GENERIC IT TRAINING: A PROCESS PROTOCOL MODEL

A process protocol model

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Abstract

Construction companies have to strategically structure and focus their Business Strategy (BS) in order to maximise benefits. This requires detailed knowledge of the operating environment, stakeholders, resource implications and the management of risk. Information Systems (IS) and Information Technology (IT) can perform a crucial role by supporting and underpinning this strategy. A key element of the IT strategy is generic and specific IT training. These requirements must consider many issues, not least, resource implications, organisational culture, infrastructure and disparate training needs. These needs may also encapsulate both group and corporate issues, in addition to individual, operational, managerial and strategic requirements. This research investigates the use of a Process Protocol training model to analyse the key sequential stages (gates) and links needed, to satisfy, or close, the 'performance gap' between the BS, IS Strategy and subsequent IT Training Strategy.

Keywords: Business Strategy, Information Technology Training, Process Protocol

1 Introduction

The fragmented nature of the construction industry (Emmerson, 1962; Banwell 1964; Latham, 1994) has been cited as a primary factor that adversely affects performance and productivity. Many contemporary 'change' initiatives have tried to improve performance by focussing on time, quality or cost elements. However, 84.4% of commonly associated problems in the construction industry are *process* related (Kagioglou et al, 1998), and not product related. Whilst the use of IT in strategic planning require major management initiatives to deliver

strategic objectives (Rockart et al, 1996), these have undoubtedly assisted managers assess the capability of their current services and helped determine the IT and business maxims needed to either clarify gaps between what exists and what is required, or find if they have achieved a reasonable match between actual and desired capabilities (Broadbent and Weill, 1997). However, cultural boundaries within business departments often cause problems (Taylor-Cummings, 1998; Grindley, 1992; Mockler and Dologite, 1995), and 'gap' analysis requires a whole series of strategies to be formulated and implemented in order to facilitate the appropriate courses of action (Venegas and Alarcón [3]).

It is important to note that manager's decisions affect how the IT strategy is shaped, understood and accepted by the organisation (Mockler and Dologite, 1995), and interaction between process and IT can assist in the strategic planning process (Hinks et al, 1997). Design strategies for implementing IT solutions into the workplace must therefore include the adoption of new management strategies in order to be successful (Korac-Boisvert and Kouzmin, 1995). Whilst there is a need for mangers to align their IT strategy to the company's IS strategy; more fundamentally, it is equally important to ensure that the IT training strategy is aligned to the IT strategy and BS. This research demonstrates the use and application of Process Protocol applied to a generic IT training model, and assesses its contribution to performance gap analysis.

2 The business strategy and IT training strategy

Construction companies are increasingly aware of the importance of linking their IT support infrastructure to the BS. However, Goulding and Alshawi (1997), noted that whilst construction executives have an exceptional knowledge of their BS, they did not have sufficient knowledge of IT, its capabilities, applications, or association with the IS strategy. Conversely, operational personnel had superficial knowledge of their company's BS, but had a strong knowledge of IS/IT needs and applications. This relationship, indicated in Figure 1, highlights the importance therefore of matching training needs to performance expectations. Construction organisations must therefore critically analyse their BS and investigate whether the current IS support systems are appropriate to meet this strategy contemplating the implications on the IT training strategy.

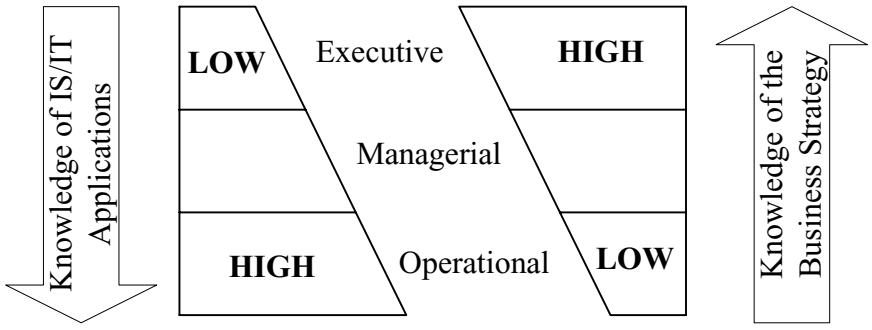

Fig. 1: Relationship between IS/IT, the BS, and Personnel

An organisation's BS should clearly identify the company's key objectives and priorities for a particular timeframe. This strategy is usually governed by numerous factors, and often includes competitor analysis and any immediate challenges facing the company. This strategy should therefore highlight the operational, managerial and strategic needs required to satisfy the BS, the needs of which require the organisation's operatives to have the necessary skills needed to undertake the tasks required. Any deficiencies in skills must be aligned to a suitable training strategy, which is subsequently linked to the BS, indicated in Figure 2.

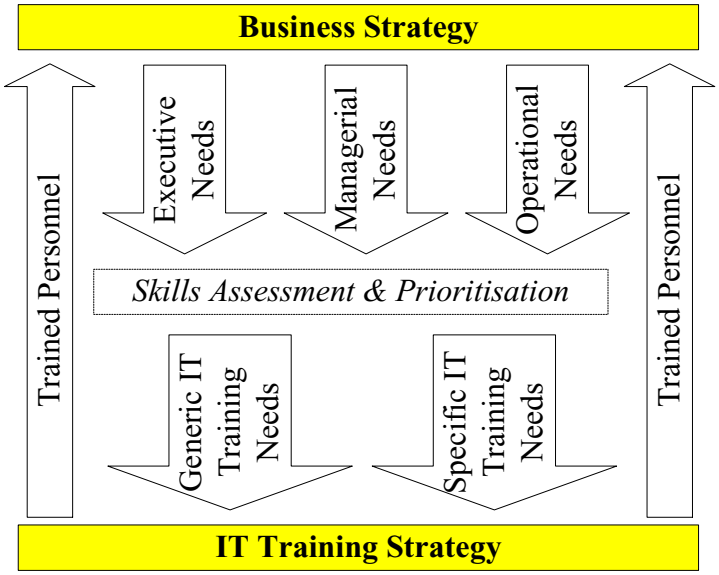

Fig. 2: Relationship of the business strategy to the IT training strategy

Heng (1996), noted that new advances in IT often place demands on personnel, particularly when training is required; but these training and development programmes can often facilitate and provide changes in organisational behaviour, which in turn can enhance the organisation's capability to survive (Kessels and Harrison, 1998). However, whilst IT can help facilitate and deliver the core BS (Moreton and Chester, 1997), employees will require education and training in order to gain new skills for their changed roles (Warszawski, 1996). Training is therefore seen as a key element for improved overall performance (Chang and Cox, 1995), and this management tool is instrumental to addressing skill deficiencies (Krogt and Warmerdam, 1997). Training programmes should however be integrated into the long-term needs of the company, creating enhanced synergies (Kumaraswamy, 1997).

The training strategy within construction organisations should make provision for all generic needs (used by all), and specific needs (used by specialists or group requirements). Feeny and Willcocks (1998) noted that understanding IT capability can deliver core capability, and Mata et al (1995), identified that technical and managerial IT skills were fundamental to delivering any perceived competitive advantage; where technical IT skills are crucial to delivering core activities, and managerial IT skills are essential for exploiting IT

and enhancing business performance. Training can improve company performance, but requires formal procedures for measuring its impact on the BS. Feedback on training initiatives can initiate training (or feedback) loops, but no specific mechanism seems to exist which integrates (or evaluates) IT training directly into the BS.

3 Process modelling

Process modelling is a procedure used to analyse complicated structured and unstructured relationships. It is particularly useful for understanding points of view, identifying critical information flows and data relationships. Some of the main process models used are Data Flow Diagrams (DFD); which concentrate on information flows, Integration Definition language 0 for Function Modelling (IDEF-0) and Role Activity Diagrams (RAD); which are popular for modelling problems. The term 'process' can be defined and classified in many ways, especially in the construction and manufacturing industries. However, notwithstanding these differences, the fundamental concepts rely on transforming inputs to outputs, as indicated in Figure 3. Therefore, by using process modelling, many complicated and complex stages can be easily broken down into readily identifiable processes for ease of understanding.

Fig. 3: Components of process

Whilst Shirazi et al (1996), noted the importance of project organisations suitable for associated environments, it is important therefore that construction companies model their business processes before they can automate and improve them. Managers can apply process modelling with some assurance that the actions taken will improve process performance (Soares and Anderson, 1997), and thus, process modelling is a valuable tool for clarifying and understanding processes within organisations.

4 Process protocol

Process Protocol (PP) is a modelling tool capable of representing all diverse parties interested in a process, the flexibility and clarity of which allows generic activities to be represented in framework which encompasses standardisation. This framework encourages users to appreciate process more easily; affording improvements in communication and co-ordination, the control and management of resources, and the adoption of 'shared vision'. Encompassing change management precepts, it allows components of a process to be separated into key phases, based on five key principles, namely, Progressive Design Fixity; Consistent Process; Co-ordination; Stakeholder Involvement/Teamwork; and

Feedback. PP was developed to improve the collaboration between companies in the construction industry, and provide a framework that would improve overall effectiveness. The key attributes and of this framework encompasses the following concepts:

- **Activity Zones**: A structured set of sub-processes designed to support the solution.
- **Deliverables**: Outputs from project and process information, used to create the *Phase Review Report*.
- **Phase Review & Stage Gate Processes**: Generic processes within the stages, separated by decision gates (*Phase Review Meetings*) needed to fix and approve the information prior to progression.
- **Gates & Phase Reviews**: Project and process review points, used to examine progression, dependant upon predefined criteria. Gates are either *Hard* (prevent progression) or *Soft* (accept conditions and allow concurrency).
- **Legacy Archive**: Mechanism for storing, recording and retrieving project and process information.
- **Phase Review Report**: Document of deliverables presented at the phase review gates, the information of which is subsequently stored in the legacy archive.

The generic nature of PP can be applied and adapted to suit many disparate and diverse project environments, and Cooper et al (1998), clearly demonstrates the application of PP to generic design and construction processes. Processes must be managed and controlled in a consistent and predictable manner, and PP offers a framework for improving communication and process management within the construction industry (Kagioglou et al, 1998).

5 Development of a process protocol IT training model

Construction organisations need to make important decisions on deploying finite resources, the rationale of which often balances a range of factors. It was evident however that no real mechanism existed that directly 'measured' the impact of IT training on the BS. A Generic Assessment Process Protocol model for IT training (GAPP-IT) was developed with industry to analyse the key sequential stages (processes) required for instigating and deploying IT training within construction organisations. Two major UK construction companies were used to 'map' IT training issues and processes into a coherent framework for discussion. This framework was subsequently prototyped, tested, and refined, to validate processes and achieve generic taxonomy. GAPP-IT encompasses important decisions needed to be taken to formulate and deploy IT training within a construction environment. Training results, may then be directly measured against the 'performance gap', indicated in Figure 4.

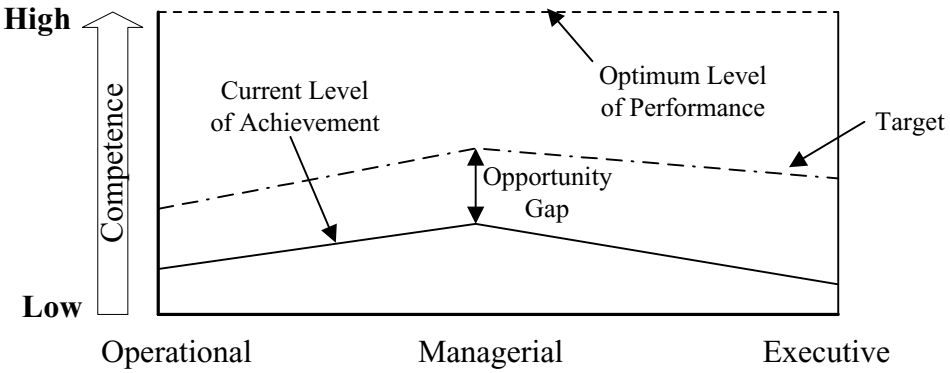

Fig. 4: Performance gap analysis

This research identified three main target groups for analysis, specifically, operational, managerial and executive levels. No attempt is made to discuss the intricacies of resource allocation, corporate culture, or distinguish between organisations that contain subsidiaries or groups. However, the generic nature of this model can encompass these variables. Seven key phases are considered, indicated in Figure 5, which encompass the initial preliminary stages, through to commissioning and feedback. Each of these phases can be collapsed to show lower level information, an example of which can be seen for Phase Zero, indicated in Figure 6. The model is divided into three levels horizontally, covering operational, managerial and executive requirements, and the model is entered at Phase Zero, and exited in Phase Six. A brief summary of each of these phases can be seen as follows:

- **Phase ZERO**: This phase allows users to establish the need for IT training. It evaluates the existing business needs, contemplates the present IS and IT strategy, and assesses all potential resource requirements. The BS is established at this phase, contemplating the prevailing market forces and Stakeholder involvement. If the BS indicates that there is potentially a demand for IT training, users pass through a soft gate into Phase One.
- **Phase ONE**: This identifies the processes involved in formulating a generic IT training strategy. It uses information from Phase Zero, and identifies Critical Success Factors (CSF's) derived from the BS. A skills audit is used to ascertain training needs and levels. If IT training is not required, users exit the model through a decision icon, and the information is stored in the Legacy Archive. Should training be deemed necessary, an outline generic training strategy is formed, and users pass through a soft gate (as no financial commitment has been made) into Phase Two.
- **Phase TWO**: This allocates financial resources to the IT training needs identified in Phase One. The corporate training policy is finalised, and funding is ascertained for generic training needs at operational, managerial and strategic level. Any specific IT training needs deemed not 'generic' at the corporate level, are incorporated at group/subsidiary level, where alternative funding may need to be sought. Training quotations are acquired, and funds are prioritised to the key BS deliverables. A Phase Review board meeting is

required before progression is allowed, as a hard gate (requiring financial commitment) exists.

- **Phase THREE**: This phase establishes the training and control mechanism needed to ensure that any critical needs or deadlines can be met. The CSF's generated by the BS, are agreed, and the type of evaluation and control mechanism is chosen (cognisant of resource implications and appropriateness to the task). This information is then agreed at the Phase Review board meeting, and users subsequently pass through a hard gate into Phase Four.
- **Phase FOUR**: This phase monitors and controls the actual training in accordance with the control mechanism agreed in the preceding phase. A Phase Review board meeting is used to ratify and record progress, and users then pass through a hard gate into Phase Five for evaluation.
- **Phase FIVE**: This phase evaluates the overall training experience from training providers in the form of feedback reports. Training outcomes are measured against the original objectives, and the effectiveness of the control mechanism is evaluated. The existing training policy is updated, and information is stored in the Legacy Archive. A Phase Review report records all this information, and users are then allowed to pass through the final hard gate into the feedback phase (Steering Committee).
- **Phase SIX**: This is the final and most important phase in the GAPP-IT model. It uses a steering committee to overview the whole process of IT training, and evaluates achievements against original objectives. Training is assessed and measured against the performance gap, and open discussion forums are used to foster new ideas and stimulate discussion for new training initiatives. This information is then evaluated in context, noting the company's current deployment of resources, culture, and level of evolvement. The Legacy Archive is used to feed information back into the process management wheel (incorporating any revisions, changes in policy, or change management issues), and the whole process is able to start again.

6 Summary and conclusions

Process models are useful to 'map' ideas and concepts into tangible frameworks for evaluation. Process Protocol takes this one step further by absorbing unprecedented levels of generic detail into its architecture, thereby allowing users to conceptualise and appreciate the links and relationships between processes and sub-processes more readily. The GAPP-IT model allows managers to assess the impact of IT training initiatives on the BS, and decisions can be measured against the performance gap. Furthermore, the corporate skill base can be matched to targets dictated by the BS, and the training strategy's contribution to the delivery of any CSF's can be subsequently evaluated. However, it is important to note that the effectiveness of any training strategy can be influenced by many other factors, not least, stakeholder influence, the prevailing organisational culture and overall management commitment.

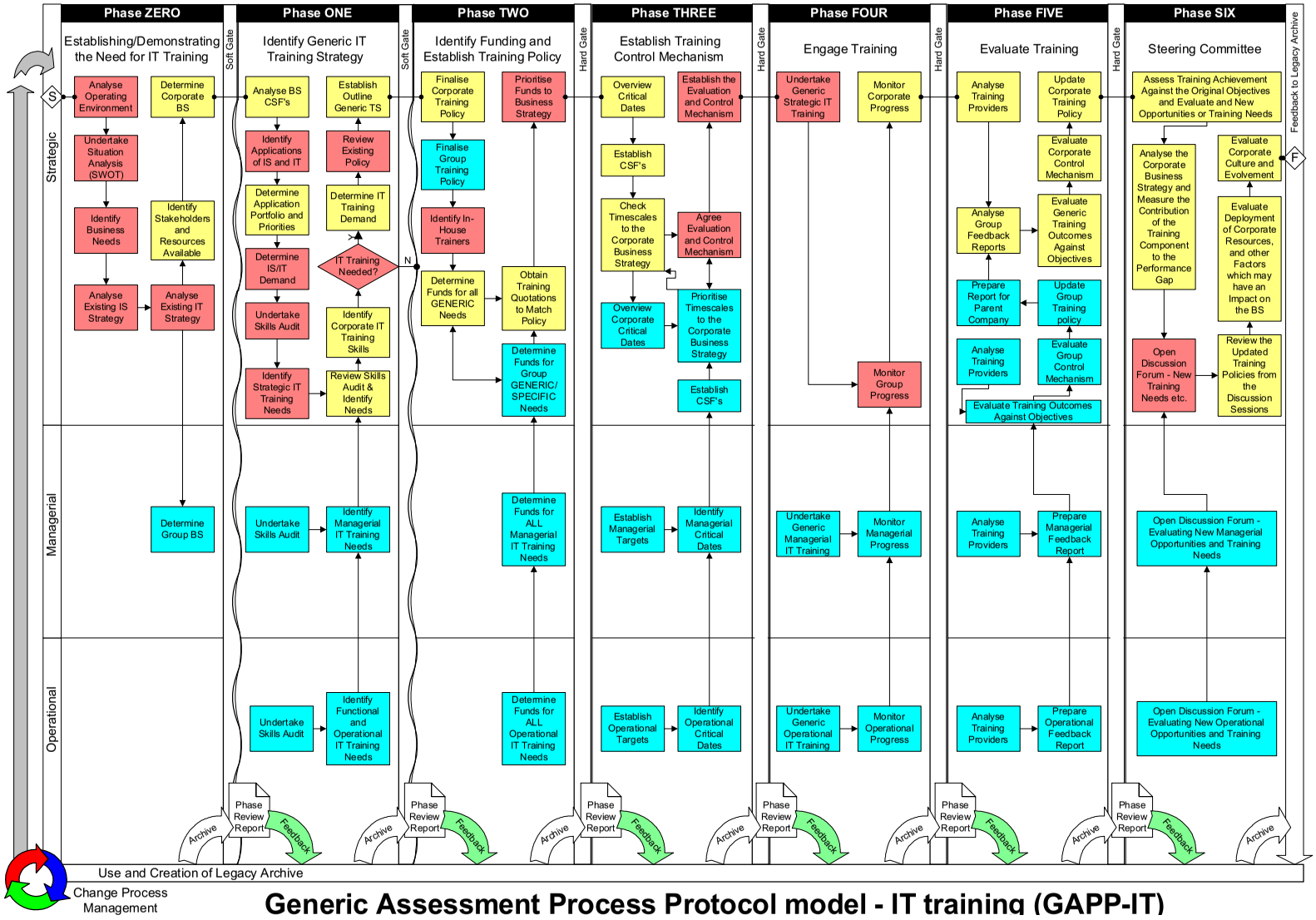

Fig. 5: GAPP-IT Process protocol model for IT training

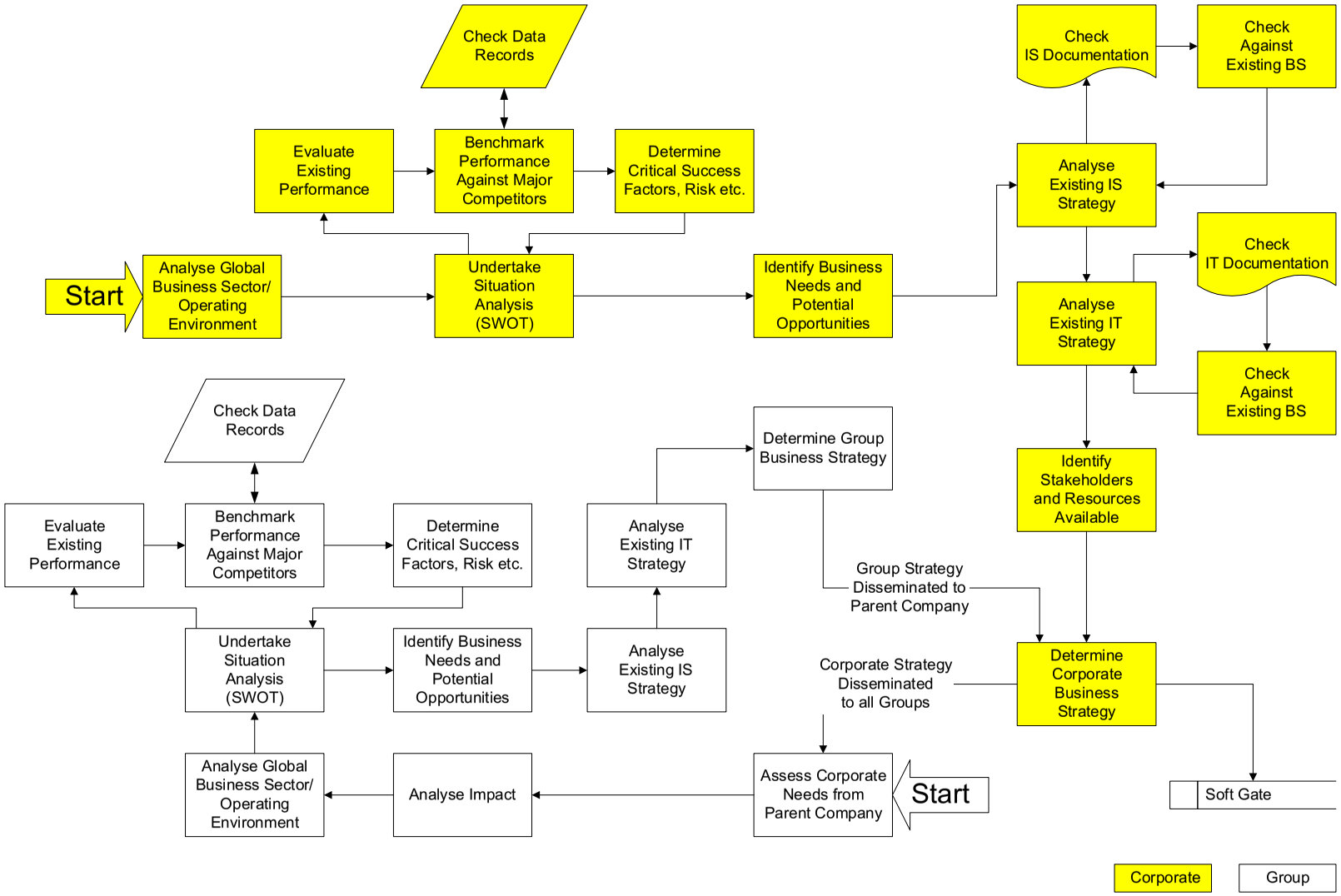

Fig. 6: Phase ZERO establishing/demonstrating the need for IT training

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