



## SMART, SPUR AND SPUR<sup>PLUS</sup>

Applicants for a SMART:SCOTLAND Award or a SPUR or SPUR<sup>PLUS</sup> grant must either be based in Scotland, or be planning to set up a base in Scotland.

### What They Are

SMART:SCOTLAND is intended to help small businesses improve their competitiveness by developing new, highly innovative and commercially viable products or processes to the benefit of the national economy.

It is a competition open to individuals planning to start a new business and to existing small independent firms and groups with less than 50 employees and either an annual turnover not exceeding €7 million\* or a balance sheet total not exceeding €5 million.

Successful applicants receive funding of 75% of the cost of carrying out a technical and commercial feasibility study lasting between 6 and 18 months. The maximum award is £50,000.

Entries to the SMART Competition may be submitted at any time. Judging takes place on three occasions each year. Entries received by 5pm on the second Monday of January are considered by the first judging panel, those received after this time but before 5pm on the second Monday of May by the second judging panel, and those after the second closing date but before 5pm on the second Monday of September by the third judging panel.

SPUR grants assist SMEs to develop new products and processes involving a significant technological advance for the UK industry or sector concerned, up to pre-production prototype stage. Awards can be made to independent businesses and groups with less than 250 employees and either an annual turnover not exceeding €40 million or a balance sheet total not exceeding €27 million. SPUR can offer a streamlined application process to SMART winners who have successfully completed their projects and require additional assistance to develop a pre-production prototype.

A fixed grant level of 35% of eligible costs, up to a maximum grant of £150,000 may be offered to projects of between 6 months and 3 years duration which involve eligible project costs of at least £75,000.

A limited number of SPUR<sup>PLUS</sup> grants are available for businesses which are attempting to develop world-beating products or processes for markets, such as telecommunications and biotechnology, which demand particularly expensive leading edge technology. Awards of up to £500,000 – payable at the rate of 35% of the eligible project costs – may be offered to these exceptional projects.

Independent companies and groups with less than 250 employees and either an annual turnover not exceeding €40 million or a balance sheet not exceeding €27 million can be considered for a SPUR<sup>PLUS</sup> grant.

Projects must be between 6 months and 3 years duration and should normally contain eligible project costs of at least £1 million.

Both SPUR and SPUR<sup>PLUS</sup> are non-competitive schemes.

\* The exchange rate for the Euro varies from year to year.

As a guide, on 5 January 2004 the exchange rate was €1 = £0.7026



## SMART, SPUR AND SPUR<sup>PLUS</sup>

### Eligibility and Selection

Applicants for a SMART : SCOTLAND Award or a SPUR or SPUR<sup>PLUS</sup> grant must either be based in Scotland, or be planning to set up a base in Scotland. However, applicants not based in Scotland, who apply for a grant, must establish a business in Scotland before a grant offer can be made.

Most technologies are eligible but defence projects cannot be assisted.

The selection criteria for a SMART : SCOTLAND Award include: the quality and novelty of the proposal; whether the Award is essential for the project to proceed; the qualifications and

experience of the project team; the degree of technical risk; the financial and commercial viability of the project and business; the means of moving to commercial development; and the wider potential commercial benefits.

Similar judgements are taken on SPUR and SPUR<sup>PLUS</sup> applications.

SMART, SPUR or SPUR<sup>PLUS</sup> grants help businesses to meet essential project costs such as: labour, overheads, materials, sub-contracting, consultancy and intellectual property. Capital equipment costs are allowed, but only to the extent they are required to carry out the project.

### Applying for the Awards

For the SMART : SCOTLAND Award you complete an entry form which will provide a quick guide to the project. This should be accompanied by a project proposal about 10 pages long and a business plan. Supporting evidence should include patent applications, letters from the bank, business accounts, CVs, etc.

If you are successful you will receive a formal offer specifying the technical programme of work, the amount of Award and any conditions attached. If you accept the offer and conditions, you will receive an up-front payment of one-third of the Award.

Before completing an application for SPUR or SPUR<sup>PLUS</sup> grant, you must first discuss your proposal with a project officer from SEETLLD.

Grant payments on SPUR and SPUR<sup>PLUS</sup> are made after expenditure has been incurred and defrayed. Claims are normally submitted on a regular (3 monthly) basis throughout the project.

The contact point for SMART, SPUR and SPUR<sup>PLUS</sup> is:

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Further information and application forms can be obtained from the Department's website at:

[www.scotland.gov.uk/innovationgrants](http://www.scotland.gov.uk/innovationgrants)

The SMART : SCOTLAND, SPUR and SPUR<sup>PLUS</sup> schemes are part-funded by the European Regional Development Fund.



*As a direct result of winning a SMART:SCOTLAND Award, immunodiagnostic reagents are now commercially available for use in aquaculture.*

## The Way They Were

Few diagnostic reagents for use in aquaculture were commercially available, despite the huge range of economically important fish pathogens that existed. Such reagents were commercially available for clinical and veterinary medicine but as very few existed for fish, these had to be developed from scratch. Over 15 years Professor Sandra Adams' research laboratory at the University of Stirling's Institute of Aquaculture developed a variety of probes to detect fish pathogens and to monitor immune responses in fish.



## Using the SMART Award

Professor Adams explained that 'it had become apparent that a market existed for the diagnostic reagents, as requests flooded in from all around the world'. As the antibodies were to be used as diagnostic probes, it was vital that they were rigorously validated for specificity, that they were stable on transportation, and that they were produced under standardised conditions. 'The SMART Award offered the ideal opportunity to do this.'

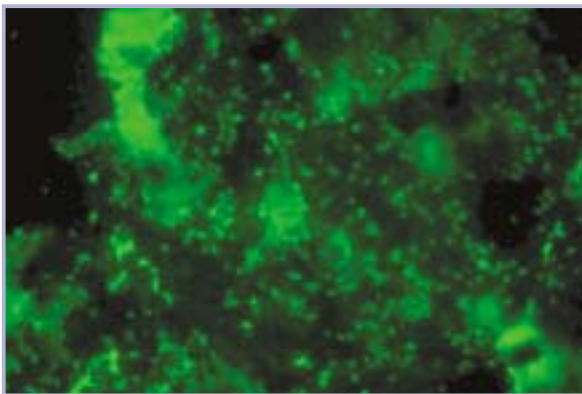
SMART funding came through in December 2001 and Dr Kim Thompson and Mrs Karen Sneddon were appointed as Technical Director and Project Scientist. Space and equipment were rented from the university and a small production facility was set up to take the business plan forward.



## The Effect of the SMART Award

As a direct result of winning a SMART Award, Professor Adams and Dr Thompson set up Aquatic Diagnostics Ltd (ADL) in August 2001. This means that immunodiagnostic reagents are now commercially available for use in aquaculture. 'This offers a whole new dimension in fish health management, as these reagents can be used for both pathogen detection and to assist in vaccine development,' Professor Adams explained.

The launch of ADL is particularly timely. Global aquaculture is expanding rapidly, with respect to the quantity and variety of fish species being cultured to meet the demand of the consumer market. Asia accounts for 90% by volume of global aquaculture production with China responsible for a large proportion of this. In November 2002 ADL went on to appoint Jingmei Biotech Ltd as its Chinese distributor. Since then Fukanoshi Ltd has been appointed as ADL's Japanese distributor. Twenty products are now available through ADL with another 15 in the pipeline. ADL anticipates a turnover of £250,000 within three years.



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*Crusade Laboratories, a Scottish biotechnology company with its roots in a Scottish university is at the forefront of biotherapy for cancer. SMART Awards have allowed us to maintain our advantage.*

## The Way They Were

Moira Brown was Professor of Neurovirology at the University of Glasgow until April 2003 when she decided to be employed full-time by her company, Crusade Laboratories Ltd. She has pioneered the use of herpes simplex virus (HSV) as a therapeutic for cancer and has been instrumental in demonstrating that basic academic research in the life sciences can be translated from the bench to the patient. The academic team led by Professor Brown was responsible for showing that the common cold sore virus, herpes simplex can be disabled in such a way that it is no longer able to destroy the cells of the brain and cause encephalitis. In addition, they were able to show that this modified virus could only replicate in actively dividing cells and not in the normal fully differentiated cells of the body. This discovery of avirulence coupled to selective replication competence only in actively dividing cells, highlighted to Professor Brown that the modified virus HSV1716 may have a role in treating cancer.

Following intense preclinical research, HSV1716 was injected into the tumours of patients with the intractable brain cancer, glioma. After permission from the Department of Health, Gene Therapy Advisory Committee (GTAC) and the Medicines



Control Agency (MCA), the first patient was treated in October 1997 and this was a world first. The portfolio of IP attached to the virus and its application became the backbone for Crusade Laboratories Ltd which was formed in December 1999. By that time, a considerable number of patients had been treated and no toxicity had been experienced by any patient.

## Using the SMART Award

The clinical results gave credence to the potential of HSV1716 as a cancer therapeutic. Building on this strength, Professor Brown decided that not only could the virus be a cancer killing agent in its own right but that it could be used as a vector to deliver other cancer killing products. To take this research forward, the company needed extra support in the form of staff and consumables and thus Crusade Laboratories applied for, and were successful in obtaining, a SMART:SCOTLAND Award.



The first part of the SMART Award allowed Crusade Laboratories to modify the prototype virus HSV1716 to express an enzyme, nitroreductase. This enzyme is used to activate a compound CB1954 which on activation becomes a cell-killing chemical. The concept is called GDEPT – gene directed enzyme prodrug therapy and it is a form of targeted chemotherapy. The SMART Award has allowed the combination of oncolytic virus therapy with targeted chemotherapy in the form of a ‘magic bullet’. By injecting the new virus directly into tumours, the tumour can be killed both by the virus and by the chemotherapy. The distressing side effects associated with normal chemotherapy are avoided because CB1954 only becomes toxic where nitroreductase is expressed, i.e. in the tumour and not in other organs in the body.

The laboratory results have shown that tumour cells infected with the new virus and treated with CB1954 are killed more effectively than tumour cells infected with either HSV1716 or CB1954 alone. The concept has been proven that Crusade’s prototype virus can be used to deliver targeted chemotherapy effectively. The success of the first Award allowed the company to obtain Part 2 of the SMART Award to take the new virus into preclinical studies in models of glioma, melanoma and ovarian cancer. This part of the project started in September 2003 and is making good progress.

## The Effect of the SMART Award

Professor Brown said: ‘Crusade Laboratories, a Scottish biotechnology company with its roots in a Scottish university, is at the forefront worldwide of biotherapy for cancer. SMART Awards have allowed us to maintain our advantage. Our company is based on many years of basic academic research; a belief that we have discovered an effective therapy for cancer; a determination to translate from the “bench to the patient” and a fundamental belief that there is a basic obligation to give back to society and to make sure that ideas and innovation have the best chance of exploitation. The Scottish Executive have helped in this achievement. There is a long way still to go to get a registered, marketable product and we continue to push forward with determination and belief in our technology.’

At the end of 2003, >50 glioma patients, 25 patients with squamous cell carcinoma of the head and neck and 5 patients with melanoma had been treated in Phase 1 toxicity trials with HSV1716. The results have been highly encouraging and a European multi-centre efficacy trial in glioma patients is due to start in 2004. The European Medicines Evaluation Agency (EEA) has recently awarded Crusade ‘Orphan Drug’ status for its lead product HSV1716.

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*‘We did not have enough funds to keep the business going while also developing two products. That is where the SMART Award came into its own. It is a very valuable award for a small company and it came at the right time.’*

## The Way They Were

Dr Tom Gilchrist was a former ICI chemist lecturing in Strathclyde University’s Bioengineering Unit when he took an interest in biomaterials, especially the use of different materials in wound dressings. In 1984 he left to start his own business but like many new businesses it did not have the money to develop all its ideas unaided. Dr Gilchrist was able to advance two new products with the help of both a SPUR and a SMART Award.

Wound management was changing. ‘The whole purpose of a dressing has been to get the wound to dry up,’ he said, ‘but moist wounds healed better. A colleague in this area asked if I could produce a material which would do the job and I was able to come up with one derived from seaweed. It forms a gel and keeps the wound moist.’

‘That product is now used internationally in Europe, America, the Far East and Japan. It is in all the main markets and is a market leader of its kind for treatment of a range of wounds.’



## Using the SPUR Award

‘More recently there have been problems in hospitals from wounds which become infected. More and more bacteria are becoming resistant to antibiotics so there is a greater emphasis on prevention rather than cure. I met someone who had devised water soluble glass. I started to put silver in this glass. If the glass is incorporated in a wound dressing, the glass dissolves giving off silver which is a strong anti-bacterial agent.’

Because so much testing has to be done, it took five years from the concept to its launch in November 1995. ‘There is a limit to how long you can finance such a project on your own

in a small business’, Gilchrist said. The solution was a SPUR Award. ‘It provided an important means to allow us to continue. In our field there is such a long lead time to market before you start getting any return from your money.’

The innovation was extended from wounds to medical procedures involving tubes – another potential vehicle for bacteria – and the SPUR Award allowed that extension to be developed.



## Using the SMART Award

But at the same time Dr Gilchrist came up with an idea for a new dialysis fluid for patients suffering from kidney failure. 'A form of treatment has come in during the last 10 years called peritoneal dialysis. It is growing in popularity, is more cost-effective, and it gives a patient freedom from being attached to a dialysis machine.

'It is growing in preference to haemo-dialysis but has several problems still to be resolved. One of the problems is in the dialysis fluid being used. Many of the patients who need dialysis are diabetic but one of the principal fluids contains glucose sugar.

'We have replaced the sugar with a protein derived from milk. We started developing these fluids in a small way but we did not have enough funds to keep the business going while also developing our innovative medical devices.

'That is where the SMART Award came into its own. It is a very valuable award for a small company and it came at the right time. It helped funding to a point where tests gave results.'

## The Effect of the Awards

It is only really at this point that a commercial partner can be sought. 'You have to demonstrate clinical efficacy before you get a partner coming in. As a result of all that work on dialysis-related clinical trials we now have the tried and tested product which is under evaluation by a major dialysis company.'

'The dialysis fluid will be licensed.' This will allow Giltech to re-invest in R&D. 'That is what we do. Manufacturing will have only a minor role.'

Giltech's initial two-wound management products based on infection control technology are now in the marketplace having received FDA approval. They were launched into the North American market during 1998. More recently a large medical device group have taken on board the technology for applications in five of their divisions and the first products are now entering global markets. Giltech employs 10 full-time staff, a part-timer and consultants. It works closely with university departments and supports two PhD students.

'This gives us access to high-tech instruments and procedures which we just cannot afford,' said Gilchrist. 'The students come in summer and spend a month or so with us.'

'We have been very reliant on SMART and SPUR to get us to this point. As our products prove successful in the marketplace we have an expanding core income to use on further R&D.'

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*It can take up to 5 years to get a new pesticide to market. The SMART Award effectively kick-started this process, allowing a full-time researcher to be employed in the laboratory whilst the founders concentrated on developing the commercial side of the business.*

## The Way They Were

Drs Alison Blackwell and Sue Welburn were both members of staff at the University of Edinburgh's Centre for Tropical Veterinary Medicine when they set up In-Phage Ltd with seed corn funding from the Edinburgh Technology Fund. Both are entomologists but working at different ends of the spectrum; Alison on insect ecology, behaviour and control, whilst Sue is a molecular entomologist, with particular interest in tsetse fly transmitted sleeping sickness. Between them, a window of opportunity was identified for novel methods of insect control: many existing insect control products are rapidly becoming redundant, due to increasingly restrictive legislation (relating to health and safety issues), in addition to growing resistance of some major pests to traditional control products. Furthermore, there is an increasing customer demand for environmentally-friendly, non-chemical means of insect control.

It was decided to try and target the very life-support mechanism of large numbers of insect pests. Insects which live in specialised niches (e.g. blood-, plant- and cellulose feeders) often lack essential nutrients in their diets, which instead are provided by symbiotic bacteria living in or close to their gut. Start-up funds from Edinburgh Technology Fund enabled us to confirm the importance of these bacteria and that their removal (with antibiotics) resulted in disruption of insect growth, survival and reproduction. Clearly, antibiotic treatment of insects would not be a viable method of control, which would require a different line of attack.



'Phage therapy' is growing in importance in both human and veterinary medicine to combat antibiotic-resistant infections. 'Phage' (or bacteriophage) are bacteria-specific viruses which destroy bacteria by injecting their own DNA into the bacterial cell, which is then instructed to produce new phage particles. The bacterial cell bursts within 30 minutes of infection, releasing new phage to infect further bacterial cells. Our aim was to try and develop this technique with insect bacterial symbionts to effect control. Hence, a SMART:SCOTLAND Award was applied for to initiate the R&D which would help us with this aim.



## Using the SMART Award

The SMART Award allowed In-Phage to explore their ideas regarding the use of bacteriophage in insect control. It can take up to five years to get a new pesticide to market due to the regulatory issues which have to be attended to. The SMART Award effectively kick-started this process, allowing a full-time researcher to be employed in the laboratory, whilst the Founders concentrated on developing the commercial side of the business, including investigating the market in more detail and protecting the intellectual property associated with the technology.

By the end of the project, we had investigated a range of both specific and generalist bacteriophage for in vitro activity against insect symbiont cultures, in addition to in vivo assays of active bacteriophage with target insects, assessing the effects on symbionts, insect survival and reproduction. Key pest targets were identified through both our market research and discussions with significant players in the marketplace. These include the ubiquitous cockroach and the house dust mite, which is the major cause of childhood asthma.

## The Effect of the SMART Award

The SMART Award enabled us to make significant progress in assessing the potential for applying 'phage therapy' techniques to insect control, raising a number of important technical issues regarding specificity and delivery mechanism which we hope to explore in a SPUR application. The endorsement from SMART also helped raise the profile of In-Phage within the businesses community, putting us in touch with a number of invaluable contacts. It has also enabled us to speak directly to the pest control industry, who largely have given very good feedback, seeing the potential of the technology. This has been a massive boost to our confidence of taking an academic concept through the stages required to get it out into industry.

Through a detailed examination of the pest-control market during the project, we have been able to revise our business model, deciding to concentrate on developing our platform bacteriophage technology for key markets, with the aim of gaining revenue through licensing deals. In addition, we have begun to create a revenue stream from contract research and consultancy, drawing on a wealth of research experience which lies within the company. These contracts are allowing us to build relationships with international pest-control companies, which may eventually become licensing partners for our core bacteriophage technology.

The business now employs two full-time researchers and several consultants and is being headed by Alison, who is currently supported through a prestigious Scottish Enterprise/Royal Society of Edinburgh 'Enterprise Fellowship'.

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*Winning the SMART : SCOTLAND Award has greatly assisted Nandi Biotechnology Ltd to realise the commercial feasibility of its products.*

## The Way They Were

Dr Lydia Campbell, a South African-born food scientist, worked in the R&D Division of a major international food company, when she took an interest in 'natural' bio-engineering of food proteins to improve their functional properties. After accepting a research position at Heriot-Watt University in July 2000, Dr Campbell lodged a patent application that dealt with the manipulation of egg white and whey proteins. One of the applications of the modified proteins was that they could be used as fat substitutes for manufacture of low-fat foods.



## Using the SMART Award

The SMART Award allowed Nandi Biotechnology Ltd to conduct industrial manufacturing trials of the egg white and whey proteins. The products from these trials were tested in dairy cream and mayonnaise, confirming the claims for improved functionality, such as water binding and emulsifying properties. This meant that Nandi-products could be manufactured at low cost and could be utilised not only as fat replacements by the food industry, but also for the manufacture of innovative new products for the dairy-free (egg white) and gluten-free (whey protein) markets.

## The Effect of the SMART Award

Winning the SMART Award has greatly assisted Nandi Biotechnology to realise the commercial feasibility of its products. The Award has also enabled the company to secure development agreements with large food companies in the UK, South Africa and the USA.

The company has now applied for a SPUR Award, which will be used to investigate the wider application of its products in the food industry and also to improve existing technology to the pre-production stage. The company plans to set up and equip a small food biotechnology laboratory in 2004. This will provide the environment to further support and expand its industrial joint ventures.

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*Scapa Technologies is recognised as a global technology leader, the company is profitable and growing fast. Things are going to get bigger and better as the technology market recovers, but without the continuous support of SMART and SPUR<sup>PLUS</sup> none of this would have happened.*

## The Way They Were

Back in 1994, on leaving Edinburgh University's Parallel Computing Centre, Dr Michael G. Norman set up a consulting business subcontracting to other consultancies, analysing the significance and effectiveness of technological developments within the commercial software sector. By 1997 the company, Makespan Limited, was profitable and employed five people, and Michael had been joined by David Mercer, the former Commercial Director of Edinburgh Parallel Computing Centre, and a veteran of the commercial side of the university's Computing Service.

At this point, Makespan Limited embarked on a project using the industry-leading load testing tool. This type of software tool works by simulating the activity of a large number of users of a computer system and is used to ensure systems operate correctly before they are made available to real users.

The tool was difficult to use, required a very high level of skill in the tester, and was quite expensive. Michael and David spotted a market opportunity in remedying these deficiencies. However, it was very clear that to take on the market leader



(now capitalized at around a billion dollars and well established in all global markets including Scotland) their new product would have to be a global innovation, and that the business would require much more investment than was available from the operating profits of Makespan Limited.

## Using the SMART and SPUR<sup>PLUS</sup> Award

In 1998, Dr Norman and Mr Mercer set up a second company, Scapa Technologies Limited and applied for SMART funding for a project known as 'Scapa for OLAP' to prototype a new product for load testing OLAP systems – a form of business analysis system popular in the finance sector, the market leader being known as Hyperion Essbase.

The initial SMART 1 Award and its successor SMART 2 led to a product known as 'Scapa StressTest for Hyperion Essbase'. A pre-production prototype was piloted with various customers at the end of 1999 and taken to market in mid 2000 with the help of a seed Venture Capital round. The product was a quantum leap forward in the performance testing area, but was limited to a very specific niche.

By end 2000, Scapa Technologies had half-a-dozen customers – all of them blue-chip companies, and mostly based in the USA. A venture capital round was sourced in early 2001 to develop sales of the existing product, whilst creating product for new niches in the then-fashionable Application Service Provider (ASP) market. This development was known as ASP-Assure and a SPUR<sup>PLUS</sup> Award was successfully applied for to provide part of the huge investment in R&D.



On September 11th 2001, Scapa Technologies' newly-opened US subsidiary was due to start a major implementation project using Scapa StressTest for Essbase with Deutsche Bank in the World Trade Center. Thankfully all Scapa Technologies staff, customers and other contacts were spared by the tragedy that unfolded, but by the afternoon of September 11th, the software market had entered the biggest recession for 25 years, the market for Scapa Technologies existing product effectively disappeared, the ASP market disappeared with it, and Scapa's very shaken management team soon realized that it was necessary to get a new product to market to maximise the chance of finding someone who was prepared to buy some software.

Luckily, the flexibility within the SPUR<sup>PLUS</sup> project meant that deliverables could be re-arranged and early versions of Scapa StressTest for Citrix MetaFrame and Scapa StressTest for Remedy were released in Q1/02 and marketed to a wide range of organizations using those respective types of systems, rather than just ASPs. Initial customers provided some revenues in a very dark period. The products were refined and extended in the ASP-Assure project to provide Version 2.0 in Q1/03. The final deliverable from the ASP-Assure project was released in January 04 as Scapa StressTest-Express.

## The Effect of the SMART and SPUR<sup>PLUS</sup> Awards

By end 2003, although the commercial software market was still extremely depressed, Scapa Technologies employed 22 people was exporting around the world (even making the occasional sale in Scotland) and was profitable. It was beating the established market leader in four out of five competitive encounters and growing fast in a market that according to the International Data Corporation was shrinking and consolidating, and where no other company was gaining market share against the market leader.

All of this was down to Scapa Technologies superior load testing technology developed under SMART and SPUR<sup>PLUS</sup>. The technology is quite simply more sophisticated and thus easier to use, automating a range of activities that with other tools are laborious, time-consuming and in many cases practically impossible.

In 2003 according to Deloitte, Scapa Technologies was the 6th fastest growing technology company in Scotland (30th in the UK). Meanwhile, however, the world wasn't standing still, the competition wasn't standing still and there were bigger niches for Scapa Technologies to go and conquer, so a second successful SPUR<sup>PLUS</sup> proposal 'Process Analysis for Web Services (PAWS)' was made in late 2003 to build a wider range of products for the emerging Web Services market, to be released through 2005/6, building on top of a collaborative Open Source development project known as Hyades ([www.eclipse.org/hyades](http://www.eclipse.org/hyades)) developed with industry leaders such as IBM, Intel and SAP.

Dr Norman said: 'by 2004, Scapa Technologies is recognised as a global technology leader, the company is profitable and growing fast. Things are going to get bigger and better as the technology market recovers, but without the continuous and flexible support of SMART and SPUR<sup>PLUS</sup> through the boom/bust cycle of 1998-2003, none of this would have happened.'

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