LEAN SUPPLY: Cost Reduction or Waste Reduction?

A preliminary study of Lean initiatives and lower tier suppliers in the Aerospace Sector

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Executive Summary

Since the latter part of the 1990’s many aerospace companies have sought to improve performance through the adoption of a Lean approach to manufacturing. More recently, the ‘prime’ aerospace manufacturers and many major systems suppliers have instigated further initiatives, with the aim of involving their suppliers in the development of ‘Lean Supply’.

This preliminary study seeks to identify the varying approaches the customer organisations have taken to implementing Lean programmes with their lower tier suppliers, and how these suppliers have responded.

Central to the study is the question of whether the industry in general views Lean as simply another initiative, aimed at negotiating further price reductions, or more broadly as a means of removing waste from the supply chain, thereby protecting the profit margins and long-term viability of the industry’s supplier base.

It is clear from this research that to realise the full advantages, Lean practitioners in UK aerospace must move beyond the current primary focus on manufacturing techniques and optimising only their own company’s part in the supply chain as an isolated process, toward embracing a Value Stream perspective.

The report consequently proposes a series of interim steps as a way forward for current practitioners and organisations embarking on Lean implementation.
1. Introduction

Since the latter part of the 1990’s many aerospace companies have sought to improve performance through the adoption of a Lean approach to manufacturing, as originally developed by the Toyota Corporation in the automotive industry\(^1\). More recently, the ‘prime’ aerospace manufacturers and many major systems suppliers have instigated further initiatives, with the aim of involving their suppliers in the development of ‘Lean Supply’\(^2\).

This paper is the result of a preliminary study funded by the Department of Trade and Industry, to examine the motivation and expectations for such initiatives and identify how a sample group of lower tier suppliers have responded.

The report highlights the potential difficulties and dilemmas that can arise as companies move beyond inter-firm relationships that were once adequate for mass-production and vertical integration, towards greater collaboration and partnership. It consequently proposes steps that companies may wish to take in order to help facilitate this transition.

Scope of the Study

This study examines the issues involved in the promotion of Lean initiatives among lower tier suppliers in the UK aerospace sector.

For the purposes of the study, due to the matrix nature of supply in the industry, a lower tier supplier is defined as an organisation supplying either component and / or consumable items, and the definition consequently excludes large system manufacturers and similar organisations.

Although the study examines small to medium size enterprises (SME), having for example less than 250 employees, it was not a prerequisite for the companies studied to be of this size, nor was it important whether the company supplied directly to a ‘prime’ or to another level in the supply chain.

\(^1\) UKLAI (1999) ‘The Collection & Analysis of Performance Measures for UK Aerospace Companies’ Society of British Aerospace Companies

The customer organisations studied were consequently large system producers and aircraft manufacturers.

In total, ten organisations were selected for the study and interviewed during the period February to May 2002; five lower tier suppliers and five customer organisations.

**Lean Theory**

The term ‘Lean Production’ was first used by Womack, Jones & Roos\(^3\) to describe the 2:1 difference in productivity they found between car assembly plants in Japan and those in Europe. They subsequently explained how companies could make dramatic improvements in performance by adopting the Lean approach to manufacturing pioneered by the Toyota Corporation.

Womack, Jones & Roos advocated for companies to jointly identify the value stream for products, from concept to consumption and to optimise this value stream, without regard for traditional functional or organisational boundaries. The result would be a network of organisations working together in a ‘Lean Enterprise’, with teams carrying out this work organised between functions and companies, supported by functional specialists.

To assist organisations intending to implement Lean, Womack & Jones\(^4\) later defined five ‘Lean Principles’ as an antidote to the ‘muda’ or waste in organisations that is…any human activity which absorbs resources but creates no value:

- **Value**: Define value only from the customer’s point of view and focus on eradicating non-value adding activities and maximising those that create value.

- **The Value Stream**: Specify all the activities required to design, order and provide a product, from concept through to delivery into the hands of the customer.

- **Flow**: Manage all tasks along the value stream so that there are no stoppages, scrap, or backflows.

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• **Pull**: Establish a system of cascading instructions from downstream to upstream activities, so that nothing is produced until the downstream customer signals a need.

• **Perfection**: Continue to work towards the complete elimination of waste, so that all activities along the value stream create value.

Any initiative intended to move an organisation towards Lean production and supply consequently requires the organisation to significantly review and reassess ‘traditional’ organisational processes and practices.

For example in the Lean model, traditional functional boundaries create obstacles to the smooth flow of activities and consequently need to be realigned around the necessities of the value stream. Similarly, all customer-facing processes must be evaluated and integrated across the corporate boundaries of the other organisations in the value stream.

An important feature of Lean is the emphasis on the reduction of inventory and associated costs, while maintaining the flexibility to service *kanban* inventory systems with frequent, low volume, on time deliveries. This may not only necessitate a review of manufacturing and supply principles traditionally based on economies of scale, but also requires the establishment of procedures for the early detection of errors, since one of the costs to be removed from the value stream will be the need for incoming inspection.

In the pursuit of waste and cost reduction, *customer organisations* need also to seek greater and earlier collaboration with suppliers, for example in the conceptualisation and design of products, and this highlights the emerging importance of relationships in Lean.

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**Lean supply requires a move beyond traditional supplier relationships, where contracts are awarded largely on the basis of price, towards long-term, obligational relationships, focussed on the removal of waste from the value stream to the mutual benefit of both parties.**

The alignment of roles and the development of effective relationships between successive customers and suppliers along the value stream are crucial to achieving lean supply\(^5\). The success of Lean lies fully in the ability of

the parties to commit to long-term collaboration, open communication, the sharing of information and ethical conduct. The consequence of this in Lean supply is the need to move beyond traditional supplier relationships, where contracts are awarded largely on the basis of price, towards long-term, obligational relationships, focussed on the removal of waste from the value stream to the mutual benefit of both parties.

**Expectations for Lean Supply**

Based on these definitions of Lean, we developed a set of exploratory expectations for the development of Lean Supply, which we subsequently used as the starting point for a series of interviews with each of the ten organisations involved in the study.

- Customer led performance improvement initiatives would be consistent with Lean principles.
- Customer led performance improvement initiatives would define unambiguous and achievable expectations for their suppliers, possibly to include collaborative activities in the implementation of Lean.
- There would be evidence of change in organisational structure, operational processes, strategic direction or investment focus in both the customer and supplier organisations studied, resulting from Lean activity.
- Performance improvement initiatives would seek to eliminate waste from the value stream and the benefits derived would be shared between the parties.
- There would be evidence of changing relationships in the organisations studied; from short-term, price based contractual relationships towards long-term, obligational and collaborative relationships.

The following section of the report outlines the organisations’ responses and develops a representation of the current state of Lean within lower tier suppliers.

**2. Why a Lean Performance Improvement Programme?**

There was a general consensus within the companies studied that the primary motivation for initiating or participating in Lean based improvement programmes was to gain improvements in quality, cost and delivery (QCD), to which one company explicitly added the desire to improve their relationship with suppliers.
Although superficially homogeneous, each company also cited their own particular motivations derived from their current business challenges, ownership and company history. One independent supplier for example, having attended a seminar promoting Lean immediately identified the potential benefits for his company’s profitability taking the clear view that “…we had to do it. There was not a good enough reason not to do it.”

Other organisations had been influenced to commence their programme through exposure to Lean in the Automotive Sector, another by the urgent need to improve working capital by reducing their current levels of work-in-progress. One company saw Lean as a pragmatic business fundamental… “The shortest lead-time from the time we start the job to the time we get paid is what we ought to be trying to reduce. That's how I see lean.”

Despite its increasing adoption by the industry, the interviews did highlight the differences between organisations in their understanding of Lean and it’s objectives. One supplier commented that “…people still think if you are a big enough company then get your suppliers to be Lean (and it) makes you Lean…”

This supplier also questioned why the focus for Lean centred predominantly on manufacturing activity “…you’ll never become Lean if you only ever focus on just the manufacturing of it. It's how do you supply it and how do they get it onto their wing or wherever it's going, when they need it to.”

Similarly, while some organisations perceive Lean as a panacea, others take a more selective view. “…We did a TQP programme twelve years ago; there are aspects of that that are still pertinent. So you muddle it, you mould it to exactly what suits us. …There isn't one answer, there really isn't.”

Among lower-tier suppliers, there was however a common suspicion that customer led Lean initiatives would always ultimately seek to reduce their operating margin, rather than seek to identify and reduce waste across the value stream. One customer responded by
saying “At this time we’re not after their bottom line. We’ve done that historically and the UK supplier base has disappeared.”

Another customer organisation said however that while improvement to quality, cost and delivery were the primary drivers for them “…we want to be able to place purchase orders as late as possible, we may want them to hold stock for us which we don’t want to pay for.” Both these objectives would certainly impact upon supplier profitability and would not necessarily be consistent with Lean thinking.

Unsurprisingly, Lean based improvement is not an altruistic activity. Each organisation will bring its own set of motivators and expectations when embarking on, or participating in, an improvement programme. All organisations in the industry, large and small, are under pressure to reduce lead times, improve quality and make it cheaper than last year. For some, Lean will be perceived as a means of achieving this by working collaboratively with suppliers in the removal of non-value adding activities, thereby maintaining or even enhancing profitability across the supply chain.

For others, the complexity of this undertaking may mean that, at worst, the responsibility is simply passed from the customer to the supplier in the form of an ultimatum, with little or no collaboration on how improvements to QCD may be achieved.

One supplier explained their experience in supplying three companies, each of whom in turn supplied the same end customer. The end customer set an overall cost reduction goal of 35% and each of the three companies then took a different approach with the supplier. One company simply requested a 35% cost reduction. The second asked for the same reduction but suggested ways to reduce the supplier’s costs, such as changes to deliveries and invoicing. The third said, “…let’s see how we can take costs out of it”. As a result the supplier reported that they had managed to eliminate various non-value adding activities, going some way to protecting their profit margin.

All organisations talked of the urgency with which they were addressing the continuous pressure from their customers for improved delivery and lower prices. Consequently, the customer organisations considered that for their suppliers non-participation in the improvement process was simply not an option. One customer explained “…It’s very much the way the company needs to do business for the
immediate period and for the future. Suppliers need to be aware that if they meet the performance targets that we are going to assign to them …there will be a growth strategy put in place. Conversely, if they don’t after a period of time, be it twelve, eighteen, twenty-four months, there will be an exit strategy put in place.”

There may however already be early signs that some organisations are beginning to move away from the Lean approach altogether, as they face immediate business challenges for which they fear the Lean approach to improvement may not offer sufficiently rapid or targeted results.

One company told us that they are now significantly less engaged with Lean activity and are focussing more on using standard problem resolution quality tools. The aim is not to concentrate on eliminating non-value added activity but to reduce variability. “We’ve got customers not happy with delivery performance …we have to address the root causes of that…”

There can be little debate that the trend will continue towards greater competitiveness in the UK aerospace industry within a global market. The question to be answered however is whether the industry in general views Lean as simply another initiative, aimed at negotiating further price reductions. On the other hand, is there in fact a genuine awareness and will to implement Lean as a means of removing waste from the supply chain, thereby protecting the profit margins and long-term viability of the industry’s supplier base?

3. Customer Approaches to Lean Programmes

Once the suppliers have been identified for possible inclusion in the Lean initiative, they are typically invited to a promotional seminar or meeting. In most instances more suppliers are invited than can be accommodated in the first phase of the project, to ensure that in the initial round there are sufficient numbers and a diversity of participants.

“People who are disinclined to acknowledge there is a need to improve and therefore that Lean is not for us, will not survive. So it is a survival issue as well as an improvement issue…”
For some customer organisations the seminar is purely targeted at the sponsorship and promotion of Lean ideas. For others, it is the launch of a more systematic process based on value stream analysis. “First of all we encourage them to put together a value stream map for a model product... trying to get a narrow cut right the way through their business looking at one product, with the view that any improvements and changes that we make in relation to that product will have an impact on other products and other processes.”

The specific ‘improvements and changes’ ultimately realised will, of course, vary considerably from product to product and company to company. The findings of this study suggest however that most will be production related involving:

- Kanban
- Changeover reduction
- Celluarisation and one piece flow
- Visual control
- Demand smoothing (Heijunka)
- Inventory and scrap reduction
- 5S
- Kaizen
- Quality failsafing (Pokayoke)

These techniques are generic and form the basis of a ‘Lean Toolkit’ used by many companies. What differentiates organisations however and perhaps defines the relative success of their Lean initiatives, is the approach they take to implementation. In particular, this study has identified eight key variables:

1. The approach taken to supplier selection.
2. The extent to which the organisation has applied Lean to their own operations prior to, or in conjunction with, initiating a Lean programme with their suppliers (practicing what they preach).
3. The decision whether to involve the Purchasing Department as a key contributor in the implementation of Lean.
4. The degree to which the organisation establishes procurement performance measures to encourage and sustain Lean behaviour.

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6 Many texts are available, for example Bicheno, J. ‘The Lean Toolbox’ PICSIE Books, 1998
5. The level of participation and training for personnel involved in implementing Lean improvements.
6. The degree of involvement of organisations beyond only the first tier of suppliers.
7. The involvement of only Manufacturing or a wider group of ‘indirect’ functions in Lean activity.
8. The extent of collaboration in supplier improvement activities.

The Eight Variables

Supplier Selection
One pointer to the sustainability of Lean in an organisation may be the way in which the organisation selects suppliers for participation in their programme and the approach they take to implementation.

Broadly, there appear to be three ways in which suppliers are selected for participation in Lean based improvement programmes; the selection of key suppliers, the selection of problem suppliers and the selection of suppliers within a specific value stream.

Lean advocates that the value stream should be the focus of all improvement activity, and therefore should ideally also be the basis for the selection of suppliers for collaborative improvement activity.

“[The selection criteria for supplier development are] either a key supplier, in that they have a monopoly process, or turnover in that they are a very big supplier and they are capable of being a prime contractor... so that we place one purchase order for a considerable number of components and they go off and employ a load of other people... to deliver components to us... So they are the people that we mainly deal with. That’s not exclusive; we do go further down the food-chain to smaller companies...”

By far the most commonly used method however, continues to utilise the supply chain logic of selection on the basis that the company is a preferred supplier or is considered to be strategically important. “They would tend to be, but not always be, high value. They could be low value but high risk, i.e. the probability of something going wrong and that causing a significant impact here is high... and/or they be strategically important in the long-term, in that they may be very small, let’s say component suppliers, but when it comes to supporting the aircraft they will grow into an organisation that can take long-term support burden from us, either in the UK or more likely in country.”
This category also includes suppliers that may be of some political significance, perhaps as a consequence of their importance to the end customer. “…If our customer is driving me to focus on a supplier, I’ve definitely got to do some development …but it’s got to be offset against the cost.”

Practicing what you preach

The customer organisations in the study tended to fall into two camps; those that had undertaken Lean improvements internally before commencing on Lean activity with their suppliers, and those that had begun by focussing externally on their suppliers.

In the first category, organisations concentrated on their own internal value streams, processes and operations, only moving on to commence work with their suppliers once a critical mass of their own improvement issues had been resolved. “We hit a block… Yes, we could do more internally but we need to go and do more with our suppliers now.”

On the contrary, for those organisations that do not first address their own improvement issues, a degree of resentment can be created when their suppliers begin to realise that the customer organisation is not prepared to tackle their improvement challenges too. One supplier explained how efforts to improve a process failed because his customer was unprepared or unwilling to make changes to their own internal processes. “It started off fantastic… I spent three weeks working on it and found that the cost of them moving the part around their facilities was three times the unit cost. Where did they want to make the waste reduction? Here in my business… they didn't think they could initiate change in their own business”.

Purchasing Department Inclusion

A further key variable is whether the Purchasing Department is involved in the Lean programme from the outset or not. Non-participation can result in problems if the aims of the programme and the objectives set for purchasing are not harmonised. One supplier explained how he and the engineers from his customer's organisation have jointly been able to identify many improvement opportunities, however “the barrier is that the purchasing people don't like me talking to them. They think it's their business talking with suppliers.”

Some customers have strategically kept their Lean programme separate from Procurement involvement however. “…Our commercial negotiations through
Purchasing have been to try and pass… price reductions on down through the supply chain… What we’ve been doing with supplier development is to keep right out of that argument… and have had nothing to do with them whatsoever. What we’ve said is… we have these commercial pressures and these necessities for price reduction… we’re here to help you to achieve that by …taking cost out of the supply chain… so it’s almost a good guy, bad guy approach.”

Other companies have found that for the Lean activity to be sustained with suppliers, it has become essential to involve all functions that have direct contact with the supply chain. “If what we’re doing with the supply chain to date is to be sustained and taken forward, we have to engage these people such that everyone in the organisation in terms of procurement, the quality side of working with suppliers, the goods inwards and the logistics side, we’ve all got to be living and breathing Lean.”

Aligning Procurement Measures
Linked to Procurement’s involvement is the fourth variable, concerning the degree to which organisations establish performance measures that encourage and sustain Lean behaviour.

One company in our study explained what is probably typical in most purchasing departments. “The bonus for the Purchasing environment… is based on the cost, the piece price… In other words the reduction on the previous year ”. Consequently, the rewarded behaviour is for buyers to negotiate year-on-year price reductions, using the ultimate threat of the possibility of switching supply to alternative sources. However, effective long-term collaboration on eradicating wastes, which are the root cause of cost, would in fact result in greater benefits to both customer and supplier.

Such performance measures are therefore not consistent with Lean behaviour, and consequently need to be addressed if Lean initiatives are to be sustainable. “You’ll only ever change the way that they deal with you if you change the way they are measured. If your measures aren’t right the behaviour won’t be right. If you want Lean to happen you’ve got to change the measures… all they want at the end of the day is ‘You’ve been doing all this work with the supplier development people, therefore you should be able to drop your prices’…”
Training and Gaining Ownership

Many organisations place great emphasis on training and familiarising their workforce with the Lean programme. “Part of the Programme is to train up the buyers and others in the Procurement Department to be able to do this activity. We are going to up-skill the workforce to do it.” Another company emphasised that “the most important thing for new companies coming on-board is to look at how you train people.”

“Everyone in the company has had a half-day simulation in terms of why are we doing this, the basic tools and techniques, why they are important and what benefit they have.”

One supplier explained how they consider it essential to their Lean programme that every employee is made aware of the aims of the initiative and their place in it. “They buy into it and take a bit of ownership of what we are trying to do… it’s about giving them the ownership rather than me going around with a big whip saying ‘You must do this’. Give them a bit of rein to say ‘This is what I think we will do’ because the best people with the ideas are those people actually doing the job. Yes, you guide them but you let them buy into it and let them take ownership.”

The Breadth of the Programme

The next two variables are both concerned with the breadth of Lean programmes.

First, some companies limit their involvement to working with their immediate (i.e. 1st tier) suppliers only, while others engage with their supplier’s supplier and so on, along the value stream. Adhering to the traditional supply chain logic of working only with one’s own suppliers, fails to capitalise on one of the main benefits of Lean, i.e. collaboratively working across organisational boundaries in the pursuit of waste elimination.

“Everyone in the company has had a half-day simulation in terms of why are we doing this, the basic tools and techniques, why they are important and what benefit they have.”

“We don’t envisage going down the next level [in the supply chain]. So for example, if supplier management had come up as an issue for our supplier, we would develop them in that. At this moment I don’t think that we would intentionally go down the tiers to the bottom layer.”

Good practice would suggest that organisations may not wish to “break the chain” in the supplier tiers and approach lower tier suppliers directly, so while they “may get into the 2nd, 3rd, 4th tier” they would “want to do that through the 1st tier”. Nonetheless, companies have reported excellent results in pursuing issues across organisational boundaries to the origins of the problem. In particular, one company that had experienced difficulties with their suppliers tracked the problem across the value stream with the co-operation of the organisations concerned, back to the raw material
supplier. They met resistance along the way but “cajoled” their way into “a number of forging houses” and are now working “with a supplier on the bar stock side of things”.

The second breadth variable is the extent to which Lean is applied across the organisation. Many Lean programmes are limited to the production environment only and this has been questioned since waste, in the form of non-value adding activity, will be present in support functions as well as manufacturing. Consequently, the opportunity exists to apply Lean techniques across the organisation, yet few organisations take initiatives out of the shop-floor and into R&D, Accounts, Personnel, Marketing, and so on. “A lot of companies I think leave it at the shop-floor and you shouldn’t”.

**Partnership**

The final variable that differentiates organisations in their approach to implementing Lean is the extent of their collaboration in supplier improvement activities.

When commencing a Lean improvement programme, the instigating organisation is faced with a range of possible approaches along a continuum from full participation within their supplier’s organisation, through to no direct participation or collaboration at the other extreme.

Some organisations elect to fully involve themselves in coaching and assisting with Lean improvements, following on for example from Master Class events run by Lean engineers from the Industry Forum. “We are leading and not just… giving them the programme and walking away. We are making sure that we work with them right through for sustainability. Once Industry Forum walk away that’s it. We need to be back in there making sure that whatever was supposed to be done is being done.”

Other organisations elect to collaborate with suppliers on certain issues only, directing them to sources of further help for all other matters but not offering direct participation. “If we are going to deal with cost, then it would be ourselves going to
the supplier and assisting them… We also have training packs internally that we can put the supplier on, or point them towards the SBAC or anybody else.”

At the far end of the continuum, suppliers complain that certain organisations offer no direct participation or assistance with Lean improvements other than perhaps monitoring progress, directing them instead to external consultants. “They insisted that we have a consultant to view what we were doing. I didn’t think that I really wanted to spend £3,000 getting a consultant in. They insisted that if we wanted to continue working for them…”

This statement points perhaps to the Achilles Heel of the non-participative approach. For a supplier to willingly invest in consultancy they must first be ‘consciously incompetent’ and hungry for the benefits available to them from involvement in the programme. For many SME’s an investment of £3,000 is a considerable sum. Consequently the ground may need to be patiently prepared with the supplier before they are ‘enlightened’ and prepared to accept the need to purchase external help.

It may also be worth noting that for some SME’s the actual word ‘Lean’ signifies reduction, cutbacks, redundancies, reduced margin, uncertainty and fear. This misinterpretation of Lean and it’s objectives may be derived from lack of knowledge, however even when the managers of a business are familiar with Lean they may still fear that it will be misunderstood by their workforce. This study discovered at least one company that continued to actively promote the techniques of Lean “without putting a Lean tag on it” for this very reason.

The more that can be done to collaborate with the supplier in the introduction of Lean concepts, the less probable it seems that such misunderstandings and misinterpretations are likely to occur.

4. Suppliers’ Response to Lean

A positive response to Lean?
Throughout the interviews we conducted for this study, we were provided with numerous positive anecdotes of how Lean activity is helping to improve performance
and attitudes. However, there was recognition that it would take time to see the full benefits.

- “The real improvements will be coming after a year. Because we’ve gone through the process ourselves and we’ve seen little improvements…”

- “There have been some improvements …like expediting, if you think about that it’s just wasteful…”

- “It’s the fact that individuals can personally feel the benefit in their everyday occupation, and it’s tools to hand and that sort of thing, they personally gain benefit…”

- “We feel more capable of achieving some stretch goals, that perhaps certainly two years ago we would have felt were beyond us. It gives you a feeling of increased capability that nothing is actually beyond us”

- “No regrets at all about doing it. We’ve had some disappointments; we haven’t made as much progress as we might have. One or two areas have slipped back… beautiful shadow boards with nothing hanging up…”

- “There is an understanding that these things take a little time. If you are going to make it happen properly you have that leap of faith that says six months, one year, if it’s not going right at that point then there’s something wrong, but there’s certainly a period of a leap of faith.

- “I think it’s fair to say actually in the past two or three months, where we’ve started doing more lean thinking, that we have noticed changes in certain people”

- “An item that used to take 12 to 14 weeks to make can now be produced in approximately 4 days”

The overall impression we gained is that there is a growing understanding among suppliers of the necessity for Lean and also of the benefits to be realised. Nonetheless, there remains a common theme among suppliers that questions customers’ true commitment to Lean in two regards; First, their follow through after the initial launch and secondly, their willingness to apply the Lean philosophy to their own organisations.
“As far as we’re concerned they haven’t had any involvement with us directly in terms of support or assistance”

“They leave you to work it out for yourselves”

“If the OEM’s put as much effort into Lean as they do about arrears… all they do is look at the top line issue and don’t look at what is causing the arrears”

“We have had one customer where we have been very much working together, but that’s been quite rare”

“There has been no follow-up at all to see how we did. Did we think it was worthwhile? Did we experience benefits? Would we recommend it to others?”

“You don’t get the engineers coming up here saying ‘what can we do to streamline the process or take some of the processes out or whatever?’ We don’t get a lot of that”

“Quite a lot of the detail components are free issue from the customer and their delivery to us is horrific!”

“Our customer are classic ‘do as I say not as I do’… “

In addition to the two recurring themes of follow through and willingness to apply Lean philosophy within one’s own organisation, we identified three further issues that need to be addressed in order to facilitate Lean within lower tier suppliers.

- Sponsorship
- Incentives
- Conflicting demands

**Sponsorship**

Internal sponsorship from key individuals is important within any improvement initiative and within the supplier organisation it is one of the main determinants of whether a Lean initiative will be sustained. Many companies within the study were able to identify their Chairman, President of Procurement, other director or senior manager as the main sponsor of their Lean programme.

The most effective sponsors tended to be very knowledgeable about Lean. They also took time out of their schedule to inquire about the programme and talk to the
participants. One company explained how their Group Director always allocates time for Lean during his monthly visits. “He will always set aside the afternoon for saying ‘Come on, show me what you’ve done in the last couple of months’ and he’s very acute as well. He’ll say ‘You showed me that two months ago, what have you done in between?’”.

Incentives
While sponsorship is essential within the organisation, customer organisations must also be able to offer external incentives in order for their suppliers to continue participating in their Lean programmes. Although apparently obvious, some suppliers reported that they felt obliged or even coerced into participating in Lean, without being sure whether it was in their best interest.

One supplier explained that they had no agreement with their customer that the benefits derived from Lean improvement would be shared equally. Consequently, they were concerned that the customer would take all the savings and thereby further erode their profitability. Ironically, their customer told us that they would not expect to take the full saving, however this was not explicitly clear to their supplier.

The importance of incentives is becoming increasingly clear to most customer organisations. One reported that their business had originally operated on the basis of “10% to the supplier and 90% to us”. They soon recognised that there was “no real impetus for the supplier” and now share the gains equally. With this agreement in place they now believe that “there’s a real reason why the supplier would want to get involved”.

An equal share in the benefits of Lean improvement is also a long-term investment in the health of the supply chain. “What is fundamentally important is that the suppliers overall profit margin shouldn’t drop, because obviously if it does they’ve got less money to reinvest and grow their business and support us in the long-term. What we need to do is agree a common understanding of margin, agree the level of waste and agree some joint sharing arrangement that will take this chunk of cost out”.

“We’re saying that if we do see a cost reduction it will be shared 50/50 …rather than say it’s all ours, because that gives them no incentive whatsoever to work with us, we’re saying okay you keep 50% and we’ll keep 50%”
Competing demands
With so many organisations now involving their lower tier suppliers in improvement programmes, for suppliers that are participating in more than a single customer’s programme at one time, there is of course the difficulty of maintaining the bandwidth to participate in multiple projects.

One company involved in this study recently surveyed their supply base and discovered that 55% of their suppliers were currently participating in other Lean improvement programmes. Almost 30% had members of staff dedicated to assisting with customer programmes.

One supplier explained that while he thought that the Aerospace Industry was “on the right road going towards Lean” involvement with more than one project did place a strain on his company’s resources. “They are all interested in what you are doing with continuous improvement, but the problem is they are all coming to see you…”

Some customer organisations are very aware of the difficulties faced by their suppliers. “What we’ve tended to say to the suppliers is we’re not here to sink you, we’re here to help, so if you’ve got other initiatives you want to work on with other customers, fine”. The logic of this approach is that any improvements made by the supplier will ultimately distil down to the benefit of all customers. “The management team can see that cost anywhere in the supply chain we will pay for ultimately and it’s that understanding that enables us to keep going”.

Other customer organisations are more sceptical and are more insistent on improvement activity being focussed on their own value stream. “We’ve got a few suppliers on the programme that have been on [other suppliers’ Lean programmes] but to date it hasn’t trickled down to our products so… we need to push start it within our product line”.

One customer organisation was however much more direct. In their view suppliers were always too busy with other initiatives. “Unfortunately, if we did give in we’d never get to work with the supplier, so you have to be heavy handed”.

It seems that we now have a management team sufficiently enlightened to realise that any cost taken out of the supply chain, anywhere, ultimately is a benefit to us.”
Measurement

It was discouraging to find that few companies either tracked the delivered benefits of Lean in real terms, or had systems that could provide the necessary data. In a very competitive environment this could perhaps be a major weakness were Lean proponents to be challenged to justify their programmes in cost/benefit terms.

One customer’s Lean programme in particular had come under extreme scrutiny recently in terms of what they were “hitting the bottom line with”.

There can be little debate that continuous improvement requires measurement to observe and maintain advances, however it is problematical to decree one set of universal measures suitable for all circumstances. Consequently, each organisation must decide on whether to establish specific metrics for each improvement target, measure the ‘big picture’ only.

Accounting systems

Many companies involved in this study also openly conceded that their accounting systems failed to provide them with adequate management information in support of Lean. For example, one organisation explained how they are “…not a very mature company as far as accounting is concerned at the detail level. We just installed SAP twelve months to two years ago, and we still don’t have a price per part in the system.”

There are three facets to the problem of inadequate financial information in respect of Lean. First, without adequate data it is difficult to quantify the financial impact of Lean on the organisation and its operations. One organisation explained that without adequate accounting information they “…didn’t have true measures identified of what the benefits were”.

Secondly, unless the accounting system can provide a full cost profile for a product or operation, it is difficult to target the most significant regions of waste, which are the root causes of cost. One example of this is the total cost of acquisition. It appears quite common for organisations to account for their transport and miscellaneous expenses separately from their piece part price. Consequently, costs incurred through wasteful, non-value adding activity, which may account for a significant proportion of the total cost of
acquisition, may go unchallenged while less significant costs are rigorously scrutinised. Good financial information therefore supports effective targeting of Lean improvement activity.

Lastly, financial information in the form of budgets, measures and ratios, drives behaviours in organisations and if the data is inadequate or presented in an inappropriate format, incorrect or unexpected behaviour may result. One example we discovered to illustrate this was the way in which one company recovered their overheads.

If you have a component that costs £50/hour and you take six hours to produce it, the business is recovering £300 from that. If you knock it down to three hours they then have to put the hourly rate up to £100/hour, which is how it’s accounted for unfortunately.

Each component was assigned an overhead recovery rate per hour, based on the standard number of hours it took to produce the item. If wasteful activities are removed or reduced through Lean improvement, the number of standard hours to produce the item should reduce. However, in order to recover the same level of overhead, the recovery rate per hour must consequently increase to compensate for the reduced number of hours. Seen in isolation, it would appear that the Lean improvement activity had produced the negative result of increasing the overhead recovery rate per hour, and in organisation where this is a key measure this has proven to be a deterrent to Lean activity.

The prognosis for lower tier suppliers
The prospect for lower tier suppliers in the UK aerospace sector is that customer organisations will increasingly seek to work with reduced numbers of providers. The reasons for this are numerous and varied.

We are trying to assign a greater degree of work to a smaller number of performance driven suppliers that are responsive to our needs and requirements, have key capabilities that we’re looking for in terms of design capability, management capability, and are constantly attaining certain key performance indicators ... in terms of schedule adherence, quality, responsiveness, and on-going cost reduction activities.

For some OEM’s, off-set agreements mean that UK sourced components will in future be manufactured overseas. Other companies are looking to work with suppliers that have a certain financial stability and / or self-development capabilities. For many, there is an attraction in sourcing complete systems rather than components, through a small network of key suppliers. Whatever the motivation, all the customer
organisations involved in this study spoke of “clear targets” or “continuous objectives” to reduce supplier numbers.

For lower tier suppliers, and particularly SME’s, the challenge is to make sure that they retain, or climb the ladder to, preferred supplier status by ensuring that they acquire or enhance the required capabilities, and continuously increase their percentage of value-added to the customer.

If lower tier suppliers fail to do this there can be few alternative paths. Suppliers must either develop the performance capabilities the customers seek, or be acquired by another company that can enhance their capabilities, or exit the aerospace sector through diversification or closure.

Enlightened suppliers have already recognised the new reality and are using Lean to focus on activities that add value for the customer, whilst concurrently attacking cost through the reduction or elimination of non-value adding processes and operations. As already quoted, for such suppliers Lean is “a survival issue as well as an improvement issue”.

5. Key Challenges for Lean Supply

Progress or Lost Opportunities?
In Section two of this report we posed the question of whether Lean is just another initiative aimed at cost reduction, or a movement aimed at addressing waste in the industry. If the latter, then it is also a means by which costs can be removed from the supply chain, without eroding supplier profit margins beyond a point which is neither viable nor sustainable in the long-term.

What is clear is that Lean is viewed as a necessity if suppliers are going to meet the demands of customers and remain profitable in an increasingly competitive global industry. Encouragingly, supplier development teams across many organisations are

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7 Bill Lewandowski – VP Supplier Management AIA, speaking to a joint SBAC / AIA SME event at Farnborough International Air Show 25/7/2002.
currently actively engaged on promoting Lean principles, and there is evidence of significant adoption of Lean techniques within the lower tier suppliers studied.

However, this preliminary investigation has contrasted approaches adopted by customer organisations to implementing Lean in the supply chain, which may lead to different degrees of success in sustaining a Lean environment. One approach represents an attempt to get Lean techniques such as 5S and visual display adopted within the supply chain. A contrasting approach adopts a broader strategy using a Value Stream perspective to eliminate waste as the root cause of cost in the supply chain.

**Contrasting approaches to Lean Implementation in the Supply Chain:**

<table>
<thead>
<tr>
<th>LEAN TECHNIQUES</th>
<th>LEAN SUPPLY</th>
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<tr>
<td>• Manufacturing techniques focussed</td>
<td>• Value Stream focussed</td>
</tr>
<tr>
<td>• Do what we say</td>
<td>• Practicing what we preach</td>
</tr>
<tr>
<td>• Supplier selection by traditional supply chain logic</td>
<td>• Supplier selection by Value Stream logic</td>
</tr>
<tr>
<td>• Separate supplier development initiatives</td>
<td>• Purchasing &amp; Logistics involvement</td>
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<tr>
<td>• Cost reduction focus</td>
<td>• Waste reduction focus</td>
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<tr>
<td>• Coercive</td>
<td>• Partnership</td>
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<tr>
<td>• Measures that conflict with Lean</td>
<td>• Measures that sustain Lean</td>
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There is some evidence to suggest that the first approach may result in:

- Cynicism among suppliers and no integrated link up between internal improvement activities within the customer organisation and Lean improvements in the supplier's organisation
- Buying policy disconnected from Lean improvement
- Suspicion among suppliers that Lean is primarily a cost reduction exercise
- Few incentives for suppliers to participate in Lean improvement

Consequently, the objective of long-term customer / supplier collaboration on waste reduction appears to be undermined by the first approach, because

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Supply chain professionals continue to focus on year-on-year price reduction, rather than on eliminating waste as the root cause of cost.
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the Lean philosophy is not fully embedded and supply chain professionals continue to focus on year-on-year price reduction, rather than on eliminating waste as the root cause of cost.

The second approach, ‘Lean Supply’, is however beginning to be adopted by some customer organisations. By fully adopting the Value Stream philosophy the opportunity exists to secure two powerful benefits.

By partnering with suppliers in all the activities required to design, order and provide a product from concept to delivery to the customer, opportunities can be identified to smooth operations across all functions and ensure that maximum value is added for the end customer.

Secondly, since waste, and hence unnecessary cost, is most often present at the interface between organisations, by tracking a product across many organisational barriers wasteful activity may be eliminated and significant cost benefits may be realised.

**Embracing Value Stream Thinking: Key Challenges**

Despite the opportunities that exist, why are some companies finding it difficult to embrace the Value Stream philosophy?

To embrace value stream philosophy, many organisations are having to make a fundamental shift in the way they think about Lean.

For many companies Lean is synonymous with production related techniques such as Kanban, changeover reduction, celluarisation and one-piece flow, visual control, demand smoothing (Heijunka), inventory and scrap reduction, 5S, Kaizen and quality failsafing (Pokayoke). All these techniques can be applied successfully in-house, with very little need to involve other companies in their implementation.

Expanding the definition of Lean to include product value streams involves mapping the production of an item across organisational boundaries, from raw material to completion, in the pursuit of value creation & waste elimination. To achieve this involves significant challenges.
Firstly, many companies within this study are just beginning to become comfortable with the introduction of Lean production techniques; consequently most may not as yet perceive a need to move beyond this point.

Secondly, the traditional business model until the 1980’s was of standalone businesses with virtually no inter-firm collaboration. Japanese manufacturing techniques began to challenge this notion, yet full inter-firm collaboration that is necessary for Value Stream performance improvement and cost reduction, is still challenging for most organisations.

The Value Stream approach also challenges the traditional business model in other important aspects, requiring different ways of working.

<table>
<thead>
<tr>
<th>PRODUCT VALUE STREAM PERSPECTIVE</th>
<th>TRADITIONAL BUSINESS PERSPECTIVE</th>
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<tbody>
<tr>
<td>• Product View</td>
<td>• Functional View</td>
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<tr>
<td>• Whole Value Stream Focus</td>
<td>• Individual Company Focus</td>
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<tr>
<td>• Customer Pull</td>
<td>• Economies of scale</td>
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<td>• Waste Reduction</td>
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<tr>
<td>• Continuous Improvement</td>
<td>• Improvement Relative to Competitors</td>
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<tr>
<td>• Long-term</td>
<td>• Short-term</td>
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A Value Stream perspective suggests that instead of optimising around functional performance, Engineering, Procurement, Production and Marketing should be re-organised around a product focus, where the customer determines the value in a product (e.g. its desirable features and benefits).

Likewise, if the focus of activity is on the product and no longer on the functions within the business, it is logical to begin to see the product and its evolution as being the result of cross-organisational collaboration. The sphere of management influence may no longer be constrained to activity only within one’s own business, but may
also encompass seeking to optimise value adding activity for the product within other organisations, seeing all collaborators as part of a **Lean Enterprise**.

The Value Stream perspective is also significantly at odds with traditional production ideology. Instead of the mantra of **economies of scale** from which frequently results supply surpluses or famines until the next production run, the Value Stream philosophy advocates production by **customer pull**. The resulting ideal would be for production to be initiated only in relation to downstream demand and **single piece flow** instead of large batch sizes.

Similarly, where the emphasis is currently on **cost reduction** in the traditional business perspective, this should be replaced by an emphasis on **waste reduction** and **maximising customer value**. The Value Stream perspective also challenges the notion that good or bad performance is only measured relative to one’s competitors, thereby espousing an ethos of **continuous improvement**.

Finally, short-term reporting requirements potentially limit a company to tactical and often poor decision-making, aimed at beginning to realise benefits within the planning cycle. The Value Stream perspective of Lean is a strategic rather than tactical resolution. It therefore requires companies to take a **long-term view** (Womack & Jones suggest five years) during which investment in Lean must be sustained, in order to break the cycle of the traditional business model and realise the benefits of Lean.

### 6. The Way Forward

It is clear from this study that to realise the full advantages, Lean practitioners in UK aerospace must move beyond the current primary focus on manufacturing techniques and optimising only their own company’s part in the supply chain as an isolated process, i.e. as the raw material provider, the component manufacturer, the OEM and so on.

The ultimate goal should be instead to look at all the activities required to produce a specific product, across all the companies involved, and to challenge those actions that don’t create or optimise value for the customer.
The focal point of this activity would be the reduction of waste and the maximisation of value-adding activity, as opposed to the current emphasis on pure cost reduction through negotiation with the supplier. By this means costs can be removed from the supply chain, without eroding supplier profit margins beyond a point, which is neither viable nor sustainable for long-term competitiveness.

**Interim Steps to Lean Supply**

The development of Lean Supply in Aerospace must take into account the significant challenges outlined earlier, however the following interim steps are suggested as a way forward for current practitioners and organisations embarking on Lean implementation.

1. **Target supplier selection and improvement activities using a Value Stream approach rather than traditional supply chain logic.**

   Many companies are beginning to recognise the need to move away from functional silos and an individual company focus, to a concentration on product value streams as a means of structuring their organisation and their internal Lean improvement activities.\(^8\)

   As some companies in this study have shown, this philosophy can be successfully extended to Lean in the supply chain. This requires supplier selection for Lean improvement activity on the basis of their involvement in a particular Value Stream. As a starting point *customer organisations* need to have clear visibility of those organisations that significantly impact upon the Value Stream targeted for improvement.

   Activities should consequently be concerned with the flow of performance improvement to the downstream customer, even if this is only to the first tier, although the ultimate goal should be to extend improvement along each product Value Stream with a view to eliminating whole Value Stream waste and therefore costs.

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2. **Align organisational and individual performance measures**

Probably the most significant obstacle to the value stream philosophy is how we measure organisational and individual performance. At an organisational level, companies are concerned with maximising shareholder return, meeting quarterly or half-yearly targets and increasing asset utilisation, with the aim of ensuring optimal performance only within one’s own organisation.

The consequence of this approach to target setting and performance measurement is that, in turn, managers and their staff are set targets against operations they can directly influence in the short-term, such as piece price for example, where a buyer’s performance can be measured on his/her ability to negotiate a percentage price decrease.

Such performance measures need to be re-aligned to ensure that the long-term objectives of waste elimination and value creation across the entire Value Stream are supported, and not undermined by short-term self-interest.

3. **Commit to the suppliers for the long run.**

Organisations need to take a long-term view on the implementation of Lean. The adage that *Rome wasn’t built in a day* holds true.

Consequently, to realise the goal of minimal waste within a particular Value Stream necessitates a long-term commitment to the suppliers within that Value Stream. In the absence of such commitment and transparency of objectives, suppliers are likely to feel suspicious of Lean improvement activities, viewing them as another cost reduction exercise.

Establishing Lean principles in the supply chain may involve an initial five-year programme, then on-going improvement. The advantage of adopting the Value Stream approach is however, that targeted incremental improvements can be achieved within a specific Value Stream in a relatively short period of time.

Achieving these interim recommendations will undoubtedly present a considerable challenge to current practices in the aerospace industry. The Lean philosophy fundamentally challenges the way in which we do business, and companies are
beginning to awaken to the fact that its impact reaches well beyond the Manufacturing function alone.

Lean is not simply a discreet set of techniques. It is a way of approaching the challenges of increasing competitiveness and globalisation in the industry and it requires an essential change in the industry’s mind-set.

This realisation has begun to take hold in parts of the industry and the fleet footed have already embarked on embracing the broader Value Stream paradigm. The progress of these organisations will be of significant importance to those that follow, and it is hoped that this report will stimulate further investigation as they proceed.

7. Acknowledgements

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