



A self-assessment tool for implementing concurrent engineering through change management

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Abstract

A review of various tools for assisting organisations to implement Concurrent Engineering (CE) found they tend to operate independently from each other, rather than being integrated to rigorously manage the change towards effective assessment and deployment. A new workbook style tool is proposed, which is based on a self-assessment model to enable the implementation of CE through a change management strategy. The combination of self-assessment and change management enables the simultaneous measurement and deployment of practices, which can assist organisations in the project management of product development, and lead to the identification of further improvements to rigorously manage the transition to CE. The new tool described was implemented at London Taxis International (a large sized UK based automotive company) and led to the creation of a formalised new product introduction process, implementation of a project management system, and enhanced teamworking at the company.

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1. Introduction

An effective New Product Introduction (NPI) process, which is concurrent, can enhance an organisation's competitiveness by compressing product development lead-times, and enabling upstream and downstream processes to be considered when taking decisions at the product concept phase [1,2]. This approach is typically described as Concurrent Engineering (CE) and is described by Carter and Baker as '*the systematic approach to the integrated, concurrent design of products and their related processes, including manufacture and support*' [3]. Therefore, CE represents an organisation's ability to carry out product development as a series of overlapping phases, which delivers product on time, to provide customer satisfaction at the right price [4]. To achieve this requires a 'right-first-time' approach by applying numerous tools and techniques during the

project management of product development, to enable effective decision-making [5,6]. Whilst the business benefits of CE are well understood, a recent survey of UK industry concluded that although its implementation within certain sectors such as power generation, petrochemical and aerospace was claimed to be at a high level, other sectors such as automobile and machinery reported relatively low levels [7]. This is supported by Viness, Chidolue and Medhat who concluded that 50% of large UK companies were not fully mature in the deployment of CE [8]. The reasons for this were thought to be due to poor management of the change process, rather than a lack of motivation to manage change. Furthermore, Stickland suggests that '*70% of all companies who embark upon a business process re-engineering program will fail*' [9]. Kotter states that companies often struggle to manage change, because they do not take a process based approach. Instead they look for short cuts by expecting individuals to execute new working practices without training or any awareness of its need [10]. Therefore this suggests that the low take up of CE within UK industry is due primarily to companies not knowing how CE should be deployed within the organisation through the management of change.

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2. Research objectives

The main theme underpinning this research was to investigate: “How can UK industry be more effective at leveraging concurrent engineering practices within their organisations?” The research objectives were subsequently defined as follows:

- To develop a system, which will enable the implementation of CE practices.
- To verify that the system is effective by applying it within a UK organisation.

3. Comparison of approaches for enabling change

To identify the requirements for a new tool, which could enable UK industry to manage change toward CE, eight approaches for managing change were identified as: Self-assessment, Benchmarking, SWOT analysis, Auditing, Kaizen, Policy Deployment, Project Management and Control, and Workbook Implementation Methods. To assess the perceived effectiveness of the eight approaches they were reviewed against six criteria defined based upon a previous survey that identified a number of common barriers to implementing CE. The criteria were: knowledge of CE, measure current and identify future states, provide a scoring system, easy to apply, involves everyone, identifies key phases for change [11]. This identified that there is no single approach for enabling change that addresses all the criteria defined for effective change management. However, any two of Self-assessment, Auditing or Workbook Implementation Methods will do. Auditing was discounted as it is problematic and fosters a ‘pass the audit’ mentality—rather than encouraging a culture of process improvement and organisational learning. Therefore, it was decided that the development of an integrated approach combining both Self-assessment and an Implementation Workbook would be the optimum combination for organisations to manage the change towards CE, by simultaneously measuring and implementing the required practices.

4. Self-assessment and workbook methods

4.1. Self-assessment methods

Self-assessment has been popularised by various high profile National Quality Awards such as the ‘Deming Prize’, the ‘Malcolm Baldrige National Quality Award—MBNQA’, and the ‘European Foundation for Quality Management—EFQM’ [12]. Self-assessment

systems have also emerged for measuring the deployment of CE, and identifying areas for improvement. Five different self-assessment tools for CE were found, which aim to either assess CE or the innovation process: Successful Product Development [13], Time to Market Association [14], A Technical Innovation Audit [15], Readiness for Concurrent Engineering [16], and Mentor Graphics Self-Assessment Tool [3]. In all cases they aim to measure an organisation’s current state against a model of practice, and provide a means to identify future improvements. A review of these CE self-assessment tools concluded the following:

- They measure ‘where are we now?’ and ‘where do we want to be?’ However, they do not provide an aid for facilitating implementation. This provides an opportunity to develop a tool, which assesses and deploys good CE practice.
- They all assume one model for all organisations and do not provide an opportunity tailor the model for an organisation’s specific circumstances.
- They do not pay enough attention to the application of CE from the perspective of achieving specific design philosophies, such as design for manufacture, service, reliability, customer requirements and cost.
- They do not place enough emphasis upon performance measures as a means to ascertain whether improvements are delivering to the bottom line.

4.2. Workbook Implementation Methods

Two Workbook Implementation Methods have been designed specifically for implementing CE through using a project management and control related approach. These are ‘Using Concurrent Engineering for Better Product Development’ (Cranfield approach) and ‘A Practical Approach to Concurrent Engineering’ (PACE) [17,18]. The Cranfield approach consists of three phases: prepare, implement, and extend; and only uses a pilot approach as a means for deploying practice before company wide implementation. Furthermore, it is targeted toward first time users rather than organisations that are relatively mature in its application and are looking for areas that require improvements. PACE on the other hand, has seven phases: develop a strategy, assessment, create the culture, prioritise improvements, plan the change, implement improved situation, and support implementation. However, PACE prescribes a generic implementation process that has not been tested within an industrial context.

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