



# **Public Final Report of IST HPCN TTN ESCALATE - Exploiting Synergies and Co- operative Actions Leading to Accelerated Take- up and Effectiveness**

Report ESCALATE TTN/D3.3.1/revised

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# Contents

Abstract .....	i
Synopsis .....	1
Executive summary .....	2
Mission Statement .....	4
1 Structure of the TTN .....	5
1.1 The co-ordinating organisation.....	5
1.2 Approach to technology transfer.....	5
1.2.1 As a TTN.....	5
1.2.2 As an Industry Sector Group leader .....	5
1.3 PST activities.....	6
1.3.1 DEMOTOOL (Demonstration of the TOOLSHED Parallel Simulation Environment) .....	6
1.3.2 HEIDI (HPF for Effective In-house Development in Industry) .....	6
1.3.3 INDACAR (Industrialisation of Automatic Cheque Amount Recognition).....	7
1.3.4 MARKET (Marketing Analysis for Retail using Knowledge Elicitation Tools) .....	7
1.3.5 PACAN-D (Parallel Acoustic Analysis Demonstrator) .....	7
1.3.6 PARACOMP (Parallel Analysis of Composites).....	8
1.3.7 PERMAS-D (Parallel PERMAS Deployment) .....	8
1.3.8 VIVRE (Visualisation through an Interactive Virtual Reality Environment) .....	9
1.3.9 WIRED (Walking Intelligent Robots using Embedded Control Demonstrator) .....	9
2 Actions carried out.....	10
2.1 Dissemination material produced .....	10
2.2 Events .....	11
2.3 Web site .....	13
2.4 Publications & other media coverage .....	13
2.5 Participation in Industrial Sector Groups .....	16
2.6 Industrial Surveys.....	16
2.6.1 DEMOTOOL .....	16
2.6.2 Construction.....	16

2.6.3	Medical.....	17
2.7	Synergy with other TTNs .....	17
2.8	Other actions.....	17
2.8.1	TTN Network Press Campaign in the UK and Ireland.....	17
3	Achievements and outcomes.....	18
3.1	At PST level .....	18
3.1.1	New HPCN-based products .....	18
3.1.2	Planned HPCN deployment .....	18
3.1.3	Anticipated HPCN deployment.....	19
3.2	At TTN level - added value of ESCALATE.....	19
3.2.1	Benefits to PSTs.....	19
3.2.2	Benefits to the Network.....	19
3.2.2.1	Enabling best practice in HPCN solutions .....	20
3.2.3	Impact and benefits to industry .....	20
3.2.3.1	Impact and benefits through the Construction Sector Group .....	20
3.3	Lessons learned .....	21
3.3.1	Working for the benefit of SMEs.....	21
3.3.2	The TTN/PST model and the role of the Network .....	21
3.3.3	Collaboration through the Network.....	21
3.3.4	Sector groups .....	22
3.3.5	How to connect with industry.....	22
3.3.6	Press campaign (UK & Ireland).....	23
4	Exploitation.....	24
4.1	At PST level .....	24
4.2	At TTN level .....	24
5	Conclusions.....	25
6	Information about the TTN.....	26
6.1	Contact details.....	26
6.2	Project duration and budget.....	26
	Annex I - Final Report of Construction Sector Group.....	26

Annex II - Final Report of Medical Sector Group .....26

## **Abstract**

The ESCALATE TTN (Technology Transfer Node) was based in Southampton, UK, and managed by the IT Innovation Centre (formerly known as Parallel Applications Centre, or PAC). It started on 1 April 1997 and finished on 31 March 2000. There were nine PST activities attached: DEMOTOOL, HEIDI, INDACAR, MARKET, PACAN-D, PARACOMP, PERMAS-D, VIVRE and WIRED. ESCALATE was leader of the Construction Sector Group.

ESCALATE and its PSTs brought together SMEs and HPCN technology in many application areas, including automotive, retail, banking, loudspeaker manufacture, aerospace, offshore engineering and robotic engineering.

## **Synopsis**

ESCALATE, based in Southampton, UK, was one of 20 technology transfer nodes (TTNs) in the ESPRIT funded HPCN-TTN Network. It was one of two TTNs in the UK. There was just one participating organisation:

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ESCALATE managed nine Preparatory, Support & Transfer (PST) projects and was a technical partner in seven of them. We had project partners in France, Germany, Italy, Norway and Spain, as well as the UK, and our work involved a wide range of technical and industrial applications.

### **Success in PSTs**

All but one of the projects was rated a success and in general the partners have been very positive about the impact of the project and the Network on their businesses. There is now a firm belief that HPCN delivers real benefits and in most cases the partners expect to use HPCN further in the future.

### **Successful European synergy through the HPCN-TTN Network**

The added benefit of being part of a European Network of TTNs was the opportunity it afforded to disseminate our PST results to a far wider audience than we could manage alone. The TTNs and their industry partners also shared experiences and learned from each other, both on a technical level and from a marketing/industry-awareness point of view.

This synergy was facilitated at the six-monthly meetings of the TTNs, at events organised by and for TTNs, and in the activities of the Industry Sector Groups.

ESCALATE was leader of the Construction Sector Group (whose Public Final Report accompanies this report), an active member of the Medical Sector Group (whose Public Final Report also accompanies this), sole participant in the Retail Sector of the Finance, Insurance & Retail Sector Group, and a contributor to the Automotive and Aerospace Sector Groups.

### **Template for future success in technology transfer**

Through involvement in the HPCN-TTN Network, the contacts made (both with other TTNs and with industry itself) and the lessons learned, IT Innovation is well placed to continue its role as a technology transfer centre.

## Executive summary

The sole participant and manager of the ESCALATE TTN was the IT Innovation Centre, Southampton, UK (formerly known as the Parallel Applications Centre, or PAC). ESCALATE had three roles as a technology transfer node in the HPCN-TTN Network:

- Technical participation in and/or management of nine PST activities;
- Co-operation with TTNs in other activities;
- Management and/or participation in five Industry Sector Groups of the HPCN-TTN Network.

## ESCALATE's PST activities

ESCALATE was a technical partner in seven PSTs and co-ordinator of two more. Our technical involvement was in DEMOTOOL, HEIDI, MARKET, PACAN-D, PARACOMP, PERMAS-D and WIRED. The expertise we brought to these projects ranged through parallelisation of FEA and CFD codes, data mining and design of a distributed, embedded control system for a robot. The end-users were in many industries, including automotive, banking, retail, loudspeaker manufacture, aerospace, offshore engineering and robotic engineering. In addition to the UK, ESCALATE had project partners in France, Germany, Italy, Norway and Spain.

ESCALATE managed the INDACAR project, whose French participants produced an HPCN-based cheque-processing application. ESCALATE also managed VIVRE, a pan-European project with eight partners that tested a new method combining data visualisation technology with 3D VR exploration techniques.

## Achievements

Most of the ESCALATE PSTs did not produce commercially available software at the end. However, the impact on the project partners has been high. IT Innovation expects to use the PST successes as reference stories in its continuing drive to work with new end users either on a commercial basis or in further externally funded projects.

Our post-project survey of PST partners revealed that there is now a firm belief that HPCN delivers real benefits. In two cases (PERMAS-D and INDACAR) HPCN has been deployed and the users are seeing business benefit already. In most of the others, take-up will happen as soon as products are made available based on the parallel codes demonstrated in these projects.

Many of the project partners report that the lessons they have learned in the course of the work are enabling them to make better business decisions.

- PACAN-D, PARACOMP and PERMAS-D have provided good case studies of the methods of code parallelisation used. At least four papers have been published to date, and two more have been accepted.
- VIVRE has also had recent success with a paper presented at a prestigious international event in San Francisco.
- The WIRED robot has captured the imagination of the media and given makers, Portech, some welcome publicity, bringing their work to the attention of potential end users. Although Portech is not yet manufacturing off-the-shelf robots, this possibility is ever closer. At least one project has been funded to develop a new application (ROBOSENSE, for placing sensors on

dams) and there is a strong possibility of further projects to develop robots for tasks in other hazardous areas, such as volcano vents and minefields.

## **Participation in Industrial Sector Groups**

ESCALATE had the following involvement in the TTN Network's Industrial Sector Groups:

- Construction – manager
- Medical – full participation
- Retail – full participation
- Automotive – contribution when possible
- Aerospace – contribution when possible

This was the area in which most of our dissemination activity took place and where we gained most of our overall insight into the readiness of European industry for HPCN, especially in the Construction Sector.

Through our work in the Construction Sector Group, ESCALATE brought business benefits to:

- PSTs of other TTNs;
- Delegates to UK workshops;
- Industry speakers at UK workshops;
- Co-organisers and hosts of UK workshops.

ESCALATE was able to identify this success by issuing questionnaires to delegates at all our UK workshops, as well as seeking written feedback afterwards from other participants. ESCALATE (with no PST projects of our own in that sector) made sufficient impact on the UK construction industry to be invited to participate in a panel advising the government on future IT strategy in the construction industry.

## **Co-operation with TTNs in other activities**

Apart from involvement in our own PSTs and in the Industry Sector Groups, ESCALATE had a high profile in general meetings and activities of the TTNs, such as the following:

- Hosting a meeting of TTNs to discuss PC clustering best practice, October 1997;
- Co-organising an internal meeting of the TTNs in Lisbon in 1999;
- Attending an extraordinary meeting of TTNs in Helsinki, November 1999, to discuss future actions;
- Participation in the TTN Network's press campaign in the UK & Ireland.

These activities enabled the TTNs to learn from each other and to benefit from the combined experience of all.



## Mission Statement

ESCALATE operated as a Technology Transfer Node (TTN) within the HPCN-TTN Network. It aimed to support the HPCN-TTN Network mission to improve the competitiveness of European industry by promoting take-up of HPCN.

ESCALATE had two main roles:

1. to support and manage a portfolio of attached PST (Preparatory, Support and Transfer) activities in which HPCN applications were demonstrated/trialled;
2. to participate in the Network, promoting PST activities at European level and stimulating wider HPCN take-up by European industry.

In its first role, ESCALATE worked to enhance the potential of its PST projects by:

- identifying and co-ordinating technical synergies between PSTs;
- promoting PST successes and best practice;
- gathering feedback on the promotional activities of the Network and on HPCN needs in target industrial sectors;

In its second role, ESCALATE aimed to:

- stimulate mobilisation of technology providers through the Network to address industrial HPCN needs.

To achieve this, it focused its technology transfer activities mainly on three sectors of European industry:

- Construction (through co-ordination of the Construction Sector Group);
- Medicine (by participating in the Medical Sector Group); and
- Finance, Insurance and Retail (by participation in the FIR Sector Group).

To a lesser extent, ESCALATE also contributed to the Automotive and Aerospace Sector Groups.

# 1 Structure of the TTN

## 1.1 The co-ordinating organisation

The IT Innovation Centre is a deployment-focused technology transfer organisation and as such the activities of ESCALATE were well matched to our usual activities. We offer solutions and services to empower businesses to work more effectively by addressing their information and knowledge needs.

Through our work in projects such as the PSTs attached to ESCALATE, we improve our capability to add value to our clients' businesses. At any one time, our work is built around a number of core service areas which reflect our view of key areas for innovation in a one to three year timeframe.

## 1.2 Approach to technology transfer

### 1.2.1 As a TTN

Prior to the start of ESCALATE, IT Innovation had already promoted the take-up of HPCN by European industry in the following ways:

- supporting end-user investment in HPCN technologies;
- enabling or assisting software vendors to exploit parallel HPCN architectures;
- working with end-users to add value to existing HPCN investments.

IT Innovation's involvement in ESCALATE enabled it to continue and enhance these processes and focus particularly on European SMEs. It was anticipated that this in turn would lead to enhanced business performance and new products and services from European industry.

### 1.2.2 As an Industry Sector Group leader

As leaders of the Construction Sector Group, ESCALATE aimed to enable the transfer of HPCN technology to the European construction industry by:

- identification of the needs of the industry;
- awareness creation of the benefits HPCN can bring (i.e. success stories such as PST projects);
- stimulation of new HPCN in construction actions involving new end-users by bringing the right people together (i.e. end-users plus suppliers and enablers).

To achieve its objectives, ESCALATE co-ordinated the following core activities for the Construction Sector Group:

- i) consultation with industry (directly through existing contacts, at events, through press contacts, by structured survey, via web sources, etc.) to identify issues of concern where HPCN solutions could be applied;
- ii) selection of issues to be addressed, appropriate to what we could offer;
- iii) organisation of workshops with key participants to discuss the issues and potential solutions;
- iv) follow-up to enable new actions towards take-up;
- v) and communication within the Sector Group and with other Sector Groups, via networking, to share with and benefit from the resources of the TTN Network as a whole.

In association with these activities, ESCALATE also:

- co-ordinated the submission of press releases;
- arranged for appropriately targeted display or distribution of flyers and other dissemination material for PSTs in the Sector Group;
- managed and updated the Construction Sector Group web site;
- disseminated information amongst the TTNs in the group; and
- assisted the Network co-ordinators in the exchange of information between other TTNs and Sector Groups.

### **1.3 PST activities**

#### **1.3.1 DEMOTOOL (Demonstration of the TOOLSHED Parallel Simulation Environment)**

Started 1 Jan '99; ended 28 Feb '00 - Duration 14 months

Through applications of the TOOLSHED Parallel Simulation Environment in two different domains (aerodynamics and car crash simulation), the DEMOTOOL project assessed the TOOLSHED open structure and the applicability of the STEP ISO standard. The aim was also to promote the measured business benefits of using TOOLSHED, and more widely Problem Solving Environments, at a European level.

The partners in the project were:

- Bertin Technologie, France (project co-ordinator and simulation experts)
- IT Innovation (systems integrators)
- Mecalog, France (automotive end-user)
- Matra Bae, France (aerospace end-user)

The suitability of TOOLSHED for parametric sensitivity analysis was confirmed and the different automating facilities were also proved to be easy and quick to use.

#### **1.3.2 HEIDI (HPF for Effective In-house Development in Industry)**

Started 1 August '97; was terminated prematurely in November '98

This project aimed to improve a CFD (computational fluid dynamics) industrial code used by Alfa Romeo Avio in simulation of combustion. The existing in-house code was written in Fortran77 and the intention was to parallelise and convert it to the HPF language. Initially it would be used in test cases involving gaseous turbulent combustion flames in 3D combustion chambers.

Work ceased when the task proved too difficult due to the lack of maturity of the HPF paradigm and implementation.

The partners in HEIDI were:

- IT Innovation (parallelisation experts)
- NA Software, UK (UPF experts)
- Alfa Romeo Avio, Italy (aerospace end-user)

Although technically the project failed, it gave the partners an important insight into HPF and its readiness for industrial use.

### **1.3.3 INDACAR (Industrialisation of Automatic Cheque Amount Recognition)**

Started 1 September '97; ended 30 June '98 - Duration 10 months

When you pay a cheque into the bank, your cheque and the pay-in slip go to a clearing house where people make sure that the amount on the cheque is the same as the total on the pay-in slip. When one pay-in slip is used for lots of cheques, the workload increases. In this project a computerised system was installed to read the cheques and add up the totals on the pay slips. Handwriting recognition - of both words and numbers - was the clever part of this system.

ESCALATE's role in this project was as managers; they did not have technical input. The three partners were all based in France:

- A2iA (owners of Intelligent Character Recognition [ICR] software)
- Unisys (solution integrator and supplier of payment processing hardware)
- ATOS Courbevoie (cheque clearing house)

As a result of this project, cheque clearing houses, banks and customers of those banks will benefit from a more efficient system with fewer errors.

### **1.3.4 MARKET (Marketing Analysis for Retail using Knowledge Elicitation Tools)**

Started 1 Sep '97; ended 30 Jun '99 - Duration 22 months

Somerfield Stores, a well known UK supermarket chain, sought to improve its bread ordering capability by investigating how data mining technology can be used to predict bread sales. The same methods applied to other everyday products with a short shelf life (e.g. milk, fruit) could result in significantly enhanced sales figures.

The partners were:

- Somerfield Stores, UK (retailer)
- SPSS/ISL, UK (data mining tool vendors)
- IT Innovation (data mining deployment experts)

Although unconnected business issues prevented Somerfield from carrying out trials across a selection of its stores, the project proved to them that data mining methods are far superior to spreadsheet analysis. Data mining is now integral to their business and will be part of their new, web-based ordering and delivery service.

### **1.3.5 PACAN-D (Parallel Acoustic Analysis Demonstrator)**

Started 1 May '97; ended 31 May '99 - Duration 25 months

This project enhanced computer software that can simulate the effects of sound in an enclosed space (e.g. quality of sound emitted by a loudspeaker). A computer simulation dispenses with the need to manufacture lots of variations on a loudspeaker to find the best design - but only if the computer can work faster than the loudspeaker makers. This capability is made possible through HPCN.

An important part of this project was enabling the HPCN simulation software to work on desktop PCs that were also used for other tasks.

The partners in this project, all UK based, were:

- Celestion (loudspeaker manufacturer)
- MIRA (Motor Industry Research Association)
- SER (code owners)
- IT Innovation (code parallelisation experts)

Although acoustics is a complex process to define and analyse, the project demonstrated that HPCN works fast enough and accurately enough to make it more efficient than conventional testing of prototype designs.

### **1.3.6 PARACOMP (Parallel Analysis of Composites)**

Started 1 May '97; ended 31 May '99 - Duration 25 months

Composite materials are presenting new challenges to engineers. Lightweight fibre and resin, which is strong and durable, can be used in place of traditional alloys. For the aerospace industry, which is constantly striving to reduce the weight of airframes, composites are the natural choice for safer travel in the future.

These materials have a complex structure, however, and require far more compute power when tested for safety at the design stage. Numerical simulation using finite element analysis (FEA) is used prior to full scale testing, to identify where composite components are likely to fail.

The partners in PARACOMP, all UK based, were:

- Messier-Dowty (manufacturers of aircraft landing gear)
- FEA Limited (owners of the LUSAS code)
- IT Innovation (code parallelisation experts)

As a result of this project, Messier-Dowty, a UK-based SME (small to medium size enterprise) achieved a significant speed-up in their simulation process without the need to invest in a supercomputer.

### **1.3.7 PERMAS-D (Parallel PERMAS Deployment)**

Started 1 May '98; ended 30 April '99 - Duration 1 year

In this project, Norwegian offshore engineering company Structural Engineering (SE) increased the productivity of its analysts by using high-performance finite element analysis software. PERMAS-D produced a viable migration strategy for SME engineering consultancies needing greater performance from their simulations.

The costs and benefits of using a shared-memory computer as a centralised simulation resource were investigated. For SME engineering consultancies where finite element analysis simulations are part of their core business, an SMP platform can greatly enhance the productivity of the engineers. Two such SMEs were involved in the project and the investigations were carried out with test cases of real concern to them. The PERMAS-D partners were:

- IT Innovation (business process analysts)

- Intes, Germany (code owners)
- Dynalis, France (automotive engineering company)
- Structural Engineering, Norway (offshore engineering company)

The results demonstrate that the PERMAS FE code runs effectively on shared memory platforms (SMP) with test cases of real concern to industry. They also identify a migration strategy for potential users of parallel PERMAS to facilitate their take-up.

SE have now invested in SMP and are already seeing benefits, and Intes are selling the code.

### **1.3.8 VIVRE (Visualisation through an Interactive Virtual Reality Environment)**

Started 16 Sep '97; ended 30 April '99 - Duration 19.5 months

Through a novel combination of virtual reality (VR) techniques and conventional visualisation systems, engineers are now able to immerse themselves in virtual environments ranging from an underground cavern for oil storage to the surface of dental plaque.

Eight organisations in four countries developed the combined technique suitable for a variety of industrial uses. They have proved that VR can bring added value to conventional visualisation methods for a wide range of applications including underground oil storage, modelling of dental plaque, design of furnaces and simulation of water flow in valves.

The partners in this project were:

- Tessella, UK (visualisation experts)
- CLRC, UK (visualisation experts)
- Unilever, UK (consumer chemicals)
- NAG, UK (visualisation code owner)
- Air Liquide, France (furnace experts)
- Tethys, France (software developers)
- Labein, Spain (engineering consultants)
- BSSI, Norway (visualisation consultants)

In all four user cases, the organisations were able to see clear business benefits through this powerful combination of visualisation techniques.

### **1.3.9 WIRED (Walking Intelligent Robots using Embedded Control Demonstrator)**

Started 1 Jan '98; ended 31 May '99 - Duration 17 months

This project demonstrated a distributed, embedded control system using a network of off-the-shelf micro-processors. Such a system could have many applications in industrial machines but in the WIRED project it was used to dramatic effect in a walking, climbing robot.

The remotely-operated robot is capable of walking or climbing to perform a variety of tasks in situations where it would be dangerous for a human to work. It is innovative because it is made from off-the-shelf components and is controlled by a network of micro-computers distributed around its body, instead of having a large central 'brain'.

The industries to benefit will be those with hazardous environments, such as the nuclear or offshore industries; structural engineers - the robot can place sensory equipment to carry out tests on, say, dams at risk from earthquakes; possibly also missions to clear landmines.

The partners in this project, all based in the UK, were:

- Portech (robotics and automation company)
- IT Innovation (designers of control software infrastructure)
- The Mobile Robotic Group of the University of Portsmouth (supply of advanced algorithms)

The project successfully demonstrated an innovative approach to engineering tasks. A combination of modular systems made from off-the-shelf components, and HPCN to provide communications between components and CPU, will make Portech's robots accessible to new users.

## 2 Actions carried out

### 2.1 Dissemination material produced

Date	Project	Description of material	Number produced
Ongoing	DEMOTOOL	Website: <a href="http://www.it-innovation.soton.ac.uk/demotool/">www.it-innovation.soton.ac.uk/demotool/</a>	-
Mar '99	DEMOTOOL	Flyer on the TOOLSHED environment for use by Bertin in promotion of TOOLSHED/DEMOTOOL activities	On demand
Feb '00	DEMOTOOL	4-page flyer showing case study results, for use on demand to support exploitation after end of project	On demand
Feb '00	DEMOTOOL	CD-ROM showcase presentation	On demand
Jul '99	MARKET	Article submitted to Retail Management International for their feature on data mining in Sep/Oct issue (not published)	1
Oct '99	MARKET	Demonstrator - can be viewed at <a href="http://www.hpcn-ttn.org">http://www.hpcn-ttn.org</a>	1
Ongoing	PACAN-D	Website: <a href="http://www.it-innovation.soton.ac.uk/pacan-d/">www.it-innovation.soton.ac.uk/pacan-d/</a>	-
Jun '99	PACAN-D	Poster (for display at UDT '99, Nice; EAEC '99, Barcelona; Usenix '99, Seattle; and ISATA '99, Vienna)	2
May '99	PERMAS-D PARACOMP PACAN-D DEMOTOOL	Press release for workshop 'Changing the Way we Use Simulation'	1
May '99	PERMAS-D PARACOMP PACAN-D DEMOTOOL	Flyer for workshop 'Changing the Way we Use Simulation'	50
Ongoing	PERMAS-D	Website: <a href="http://www.it-innovation.soton.ac.uk/permasd/">www.it-innovation.soton.ac.uk/permasd/</a>	-
Dec '98	PERMAS-D	Technical newsletter sent to all INTES clients	Not known
Jun '99	PERMAS-D	3 durable posters - showing expected benefits, SMP PERMAS performance and cost-benefits analysis respectively (for display at EAEC '99, Barcelona and ISATA '99, Vienna)	One of each
	PERMAS-D	Flyer produced by SE for distribution to their clients and potential clients	On demand
	PERMAS-D	Flyers - A4 size - from posters. Sent to Intes mailing list	Not known
ongoing	VIVRE	Website: <a href="http://www.tessella.co.uk/projects/vivre/index.htm">www.tessella.co.uk/projects/vivre/index.htm</a>	1
	VIVRE	Video	1

Date	Project	Description of material	Number produced
May '99	WIRED	Press release for Embedded Systems Show	1
May '99	WIRED	Flyer for Embedded Systems Show (produced by Portech)	200
May '99	WIRED	Posters for display at Embedded Systems Show (produced by Portech)	4
Jun '99	WIRED	Reprint of 'Braveheart' article from 'Electronics Weekly' - for general distribution by partners	500
Nov '99	WIRED	Flyer - A4 for distribution at IST'99	500
Mar '00	WIRED	Reprint of 'Joint Effort' article from 'IEE Review' - for general distribution by Portech and ESCALATE	300

## 2.2 Events

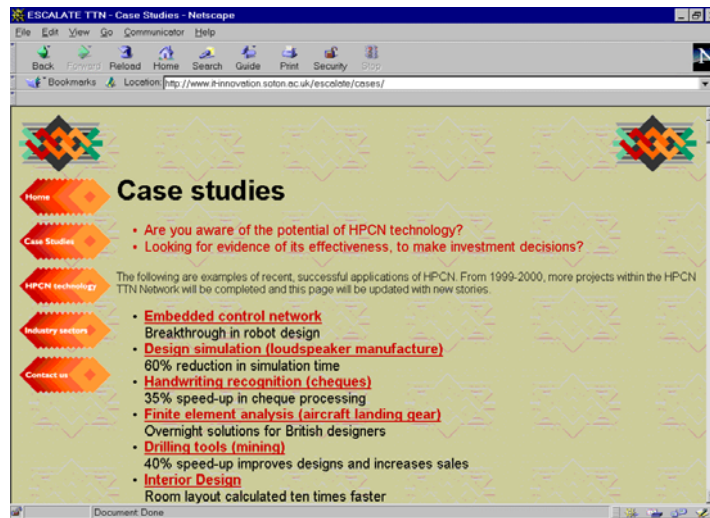
Date	Project	Event name and description	No. of people attending
Oct '97	ESCALATE	PC Clustering Best Practice - hosted by ESCALATE	14
Jan '99	DEMOTOOL	TOOLSHEd environment introduced to the CN4/AFNOR (French National Standardisation organisation) members	Not known
Apr '99	DEMOTOOL	Information sent to the European Conference of PDT, in Norway	Not known
Apr '98	INDACAR	Seminar presenting ICR technologies to French banks	27
Apr '98	INDACAR	Presentation by Jean Claude Simon (A2iA) - 'ICR technology today and the impact on business processes' at international seminar in France	20
Apr '99	PARACOMP PACAN-D PERMAS-D DEMOTOOL	ESCALATE presented a paper at HPCN Europe 99: 'Case studies of four industrial meta-applications'	50
May '99	PARACOMP PACAN-D PERMAS-D DEMOTOOL	Workshop hosted for ESCALATE by NAFEMS, near London: 'Changing the Way we Use Simulation'	20
Apr '99	PACAN-D	Paper presented at Reproduced Sonar 14 Windermere Conference	35
Apr '99	PACAN-D	Paper presented at Sonar Transducers 99 Conference, Birmingham	30
May '99	PACAN-D	Paper presented at 106th Audio Engineering Society Convention, Munich	40
Jun '99	PACAN-D	Paper presented at 'Undersea Defence Technology Europe', Nice	35
Jun '99	PACAN-D	Paper presented at international conference on Parallel & Distributed Processing Techniques and Applications (PDPTA'99), Las Vegas	80
Jul '99	PACAN-D	Two papers presented at Usenix 99, Seattle	50



Date	Project	Event name and description	No. of people attending
Jul '99	PACAN-D	Poster displayed on stand at EAEC European Automotive Congress 'Vehicle Systems Technology for the Next Century', Barcelona	1
Jul '99	PACAN-D	Poster displayed on stand at ISATA'99 (International Symposium on Automotive Technology and Automation), Vienna	1
Nov '98	PERMAS-D	Booth at German Finite Element Congress, Baden Baden	100
Feb '99	PERMAS-D	Booth at MICAD '99, France	200
Jun '99	PERMAS-D	ISATA 99 - Dissemination material on the Auto SG booth, Vienna	100
Jun '99	PERMAS-D	EAEC 99 - Dissemination material on the Automotive Sector Group booth, Barcelona	100
Jun '98	MARKET	Business Intelligence 98, London - flyer distributed from IT Innovation exhibition stand - 'Data Mining: a Retail Case Study'	75
Dec '98	MARKET	Unicom Seminar, Olympia, London - Colin Shearer, SPSS, presented 'Applications of Data Mining Techniques in Marketing, Retail, Finance and Insurance Industries.'	60
Feb '99	MARKET	Somerfield presented the results of the Market project to executives across various sectors including transport, financial etc at a seminar organised by Smith Group	25
Mar '99	MARKET	PAC presented the MARKET project at the Data Mining Workshop organised by the Belfast TTN	50 SMEs
Jun '99	MARKET	Simon Metcalfe, business analyst at Somerfield, spoke at the Business Intelligence 99 Conference	50
Apr '99	VIVRE	Articles and conference papers presented at HPCN 99	80
	VIVRE	Articles and conference papers presented at EGVE 99.	50
Mar '98	WIRED	Attended EuroMech Colloquium, Munich	30
Apr '98	WIRED	Exhibited at Hannover Trade Fair	2,000+
May '98	WIRED	Exhibited at MTQ'98, Birmingham	300
Sep '98	WIRED	Attended IEEE Control Applications event, Trieste	100
Oct '98	WIRED	Attended DTI events on FPIV/FPV, London	50
Nov '98	WIRED	Attended CLAWAR '98 1st International Symposium, Brussels	80
Apr '99	WIRED	Attended 'Remote Techniques for Hazardous Environments', London	45
Apr '99	WIRED	Exhibited at British Nuclear Energy Society Conference	100
Apr '99	WIRED	Exhibited again at Hannover Trade Fair	2,000+
May '99	WIRED	Exhibited at Embedded Systems Show, Olympia, London	2,000+
Nov '99	WIRED	CLAWAR Conference	200
Nov '99	WIRED	IST'99, Helsinki	1,000+

## 2.3 Web site

<http://www.it-innovation.soton.ac.uk/escalate/>



ESCALATE's website provides case study descriptions of all its PST projects, as well as general information and definitions of different applications where HPCN can be applied (e.g. CFD, FEA, data mining and embedded systems). It has information and links to all the Industrial Sector Group websites.

## 2.4 Publications & other media coverage

Date	Project	Publication	Headline and Author
Oct '97	VIVRE	Community Clubs News (an EPSRC newsletter)	'Combining Visualization and Virtual Environments'
Dec '97	VIVRE	VR News	Quarter-page description of the project
Dec '97	VIVRE	Scientific Computing World (magazine)	Two-sentence description announcing funding of VIVRE
Dec '97	VIVRE	Environmental Engineering (the magazine for test engineers)	'Interactive Virtual Reality Environment' (feature in their 'In The News' pages)
Dec '97	VIVRE	Eureka - Engineering Materials & Design (magazine)	'Software Access makes it Automatic for the People' (a round-up of hardware and software for designers, mentions VIVRE)
Mar '98	VIVRE	Tessellations (News & Technical Updates from Tessella)	'Visualize with VIVRE' (front page feature)
Mar '98	VIVRE	CLRC website	Page about VIVRE <a href="http://www.dci.clrc.ac.uk/LinearActivity.asp?212">http://www.dci.clrc.ac.uk/LinearActivity.asp?212</a>
Mar '98	VIVRE	Atlas (a CLRC newsletter)	'VIVRE: Visualization through an Interactive Virtual Reality Environment'

Date	Project	Publication	Headline and Author
Mar '98	VIVRE	Scientific Computing World (magazine)	VIVRE mentioned in article 'Graphics tools throw spatial data into relief' by David O'Brien
Apr '98	MARKET	CLUG News (Clementine Users' Group Newsletter)	'Clementine is in the MARKET for European retail solutions'
Apr '98	INDACAR	La vie des agences (a financial magazine)	ICR technologies applied to payment processing [interview with Roland Taillefer, director of UNISYS Finance Division]
Jun '98	MARKET	PriceWaterhouseCoopers website	'MARKET: Somerfield's use of data mining'
Jul '98	MARKET	STRATAGEM (Data Mining News from Clementine)	'Bread Dominoes'
Jul '98	MARKET	DM Review Magazine www.dmreview.com	'Somerfield Stores Generates New Insights with Clementine' (Product Review by Jerry Warren, senior project manager for Somerfield Stores Ltd)
Nov '98	WIRED	Engineering	'Climbing the Walls' by Max Glaskin
Dec '98	DEMOTOOL	Paper accepted for 'Future Generation Computer Systems' Vol. 15	'Predictive Resource Management for Meta-Applications' by N. Floros and others
Dec '98	MARKET	Knowledge Management (www.knowledge-management.co.uk)	'Key players and their products: let's go mining' - within this, Case Study: ISL at Somerfield Stores
Feb '99	WIRED	Engineering	'Mindstorms to Mars' (general article about robots) picture and mention of Robug IV
Apr '99	PACAN-D	Engineering	'A Sound Investment' - Clustering the power of desktop PCs can bring the benefits of finite element analysis and much more to designers - by Max Glaskin
Apr '99	WIRED	ESE (Embedded System Engineering)  ESS Show edition	Three photos of the robot, one on the front cover: "This chap is heading for Olympia too..."
Apr '99	PACAN-D, PERMAS-D, PARACOMP, DEMOTOOL	Paper published in 'HPCN 99 Proceedings' (1999)	'Case Studies of 4 Industrial Meta-Applications' by Tim Cooper
Apr '99	PACAN-D	Paper accepted for 'Sonar Transducers '99' (Birmingham, 19-21 April)	'Applications of High Performance Computing Techniques to Sonar Design' by P. Macey and others
May '99	PACAN-D	Paper accepted for 106th Audio Engineering Society Convention (Munich, 8-11 May)	'HPCN Techniques for Vibroacoustic Analysis' by P. Macey and others

Date	Project	Publication	Headline and Author
May '99	WIRED	Electronics Weekly (magazine and website)	'Braveheart' by Alex Mayhew-Smith
May '99	WIRED	The Daily Telegraph 'Connected' supplement	'Spider with a blowtorch bound for docks' by Max Glaskin
Jun '99	MARKET	'Business Intelligence 99' Conference flyer	'Retail Applications of Data Mining' by Simon Metcalfe, Somerfield Stores
Jun '99	WIRED	Electronics Times (front page) - mentions funding, WIRED, and EU Esprit programme	'Robo-study'
Jun '99	WIRED	Research Bulletin 4 (Uni Portsmouth publication)	'Portsmouth's Walking Robots get WIRED'
Jun '99	PACAN-D	Paper accepted for 'Undersea Defence Technology Europe '99' (Nice, 29 June - 1 July)	'Applications of High Performance Computing Techniques to Analysis of Submerged Structures' by P. Macey and others
Jun '99	PACAN-D	Paper accepted for PDPTA'99 (Las Vegas, 28 June - 1 July)	'An Assessment of MPI Environments for Windows NT' by K. Takeda and others
Jul '99	PACAN-D	Paper accepted for 3rd USENIX Windows NT Symposium (Seattle, July 12-14)	'Porting Legacy Engineering Applications onto Distributed NT Systems' by Nick Allsopp and others
Jul '99	PACAN-D	Paper accepted for 3rd USENIX Windows NT Symposium (Seattle, July 12-14)	'Parallel Computing on Windows NT Clusters' by K. Takeda and others
Aug '99	WIRED	Clawar News	'Robug IV is about to walk!'
Oct '99	VIVRE	Paper given at IEEE Visualization '99 conference, San Francisco	'Putting You in the Picture: Enhancing Visualization with a Virtual Environment' by David Boyd and others
Nov '99	PERMAS-D	Description on the PROSOMA website (www.prosoma.lu)	Parallel PERMAS Deployment
Dec '99	WIRED	PA News Centre (www)	'Robot Can Walk Up Walls'
Dec '99	WIRED	Excite news (www)	'Robot Can Walk Up Walls'
Jan '00	WIRED	Innovation & Technology Transfer	Picture of robot at IST'99
Jan '00	WIRED	New Reporter (Uni Soton publication)	'Robot Technology Tackles Dams & Earthquakes'
Feb '00	WIRED	Computing & Control Engineering Journal	Short article and photo
Feb '00	WIRED	New Electronics (cover story) - 3 page article	'Invasion of the Superbots' - Graham Pitcher
Mar '00	WIRED	IEE Review	'Joint Effort' by Margaret Cecil-Wright
Mar '00	WIRED	BBC1 television: BBC Breakfast News (08.40 a.m.)	Robug IV presented, Paul Gordon (IT Innovation) interviewed

Date	Project	Publication	Headline and Author
Mar '00	WIRED	BBC2 television: Robocritters (21.30 p.m.) - programme about robots based on animal designs	Robug IV and Portech featured for around 5 minutes
Mar '00	WIRED	The News (Portsmouth daily newspaper)	'Got a dirty job that needs to be done? Just call on Robug' - Simon Toft
Mar '00	ESCALATE (PACAN-D + PARACOMP)	Financial Times	'Scheme Boosts Computer Power' - about HPCN TTN Network, mentioned Celestion and Messier- Dowty as beneficiaries
Mar '00	PACAN-D	Journal of Supercomputing  (Paper accepted for special issue on Cluster Computing)	'An Assessment of MPI Environments for Windows NT' - Nick Allsopp
Mar '00	PACAN-D	Paper accepted for the 5th International Conference on Computational Structures Technology, 6-8 September 2000, Leuven, Belgium	'Scalable Performance for the Parallel Vibro Acoustic Analysis of Loudspeakers using Desktop PCs' - Nick Allsopp

## 2.5 Participation in Industrial Sector Groups

Outside its work in the PSTs, ESCALATE's main activity was participation in the TTN Network's Industrial Sector Groups and this occupied a major part of ESCALATE's effort. The activities included producing dissemination material, collaborating with other TTNs, organising and attending events, etc. A summary of our main achievements in these is outlined in Section 3.

## 2.6 Industrial Surveys

### 2.6.1 DEMOTOOL

Two surveys were carried out as part of the DEMOTOOL project:

- A questionnaire survey by Bertin, carried out early in the project to identify target user groups for the TOOLSHED parallel simulation environment;
- A telephone survey by IT Innovation, carried out near the end of the project to assess and promote the readiness of such users to adopt knowledge-based processes

### 2.6.2 Construction

In the first year of its leadership of the Construction Sector Group, ESCALATE commissioned a survey of 100 European organisations in the construction industry, to identify current understanding, use and expectations of HPCN. The data was used to improve our message and to add to our database of contacts.

### 2.6.3 Medical

As part of its contribution to the Medical Sector Group, ESCALATE carried out a survey of organisations involved in telemedicine projects, with a view to establishing synergy where appropriate between telemedicine projects and PSTs in the Medical Sector Group.

### 2.7 Synergy with other TTNs

During the three years' duration of the HPCN TTN Network, ESCALATE enjoyed many conversations with other TTNs in which news was shared, information exchanged and ideas discussed. In addition to that, the following are the most important examples of synergy:

Date	Synergy with other TTNS - Actions
• Oct '97	ESCALATE hosted a meeting in Southampton to discuss best practice low-cost HPCN using PC clustering. Representatives from seven TTNs attended as well as external experts. In November, ESCALATE reported the results at the meeting of all TTNs in Turin
• Feb '98	ESCALATE attended marketing workshop in Amsterdam. Representatives from all 20 TTNs were present
• May '99	ESCALATE co-organised (with TETRAPC) the internal meeting of TTNs in Lisbon
• Oct '99	ESCALATE collaborated with TTNMV-SF and the Network Co-ordinators to prepare a Technical Press Session for the Network meeting in Sitges
• Jan '00	ESCALATE attended Tetramed Global Workshop, organised by TETRAPC, to collaborate with other TTNs and Third Mediterranean Countries in demonstrating example of HPCN TTN Network in set-up of new network

### 2.8 Other actions

#### 2.8.1 TTN Network Press Campaign in the UK and Ireland

This campaign took place in February and March '00. Three TTNs (ESCALATE, ENTICE and ICeTACT) contributed, as well as the Network Co-ordinator, Tony Gore. A PR agency, McCann-Weber was commissioned to lead the campaign on our behalf.

McCann-Weber issued information to over 200 publications and personally approached over 50 journalists including business & technology correspondents on the national and key regional media (including Scotland), technology & business freelancers and key trade press.

- ESCALATE provided synopses of INDACAR, PACAN-D and WIRED for use as appropriate.
- ESCALATE provided input to a press release about WIRED, and helped organise an interview between the end-user, Portech, and the Portsmouth News.

- ESCALATE also assisted in arrangements for Celestion, end-user in the PACAN-D project, to speak to the Sunday Business.
- ESCALATE provided McCann-Weber with additional information about end-users Celestion and Messier-Dowty for an article about the HPCN-TTN Network (based on an interview with Tony Gore) which appeared in the Financial Times on 23 March '00.

### 3 Achievements and outcomes

#### 3.1 At PST level

It is not always apparent, immediately after a project has ended, whether the user partners will revert to how they worked before or whether they will make the necessary effort to fully embrace the new approach. To find out, in March 2000 ESCALATE contacted partners from all its completed projects to ask them what lasting impact they had experienced.

In general, the partners were very positive about the impact of the project and the Network on their businesses. Most had participated in the projects in order to assess the benefits of HPCN first-hand, with a view to future take-up in their core business. All partners reported that they had met this objective to some degree or other.

##### 3.1.1 New HPCN-based products

In two cases (PERMAS-D and INDACAR), the users from the project have now deployed HPCN and are seeing business benefit already, although this has not been quantified by them.

The vendor partners in PERMAS-D and INDACAR now have HPCN-based products and are generating revenue from sales of licences.

Rolf Fischer from Intes (PERMAS-D) said, *"There is now a growing interest in HPCN. PERMAS-D type architectures are being used in industry more and more"*. Meinolf Müller from Intes added, *"Parallel PERMAS is now used across the business"*.

##### 3.1.2 Planned HPCN deployment

In 3 projects (MARKET, WIRED and VIVRE) the users plan to deploy HPCN in the near future.

From MARKET, Somerfield are planning to use data mining to help them target their home delivery service. Jerry Warren from Somerfield said, *"Without MARKET we probably would not have looked at these tools."*

From WIRED, Portech will be using embedded HPCN architectures for future walking/climbing robots.

From VIVRE, both CLRC and BSSI will be producing new tools based on the combination of VR and visualisation explored in the project.

- David Boyd from CLRC said, *"We wouldn't be doing this [new tool development] without the kick-start from VIVRE."*
- Pat Gaffney of BSSI said, *"We have taken the experience from the project and written a commercial product."*

- Jeremy Walton from NAG said, *"The dissemination [in VIVRE] has really boosted NAG's credibility and raised our visualisation profile."*
- Rob Treloar from Unilever said, *"It [VIVRE] was good to Unilever - we learned a lot."*

### 3.1.3 Anticipated HPCN deployment

In another two projects (PACAN-D and PARACOMP) the users in the project are ready to deploy HPCN as soon as there is a commercially-supported product version of the codes demonstrated. In both these cases, as soon as a major client is found by the vendors, they will move to full product versions.

- Simon Roberts from MIRA said, *"We would definitely use it [the PACAN-D software] in a commercial environment if it was supported and tidied up a bit. It is nice and transparent."*
- Julian Wright from Celestion said, *"[PACAN-D] made the benefits of faster execution of the code more obvious. We are now pursuing all routes to increased performance and the [HPCN] technology has sold itself."*

## 3.2 At TTN level - added value of ESCALATE

### 3.2.1 Benefits to PSTs

ESCALATE brought added value to many of its PST partners by making available to them the expertise of the Network as a whole, and by affording them opportunities for gaining a wider audience. This was mainly achieved through participation in the activities of the Industry Sector Groups and in press campaigns.

However, as ESCALATE's main Industry Group contributions were to the Construction Sector Group and the Medical Sector Group (in which we had no PSTs), our PSTs found little or no advantage in these [see Lessons Learned, Section 3.3 below].

### 3.2.2 Benefits to the Network

ESCALATE helped the Network as a whole, not only by making a valuable contribution to the activities of the Industrial Sector Groups but also by contributing to the learning process of all the TTNs.

ESCALATE was often in the forefront at Network meetings. At the meeting of all TTNs in Lisbon, ESCALATE co-organised (with TETRAPC) the internal meeting of TTNs. At the next six-monthly meeting, in Sitges, ESCALATE collaborated with TTNMV-SF and the Network Co-ordinators to prepare a Technical Press Session which helped all the TTNs to prepare for their press campaigns in the coming months.

Although our involvement in Industry Sector Groups brought few advantages to our own PSTs, there were clear business advantages for many of the other TTNs' PSTs in these groups, through our work. For example, our workshops in the Construction Sector Group brought together partners in the Dutch-TTN's CAT project and the Swedish PDC-TTN's 3DEMO project. Each was working with immersive 3D visualisation technology and they were enabled to learn by sharing their experiences.



Another of PDC-TTN's end-users, BrisData (from IDASTAR) reported after a recent visualisation workshop in the UK: *" I met somebody from the 'other' track that was an extremely interesting contact and I will most likely follow this up with another visit. So the trip was definitively worthwhile."*

### **3.2.2.1 Enabling best practice in HPCN solutions**

In 1997, before many of the Network's PST projects were in full flow, some of the TTNs wished to hear others' views on the pros and cons of different methods of clustering PCs, taking into account cost and availability of systems and hardware. Following ESCALATE's meeting in Southampton, in October 1997, where practitioners presented their findings and TTNs asked questions, the TTNs who attended were able to make confident decisions on the best way to proceed in their respective projects.

The participating TTNs were: NOTSOMAD, CEPBA-TTN, HIPERTTN-UPV, DANHIT, ProHPC, ENTICE and ESCALATE. Although ESCALATE did not seek feedback from those TTNs when their projects had finished, we know from our own experience that the meeting was very useful and helped to ensure a successful outcome for PACAN-D, PARACOMP and PERMAS-D.

### **3.2.3 Impact and benefits to industry**

One of ESCALATE's main aims when we started out was to use the TTN Network as a route to address industrial HPCN needs. Addressing issues dictated by 'industry pull' became more difficult as the project progressed and we were directed to focus on promoting the results of the PSTs. However, we did achieve notable success in UK workshops which we organised through the Construction Sector Group. We also made some impact by undertaking industry surveys (e.g. for the Medical Sector Group and the Construction Sector Group) which enabled us to understand the issues and possible barriers to uptake, and this knowledge has been helping us since to speak with some authority when in dialogue with industry.

#### **3.2.3.1 Impact and benefits through the Construction Sector Group**

The workshops that ESCALATE organised in the UK were not only of value to the PSTs invited to speak. There were also business benefits to other speakers and participants, as well as to the co-organisers and/or hosts from industry.

- The workshop for bridge designers (London, November 1998) and the workshop for water engineers (Wallingford, December 1999) were both rated as CPD (Continuing Professional Development) courses by the Institution of Civil Engineers.
- Richard Lonsdale, AEA Technology speaker at the water engineering workshop, commented afterwards that the workshop had been more useful to him in terms of contacts than the UK's most important event for the water industry, the recent IWEX Exhibition.
- At all four UK workshops more than 50% of participants completed questionnaires and feedback overall was very positive. Although the participants had different levels of technical knowledge, nearly all found the presentations were pitched at the right level. All reported that the event was useful, and many had made new business contacts that they intended to follow up afterwards.
- In January '00, through an industry contact made in the Construction Sector Group, ESCALATE was invited to participate in a group discussing information and communications technologies for a consultation document being prepared by the Construction Associate Programme (CAP) of the UK Government's Foresight Initiative. The CAP programme was also

contributing to the work of CRISP (Construction Research & Innovation Strategy Panel), one of the main standing committees of the Construction Industry Board. Although we turned down the offer, due to its requirement for a substantial unfunded commitment, this invitation was a sure sign to us that we had established a name for ourselves in the UK construction industry.

### **3.3 Lessons learned**

#### **3.3.1 Working for the benefit of SMEs**

Although there was a clear and worthy requirement to enable SMEs to benefit from low-cost HPCN, the limited size of the user companies in some of our projects presented difficulties. In some cases, they were keen to deploy the new, HPCN version of a piece of software that had been demonstrated. However, the potential revenue from their small number of licences was not sufficient for the software vendor to invest in commercialisation and support of the software. Had a large organisation been involved, with potential interest in many licences, the business case for the vendor would have been much clearer and thus the SMEs would have benefited from the knock-on.

To address this problem, dissemination needs to target both SMEs and large organisations. If large organisations are exposed to the success stories, they may be able to create the business case to invest and this in turn will provide the business case to the vendors to support HPCN platforms.

#### **3.3.2 The TTN/PST model and the role of the Network**

PSTs got the most value out of the TTN where the host TTN was also a technical partner in the PST. In ESCALATE's case, IT Innovation was not a partner in INDACAR or VIVRE and these projects did not get the best value from the TTN Network.

The TTN itself was a useful mechanism for co-ordinating PST projects and reducing the organisational load on SMEs (especially those with little experience of EC funding). During the course of our PST projects, it was clear to ESCALATE and its PSTs that there was benefit to all from ESCALATE's role as a TTN. It brought the added value of contact brokering, project co-ordination support, and dissemination experience and ideas.

However, in the case of ESCALATE, where there was only one organisation in the TTN (IT Innovation), the TTN brand name - 'ESCALATE' - had no value and just served to confuse dissemination messages. In retrospect, we would have been better advised to use a name that was linked with our own (as did CEPBA-TTN, TTN@GMD, PDC-TTN).

On the other hand, the Network brand - HPCN-TTN Network - did have some value and added some credibility to TTN activities.

Although collaboration between PSTs belonging to different TTNs would have been valuable in cases where the work and objectives were similar, in reality there was very little communication. Sometimes this was because the TTNs got in the way by insisting on being in the loop, when in fact the best approach was often to talk direct to PST partners.

#### **3.3.3 Collaboration through the Network**

Cross-TTN collaboration was effective when it was focused on a specific activity (for example co-organising a workshop) and where there was a direct incentive for the TTN to collaborate (such as gaining new contacts, or disseminating a PST result).

The Network itself worked largely because of the 6-monthly meetings where the TTNs could meet and discuss things face-to-face. It was at these meetings that the most effective TTN collaborations were initiated. In early meetings there was too much competitiveness, so TTNs were not open with each other. As the mood of later meetings relaxed they became more productive.

### **3.3.4 Sector groups**

The best Sector Group leverage was obtained by PSTs attached to TTNs that were members of the relevant Sector Group. ESCALATE was a member of Construction, Medical and FIR, but only one of ESCALATE's PSTs was actually relevant to one of these Groups (MARKET in FIR). This meant that the other PSTs did not get the full benefit of the Sector Groups.

Looking at this from the other point of view, the Sector Groups to which our PSTs would have been relevant did not have the opportunity to benefit from what our PSTs had to offer. (The same problem, in reverse, that the Construction Sector Group experienced with Parallel PHOENICS). This would suggest that the most effective model for a TTN is to have a number of attached PSTs all relevant to one Sector. This would also maximise the cross-PST leverage.

### **3.3.5 How to connect with industry**

During the lifetime of the Network, the TTNs learned much about presentation and methods of targeting the right audience (e.g. at a Marketing Workshop for the TTNs in the first year of the project, and also through practical, working experience). IT Innovation has benefited and will continue to apply methods from the following lessons learned:

- Web focus must be clear, not a mixture of internal and external messages. Industry wants to know what's happening but they don't want to be referred to as 'industry'!
- Talking to people in respected industry bodies and getting their support adds enormous value to activities. ESCALATE used such leverage to good effect in the Construction Sector Group workshops in the UK.
- Attracting business people (as opposed to academics) to events requires a less technical, more dynamic approach in which business benefits are clear.
- Personal invitations have a much higher success rate than impersonal mailshots, though the latter are also an important way to reach a potential audience.
- A dinner for the speakers, preferably the evening before the event, is a very good icebreaker. It always leads to further discussions at the event, and often results in further contact being made after the event.
- While it is natural to assume that a workshop is mainly for the benefit of the delegates, it is often the speakers who get the most business value.
- Workshops and seminars must allow time for speakers and delegates to make business contacts. Break times should never be cut short in order to allow more speakers' times. A buffet lunch, where people can circulate, is better than a sit-down meal.
- Academic students add no value to an industry workshop (though their teachers may be useful delegates if they are leaders in their field). Although students are always very keen to come and learn, and it may be tempting to let them in to swell the numbers (to make the event sound

more successful, on paper), there is more value in achieving a higher ratio of business people - quality, not quantity.

### 3.3.6 Press campaign (UK & Ireland)

Media professionals McCann-Weber were commissioned by the Network (with a service budget contribution from ESCALATE) to conduct the Network's press campaign in the UK and Ireland. Their experience confirmed to us that it is not easy to interest the press in our stories. McCann-Weber reported the following issues:

- HPCN-TTN initiative perceived as very technical;
- Technology pages on national daily newspapers reluctant to cover what they consider a business to business initiative. These publications are aimed firmly at the consumer;
- The timing of the campaign was not ideal as the current project was coming to an end;
- The Robug story, chosen for its consumer appeal, had already received considerable media coverage so was not considered a new story.

In response to these issues, McCann-Weber focused on business correspondents and developed a simplified release focusing on the benefits specifically for SMEs. However, despite the drive to present the material in a non-technical way, the story was still considered too technical and business-to-business focussed for the mainstream national broadsheet and broadcast media.

McCann-Weber considers that when a new round of Technology Transfer projects is launched, there will be considerable scope for an awareness raising PR campaign at the outset, not the conclusion, of the project.

## 4 Exploitation

### 4.1 At PST level

As reported in Section 3, IT Innovation and some of its former project partners are continuing to exploit the results of the PSTs. Papers are still being presented to interested audiences; success stories and reprints of articles in the press are being used by IT Innovation as reference stories in its sales drive to promote its skills to potential new user/clients.

DEMOTOOL	The project partners have a continuing commitment to exploit the results and an exploitation agreement now exists between the key technology owners of TOOLSHED.
INDACAR	A2iA has launched a US subsidiary and will be selling HPCN-based cheque processing solutions in the US and the UK.
PACAN-D	At the time of writing, two papers have yet to be presented to the public.
PERMAS-D	The vendor partners, Intes, now have HPCN-based products and are generating revenue from sales of licences.
VIVRE	Both BSSI and CLRC are to produce new tools based on the combination of VR and visualisation explored in the project. A recently published paper about VIVRE has also helped to raise the profile of participating organisation NAG.
WIRED	At least one new project (ROBOSENSE, for inspection of dams at risk from earthquakes) has resulted from the success of the WIRED robot. Other applications are due to be developed for use in hazardous areas such as minefields and volcano vents. Discussions are underway for commercial climbing robot applications in the shipping industry.

### 4.2 At TTN level

It is envisaged that beyond the end of the ESCALATE project IT Innovation will continue to promote the use of HPCN technologies in a TTN-like manner. IT Innovation's mission is to help its clients and partners to release the potential of their businesses through the creative use of IT. In delivering this mission, we will continue to exploit the success stories, lessons learned and experiences of participating in the HPCN-TTN Network.

It is likely also that IT Innovation will continue to work co-operatively with some of the other TTN-hosting organisations with whom we have developed a valuable working relationship over the last three years.

## 5 Conclusions

The HPCN-TTN Network has been a success. It was a very ambitious activity and nothing like it had been attempted before.

One of the key objectives of ESCALATE and the TTN Network as a whole was to help European SMEs to become more competitive through the uptake of HPCN. In a number of cases this has already happened - with uptake complete and business benefit being delivered. In many more cases it is expected that uptake and business benefit will happen over the next year or two, as a direct result of the TTN Network.

In achieving this success, much has been learned by the TTNs, the PST partners and the Network co-ordinators. The efficiency and effectiveness of engaging with industry has improved dramatically over the life of the Network and these lessons now mean that all the players are well-placed to continue the HPCN technology transfer mission.

These are some of the key lessons:

- the key to technology transfer is bringing the right people together with the right technological solutions to their problems in the right environment;
- sector groups are an effective way of creating a critical mass of relevant success stories and bringing people together;
- businesses in industry need benefit-focused success stories that are relevant to their situation;
- solution providers need some large potential clients to make the business case for significant investment in HPCN solutions. SMEs can then benefit from the knock-on;
- people collaborate effectively when they all have something to gain - not just because they have been paid to work together.

Not all the results have been successes - some activities were terminated early, and some concluded that it is too early for HPCN, but these results demonstrate that HPCN is just starting to move into the mainstream. Had all the projects succeeded in HPCN deployment, it could be argued that there is no need for a technology transfer initiative!

Another success measure for the Network was to achieve European impact and this has certainly happened - the list of newspaper articles, TV appearances, conference papers etc. is growing by the day.

The European Commission has also learned a great deal from the collective experience of the participants in the Network and should be able to apply these lessons in future funding programmes aimed at European SMEs.

Perhaps the Network outcomes can be summed up by Rolf Fischer's comment about the impact of PERMAS-D on Intes: *"There is now a growing interest in HPCN. PERMAS-D type architectures are being used in industry more and more"*. The HPCN-TTN Network has played a significant role in generating this growing interest and enabling this uptake.

## 6 Information about the TTN

### 6.1 Contact details

ESCALATE had just one participating organisation, the IT Innovation Centre, which is an autonomous unit of the University of Southampton.

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Chilworth Science Park  
Southampton  
SO16 7NP

Tel: +44 23 8076 0834  
Fax: +44 23 8076 0833

E-mail: [ttn@it-innovation.soton.ac.uk](mailto:ttn@it-innovation.soton.ac.uk)

Website: <http://www.it-innovation.soton.ac.uk/escalate/>

### 6.2 Project duration and budget

ESCALATE had a duration of three years. It began on 1 April 1997 and ended on 31 March 2000.

The total global cost, for ESCALATE and the nine PSTs, was approximately 3,839,000 Euros, of which the EU provided funding of around two-thirds (i.e. 2,518,300 Euros).

For ESCALATE alone the global costs were approximately 476,800 Euros, all of it funded by the EU.

END of MAIN REPORT of ESCALATE TTN

To accompany this report:

**Annex I - Final Report of Construction Sector Group**

**Annex II - Final Report of Medical Sector Group**