Managing the value delivery process

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Abstract *This paper introduces a reference model for the life cycle of a logical business unit (LBU). It goes on to explain how the model was deduced from empirical data generated during participation by the authors in a series of change management interventions in various organisations situated in the West of Scotland. Case studies are used from these interventions to illustrate how the application of reliability-engineering concepts was used to explore the performance of business processes in delivering stakeholder value. It is recommended that "generate" "decommission" and "remedial" business processes are added to a widely used business process framework. This new framework when used for lifecycle planning of LBUs in conjunction with the LBU life cycle model can assist businesses in reliable delivery of stakeholder value.*

Introduction

At the Centre for Strategic Manufacturing the authors are members of a team of researchers developing reference models to help businesses improve and sustain business performance. These models are then tested in change management interventions in organisations to validate them. The empirical data generated during these validation opportunities are used to develop the reference models further, to make them more effective in subsequent change management interventions. This paper explains how this research process led to the creation of a life-cycle reference model for a logical business unit (LBU). Having created the reference model, the data generated during recent change management interventions were revisited in the light of the new thinking and used to propose modifications to the computer integrated manufacturing-open systems architecture (CIM-OSA) framework for business process architecture (Childe *et al.*, 1994).

Background

A reference model for an integrated performance measurement system (IPMS) (Bititci *et al.*, 1998a) was developed during an Engineering and Physical Sciences Research Council (EPSRC) funded research programme. This model was created using business process thinking, the CIM-OSA business process framework and the Viable Systems Model (VSM) (Beer, 1985) as inputs to the model building process. Testing of the IPMS model, by auditing a large number of organisations (Bititci *et al.*, 1998b) from different business sectors against the reference model, led to the creation of a viable business structure (VBS) (Figure 1) which would enable an organisation to change rapidly in response to changes in its operating environment and, in so doing, remain viable. It shows an organisation to have a recursive structure with business processes embedded in business units which are in turn embedded in a business with "support" processes

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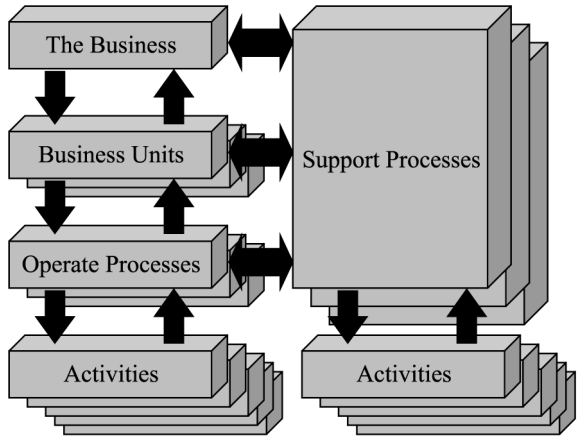

Figure 1.
Overview of the viable business structure

providing a service for all levels. The "operate" processes are the processes that deliver value for the customers.(Childe *et al.*, 1994)

The CIM-OSA business process framework was used within the VBS to provide a business process orientation for the structure. The CIM-OSA framework defined operate processes, manage processes and support processes as generic processes in a business. The purpose of the operate processes was to create value for the business and the support processes provided a service to the operate processes and the manage processes (Figure 2).

Central to the IPMS model and VBS is a part of the enterprise defined as a business unit. This unit has manage, operate and support processes within it designed for the prime purpose of providing products to a market segment that has specific competitive requirements. The business unit is not necessarily a physically separate part of the enterprise because the same physical assets and people can be used to supply products

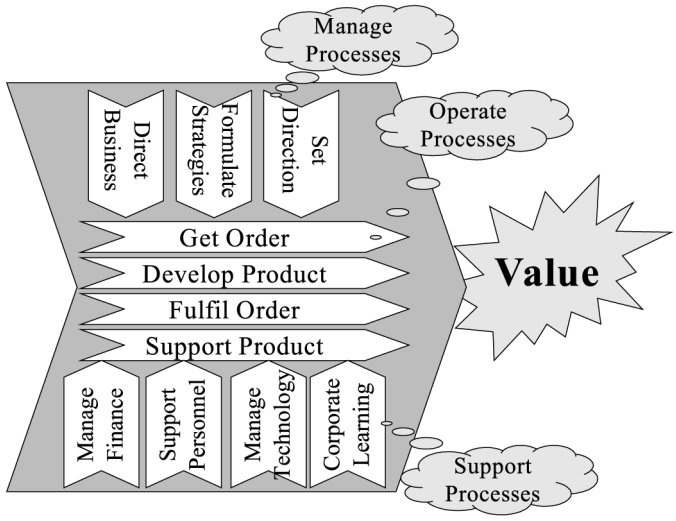

Figure 2.
Business process framework

that compete in a number of market segments with differing competitive requirements. Business units are differentiated "logically" rather than "physically", although, in many cases, there will be physical separation of business units as well.

Since "business unit" is a label commonly used in industry to describe parts of a business not conforming to the above definition, and to prevent confusion, this entity will be referred to in this paper as an LBU.

The operate processes were defined in the CIM-OSA framework as the processes that create value for the business. The VBS specified that one or more LBU could be operating at any one time in a business to provide an aggregate contribution to the performance of the business in order to sustain that business. The challenge for a business therefore is to manage those LBUs effectively to ensure that the combined performance levels from the LBUs are sufficient to sustain the business.

The authors have studied the performance management of business processes inside organisations during a number of change interventions in companies of varying sizes and in different sectors. The interventions were usually as part of a TCS programme. The TCS programme is an initiative that is part funded by the UK Government. It requires a programme of work of strategic importance to the industrial partner to be developed, together with an academic partner. The academic partner and industrial partner work on the programme together with a graduate called an associate, who has been recruited specifically to progress the programme within the industrial organisation. These programmes usually last for two to three years and provide an opportunity for academics to test theory in practice.

How effectively business processes were managed in these organisations was investigated by using concepts widely used in reliability engineering. The concepts were used to stimulate action to make changes in the performance levels of business processes in general but "operate" processes in particular by measuring and monitoring the performance of the customer order fulfilment process (COFP) in delivering value for the stakeholders of the business. The European Excellence Model (EFQM, 2000) lists the criteria that organisations should refer to in achieving levels of excellence in "key performance results" for their stakeholders. A balanced approach is required in delivering value to all stakeholders for an organisation to achieve and sustain performance levels in pursuit of excellence by managing business processes effectively.

The performance of the COFP was measured and monitored as a whole process from customer enquiry to dispatch of product for each organisation. Value stream mapping was used to establish the activities within an LBU-specific COFP that serviced a particular sector of the market with specific competitive requirements.

Performance measures that were found to be useful in measuring the performance of the whole COFP were:

- the value-added ratio (VAR);
- first pass yield (FPY);
- risk priority number (RPN); and
- overall equipment effectiveness (OEE).

The VAR (Stalk and Hout, 1990) is used to calculate the velocity with which sales orders flow along the value streams of the COFP. FPY is used to monitor interruptions to flow of sales orders along a particular value stream (Turner, 2002). RPN is used to

measure the impact on customer value and business performance of those defects preventing flow of orders along the value stream (Chrysler Corporation *et al.*, 1995). OEE (Nakajima, 1988) is used to measure how effectively equipment is used to process sales orders along the whole value stream.

The overall reliability engineering philosophy applied to monitoring the performance of the COFP was "on condition monitoring" (Bentley, 1999). This philosophy suggests that the condition of a component in a machine can be monitored either continuously or at intervals and, depending on the findings, the component can be replaced or serviced to increase the "up time" of the machine and prevent costly interruptions to the production processes caused by unpredictable breakdowns.

The process of "on condition monitoring" of the whole COFP by using the performance measures mentioned previously is called "active monitoring" (Turner and Bititci, 1999) because the data collected can reveal the variability occurring in activities in the COFP and provide the opportunity for the organisation to take action to improve the process by removing the causes of variability. This leads to the process becoming more reliable and predictable in delivering stakeholder value.

The life cycle of an LBU

A business exists by effective participation in one or more value streams. How effectively the business processes are managed to deliver stakeholder value determines whether the participation in a particular value stream will continue. If one of the stakeholders is not satisfied with either the current value experienced or perceived future value predicted, then they might want to withdraw their support for the business. In the first instance the organisation must be able to attract customers in order to participate in a value stream. It must generate "value solutions" that are not only attractive to customers, but also to all stakeholders of the business. This is illustrated in the following case study.

ICI Explosives Europe – Chemicals Business case study

An LBU called the Chemicals Business in the ICI Explosives Europe business located in Ardeer in Ayrshire was participating in a number of value streams by manufacturing and distributing nitrocellulose-based products to a global market. One of the authors was a member of the Chemicals business team in 1996-1997 and assisted the LBU in designing a performance measurement system to monitor progress in achieving a business objective based on return on net assets (RONA), a key performance indicator for the ICI Group. Active monitoring of performance measures that were part of a RONA Tree using Shewhart charts was used at business team meetings to measure the effectiveness of the Chemicals Business strategy (Turner, 1998a). The Shewhart charts predicted that the current strategy would lead to failure in meeting the RONA target of 20 per cent set by the ICI Group for continued participation of businesses in the group. The 20 per cent target for RONA was set as part of a "creating shareholder value" strategy for the ICI Group (ICI, 1994). To ensure continued membership of the group, the business team developed a new strategy to increase participation in the value streams by developing partnerships with major customers to manufacture products normally manufactured by these customers. In so doing, the Chemicals Business would increase the value-added content available to them in the value stream and allow the RONA target to be met in the future. The change in strategy

meant an extension in the COFP by new activities being added to supply down stream products. The Shewhart charts were used at subsequent business team meetings to monitor the success of this strategy.

This case study illustrates that a LBU was in danger of not delivering the value required by one of the stakeholders (ICI Group) and as a consequence was in danger of being sold off to another company or disappearing altogether from the Ardeer location by being closed down. By generating a "value solution" that was not only satisfactory for the customers in the value stream but, more importantly, more satisfactory for the shareholders of ICI, the life cycle of the LBU was extended.

The "value solution" generated by the Chemicals Business team can be considered to be a change in "value discipline" (Treacy and Wiersema, 1996). The value discipline being followed by the business was operational excellence, but the changes in the business environment as sterling strengthened, and over capacity in the nitrocellulose commodity market weakened prices, meant that they were unable to sustain the RONA performance if they continued with the operational excellence strategy. A change in strategy to a more customer intimate value discipline allowed the business to improve shareholder value (Turner *et al.*, 2000). This analysis suggested that changing to another value discipline can extend the life cycle of an LBU.

Another reference model created by the team at the Centre for Strategic Manufacturing called the Value Matrix (Martinez and Bititci, 2000) identifies six generic "value propositions" being used by companies to focus strategy and deliver both value for customers and wealth for the business. This matrix can be used by organisations to extend the lifecycle of a LBU. This is done by adopting a suitable value proposition and then modifying the business processes associated with the LBU to deliver a value solution that will continue to attract customers and sustain the level of performance in the business to satisfy all stakeholder requirements. The Value Matrix has evolved into a Value Cube (Martinez, 2003) that can be used as a reference model to identify "corporate competencies and capabilities" needed to deliver the new value proposition selected by the organisation and to help the business to reengineer a LBU to deliver this newly adopted value proposition.

The thinking behind the Value Matrix and Value Cube was applied to changes that had occurred in another ICI Explosives Europe business that supplied commercial explosives to global value streams. A case study written by one of the authors (Turner, 1998b) was revisited in the light of the new knowledge provided by these reference models.

ICI Explosives Europe – Commercial Explosives Business case study

The Commercial Explosives business supplied the global mining and quarrying sector. In the UK the Commercial Explosives business had manufacturing sites in Scotland, England and Wales. The original business was based on nitration technology and the products were nitro-glycerine (NG) based. This business had considerable barriers to entry because of the safety, security and environmental issues around the setting up of manufacturing sites near to centres of population. In the 1970s new technology that was based on ammonium nitrate emerged and progressively replaced NG-based explosives across the world. This lowered the barriers to entry because much safer manufacturing and environmentally friendly sites could be set up close to centres of population. The Commercial Explosives business was forced out of a somewhat cosy,

protected business environment into a much more competitive situation and went through a period of transition that eventually led to the closure of most of the manufacturing sites in the UK. The emphasis of the business went from a product leadership value proposition, to operational excellence and then to a customer intimate value proposition over this period. Before the emergence of ammonium nitrate-based explosives the ICI Explosives business led the world in innovation of new and technically better products for mining and quarrying. They protected the products by patents and excelled in technical support of the introduction and use of these products in the field. With the emergence of ammonium nitrate explosives the high prices of NG-based explosives could not be sustained and so the emphasis in the business moved to an operational excellence basis leading to the award of MRP 2 Class "A" status for operational excellence throughout the business in 1991. This allowed the business to reduce costs and maintain some of the NG-based markets while they established ammonium nitrate-based products of their own. This strategy was of limited life because new low-cost entrants to the market, who focused on a limited product offering, kept prices low. To counteract this a new concept was introduced by ICI that led to explosives being manufactured in situ in quarries on customer's premises by ICI personnel using mobile manufacturing units. Eventually ICI stopped selling explosives and instead sold "rock on the ground" that had been blasted by ICI employees within customer's premises. In effect this was a customer intimate value proposition that locked the customer in to long-term contracts. The customer's personnel that were used originally for blasting purposes were dispersed within their business and in time they did not have either the equipment or the competence to blast rock. They became completely dependent on ICI personnel and gradually ICI took over other value-added activities such as blast layout design, rock strata analysis and blast hole boring. The name of the LBU was changed to Quarrying Services to reflect the value solution now being offered.

In 1998, ICI sold the worldwide ICI Explosives business because it did not fit into the profile of the portfolio of businesses created by a new strategic direction taken by the Group. The site at Ardeer continued in operation without the Commercial Explosives business but it was necessary to take remedial action on those areas of the site that had manufactured explosives for over a century to remove contaminants before the site and remaining Chemicals business could be sold. The site was eventually sold to another business in 2003. To carry out the remedial task a LBU was generated called Ardeer Operating Services with the prime task of returning the site to the natural state it had been in before explosives manufacture had started there in the 1870s.

The changes in value propositions occurring in the Commercial Explosives business LBUs as they tried to sustain the business and remain in the selected value streams by generating a series of value solutions led to the classification of phases in the life cycle of an LBU as follows:

- *Emergent* – not yet operating and so not contributing to business performance. A new value solution has been selected and people and equipment and operate processes are under development and attracting resources from the business.
- *Fledgling* – operating but the operate processes still not capable of making a full contribution to business performance and in need a lot of support and further development.

- *Prime* – having robust, capable operate processes and making a substantial contribution to business performance whilst delivering value solutions for all stakeholders.
- *Vestigial* – although having a robust and capable operate process, no longer making sufficient contribution to business performance to satisfy all stakeholders and to justify being continued in operation in its present form.
- *Redundant* – closed down and no longer required by the business but could require decommissioning and remedial activity.

The LBU that emerged to sustain the business in the years prior to the sale of the explosives business was the Quarry Services LBU. This provided services to the quarrying sector to create mounds of rock on the quarry surface in a customer's premises of suitable particle size distribution, and in a pile with easy access for vehicles to be loaded for transport to the rock grading plant. To allow this LBU to emerge, a mobile manufacturing unit had to be designed and tested to allow the ingredients to be used for manufacturing explosives to be transported on public roads to get to the quarry, then to be mixed safely in situ, and then loaded into the boreholes on the quarry surface. The vehicle design, application for a licence for the vehicle to be used on a public road, testing of the ingredients and final product in quarries together with the development of the personnel and systems to deliver the service took many months before the operate process could be started and revenue created for the business. The financial resources to support the activities of people within the business during this development phase had to be provided during this period with no financial return being generated for the business.

When the operate processes had been designed and tested they began to function with a lot of support in the early stages and with selected customers only. Only when the operate processes were considered suitable to be used generally with customers was this support reduced. This phase has been called the "fledgling" phase because the operate process needs a lot of support before it begins to consume less resource and then stand alone and generate the appropriate level of contribution for the business to ensure the business remains competitive.

When a LBU is in its prime, the operate processes are well established and function robustly to deliver the targeted contribution for the business that is needed to sustain the business. The Commercial Explosives operate processes when manufacturing the NG-based packaged explosives prior to the emergence of the ammonium nitrate-based explosives were in their prime with a good contribution being made to the business on a regular basis and with predictable process performance. The business had developed the infrastructure and competencies to manufacture, supply and support these products to a global market and to make sufficient returns to maintain and develop further products to ensure the appropriate level of contribution continued on into the future.

The emergence of ammonium nitrate-based explosives led to a reduction in contribution from NG-based products because the market for these products shrank and excess manufacturing capacity was created as the ammonium nitrate products began to become established. The safer handling features of this new range of explosives and the absence of the headaches caused by NG explosives combined with the excess capacity in the sector meant that prices for the NG explosives were

continually being eroded. Eventually this LBU became a low contributor to the ICI Explosives Europe business and the contribution was considered insufficient to sustain the business into the future. This phase of the LBU life cycle has been called "vestigial" for this reason.

When the Commercial Explosives business decided to stop selling the NG explosives product range it was left with manufacturing units on vast sites in Scotland and Wales. The operations of the NG explosives LBU became redundant on these sites and were no longer needed by the company. The machinery and facilities were contaminated with NG and so were in need of decontamination and decommissioning. After the decommissioning process was complete the buildings were demolished. Sampling of the soil on the sites revealed that the soil was also contaminated with NG and other chemicals used during the long history of over a century of manufacturing on the sites. Only after a long remedial process to remove all contamination were the sites considered suitable for sale and for use for other purposes than manufacturing explosives. Not all LBUs will require decommissioning and remedial activity when they become redundant. The machinery may well be adapted and used in the generation of new value solutions. There will be the need to consider the skills and competencies of the people during transition from one value proposition to another and this may involve redundancy, recruitment, and retraining to satisfy the needs of the new value solution. In Commercial Explosives new roles were created for decommissioning and remediation of the sites and for redeployment or resettlement of people in new locations in other parts of the ICI business or outside.

The decline of the LBU providing NG-based packaged explosives to the value streams and the evolution of the LBU providing quarry services to the same value streams is illustrated in Figure 3. The contribution to the ICI Explosives Europe business is replaced by the emerging LBU but the costs of decommissioning and

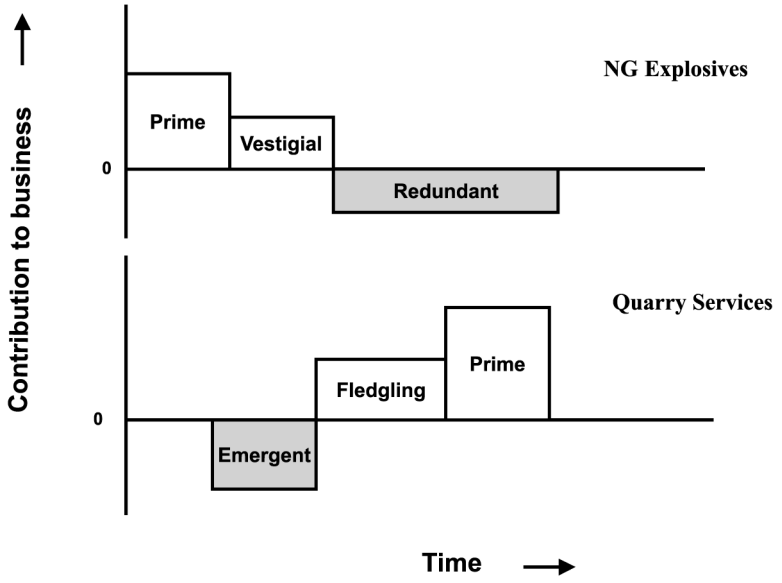

Figure 3.
Life cycle of logical business units in commercial explosives

remedial activity still needed to be provided for by the contribution from the Quarry Services LBU. Also as the NG explosives LBU declined the resources had to be provided to support the Quarry Services LBU in the emergent and fledgling phases.

The life cycle of a typical LBU deduced from this case study is illustrated in Figure 4.

This life cycle model for a LBU can be used together with the VBS and Value Matrix to evaluate the performance of businesses. The VBS is recursive and shows the business at one level of recursion and contained within it LBUs at the next level of recursion. For the business to remain viable, resource bargaining takes place between the two levels of recursion. The ICI Explosives Europe case study shows that resources are consumed by LBUs at different stages of the life cycle without sufficient contribution from emergent, fledgling, vestigial and redundant phases of the life cycle to ensure the business is sustained. To continue to exist the business must generate new value solutions and LBUs operating in the prime phase for continued participation in the value streams of choice, or competitors will move in and occupy that segment of the value stream. In the slow-moving business climate in the past companies occupied the prime phase of the LBU lifecycle for longer periods of time, but in today's more competitive climate they do not have this luxury and must continually generate new value solutions and LBUs to survive. The resource bargaining between the business and its LBUs must be done effectively to ensure a succession of future value solutions are generated together with a succession of new LBUs to replace the contribution of the declining LBUs. The contribution from those LBUs in the prime phase must be sufficient to allow investment in succession planning of new LBUs to ensure continued stakeholder value.

Measuring and monitoring stakeholder value

Generation of stakeholder value from current LBU's needs to be measured to assist in the succession planning of LBU's and the future stakeholder value likely to be achieved needs to be predicted. This information will be used in the resource bargaining activity between businesses and their LBU's to ensure continued effective participation in the value streams. A number of case studies have been published by the author on the application of performance measures and active monitoring systems to monitor

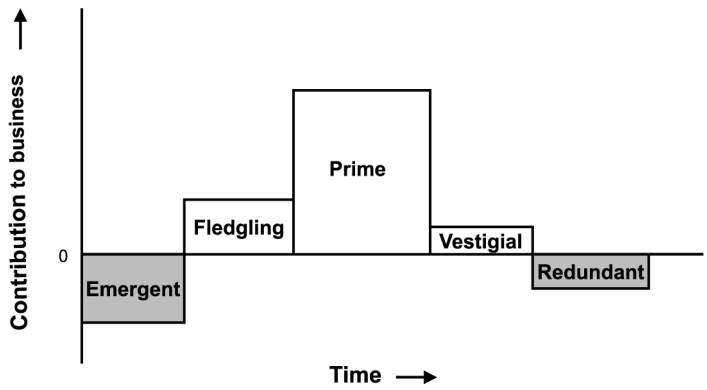

Figure 4.
Framework for the life cycle of a logical business unit

current performance and predict future performance of business processes. Some of these case studies are used to illustrate how the information obtained from these measurement systems can be used to identify phases of a LBU life cycle.

Worldmark, East Kilbride

A TCS programme with a product identification company in East Kilbride called Worldmark used FPY and RPN performance measures to measure the performance of the organisation in processing sales orders for labels along a COFP (Turner *et al.*, 2002). To continue to participate in the value stream they carried out risk perception analysis with major customers to find out what future performance improvements would be required to keep their business. The findings from this analysis were that the delivery reliability would have to be sustained at current high levels but with a reduction in turn around time (TAT), the time between them placing an order and receipt of the product in their premises, from 48 to less than 24 hours. Also a price reduction of *X* per cent was necessary.

The COFP was mapped and FPY and RPN performance measurement systems were put in place at interfaces between functions along the value chain. Interruptions to flow were identified and removed. Department managers were given personal objectives to reduce high RPN and improve standard operating procedures to ensure the improvements were sustained. The TAT was reduced to less than 24 hours within 18 months for major customers and the cost reductions made by removing non-value adding activity allowed price reductions to be made without the contribution to the business being reduced. The process improvements meant that the LBU was kept in the prime phase and an improved value solution provided for major customers without reduction in stakeholder value for other stakeholders of the business.

Alcan Packaging, Glasgow

A TCS programme was used to improve the performance of the Alcan Packaging business that produced packaging and other materials by rolling aluminium sheet to produce aluminium film laminates. The opportunity was taken to use the IPMS reference model to design and implement a performance measurement system (Creighton *et al.*, 2000).

An extensive Web-based performance measurement system with full active monitoring systems using Shewhart control charts that were accessed through the Alcan intranet was implemented throughout all business processes at the site in Glasgow. The key performance indicator used by Alcan Group to monitor performance of their businesses is economic value added (EVA). Over a period of two years process improvement methods were used to improve the performance of the business from an EVA negative position to a position in which positive EVA targets set by the group were being met and future achievement of EVA targets was predicted.

There were three LBUs at the Glasgow site serving foodstuff, cigarette and cable value streams. Although the aggregate contribution from the LBUs meant that EVA targets were being met the business decided to close the site and move the business to another Alcan location in England to reduce transport costs incurred in bringing raw materials to and distributing products from Scotland. The main customers were located in central Europe and the Bridgenorth site in England was closer to these markets. The aluminium sheet travelled to Scotland from another Alcan site in Wales.

Moving the business to England would increase the contribution to the Alcan Group by reducing the non-value-adding activity associated with travel time and transport costs in the value stream external to the Alcan Packaging site located in Glasgow.

The move from Glasgow to a site in England required the LBUs in Glasgow to be decommissioned and equipment moved to the new location. Personnel in Glasgow carried out the decommissioning and travelled to the new site to commission the new LBUs before becoming redundant.

This illustrates the vestigial and redundant phases of the life cycle model for LBUs in Glasgow and emergent and fledgling phases for LBUs in the new site. The internal value stream of the Alcan Group as a whole has been improved by reducing the transport elements but at the expense of the employee stakeholders at Alcan Packaging Glasgow who were asked to leave the company. Hopefully the contribution levels reached in the prime phase in Glasgow will be achieved in the new location with new people, systems and culture. The VAR of the value stream from an Alcan Group perspective has been increased but at the expense of closing down the Glasgow site. The resource bargaining activity between the Alcan Group and Alcan Sites involved in the changes should have considered the changes in contribution to the overall business during this transition. The duration and cost to the business of each of the phases of the redundant phase in the Glasgow LBUs and emergent and fledgling phases in the English LBUs against the benefits of increased VAR for the Alcan Group should have been considered.

Pressure Instruments Limited

A current TCS programme is being undertaken with a family-owned small to medium-sized enterprise (SME) manufacturing and distributing a high quality engineered product used in extreme conditions in chemical plants to measure pressure in vessels (Turner *et al.*, 2003). The company has been in existence for over a century and has used a customer intimate value proposition to supply customers in a niche market. They offer a very responsive assemble-to-order service to customers for design and manufacture of a wide range of customer-specific products. Customer demands for shorter and shorter lead times from placing their order to expecting delivery had been addressed by the business by increasing the segment of the value stream they controlled. Components that used to be bought in from suppliers had begun to be made in-house to increase their control of the value stream so that the overall lead-time to customers could be reduced. This strategy increased the complexity in the internal value stream and so an operational excellence strategy to support the customer intimate value proposition was adopted to remove non-value-adding activity from the internal value stream to improve responsiveness to customers and to reduce costs.

FPY was introduced to the whole COFP and the progress of orders flowing down the internal value stream was actively monitored for interruptions to flow. Value stream mapping was carried out and the VAR calculated for the internal value stream. The sales order processing and purchasing areas showed ratios of less than 5 per cent. Process improvement activity removed non-value-adding activity from the value stream and increased these ratios to greater than 65 per cent. FPY trend data are showing much better flow through these departments and overall lead-time reductions. The TCS improvement programme is now moving into the main manufacturing areas.

This company has a number of LBUs, but they all operate to the same customer intimate value proposition. It has managed to continually offer attractive value solutions to customers over a long timescale by increasing the segment of the value stream covered by the COFP. This meant that the LBUs had moved from being in the prime phase back into the fledgling phase. Improvement activity is now moving the LBUs back into the prime phase by adopting an operational excellence strategy in support of the longer term customer intimate value proposition.

The FPY active monitoring system along the COFP is showing variability in the COPD activities serving all value streams and charts in all departments are predicting that the company can significantly improved response time to customers and reduce overall operating costs by at least 20 per cent.

This is an example of a company extending the internal value stream to ensure continued participation in the external value stream. Managing the increased complexity of the extended internal value stream required improved corporate competencies and capabilities in delivering an operational excellence strategy to reach previous levels of contribution.

LBU life-cycle planning

Using the LBU life-cycle model in conjunction with the VBS in studying business performance led to the discovery that the CIM-OSA framework for business process architecture at the heart of VBS could not be used in all business situations. The model applies to the situation when operate processes are established in organisations and COFP processes are operating to deliver value for customers. However there are phases in the LBU life cycle when products and services are not being provided for the value stream and so value is not being delivered to customers but costs are still being incurred by the business. This situation occurs in the emergent and redundant phases of the life cycle. These phases also need support and manage processes for effective use of company resources during these periods. Essentially the activities in the COFP of a LBU are being modified or created during the emergent phase and decommissioned during the redundant phase. To ensure that these important phases in the LBU life cycle are managed well and resourced properly then the business processes for these phases should be clearly defined and measured by the business. They should also be included in the resource bargaining process between the business and its LBUs to ensure that the resources consumed are formally agreed and planned as part of the company business objectives. A new business process architecture is displayed in Figure 5 to include the additional business processes needed in LBU life cycle planning. The generate processes generate the COFP and associated support processes to deliver the value solution that is attractive to all stakeholders. The COFP process is a customer of the support processes and so these need to be generated as well to provide the service levels required to deliver the value solution. The decommission processes start after a decision has been taken to stop delivering products to the customer. The COFP may be modified to focus the LBU on another value solution for the same or a different value stream or dismantled altogether. During this period it is not creating value for the business because it is not producing products for customers. If the site used for the LBU needs to be returned to its natural state then a remedial business process must also be used.

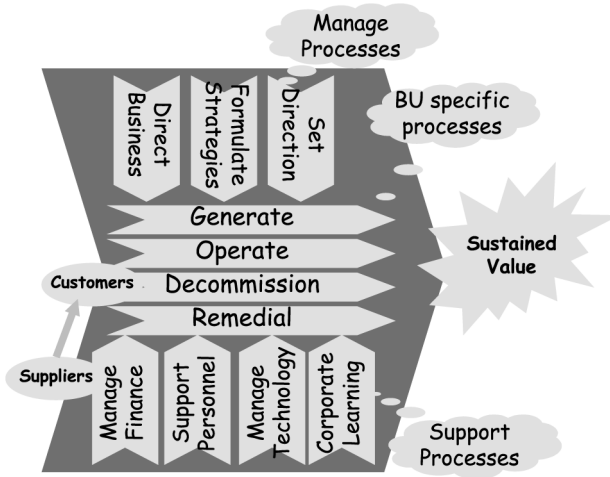

Figure 5.
Business process framework for LBU life cycle management

The resource bargaining activity between the business and the LBUs can be used to plan the life cycles of LBUs to ensure that the stakeholder value of the business is sustained. The aggregate contribution to the business from LBUs needs to be sufficient to sustain shareholder confidence into the future, so that shareholders do not withdraw their support. The contribution from LBUs in the prime, fledgling and vestigial phases of the life cycle needs to be sufficient to provide resources needed in the generate, decommission and remedial activity of the LBUs into the future for the business to be considered to be reliable by shareholders. An effective resource bargaining and LBU life cycle planning process is an important manage process for sustaining business performance.

Growing a business for sustained stakeholder value

Having identified the need for a LBU life-cycle planning process two further case studies are used to illustrate how this is taking place in organisations that are not in decline but are growing rapidly. If the theory is correct then the emergent and fledgling phases must be happening and the generate processes will be in active deployment.

Mastclimbers Limited, Glasgow

Another TCS programme is currently being used to assist a fast-growing SME providing access solutions for the UK construction industry to develop better operations planning and control systems. Potential failure mode and effect analysis (PFMEA) (Turner, 2002) was used to generate RPNs for activities in the value streams the company used to supply mast climbing platforms to contractors and subcontractors working on high rise residential buildings. The analysis was used to develop standard operating procedures and create training programmes for employees to progress contracts with clients and also for accredited training programmes for the safe operation of platforms by contractors and subcontractors.

The Mastclimbers business was started by its current managing director in 1996 and has become one of the fastest growing companies in Scotland. The value solution he created was to provide a service to construction companies contracted by local

government to refurbish multi-storey residential buildings owned by local government. The service enabled buildings, normally covered in scaffolding during the duration of the refurbishment to be free of scaffolding and for platforms on masts secured to the buildings to be raised and lowered to the point of activity where cladding and windows were replaced or maintained.

This solution reduced the duration of the contract because the major contractor's internal value stream contained long periods of time during the construction and removal of scaffolding. The Mastclimbers business started in Glasgow and expanded into other areas of the UK. The standard operating procedures and training programmes helped the organisation to replace scaffolding in contracts by providing a "partnership in safety" for the contractor during the operation of the platforms. The value proposition was "customer intimacy" giving the customer a safe and reliable service for the duration of the contracts.

As the business expanded new uses for the platforms began to emerge for new building contracts rather than refurbishment. This required a quite different service compared to the refurbish contracts and much more frequent supply and removal of platforms of different geometry during the new build process. This was identified as a new LBU and another PFMEA was performed. This allowed the activities specific to the new build contracts to be identified and new planning and control systems to be developed to deliver this new "value solution". Having identified the activities in the internal value streams needed to interface effectively with the main contractors value stream the COFP and support processes are now in the process of being developed and resourced to ensure effective management of this new LBU.

This is an example of the emergent and fledgling phases of the life cycle being planned and generate processes being used in an emergent LBU. The outcome will be a COFP that has been designed and resourced to give the requisite value solution for stakeholders as the company grows. The experience will be used to study the LBU as it emerges and to identify the generate processes used during this period.

Korway Foods Limited, Bellshill

This TCS programme also involves a fast growing SME, managed by a major shareholder in the food sector. Korway Foods Limited (McLeod *et al.*, 2003) was established in 1997 and the value solution responsible for the rapid growth was to design and supply ethnic foods to customers in the Scottish market with a unique Scottish taste. In particular pakoras and similar snack foods usually consumed by customers as starters in Indian or Pakistani restaurants that are very popular in the West of Scotland. The value solution was successful and the company grew quickly and had to move into larger premises within a few years. Customers were developed in all the large retailers with a customer intimate value proposition to supply customer's orders within 24 hours and to work with them to develop new products for their outlets. The proposition led to a rapid increase in product variety as customers requested individual styles of packaging and a wide a range of sizes.

OEE was used to analyse the effect of this variety of products flowing along the COFP and active monitoring of pieces of equipment along the COFP was introduced. The active monitoring showed large variability in OEE at certain stages in the COFP and poor utilisation of capacity because of the variety of products in assembly of orders. The analysis over time has led to the managing director identifying distinct

LBUs providing products for different value streams competing for capacity on the same equipment. A decoupling point (Waddington, 2001) between lean and agile manufacturing approaches has been established so that the production of product for different LBUs can be planned more effectively with lower costs and better use of capacity while maintaining the responsiveness to customers demands. The investment in more flexible equipment and resources to manage the LBUs better is also being considered. The output from the OEE active monitoring system is being used at business team meetings to develop strategy.

Discussion

This paper has described how the idea of a LBU life-cycle model emerged out of empirical data generated in a number of research programmes involving change management interventions in companies of various sizes operating in a number of different business sectors. The methodology used in the change management interventions was to apply reliability engineering concepts whilst exploring the performance of business processes in delivering value solutions for stakeholders. The data generated revealed variability in the performance of activities in those business processes used to manage internal value streams. The researchers believe that more effective management of these processes can be achieved by life cycle planning of LBUs.

Recognising the phases in the life cycle of an LBU can in itself lead to better life cycle planning and more effective delivery of stakeholder value. An understanding that value solutions need to be generated to ensure that stakeholder value is sustained by more effective participation in value streams encourages the definition and introduction of generate processes that are properly resourced. This will come from the realisation that ineffective resourcing of this kind of activity in an organisation can mean a threat to survival if prime LBUs move into the vestigial phase without another LBU entering the fledgling phase to continue the business contribution levels needed to sustain stakeholder value.

Further research programmes are in progress to identify the activities being carried out by organisations during the generate processes. This will provide case study material to show how the emergent phase of the LBU life cycle is effectively managed. Research activity is also needed to find best practice in decommissioning and remedial processes so that the impact of these activities on stakeholder value can be minimised.

Tentative steps in the generate LBU process have so far been identified as:

(1) Identify unique selling proposition.

(2) Perform stakeholder value analysis.

(3) Generate value solution to satisfy all stakeholders.

(4) Generate value proposition to attract customers.

(5) Identify corporate competency and capabilities to deliver the value proposition.

(6) Specify business processes for the value delivery system.

(7) Create LBU with performance measurement system linked to the company IPMS system for resource bargaining.

(8) Agree COFP creation/modification requirements and confirm resources required for developing both process and people capabilities needed.

(9) Mobilise the resources needed and develop/attract people.
(10) Pilot COFP with receptive customer.
(11) Confirm COFP will deliver the value solution.
(12) Launch the COFP with select customer base.
(13) Extend the customer base.
(14) Improve LBU until prime.

The proposed changes to the business process framework need to be discussed and clarified with other researchers in the business process management (BPM) area of expertise and research programmes developed to validate the proposals in practice.

Conclusion

This paper has argued the case for more effective participation in value streams by life-cycle management of LBUs. A model for the life cycle of a logical business unit has been created with emergent, fledgling, prime, vestigial and redundant phases. To allow the emergent and redundant phases to be managed effectively the paper identifies the need for generate, decommission and remedial business processes to be added to the CIM-OSA business process framework. Tentative steps in a generate process have been introduced. A need to define a manage process to ensure that stakeholder value is sustained using life-cycle planning of logical business units has been identified.

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