, and most importantly to learn from past mistakes which will help to avoid hiccups during actual deployment and operations. During the prototyping session the BP&ISR team should measure the process and systems performance to ensure that the new and reengineered processes and systems are delivering the desired results. If any of the reengineered and/or new processes and systems failed to work as expected, the team will have to identify the root cause and revise the

deployment plan and the relevant processes and system accordingly. They will then have to re-implement and conduct a second prototype / test session and repeat the same process over again. In this context, any problems encountered during the prototyping session can be avoided during actual process and IS/IT deployment.

The time frame to operate the process under a test scenario will depend on the complexity and the extent of the reengineered processes and systems. The process team will as usual have to work with strategic management and other stake-holders to decide the time frame.

Activity 4 : Install & test IS/IT systems & procedures

The systems testing can be done in parallel with activity 3 above. At this stage both the hardware and software is tested in the context of the real business environment and it will be the users who do most of the testing. In practice it involves committing the relevant hardware, networks, information system and the related procedures through their phases. Therefore, as with any other information systems testing involving users, a number of minor changes should be expected. Although all new and reengineered IS/IT support is expected to be tested by the system analysts prior to deployment, these problems are usually unavoidable (Weerakkody 1995). Therefore, systems analysts, programmers and technicians will have to be on standby to promptly resolve any problems that may arise. Once perfected the systems should be capable of providing effective and efficient IS/IT support to the relevant process, and meet the standards and performance measurements set for the process.

Prepare The IS/IT Unit

In addition to the IS/IT representatives in the BP&ISR team, it is important that the IS/IT function should participate in the process and supporting IS deployment stages. In the event of implementing new hardware and software, the technical specialist and system analysts will have to train the users and initially work with them for a brief period. Most importantly the IS/IT function will have to change their strategy to facilitate new systems requirements for the new process oriented work environment

Activity 5 : Deploy 'To Be' blue print & IS/IT systems

Once the processes and systems are fine tuned and the prototype/test run has confirmed that they produce the desired results, the new and reengineered systems have to be formally deployed throughout the organisation. The formal deployment can be treated as an extension to the prototype (activity 3), but a formal schedule for process and systems deployment should be prepared covering the following :

- The process and IS/IT roll-out approach (i.e. phased or complete roll-out)
- Deployment locations
- Roles and responsibilities for the roll-out
- Resource requirements
- Key milestones and measures of success

The BP&ISR team has to also make note of any significant problems and issues faced during deployment, so that they can be avoided in any future reengineering efforts. After the formal

deployment and training is completed the project team should closely monitor the progress of business processes, information systems and the employees performing them before handing over the full responsibility to the process participants.

Activity 6 : Introduce and monitor process measurements

Using the data collected in phase-4, target performance levels can be set for the reengineered processes. Once the new processes are implemented and the appropriate standards are in place, the BP&ISR team can continue to measure the performance against the standards, and against internal and external benchmark results and respond to any deviations from them. This should be an exercise which is carried out periodically with a view to assess and improve the process on a continuous basis. It is usually the responsibility of the process owner to monitor the process performance, and both internal and external measures can be used to assess the process and systems performance. For instance, the following criteria can be helpful as process measurements :

- customer satisfaction results
- profitability
- costs
- throughput
- speed of service
- cycle times
- system response time
- number of errors
- quality of deliverables
- number of work related problems

The comparative figures for the above criteria / measurements can be derived from the benchmark results.

Activity 7 : Continuous improvements

Continuous improvements are required to keep up with the changing nature of business and customer requirements, and to sustain the level of performance, quality and appropriateness of the reengineered processes and systems. Periodically performance measurement results should be evaluated and performance improvement opportunities should be identified. Once identified they should be implemented in the context of incremental / continuous improvements with a view to optimise the process. Hunt (1996) suggests that management should reassess the process performance to determine how well the actual performance matches their performance improvement goals. Alternative approaches can be used to identify process improvements, such as, brainstorming sessions, process participant work-shops and evaluating process maps etc. As the term 'continuous improvement' suggests, it is a never ending cycle and it forms a major part of most BP&ISR projects.

DELIVERABLES

Results of the Prototype/test

It is recommended that the results of the prototype/test session be documented. This will be helpful in the context of the actual process and systems deployment and future BP&ISR projects. Examples of data that can be recorded are, difficulties encountered during process and IS/IT deployment, significant milestones achieved, process and systems problems faced during the prototype run (operations), opportunities for further improvement and other relevant comments such as staff reactions etc.

Performance Data

Process and systems performance data can be recorded using a process/system run chart. A run chart can be used to identify whether the processes and systems are meeting expectations and to identify any shifts in process performance (IBM 1991).

Further improvements

While continuously monitoring the processes and systems, the BP&ISR team should document further opportunities for improvement. This document can then provide the inputs for the project team's continuous / incremental improvement efforts.

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Appendices

Appendix A

The following list outlines examples of popular process reengineering case tools available in the market.

Simple Flow-Chart Graphic Software

Product Name : *VISIO 3.0*
Vendor : Shapeware Corporation
520 Pike Street, Suite 1800, Seattle, Washington 98101-4001
Tel : (206) 521 4500, Fax : (206) 521 4501

Product Name : *ABC SnapGraphics 2.0*
Vendor : Micrografx Corporation
1303 Arapaho Street, Richardson, Texas 75081
Tel : (214) 234 1769, Fax : (800) 733 3729

Product Name : *Process Charter 1.0 for Windows*
Vendor : Scitor Corporation
333 Middlefield Road, Menlo Park, California 94025
Tel : (800) 549 9876, Fax : (415) 462 4201

IDEF Process Mapping Products

Product Name : *Business Design Facility (BDF)*
Vendor : Texas Instruments
6620 Chase Oaks Blvd., MS 8507, Plano, TX 75086
Tel : (214) 575 4942, Fax : (214) 575 4144

Product Name : *BPWin*
Vendor : Logic Works, Inc.
1060 Route 206, Princeton, NJ 98540
Tel : (609) 243 0088, Fax : (609) 243 9192

Product Name : *Design/IDEF*
Vendor : Meta Software Corporation
125 Cambridge Park Drive, Cambridge MA 02140
Tel : (617) 576 6920, Fax : (617) 661 2008

Process Simulation Products

Product Name : *OPTIMA*
Vendor : AdvanEdge Technologies, Inc.
10170 S.W. Hedges Court, Tualatin, Oregon 97062
Tel : (503) 692 8162, Fax : (503) 691 2451

Product Name : *ITHINK*
Vendor : Performance Systems, Inc.
45 Lyme Road, Suite 300, Hanover, New Hampshire 03755
Tel : (603) 643 6936, Fax : (603) 643 9502

Product Name : *PROMODEL and ServiceModel*
Vendor : PROMODEL Corporation
1875 South State, Suite 3400, Orem, UT 84058
Tel : (801) 226 6036, Fax : (801) 226 6046

Appendix B

Glossary of Terms

BP&ISR	Business Process and Information Systems Reengineering
BSAD	Business Systems Analysis and design
IE	Information Engineering
ISR	Information Systems Reengineering
RAD	Rapid Application Development
TQM	Total Quality Management

Benchmarks — A quality target to shoot for (where the company should be) based on customer requirements, the nature of the process, and the best comparable models from around the world (IBM 1991).

Benchmarking is the continuous process of measuring products, services and practices against the toughest competitors or against companies recognised as industry leaders (Rank Xerox 1991).