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Dr Justin Hayward, Director, CIR & HVM-UK
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Summary of Conference Day by Dr Justin Hayward, Director CIR Ltd

Approximately 130 business people attended the first CIR HVM Conference in the South East, the fifth in the CIR HVM series, on 17 November 2005 at Harwell in Oxfordshire. The day was pronounced a success by lead sponsors SEEDA, by the conference Chairman and by CIR. Panel Sessions, numerous case study talks, networking and general increase in awareness and improvement in the image of HVM in the South East were afforded by the conference. Many feedback forms suggested that it was a success, with one respondent saying that it was perhaps "the best line up of speakers I had ever seen". Speaker presentations were given the highest praise in that feedback, across the board. SEEDA's top directorship itself described the event as "an extremely interesting day".

The day was divided up into 4 main sessions, with a lunch networking break and two half-hour breaks mid morning and afternoon, and a final networking session over a glass of wine early evening before departure.

In order, the sessions were entitled: Introduction & Growth; Macro; Micro/Nano; Strengths & Actions respectively. The day went on in the manner of a business meeting, starting by defining its goals, making definitions of the subject matter High Value Manufacturing (HVM) and defining the participants in this field. There was a talk positioning the UK in HVM. It went on to give some generic case studies that defined growth and success before a first panel session.

In the second session, companies whose businesses involved complex assembly of large or 'Macro' products took the stage and described their business cases and experiences. Following this, there was a panel session and then lunch.

The third session came after lunch; this session focused on small, or component HVM products or materials. There was a strong nanotechnology focus coming through. Companies again described their business cases and experiences, in a similar manner, but in a different part of the supply chain to session two. The third panel session followed this, and then there was a mid-afternoon break.

The final session drew together the generic success and early stage HVM case studies and the defining first session. There was a talk from an archetypal technology cluster HVM company, Oxford Instruments. There was then a talk on the interface between academia and industry and some examples of large scale projects assisted strongly by government, and a mention of the need to

communicate the importance of HVM to future engineers, scientists and technologists, as well as business people.

A video of the 20 minute CIR HVM speech by Lord Sainsbury, with a special message for the conference followed this talk. Following this, Pam Alexander, CEO of SEEDA the partner sponsors gave a talk enumerating key messages that the RDA SEEDA had taken in during the day's talks.

There then was a final panel session with all the participants in the final session. Professor Mike Gregory summarised the day as Chairman, and Dr Justin Hayward (CIR) thanked participants and made announcements of future events as conference manager.

These summary notes are meant to be just that: they are not a complete, structured, grammatically-perfect set of chapters. If any point is not clear from the text, please call CIR for clarification from the original tapes and texts.

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First Session Notes (GROWTH)

Introduction

Five years ago, a lot of people thought manufacturing was virtually dead in the UK. Most people would think we don't make anything in the UK anymore. That is untrue. But we need to make people aware that manufacturing is important and why. It is important because it is at the heart of where a lot of innovation goes on.

Some innovation comes from great science laboratories, or universities, but what is often forgotten, is that a lot comes from the very act of making things. By making things you learn how to make them better and how to different things, and more cheaply so that you can make a business out of them.

We think of manufacturing as a cycle: understanding the markets, designing them, distributing and servicing them, and the core bit, making them. Knowledge of physical production is absolutely critical. Whilst we might not be able to do that where there is a high labour cost in the UK, it is essential we have control of the IP that underpins that activity.

Why HVM?

As people come to recognise the importance of manufacturing for the economy, we must ask ourselves, how to make it work. Government strategy evolves around high technologies, service industry and innovation, That is, Chinese Government Strategy! This is something they are getting annoyed about: using up all their raw materials, polluting their country, while others are branding things and making all the money. So the idea that we can get away with this, is not going to last much longer. They will come to understand branding, and can buy brands much more easily than we can build manufacturing capability. The long decline in terms of percentage of GDP of the manufacturing sector as a whole was noted. We must do more to improve the image of the future of manufacturing, HVM, to increase the interest in it from our children.

Talk 2

Global communications are such that nowadays, the poorest people and nations in the world are aware of how the rest live. They can learn quickly and more often now copy quickly what they are doing.

We will continue to live in a world where the oil price is likely to be high and possibly escalate higher, making other forms of energy more viable and in any case, essential.

While products flow globally easily, people still do not and wages vary enormously in different countries.

There was a (CIR) definition of high value manufacturing based upon products such that there is (are): improved time-to-market; intellectual property strategies; investment of profits and other funds in an ongoing pipeline of R&D; design inputs to make technology come to life. There was mention of technology sectors where this was often most applicable.

Where can the UK compete in HVM? HVM means new markets and new designs. These were noted as involving risk. That 'HVM' must be long term, exciting, and investors must see it as a good source of risk, which is high margin.

Talk 3

It was argued that we need not "give up" in manufacturing and see loss of GDP, jobs and productivity and competitiveness as inevitable. The British 'play fair' in terms of international trade, and should continue to do so, but should think of keeping know-how as it is generated, so that companies can grow from this, rather than always giving away that 'recipe' to other nations, a point made in the introduction.

Government reacted to the manufacturing situation in 2002 with its Manufacturing Strategy: GMS. This mentioned seven pillars of wisdom. It was praised at the conference as having "got off to right start with what we need to do". In 2004 Nick Brayshaw reviewed it. MAS received praise all round. Key Performance Indicators for manufacturing are now beginning to be published. The government established the Manufacturing Forum, aiming to bring together all aspects and attitudes of manufacturing.

In 2005, the government's 5 year plan was written down.

There is an important model: government, academic, financial institutions working together. No single body has the answer. 'Partnership' is the key word as we move forward. Innovation and investment must be rewarding in the long term.

As we move to HVM, need small companies coming together to form teams. KPIs show that UK reduced level of R&D expenditure by over 0.5%. Korea increased it by 40%, the Swiss by 10%. We also need to follow through with performance. The 5 year plan is based on increasing the percentage of R&D going forward.

We are people who have to take HVM to where we need to be! Many senior people have benefited in the older generation from increasing asset prices (houses); from fairly decent pensions; from good salaries. We pass down a different story to our children, if we are not careful. They will work longer for less, have lower house price rises, pay more for healthcare and have lower pensions. Demographics make all this more difficult in times to come.

Recommendations of centrally shareable high tech manufacturing facilities have been advised and are indeed needed. The reports are good, but they need to be invested in.
We must have a taxation system that rewards innovation going forward. Need to educate artisans and technicians as well as professors.
Industry must not step back and let government do apprenticeships. Industry must do that, given government level strategy.

Why does manufacturing matter to the UK economy and what are the driving forces?

1) It is an important part of the UK economy, about 16% in terms of GDP; over half of our exports and services; and 15% of the jobs in the UK (3.5 million jobs) and one of the largest employers of unskilled labour in the UK. About 50% have no vocational skills at all – historically employs the "rejects" of the system something which it won't continue doing.

However, measuring manufacturing in terms of GDP is not particularly representative, since we now outsource many of the services, such as cleaning, the services, that we used to class as 'manufacturing'. For every three people directly involved in manufacturing, there are another two, whose jobs also directly relate to it.

2) Manufacturing is the key driver of economic growth.

Manufacturing creates the greatest value per individual per job. It is about 50% higher than the whole economy, and almost double that of the services sector. It is capital intensive. Manufacturing product, using machines, leads to high output per individual. And the growth in productivity of the manufacturing sector is about double that of the whole economy. In government terms, if you want living standards to grow, the GDP of the country needs to increase.
You can do that in three ways:
1) get more people to work (and in the UK we have the highest employment rate of all the developed economies – not a great pool of people who want to work, so you are back to immigration (unpopular);
2) get those in work to work more hours;
3) improve productivity (and the most productive work in the UK is manufacturing).
Though the government is unlikely to actively promote increased employment in manufacturing, it would want to stop the decline, which is reducing the value-added of the whole economy.

Manufacturing in absolute terms (not as a percentage of the economy, but in output terms) is about 20% higher than at the start of the 1980s i.e. about 1% a year growth. But this is now declining due to exchange rates, and advent of low-cost economies, such as China.

However, the UK has been out-performed by other countries. The US, France and West Germany are perhaps the only economies who produce comparable data. The growth of output in the US has been double ours in the last 40 years, as has Germany's and France's has been three times that of the UK. In terms of employment, the US, Germany and France's employment in that time has remained constant, but ours has halved – headcount reduction. We have shed labour, through productivity. This has been our driving force. Our competitors in Europe have been unable to do this, due to their social agenda, so have had to drive product development, innovation (different policy levers).

Driving forces:

1) Sterling strong.

2) Competition from low-cost economies: China. Output is growing by about 10% per annum, but 70% of that is due to increased demand in the West. We, in the UK, is only satisfying half the demand, we are creating. The fact people are moving their factories out to China, is a relatively small part of the balance.

3) Threat or opportunity? Everyone who works in China, in an industrial context, will become a consumer themselves. 1.3 billion people who will become consumers for the products we make in the West. China has become one of the largest markets for aeroplanes. Our growth in exports to China is going at about 35% a year, exports to Europe virtually flat.

4) Cost pressures (oil). Baltic dry freight index (measure of shipping products around the world) – cost of shipping rising (busy). Price of metals at all time high.

5) Weak investment growth in the UK. Less capital available in the UK compared to other competitors. Fiscal disincentive: There is tax relief for the cost of importing goods, but no such benefit for investing in the UK and deciding to make the product here!

6) Globalisation. Will not go away, but will change (see above)

7) Critical mass: can manufacturing continue to decline in absolute terms without links in the chain disappearing.

8) Skills. 80% of vacancies for manufacturers now require at least NVQ Level 3.

9) The government is piling on legalisation. But there was a shift in mindset of the DTI about 5 years ago, which led to the publication of Manufacturing Strategy etc, establishment of manufacturing forum (which represents all of the stakeholders). They are working actively to promote manufacturing.

But have we yet seen the results? And the government is ambivalent/hostile to manufacturing. Government funds MAS – which has made a difference. Also, manufacturing skills academy in the pipeline.

Manufacturing is an essential part of the economy. It forms 15% of the employment (possibly up to 20-25%). There is a constant challenge to become more competitive.

Driving high value manufacturing is the agenda for the future. What we need is more action.

Example HVM Company 1

We outsource 90% of our manufacturing. Our strengths are in design and product development.

Key strength innovative design.

Key challenge is the retention of technically qualified staff, especially in fields of physics and software.

To retain them, use a whole series of equity plans and share options; increasingly difficult to get very good staff.

Many companies are trying to sell machines and scanners, but the thing that makes the sale is the software that goes with them. It answers the questions users want to address in terms of customer management.

It costs 1.2 billion dollars to take a drug to market. Every month of phase two and three trials you can shave off, will save you around 1.5 to 2 million.

The smarter and faster you can produce, either indications or counter indications for your drug, you save money.

There is a great symbiosis between Oxford University and commercialisation of science.

Students in the final years of their degrees all want to be entrepreneurs.

There has been a sea of change in attitude over the last 20 years, we are becoming an entrepreneurial culture, which is increasingly rooted in cutting edge science and technology.

The fundamental message is that there are vastly more opportunities available than there are people to develop and exploit them.

There is extraordinary potential, the mindset is beginning to move in the right way.

Example Company 2 (BMW MINI Case Study)

Surprised about the huge success of doubling production in 4.5 years.

4,500 people employed in the UK. Important part of BMW production network globally. Two years ahead of schedule built the 500,000th MINI.

Long-term commitment to the UK and the area of Oxford: £100 million investment announced.

Sales: biggest market is the UK then USA. Didn't expect such sales in the USA of very small cars. 3rd biggest in Germany.

Sales: Higher spec cars are more profitable.

Several new products such as Diesel and Convertible added to product range in a short space of time in the early 2000s.

Each customer can order from 10 to the power 45 options. i.e. Two cars are never the same. Customers are able to change car up to 8 days before production date.

Success is not just about production: there is a lot of variety in supply base. 33% of parts 139 British suppliers, £45 million in purchases from them. Total number is 422. Logistic exercise to increase supplier base for sales. High complexity components are coming from the UK near Oxford and Banbury and Birmingham, i.e. from local suppliers.

Staff: Bonuses paid for performance improvements. Innovative people: 10000 ideas (continuous improvements): £6.5m in savings so far from these ideas. Associates can pursue a degree in IT tooling engineering and business.

Key Success Factor: good relationship with employee/worker organisational groups, otherwise would not have been possible to increase the size of the plant.

Changes made in the UK to help this would not have been possible in Germany.

Talk 3

Aerospace and the South East

SE England well positioned for changing nature of the market.

£7bn business in aerospace and defence. Firms have global 'primes'. There are also unique small firms. A business development organisation to help firms win business in this global market.

Collapsing lead-time and innovation and commercial exploitation. Now fewer primes; they want fewer interfaces (suppliers).

We are in a unique place currently to take advantage of the new business models. Ways of doing business are small agile innovative companies with complementary capabilities close coupled to research centres. FAC positioned to help them.

Bold target: growth, products for space and autonomous systems and protections of the environment. Target to grow these markets by £3bn in the next 5 years.

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SEEDA

The reason why we are here is that SEEDA wants to make clear that Manufacturing is important to the South East.

SEEDA leads on how we can use government spending and procurement policies for improving
South East is the manufacturing capital of the UK on every index. Manufacturing is employing 500,000 in the sector in the South East. This is a vital sector of the SE economy.

What is the South Eastern economy?

- 8 million people in the SE.
- GDP £145 bn.
- In any tax year £11-20 bn excess.

Vital part of UK economy:

- Over 3% growth versus average of 2.4% for the UK.
- 285,000 VAT registered businesses in the region.
- Manufacturing turnover is £18bn and 500k emps.
- R&D spend is over £4bn.
- We need more R&D investment.
- Confirming over 20,000 in manufacturing
- GVA (profits): profit growth second only to SW in growth. SE overall is some £6bn more than SW. £18bn.
- SE over 15% of High Value Manufacturing in the UK.
- Looking at nanotechnology as a sector.
- SE supports a lot of other businesses around the UK.
- 25% of all UK exports leave the SE. Leads to increased efficiency and productivity in our companies.
- Looking to bring in new companies to region (6000 foreign companies so far) and trying to export back the other way. (UKTI SE)
- If you manufacture you will be wealthy. China is making a lot of money from this now. We are not about to let manufacturing go.
- We don't compare with other regions; we trail 20th biggest economy in the world, trails in many indices, such as prod, GDP, patents, average earnings.

- Hertford Connecticut is top in patents, twice as many as we do. Use of IP turning it into goods and services drives economies.
- We don't worry about offshoring. If we move into higher value manufacturing driven by high levels of skills, we can do this.
- Can build instruments that can build for the nanotechnology era.
- A lot of the innovation that comes from Universities should be exploited as products. The Japanese see that most of the things that have been invented in the 20th century came from Britain, but do we still make them? We have to respond to markets faster.
- SEEDA strategy: we want to assist manufacturing. MAS SE was piloted in the SE; has been a great success. Doubling its budget in the SE; spent money assisting SMEs to manufacture. Creating GVA £21mn to those companies. Doubling provision of that support and moving to lean manufacturing.
- Innovation Advisory Service
- Strategic support from Science and Technology Advisory Fund
- Nanotech Fund for R&D
- Linked to China, and want to increase connections
- Want to move up the value chain
- Productivity versus the USA?
- USA does two things better: invest in new technology; look at people and promote them early and give them responsibility
- Need to bring our products to market a lot faster: SEEDA to do anything to help you.
- Top manufacturing region in the UK
- How can we make your businesses better?

PANEL ONE SUMMARY

One of the issues discussed a lot in the session was lack of skilled people. Surely we need to ask how we get people to live in high cost regions. Surely this must be done at government levels?

- We are here because we enjoy the wealth we have created. Californians would feel the same problems. Governments can and will do more. I would like to see more investment in infrastructure in the South East.
- We need better transport links. We have to balance it and take care of the environment at the same time.
- We can pay competitive salaries; and tend to use equity as a way to encourage people.

- Very difficult to get people to do postdoc work in Universities. Almost impossible to live on those salaries. Academic group leaders are spending time fixing up consulting work for those people, which is not easy! They are thus losing time on research, very bad given this conference's stated objectives and issues.

In terms of where high value manufacturing will be in 20 years, please tell us why a young engineer or technologist should not go into banking?

- It is one of the most exciting things one can do in life to take a product from an idea to a real thing. And then sell it!
- There aren't any schoolchildren who looked forward to a career in banking.
- I do like making things.
- It is nicer to see a product coming out of an assembly line than sitting in a high tower and seeking the money.
- Agreed. My most exciting businesses are the ones that are out there selling high value high tech products, which are taking us out there all over the world.
- We have been good at innovation. We have not been so good at commercialisation. If we can couple the research in our Universities with commercialisation then we can have an exciting future.
- Everyone gets just one life. A life in which you can take fantastic ideas (at the moment for me that is in molecular biotechnology and information technology) and you pull those things together, to make or build something is a fantastic thing to do, and actually, you can get 'very rich' doing it too!

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Second Session Notes (MACRO)

HVM Case Example 1

Motorsport, employs 40k people, and turns over £5bn GBP a year. £2.2bn is export products and services.

20 year old company, turning over £110m, 900 employees, privately and private equity owned. HQ in the UK, 8 facilities globally.

Business Model: vehicle manufacturers produce cars in millions and may want to get involved in motorsport to give impetus and kudos to the road car brand. This example HVM company's outsource operation develops a race variant of car. How create value for customers: 70% of revenues are from non-core businesses. Business model is right at the heart of HVM game. Design at the heart of HVM. The British design name well known.

Design

Design is central and critical to HVM. The world is full of commodity-manufactured items. Even people in China, Malaysia, Korea, Taiwan, who currently manufacture low cost items, are coming to realise that there is reason to move up the value chain: money to be made, and 'the low-cost party cannot last forever'.

What is design?

It starts with people, and how they perceive value: often emotional. Thus design is understanding the psychology of what will make someone pay 50-100% more for a product. Aims to deliver: beautiful, desirable, intelligent, appropriate and sustainable products.

Design is not a linear process, but a crucible. Integrated innovation approach all the way through.

An opportunity generator.

Importance of craft: Craft is important as well as high tech community. We should commercialise it in UK. E.g. Gucci.

E.g. Apple: at the highest level Jobs and Ives directors drink together and have design and general strategy ideas together at top level in that context. Design is a unifying force and an opportunity generator.

E.g. Fuel Cell for Hydrogen Motorcycle: Toyota and GM did not believe what it can do. No consumer cares about that fuel cell; turned into silent clean electrical generator. Turn a piece of technology into something desirable. Wrapped a motorcycle around the unit to create a real-world believable

opportunity. Company has pulled in about £50mn of investment. Design can help bring money in and get products to market. Products or design aspects are not necessarily high tech.

Importance of intellectual property:

- Safeguarding and protecting.
- Speed
- Make it too difficult to copy e.g. iPod. Squeeze the supply chain: buy up all needed products for example if big enough.

Are we into long-term investment, or the 'sun-seekers'?[1]
In the longer term there cannot be a future in that.

The only way for manufacturers will success unless understand what customers want and what they are prepared to pay. Cannot get away with making product which will make profit, without being consumer-centric/-focused, you are wrong.

Integrate design into the manufacturing process.

The future for manufacturing in this country is through adding value. Design helps scientists and technologists connect their product to the market place, to understand and meet user needs. Rapidly growing companies distinguish themselves by recognising design as a core factor of their work.
Design is a market-focused process.
Design involves everyone in the R&D process.
Design brings people together making the R&D process less risky and more commercially successful.

Example Company 2
Concurs that only through understanding the importance of design that got company off ground.
Main activities: make instrumentation clusters. Key are the electroluminescent display and outdoor media and backlighting systems.
Doubled revenue every year for 4 years. Now merged with a company to reach 30 employees.

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[1] ('Sun-seeker'=Making a couple of million and selling out and then buying a boat somewhere sunny.)

Our technology had been written off as a boring and old. We couldn't afford to enter the largest markets, that would have been risky: high volume and low margin.
Had to spend a lot on R&D.
Needed designers and had to bring all inhouse; partly as could not afford IPR protection. Didn't have money to fund patents. We were fastest to market; listened to customers; now selling into 12 countries.

Broke all the rules: great product, no markets. No applications. Had to cajole people into using them. Model: Set up a Foundation, funding designers and artists; giving them cash and enabling them to realise their dreams, and at the same time, the company appears in media and papers everywhere! These people work for large car manufacturers etc, designers inviting us in and asking what we can do for them. Now have £2mn turnover and no salespeople. Demand is beating our resources to do the work.
We show our displays all over the world. Architects understand them then we get invited in.
Put up in same time that it takes to put up a paper poster. There is more than double the recall rate, but 10-15 times more cost than a paper poster: high value!
Modern buildings are glass; only solution is to display advertising on the inside. The company solved that problem.
Solutions can be unusual but they always solve a problem.
Solutions can simply pique people's imagination; then it is about creativity and marketing solutions.
Only through understanding design was the company able to take a product from nothing to a £3mn business in five years.

PANEL SESSION TWO
How you have found the experience of working with Private Equity? Companies unsure of how to handle this.

Critical for us that when PE comes in that they let us get on with it at management level. Not under pressure to do things that are not what we need to do. Help from wings only.

Designers: seen a lot of work on product but is there any innovate in processes and services?

In the last couple of years we have done more work designing experiences, better services, innovation management. Moved from hard product into helping organisations to find ways of innovating better. The

design process is applicable to service as to hard product. This has only been accepted in the last five years. It is about bringing people together. If can do it can create a service as well as a product.

Our best product designers wouldn't think of designing a product in isolation; product and service difficult to separate.
I agree. We manufacture. Our design heritage: in order to build a dress we had to create a new product. Working with our new designers we created a new process that could reduce cost of manufacture of displays etc. Fundamental trickle down.

Designers being paid by royalties? A small risk portfolio for the design house can be a great plus for the SME.

I agree. This is exactly what we are trying to and give royalties and send them around the world.

The idea of doing a royalties deal is single most exciting thing to us. Reality at the coalface is down to trust. There are still organisations that are large and that would 'take advantage of us'. Because we are a small company that could fundamentally damage us. The best deal that we can get is a hybrid. But finding ways of doing that is key.
Overall, I'd be supportive of the approach; often a business in its early days won't think very much about spending more on lawyer or accountant; but would encourage them to spend on design. A royalty approach is good.

I don't know any lawyers who work for royalties; this is the acid test!

Question on patents:

One of the things, in my experience, about our US cousins is that, if they can take advantage of someone, they will. Somebody is going to try to patent water or air there. Design registration is a less onerous method of protection, but doesn't work in USA or in China. It is a very useful first base.

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Third Session Notes (MICRO)

Example Company 1

Summary of nanomaterials. 25 nanometers of stainless steel. 5g of it. 1000,000 times 6 billion particles.

Made: in a couple of seconds…

Changes: in optical, electrical, biological properties of the materials.

Focus: has been on existing materials like zinc oxide.

Markets:

Replacement; Add functionality; Carry other components; New products

Key issues: Scale of production; Quality assurance; How you make nanomaterials

Not a West only business: E.g. Cyprus, Chile, India, Thailand, Brasil, Argentina also involved.

What is the parent company doing? Brainpower and not much production.

Production:

Came from problem of nanoaluminium. Now it works. Surface area high particles small. Difficult to obtain.

Made world's only system for making macro amounts of metal oxides. All client groups deferred to the quality assurance person on call. Reproducibility is key.

Issues

System: can give self the USP by putting over product.

Someone will be focusing down on this and optimising. 1300 companies in 52 nations in 3 years have spoken to. Every possible process can imagine. Current view is that applications are the key. All from people who've had an idea but can't find the application. Nanoenabling. Can I enhance and add functionality to my product?

VC & investors: always expected one killer application. This doesn't exist. One technology arrives that may drive a business forward. A lot of hype, but a ground swell of serious ideas for new products.

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Example Company 2

Many years of business and technology trial and error. Initially without a lab, office or any investment other than own capital.

Many false starts, projects that came to nothing. Situations where development phase work became outmoded or obsolete on completion!

Winter of 1978, was before science parks and incubators. Took six years to get to a modern lab.

No products, no markets, no grants, no loans, £12.5k capital.

Business model tested was: can I go from contract R&D and evolve to products?

Then BP solar approached. Made a few products. Weren't ready for photovoltaics in 1980s. DTI award for plasma source. Make the world's first blue solid state laser. It works. BP Solar published. Everyone wanted one. 500 installed base at £30k each now!

Showed IBM that could solve their problem. Now 400 installed base of second product at £30k+. Awarded Queen's Award. No bad debts, blue chip customers.

100s upon 100s of free marketing notes via research journals references.

Nanoparticles: made an enabling generator. Machine sells for £200k. Ultra high vacuum. First order from China and second order from India. With profits developed a portfolio of products. So we have a lot of repeat order products, and marketers globally.

Publishing of scientific papers and referencing of work by others seen as important source of publicity.

The company is now poised for growth.

Example Company 3

Business Model: Buy in a blank piece of metal for a dollar. Put a hole or holes in it. Then sell it for $100. That is a nice, simple HVM application and model!

Real interest is to sell systems. Can cost £100k to £1m. In addition to providing systems, can help cope with surges in demand in production. Want long term relationships with customers.

Challenges: how can you justify cost of over £1m for the equipment. It comes down to knowledge of process. What equipment does the customer want? Most want maximum quality, but that is very slow. Customer parameters enable most appropriate solution. Machine any solid material, ceramics, silicon, steel and all metals, plastics, polyamide for electronics.

Markets: microelectronics, automotive, environment.

Driver: Shrinkage of semiconductor components now.

Hole in silicon nitride costs a dollar, but might need 200 holes! 250 holes half a micron error in diameter.

Example: Injection nozzles.
New developments: Smaller holes, shaped holes, angled holes.
Trends: better resolutions, cost, quality, new materials, robustness/24 hr production capability.
Challenges: that the market appreciates the value. Sell expensive equipment. Why should people pay that? Basic answer is: we can do what no-one else can do globally. If they need it then our services worthwhile.
Some of our business is protected by patents but some is knowhow. Why do they come back after they've seen us do it? Margins maintained by partnership and client management.
Growth: Markets named; must maintain those markets as knowledge spreads out.
Innovate and be ahead. So we can offer something new.
Be at the start of the markets as the markets develop.

Example Company 4

Our product is all about people and communications. With electronics, the human body is the next challenge. We will want to have connectivity with us on us at all times. Be able to take information to and from the body at all times. It will be about connecting the bio-, nano-, molecular world to the consumer.
Business model: industry is semiconductors, fabless. Company does not have a plant, subcontracting this. Involved in all the high value activities as a manufacturer: design and test.
Small company: typical of high tech businesses: have to be global from day one.

Funding came from small VCs and friends and family. £3mn. Rest of money has come from customers. Rapid growth, but not enough to keep business profitable. Taking that to market and positioning within market to see what is going on there.

Backed into AIM market with company buyer and the market saw this as a reverse merger, but now a fully owned subsidiary: now just one shareholder (another company), and trading at £30mn market cap.
Reasons: were able to raise money via a small number of presentations raised £7.1mn. Allowed early stage investors an exit route.

Moving up the chain into manufacturing from design and development services. We needed some way of being able to develop the company as a design team.
You make more money out of manufacturing.

Summary

Patented ultralow power technology for high value added sectors.

Taking semiconductor tech and embedding it within a platform.

Using analogue processing with digital processing so that outcome is very low power compared to standard digital processing.

Trend: We see that healthcare will become more like consumer devices.

Example Company 5

General

Manufacturing is very capital intensive and it takes time to put the kit together, and get it running and to recruit people: all of these things are different from academia.

To shorten this, you need money to 'throw' at the development phase. If you can do this, you can speed up considerably. Not just buying kit and getting in extra people. Successful companies have investors that weren't afraid to pay more to hire a CEO and management team to solve a problem and get it out faster.

You need to understand risks and market dynamics. There is an opportunity for business schools: but sadly, far too many such schools take far too theoretical an approach with their students, research and teaching. They don't get out into the real world enough to see what actually happens.

You also need the culture of entrepreneurism. A leading business person referred to that this morning. I join with him in saying that tech transfer in the Universities (their venture funds), made an enormous difference.

Matching expectations: scientists, technologists, investors, business.

Counter currents here: scientists view things on a short timescale, research assessment and publications in top peer review journals. Technologists are judged on what they've made and whether it works or not. Very easy to measure if it really works.

Investors want to see the highest return on the money. That can be a real problem in that development stage.

Business itself wants sustainable cashflow.
Trying to match all this at the same time is a real problem.
We have to face this if we are to succeed in the UK in the high value manufacturing scenario.

Out from a University: This is a typical spin off company.

£120k over a 2 year period: if had a good postdoc, then could do preliminary market info and start looking for CEO and money.
That would need about £1.0 – 1.2 million, perhaps from the University VC body. There would be milestones attached to next tranche of money.
Would leave the University: build a team up, 10-12 people in, and take on more serious market studies; retain University contacts and other Unviersities whom you think can help.

If that goes well, then need to raise the serious money of £5-10 million, and maybe could float at this early stage, but mostly not recently, due to poorer market conditions.
Might move, restructure board, build a team up especially sales and marketing.
University inventors then get right off the board and leave it to the experts. Academics are often the very worst people to have on the board in the 24+ month period.

Example given followed a pattern quite close to this profile above. 7 years of research. Floated on Aim this last summer 2005, valued today Nov 2005 at about $USD115million.

Summary needs for HVM

- Blur the boundaries between basic and applied science
- Try to balance all the expectations of the stakeholders
- Become a solution provider
- Encourage young people to sell their product, service or idea as a solution

PANEL 3

How do people go to the University and meet with scientists and engineers to take forward those ‘surplus’ ideas and opportunities that out number people to take them forward?

The mechanism is there and we encourage it strongly. The first thing to do as members of the University, especially 3rd and 4th year students, is to write the idea down on a piece of paper and go and see the programme managers at ISIS Innovation. If they want a bit of help their tutors, supervisors can go along with them. The route is well-understood within the physical and life sciences of the university. There is no barrier; people are encouraged to do that.

If an academic or other person has an idea we test their entrepreneurial flair by seeing if they can find their way 2 miles from the University to reach us! We discourage them further by asking them to fill in a form, which has 12 questions on it: name, who funded your research? So we can check who owns the project or idea. It then gets easier after that. It is researcher led. It is impossible to commercialise ideas unless the inventor wants to commercialise it, it moves from difficult to impossible.

It was said earlier that the risk money should actually come from the government. There isn't much coming from them. Where else can you get it from? Or is it people's only hope?

True. In some cases, the risk is so high, that it is unfair to expect people to invest their life-savings in this activity. Some of these whacky ideas, I say to those who have them: would you really go to your Uncle or Dad and ask for some money for this? I think that business angels and investors should be treated with a modicum of respect and not looked upon as sort of source of funding for some of these whacky ideas. The government should be looking to put more money into applied science. I think this country has been very lucky with the level of funding going into basic science. You see it around here: Rutherford Lab has enormous funding in very basic science. I don't believe as a country we have got the balance right between funding for applied science and pure science.

If I could follow up, some of the RDAs money is becoming available for this type of thing: there are grants for R&D; and there is also a group called Finance South East, which is part venture capitalist and part financial arm of SEEDA. Both of these two groups now recognise the need for this early stage funding. Applications are welcomed: it is risk money, but it is competitive and not a guaranteed way to get funding.

My company has done very from the DTI over the years, and level of funding has been 75% of funding. Very impressive. There are other sources of early stage risk money, city investors who are prepared to take substantial risks given good proposition and business case explanation. As you know there are

enormous funds slushing around in the City at present, and there is an appetite to take a bit of that and back the things that might come off.

Which one barrier or lever would you like to see the public sector lifting, because it has been a fantastic list of case studies which we've had today, all very very positive. If there was one thing you could have changed what would it have been for better or for worse?

Roads and housing need to be improved. A34, or tries to drive towards Swindon or Cambridge. Coupled with that is housing: Begbroke people are living huge distances away simply because they cannot afford to live in the Oxford area.

I agree on transport. It is difficult for people to find staff. People are hard to find; they travel too far when they are found.

Good people: affordable housing is a part of that. We cant afford to pay the high salaries, but people need that in order to move to this area.

I made the mistake of living in Sevenoaks and working in Hampshire. Do I need say more?

I agree with colleagues to the right. Infrastructure and housing is key. Some scale on that, our young engineers are really well paid, something like £50k a year: for instance because we are a relatively small company that is risky, so otherwise they go to Silicon Valley or somewhere else, even at that level they are having to drive consirable distances to get to work. We are saying that you don't necessarily have to come to work everyday. You can sit at home with a broadband link. So if there are ways of being able to set up legislation so that this is encouraged then all to the good.

I am happy with everything as it is, but I make one comment. My company couldn't have survived in the early days, keeping up with the science developments (now all online) without having a reader's ticket to the Bodleian Library, so thanks to them!

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Dr Justin Hayward, Director, CIR & HVM-UK
www.hvm-uk.com

Final Session Notes (STRENGTHS AND ACTIONS)

Example HVM Company

Supplier of analytical instrumentation and specialised in high magnetic fields, x-ray fluorescence and the science of the very, very cold environments. Also superconducting magnets.
A true example of high value manufacturing.

Personal view of what is necessary for HVM
Effective HVM is synonymous with the ability to deal with all types of risk.
What is high value?

A customer will pay a premium.

Why so?

Because it is hard to do.

Why so hard?

At cutting edge of technology. Associated with risk.

Development programmes do not always run to plan.

Other types of risk are associated with HVM.
HVM always requires a significant level of risk investment. Fundamentally, a risky undertaking.
Need highly skilled staff with a unique set of skills. Risky by their rarity.
Also, HVM tends to mean low volume: We sometimes ship only one or two units a year. If we lose one customer or one unit that is a late delivery, this has a big effect on the bottom line. All adds up in terms of risk: company staff need to happy in that environment, and the management need to be able calibrate and mitigate risk well.

Customers buy high value goods from recognised brand leaders.

HVM products are a significant investment for our customers. They will only trust their money from trusted players. Built up over years from strong product quality over years.

Technology edge and brand name are our particular competitive advantages.

High Value Manufactured products are tomorrow's commodities. High value is not a 'steady-state' situation.

Strong patent portfolios have a finite lifetimes. People will always find ways round them in time. HV products become commodities sooner than may think sometimes even before development phases are over as we saw in two separate examples this afternoon.

As efficiency goes up, costs go down. This attracts new players into the market. What was a HV proposition becomes a commodity. If in HVM, this poses a dilemma. Have a decision to make at the cusp of becoming a commodity: either you can vigorously cut out the high cost overhead associated with HVM, or you can dump the commoditised product line and move on to whatever is the next HVM product using your high cost R&D infrastructure. There is no middle road. Both those options appear unattractive as you sit in the board room.

If you don't make those vigorous cuts, you end up with high cost manufacturing not high value manufacturing. In general, we have selected the second path of going to the new products that come from the R&D side. This is constantly risky and some investors gulp at that. But the alternative may not be sustainable.

Commercial value is best extracted direct from the end user. An interesting lesson. Value is in the eye of the beholder. If have a long value chain, that all gets eroded and the value of the innovation gets lost. The best way to extract the value of an innovation is to sell to the end user.

We have no shortage of great technology. Our biggest challenge is finding the route to market the channel the supply line, finding the niche, and making sure you have an unimpeded direct route into the customer who provides the added value.

That is just as important as the initial innovation.

On government involvement:

This can be very helpful through a sound industrial policy, though not through direct subsidy. Example the ITER programme, which holds the promise of bringing large quantities of cheap, clean energy from sea water from nuclear fusion. Glad the UK government supports that. It is also a 17 foot high superconducting magnet; (and if you make such things this is good).

That type of programme is essential and all G8 governments should be a part of that. Such basic research project support is good, but direct support to industry not so good. That tends to lead to inefficiency, because people start asking the question "how can I spend this money?" rather than "what do we need to invent?"

Once you start down that wrong path it is a slippery slope.

"**Mr Chairman, if I may paraphrase the theme of this conference: 'that the future for manufacturing in the UK is high value manufacturing'. I fully support that premise, I think that is absolutely true. I don't think there would be many people arguing with that premise here.**
"However, it would be easy to confuse that premise for the UK, with a different premise, that because it is high value manufacturing, it belongs in the UK. That is not true. Last week I was at our site in Shanghai, we now have 50 people there and it is the fastest growing part of the business. At the moment they are doing relatively lower value added tasks, but there is no fundamental reason why that should not continue for long to be the case. The quality and education of the staff; the local government and infrastructure are all as conducive to HVM as over here in Oxford. My competitors will move HVM to China. And at some time that we will do the same. The message here is that HVM is the way forward today for UK industry, but it is not a haven of safety where we can rest on our laurels. It is just the current state of the global economy."

Next week, I go round the City presenting our results and being grilled in minute detail. Investors require a ROI and regular updates, and want return/dividends and they want it on time and with lower risk. Part of what I must do is communicate the nature of HVM and the risks involved. This keeps the investment streams in place to keep you at the state of the art.

It is also dangerous to look at HVMs in isolation: in general this doesn't usually happen. There is usually an HVM supply chain feeding into that HVM. And often that can be local. There are a number of tech clusters that are mutually supportive in the Oxford area. Superconducting cluster here. We share staff, we share technology, we work together and we also compete. There is a nanotech and bioscience cluster development. This is a feature of HVM having a HV local supply chain.

Finally, the flip side of that really. We've talked a lot about HVM in the context of HVM in regions. In the context of Oxon and the SE. But really a local manifestation of a much more global web of supply and

demand. Just looking at one region is not enough and if looking for a success have to look at the whole web of HVM and commoditised manufacture. The two may exist in one larger company and with a complex link of skills, IPR and products flowing between the two types of area.

HVM is a local optimisation of the cost of capital and the high-skill, high cost labour available there.

Fortunately, the SE is at a good point on that optimisation: but this need not always be the case (unless we are aware and resourceful).

Talk 2

The institution plans, installs & operates very large scale scientific facilities, provides strategic advice to government and acts as portal for UK scientists to access to such major national & international facilities. The organisation is large with about 1700 staff; and 10,000 users.
This government funds nothing but pure science was suggested earlier. As Chief Technologist of this large organisation, the speaker did not feel this was much of an endorsement!
Primary business: designs, plans, advices government on extremely large scale facilities. The low end of our work is on projects at £100mn. Right now, it is recommending on a £1.2bn neutron scattering system. These have a lot of technology behind them.
The new Diamond Synchrotron is the UK's largest single technology project installation for 30 years, at £230mn construction costs. Due to become operational in January 2007. Also the world's largest civil laser facility.
The high tech support departments are strongly encouraged by government, with increasing investments.
Mixed economy campus. Not a single discipline organisation. 10-12k international scientists coming through our facilities.
It is an interdisciplinary world we are coming into.
We will lead the world in biotech, atomic structure.
The institution is there to support the academic sector.

If we get that right we are generating nationally leading science.
The institution also has its own exploitation company.
If you have a mixed campus can get lots of added value activities; HVM.

There is an innovation centre for ultra high tech SMEs in the North West. The Universities joining in you start to get critical mass of expertise and can become internationally competitive. What we do here: Innovation Centre. Three other buildings. This is a generic model and practice for the UK getting university and industry working together.

We should not drive regional competition. The competition is across borders not across regions. Strategic Partnership between SEEDA and NWDA in this regard.

Carefully looking at international: collocating academic entities with HVM firms. Berlin, Gothenburg, Philips. All thinking about this too.

We have to look after tomorrow's high tech experienced people: We had more than 3000 visitors, many children. Numerous letters from their parents saying that they were not interested in science before this, and now they are.

Speaker feels that this is extremely important: We must look after tomorrow's entrepreneurs as well those of today.

Singapore and China you see these integrated approaches; nice to see that people in the UK are thinking in this way.

Lord Sainsbury, Undersecretary of State for Science and Technology, Address

Global manufacturing is undergoing revolution. In 1980, less than 10% exports came from the developing world, today that figure is 30%. China, with 5% of our wages, alone is producing 70% of the world's photocopiers, 50% of the cameras, 40% of the microwaves and 25% of textiles. We have to beat them on high value and high skill and must develop our technology-intensive- and skill-based industry. So in 2002, the Government established its strategy, fundamentally base on innovation, to help companies meet the twin challenges of globalisation and technological advance. In 2004 we reviewed the strategy, set up the manufacturing forum to ensure its effective implementation.

Three areas have come out of that:

1) Skills
2) The image of manufacturing.
3) Public procurement.

What do we mean by HVM? There is a myth that manufacturing is old-fashioned and that the future lies with services. But this damages our ability to get investment into the sector and to recruit talented

graduates into the sector. Research has shown that manufacturing is moving away from a focus on production and raw materials into an understanding that value can be created from all parts of the chain. Manufacturing is inextricably linked with services. We aim to demonstrate that high-tech manufacturing is an important part of the economy that can offer an exciting future for young people. The government does not believe that it is its role to intervene in the competitive process, but to create a dynamic market economy and to create good conditions for companies to grow. In three key areas – design and technology, skills and fiscal policy – we have made changes which will benefit HVM companies.

Science & Technology

There are 120 000 more young people doing science and technology today than in 1997. As a percentage of the total number of students, the total has risen from 38% to 40%, which is extremely high by national standards. The biggest increases have comes in Biology and Computer Science. Fall in engineering students. Problem in the UK on the technician level.

1) More generally, scientific understanding and technology – rapidly changing. Many new opportunities. UK has great science and technology capabilities, and it was this base that we first funded when we came into power. Budget (1997/8): £1.3 billion. This will have more than doubled in real terms to £3.4 billion by 2007/8. More than £0.5 billion per annum on university facilities. There is also a focus on the world-class universities.

2) Also, we have focused on increasing knowledge transfer (Higher Education Innovation Fund). The market value of University spin-outs floated on the stock market in 2004 = £604 million, £100 million more than the governments investment in knowledge-transfer to date. More people receiving enterprise training. And these cultural changes in universities are reflected in the high-tech clusters that are forming around top universities.

3) To encourage more user-driven /applied research. Technology strategy plan identifies sectors where the UK has the capacity to create a competitive edge. This funding we have used to support areas such as ICT, biotechnology, nanotechnology, aerospace. We've allocated £320 million over 3 years and set up an industry-led technology strategy board to regulate it.

Micro and nanotechnology: I launched a £90 million initiative (2003) to develop new products. Offered support and helped create a network for facilities, covering academic and industrial capabilities. R&D projects in healthcare, crime prevention. Investment into national measurement laboratories. Joint industry and government research projects. Access to networks and sources of new knowledge were

identified by the DTIs innovation review as 2 of the most important determinants of business innovation performance.
4) Developed a community of overarching knowledge transfer networks, e.g. Bioprocess UK, at a cost of £43 million over the next 3 years.
Innovative manufacturing and research centres set up in 2001 to create relevant research outputs.

In summary: Results are no longer seen as discrete process or product improvements, but can be part of long-term strategic partnerships, which produce strategic improvements and strengthening of a company's technology base. November 8th: announcement of the first professorship of technology transfer in the physical sciences at Imperial College. Also MAS.

In conclusion: The government sees high-tech manufacturing as a crucial part of our strategy for the future and innovation as the means by which we can change globalisation from a threat into an opportunity. We should not underestimate the size of the challenge, but neither should we forget our skills and technological capability.

Key Messages Talk, Pam Alexander, CEO SEEDA

It has been a very exciting and interesting day.

I would like to thank the organisers and all the other sponsors for making this possible. I hope the last few minutes will pull together some of the thoughts we've had today.

I think the one thing that came out today from every speaker was an enormous degree of *optimism*.

Clearly HVM is the future in the UK.

When my Chairman and I say that the South East is in fact the highest HVM region in the country, we nearly always get the response, that I didn't realise things were that bad in the West Midlands!
That isn't really the point.

We are producing an increasing amount of value and exports in this region.

I do think it is important that we have made the shift from the term "high value-added manufacture". This does imply traditional industries in a linear chain. We've shifted to the term "high value manufacturing" where all day we are hearing about *revolution. That is certainly an important piece of language that I am certainly taking on board.*

Clearly we are not going to survive as a nation of shopkeepers. *We must assist HVM.*

Lord Sainsbury's talked about the government's five year plan for science, innovation and technology in the UK, and we are the lead RDA for innovation and science. The RDAs have taken on an increasing role since the five year plan came out. We haven't been given any more money to do it, but we have scraped together from some of the other funds we have £360mn which will be used over the next three years in science and innovation across England.

The South East doesn't have much of that money but it does have a substantial pot, and I think one of the things that struck me early on in the day was the point that was made that in a sense we had it too easy in British manufacturing, we were able to downsize staff, and perhaps that made us less creative than some of our European partners in looking for productivity gain. And it strikes me that it has always been that the South East has never had the subsidy that the rest of the UK has had.

In some ways that has helped us to be more creative and catalytic here; we've been good at mitigating risk and investing in great ideas.

Helping things that were going to be brilliant to actually get there.

I'm going to say a few words about how we are applying the Regional Economic Strategy, which we are reviewing at the moment. We are consulting with the whole of the region to see how we can underpin the development of the South East.

The RES has had 3 themes:

1. Global Competitiveness
2. Productivity
3. Quality of Life

The third was a key theme through consultation.
200 people at the 17 events we've held so far on this. Quality of life as a competitive advantage, not something tacked on. Through that we've identified 6 drivers for sustainable prosperity:

1. Employment
2. Productivity
    a. enterprise,
    b. innovation,
    c. skills,
    d. competitiveness through avoiding regulatory barriers,
    e. investment in infrastructure

I asked before for the panel to say what they needed for innovation and HVM. I should never have mentioned congestion!

I was in China in February with Jim, discussing with various provincial governments how they were taking high value forward.
Indeed, we went to a research institute at one of the top universities in China and heard about how they bring their ideas to market. The President had heard of the SARS outbreak, and I want anyone with a temperature at the airport, out of the queue and out of harm's way. Within a week they had invented the heat-seeking camera and installed it in every port in the country. If we could get that level of time to market for our infrastructure in the UK we would really be getting somewhere. So I thought it was interesting to hear discussions of time to market. I mention the nanotech fund we've launched to help collaborations in the South East, to find winning ideas and invest the money. We hope this will help to bring to market some of those ideas in HVM across the SE. We've seen the Chinese buying up some of our ideas first as they also want to be the best in the world.

And the themes in the RES are about two aspects of that:

1. Investing in success
2. Lifting underperformance and investing in potential

A new South East Science and Technology Advisory Council (SESATAC) has been formed and they have given us three headings:

1. Investing in emerging technologies and their applications
2. Investing in knowledge transfer networks
3. Investing in the schools base.

We have an R&D target as a country that we should reach 2.5% of GDP by 2014. That is very ambitious if look at USA and EU. We are already above in the South East.

We will have support for that coming through in our strategies. We are focusing on six sector consortia to bring together the best in product. FAC is a model for that.

Proof of Concept Fund as part of the basket of support mechanisms.
Advisors: met today an advisor on R&D tax credits.
Lifting underperformance is followed through in terms of lifting productivity through non-working people of working age, of which there are 900k in the South East. These people are not working and not on the unemployment register either. That is an enormous pool. We want to avoid polarisation. As we all get richer, and want more services from people in jobs that we don't want our children to do, we have to innovate in the service sector too.

We heard about the importance of integrating design and the MAS is one of the great successes in government support in the HVM sector and in this regard across the UK.

We are going to incorporate design immersion through SEEDA itself directly, in the service sector.

We need to drive performance through design. The MAS is focused on supply chains and medium-sized companies to drive this forward.

It is strategy not subsidy. We want to focus on world class. We have heard about one of the great world class UK projects, the Diamond Synchotron; and we are very excited about working with Daresbury in the North West to see how we can use that resource for the whole of the UK and particularly in the South East.

Diversity has left us with some serious skills gaps. That legacy of an unskilled workforce is something that we do have to address with a business driven process. The DoE is focused on level 2

qualifications, but we've persuaded them that they also need to focus on Level 3. That was quite an important breakthrough.

3. RES Quality of Life

Partly through having the escalators for skills for our own residents and the housing, transport and business premise infrastructure to keep businesses and residents here.

There is a danger of a tipping point for businesses particularly in this area of the South East (South Oxon). We talk to businesses who say that they are global companies and that one more car on the road between their homes and work will be the reason why they leave the region and the country.

We will also be looking for new ways for getting things done in infrastructure more quickly (because it is not the money and private sector developer funds that are really the problem). That would be progress. I am optimistic about improvements in delivering infrastructure for the region.

I hope you will be part of the consultation document, which will be published in November 2005 later this month.

The one message I take for the South East and for the UK is that *the future for the South East is in value not volume*.

PANEL 4

Proof of Concept Fund, could you elaborate a bit and talk about timescale and reduce the red tape that is usually involved in this kind of government grant.

We've set up an organisation to be part of the supply chain not the bureaucracy. It is one of the menu of funding packages that we feel needs to be available through Finance South East.

I was giving the prizes at *Enterprise Week*, this week, we weren't able to tell everyone what their ideas were because apart from the prizes some of them won *Proof of Concept Awards* too there and then.

We just invented a new fastener, as a traditional manufacturer. But if it wasn't for the fact that we have all the skills here even though a lot of the fasteners are made in the South East, then we couldn't have had the innovation and three patents.
You need some of the basic industry still. Everything has to remain in place.

If you don't have the infrastructure and skills then you are going to lose the idea as well as the product.

We've had people in design innovation enterprise but the one thing we are still a bit scared of is marketing. Sometimes we have to use the M word. Maybe as a nation we sometimes don't want to talk about money and orders and things like that.

It seems to me that it has been a day of optimism. I am going to ask the panel why this is the best place on the planet to do High Value Manufacturing.

There has been a culture grown up over the last twenty years of "can-do" just like in San Jose and Cambridge. In this case, the driver is the proximity to Oxford University, and I am very happy to be here and part of it.

I agree. Innovation is not a dirty word. I am new to the area and very impressed. We see innovation as the seed corn for future business and this is not always seen as the case across the rest of Britain.

I say people; when I went to China (as a geographer), people asked when we said we were from South East England they said: 'well that is just so far away and not really Europe.' They were looking at their Asia-centred Maps, and of course it seems that way to them. Iceland looks the same. But we have fantastic access to markets and how it is London, then, we have people from the traditional experience and enterprises built up over the last 50 years, so I think actually the South East is the very best place to be and that we can see companies coming here because they will make a profit not a subsidy.

Having tried to initiate some of what's been happening here in Oxford elsewhere in Europe, I think one of the features here is "irrational exuberance". Other places have not tried things that ought to work where here they try them when they perhaps ought not to!
So I vote for irrational exuberance.

This is an incredibly strong science and technology base here. All the time we must work together to seek out that extra bit of added value.

Chairman

We've seen today the whole panoply of small companies working on the science for applications to larger companies making things like motor cars going very well and growing quickly in the region and in global market too.

It is a *pity more people on the street cannot see this* and one thing is that we must try to get these messages of what has been said today out to the person on the proverbial Clapham Omnibus, and indeed that is what the Manufacturing Forum is also working on.

I think it only remains for me to congratulate Justin and Mike McCreary and the other CIR people Helen and Rosie, for organising this 5th HVM event.

Justin Hayward then thanked the conference, announced that CIR hopes to run further HVM events in the East, South East, London, South West in 2006, and invited networking.

END OF CIR HVM SOUTH EAST & OXON CONFERENCE SUMMARY 2005

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Manufacturing Advisory Service - South East (DTI) (www.mas-se.org.uk)

The MAS is committed to sourcing and providing information on best practice in manufacturing. MAS-SE provides a dedicated route to hands-on, total manufacturing support for businesses across the South East. In addition to providing a free helpline and telephone support to manufacturers, with information ranging anywhere between the start-up of businesses to sourcing suppliers or finding business partners, MAS-SE also operates a Knowledge Transfer Initiative, to train staff and teams in techniques of best practice.

UK Trade & Investment South East (www.uktisoutheast.com)

UK Trade & Investment is the government organisation that supports UK companies wishing to develop their business overseas. For more information about our impartial local advice delivered by experienced exporters, practical help and how to use our global network, contact us on 08457 35 45 55 or visit our website.

Design Council (www.design-council.org.uk)

The Design Council improves prosperity and well-being in the UK by demonstrating and promoting the vital role of design, particularly by helping businesses be more competitive and by improving the effectiveness of public services. Its national design programme, being developed with the RDAs, is designed to help UK manufacturers to transform their bottom line and secure competitive advantage by using design to guide decision making and produce strongly differentiated products.

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CIR Ltd offers market & investment research, financial, technology and strategic consulting through dynamically formed, small teams of business, technology, and financial analysts and sector-expert consultants. CIR's 30 partners are expert in printing, displays, electronics & semiconductors, biotechnology, new materials, energy and software sectors.

CIR thanks SEEDA for its partnership in making this HVM-UK: SE Conference possible.

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Introduction to High Value Manufacturing and Definition

CIR is delighted to organise this 5th HVM-UK conference. The series is now expanding across the country. The leading institutions are now with us in using the expression "HVM" as defined below, to encapsulate what is the most likely long-term future of the business of making products by UK companies.

We welcome all speakers, sponsors and delegates to participate as fully as possible in this important discussion today. We have changed the programme so that any emphasis on particular sectors is taken away with the intention that all talks are important to all delegates, as case studies often of successful or perhaps earlier stage companies trying to work out their best way forward for growth. The days begin with definitions and general talks laying the foundation for the case study talks, which are arranged according to 'business model' or position in the 'supply chain' rather than 'sector'. We finish with a multi-stakeholder high-level session, whose aim is to capture the knowledge shared earlier in the day, and to formulate strengths and actions. Those on the panel are government and government manufacturing advisors, leading HVM companies, financial and academic players.

CIR definition of High Value Manufacturing (HVM)

CIR uses the trademark phrase 'High Value Manufacturing' or 'HVM' rather than the phrase 'high value-added manufacturing'. This was a deliberate choice by CIR in 2002, which has now taken root. CIR believes the recipe for HVM is not simply about linear 'value-add'; it is a function of time-to-market, IP and reinvestments, and design among other factors.

CIR developed a working definition of HVM: "HVM is manufacturing where there is relatively high value created in the supply chain segment involved.

In a corporate setting, HVM is usually characterised by higher-than-average expenditure on R&D as a proportion of sales, and/or is highly innovative with respect to product development, design and/or is associated with above-average levels of intellectual property (IP).

HVM often applies to newer markets, where design or manufacturing processes may be fast-moving, new, unfamiliar, or not well tried and tested; and where prototyping, demonstration and or lower volume production are valuable. Selected business sectors where this is often realised are: electronics and semiconductors; printing and displays; medical devices and biotechnology; aerospace; automotive and motorsport; new energy; new materials and nanotechnology; and communications technology."

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CIR HVM-REPORT 2005 TO SEEDA: EXECUTIVE SUMMARY

2.1 Introduction

We use the expression "HVM" as defined below, to encapsulate what is the most likely long-term future of the business of making products by companies headquartered in the UK. Our general aim is to shed light on this section of manufacturing, and to support it. We wish to create a community that is aware of itself in taking forward confidently this type of manufacturing. We wrote the 64pp report, primarily supported by SEEDA, of which this text is a summary for the perusal of HVM-UK Conference Series participants, to add to this process.

2.2 Defining High Value Manufacturing

2.2.1. *Definition of HVM*

CIR uses the trademark phrase 'High Value Manufacturing' or 'HVM' rather than the phrase 'high value-added manufacturing'. This was a deliberate non-standard choice of phrase by CIR in 2002, which has now taken root. CIR believes the recipe for HVM is not simply about linear 'value-add': it is a more wholesome function of time-to-market, IP and reinvestments, among other factors. CIR developed a working definition of HVM: "HVM is manufacturing where there is relatively high value created in the supply chain segment involved. In a corporate setting, HVM is usually characterised by higher-than-average expenditure on R&D as a proportion of sales, and/or is highly innovative with respect to product development, and/or is associated with above-average levels of intellectual property (IP). HVM often applies to newer markets, where design or manufacturing processes may be fast-moving, new, unfamiliar, or not well tried and tested; and where prototyping, demonstration and lower volume production are all still valuable. Selected business sectors where this is often realised are: electronics and semiconductors; printing and displays; medical devices and biotechnology; aerospace; automotive and motorsport; new energy; new materials and nanotechnology; and communications technology."

2.2.2 Selection of appropriate Key Performance Indicators

The following are taken from the government's manufacturing strategy for reference:

Segment/'Pillar'	**Key Performance Indicators**
Promoting Science and Innovation	Innovation, investment, skills and productivity
High Skilled, High Performance Workplaces	Skills
Encouraging Intelligent Public Procurement	Overall Outcome: A more coherent, transparent and predictable public procurement process resulting in innovative bids from UK manufacturers and better value for money for the public sector.

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Encouraging High Value Added Investment	Investment and profitability.
Promoting Best Practice	Output, productivity and skills.
Improving the Understanding of Manufacturing	Overall Outcome: Well publicised and received programmes of research that effects real changes in stakeholder attitudes towards manufacturing over the next ten years.

In 2002 the UK government published its manufacturing strategy in recognition of the fact that UK manufacturing output had been falling over the previous 2 years. The strategy was compiled by a multifaceted working party initiated at a manufacturing 'summit' chaired by the Secretary of State and held in 2001.

The introduction summarised the positions as:

Manufacturing is important. It accounts for a sixth of the economy, it employs around 4 million people and many more in associated industries and services. Manufacturing accounts for 60% of our exports and 80% of research and development, so is a key driver of innovation and technology uptake.

But manufacturing productivity in many other industrialised countries is higher than it is in the UK: around 30% more in France and Germany, and 55% more in the US. If UK manufacturers could match performance in these countries, the UK would be £70 billion better off. Returns on investments would be higher, jobs even better paid, and companies more competitive.

The strategy document went on to introduce the so-called 'Seven Pillars for Manufacturing Success'. These seven pillars are: Macro-economic stability, investment, science and innovation, best practice, raising skills and education levels, modern infrastructure, the right market framework. All but 'macro-economic stability' appear in the table above.

Image of Manufacturing

Stakeholders continued to feel there was a widespread poor public perception of manufacturing leading to problems in recruitment, reluctance on the part of financial institutions to invest in it and with schools having little awareness of the real opportunities in manufacturing. The document suggested that that we should investigate the issues. There should be promotion of a positive attitude within schools and a broader senior ministerial presence at key manufacturing events. Finally, a public relations campaign should celebrate success to counterbalance negative media reports. Further, the sectors we are writing about should be those, which will lead the way forward longer term. Good news does not easily sit well with the media, except as part of a 'build-up and knock down' strategy; this is merely to note this difficulty, but not to offer solutions now, beyond seeing that greater, skilled PR management is needed to handle this fact.

2.3 Global Perspective

Our 2006 report will cover this in much more detail.

We arbitrarily divide the manufacturing landscape in the world into two distinct categories, the existing 'developed world' economies and the 'emerging' economies. They are those who are seeking to regain what they had, and those who are seeking to retain the growth rate they have achieved. America clearly fits the first category together with Western Europe, whilst Asia, Eastern Europe and South America define the second category.

America

America has arguably just awakened to what it lost and, in 2004, President Bush commissioned 'Manufacturing in America, a comprehensive strategy review to address the challenges to U.S. manufacturers'. The stated goal was 'to help the American manufacturers compete and win in the 21st century' and the question posed to participants was 'How can government help manufacturers compete?' For diplomats reading it, this title may ring some alarm bells. But the resulting document stresses the role of manufacturing with the phrase '…a healthy manufacturing sector is key to better jobs, fostering innovation, rising productivity and higher standards of living in the United States.'

This led President Bush to announce a six point 'jobs and growth' agenda. These points are:

To make healthcare costs more affordable; To reduce the lawsuit burden on the U.S. economy; To ensure an affordable, reliable energy supply; To streamline regulations and reporting requirements; To open markets for American products; To enable families and businesses to plan for the future with confidence.

Advisors have spoken with Bush. He has taken on board that the energy supply cannot indefinitely be satisfied by fossil fuel extraction. He has talked about the switch to the hydrogen, and possibly other, economies.

Of particular interest to companies involved in HVM is the stated approach to 'investing in innovation' that recognises the need to bolster further the development of new technologies that tend to increase productivity. The measures include a review of the federal R&D funding for generic technologies, engineering and the physical sciences to encourage better co-ordination and focus on innovation and productivity enhancing technologies. The key action is a review that has the following remit:

'The review should consider the need for additional investment in core R&D programs for generic technologies, engineering and the physical sciences, especially in interdisciplinary scientific endeavours. The model followed should be the same one used over the past 50 years to develop the major technologies influencing the U.S. economy today (semiconductors, computers, network communications, biotechnology and now nanotechnology). This model is based on government funding of basic science and early phase generic technology research, followed by massive investment in applied R&D by the private sector'.

European Union

The key policy statement reads:

'In the face of globalisation and intense international competition, the European Commission has launched a new industrial policy to create a better framework for conditions for manufacturing industries in the coming years. The manufacturing industry matters to the EU, it employs over 34 million people, it accounts for three- quarters of EU exports and over 80% of EU private sector R&D expenditure. The new EU industrial policy will complement work at Member State level to support a strong and dynamic industrial base. It includes seven new cross-sectoral initiatives:

An intellectual property rights and counterfeiting initiative (2006); A High Level Group on competitiveness, energy and the environment (2005); External aspects of competitiveness and market access (2006); New legislative simplification programme (2005); Improving sectoral skills (2006); Managing structural change in manufacturing (2005); An integrated European approach to industrial research and innovation (2005).

In addition, the commission brings forward seven new initiatives targeted at specific sectors:

Setting up a new pharmaceuticals forum (2006); Mid term review of life sciences and biotechnology strategy (2006/7); New High-Level Groups on the chemical industry and the defence industry (2007); European Space programme; Task force on the competitiveness of information and communications technology (2005/6); Mechanical engineering policy dialogue (2005/6); A series of competitiveness studies, including for the ICT, food, and fashion and design industries.

This industrial policy whilst laudable in intent and purpose is in danger of being too much dialogue too late and can definitely be seen as lagging behind the US initiative. However, the member states have been proceeding with national initiatives in pursuit of national interests that can be to the detriment of other member states.

Asia

To speak of 'Asia' is, of course, to make sweeping assertions about a large number of diverse nation states, cultures and economies. However, with respect to industrial strategies, one can consider them as essentially similar in that they have large populations coming from an essentially subsisting agrarian and hence low purchasing power background. This leads them to offer access to a large labour force and in turn a potentially large domestic market. Many of the principal nations, with the exception of Japan, have increasing GDP growth at a time when the world growth in GDP has been slowing down. There is an obvious division within them between established and emerging manufacturing centres. Asia boasts some well-known established manufacturing centres, built over the past couple of decades in Japan, India, Taiwan, Singapore and South Korea, and emerging low labour cost centres such as China, Indonesia, Malaysia and Thailand.

Today the developed countries have the majority of world trade with the EU and US accounting for some 51% of international trade, but it is not going to stay this way!

Economically, China has experienced average annual growth of almost 9% over the last 25 years and if carried forward means it will become the world's largest exporter by 2010. India registered 8.2% growth in 2004 giving it the second fastest growth rate in the world after China. Each of these two nations has been investing heavily in education with, for instance, graduations in India currently running in excess of 2 million per year with 5% in technology related subjects. These and many other 'Asian' nations are transforming from heavy state intervention in industrial strategy through ownership towards a strategy of positive state assistance to attract inwards investment and the establishment of private enterprise. China's growth has been so strong that it now strongly effects the global market for oil; academics in China are already thinking about new forms of energy, aware not only of the demand-supply relationship for oil pushing prices up, but also of the political stability implications of it.

Taking India as an example, the objectives of the Government Industrial Policy are:

- to maintain a sustained growth in productivity.
- to enhance gainful employment.
- to achieve optimal utilisation of human resources.
- to attain international competitiveness and
- to transform India into a major partner and player in the global arena.

Policy focus is on:

- Deregulating Indian industry;
- Allowing the industry freedom and flexibility in responding to market forces;
- Providing a policy regime that facilitates and fosters growth of Indian industry.

Amongst the many measures being taken to implement these policies in the HVM arena is the establishment of Electronic Hardware Technology Parks (EHTP) and Software Technology Parks (STP) aimed at building a strong electronics industry and with a view to enhancing exports. Under both schemes, inputs are allowed to be procured free of duties.

Along similar lines, the Chinese government has funded massive technology parks and provided state funding for the establishment of large R & D centres with tax and investment benefits. Construction companies are cash-rich and becoming more so.

The American paper referred above may apply universally: "Competing in a global marketplace puts a premium on government getting the fundamentals right to create an environment in which manufacturing can flourish. It means examining whether the government's actions and the structure of the market improve or hinder the ability of firms, in manufacturing and throughout the economy, to compete in an increasingly global marketplace."

Most governments around the world have awoken to this situation with many taking dominant roles in promoting that 'economic environment' and using the remains of their declining control economy powers to promote their capabilities. In these enlightened nation states, manufacturing has the image of salvation to remedy years of regression and poverty.

2.4 UK Perspective

The image of manufacturing in the UK is not perceived to be good. The lack of prestige for manufacturing makes it hard to attract the brightest individuals coupled with the inability to recruit and the lack of status afforded to science, technology and engineering make it difficult to enrol new UK students. Of grave concern must be the fact that, according to Professor Peter Dobson, '… a shortage of PhD students is developing with the number of UK nationals starting PhDs declining'. Given that the essential fact of High Value Manufacturing is the meeting of new science and industry, it goes without saying that if the source of scientists reduces then the size of HVM may well fall accordingly. Against this backdrop it is essential that all parties interested in the long term role of UK manufacturing, schools, academia, industry and government must utilise every opportunity to extol the virtues and the importance of science and HVM. Within this group, government alone has the authority to direct schools and academia whilst industry has the responsibility to influence. Without a concerted effort through this partnership we will fail to attract the calibre of entrants to industry that is required to survive as we enter the 21st Century.

2.5 South East England: Statistics and Outlook

There are nearly 20,000 high value manufacturing companies in the UK, with fifteen percent (just over three thousand) of those based in the South East. Amongst high value manufacturing companies, those who have the highest proportion of companies based in the South East include manufacturers of instruments for measuring, medical equipment manufacturers and pharmaceutical manufacturers. Between 22 and 23% of companies in these sectors are based in the SE, compared to only 15% of HVMs generally. Other HVM sectors which are strongly represented in the South East are the manufacture of ships and boats, the production of office machinery, computers and processing equipment, the manufacture of industrial process control and the manufacture of glass and optical and photographic equipment.

Table 1. Table showing manufacturing sectors with a stronger than average representation in the SE region.

Manufacturing Sector	*% of companies from the sector in the UK as a whole who are based in the South East*
Instruments for Measuring	22.6
Medical equipment	22.6
Pharmaceuticals	22.3
Optical and Photographic Equipment	20.5
Industrial Process Control Equipment	19.9
Ships and boats	19.8
Office machinery, computers and processing equipment	19.5
All High Value Manufacturers	15.2

Geographically, sub-regionally, we see an interesting spread. Oxfordshire is most overweight HVMs, but a relatively smaller county than others in the political region. Hampshire is also considerably overweight HVMs, though this takes in all ships and boats companies, which may have offset the score upward if some of those are not HVMs in actuality. We have not performed a statistical significance test on the data, and the selection procedure for the inclusions was by arbitrary Sector Identification Code (SIC) rather than by comparing exactly what each company does with the HVM definition used by CIR.

Table 2: Number of HVM companies, and total companies in each county

County	*No of HVMs*	*% of SE HVMs in the county*	*No of Companies*	*% of all companies in the SE from the county*	*Density of HVMs and ranking among counties*
Oxfordshire	237	7.7	16,600	4.20	1.83; 1st
Hampshire	685	22.2	49,250	12.5	1.77; 2nd
Buckinghamshire	241	7.8	25,600	6.5	1.20; 3rd
Berkshire	308	10.0	36,750	9.3	1.08; 4th
Kent	497	16.0	74,850	19.0	0.84; 5th
Surrey	574	18.6	89,650	22.8	0.82; 6th
Sussex	549	17.8	101,400	25.7	0.69; 7th
Total SE Region	3091	100	394,100	100	1.0

Table 3. Table showing the extent to which HVM activities within the south-eastern counties are concentrated within specific sectors.

County	*% of all HVM companies in the county that belong to one of the five largest sectors (as quantified by number of companies)*
Berkshire	49.2
Buckinghamshire	54.3
Hampshire	83.5
Kent	33.5
Oxfordshire	89.9
Surrey	36.0
Sussex	30.1

2.6 Recommendation, actions

Background

- In making recommendations for a subject as complex as HVM in a diverse region, it is always possible that the initiatives may already be underway but not immediately known to CIR.
- The existing Manufacturing industry has 'done lean to the point of emaciation' and the future strategies for Manufacturing both conventional and HVM must move on from internal navel gazing efficiency improvements and recognise that HVM has an economic scale that only National strategies can address. In saying this it does not relieve HVM's of striving for world class capability, that is the given to stay in the race!
- If the UK is to have a long-term sustainable High Value Manufacturing industry it is vital that actions are taken now! The science and technology is at a turning point that if grasped now will put the UK in pole position. That turning point or watershed is the adoption of nano technology in all its various guises. Nano is an all-embracing and enabling technology that has applications in all HVM products. If the UK adopted a genuine cross party, cross agency, cross industry strategy to ensure that the next generation of all designs incorporated the benefits of nanotechnology it will lead the world..
- Whilst there is investment money available for short to medium term projects the *real* issue is the funding of long term (7 –15 years) projects. Private funding in the UK just will not wait that long for returns.

HVM structure: networked, international collaboration, cleaner, ethical*:*

- Start up companies and Universities should consciously create 'Joint Venture clusters of similar start ups and research projects to share knowledge and the 'above the line' costs of say marketing, compliance, sales channel etc to avoid dissipation of efforts and money. These could be initiated by the RDA's or similar
- The government needs to think through the current panoply of bodies addressing Science and Manufacturing, These include the DTI, RDA's, University Councils, Research Councils, Professional Institutions, Trade Associations etc etc. They have vast duplication of boards and staff collecting data and all spending vast sums of money in terms of administration and actual grants to industry. The system needs to be streamlined, focused and strategically re-directed with the money saved re-invested in Science and HVM. The nation needs to adopt the role 'venture capitalist' for emergent technology companies.
- There must be a national strategy for enabling technologies such as nano that brings together all the body of knowledge and seeks to disseminate across industry sectors. In the mean time, the SE RDA needs to get on with the Regional Nano and Microtechnology Network plan and become the pilot for UK best practice.
- The 'Encouraging Intelligent Public Procurement' initiative needs to step up a gear with the strategic impact of the decision being taken into account on an equal footing to the economic circumstances. This is particularly so in medicine and defence spending that have historically been a great catalysts of technical innovation.
- There is a need for skilled 'intermediaries' to work with HVM's to ensure that both inward and outward licensing together with patent registration becomes easily understood, is beneficial to the UK strategy and is more easily affordable. This could become one of the front office 'cluster' services referred to above.
- The SE Regional Economic Development plan should become the catalyst for stimulating the growth of HVM.
- A national awareness campaign for the stimulation of science and maths as entry to HVM and in turn the attractive opportunities for the future of employment in HVM needs to be mounted.
- We need to reach out to the young people of today and show them the attractiveness of working in modern HVM as opposed to their 'smoke stack' view of it.
- Need to see tax benefits for those people willing to invest in long-term investment projects.
- Need to stimulate Apprenticeship training schemes through some form of Tax levy redeemable by those companies who invest in training.

- 'Cluster' training schools to be set up to link with the Apprenticeship and academic technical training schemes. Must increase the technician engineering pool.
- Bring back technical colleges to train the technicians in association with the above.
- Enabling technologies need to produce 'road maps' of where they are going and what other industries need to become involved. A technical elite knowing all is inadequate: we need buy in from all aspects of HVM.
- Need to improve the roads. Look at Germany, long distance road lorries are taken to their destination on flat bed trains and only travel on roads for the last part of their journey.
- Need to breed more inter-disciplined people, scientists who understand marketing, engineers who can speak foreign languages etc

The need for IPR and process 'recipe' retention

The current UK manufacturing strategies are based on the following political premises:

- Energy costs featuring oil at $60+ per barrel
- The Suez and Panama canals remain open
- America (and others) maintain an open market free trade stance
- China continuing to grow at around 10%pa, becoming increasingly dependent on imported oil

If any or all of the following 'fat-tail' or 'low probability' events were to happen, for example:

- Oil went to $150 per barrel
- Either or both of the canals were blocked for a prolonged period of time
- Barriers to free trade were erected by any of the major nations
- The present minor conflicts that exist around the world in very sensitive areas were to escalate to full scale wars with major blocs supporting opposing sides

Then, the mass importation of goods of any description from extended global supply lines would be either stopped or subject to re-evaluation in the light of soaring logistic costs. A very sobering thought!

It is routine for all companies to have a plan for localised events, fire, flood bombs etc. Eventualities on the scale above require national level planning. We must maintain the 'recipe' for all production processes, even if only at pilot scale, and arguably (although in the event of free trade barriers perhaps not so) ownership of the IPR to continue manufacturing. We must not allow HVM to go the way of the garment industry where, during the recent hiatus regarding import quotas, the Chairman of the Garment Manufacturers Trade Federation said that the UK no longer had the skills and knowledge, let alone the capacity, to fill the vacuum in the supply chain.

Whilst the above is the blackest of situations, at the national procurement level it is essential that investment in technology and new products is made in recognition of the possibility that the UK may have to produce the items on shore under certain circumstances. The person who recovers from a catastrophe the fastest is the one who planned for it!

In any eventually, we do need to retain generic, older and new intellectual property for both products and processes.

2.7 Concluding remarks

- The DTI and the RDA have already made good progress but it needs to be better resourced and more forceful, with good ideas put to positive actions.

- We in the UK have the ideas and in most cases the people to start them off.
- Now is an opportunity for government, the DTI and the RDA's to give strong leadership in determining the place for Britain in the 21st century.
- It may not require a lot of 'new money', just the re-distribution of the existing funding that disappears into a 'bureaurocratic soup'.
- To do so will mean that a number of powerful people may have to check their personal and political beings and put the national requirement to the fore.

2.8 CIR Global High Value Manufacturing Report 2006 (to be completed and released)

CIR's team is developing the work done in this UK context so that it provides a view of this topic nationally in depth and globally, as seen from the US, Europe, Asia-Pacific, in high and low cost regions, and across a broader range of subjects. This will be an authoritative report, based on knowledge obtained from four years of consideration, conferences and consulting work on HVM. CIR seeks sponsors, supporters and purchasers of this report.

Acknowledgements

This summary is part of a report commissioned by SEEDA in HVM in its region.

CIR thanks SEEDA in particular, and all its sponsors and manufacturing partners in HVM, who have been supportive. CIR thanks its Associate Mike McCreary for drafting much of this report from research and interviews performed by a junior analyst at CIR during the summer of 2005.

Announcements

CIR will announce HVM Series for 2006.
CIR will set up a membership society for all those who have voted with their feet and attended an HVM-UK event since 2002.
CIR also hopes to see you and colleagues back in the new year at HVM to continue the discussion!