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2. Executive Summary

A summary page (non-confidential) in a form suitable for publication should give the most significant aspects which describe the project: objectives, clear description of the results, their usefulness and possible applications and indications on the exploitation plans. This page will be used to update your current record in CORDIS.

SIMTAG aimed to improve the safety, security and efficiency of intermodal transport. Its objectives were to demonstrate that these improvements were compatible with commercial efficiency; that standards could be adopted, provided sufficient commercial benefits existed to encourage development and take-up; that commercial solutions could be made available and globally effective through existing cost-effective technologies; that new, commercially-viable technologies could be exploited; and that commercial confidentiality and competition could be maintained whilst introducing new standards, process and technology.

Having identified through the early project work that the security, safety and efficiency of intermodal freight transport were being compromised by the fragmentation of systems and processes and by the misalignment (both in physical terms and in time) of container location and documentation relating to the cargo, the Consortium changed its focus from the development of “BlackBoxes” to gather data from the container, to management of the data through a web portal. The scientific and technical results of the project, therefore, reflected this change of focus.

The Consortium devised a web-enabled Portal, including core services (essential to the control of what SIMTAG itself offers) and added-value services (provided by selected third parties, accessible through the Portal and appropriate to particular cargo movements). The stand-alone result embodied in the Portal was supported by subsidiary results, namely: a high-level requirement specification for the SIMTAG system; version 1 of the Portal developed for use in Demonstrator 1; version 2 of the Portal, with increased functionality beyond that in Portal version 1, developed for use in Demonstrator 2; the functional Portal architecture; and an XML Schema used during the second demonstrator as an interface between the Savi Transportation Security System (a web-based application providing on-line tracking, security monitoring and management of cargo containers and their contents and other assets at nodal points in the transit) and the SIMTAG system to register or update Journey Plans automatically in the SIMTAG system on the basis of information passed to it from the Savi system. It was only in the last leg of the journey in the Africa to Tilbury transits, when the Savi system ended, that SIMTAG operated on its own and addressed the “last mile” from Tilbury on the Thames estuary to Hornsey in north London.

The SIMTAG project has also produced a supply chain model, incorporating a risk model; a specialised remote telematics device certificated for use in ATEX Zone 1 explosion-risk environments; and the platform for launch of a commercial product – the SIMTAG Portal.

The principal result of the project, the SIMTAG Portal and its associated methodology and services, will have wide use in the freight transport industry. Its underlying methodology, based on a Registered Journey Plan for each container being shipped,

includes an Event Log (through which to monitor and record any deviations from the Plan as to location, security-seal status, temperature or other selected attributes such as can be monitored through track-and-trace services) and a strongly practicable process for alerting and facilitating emergency response.

These features will enable manufacturers, shippers, freight forwarders, freight integrators, transport operators, warehousemen and depot operators, consignees, emergency services and insurers to gain very significant benefits. The reduction or elimination of the need to re-key data relating to the cargo during the course of a movement will result in large and cumulative cost savings to the benefit of all parties in the supply chain. The accessibility of services specialising in hazardous cargoes (as to their characteristics, proper handling requirements, clean-up guidance and risk alerts), together with information about the exact location and status of the cargo through the SIMTAG Portal, will enable authorised emergency services to make more informed choices as to how to deal with, for example, a chemical spillage, thereby providing greatly improved protection to local communities and the environment.

SIMTAG also emerged as a useful compliance tool in relation to many major international initiatives; for example, the Container Security Initiative, the 24-Hour Advance Manifest Rule and Customs – Trade Partnership Against Terrorism. There exists a clear synergy between SIMTAG and work undertaken by the Work Customs Organizations’s Task Force on Security and Facilitation of the International Trade Supply Chain which focuses on security elements such as physical security, access control, personnel security, procedural security, documentation processing security, trading partner security, and crisis management and disaster recovery. All these areas are directly relevant to SIMTAG’s activities.

As to the SIMTAG Portal’s applicability for extended use in the freight transport industry, whilst chemical tank containers were used in Demonstrator 1 and reefer containers and dry containers (or boxes) were used during Demonstrator 2, the Portal might also be used to register journeys involving other logistics units. Such units might include swopbodies; truck semi-trailers and trailers; railway wagons; or any transport/logistics unit that could be discretely identified, numbered and tracked.

One of the principal reasons for creating an XML interface was to demonstrate SIMTAG’s capability to take data feeds from a third-party system. The potential application thereafter would be to take data feeds from company Enterprise Resource Planning or logistics systems to create Journey Plans within SIMTAG.

The SIMTAG Supply Chain Model, which incorporates an innovative risk model, is a program setting out the various stages in an intermodal supply chain to enable risk mapping. The supply chain model provided the framework which allowed the standardisation of the recording and notation of supply chain stages and, as such, will be used on an ongoing basis during the commercialisation phase of SIMTAG and possibly beyond. The Supply Chain Model was developed for use in the intermodal freight transport industry and could easily be adapted for use in all industry sectors.

The telematics device used in Demonstrator 1 was designed and developed as no suitable devices were available “off-the-shelf” that would meet the stringent requirements of use

in hazardous/explosive environments, such as those existing in the BP chemical plant in Lavera. As such it would be used by the European and global chemical transportation industry who need to transport chemicals into and out of chemical plants. The Consortium does not see any other applications for which the telematics device could be used.

The SIMTAG Portal is being commercialised and will be launched through a new company, Intermode Services Limited. This company has been formed by members of the SIMTAG Consortium. Its window for exploitation has been recognised as narrow, if it is to take advantage of the current lack of apparent competitors. Intermode Services Limited has already made exciting progress in confidential discussions with a number of service providers, starting with track-and-trace, emergency response, hazardous goods and insurance applications and involving global functionality. The prospect is for SIMTAG's commercial Portal and associated activities to go live in the next few months.

The external exploitation potential for the other project results could be somewhat limited. The Supply Chain Model will continue to be used within Intermode Services Limited but there are currently no plans by the Consortium to exploit it externally. The telematics unit was built specifically for the purpose of complying with ATEX Zone 1 requirements for Demonstrator 1. These requirements are specific to the tank container market and not representative of general intermodal transport safety. Various issues related to the telematics unit were raised by Consortium members, such as cost, battery power duration, size, weight and attractiveness to thieves, but none of these issues was deemed to be insoluble. A decision was made by the Consortium that further development of the telematics unit would not take place during the course of the project. There is commercial exploitation potential for the telematics unit which may well be addressed during the commercialisation phase of SIMTAG, particularly as and when the chemical transport industry is targeted.

The evolution of SIMTAG is proving of real interest to national, regional and international agencies mandated with responsibilities (and the concomitant costs and resourcing issues) of safeguarding and enhancing the security and safety of intermodal cargo movements. At the same time as SIMTAG has been encouraged by the positive response of some of the world's largest logistics groups, it has also demonstrated its capability to bring real benefits to small and medium-sized enterprises and to countries whose import and export trade is not in the immediate future likely to be able to include or monitor electronic devices fitted to containers.

Intermode Services Limited therefore stands to exploit the results of the SIMTAG project effort in a closely-focused manner and is being brought to market energetically in a truly global context. Thereby, SIMTAG will be seen as having been able to assist in accelerating the expansion of intermodal cargo transport and to enable parties who have hitherto held back from developing it or using it to have much greater confidence in the cost-effective efficiency and reliable benefits such transport can deliver. Hence, SIMTAG will have contributed to modal shift and many of the other policy priorities in the EC White Paper: European transport policy for 2010: time to decide (COM (2001) 370). It will have increased European competitiveness in global markets and enhanced the economics and well-being of European businesses and the community.

3. Objectives of the Project

The overall aim of the SIMTAG project has been to improve the safety, security and efficiency practices of intermodal freight transportation and, in particular, for the carriage of dangerous goods and those that may be vulnerable to interference from criminals or terrorists.

The objectives of the SIMTAG project were to demonstrate that:

- effective security and safety in intermodal transport are compatible with commercial efficiency;
- adoption of standards is possible, provided sufficient commercial benefits exist to encourage development and take-up;
- technologies exist at an appropriate cost for commercial solutions to be made available that are effective globally;
- approaches can be developed for the exploitation of new technologies that are commercially viable; and
- commercial confidentiality and competition can be maintained whilst introducing new standards, process and technology.

The original focus of the project had been set towards the development of “BlackBoxes” which, at the time of proposal preparation, had been available in the market for management of transport assets, rather than for the cargo they carried. SIMTAG originally saw this as a serious omission as, in many cases, particularly for road-, barge- and train-based movements, the cargo carried was generally more valuable than the transport assets involved and could also be intrinsically more dangerous and in greater need of tracking and control.

The Consortium’s initial research, however, altered the project’s focus towards visibility and connectivity of the intermodal journey and the provision of services via a web portal. This change of focus came about as a result of the emergence elsewhere of a broad range of technologies capable of fulfilling the BlackBox role in many sectors of the intermodal process. Even though there was already a wide range of telematics devices in the market to gather data on container movements, the Consortium came to realise that what was missing was a system to manage that data and thereby provide added value to the intermodal supply chain.

The Consortium’s methodology for attaining the above objectives to increase safety, security and efficiency in the supply chain, therefore, changed from developing BlackBoxes for gathering data to developing and bringing to market a Web Portal to manage the data and through which third-party services could be accessed.

4. Scientific and Technical Description of the Results

This section is the main part of the report and comprises different technical chapters covering the research approach and the work performed under the project and highlighting the main results achieved. Tables, figures or charts should be used where appropriate.

In setting out to achieve SIMTAG's objectives to improve safety, security and efficiency in intermodal freight transportation, it was necessary for the Consortium to gauge the current status of such activities. To do this, we undertook a field-based data gathering exercise of background information, a task which was huge in scope and which needed to be more finely delineated to make it more manageable. To assist in this endeavour, the Consortium drew up an initial project-specific glossary of terms and acronyms so that, even as a Consortium, we were working with an agreed set of definitions.

The main results achieved and key developments and changes made during the project are set in textual boxes which have been greyed out.

4.1 Research Methodology

4.1.1 Corridor Assessment

Our initial points of study were the two original demonstrators. The first corridor was intermodal and vertically-integrated and, as such, the Consortium envisaged it would demonstrate good practices. This corridor, known as SIMTAG Demonstrator 1, involved the carriage of polyisobutylene (PIB) from BP's chemical manufacturing plant at Lavera, near Marseilles for discharge in Hull.

The second corridor (as planned) involved a closely-integrated and long-standing logistical partnership between Crompton NV and ICL, involving cargoes of liquid silicon in drums, manufactured at a chemical plant in Antwerp and loaded onto the weekly ICL container ship for carriage to Richmond, Virginia.

In March 2003 the Consortium had the opportunity to study both these corridors in detail on site. The Consortium gained detailed insight into safety, security and efficiency aspects; interviewed personnel involved face-to-face; gathered actual and exemplar documentation; and were able to draw numerous conclusions which the Consortium bore in mind on a confidential basis as to the way further interviews would be conducted with other parties in our research study.

The initial corridor assessment opportunities greatly assisted the Consortium in designing and building its approach to the two demonstrators.

4.1.2 Questionnaires and Interviews

The Consortium designed two styles of questionnaires:

- a short, web-enabled questionnaire available for access on the SIMTAG website www.simtag.org; and

- a SIMTAG Interview Document which was used for face-to-face interviews with key companies, trade associations and public sector agencies (and which was also completed independently by some in these categories whom we were not able to meet on a face-to-face basis).

The response to the web-enabled questionnaire was disappointing, despite the best endeavours of the European Shippers' Council to encourage its membership of some 1,400 companies to assist us by completing it. Other trade associations, notably CLECAT, FEPOR, ECSA and the FTA, were in dialogue with us for the same purpose.

In contrast, the SIMTAG Interview Document, which included open-ended questions to enable respondents to talk freely about their experiences of intermodal freight transportation, proved to be capable of yielding interesting data and opinion. We overcame initial reluctance on the part of many of the parties approached, based on their intensive work schedule, their reluctance to answer questions or give interviews, and in some cases their reluctance to share information with others in their industry.

We approached 52 parties seeking either a face-to-face interview or completion of at least the SIMTAG Interview Document. Of these, 9 failed to respond and 24 declined, leaving 19 interviews completed. The Interview Document, which had five sections, was designed to maintain an even balance between enquiries as to safety, security and efficiency aspects of intermodal transport.

In Section 1 it provided the opportunity for the Consortium to:

- gather broad statistical information of company locations, numbers of transport movements and transport assets owned or leased;
- identify a listing of the principal activities of interviewees, their typical supply chains, the extent of their activities across the range of UN cargo-type classification as to dangerous goods;
- assess the spread of different transport modes utilised by interviewees and the reasons for their selection of such modes to assess the use of intermodal transport;
- ascertain the principal methods of exchanging information with other parties involved in the supply chain, drawing out practice, aspiration and attitudes regarding the use of telematic applications; and
- assess opinion on the visibility of cargo, real-time linkage of cargo and related documentation and the extent to which technology succeeds in integrating, accelerating, making consistent and securing international supply chains and cargo flows.

In Section 2 to:

- gather views as to the highest areas of risk and inconsistency in transport operations, set in a sequential grid of supply chain stages and addressing safety, security and cost-efficiency risks by reference to standards, people/processes and information support and systems;
- facilitate response and discussion as to the success or otherwise of industry initiatives over the last few years to improve safety, security and operations; and

- identify why some regulatory change had been criticised for the manner of its implementation, just as some had been commended.

In Section 3 to:

- gather responses from interviewees to stark questions as to why safety sometimes becomes compromised in intermodal transport; and
- provide opportunity for interviewees to describe what they considered would be the most important safety improvements and what the EU and other international bodies should bear in mind in preparing legislation, regulation and guidance, and as to regulatory bodies, in the enforcement of regulation.

In Section 4 to:

- gather responses to similarly searching questions as to how security is dealt with in intermodal transport and how risks can be minimised.

In Section 5 to:

- determine the fundamental impediments to efficient operation in the supply chain and the best ways in which they might be addressed.

The Interview Document proved to be a very useful tool to elicit wide-ranging and interesting commentary from respondents from industry. It highlighted the dilemma that the more detail people have about the cargoes being carried, the more this provides criminals or terrorists with a better opportunity to intervene with malicious intent in the supply chain. There is widespread unease about increased risks from the inevitable use of spot markets for container procurement and booking/handling of cargoes and from problems connected with sub-contracting.

The results of these interviews provided the Consortium with sufficient material to make a statement of existing safety, security and efficiency standards and procedures which can be found in Deliverable 1a “Report on current practices, procedures, equipment, services and incidents, identifying weaknesses, regulatory and legislative requirements” dated 27 May 2003.

The initial market survey also covered legislation; historical trends; formal responsibilities and obligations by government or other agencies in the safe and efficient management of the cargo/supply chain flows; existing safety and security standards for personnel; and technology used in tracking, monitoring and ensuring efficient movement. A useful by-product of the research was the initial gathering of cost data, such as was available, to assist the Consortium in identifying systems that were cost-effective and to provide the opportunity to determine where the trade-off lies between corporate expenditure to underpin a range of new processes and to buy in new technology and the gains in efficiency, safety and security in global supply chains.

A high level of focus was given in the survey to the transportation of hazardous goods, not with the intention of concentrating on a single category of cargo to the exclusion of others and not to concentrate on the larger players in the industry to the exclusion of the small and medium-sized enterprises but with a view to providing a benchmark of good practice to which all actors, large and small alike, might aspire.

The Consortium's data gathering also gave an insight into a wide range of topics identified as "Other Important Issues", some of which would not remain a continuing focus of SIMTAG but which did indicate the need for further action by, for example, the SIT Thematic Network, the EC and industry at large. These issues were, in fact, handed over to the SIT Thematic Network in July 2003 to be included, as and to the extent to which they were relevant to their cluster work.

The survey revealed a pattern which assisted the Consortium to shape its further work in the project. The aim henceforth would be to identify areas where a significant difference could be made to efficiency and risk reduction. The focus would be to concentrate on process and information discontinuity in the supply chain and to address the detail and timeliness of information gathering and management.

4.1.3 A Framework to Record the Stages in the Supply Chain

Throughout our initial research it became necessary to be able to record how the supply chain operated currently and to predict what the characteristics would be after the application of the SIMTAG proposals and technology.

A supply chain model was developed to assist in:

- codification of the complex processes in the supply chain, thereby allowing a common language to describe its current working and recommendations for change to process, administration, operation and data;
- provision of a basis for "bench testing" proposals and recommendations;
- provision of an underpinning standard for the calculation of risk;
- definition of common approaches (scenarios) that allow the number of variables to be reduced, simplifying the problem of assessment; and
- development of a referenceable baseline for future work.

4.2 Deficiency of Intermodal Data/Statistics

The Consortium found that, even after further in-depth research to obtain as much relevant (and especially Europe-wide) data on intermodal transport accidents and associated costs as possible, there must indeed have been a widespread deficiency in the existence of this information, as it had proved impossible to identify many additional sources of such information, even in our extended survey.

A principal finding as a result of the Consortium's initial research, in-depth interviews and detailed consideration of intermodal supply chains led to the pivotal recognition that security, safety and efficiency of intermodal (i.e. containerised) freight transport were being crucially held back by misalignment and lack of synchronicity between the cargo and the documentation (whether paper-based and/or electronic) relating to it.

4.3 Ongoing Research

Our continued research focused on further assessment and mapping of risks in the intermodal supply chain and examination of options for change and approaches to risk mitigation. This was largely a desk-based exercise using the contextual information gathered during the market survey and the supply chain model developed during our early

work and described in detail in Deliverable 1b “Standard supply chain model for information and physical goods flows”, dated 27 May 2003.

The major priority during this phase of our work was to address the overriding need for the geographical, synchronous and comprehensive alignment between the container and its cargo and the information relating to it as it moves along its end-to-end transit from manufacturer to end user. Having identified the major risks, the Consortium then looked at the options for change, including the drivers for change and the level at which options for change should be sought. The Consortium’s findings led towards possible commercial solutions, technology functionalities and systems architecture.

It was at this early stage in the project that the Consortium was able to look towards successful early commercialisation of improvements to the supply chain, rather than reliance on potential regulatory change. The Consortium decided that henceforth decisions on scope, functionality and approach would be based ultimately on the likelihood of adoption in the supply chain within a reasonable time. The project was then committed, with the European Commission’s approval, to promote the commercially viable over the mere technically feasible.

The fragmentation of process, systems information, services and geography which characterise intermodal transits led the Consortium to conclude that the most effective way of improving safety, security and efficiency in the supply chain would be through a web portal solution for the benefit of small, as well as global, players.

Technology options were researched and the decision was made by the Consortium that, whilst the proposed SIMTAG solutions would work alongside innovative US government initiatives introduced post 9/11, they would have components that could and would operate independently of other systems. There was a wide variety of technology that could be applied at the container and cargo level; the varied functionality of technology types and process solutions to identified risks were driven by:

- the nature of the perceived threat;
- the value and intrinsic danger of the cargo; and/or
- the type of container, flow and geography.

Varied functionality brought with it various benefits and drawbacks, requiring different applications in different sectors. “On container” technologies were an important component in providing greater information visibility and continuity but, in isolation, they were essentially a micro option for change.

The cost implications for a web portal would be broadly based on the individual costs of the services provided through the portal, with minimal additional overheads. The Consortium did not attempt at this stage to evaluate the cost/benefit of individual service provision and regulatory compliance but identified this as a key component of take-up in a commercialised product.

SIMTAG would respond to the key requirements of safe, secure and efficient intermodal transportation by providing information visibility and connectivity and by the provision of linked services through a web portal. SIMTAG would provide exception monitoring and

would produce alerts when activities went off track and provide beneficial conditions for forensic intervention and analysis. These functionalities looked set to provide the key components of successful journey planning and co-ordination for the intermodal supply chain. At that stage of our research, the Consortium became convinced that the development of a web portal constituted the only technical and commercially feasible solution to achieve the project's objectives. Accordingly, the SIMTAG Consortium altered its focus towards visibility and connectivity of the intermodal journey and provision of services via the SIMTAG Web Portal rather than the development of so-called BlackBoxes.

To meet the criteria of commercial viability, the SIMTAG focus needed to be on systems, data and processes that offered improved supply chain efficiency, where clear connections were demonstrated to both industry-wide and local safety and security initiatives. This would present some challenges to the focus of systems and their design:

- **Fragmentation and potentially diverse requirements** – The, as yet incomplete, state of governmental initiatives on security and the local nature of the individual company initiatives required that proposals be both flexible in their functionality (by geography and user) and capable of significant change over time.
- **Emerging demands** – The requirements of feasibility and the potential market, particularly as to security, were initially unclear. The project focus needed to allow for an early market entry with some services to generate revenue but with the ability to change functionality, underlying technology and suppliers of key services over time.
- **Absence of standards** – Standards do not exist for much of what would be proposed; whilst international bodies were working on the establishment of them, this would take time. The project focus needed to include the means of facilitating efficient, safe and secure trade in this environment, variously translating, connecting and allowing exchange of data between trading parties across the standards divide.
- **Independence** – It was evident from the early work in the project that an attempt to introduce a service or solution based on a single supplier, a single technology or a single point of management would not be successful. Commercial take-up was possible only with explicit choice in service provision, supplier of technology and management. The project had to focus on finding an economic model which allowed revenue to be generated from the creation and implementation of a multi-vendor system allowing competition and, crucially, reducing the need to adopt a single technical standard or supplier ahead of the emergence of any perceived market standard.
- **Leveraging existing work** – Much work had been done by service providers, transport companies, cargo owners and technology companies to build individual pieces of the overall solutions required. Setting out with a commercial proposition that required SIMTAG to persuade these companies to abandon this investment would be an insurmountable hurdle, particularly since competing across a wide range of functionality would be a high-risk strategy. The focus had, therefore, to include the ability to integrate and connect existing solutions, preserve customers' existing investment and "join up" point solutions between trading parties.

- **Speed to market** – It was clear that considerable sums were being spent and management effort was being focused across the world on point solutions. A window of opportunity existed to provide coherence (at a technical level) and the vision (at a supply chain level) for their integration. It was essential that the SIMTAG focus included bringing the initial concept – even if in its simplest form – to practical reality early.

SIMTAG's focus had to be one of improved connectivity, standards translation and provision of easy access to services – whether existing through current providers or new-built by SIMTAG or others. This should take as its overriding aim the joining up of existing provision (whether hardware, software or management services) to provide visibility and system connectivity across the parties involved in the intermodal supply chain. The primary drivers of the project, as highlighted above, all suggested that the development of a proprietary, monolithic solution or one that depended on the development of specific new technologies or hardware was unlikely to be successful.

Our research had concluded that the major supply chain risk to efficiency, safety and security was in the area of information discontinuity: the inability to monitor and confirm that a container in transit and the information relating to it were routed, handled and kept secure in accordance with a plan defined pre-transit. In separate research, the Smart and Secure Tradelanes (SST) initiative reached similar conclusions¹.

A unique Registered Journey Plan was designed, to be the basis for enabling each movement involving one container so registered with SIMTAG to benefit from selected, high-quality services which would directly enhance the security, safety and efficiency of the transit.

Once an intermodal movement had been identified, a Journey Plan would be registered within SIMTAG and the events that took place in the course of delivery, as the execution of the Plan progressed, would be logged against that Plan. Documentation necessary for a movement would, similarly, be linked to the Plan. By this means the information necessary to execute a Plan; to recover from failure; and to manage events efficiently would be available in a timely way to those who needed it. The concepts of the “Event Log” and of access to SIMTAG, via secure forms of user authorisation and authentication, would facilitate integration of information provision relating to prospective or actual cargo movement. From this, far more efficient and speedy planning of intermodal transport, ordering, processing, invoicing, insuring, compliance and emergency response could become really effective prospects in the freight transport industry.

4.4 Initial User Feedback

Useful feedback from potential industry users was gained at workshops held in Teesside (23 September 2003) and Antwerp (2 October 2003). Security was covered at length at both workshops. The general consensus was that the difficulties with security emanate equally from inbound and outbound movements (to a plant). These particularly arise from

¹ SST White Paper, May 2003 and presentations at the International Port Security Symposium 20 May 2003, Rotterdam and European Supply Chain Summit 2003, Luzern.

an absence of appropriate paperwork supporting the movement, whether as to the authentication of tank content, the credentials of the driver or those of the vehicle. Devices which detected abnormal events that could lead to security infringement should be capable of forwarding data to the SIMTAG service.

There was a strong focus at the Teesside workshop related to a major concern that information was unavailable at the scene of an incident. Ideally, users would want to know which vehicle was involved; what the incident was; what response should be made, given the cargo type; and to have immediate access to the relevant manufacturer or specialist adviser.

There was also discussion centred on the different roles in organising and delivering a supply chain movement and the differing value that would be created by the SIMTAG service for each of these role types. Whilst value was identified in each of the following areas, it was recognised that the value would be different for each:

- Brand protection for the manufacturer.
- Market entry support for 3PL start-ups.
- “Connectivity” for container operators arranging transport and trying to maximise utilisation of their equipment.

Participants at both workshops agreed that there was a severe shortage of truck drivers in intermodal transport and that there was pressure on costs all the way through the supply chain. Authentication of people (particularly drivers) in the supply chain was a recurring theme, current practicalities in this respect being seen as a principal cause of both safety lapses and degraded efficiency.

No clear consensus emerged about which data and which data standards (for codification or transmission) should be adopted, reinforcing the project view that in this area a combination of flexibility in dealing with the existing mechanisms and innovation in defining structures is needed.

Business rules that codify the ability to create, update or view data by cargo flow would be essential and in a multi-actor, multi-mode transit simple solutions to this apparently complex problem must be devised. By way of example, the notion of an electronic “door-to-door CMR” was welcomed, but acknowledged as difficult to achieve.

No apparent concern was expressed at the holding of data “in common” in a third-party environment, provided appropriate controls were placed on access. This attitude – that corporate data need not reside on corporate premises – illustrated the significant shift in perception that had taken place over the last ten years, aided by the Internet, on-line activities and a changing culture.

Discussion regarding the “push” versus “pull” models for data ranged widely and provided insight into several aspects of opportunity. The conclusion of the discussion was that it differed by class of information – with event monitoring and alerts of specific events such as “push” processes – SIMTAG sending data to a wide range of devices and systems when predefined business rules were contravened or specific events encountered. In all other areas, data access should be by “pull” i.e. at the time and in a form that is

under the control of the recipient. The abilities of SIMTAG to identify the exception from the norm and to be specific and precise about the data supplied were seen to be key measures of success.

Elemica (a leading global network for chemical buying, selling and supply chain management) was raised as a model for the many message platforms that SIMTAG would need to use and/or with which to become interoperable. The general drive within the workshops was for a solution to be delivered that was simple and focused towards efficiency gains.

Focus on how to pay for the services led to lively discussion and the consensus was to pay-as-you-use mechanisms with perhaps a small registration fee as a way to get the offering off the ground. It was seen to be essential that a “member shipper” could, as part of his membership, enlist supply chain actors down the chain, even if they were not members, for any registered transit for the purpose of recording data for that transit. This was essential to the fast take-up of SIMTAG and for early adopters to get value. The general consensus was that “the money was there; it was just not in the right place” to pay for the service and for the supply chain as a whole to benefit.

Primary benefits were seen as:

- reducing paper-based transactions;
- identification of vulnerabilities;
- process simplification;
- standardisation – information, processes and assets;
- process variation; and
- demurrage/quay rent reduction.

Consequential benefits were identified as:

- facilitating modal shift;
- information access/visibility/brand etc.;
- reducing container idle time, thereby improving security and asset utilisation;
- impacts of missing and late information; and
- the cost of delay.

Reduction in paper-based transactions was also seen as a bonus of the SIMTAG system, along with an accelerated proof of delivery (POD) system to get the cash into the right people’s pockets as quickly as possible. One participant had already invested a significant sum into a bespoke tracing system and order-processing environment. Notwithstanding this, he was supportive of a transporter-neutral (i.e. independent) provision of service such as SIMTAG and saw the connection between the two through the SIMTAG “service provider concept” as a means of extending benefit.

A number of other opportunities were identified during the course of the workshops for the SIMTAG project team to consider, including:

- demurrage (quay rent) systems to identify specifically idle time at chargeable locations such as ports and rail heads;

- certificate of analysis for chemical movements – availability to customer and forwarder;
- connection to driver passport schemes and build-up of a driver history function (similar to the physical location history currently envisaged);
- safety bulletin systems;
- connectivity with specific truck counter-theft organisations;
- links to yard management systems;
- links to specific initiatives in industry led by CEFIC and ECTA; and
- creation of a single electronic envelope to “wrap” non-standard data and still manage the dissemination.

The summary of high-level findings included:

- the proposed services were seen to be of value;
- considerable difficulty was anticipated with take-up – largely resulting from discontinuity between who pays and who benefits, together with the industry’s small margins, but such services would be necessary - in other words this is not a question of “if” but “when”;
- different parties in the supply chain had very different interests and the system needed to reflect this in a “tailored view”;
- there was general acceptance that the technology would work; and
- there were areas of real benefit that the SIMTAG project team had not yet identified or defined.

The participants of the workshops also advocated that simpler and more precise ways of describing how SIMTAG worked needed to be found, to enable the sale of the services and to encourage take-up.

By testing its own research and by discussion with industry experts, the Consortium highlighted many direct economic losses and enhanced risks in the present system which could be redressed using SIMTAG methodology. As a result of industry feedback, further refinement was made to the outline Technology Review developed during the early project work in order to make it a stand-alone document for discussion with suppliers. This document contains the Consortium’s recommendations for new systems and processes and was published as the High-level Requirement Specification for the SIMTAG System.

At this stage the Consortium looked at the initial requirements for the two demonstrators to inform their design, build and verification. Evaluation and validation of the data gathered during the demonstrators to provide a clear understanding and measurement of the benefits accruing to the supply chain as a whole and to individual stakeholders in particular would form a crucial element of SIMTAG’s business planning. The Consortium also believed that including a virtual corridor would be beneficial in the second demonstrator phase.

4.5 Demonstrator 1

The SIMTAG Portal Version 1 was used for Demonstrator 1 and was developed entirely in-house by TRI-MEX. It included the Journey Registration and Event Log, cataloguing the changes in activities to the original Journey Plan. Third-party services were linked, including asset monitoring and hazardous goods information and document management.

The key issues set to be addressed in Demonstrator 1 (outlined in Section 4.1.1 of this report) included:

- making data and process more coherent;
- providing timely data on the cargo and its location and movements;
- the means of exchanging meaningful information between supply chain actors; and
- the language and mechanism for end-to-end planning across multiple parties.

The key elements of Demonstrator 1 included:

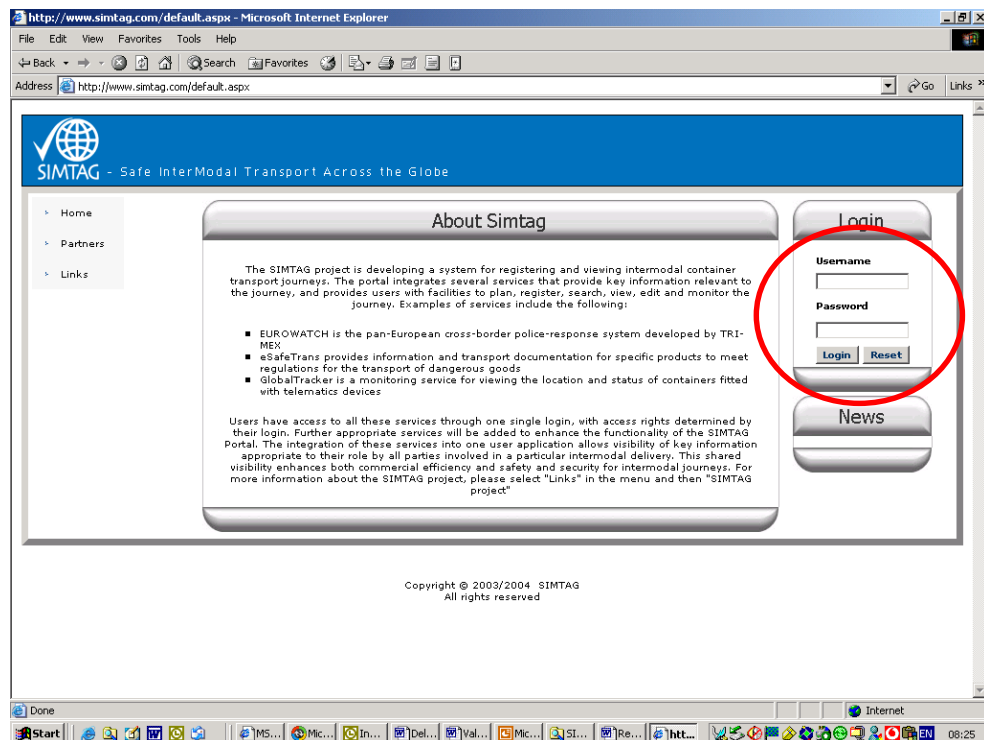
- development and implementation of the SIMTAG Web Portal;
- development and implementation of the Journey Registration and Publishing/Viewing application;
- integration of external services, including asset monitoring, incident response and safety intelligence; and
- a telematics device approved for use in ATEX Zone 1 environments.

A Validation Plan for Demonstrator 1 focused on the validation of the results of this corridor. The Consortium had managed the first demonstrator as a technical proof of concept, the results of which would feed into further development of the Portal, and a “pre-production” version to be evaluated in Demonstrator 2. The Validation Plan concentrated principally on the technical assessment of the SIMTAG solution as applied in the first demonstrator and was used as the basis for results measurement and analysis on which the Evaluation Report (Deliverable 5.1 (restricted) and 5.2 (public)) were produced. Demonstrator 1 dealt with technical and user acceptance assessment and, to a degree, impact assessment. It did not focus on other types of assessment, such as financial, legal, market (although the user needs assessment would feed into the market assessment) or socio-economic assessments as these would be addressed in the second demonstrator.

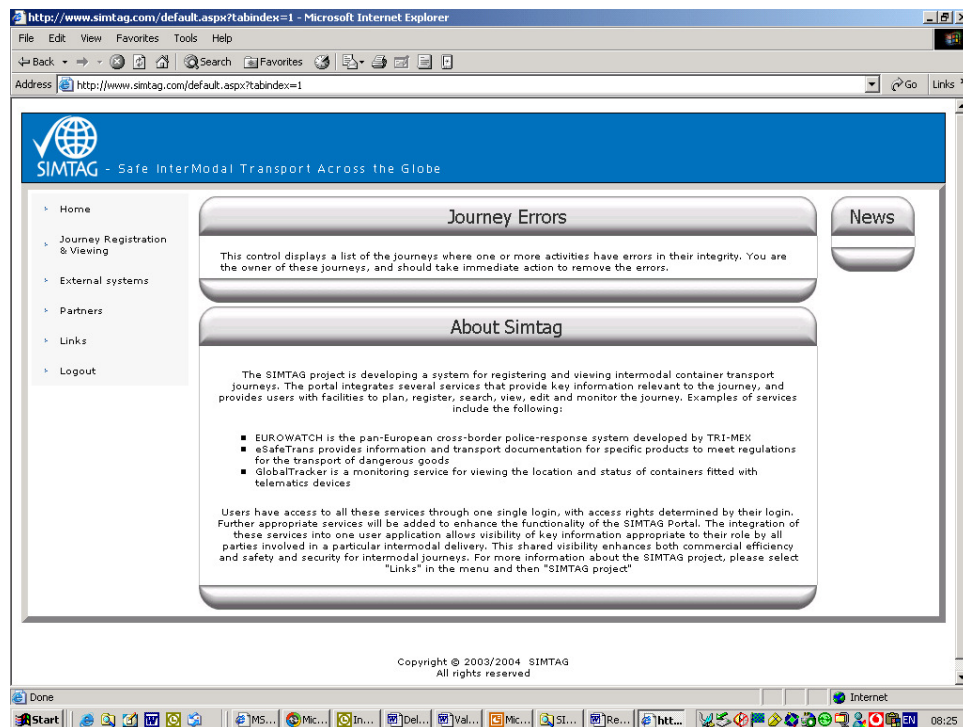
The URL for the SIMTAG Web Portal is www.simtag.com. This is where users can sign into the Portal to access the range of services brought together by SIMTAG. One of the key purposes of the Web Portal is the login and authentication of users, and so the first step a user must take before he/she can access the Portal is to enter a valid username and password. Usernames and passwords are allocated and maintained by TRI-MEX on behalf of the Consortium.

Visitors to the SIMTAG website who do not have a username and password can obviously not access the site, but they can see information related to the project, including

a link to the project website (www.simtag.org) and links to the Consortium members' individual websites.



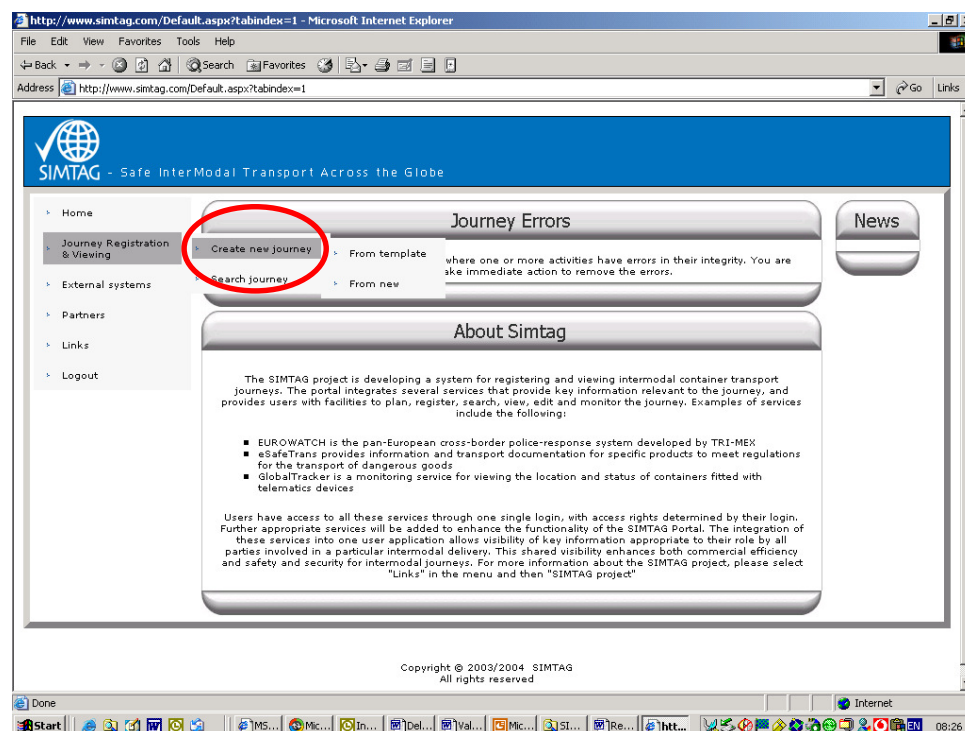
On logging into the website, the user will arrive at the user's tailored home screen. This screen is customised to the user and the relevant access permissions from his/her login.



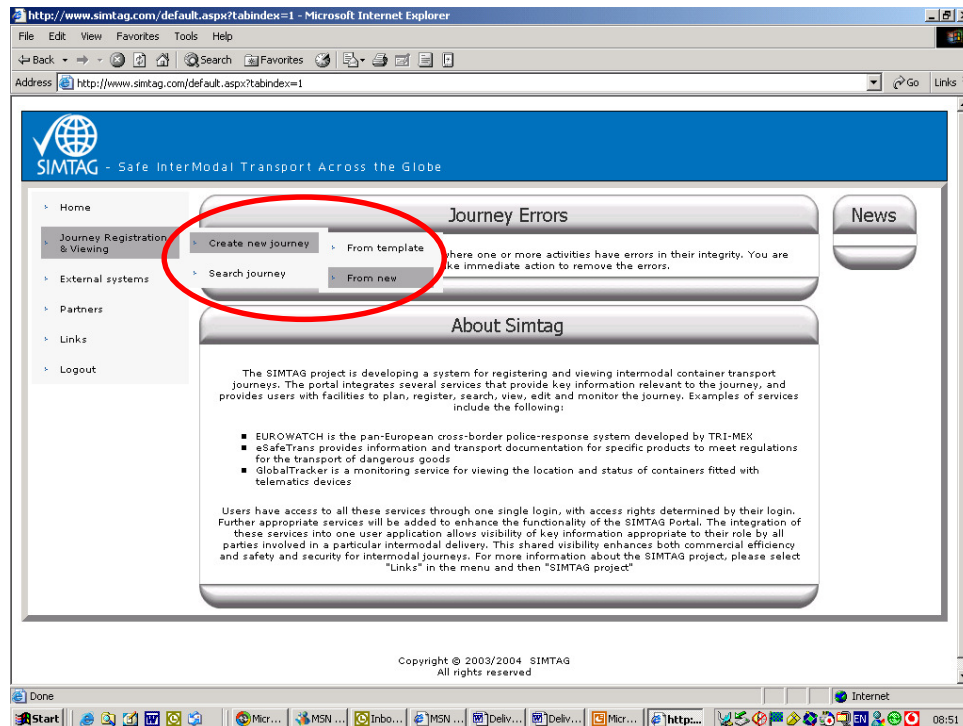
Key elements displayed on the user home screen include:

- a menu outlining the range of options and services available to users;
- a Journey error “portlet” that highlights to users immediately on sign-on any Journeys that are in progress where an integrity issue has arisen due to a re-scheduling of an Activity in the Journey. Only Journeys in which the user is involved as either Journey Owner or Actor are listed. This provides an immediate warning activity, prompting action to be taken, thus minimising disruption in the supply chain and improving efficiency;
- the menu structure is such that moving the mouse pointer over a menu item will open up a sub-menu of the options available; and
- additional portlets are provided to include other relevant items such as News, Frequently Asked Questions etc.. Portlets can be set by the user, so that different users see different portlets and services.

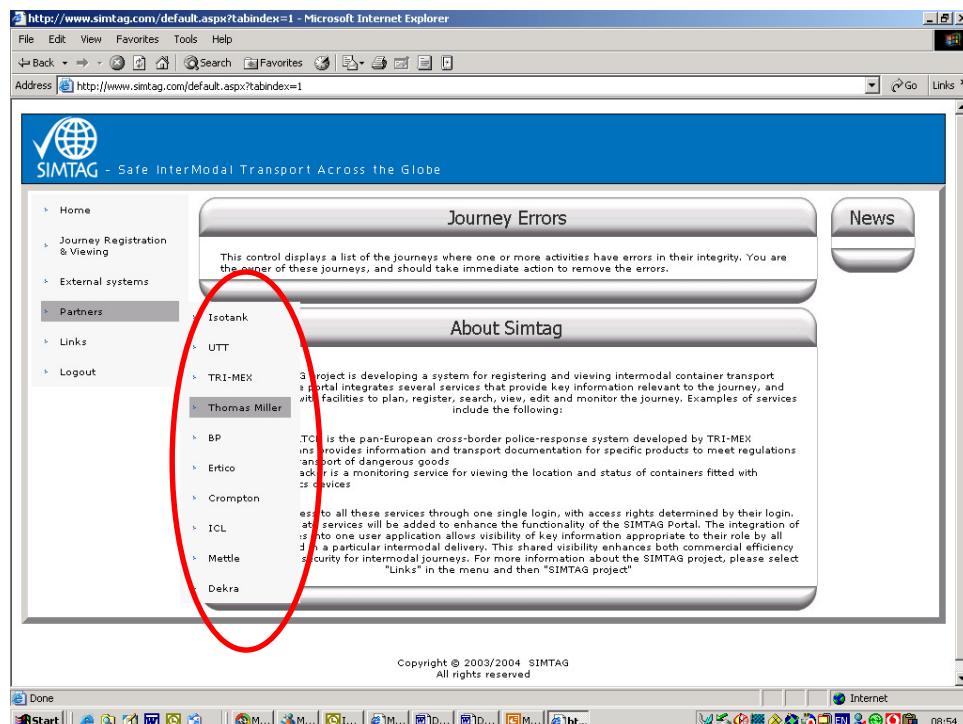
One of the key menu links is to the Journey Registration and Publishing application. If the user has the relevant permissions, he/she can create a new Journey Plan or search for existing Journey Plans by selecting the relevant option from the Journey Registration and Viewing menu option.



Selecting “Create new journey”, in turn, opens up two new options, to “Create from new” or “Create from template”. This demonstrates the hierarchical nature of the Portal menu system. By selecting “Create from template”, the user can create a Journey Plan more efficiently by using standard templates or by selecting a previous Journey to use as a base template.

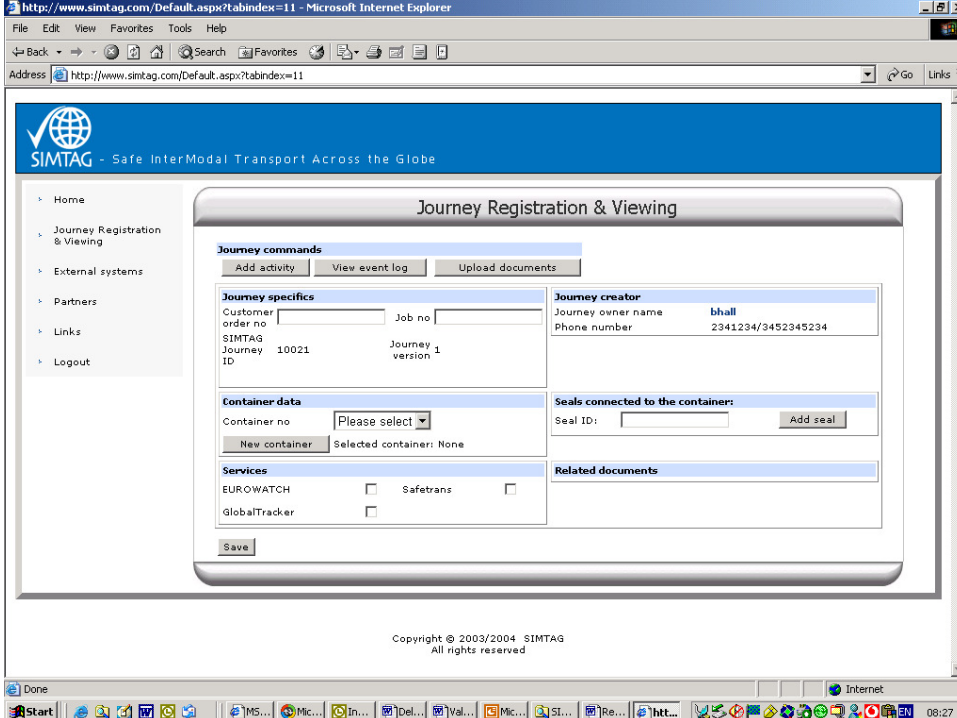


The Portal provides links to relevant websites, including those of the Consortium members.



Only authorised users have access to the SIMTAG Portal and only authorised users can access the Journey Registration and Publishing application. Authorised users can, subject to their assigned permissions:

- create new Journeys for which they will then be the Journey Owner;
- view Journeys for which they are either the Journey Owner or an Actor of an Activity within the Journey;
- update Journeys, including Activities, for which they are the Journey Owner; and
- update Activities within a Journey if they are either the Journey Owner or an Actor for the said Activity.



The screenshot shows a web browser window displaying the SIMTAG application. The address bar shows the URL: <http://www.simtag.com/Default.aspx?tabindex=11>. The page title is "SIMTAG - Safe InterModal Transport Across the Globe". The main content area is titled "Journey Registration & Viewing" and contains several sections:

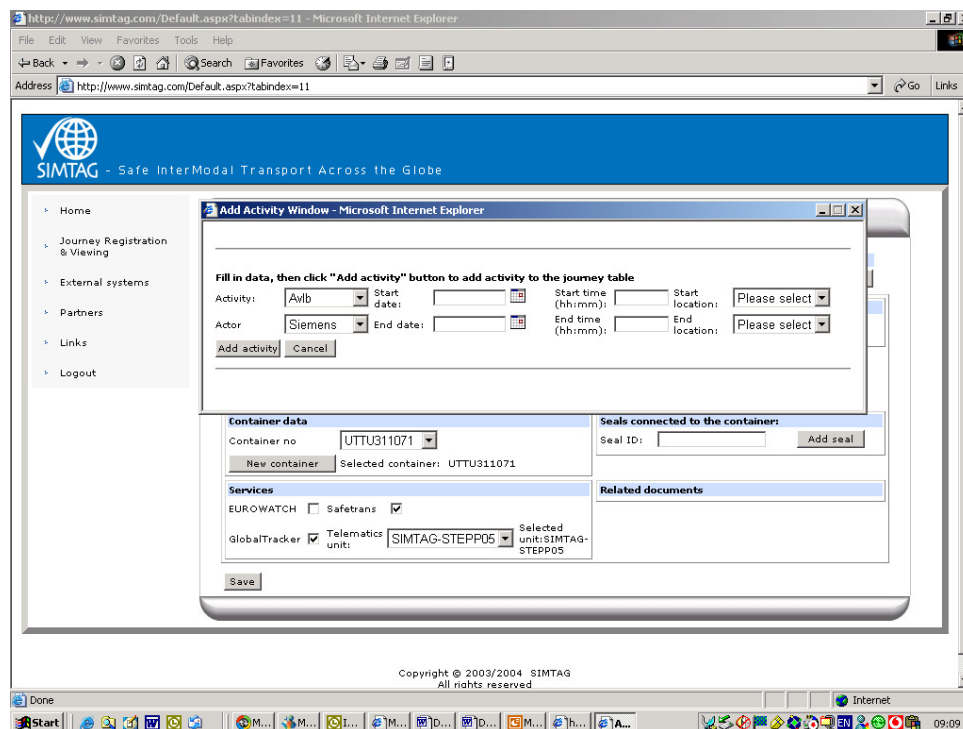
- Journey commands:** Includes buttons for "Add activity", "View event log", and "Upload documents".
- Journey specifics:** Fields for "Customer order no", "Job no", "SIMTAG Journey ID", and "Journey version".
- Journey creator:** Fields for "Journey owner name" (bhall) and "Phone number" (2341234/3452345234).
- Container data:** A "Container no" dropdown menu (set to "Please select"), a "New container" button, and a "Selected container: None" label.
- Services:** Checkboxes for "EUROWATCH", "GlobalTracker", and "Safetrans".
- Seals connected to the container:** A "Seal ID:" field and an "Add seal" button.
- Related documents:** A section for managing documents.

A "Save" button is located at the bottom of the form. The footer of the page reads: "Copyright © 2003/2004 SIMTAG All rights reserved".

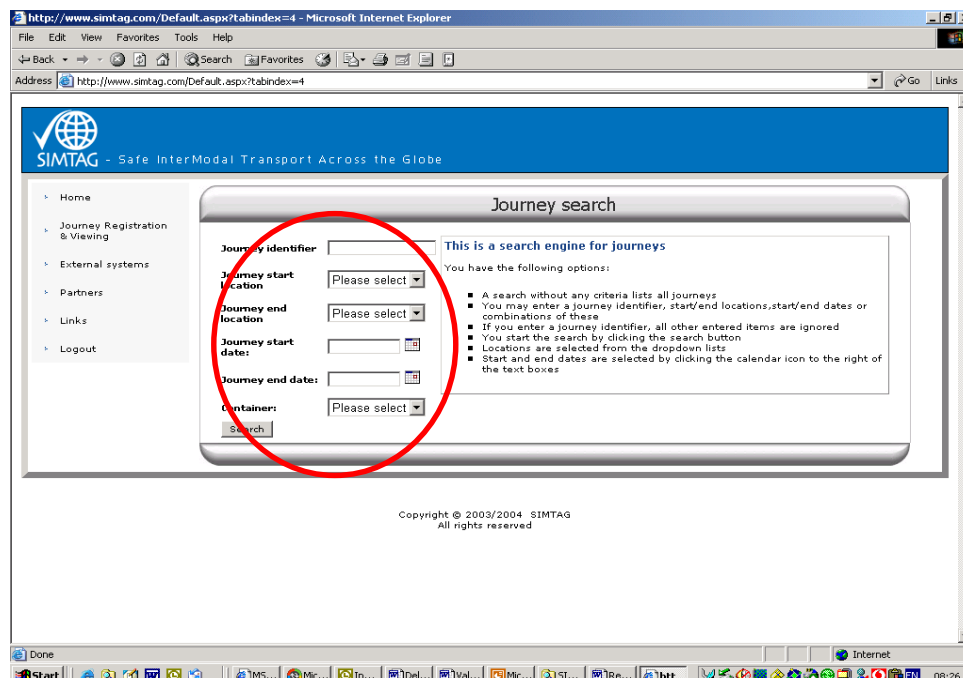
Once a core Journey Plan has been saved, Activities can be added to the Journey Plan. In order to enter an Activity, the user must enter:

- the Activity (selected from a list) – e.g. haul, load, wash etc.;
- the Actor – i.e. who is responsible for the Activity. The Actor is selected from a list;
- projected start date and end date for the Activity; and
- start location (node) and end location (node) for the Activity.

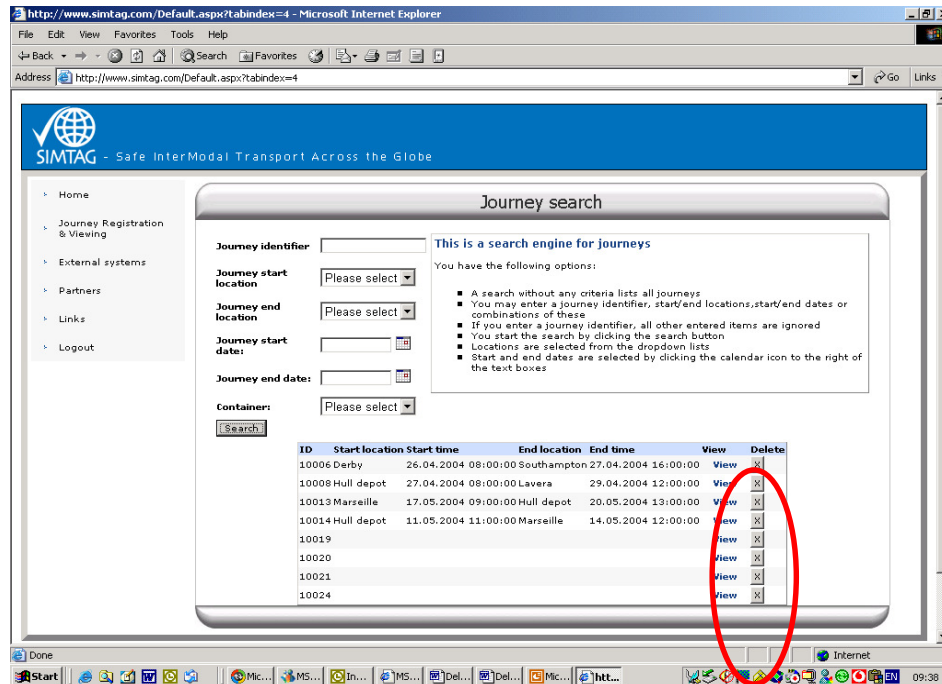
A Journey can obviously be made up of several Activities. Once the first Activity has been entered, the user must select a predecessor for each subsequent Activity. This will set the start time and location automatically for the subsequent Activity. An integrity is enforced to ensure that succeeding Activities start at a time and location in line with the end time and location of the preceding Activity.



A user can search for existing Journeys by selecting the “Search” option from the Journey Registration menu, and then entering a range of search criteria. Users can only view Journeys with which they are associated either as Journey Owner or as an Actor for an Activity within the Journey Plan.



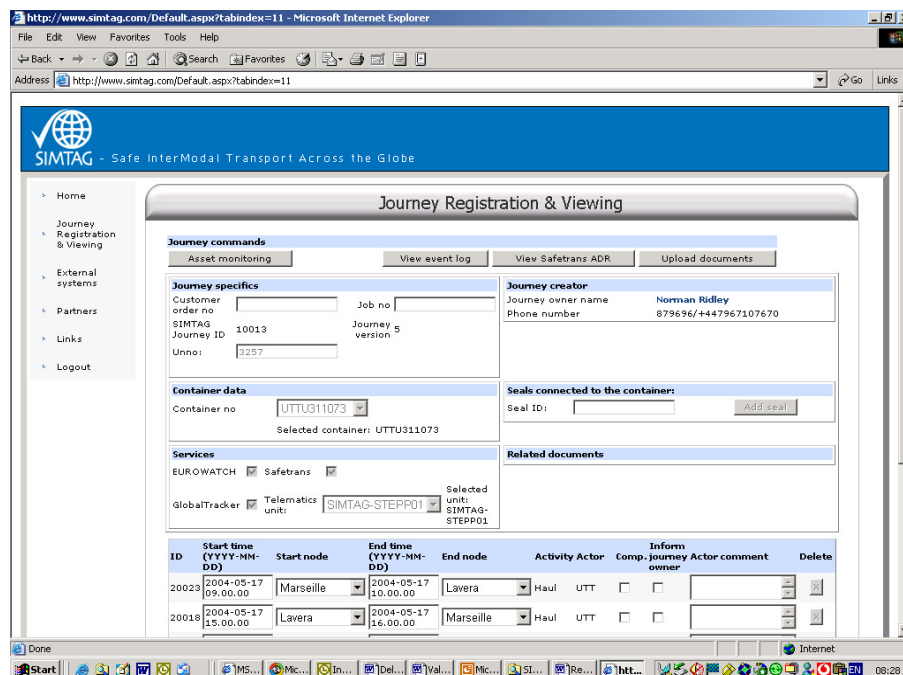
All Journeys matching the search criteria are displayed and the user can select the Journey he/she wants. If no search criteria are entered, the user will be able to select from all Journeys with which he/she is associated.



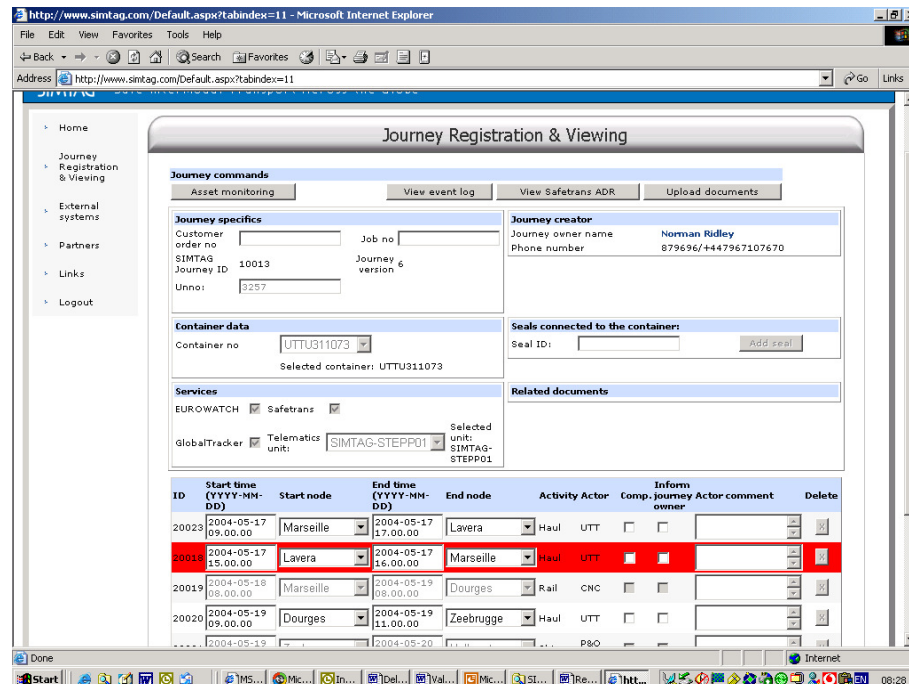
On selecting a Journey, the user is taken to the Journey Plan for that individual Journey. The user can then only amend items when he/she has the relevant permissions:

- A Journey Owner can update any part of the Journey Plan, including Activities.
- An Actor can only amend Activities for which he/she is the Actor.

Any items which cannot be amended by the user are greyed out.



Any Activities within the Plan that require review are highlighted in red. This will have resulted from a change in a previous Activity which has caused a breach in the integrity rules related to either the start time or start date of the highlighted Activity. It may be, for example, that the end time for the preceding Activity has been changed to a later time, and therefore the start time for the succeeding Activity must be amended accordingly. Activity changes will cascade through the Journey until the integrity is re-established.



A staged mock incident took place during the Consortium Meeting in Brussels on 27 April 2004. The mock incident was designed to demonstrate the link between the SIMTAG Web Portal; the GlobalTracker asset monitoring service; the eSafeTrans safety intelligence information; and the EUROWATCH incident response service. The mock incident simulated a terrorist attack in the United Kingdom on a Danish-owned truck and Danish driver, carrying a load of dangerous chemical (urea nitrate, UNNO: 1357). The total time for the mock incident from start to finish was in the order of 15 minutes. The mock incident is reported in detail in Deliverable 5.1 Demonstrator 1: Evaluation Report (restricted).

Activities undertaken in the demonstrator were recorded in the supply chain model and were used explicitly to infer security benefits. Analysis of the corridor and results indicated that extrapolation from one benefit to another across the three categories of security, safety and efficiency is entirely appropriate.

- **Emergency response and simulated incident and the EUROWATCH link to emergency services including police** – the incident trigger and response process applied to security, safety and efficiency. The specific responses and responders would differ in each case, defined by the business rules built into the Journey Registration.

- **Journey management and route registration** - Registration of a Journey, with the responsible party, timing and route, together with the response business rules, applies to all categories of benefit.
- **Availability of documentation and on-line data** – the demonstrator included the uploading of documentation related to safety and supply chain efficiency (access to safety documentation and management documentation). The absence of specific security documentation in the corridor did not represent an absence of benefit, since the processes of data recording and emergency response which were tested and recorded were identical for security documentation and allowed the Consortium to extrapolate security benefits in the model.
- **Asset tracking and monitoring** – asset tracking and monitoring were undertaken for supply chain efficiency and product quality purposes. The technical installation that was tested and the telemetry recorded were equally applicable across all benefit categories and the assumption in the supply chain model of a security sensor (such as a door open detector) in place of the temperature sensor was a reasonable extrapolation.
- **Remote telematics device** – the remote telematics device, whilst built for safety and efficiency purposes, employed a set of capabilities that were equally applicable to security. Further work would be required on the form, packaging and management to deliver the different benefits, and the requirements for these would be considered in future project research.

The specific supply chain used for the first demonstrator from Lavera to Hull was successfully documented and captured in the form of the supply chain model. The data was used to assess the wider supply chain benefits and define the priorities for the solution functionality of Demonstrator 2. The supply chain model provided a framework to allow a more informed view of costs, benefits and target functionality to be developed.

The first demonstrator was able to meet all the goals set for its operation in the Validation Plan and the criteria that were set for assessment of success of the demonstrator.

Objective	Delivered	Evidence
Near-continuous availability and correct function of the Portal platform	Yes	<p>We experienced no periods of unavailability of the Web Portal during the demonstrator. There were some minor issues with users gaining access, caused primarily by the use of incorrect logins. These issues were quickly resolved.</p> <p>By providing the services over the Internet, service delivery can be guaranteed with very high rates of availability. Appropriate security, back-up and disaster planning would ensure a commercial model with availability rates in excess of 99.5%.</p>

Objective	Delivered	Evidence
Near-continuous availability and correct function of asset telematics	Yes	During the demonstrator we experienced near-continuous availability of the telematics device. When the device was not available, this was due primarily to batteries requiring recharging, and to some initial training and process issues. Once these items were resolved, the availability improved to acceptable levels (>99%).
Near-continuous availability and correct function of communications systems	Yes	We experienced no difficulties whatsoever in communications during the demonstrator.
Demonstration of agreed key-event linkage between two or more provider services	Yes	We demonstrated continuously through the demonstrator the linkage between a variety of services. Most notably, we demonstrated a constant linkage between the Journey Registration and Viewing application and the asset monitoring service of GlobalTracker. During the mock incident, we demonstrated a very effective linkage between the SIMTAG Web Portal; the Journey Registration and Viewing application; the GlobalTracker asset monitoring service; and the EUROWATCH incident response service.
Successful and timely provision of hazardous goods intelligence and planning services	Yes	We demonstrated the availability of safety intelligence through the linkage to the eSafeTrans website.
Successful timely intervention and response in a staged security and hazardous goods incident	Yes	We demonstrated a successful incident response during the Consortium Meeting on 27 April 2004. This mock incident was a clear demonstration of how the improved systems, tools and procedures of SIMTAG would operate in a real, live incident.
Provision of increased visibility and integration of the supply chain process at a cost that makes commercial sense to the shipper and carrier	Yes	The SIMTAG Portal and the associated services have clearly demonstrated improved visibility in terms of the location and condition of the intermodal shipments. A view of the costs and benefits was developed in WP6 (Organise and Publish Interim Findings). There was clear anecdotal evidence from the relevant Consortium Members that not only could the improved systems, procedures and tools be implemented in a cost-effective manner, but that there are significant cost benefits to be gained from the implementation that would, in fact, more than outweigh the costs of implementation.

Objective	Delivered	Evidence
Secure and timely provision of automated documentation processes	Yes	Delivered through secure document upload and download, in parallel with existing paper processes, to provide real-time access to authorised parties, irrespective of geography or of transit stage.

Table 1: Demonstrator 1 Achievement of Objectives

A User Guide and an Installation Guide for the telematics unit were also produced. Data created during the trial was automatically logged into the system for subsequent analysis and use. Individual written user logs were not created for Demonstrator 1 for the following reasons:

- Data on timing and activity during the first demonstrator would not represent the potential production version data and its impact, due to the fact that the existing processes were being undertaken simultaneously with the new SIMTAG processes – timing and activity being constrained by the latter.
- The activity data that would be recorded in the user logs was also available in the recording activities (paper and systems) of the existing processes, from where it could be extracted if required by the Consortium.

A working session with representatives of the principal Consortium partners was held at the premises of Isotank to gain information and feedback about the qualitative aspects of the trial. Using a workshop, rather than interview, format allowed effective prioritisation of the issues and benefits, and generated consensus suggestions for improvements. The user assessment meeting focused on three aspects of the demonstrator:

- operation of the demonstrator with respect to the functionality of the technology and Portal and its ability to meet the operational requirements;
- prioritisation of the issues and enhancements to be addressed prior to Demonstrator 2; and
- the steps needed to begin the commercialisation work.

The Consortium felt that Demonstrator 1 had been successful in proving that the new systems, procedures and tools identified in the project's early research work to improve safety, security and efficiency could be successfully developed and implemented in a cost-effective manner. Demonstrator 1 had essentially been a proof of concept. Sufficient knowledge and experience was, however, gained to inform the design development and operation of the second demonstrator and to begin the process of refining the functional and commercial opportunities for such a service.

4.6 Interim Findings

The analysis and results of the first demonstrator provided the basic feedstock for the development of the project's interim findings. This work took place sixteen months into the project and, as far as the preliminary research work was concerned, marked the virtual mid-point in the project's development.

The work undertaken during this phase included: recording in the supply chain model of costs and benefits information arising from the flow of cargo in the first demonstrator; consideration of documentation of the target (production) functionality for the systems and tools necessary to support the benefits case and to be used in the pre-production corridor; provision of commentary on the extent of the changes necessary in regulations, standards and operation to achieve the benefits, in conjunction with the SIT Thematic Network; the compilation of statements of the possibilities and impact of harmonisation; production of an outline plan for commercial application and wider take-up; and preparation of a list of unresolved issues and process for resolution.

In order to obtain a representative sample of transits from the first demonstrator, the Consortium decided to extend its run through to the end of June and into July 2004. This extension turned out to be very useful in respect of additional and beneficial user feedback. Early indicators of users' views on SIMTAG showed:

- the advantage and prospective cost savings of earlier and better predictability of container location;
- real-time alerts to enable effective response to temperature changes of cargo; and
- substantial improvement in personnel deployments along the supply chain through reducing or eliminating the need for repeated information.

The Consortium also undertook a brief survey of projects dealing with other modes, principally rail, including:

- CESAR: an intermodal project of three intermodal operators: Kombiverkehr, Hupac and Cemat (which included information requirements for intermodal transport);
- TEDIM: a group of projects including: (i) RailCom: electronic waybill exchange between Russian and Finnish Railways; and (ii) RailTrack: the Finnish tracking and tracing system RailTrace;
- CROBIT: a project for a corridor-related information system; and
- ORPHEUS: a project to introduce electronic CIMs (the document for the International Carriage of Freight by rail, introduced by COTIF, the Convention Concerning International Carriage by Rail).

The intermodal aspects and interconnection between operators of the different modes, whilst recognised as important, are still embryonic in development.

In addition to demonstrating the inter-connectivity of other forms of technology to the SIMTAG Portal, the Consortium enhanced the range and functionality of services available through the SIMTAG Portal to include:

- moving from a home-built Portal to a commercially available Web Portal tool, providing additional functionality;
- user security and authentication;
- enhanced user maintenance of foundation data, such as locations and assets; and
- enhancements at activity level within a Journey Plan to allow concurrent activities; reporting on efficient use of assets, idle times etc.; and critical path analysis.

The completion of Demonstrator 1, the feedback from users and the opportunity to look at SIMTAG in the context of the intermodal freight transport industry and the supply chain generally gave the Consortium enough information to start outline planning for commercial application and wider take-up. This meant that the Consortium would need to look at the users' expectations of SIMTAG and how SIMTAG could fulfil those expectations. Future activities included:

- further work on aggregation of data to be collated by industry sector and geography so as to build a model of the issues and key targets for exploitation;
- further work on business modelling and development of the plans for market entry and exploitation, designed to reduce the early capital expenditure and maximise early benefits;
- developments of take-up checklists or pre-requisites for start-up to assist implementation, including:
 - systems compliance;
 - transport asset configuration;
 - data standards and compliance;
 - emergency authority coverage;
 - standard simplified model to assist individual operators to assess costs and benefits; and
 - standardised implementation plan for tailoring user by user.
- preparation of promotion materials, including “push” Internet marketing of the opportunities, contact details and interactive materials to aid understanding and take-up;
- submission of proposals for modification of standards to the appropriate international standard-setting bodies (if previous work had identified such a need);
- preparation of a Marketing Plan to target potential customers; and
- identifying and enlisting further partners appropriate to the exploitation of the services, systems and tools which might include:
 - insurance companies;
 - transport asset equipment manufacturers;
 - application software companies;
 - telecommunications companies; and
 - major primary material producers.

User feedback proved extremely beneficial. The SIMTAG Portal was regarded as user-friendly; reliable; provided a good fit with existing business process; avoided the need to re-key data, thus avoiding mistakes and saving time; and avoided the need for personnel

to monitor and change temperature of the tank containers by actually going to the quayside and undertaking those tasks, as they could be done remotely through SIMTAG. The Consortium was also able to determine what areas of improvement were necessary including:

- proof of Delivery (POD) would be simple through the SIMTAG system. This could accelerate and automate the link to invoicing, with an obvious and important benefit to cash flow;
- the Portal would enable a paperless system to be operated which would help to increase the efficiency of the system and reduce overall costs in the long run; and
- it was important to ensure that the use of the SIMTAG Portal be properly focused.

Software requirements were identified; for example:

- current access was “Pull”, not “Push”;
- currently only free-form documents could be attached to the Portal; and
- data ownership issues needed to be resolved. It would be necessary to determine who owned the data; this had a bearing on data security.

Unresolved issues were also identified, as also was the process for resolution. A particular legal aspect which was highlighted by the Consortium was the need to use electronic documentation and for that documentation to be legally accepted. Discussions with Bolero, a company which pioneered the challenge to create a paperless international trading environment, starting with electronic bills of lading, are ongoing to seek an appropriate solution for global acceptability in this regard.

Based on the experience gained from Demonstrator 1, the Consortium was able to finalise its approach to Demonstrator 2, which would include the use of technology that was closer to production reality. The greater ability to flex the business process involved and the more predictable transits would assist in gathering more detailed, useable data from the second demonstrator.

The Consortium had aimed to seek out the commercial imperative which would drive the take-up of SIMTAG without having to rely on the implementation of new legislation. The Portal was, however, not being developed in ignorance of what was happening on the legislative front and the work undertaken in this work package helped us to take stock of exactly where SIMTAG was in relation to current and impending changes in regulations, standards and operation.

SIMTAG was emerging as a useful compliance tool in relation to many major international initiatives; for example, the Container Security Initiative, the 24-Hour Advance Manifest Rule and Customs – Trade Partnership Against Terrorism. There existed clear synergy between SIMTAG and work being undertaken by the World Customs Organization’s Task Force on Security and Facilitation of the International Trade Supply Chain which was focusing on security elements such as physical security, access control, personnel security, procedural security, documentation processing security, trading partner security, and crisis management and disaster recovery. All these areas are directly relevant to SIMTAG’s activities.

4.7 Demonstrator 2

The purchase of the Organosilicons Division of Crompton NV by General Electric meant that the original second demonstrator, as planned and as described in Section 4.1.1 of this report, was no longer possible. A period of intensive discussions with Savi Technology, Inc. resulted in an agreement between Savi and TRI-MEX that SIMTAG would collaborate with Savi on a high-profile strategic demonstrator sponsored by the US Trade Development Agency (USTDA), the Namibia Port Authority (Namport) and the South African Port Operations (SAPO), as part of the Smart and Secure Tradelanes (SST) for Africa Feasibility Study, managed by Savi. The South-West Africa to Tilbury, UK corridor evolved with two alternative routes, identified as corridors 2a and 2b. This collaboration successfully illustrated the ability to accept data through an XML interface from a third-party system. That enabled SIMTAG to create from such data a Journey Plan within the SIMTAG Portal and thereby extend the manageability of the supply chain being monitored by such a third-party system, by giving full end-to-end visibility in the supply chain.

Demonstrator 2, therefore, had two parts: the Africa to UK trial (in collaboration with Savi Technology, Inc.), including corridors 2a and 2b in which location and security technology was fitted on dry refrigerated containers; and the UK to Hong Kong trial consisting of corridor 3 (in collaboration with the Bernard Group, a global freight management and logistics solutions company), in which the benefits of using the SIMTAG Portal without any on-asset technology were also being evaluated.

Corridors 2a and 2b involved the carriage of chilled/frozen meat from Namibia via Cape Town to Tilbury, UK for distribution to final consignee. The corridors ran respectively from Windhoek and Okahandja via Cape Town, then by ship to Tilbury. There was in each corridor a final road leg to the Ecco Cold Store at Hornsey in north London which was not covered by the Savi Transportation Security System (Savi TSS). Shipment monitoring started from 25 October 2004 and ran through to mid-December.

Corridor 2a ran by road from Okahandja to Namport Terminal, Walvis Bay, in Namibia, then by feeder vessel to Cape Town Container Terminal, then by ship to Tilbury. From Tilbury, the containers were taken by road to Hornsey in north London, where the consignee's premises are situated. Location and seal status updates were available from the Savi TSS from despatch and respective arrivals at Okahandja, Namport Terminal, Cape Town Container Terminal and Tilbury Container Services Terminal.

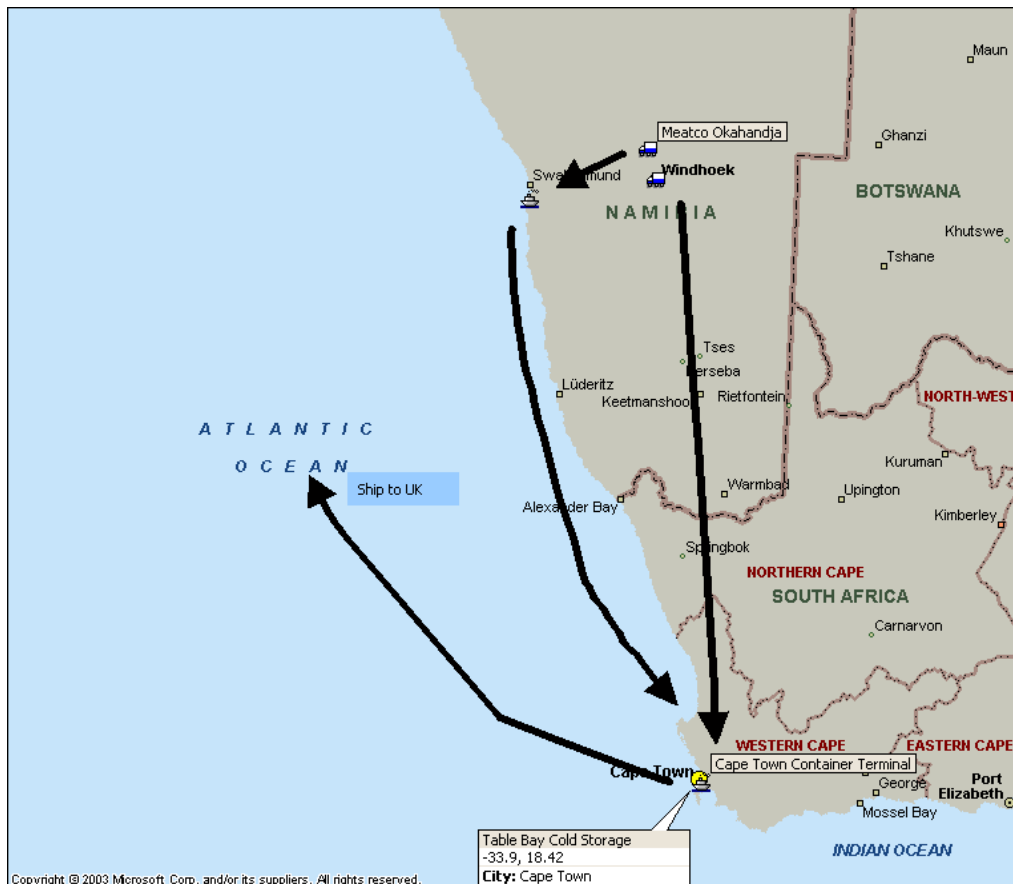


Figure 1: Demonstrator 2 – Corridors 2a and 2b

Security was demonstrated by the addition of a seal status message, transmitted from the container to the SIMTAG system which, if the status were to change other than at a planned container opening, would be visible on the SIMTAG tracking screen with logging of an event and potential transmission of an alert to the appropriate user.

As the cargo being transported through this corridor was not hazardous, it was not deemed practicable to demonstrate further safety aspects of SIMTAG beyond those demonstrated in Demonstrator 1.

Opportunities to demonstrate the efficiency of the SIMTAG system were available as a result of:

- scheduling of veterinary inspections – ensuring that the inspections of the meat cargo were timely and in the order of arrival was a complex task without good supply chain data. Containers sometimes sat for up to two weeks at Tilbury port awaiting these inspections; and
- delayed documentation – the inspection process required the availability of paper documentation which was sometimes late and sometimes delivered incomplete, necessitating physical collection. Following confirmation of acceptability to the authorities, SIMTAG’s documentation upload would allow the veterinary scheduling, container identification, and location and documentation inspection to be completed within the offices of the veterinary service without physical

collection of paper, improving the efficiency of the process and reducing significantly the potential for error.

Corridor 2b was a two-step journey from Windhoek by road to Table Bay Cold Storage, Cape Town. The meat was then repacked for onward shipment from Cape Town Container Terminal to Tilbury Container Services Terminal in the UK. Because of the repacking operation in Cape Town and as different containers and seals were used for each leg, the data received via the Savi TSS and SIMTAG system link-up was treated as related to separate journeys respectively from Namibia to Cape Town and from Cape Town to the UK. In both the Savi TSS and the SIMTAG Portal, location and seal status updates were made available via the Savi TSS at specific points along the transit, namely at the point of despatch at Windhoek; at Table Bay Cold Storage; at Cape Town Container Terminal; and at Tilbury Container Services Terminal. From Tilbury, the containers were taken by road to Hornsey.

Corridor 2b offered the potential to track product across warehousing and container consolidation at pallet level.

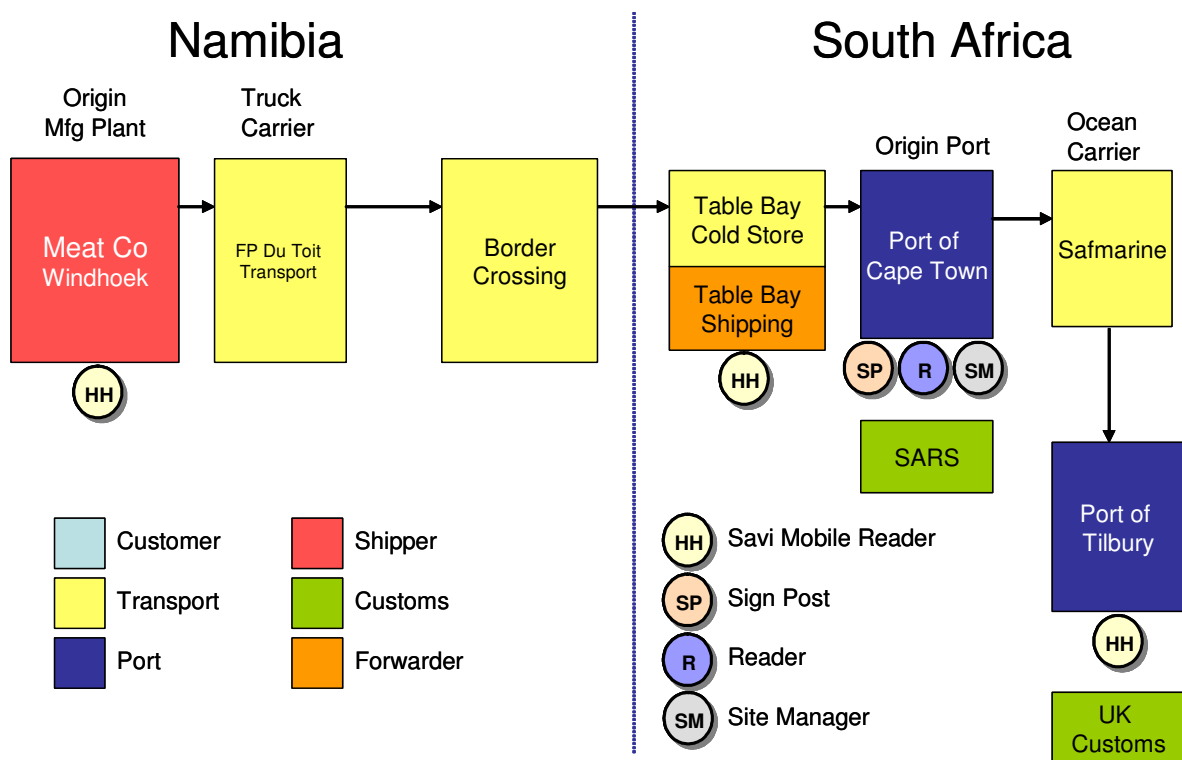


Figure 2: Corridor 2b Windhoek to Tilbury
(courtesy of Savi Technology, Inc.)

The third corridor (Tilbury to Hong Kong Direct or via Southampton) involved dry containers travelling from the UK to Hong Kong. On 1 November 2004, the Bernard Group started registering these shipments from their Tilbury Logistics Centre. These shipments were part of a flow, either going direct from Tilbury to Hong Kong by ship or starting with a road leg to Southampton container terminal, where they were then loaded

for the ocean voyage. All these shipments were transferred intermodally from ship to truck at Hong Kong, for delivery to the consignees.

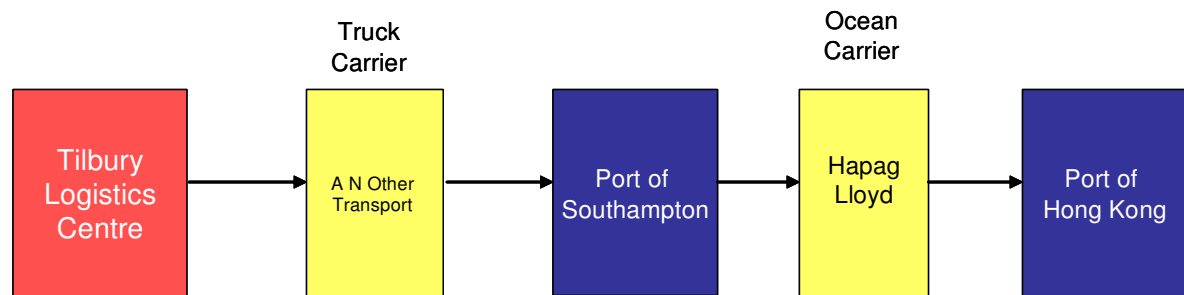


Figure 3: Corridor 3 Tilbury to Hong Kong via Southampton

Containers in corridors 2a and 2b were fitted with RFID-based electronic security seals that communicated with readers placed at strategic locations in the port infrastructure. The readers were connected to the Savi TSS, thus feeding an Internet-enabled global information network. Location and seal status updates were registered when a tagged container passed through the relevant infrastructure along the journey corridor.

The Savi TSS is connected to users through the Internet. During the trials it provided registration and update XML messages to the SIMTAG Portal as text emails over the Internet. A more direct protocol (such as HTTP POST) could have been used, but this method was adopted for ease of implementation for the trials.

The SIMTAG Portal is viewed with a browser with Internet access. Because of the trial nature of the project, the Web server connection did not use secure socket layers (SSL), as would be used for a commercial service. Whilst SSL would have provided a secure encrypted connection, it would have added an unnecessary layer of complexity, which might have obscured fault diagnosis during the development phase.

For Demonstrator 2, the Web Portal was enhanced with the following features:

1. The Portal was re-engineered using a commercial web-portal development tool in order to improve its scalability and manageability.
2. The Portal was moved onto a web-hosted facility in order to improve its resilience and reliability.
3. User management facilities were extended so that customers could administer their own user communities.
4. The “look-and-feel” of the Portal could be easily tailored to individual customer requirements.
5. The Journey Registration tools were extended to allow the management of concurrent Activities on the same Journey Plan.
6. A report function was added to create an overall summary report of a Journey. It can be viewed on screen or exported to other applications (e.g. Microsoft Excel).

7. An enhancement, suggested by UTT during the course of the first demonstrator, was included. This provided the user with the ability to tailor the presentation of key fields to suit his specific preferences; for example, the frequency and level of detail presented.
8. An XML Schema was defined to allow applications such as the Savi TSS to register and update Journey Plans by sending XML messages to the SIMTAG system, where they could then be loaded, viewed and manipulated.

The most significant enhancement of the second demonstrator was the interface to the Savi TSS. This interface illustrated the ability to provide links to third-party tracking systems through SIMTAG. It also extends the manageability of the supply chain by giving full end-to-end visibility.

The interface to the Savi TSS was implemented so that an XML Schema, to represent the Journey Plan, was developed by the SIMTAG project and agreed with Savi. The Savi TSS would send an email containing the XML Journey Plan to the SIMTAG system, in which the Journey Plan would then be updated by the XML message. The transmission of the email was triggered whenever the Savi TSS received an updated report on position or security status of the container seals. Updates, including positioning and security status data, were sent by XML email. The SIMTAG system scanned its mailbox every 60 seconds and automatically created or updated a Journey Plan based on the XML data contained in the email. Journey Owners and Actors could be alerted via email as relevant activities occurred.

The screenshot displays the SIMTAG web application interface. The main window, titled 'Journey Summary Window', shows the following information:

General information

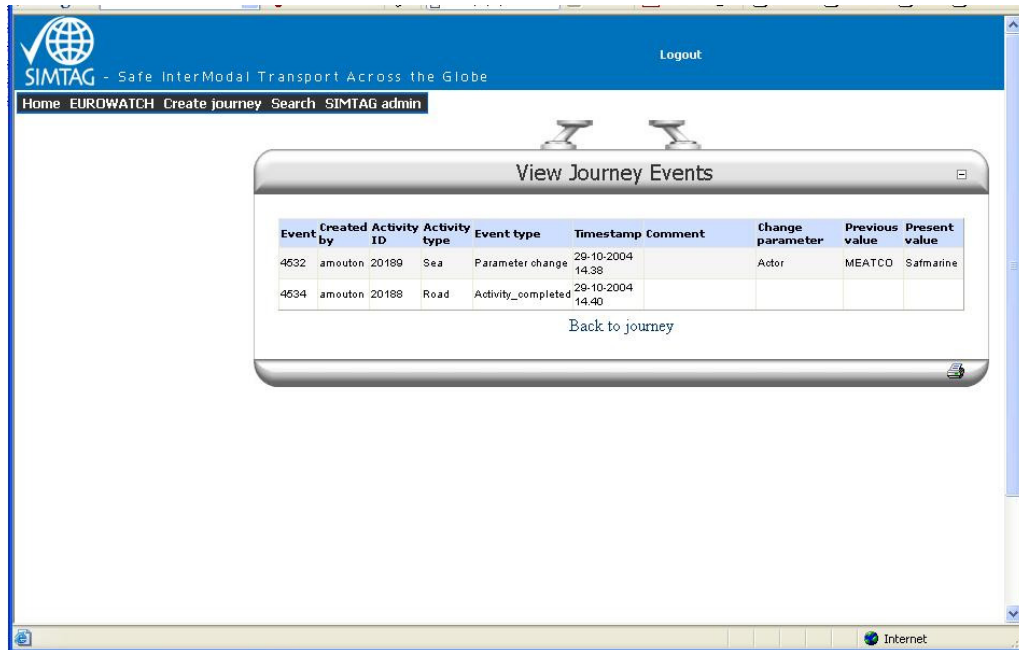
Journey owner name: Andre Mouton
 Journey owner email: amouton@meatco.com.na
 Journey owner phone numbers: +264 61 21 6810/+264 61 21 6810
 Container ID: SAMU2911017
 Customer order NO:
 Job NO:
 Bill of lading NO:
 Seal NO: 130 12-4004896 (ID Seal name)

Journey legs

ID	Start time (YYYY-MM-DD)	Start node	End time (YYYY-MM-DD)	End node	Activity	Actor
20188	2004-10-28 10:47:00	Table Bay Cold Storage	2004-10-28 10:47:00	Cape Town Container Terminal	Road	MEATCO
20189	2004-11-01 23:59:00	Cape Town Container Terminal	2004-11-17 23:59:00	Tilbury Container Services Terminal	Sea	Safmarine
20365	2004-11-19 11:00:00	Tilbury Container Services Terminal	2004-11-19 12:00:00	Ecco Cold Storage, Homsey	Road	Allied Meat Importers

The 'Journey reports window' is also visible, showing options for 'Single journey summary' and 'Journey sensor data', both with 'XML file' selected as the presentation type.

In addition, a log of Journey Events records an audit trail of activity, including inputs and changes by individual users; by company; and/or by Activity type (e.g. completion of a movement).



Event ID	Created by	Activity ID	Activity type	Event type	Timestamp	Comment	Change parameter	Previous value	Present value
4532	amouton	20189	Sea	Parameter change	29-10-2004 14:38		Actor	MEATCO	Safmarine
4534	amouton	20188	Road	Activity_completed	29-10-2004 14:40				

Back to journey

The Demonstrator 1 supply chain was documented at Levels 1 and 2, and partially at Level 3, of the SIMTAG Supply Chain Model, as shown below in Figure 5.

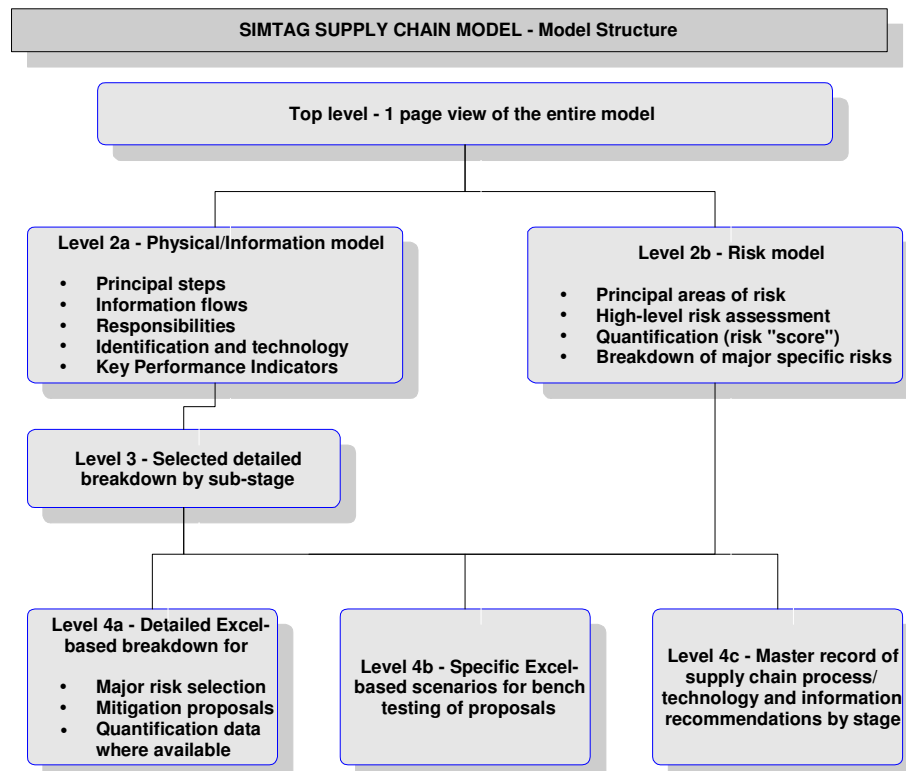


Figure 4: Model Levels for the Supply Chain

Each of the three supply chains in the second demonstrator was modelled separately at Level 1 and Level 2 to make the discussion of that demonstrator consistent, in terms of description, risk assessment, cost assessment and proposals for change.

The Bernard Group corridor allowed the Consortium to assess the minimum-cost, fastest start-up business model for commercialisation.

All three demonstration routes proved to be successful, albeit with some reworking of the data during the course of the demonstration. A number of issues arose that led, initially, to some spurious data and incorrect reporting of Journeys. This was picked up during the monitoring of the trial and work was undertaken to confirm data and reporting validity.

The broad objectives set out in the Validation Plan for Demonstrator 2 were achieved, as shown in Table 2 below:

Objective	Evidence of achievement
Increased cost efficiency	Evidence for this included: <ul style="list-style-type: none"> • visibility of Journey Plan allowing scheduling of “touch- point²” resources; • asset utilisation improvements (container and road haulage); and • customer resource scheduling (in-gating, de-stuffing and road haulage).
Improved safety	Testing of safety and of the benefits provided by SIMTAG was an explicit part of the first demonstrator, but only an implicit component of the second. Since this cargo was not hazardous, the use of specific services through the Portal for the management of hazardous material was inappropriate. However, the potential for improvement of public safety in any commercial use of SIMTAG was evidenced by: <ul style="list-style-type: none"> • documentation and processes in SIMTAG that facilitate the improved control of the foodstuff and veterinary inspection; and • reduced dwell in transit, allowing the scheduling of faster transits for fresher product.
Improved security	This was evidenced by: <ul style="list-style-type: none"> • greater visibility of containers in transit, including identification of non-compliant processes and activities; • electronic sealing of the container with alerts on status; and • improved access to manifest and management data. It was not the objective of this demonstrator specifically to test the security of the SIMTAG system itself; rather, the focus was on the possibility of using the SIMTAG functionality to project potential benefits for improvement of the supply chain.

² Touch-point resources – those resources necessary to service a container at stages of the supply chain, such as inspection.

Objective	Evidence of achievement
Improved customer service	<p>The potential for customer service improvements was evidenced through data and process changes allowing:</p> <ul style="list-style-type: none"> • improved customer resource scheduling (in-gating, stripping and road haulage) reducing customer costs; • increased customer confidence through visibility of the transit; • fresher produce through reduced dwell times; • the opportunity to reduce stock in transit; • fewer stock and transit errors; and • data for positive product traceability.
Improved market opportunities	<p>Market opportunities, though not directly demonstrated, can be inferred from the evidence of the trial:</p> <ul style="list-style-type: none"> • greater reliability of the longer supply chain from Africa to the UK and improved control, allowing these chains to compete more effectively with shorter or more established routes and producers; and • improved reliability and cost, introducing the potential for new products and services (such as more meat processing at the production source).
Improved working conditions	<p>A consequence of a trial such as this is that the existing processes, data and procedures cannot be abandoned in favour of the trial processes during the demonstration. It was therefore not possible to test improved working conditions explicitly. However, the following was found:</p> <ul style="list-style-type: none"> • remote visibility of the transit status, location and security allows activities that previously required driving, and movement in dangerous areas, to be undertaken from a desk; and • data collection activities in harsh climates and environments can be reduced.

Table 2: Broad Objectives set in the Validation Plan

Even with no telematics, the SIMTAG Portal could provide an integrated view of current and historic Journey information. Whether the optimum use of SIMTAG would be through low-cost/no-cost technology on containers and therefore a consequential increase in manual data uploading to the system or through a higher-cost data collection system offset by reduced administration, had to be decided. The Consortium found that the balance of these costs and benefits differed from supply chain to supply chain. Benefit optimisation would be addressed in the SIMTAG Business Plan.

4.8 Recommendations

This phase of the project work gave the Consortium the opportunity to take stock of the results of the two demonstrators, the interim findings made after the first demonstrator, and the results from the workshops and interviews with representatives from the transportation industry so as to formulate a number of strategic recommendations and gauge their impact as to security, safety and efficiency in respect of policy makers, processes and standards. Many of these recommendations, if adopted, could almost immediately open the way for global improvement of intermodal transport security, safety and efficiency. For the sake of convenience, a grid representing these recommendations is reproduced as follows:

Security:	Policy Makers	Processes	Standards
Sec 1. Policy-makers should decide whether to concentrate on Homeland Security or to maintain an integrated focus that includes reducing cargo theft.	√		
Sec 2. Transport economists and international/national policy makers should combine to map out realistically the costs of effective security improvement and determine in what proportions these should be borne respectively by the community and by the transport and cargo interests.	√		
Sec 3. International and national authorities should grant fast-track advantage to "trusted shippers", "trusted agents" and "trusted carriers".	√		
Sec 4. International policy-makers should accelerate and intensify efforts to make a level playing field for national security enablement in intermodal transport.	√		
Sec 5. Policy-makers, as to security improvement, should focus hard on ways of keeping cargoes moving and of reducing security risks while cargoes are stationary.	√		
Sec 6. Policy-makers should be careful to maintain the essential flexibility of intermodal transport.	√		
Sec 7. Real-time tracking and tracing systems should be fostered so that alerts can accelerate and focus emergency intervention.		√	
Sec 8. Fluent systems should be adopted globally as soon as possible for certificating and tracking all containers carrying High Consequence Dangerous Goods.		√	
Sec 9. Global conventions should establish normative and unified hierarchies of accountability for the ownership and control of data and data management processes related to intermodal consignments.		√	

Security:	Policy Makers	Processes	Standards
Sec 10. Further research should be carried out as to the practicalities, costs and wider integration of certificated actors or supply chains.		√	
Sec 11. National and international, public and private-sector security techniques should become based on seamless visibility and efficiency in the supply chain.			√
Sec 12. There ought to be adoption of a standards-based unique intermodal journey number.			√
Sec 13. Special efforts should be continued, in the public and private sectors, to improve security by more intensive focus on the "first mile" and the "last mile" of the freight journey.			√
Sec 14. Every effort should continue to be made to reduce the likelihood of unnecessary security intervention and resulting cargo delays.			√
Sec 15. Port-focused security monitoring systems should be linked to high-quality existing management systems and other nodal points; for example, those of security-assessed warehouses and depots.			√
Sec 16. Security improvements should continue to be set in harmony with the needs of Customs authorities and the new integrated Customs data gathering, management and response systems engendered by the WCO.			√
Sec 17. Strong encouragement should be given to end-to-end improvement of intermodal security.			√
Safety:			
Saf 1. Research should be undertaken urgently as to the economics and human factors involved in radical improvement of the objectively accredited, certificated and verified competence of cargo systems safety inspectors.		√	
Saf 2. Globally-recognised simplification of multi-layered and iterative safety certification schemes should be accelerated.			√
Saf 3. Efforts should always be made to ensure, so far as possible, that compliance with a new safety regulation does not have a collateral effect of making more difficult compliance with another.			√
Efficiency:			
Eff 1. Improvement of existing systems should be encouraged as much as their replacement by entirely new systems.	√		
Eff 2. The prospective efficiency gains from global acceptance of electronic documentation, especially of documents of title, should encourage strong policy initiatives, especially towards bankers and the commodity exchanges, to overcome residual insistence on paper.	√		

Security:	Policy Makers	Processes	Standards
Eff 3. Efficiency gains should be evaluated even without the benefits flowing from on-container data capture and data transmission devices, particularly for the advantage of SMEs and non-integrated intermodal actors.	√		
Eff 4. Transport economists should intensively research the relative economics of improved security and greater supply chain management efficiency.		√	
Eff 5. The relevance of the New Approach to intermodal transport compliance should be studied intensively.		√	
Eff 6. The inefficiencies of delay in cargo transits and fragmented or replicated information systems should be studied alongside the enhanced risks of security breach when the container is idle.		√	
Eff 7. Improved international intermodal transport systems should be integrated to the best industry-regulated management process systems provided cost/benefit equations are favourable.		√	
Eff 8. "Single-window" data platforms should be encouraged wherever possible.			√

Initial work on these recommendations was undertaken in anticipation of the integration of the results with the SIT Thematic Network until that programme ceased in October 2004. The relationships established through the SIT programme and separately by the SIMTAG Consortium members have allowed the continuing sharing of information on a wider basis and the testing of findings on a broad range of interested parties.

The Consortium also made a number of observations and recommendations in respect of SIMTAG's potential role. These observations included:

- SIMTAG and the trend towards disintermediation;
- SIMTAG and the spot market, reverse logistics, backhaul and empty containers, etc.;
- the intrinsic neutrality of the SIMTAG Portal;
- the potential for SIMTAG to reduce supply chain disruption losses; and
- strategic recommendations for policy-makers and as to processes and standards.

The Consortium confirmed that there was a real business opportunity for SIMTAG, principally in supply chain efficiency, operational reliability and supply chain security and safety. Further work would need to be undertaken with potential service suppliers, however, to define the potential uptake, gain additional confirmation of the opportunity (on a service-by-service basis) and further quantify the benefits.

4.9 Dissemination of the Project Results

The availability of lower-cost technology and the developing understanding of the need to manage the supply chain as a critical component of the overall business process were two key changes that have provided the impetus for technology development in the freight transport industry over the past five years. This development in technology saw the emergence of systems that were largely focused on single-mode movements to avoid the added complication of managing the transition at modal boundaries. The next generation of optimisation applications focusing on cargo transportation would doubtless lose the single-mode focus and widen the commodity. A supply chain opportunity therefore emerged, seeking software and technology that were flexible and adaptable to specific supply chains, modes of transport and sectors.

To remain competitive, carriers and logistics companies will have to go beyond simply optimising existing systems to achieve efficiencies and should move to a much more integrated approach to the management of the supply chain, investing in the transformation of their operations from closed “after the event” systems to open shared data and processing that allow collaboration across modes and providers.

The Internet, together with open computing standards, will provide increased visibility of goods in transit. Track-and-trace functionality, delivered via self-service websites, is also cheaper and more efficient than a telephone call to a customer service centre. As a result, logistics portals will become increasingly important. Portals like SIMTAG will provide the sort of connectivity previously beyond the financial reach of small and medium-sized enterprises (SMEs). In addition, growth in the ERP applications market is attributed to the general IT spending increase as well as the demand for more integrated solutions to boost an organisation’s productivity, profitability and competitiveness.

From its inception, the Consortium undertook to develop SIMTAG commercially and it believed that an obvious commercial industry need had to be identified if greater safety and security measures were to be adopted in the supply chain without legislation. A new company, Intermode Services Limited, has now been formed to take SIMTAG from project to commercial status. Dissemination activities undertaken by the dedicated commercialisation group centred on obtaining commitment from potential users to buy into the Intermode system. These dissemination activities will be ongoing throughout the commercialisation phase and through to product launch.

During the course of the project, the Consortium’s approach to dissemination was to create a dissemination plan which would ensure that, as far as feasible, SIMTAG’s profile would be as high as possible within the freight transport industry; would become known to government offices, including Customs and Departments/Ministries of Transport, in Europe and the USA; and would become a talking point for trade associations. Whilst the Consortium’s phasing of the work meant that dissemination activities would take place well into the second year of the project, this did not detract from the Consortium’s flexible view on dissemination. As progress was made in the project – whether in the context of findings from market research or technical development – SIMTAG would cross-reference this with market entities, either by presenting the findings at a conference

or seminar or in workshop discussions with potential users, to ensure that it maintained a development focus allied to the market into which it intended to exploit the project's results.

An early alignment of interest was forged with the SIT Thematic Network, which the Consortium felt would form an additional dissemination route for SIMTAG's results. Information related to the project would generally be disseminated via the SIMTAG website where all the public deliverables approved by the European Commission had been posted.

The project results were disseminated in a number of different ways, including conferences, seminars, workshops, publications, as well as through the project website www.simtag.org. The Consortium presented at some twenty-four conferences over the duration of the project, nearly one a month. Representatives of the SIMTAG Consortium were also asked to run a number of round-table discussions on the subjects of safety and security, which were very important and topical issues during the course of the project.

The Consortium ran a number of workshops during the course of the project. The first User Assessment Workshop was held in Redcar, UK on 23 September 2003 for the purposes of testing the market's reception to the principal SIMTAG concepts and to identify the particular interest that different actors in the market might have in the benefits and costs of implementation.

The objectives of this workshop were to seek input from potential users of SIMTAG to the requirements specification; in particular, so as to:

- understand issues in intermodal movements from the perspective of Port, Manufacturer, Transport Provider and Police;
- define causes of loss, excess cost and poor customer service;
- identify what contribution better information could play in improvements; and
- list specific functionality/capability that would move the industry forward.

It was at this workshop that a recommendation was made that Thomas Miller, as project co-ordinator, should specifically address the process of commercialisation.

The second User Assessment Workshop was held in the Antwerp offices of ICL on 2 October 2003 and provided an opportunity to extend the discussion on solutions that SIMTAG might introduce so as to understand the extent of process change and the level of existing systems and to test how the market might react to its introduction (see further Section 4.4 of this report).

The successful completion of Demonstrators 1 and 2 provided the opportunity for two pivotal workshops to be held: one in Brussels on 30 November 2004 and the other in London on 3 December 2004.

The Brussels Workshop concentrated mainly on the identification of the business process, service and market sector factors that would encourage early take-up of SIMTAG, and on presenting to a key target group the findings of the SIMTAG project and the services and

benefits expected to be delivered as part of the commercialisation. The London Workshop focused more on obtaining practical, industry-based feedback and advice on technology and service integration, whilst seeking to identify the technical questions that both providers and customers would ask in considering whether to adopt the service.

At each of these workshops, the Consortium arranged a demonstration of the SIMTAG Portal, which showed the functionality of the Portal to full effect, whilst also providing the opportunity for participants to offer suggestions as to what services the Portal might deliver when launched into the market.

The Consortium felt that these workshops were very successful and the feedback assisted greatly in the formulation of ongoing commercialisation activities.

A number of potential supplier/partner workshops and bi-lateral meetings were undertaken during October and November 2003 to evaluate the service, technical and commercial basis for potential inclusion of the supplied technology within SIMTAG. Discussions with suppliers are ongoing.

Apart from workshops, dissemination activities included the creation very early in the project of a SIMTAG brochure. This was, however, produced at a time when the Consortium's focus was on the development of "BlackBoxes". When the Consortium recognised that the course of the project would not be following that specific route but would steer towards the development of a Portal, the brochure became less useful.

A short document entitled "SIMTAG – Transforming the Intermodal Supply Chain" was created as a sales document to interest outside parties in the Portal. This document was distributed to all participants of the Brussels and London Workshops.

A document tracing the project's achievements from inception through to business planning and exploitation was also created as a dissemination tool and can be found at Appendix 1 to Deliverable 9 (Dissemination Report).

The development of the SIMTAG Portal, www.simtag.com, for use in the two demonstrators, was undertaken during Work Packages 5 and 7, which addressed Demonstrator 1 and Demonstrator 2, respectively.

The Consortium had maintained a relationship with the SIT Thematic Network until it was terminated on 12 October 2004. We saw SIT as one of our major dissemination routes, as the SIT Consortium was building up a network of parties interested in safety, security and efficiency who would be interested in progress being made on the SIMTAG project. Issues which SIMTAG regarded as important during the early project work but which would not form the focus of our own continued research (listed in Appendix 20 of Deliverable 1a) were passed to the SIT Thematic Network for investigation as and to the extent to which they were applicable to the cluster work being undertaken by the SIT project.

An opportunity for further networking with other projects (such as **ALSO DANUBE** (Advanced Logistic Solutions for the Danube Waterway)/**DoRIS** (Donau River

Information Services), looking at the increased use of inland waterways, and **COMPRIS** (**C**onsortium **O**perational **M**anagement **P**latform **R**iver **I**nformation **S**ervices, seeking to enhance the existing concept of river information systems) presented itself when the Consortium was asked by the European Commission to present the SIMTAG project at a Cluster Meeting on 22 July 2004. This event provided some exposure for SIMTAG on a concertation basis and gave the Consortium the opportunity to learn about developments in other projects.

A feature article on SIMTAG was published in the December 2004 issue of Cargo Security International. A number of other publications refer to SIMTAG, including RFID Journal and Telematics Update. The Consortium has also issued two Press Releases: the first in March 2004, which was widely disseminated to members of the global freight transport industry; and the second on 6 December 2004, which focused on the project's collaboration with Savi Technology, Inc. in the SST Tradelanes for Africa project. SIMTAG also featured in a separate Press Release issued by Savi on 6 December 2004.

SIMTAG was successfully, even pivotally, presented to the Strategic Council on Security Technology (SCST) in Washington on 7 October 2003. The Smart and Secure Tradelanes Initiative (SST) was launched by the SCST and is an industry-driven, supply chain security initiative. SIMTAG was able to collaborate with Savi Technology, Inc. on the SST for Africa Feasibility Study and to provide last-mile technology in two of the SST for Africa trade lanes during SIMTAG Demonstrator 2. The Intermode Services Limited commercial team will continue collaboration with Savi during the commercialisation phase.

Presentations on SIMTAG were made to a wide range of industry bodies, including the World Customs Organization; the International Association of Ports and Harbors; the International Federation of Freight Forwarders Associations; ICHCA (International Cargo Handling Co-ordination Association) International Limited; the US Department of Homeland Security; and the European Commission's Nuclear Inspectorate. The Intermode Services Limited commercial team has also undertaken in-depth discussions with individual industry representatives to obtain feedback as to the benefits of the Portal for small, as well as large, companies.

4.10 Business and Exploitation Planning

The Business and Exploitation Plan identifies the need to undertake further substantial work on refining both the services and the service model. This is to be undertaken in parallel with the development of the core functionality, establishment of partner agreements and creation of the operational delivery capability.

Based on the target services, a range of potential service partners has been identified and working sessions have been undertaken to establish the potential commercial arrangements and to confirm capability.

Work has been undertaken, and is documented in Deliverable 10, the SIMTAG Business and Exploitation Plan, on the assessment and selection of target sectors and customers and the economics associated with these.

Work has also been undertaken and documented, in WP10, on the assessment and selection of target sectors and customers and the economics associated with these.

Deliverable 10 (Business and Exploitation Plan) defines the plan for the commercialisation and exploitation of the SIMTAG results through the launch of Intermodal Services Limited.

The work of establishing Intermodal, defining its services, partners costs and benefits is ongoing and Deliverable 10 represents the snapshot of the progress at the time of writing. Of necessity, confidentiality agreements have been signed with third parties that preclude the presentation of some data, specifically on cost and focus of work, and this is so identified in the report .

Included in the report are:

- the plan for commercialisation;
- the anticipated costs and revenues (based on assumptions being developed by Intermodal Services Limited);
- the prioritisation and capability of the proposed services;
- partnerships and third-party relationships necessary for delivery;
- analysis of competitors, and strengths and weaknesses;
- proposals for the funding, structure and organisation of Intermodal Services Limited;
- the plan for marketing and publicising the services; and
- evaluation of key target sectors and customers, and outline launch plan.

A final SIMTAG Business and Exploitation Plan has been produced incorporating the market targets, anticipated market entry, costs of development and anticipated market prices and financial results of these. The report includes the marketing strategy and the expected configuration of the operational entity that will deliver the services.

5. List of Deliverables

The list of deliverables (reports, software codes, experimental results, demonstrations, prototype products etc.) of any tasks completed during the duration of the project and which constitute contractual deliverables, should be given with indication of the references and issue date in comparison with the project planning.

Deliverable 1a: “Report on current practices, procedures, equipment, services and incidents, identifying weaknesses, regulatory and legislative requirements” dated 27 May 2003 and submitted to the European Commission on 13 June 2003, in line with the original submission deadline.

Deliverable 1b: “Standard supply chain model for information and physical goods flows” dated 27 May 2003 and submitted to the European Commission on 13 June 2003, in line with the original submission deadline.

Deliverable 1a Annex 1: “Data on intermodal transport accidents and associated costs” dated 29 July 2003 and submitted to the European Commission on 29 July 2003. This was an additional piece of research offered to the Project Officer on 3 June 2003 to confirm or rebut the apparent paucity of data on intermodal transport accidents and associated costs.

Deliverable 2: “Report on Major Risks, Options for Change in Process, Data and Technology and Available Mitigation Strategies” Version 2 dated 29 August 2003 and submitted on 29 August 2003, in line with the original submission deadline.

The Deliverables from Work Package 3 (Design, Develop and Populate SIMTAG Database), yet to be approved, are:

- the completed project website www.simtag.org which will be updated with remaining public deliverables, once they have been approved by the European Commission;
- the operational website – the SIMTAG Portal – www.simtag.com; and
- a simple Access database which was used to capture the data gathered during WP1.

Deliverable 4: “Report on Development of Proposals and Recommendations for New Systems” Version 1 dated 5 December 2003 and submitted on 5 December 2003. The original deadline for submission was October 2003 but the Consortium needed to extend the duration of this work package to take account of the changed focus of the project from development of “BlackBoxes” to the management of data through a neutral portal. This extension formed part of the revision of the Description of Work contained in Annex 2 (Work Package Planning Document: Breakdown of the Project Work Packages and Tasks (Version 14 – February 2004)) and Annex 3 showing the original project timeline and the revised project timeline of the Mid-Term Report covering the period from 1 January to 31 December 2003. This work package also marked the move from the conceptual stage of SIMTAG into the practical stages of the portal development and business planning.

“Validation Plan for Demonstrator 1” Version 1.0 dated 15 April 2004 submitted to the European Commission on 11 June 2004. The Validation Plan was not a contractual Deliverable but a necessary precursor report for the evaluation of Demonstrator 1 under Work Package 5.

Deliverable 5.1: “Demonstrator 1: Evaluation Report” (Restricted) Version 1.0 dated 10 June 2004, submitted to the European Commission on 11 June 2004.

Deliverable 5.2: “Demonstrator 1: Evaluation Report” (Public) Version 1.0 dated 10 June 2004, submitted to the European Commission on 11 June 2004.

The Consortium planned to submit the Validation Plan for Demonstrator 1 and Deliverables 5.1 and 5.2 during May 2004, after the demonstrator had completed its run (originally planned for the end of April 2004). The demonstrator ran until July 2004, as reported in Deliverable 6. As a consequence of sensitive commercial data being included in that deliverable report, Deliverable 6 was restricted in circulation even though the Consortium had planned for it to be a public report. The Executive Summary was, however, publishable.

Deliverable 6: “Report of Demonstrator 1 results; specification for the ‘pre-production’ corridor; and recommendations for further activity in processes, standards and procedures” Version 1.0 dated 9 August 2004, submitted to the European Commission on 9 August 2004. The Consortium was expecting to submit this deliverable report in July but this could only be written after the corridor run was completed which led to a submission date in August. This was done with the prior agreement of the European Commission Project Officer.

“Validation Plan for Demonstrator 2” Version 1.0 dated 13 October 2004, submitted to the European Commission on 14 February 2005. The Validation Plan was not a contractual Deliverable but a necessary precursor report for the evaluation of Demonstrator 2 under Work Package 7.

Deliverable 7.1: “Demonstrator 2: Evaluation Report” (Restricted) Version 1.0 dated 9 February 2005, submitted to the European Commission on 14 February 2005.

Deliverable 7.2: “Demonstrator 2: Evaluation Report” (Public) Version 1.0 dated 9 February 2005, submitted to the European Commission on 14 February 2005.

As reported in Section 4.7 of this report, the two parts of the second demonstrator (corridors 2a and 2b) started their run on 25 October and continued live running until mid-December 2004. Corridor 3 started on 1 November and concluded in mid-December. The Consortium did ask the Project Officer whether he would grant a two-month extension to the project, as a consequence of the knock-on effect of the late running of the demonstrator. The Project Officer was loath to grant a two-month extension as this would involve a Contract Amendment. Since it was felt that such a time-consuming process would lead to an unnecessary delay in the project scheduling, the decision was taken by the Consortium not to ask for a Contract Amendment. Deliverables 7.1 and 7.2 were originally scheduled for submission in October 2004 were but not submitted until 9 February 2005.

An earlier start date for the demonstrator would have enabled a better scheduling of the work but SIMTAG was entirely dependent on the start date of the Africa Feasibility Study, which was 25 October. This late start did have a detrimental effect on the scheduling of the remaining work packages and the European Commission Project Officer agreed to be flexible about submission dates of deliverable reports, as reported in Section 6.7 of this report.

Deliverable 8: “Report on Recommendations” Version 1.0 dated 21 February 2005, submitted to the European Commission on 22 February 2005.

Deliverable 8 was originally scheduled to be submitted in December 2004 but was affected by the late start of the second demonstrator, as reported above, as the Consortium was dependent upon access to the results of the demonstrator before it was able to formulate the recommendations in Deliverable 8.

Deliverable 9: “Dissemination Report” Version 1.0 dated 24 February 2005, submitted to the European Commission on 25 February 2005.

The Consortium originally planned to submit Deliverable 9 at the end of December 2004. The workshops, on which the Consortium had to report in Deliverable 9, were held on 30 November and 3 December 2004. The late timing of the workshops was as a consequence of the late running of the second demonstrator as the Consortium planned to disseminate the results of the demonstrators at those workshops. The Christmas period precluded the writing and submission of Deliverable 9 before the end of 2004.

Deliverable 10: “Business and Exploitation Plan” Version 1.0 dated 22 April 2005, submitted to the European Commission on 22 April 2005.

The results of work packages 7, 8 and 9 were crucially important for business planning and exploitation. As previously explained, these deliverable reports were submitted during the first two months of 2005, with Deliverable 10 following closely behind. Deliverable 10 was originally scheduled to be submitted in December 2004.

The “**Technological Implementation Plan**” Final Version, submitted as Annex 3 to the Progress Report covering 1 January 2004 to 31 December 2004, dated 29 April 2005, submitted to the European Commission on 29 April 2005.

The “**Final Technical Report**” and “Final Publishable Report, dated 4 May 2005, submitted to the European Commission on 4 May 2005.

Other contractual periodic reports which have been submitted to the European Commission during the course of the project are:

- the **Management Report**: covering the period 1 January to 30 June 2003, dated 20 July 2003;
- the **Mid-Term Report**: covering the period 1 January to 31 December 2003, dated 27 February 2004, submitted on 2 March 2004; and

- the **Management Report**: covering the period 1 January to 30 June 2004, dated 30 July 2004.

The co-ordinator was mindful of the need to submit the project deliverable reports in sequence and, whilst the Technological Implementation Plan, the Final Technical Report, and the Final Publishable Report Plan were virtually complete by the time Deliverable 10 was ready, it was felt logical to submit these reports after Deliverable 10 had been submitted to the European Commission.

In addition to the deliverable reports identified above, a number of other products of the work have been created in the course of the project. These include specifications and designs for the Portal and the interfaces, hardware, software programmes and technology applications used in the demonstrators and computer models used in the analysis of the supply chain and associated risks. These results are described in the Technological Implementation Plan.

6. Comparison of Initially Planned Activities and Work Actually Accomplished

Any major deviations from the work content of the Description of Work should be justified and their effects on the project discussed. Tables or charts should be used where appropriate.

Section 4 of this report (Scientific and Technical Description of the Results) covers the approach used by the SIMTAG Consortium to the research undertaken during the course of the project. It also gives a description of the work undertaken, highlighting the main results achieved. In contrast, this section looks at the initial planned activities and compares them with the work actually accomplished on a per work package basis.

6.1 Work Package 1 (Survey and Review Existing Procedures)

The objectives of Work Package 1 (Survey and Review Existing Procedures) were to review existing procedures, practices and incidents for freight transport across all EC Member States and with other territories in order that:

- the vulnerability to hazardous, commercial or security risks could be assessed;
- a standard supply chain “model” based on defined corridors could be developed; and
- a base line for change proposals could be established.

In order to make this task manageable, an overall identifiable framework and project definitions were required to ensure that Consortium partners would have the same focus in their research activities. An electronic database to capture the information gathered was set up and kept on a CD-Rom.

The Consortium gathered data relating to intermodal transport as to current practices, procedures, equipment, services and incidents, identifying weaknesses, regulatory and legislative requirements. Data was gathered by a combination of website searches; telephone and face-to-face discussions; and review of published material, ranging from laws, regulations and practice guidelines to manuals, databases and published standards of a wide range of entities in the public and private sectors. The research also included members of the Consortium “walking” all but the maritime stages of the two demonstration corridors, including detailed observation of nodal and interchange areas.

Some cost and incident data was gathered, although this was less than the Consortium had hoped. Thomas Miller, as project co-ordinator, offered to undertake a small additional study from a variety of appropriate sources and set out the results in Deliverable 1a Annex 1. This report confirmed the Consortium’s original findings that there was a paucity of data on the number of cases of intermodal cargo accidents and losses in Europe.

The Consortium’s research under this work package enabled the provision of a statement of the current status of safety, security and efficiency of major elements in intermodal supply chains. The physical security and integrity of containers were researched, as were

electronic and mechanical seals; relevant electronic and telematic technology; and emergency response.

In making proposals for improvement in the supply chain, the Consortium needed to be able to record how the supply chain operated currently and to predict what the typical characteristics would be after the application of the SIMTAG proposals and technology. A supply chain model was, therefore, developed to record the operation of the supply chain from the data gathered in interviews and research. This model was subsequently extended in Work Package 2 (Development of Approaches to Risk Mitigation) so as to provide the basis for risk assessment and improvement measurement, using a number of scenarios or “use cases”.

The initial market research enabled the Consortium to draw together the level of risks spanning different stages in the supply chain from which the major risks were identified. Risks were assessed as to their impact on safety, security and efficiency. The Consortium agreed the major risks (the only risks which would be taken forward) and defined broad mitigation strategies.

The Consortium took account of emerging trends including lack of coherence (for example, there was no overall booking system for an intermodal transit; all systems, processes and organisation approaches were based around a mode), resulting in a disincentive to use intermodal transport because it was harder to organise; and lack of incentive (for example, the cost of compliance was perceived to be high and small transport companies did not allow for investment in standards and technology, with the result that new financial models might be needed to encourage take-up).

From this research, the Consortium determined some common requirements:

- unique numbering of cargo and transport entities and an industry view of cargo hierarchy;
- real-time automatic reporting of key criteria;
- automatic comparison with planned activity and alert generation; and
- market-based system architecture.

Amongst a range of issues the Consortium would need to address were:

- fragmented systems;
- no timely location information;
- no end-to-end planning to create fluency in the transit;
- inadequate or inconsistent technical standards; and
- misaligned responsibility and liability.

Discontinuity of information, whether as to the detail of cargo handling and cargo condition at container level or as to the broader location and management of the movement, was the major risk identified by the Consortium and the one on which we would focus intently.

Important issues which would not be within the focus of the Consortium's continued research were passed to the SIT Thematic Network for inclusion in their cluster work, as and to the extent they were relevant.

Since the project Work Plan was somewhat front-end loaded, it was decided to re-balance the work within WP1 and WP2 and to include in those work packages some tasks currently included in Work Package 3 (Design, Develop and Populate SIMTAG Database) and Work Package 4 (Develop and Publish Proposals) where there were overlaps. A small adjustment in the sequence of tasks within these work packages, to improve the efficiency of delivery for all partners, was felt to be necessary. The inclusion of WP2, focusing on security and the need to address security in the intermodal supply chain, had taken away the logic of the data gathering, which was thereby re-established. This realignment of work was agreed with the Project Officer.

There were no major deviations from the work content of the Description of Work, and the objectives of the work package were fulfilled. The initial research under this work package provided a firm and comprehensive foundation of market information on which later work packages could build. As reported in Section 5 of this report, Deliverables 1a and 1b were submitted in line with the original submission deadline.

6.2 Work Package 2 (Development of Approaches to Risk Mitigation)

The Objectives of WP2 were to develop and use a risk assessment methodology and standardised scenarios based on the standard supply chain model to:

- assess the level of risks in the supply chain (as to exposure and likelihood);
- identify options for their mitigation with reference to processes, data and technology;
- undertake initial assessment of options for their cost, practicality and feasibility to develop a coherent risk mitigation strategy; and
- define the functional requirements for the demonstrator corridors.

Information relating to the two demonstration corridors was mapped onto the generic supply chain model developed during WP1, together with data collected from a number of scenarios involving aspects not included in the project demonstrators (essentially sub-sets of what the Consortium would need to consider as an entire intermodal supply/distribution chain). These aspects included different types of conveyance (dry container and reefer); different cargo types (high-value and perishable); different geographical flows (not merely confined to Europe and the USA); and ownership of the transport asset. Both original demonstration corridors involved "owned" assets and did not demonstrate risks or potential costs and benefits that would arise when applying the service to the spot market or short-leased assets. Consideration of these scenarios was necessary to give an overall view of the complexity of the global intermodal supply chain and a balanced view of the economics of any solution proposed, its commercial take-up and general applicability.

In WP2, SIMTAG took more detailed account of the wider security environment and initiatives, such as the US Container Security Initiative (CSI) and the Smart and Secure Tradelanes initiative (SST). SIMTAG aimed to design components of processes and technology that were consistent and compatible with them.

Having mapped the demonstration corridors onto the supply chain model, together with additional scenarios, as described above, the Consortium was then able to define the high-risk activities from the model. Specific stages of the intermodal cargo movement were examined for two aspects:

- risk type – whether the risks and issues of that movement stage contributed to one or more of the key project areas of safety, security and commercial efficiency; and
- risk contributor – whether the nature of the risk or issue arose from one or more of the five categories identified in WP1:
 - the people components;
 - the business process design itself;
 - the technology deployed;
 - the data availability/timeliness; or
 - any externally-driven process such as regulation.

The supply chain stages of the demonstrators and the additional scenarios were ranked, prioritising those stages where multiple risk types occurred together and where the contributing factors included the lack of availability, or poor timeliness, of information or an absence of information technology support. This ranking selected those areas for which the improvement of information management and information technology would bring the most significant benefit. The standard supply chain model developed during WP1, therefore, became a risk model and provided a novel and innovative way of addressing risk in the supply chain.

A standard SIMTAG score card was completed for each high-risk area identified. This was a simple and straightforward means of documenting the risks that SIMTAG set out to mitigate and identified the exposure, the impact and the “score” (a measure of the relative importance on a simple scale). The score uses a version of “Child’s Law”, the product of exposure and likelihood giving a simple numeric value for the risk. The score card process, where data is available, records the potential cost of risks and the potential value of mitigation, so is an important element of SIMTAG’s exploitation. The inclusion of performance reporting by means of the score cards is, we believe, innovative and certainly responds to demands for such information from entities in the supply chain.

The Consortium also collated options for change in: data and documentation verification; physical process; and application of technology which could be achieved either at an individual or small-scale level or at a macro level, providing potentially significant benefit by addressing major risk across all intermodal activity. We viewed the SST initiative, which provided a macro solution, together with appropriate legislation, as providing demonstrable efficiency gains. For SIMTAG, the challenge was the absence of a cohesive legislative component and the need to find a macro solution.

In considering options for change, WP2 specifically addressed: documentation; physical process; and technology. It also looked at communication via local and global infrastructure. Through continued research, the Consortium considered that, with an appropriate architecture in place, including message generation; message handling; a common language; and common or interoperable numbering systems, a web portal could provide a macro solution to overcome, or significantly reduce, the information discontinuities that characterise intermodal movement.

WP2 included a review of the potentially relevant technologies and a series of technical data sheets providing assessments of individual technologies which can be found at Appendix 4 in Deliverable 2 (Report on Major Risks, Options for Change in Process, Data and Technology and Available Mitigation Strategies). WP2 also developed the initial concept of the web portal solution and it was felt that, if a web portal solution were adopted, the cost implications would be broadly based on the individual costs of the services provided through the Portal, with minimal additional overheads.

WP1, work in WP2 and external observation led the Consortium to confirm its conclusion reached in WP1 that the major risk to be addressed was information discontinuity and that the principal focus should be on addressing this in the context of increased efficiency. It had also become clear that the connectivity, visibility and linkage of actions and services that could be provided through a web portal made such a portal the most appropriate way to achieve this.

The combined work undertaken led to the identification of a number of functional and enabling elements that would be needed for an end-to-end service provision. Initial work to identify the functional requirements of these elements was undertaken and recorded. Additionally, an initial assessment of the options for commercial development of the web portal was examined. Further developments of the functional requirements of the portal elements and of the commercial model were undertaken in Work Package 4 (Development of Proposals and Recommendations for New Systems).

WP2 enabled the Consortium to conclude that the proposed solution uniquely allowed for all key objectives and aspects described in the SIMTAG Technical Annex to be achieved in a full development of the system. The specific functionality to be demonstrated in the individual demonstrators was to be determined in Work Package 5 (Design, Build and Verify Demonstrator 1) and Work Package 7 (Design, Build and Verify Demonstrator 2).

The re-balance and re-phasing of the work in WP1 and WP2 meant that work under these two work packages was conducted in sequence, rather than in parallel as originally envisaged in the Technical Annex. The result of this was that, whilst the deliverable from WP1 was submitted in June 2003, as originally envisaged, the deliverable from WP2 was submitted in August 2003, with prior agreement from the European Commission Project Officer, instead of in June.

There were no major deviations from the work content of the Description of Work. The effect on the project was that the research under this work package built upon the solid basis of market information already obtained under WP1.

6.3 Work Package 3 (Design, Develop and Populate SIMTAG Database)

The Technical Annex did envisage that SIMTAG and the SIT Thematic Network would share non-confidential data collected by the SIMTAG project during WP1 and WP2 and throughout the project, and that the SIT Thematic Network would have access to the SIMTAG database, albeit subject to restrictions necessary to protect the commercial integrity of the data and the confidentiality of the information relating to specific products and routes of the participating companies. In the event, the SIT Consortium decided not to have a database to be shared with the SIMTAG project but to have a separate website of its own for data collection. That change, we believe, was sanctioned by the European Commission.

The SIMTAG website www.simtag.org was created in the early stages of the project as a means to publicise SIMTAG and to form the basis for storage of documents relating to the project. An initial simple database for capturing the data gathered during WP1 then also had to be developed. It was originally envisaged that the operational database to support the two demonstration corridors would be developed in WP3 but it was, in fact, undertaken in WPs 5 and 7. This led to the development of www.simtag.com, the SIMTAG Portal, set up with a number of user functionalities for Demonstrator 1 which were enlarged and enhanced for Demonstrator 2.

The SIMTAG website contains the following three main groups of functionalities:

- uploading, viewing and manipulation of access rights of files. An uploaded file may also be deleted from the system;
- manipulation of news and forthcoming events. Information about important events regarding the project might be added to the website. This information is then displayed to those who view the web pages; and
- manipulation of the links pages; new links might be added and old links removed.

Users of the website are divided into three types: the administrator, the document user, and the ordinary user. The administrator is the only user who has full access to all the functionality described above. He/she may upload/view any file, change the access rights of any file or remove an existing file from the system. An administrator is the only user enabled to manipulate the news and forthcoming events section and the links section.

The document user (typically, a project partner) may view all documents on the website but has no right to manipulate the access rights of any file. Neither does he/she have the opportunity to upload files. Also, this user has no right to manipulate the news or links sections.

An ordinary user may view all files that are not protected by password. However, he/she has no access to files that are protected by password and is unable to upload a file or change the access right of a file. In addition, this type of user has no influence over the sections covering news/forthcoming events and links.

The SIMTAG website provides access to the following:

- Home Page
- About SIMTAG
- Partners
- Objectives
- Programme
- Technology
- Programme/Project Data
- Project Working Output
- Contractual Deliverables
- Industry Data
- Links
- Disclaimer
- Contact Us

A simple Access database was used to capture the data gathered during WP1. During the course of populating the database with the information, copyright issues were considered and it was decided that the database could not be displayed on the website in its current form. The information was then downloaded onto a CD-Rom. The database and website design were revised during the first part of 2004 to cater for revisions in layout and access. The simple Access database was converted to SQL Server and the tables normalised. Sensitive copyrighted information was removed from the database. Users have been maintained (additions, revisions and access rights).

It has been the policy of the Consortium not to post restricted deliverables onto the website even on the basis of protecting them by password. All public deliverables which have to date been approved by the European Commission have been posted onto the website.

From 1 January 2004 until 26 July 2004, 1,158 visitors had downloaded 4,493 files from the SIMTAG website. The site had received 28,354 hits by 1,352 visitors who had visited the site 3,031 times. Between 18 October 2004, when the website was moved to a new platform, and 31 December 2004, the site had received 21,061 hits by 1,131 visitors who had visited the site 2,087 times. Unfortunately, the statistical data between 26 July and 18 October is no longer available.

The Consortium received a number of enquiries through the project email address advertised on the website – simtag@thomasmiller.com. These enquiries were from technology providers seeking opportunities to provide their services through the SIMTAG Portal; from editors of industry-focused magazines (either IT or the freight transport industry) who wanted to run an article on SIMTAG; and from parties who were interested in finding out more about the project. Enquiries came from a wide geographical area – from South Africa and France to New Zealand. All enquiries were answered individually and promptly.

It is the Consortium's intention to maintain the SIMTAG website for a year beyond the close of the project and to point those who visit the site to the development of Intermode

Services Limited, as the commercial entity sprung from SIMTAG. The Consortium feels that a year will be enough time for the transition to take place and the SIMTAG website will then be closed. Those public deliverables submitted to the European Commission in 2005 which have yet to be approved will, upon approval, be posted onto the SIMTAG website.

There were no major deviations from the work content of the Description of Work in respect of this work package which spanned the two-year duration of the project. The objectives of the work package were met.

6.4 Work Package 4 (Development of Proposals and Recommendations for New Systems)

The Objectives of WP4 were:

- to develop and publish initial proposals for new systems, technologies, processes and standards; and
- to assess and make initial recommendations for the inclusion of partners, the commercialisation and the fit with other initiatives and regulatory changes.

The Technical Annex originally emphasised the creation of hardware but the market changed such that it was now more important for the work to centre on how to bring the data together in a way that would add value. This pointed towards a web portal solution.

WP4 was organised to develop the proposals identified in WP2 from the initial outlines and theoretical recognition of the feasibility of the supply chain model to practical (though necessarily high-level) operational proposals. It was essential to test these proposals on parties outside the Consortium. Hence, two user workshops were held, respectively in Teesside, UK and in Antwerp, Belgium, with the aims of refining the requirements and assisting towards development of the success criteria for the two supply chain demonstrators.

Both workshops provided valuable feedback for the SIMTAG project team and confirmed the benefits of unique movement identification linking across legs of the intermodal journey. They highlighted the possibility of procuring through SIMTAG greatly enhanced data as to events occurring in the supply chain so as to minimise their adverse effects. They identified the need to recognise the increasing independence of provision of service from the suppliers of transportation. The participants assisted and encouraged the project Consortium to evolve a commercial model that would promote confident take-up of SIMTAG itself so as to attract partners and create capability where this did not presently exist and was essential to service provision. The prospect that SIMTAG would link efficiently with high-quality asset identification techniques was welcomed, as was SIMTAG's inherent interoperability with parallel initiatives and technologies.

A number of potential supplier/partner workshops and bi-lateral meetings were undertaken during this work package. The aim of these exchanges was to evaluate the

service, technical and commercial basis for potential inclusion of the supplied technology or service within the SIMTAG concept.

By testing its own research and by discussion with industry experts, SIMTAG has highlighted many direct economic losses and enhanced risks in the present systems which can be redressed by just the sort of improved methodology, linked to better visibility of cargoes, as SIMTAG is well positioned to encourage and accommodate. As a result of this industry feedback, further refinement has been made to the outline Technology Review document appended to Deliverable 2 (Report on Major Risks, Options for Change in Process, Data and Technology and Available Mitigation Strategies) in order to make it a stand-alone document for discussion with suppliers. This document contains the Consortium's recommendations for new systems and processes and has been published as the High-level Requirement Specification for the SIMTAG System (Appendix 3 of Deliverable 4 (Report on Development of Proposals and Recommendations for New Systems)).

During this work package, the Consortium also made the comparison between today's information flows in intermodal supply chain systems, which comprise a "many-to-many" approach leading to slow passage of information, a poor level of visibility and an absence of timeliness in the data, and the "many-to-one" approach to intermodal movements which SIMTAG will adopt.

Once an intermodal movement has been identified, a Journey Plan will be registered and the events that take place in the course of delivery, as the execution of the Plan progresses, will be recorded against that Plan. Documentation necessary for a movement will, similarly, be linked to the Plan. By this means the information necessary to execute a Plan; to recover from failure; and to manage efficiently will be available in a timely way to those who need it. In addition to the access provided to route and cargo data and the means to record events against the Plan (the SIMTAG "Event Log"), other services will be available, being provided by a wide range of partners. Access to these other services will be through the same simple browser interface and will provide capability such as planning tools; additional emergency response capability; information on efficiency and score cards related to performance at various locations and various operations; safety data; and bulletins.

Where standards are emerging or are widely recognised, SIMTAG will adopt them; including ISO numbering (for containers, for example); CMR formats and data; TREM card data; and IMO standards. Where standards do not exist, SIMTAG will be flexible in adopting SIMTAG customers' and providers' preferences and, where possible, multiple formats (for example, score cards and inspection data records). SIMTAG is not, however, trying to set standards itself, nor is it proposing to recommend regulations or norms in the intermodal freight industry (essentially not regulated on a seamless basis but only as to individual transport modes). What the Consortium is proposing is a system that provides the necessary connectivity of information and integration of services passing through each mode to enhance journey co-ordination and to increase visibility of activities in the global supply chain. The SIMTAG Portal provides an innovative use of new and emerging technology and an access point to third-party value-added services related to the intermodal freight transport industry. This, together with the provision of the Journey

Registration and Publishing service and the ability for the Portal to interface with existing systems, provides a novel concept for enhancing visibility of cargo and transport assets in an intermodal transit.

During this work package the Consortium undertook to develop three use cases or scenarios which would illustrate the use of SIMTAG, using UML (Unified Modelling Language)-style use case layouts. This introduces the process undertaken, the data input and output and a brief description of the activity from the perspective of different actors in the supply chain. The use cases illustrated were:

- a manufacturer of product shipping in containers to a customer, where the manufacturer has responsibility for the shipment;
- an end customer awaiting and receiving product shipped intermodally; and
- the provider of a single mode of transport in the chain.

These use cases focus on the simplest early SIMTAG functionality – of registering a transit; monitoring against that transit; and recording significant events. The Consortium then worked on refining its understanding of the detail of the actual processes in the supply chain and whether SIMTAG could play a part in that activity. Data storage and access and access control, which are crucial if the system is to work effectively, were also addressed.

It had become apparent that the systems that currently exist in intermodal freight transportation were fragmented and made more complex “joined-up” journeys, as required by intermodal movements, difficult. Physical and information flows were misaligned, leading to “blind” decision-making in mid-flow and also to unexpected consequences of actions. “Baton passing” in flow management led to poor customer confidence and also to an absence of tracking and management data. The lack of technical and data standards was a disincentive to both investment and change. This, compounded by considerable regulatory variation, by mode and country, contributed to greater costs and inefficiency.

A SIMTAG service could provide a resource where variations would be integrated, thereby offering to the market significant improvement in the time to delivery of new features, together with risk reduction, as users would be less vulnerable to changes in product and sector leadership or to the development of new services and techniques. SIMTAG would act as a catalyst, providing a connectivity capability and supply chain information to suppliers and users without participating in the transaction or trade itself, and would allow SIMTAG users to build on their existing investment, thereby enabling them and the SIMTAG system to gain advantage at low incremental cost.

SIMTAG envisaged connections that, amongst other routes, would include a direct user interface (web browser), electronic interconnection to customers’ systems and links to data capture devices. Methods of payment (who should pay for the service and how payment should be made) were yet to be resolved and formed part of the tasks planned for subsequent work packages.

The Consortium drew up a benefits profile which was tested out on the participants at the two workshops in Teesside and Antwerp and included the following:

- increased visibility;
- harmonised processes;
- reduction in paper-based transactions;
- identification of vulnerabilities;
- process simplification;
- reduction in container idle time;
- reduction of impacts of missing and late information;
- reduction of the cost of delay;
- standardisation – information, processes and assets;
- harmonisation of processes;
- facilitation of intervention;
- facilitation of response; and
- facilitation of modal shift.

The basic notion of the benefits remained unchanged from previous work packages – visibility of process, harmonisation of process and reduction in costs. It was also recognised that SIMTAG offered a general benefit for those who did not have telematics. It would be important for the SIMTAG Portal to do so, in order to gain critical mass in the early stages of commercialisation. Such considerations would be tested in the second demonstrator. Likewise, those who had made investments into initiatives such as CSI and C-TPAT would want to know how their systems would fit with SIMTAG. Discussion on this point at the workshops, mentioned previously in this report, drew out recognition of real benefits from users knowing more about their transit; having access to good track-and-trace services; and being able to authenticate the cargo movement from container stuffing to end-of-journey stripping. SIMTAG also addresses the emergency response need in ways CSI and C-TPAT do not. It was recognised that further analysis would be needed as to who would derive benefit and how that would be sold. This work would go ahead in parallel with the demonstrators.

This work package marked the move from the conceptual stage of SIMTAG into the practical stages of the portal development and business planning.

Deliverable 4: “Report on Development of Proposals and Recommendations for New Systems” was submitted in December 2003 and approved by the Commission.

There were no major deviations from the work content of the Description of Work. The objectives of the work package were fulfilled and the research brought about a fuller understanding of how the SIMTAG Portal would work in readiness for it to be tested in the first demonstration corridor.

6.5 Work Package 5 (Design, Build and Verify Demonstrator 1)

The Objectives of WP5 were to design, build and demonstrate the improved procedures, standards and tools for the safe and efficient management of cargo in transportation and, in particular, dangerous cargo, based on the initial requirements and tailored for the “control corridor”. The work was undertaken in six stages:

1. **Specification:** The detailed specification for the revised systems and procedures was defined, using research findings from previous work packages. This included a detailed definition of the specification for the procedures, standards, tools and technologies that were built and demonstrated in Demonstrator 1, including the method of access to data from this demonstrator.

2. **Systems Build:** The technology systems tools necessary for the proposals were built incorporating:
 - the engineering of the technology applied to the container; the communications infrastructure and the central control systems necessary for the collation of inbound data; the sorting and inferencing; and the outbound transmission to the appropriate parties;
 - the design and build of a prototype SIMTAG Portal system (specifically the Portal itself and the Journey Registration and Publishing tool); and
 - integration of elements of the following services through the Portal:
 - Journey Registration and Publishing service;
 - Asset Monitoring Service (GlobalTracker – provided by TRI-MEX);
 - Emergency Response Service (provided by EUROWATCH); and
 - Safety Intelligence and Documentation Service (provided by eSafeTrans).

This stage included all system and unit testing necessary to ensure effective operation in the field, together with connections to emergency bodies' control rooms.

3. **Process Build:** In this stage procedures and relationships were built as follows:
 - the procedures for the use of the technology;
 - training of operatives;
 - establishment of contact with emergency bodies along the corridor to ensure that the simulation of a supply chain incident was effective from detection to incident response closure;
 - methods for gathering data on effectiveness, cost, benefit and key criteria for success; and
 - implementation and contingency plans for the operation.

4. **Build/run demonstrator: the demonstrator** was operated on a “real” basis and demonstrated the use of real-time information transmitted from on-board sensors and transmitting units fitted to five tank containers.

5. **Evaluate results of the demonstrator:** The assessment on a periodic basis for the results of the demonstrator during its operation.

The demonstrator was structured to conform to the types of measurements and assessments specified within the Validation Plan which was submitted to the European Commission alongside D5.1 “Demonstrator 1: Evaluation Report” (restricted) and D5.1 (public). The results were structured in line with the Validation Plan and related to technical and user acceptance assessments and, to a certain extent, impact assessment of the demonstrator. The demonstrator did not tackle other types of assessment, including financial, legal, market or socio-economic aspects. As a result of the extended run of this demonstrator which was reported in Deliverable 6 “Report of Demonstrator 1 results; specification for the ‘pre-production’ corridor; and recommendations for further activity in processes, standards and procedures”, more detailed feedback on user acceptance was provided. The Consortium felt that the demonstrator had met its objectives and had been successful.

Data was gathered from the corridor results and mapped onto the existing supply chain model from Work Package 2 (Major Risks, Options for Change in Process, Data and Technology and Mitigation Strategies). This helped to highlight the intrinsic importance of documentation in this supply chain and the implications this had on the wider, more generic, supply chain. The supply chain mapping also enabled the Consortium to identify, from the model, target characteristics for the second demonstrator.

During WP5 the Consortium built all the technology systems tools necessary to demonstrate the improved procedures, standards and tools for the safe, secure and efficient management of cargo in transportation. In particular, the key issues addressed by the demonstrator included:

- making data and process more coherent;
- providing timely data on the cargo and its location and movements;
- the means of exchanging meaningful information between supply chain actors; and
- the language and mechanism for end-to-end planning across multiple parties.

The key elements of the demonstrator included:

- development and implementation of the SIMTAG Web Portal;
- development and implementation of the Journey Registration and Publishing application;
- integration of external services, including asset monitoring, incident response and safety intelligence; and
- a telematics device approved for use in Zone 1 ATEX environments.

There were no major deviations from the work content of the Description of Work. However, as mentioned above, whilst Demonstrator 1 was principally dealing with technical and user acceptance assessments and, to a degree, impact assessment, it did not focus on other types of assessment, including financial, legal, market (although the user needs assessment has fed into the market assessment) or socio-economic assessments. This did not impact at all on the development of the project research because these aspects of assessment were covered in Demonstrator 2. It has also to be borne in mind that systems testing and assessment of financial, legal, market and socio-economic

assessments have been ongoing during the commercialisation phase through Intermode Services Limited.

There was also an absence of security documentation in the corridor but this did not represent an absence of benefit, since the processes of data recording and emergency response were tested and recorded and were identical for security documentation, allowing the Consortium to extrapolate security benefits in the supply chain model. This did not have an adverse impact on the project.

As reported in Section 5 of this report, Deliverables 5.1 and 5.2 were submitted in June 2004, instead of May.

6.6 Work Package 6 (Organise and Publish Interim Findings)

The objectives of WP6 were to analyse the results of Demonstrator 1 (the ‘control corridor’); to publish findings and proposals for the opportunities for improvement in cargo transportation and the services, tools and procedures that facilitate these; and to specify both the details of the tests for Demonstrator 2 (the ‘pre-production corridor’) and the systems and technology revisions necessary.

This work package built on the initial data gathering in earlier work packages, including industry statistics, together with the results of the design and operation of the processes in Demonstrator 1, to publish the definitive results of that demonstrator and to define the systems and processes necessary for a production solution.

The work included the following elements:

- the recording in the supply chain model of costs and benefits information arising from the flow of cargo in the first demonstrator;
- the consideration of documentation of the target (production) functionality for the systems and tools necessary to support the benefits case and to be used in the pre-production corridor;
- the provision of commentary on the extent of the changes necessary in regulations, standards and operation to achieve the benefits, in conjunction with the SIT Thematic Network;
- the compilation of statements of the possibilities and impact of harmonisation;
- the production of an outline plan for commercial application and wider take-up; and
- the preparation of a list of unresolved issues and process for resolution.

The deliverable report from this work package was originally meant to be a public report but, in the event, was confidential as it was not merely a summary of Demonstrator 1 results but contained commercially sensitive data gathered as a result of the extended run of Demonstrator 1 during June and July 2004. It also included a variety of pointers towards aims and criteria for successful commercialisation of SIMTAG, both on its technical merits and in the global context of intermodal transport.

During our research under this work package, we also looked into a number of other projects, most of which continued to be mode-specific to rail, whilst recognising the need to connect to other mode operators. These projects included:

- CESAR: an intermodal project of three intermodal operators: Kombiverkehr, Hupac and Cemat (which included information requirements for intermodal transport);
- TEDIM: a group of projects including: (i) RailCom: electronic waybill exchange between Russian and Finnish Railways; and (ii) RailTrack: the Finnish tracking and tracing system RailTrace;
- CROBIT: a project for a corridor-related information system; and
- ORPHEUS: a project to introduce electronic CIMs (the document for the International Carriage of Freight by rail, introduced by COTIF, the Convention Concerning International Carriage by Rail).

The intermodal aspects and interconnection between operators of the different modes, whilst recognised as important, are still embryonic in development.

WP6 then looked at the set-up for the second demonstrator, which would be undertaken in a manner very different from that originally envisaged at the start of the project. Purchase of the Organosilicons Division of Crompton NV by General Electric had meant that the demonstrator expected to involve carriage of cargo by Independent Container Line (ICL) from Antwerp to Richmond, Virginia was no longer possible. After intensive discussion, however, a replacement demonstrator was arranged, involving meat carried intermodally from South-West Africa to the UK.

In addition to demonstrating the inter-connectivity of other forms of technology to the SIMTAG Portal, the Consortium would enhance the range and functionality of services available through the SIMTAG Portal. This would include:

- moving from a home-built Portal to a commercially available Web Portal tool, providing additional functionality;
- user security and authentication;
- enhanced user maintenance of foundation data, such as locations and assets.
- enhancements at Activity level within a Journey Plan to allow concurrent Activities; reporting on efficient use of assets, idle times etc., and critical path analysis.

The completion of Demonstrator 1; the feedback from users; and the opportunity to look at SIMTAG in the context of the intermodal freight transport industry and the supply chain generally gave the Consortium enough information to start outline planning for commercial application and wider take-up. This meant that the Consortium would need to look at the users' expectations of SIMTAG and how SIMTAG could fulfil those expectations.

An important outcome of this work was a clear understanding of the value and some of the benefits that users could derive from using the SIMTAG Portal. It was deemed user-friendly; reliable; provided a good fit with existing business process; avoided the need to re-key data, thus avoiding mistakes and saving time; and avoided the need to monitor and

change temperature of the tank containers by actually going to the quayside and undertaking those tasks, as they could be done remotely through SIMTAG.

WP6 also enabled the Consortium to determine opportunities for process change facilitated by SIMTAG. Benefits from SIMTAG are in two orders: (i) first-order benefits: improved execution of the existing business processes; and (ii) second-order benefits: SIMTAG-facilitated changes in business processes. First-order benefits are primarily driven by:

- data availability;
- data accuracy and precision; and
- validation of process.

Second-order benefits were looked at against three categories:

- change in supply chain process;
- changes in data; and
- changes in standards and harmonisation of activities.

The opportunity for SIMTAG was to identify areas of process inefficiency, as evidenced in Demonstrator 1 and the user workshops, so as to determine the target-efficient process and define the systems and data support necessary to achieve it. This would drive the functionality and priority of the components of the build of the first commercial release of the system that would, in part, be demonstrated in the second demonstrator.

There were no major deviations from the work content of the Description of Work. As reported in Section 5 of this report, Deliverable 6 “Report of Demonstrator 1 results; specification for the ‘pre-production’ corridor; and recommendations for further activity in processes, standards and procedures” was submitted to the European Commission on 9 August 2004, a month later than expected, as a consequence of the extended run of the first demonstrator.

6.7 Work Package 7 (Design, Build and Verify Demonstrator 2)

The objectives of WP7 were to design, build and demonstrate the improved procedures, standards and tools for the safe and efficient management of cargo in transportation, and in particular dangerous cargo, in a more refined form than that shown in the first demonstrator.

The original SIMTAG Demonstrator 2 had been planned around a cargo of chemicals in drums which, after manufacture in Antwerp, would be consolidated in containers there and carried by ship from Antwerp to Richmond, Virginia. After change of ownership in the chemical manufacturing company, this corridor was no longer feasible.

Intensive negotiations by the SIMTAG co-ordinators and TRI-MEX resulted in an agreement whereby SIMTAG could link into the Smart and Secure Tradelanes for Africa Initiative feasibility study, managed by Savi Technology, Inc., as part of the global Smart and Secure Tradelanes Initiative. This replacement demonstrator enabled SIMTAG to

show how its functionalities and benefits linked into third-party systems. It also enabled aspects of the Portal to be tested which were not tested during Demonstrator 1. An additional third corridor, in which dry containers were carried from Tilbury to Hong Kong in an entirely separate transport flow, showed how SIMTAG could benefit a wide range of parties, even if their transport assets were not themselves equipped with telematics devices linked to SIMTAG.

Demonstrator 2 was in two parts: the Africa to UK transit included corridors 2a and 2b in which location and security technology was fitted on dry refrigerated containers; and the UK to Hong Kong transit consisting of corridor 3, in which the benefits of using the SIMTAG Portal without any on-asset technology were also evaluated.

The Savi TSS was connected to users through the Internet and provided registration and XML messages to the SIMTAG Portal as text emails over the Internet. The SIMTAG Portal is viewed with a browser with Internet access.

For Demonstrator 2, the SIMTAG Portal was enhanced with the following features:

1. The Portal was re-engineered using a commercial web-portal development tool in order to improve its scalability and manageability.
2. The Portal was moved onto a web-hosted facility in order to improve its resilience and reliability.
3. User management facilities were extended so that customers could administer their own user communities.
4. The “look-and-feel” of the Portal could be easily tailored to individual customer requirements.
5. The Journey Registration tools were extended to allow the management of concurrent activities on the same Journey Plan.
6. A report function was added to create an overall summary report of a Journey. It could be viewed on screen or exported to other applications (e.g. Microsoft Excel).
7. An enhancement, suggested by UTT during the course of the first demonstrator, was included. This provided the user with the ability to tailor the presentation of key fields to suit his specific preferences; for example, the frequency and level of detail presented.
8. An XML Schema was defined to allow applications such as the Savi TSS to register and update Journey Plans by sending XML messages to the SIMTAG system, where they could then be loaded, viewed and manipulated.

The functionality built for the first demonstrator was used as a model to which enhancements and variants were applied, based on the practical experience gained. External specialist consultants advised on architecture and available portal tools. A use-case model of the Journey Plan Registration process was built and database tables were derived from this. A specification of requirements was developed that drew on the experience gained from the first demonstrator to improve a number of specific aspects of the system and its operation and use.

The SIMTAG Portal was the subject of ongoing development up to 25 October 2004. Whilst the fundamental development was completed by this date, some further changes were made after this date to correct problems as they were identified. Each software change required a reload of the software onto the web server. Despite the introduction of such changes, use of the Portal continued uninterrupted, with only occasional need to log in afresh to access the new functionality.

Demonstrator 2 data was mapped onto the supply chain model. The supply chain model has now documented the key stages of the four supply chains used for demonstration and forms a basis for testing proposals for cost and benefits to be assessed as part of the business planning.

As in the first demonstrator, Demonstrator 2 was structured to conform to the types of measurements and assessments specified within the Validation Plan for Demonstrator 2 which was submitted to the European Commission alongside D7.1 “Demonstrator 2: Evaluation Report” (restricted) and the public version, D7.2. The results were structured in line with the Validation Plan. All three demonstration routes in Demonstrator 2 proved to be successful. A number of issues arose that led, initially, to some spurious data and incorrect reporting of Journeys. However, this was picked up during the monitoring of the trial and work was undertaken to confirm data and reporting validity.

Six high-level objectives were set for the practical demonstration of the programme that the systems, services and technology should address and provide evidence to substantiate. These broad objectives were:

- **Increased cost efficiency** – of using intermodal transport due to improved recording and management of Journey Plans (benefits included reduced idle time and reduction of inventory in the supply chain).
- **Improved safety** – due to better knowledge of the nature of the cargo handled and improved emergency response in case of incident.
- **Improved security** – due to better knowledge of the whereabouts and conditions of the cargo and improved emergency response in case of incident.
- **Improved customer service** – due to more complete and accurate information.
- **Improved market opportunities** – for the organisations using the system.
- **Improved working conditions** – (reduced need for drivers to have an unnecessarily long wait; increased driver confidence of quick and effective incident handling; reduction in the volume of “progress-chasing” calls between transport chain actors; and greater accountability of individuals).

In evaluating the second demonstrator, the Consortium was able to confirm that it had met the broad objectives as to technical and functional specification requirements, as evidenced by the user feedback and corridor results. There were no major deviations from the revised Description of Work contained in the Mid-Term Report covering the period from 1 January to 31 December 2003. Due to the late start of the demonstrator run, however, it was not possible for the deliverable reports to be submitted to the European Commission within the timeframe of the contract and they were, in fact, written and delivered by the project co-ordinator in February 2005, with the agreement of the European Commission Project Officer.

6.8 Work Package 8 (Produce Report on Recommendations)

The objectives of WP8 were to analyse the results of the ‘pre-production’ demonstrator and publish data on the opportunities for improvement in cargo transportation and the services, tools and procedures that facilitate these. The work package further built on the results from WP6, the industry statistics and the results of the design and operation processes of WPs 5 and 7, to publish the definitive results of the project activities.

Deliverable 8 (Report on Recommendations) is a short summary of the findings from the operation of the demonstration corridors, brought together as a set of outline recommendations, the purposes of which were:

- to assist the definition of the functionality of the technology and services for any commercial implementation of SIMTAG;
- to inform a wider community (beyond the SIMTAG Consortium) interested in the operation of the intermodal supply chain of the opportunities for application of technology and services; and
- to provide those parties involved in standard setting and regulation with a view of potential improvements emerging from practical trials.

The intention of this wider distribution of the outputs of this work was that those involved in all aspects of transportation, service delivery, and tool development beyond the SIMTAG project team would be better informed, resulting in more closely aligned activity.

The work undertaken during WP8 took as its base the following inputs:

- the findings from Work Package 6 (the interim findings of the project);
- the feedback from the workshops and interviews with representatives from the freight transportation industry; and
- the results of the practical trials and operation of the SIMTAG system undertaken in the two demonstration work packages (WPs 5 and 7).

Initial work on the deliverable report from this work package was undertaken in anticipation of the integration of the results with the SIT Thematic Network until that programme was terminated. The relationships established through the SIT programme and separately by the SIMTAG Consortium members have allowed the continuing sharing of information on a wider basis and the testing of findings on a broad range of interested parties.

The Consortium confirmed that there was indeed a business opportunity for SIMTAG, principally in supply chain efficiency, operational reliability and supply chain security and safety. As part of the business planning process, the Consortium recommended that further work be undertaken with potential service suppliers to define the potential uptake, gain additional confirmation of the opportunity (on a service-by-service basis) and further quantify the benefits.

The SIMTAG service model will deliver core services which are essential to the control of the SIMTAG offering and added-value services that allow the user to pick from a range of additional benefits that are appropriate to a particular movement. The commercialisation group will develop the supply chain process flow and logical allocation of services to that flow.

There were no major deviations from the work content of the Description of Work. The termination of the SIT Thematic Network in October 2004, however, did prevent the SIMTAG Consortium from discussing their recommendations for increased security, safety and efficiency in the supply chain with SIT.

As reported in Section 5 of this report, Deliverable 8 “Report on Recommendations” was originally scheduled to be submitted in December 2004 but was affected by the late start of the second demonstrator. The submission of Deliverable 8 was therefore delayed until February 2005, with the agreement of the European Commission Project Officer.

6.9 Work Package 9 (Disseminate Results)

The objectives of WP9 were to disseminate the findings of the project, both from the perspective of the Consortium’s early analysis of the freight transport industry and as a means of assessing the exploitation potential of the technical results of the project.

The individual exploitation potential of some of the results of the project is limited, as they are, in fact, products created at milestones in the development of what is ultimately the most important result of all, the launch of a commercial product – the SIMTAG Portal with its associated methodology and services. The results are, however, an important part of what the Consortium has been able to disseminate about progress in the SIMTAG project and how the Portal and ancillary tools have been developed. Details of these results and their exploitation potential can be found in the Technological Implementation Plan.

The Consortium developed a Dissemination Plan which included presenting at conferences and seminars; arranging and running workshops; utilising the project website and database as a dissemination tool; publishing articles in key magazines in the freight transportation industry press; and presenting to industry groups and associations.

One of the tasks under WP9 was to bring together into a single document, for publication and use as a tool for dissemination, the results of the work undertaken during the course of the project and to trace the project’s achievements from inception through to business planning and exploitation. This task was undertaken by METTLE initially, with the assistance of Thomas Miller. The document featured as Appendix 1 in Deliverable 9 (Dissemination Report).

Two workshops were held (one in Brussels on 30 November 2004 and the other in London on 3 December 2004), as reported in Section 4.9 of this report. At these workshops the Consortium was able to demonstrate to audiences of interested industry representatives how the SIMTAG Portal worked and the benefits that could be derived

from it. There was useful and enthusiastic feedback from both these workshops which are reported, in outline, in Deliverable 9. The notes from the workshops were regarded as confidential because sensitive commercial issues were raised and could not be made public.

Other dissemination activities and publications include, for example, the SIMTAG brochure, and conference presentations resulting from the project; attending key events such as the European Commission Cluster Meeting on 22 July 2004 in Brussels and the presentation made to the Strategic Council on Security Technology in Washington, USA, on 7 October 2003; publication of a feature article on SIMTAG in the December 2004 issue of Cargo Security International and other publications which refer to SIMTAG; press releases; work towards standardisation; collaboration with third parties; and presentations made to industry trade associations and other entities including the World Customs Organization, the International Federation of Freight Forwarders Associations and the European Commission's Nuclear Inspectorate.

As a consequence of the SIT project being terminated, the SIMTAG Consortium was unable to work with the SIT team on certain topics, particularly in respect of the arrangement and running of the workshops in WP9 where such collaboration had been planned. This did not, however, have an impact on the success of the workshops.

The dissemination activities have resulted in raising the profile of SIMTAG amongst operators in the freight transport industry. Utilising the material gathered from the workshops described above, the services were categorised and built into an overall services model, identifying core and non-core services, key components of service, target suppliers and capability, and outline benefit and cost. Dialogue with potential suppliers/partners and bi-lateral meetings initiated in October and November 2003 have been ongoing during the commercialisation phase.

SIMTAG's work towards complying with and contributing to existing standards as well as future standards will continue during the commercialisation phase.

There were no major deviations related to the work carried out in this work package. As reported in Section 5 of this report, Deliverable 9 "Dissemination Report" was scheduled to be submitted before the close of 2004 but its submission was delayed to February 2005.

6.10 Work Package 10 (Business and Exploitation Planning)

The objectives of WP10 were to produce a Business and Exploitation Plan, including risk analysis and a draft Marketing Plan, and to begin the execution of the primary tasks associated with taking SIMTAG from a project developing and testing concepts to a commercial entity capable of developing and delivering these aspects in a commercially sustainable way.

Recognising that the work of business planning, exploitation planning and delivery of those plans would need to continue beyond the end date of the EU-funded part of SIMTAG, a new commercial entity, Intermode Services Limited (www.intermode.com), has been established to carry this work forward.

Work has been undertaken, and is documented in the SIMTAG Business and Exploitation Plan, on the assessment and selection of target sectors and customers and the economics associated with these.

Work has been undertaken, and is documented likewise, on the assessment and selection of target sectors and customers and the economics associated with these.

Deliverable 10 (Business and Exploitation Plan) defines the plan for the commercialisation and exploitation of the SIMTAG results through the launch of Intermodal Services Limited.

The work of establishing Intermodal, defining its services, partners costs and benefits is ongoing and Deliverable 10 represents the snapshot of the progress at the time of writing. Of necessity, confidentiality agreements have been signed with third parties that preclude the presentation of some data, specifically on cost and focus of work, and this is so identified in the report where this is the case.

Included in the report are:

- the plan for commercialisation;
- the anticipated costs and revenues (based on assumptions being developed by Intermodal Services Limited);
- the prioritisation and capability of the proposed services;
- partnerships and third-party relationships necessary for delivery;
- analysis of competitors, and strengths and weaknesses;
- proposals for the funding, structure and organisation of Intermodal Services Limited;
- the plan for marketing and publicising the services; and
- evaluation of key target sectors and customers and an outline launch plan.

There were no major deviations from the work content of the Description of Work and the objectives of the work package were met. As reported in Section 5 of this report, Deliverable 10 “Business and Exploitation Plan” was submitted to the European Commission on 22 April 2005.

7. Management and Co-ordination Aspects

The review of the management and co-ordination should at least include:

- *The performance of the Consortium and the individual partners in terms of dedication to the project, motivation and contribution, including supply of deliverables, relevant organisation, management and communication aspects.*
- *Name and contact details of the persons who may be contacted concerning the follow-up of the project.*

The SIMTAG Consortium is a grouping of global commercial companies in insurance, manufacturing, transportation, logistics, services and technology:

Thomas Miller & Co. Ltd (project co-ordinator and insurance risk managers)

TRI-MEX AS (technical solutions provider)

European Road Transport Telematics Implementation Co-ordination Organisation

S.C.R.L. (ERTICO) (European Road Transport Association)

BP Lavera snc (major supplier of chemicals)

United Transport Tankcontainers Ltd (UTT) (carrier)

Isotank Services Limited (tank operator)

DEKRA Consulting GmbH (motor vehicle service provider)

Maritime Engineering and Technology for Transport Logistics Education (METTLE) (maritime contributor)

Independent Container Line, Europe NV (carrier)

Crompton NV (major supplier of chemicals)

A short business background on each of the Consortium partners is provided below:

Thomas Miller & Co. Ltd is an independent company, founded in 1884, primarily engaged in the management of specialised mutual insurance companies (known as “Clubs”) and the provision of other insurance-related services. www.thomasmiller.com.

TRI-MEX AS specialises in cargo monitoring and incident response. Two of its counter-crime services for high-value cargo are EFS (Electronic Freight Security) and EUROWATCH, both of which combat the escalating problem of cargo crime across Europe. www.tri-mex.com.

ERTICO is a public-private partnership promoting and supporting the implementation of Intelligent Transport Systems and services in Europe. By joining ERTICO, organisations can achieve vital synergies across sectors and national boundaries to create a successful European ITS market. www.ertico.com.

BP operates in 100 countries, on six continents, serving 10 million customers every day. Its main activities are exploration and production of crude oil and natural gas; refining, marketing, supply and transportation; solar power; and manufacturing and marketing of petrochemicals. www.bp.com.

United Transport Tankcontainers (UTT) is one of the world's leading global tank container operators specialising in the door-to-door transportation of bulk liquid chemicals and foodstuffs. The company's strength lies in the coupling of its global network with its comprehensive regional networks in Asia, Europe and the Americas. www.utt.info.

Isotank Services provides safe transport and depot services for intermodal tanks arriving into the UK via ports or rail. The company specialises in chemical tank operations and undertakes trucking, cleaning, storage, repair and maintenance, and equipment hire. www.isotank.co.uk.

DEKRA Consulting provides tailored consultancy services covering technical, organisational and commercial aspects, aimed at analysing and optimising business processes. It has traditionally advised the automotive industry but is increasingly diversifying into projects for trade, service providers and public authorities. www.dekra-consulting.de.

METTLE offers wide competence in engineering and innovation for the maritime world from transport and logistics to environment, safety and risk analyses. Its goals are to rationalise abilities and resources in the maritime, transport and tourism industries www.mettle.org.

Independent Container Line, Europe NV (ICL) provides guaranteed delivery of full-container-load cargoes, tailor-made warehousing and distribution services, cargo insurance, documentation and cargo clearances, and cargo tracking and tracing. www.icline.com.

Crompton NV is part of the Crompton Corporation which was formed by a merger in 1999 between Crompton & Knowles Corporation and Witco Corporation. It is a global producer and marketer of speciality chemicals and polymer products and equipment. www.cromptoncorp.com.

The Consortium has worked very well together over the duration of the project. Each partner has broadly been well capable of completing the tasks assigned to it and, where assistance has been required on a general basis, Thomas Miller has been able to assist. TRI-MEX has provided technical help and assistance, where needed.

Goodwill was maintained when, as a result of the sale of the Organosilicons Division of Crompton NV to General Electric in the second half of 2003, the original second demonstrator (also involving ICL as the carrier) was no longer possible. Whilst neither Crompton nor ICL had a full role to play in the Consortium thereafter, they did remain Consortium partners.

Name and contact details of the persons who may be contacted concerning the follow-up of the project.

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Crompton NV	Haven 1053 – Nieuwe Weg 1 Zwijndrect B-2070 Belgium	Yvo Lambrechts, Logistics Manager	Tel: +32 3 250 26 03 Fax: +32 3 250 26 22 Email: yvo.lambrechts@cromptoncorp.com

We were advised on 25 February 2005 that Charlotte Pouderoux, who had been our contact in METTLE during the latter part of the project, would be leaving METTLE on 28 February 2005. The contact details of Carmine Biancardi, Director of METTLE, have therefore been provided instead.

8. Results and Conclusions

We report the Results and Conclusions of the SIMTAG project at four points of focus:

1. Firstly, we record the principal technical Results of the SIMTAG project, and some subsidiary Results.
 2. Next, we mention the Results that are recognisable in the form of substantive Recommendations to the EU and other entities, as to elements of potential improvement in regard to the safety, security and efficiency of intermodal transport, which have emanated from the SIMTAG project work.
 3. Thirdly, we point to the Results and benefits from the project derived by the individual members of the SIMTAG Consortium.
 4. Finally, we draw out the Conclusions of the SIMTAG project.
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8.1 The Principal Technical Results

8.1.1 Recognition of the Central Issue

The Consortium recognised that the central issue holding back improvement and growth of intermodal transport was:

- not knowing where things should be and in what condition they should be; and
- not knowing where things are and in what condition they are.

In essence, the issue that was identified by the Consortium as a pivotal Result of the initial analysis (in WP1) and as the principal driver of risk in intermodal transport is that of discontinuity between the information flows and the physical flows in the supply chain.

Whether of timeliness, level of detail or availability at the point of need, the inability to create and coordinate the information flows – related to movement plans, cargo environment data or security/safety data – with the physical cargo movement does appear to be the principal generator of commercial, safety and security risk in intermodal transport.

This recognition of misalignment and lack of synchronicity stemmed from, and was evidenced by, a number of strategic issues as found and corroborated by our research, namely:

- fragmented systems;
- no timely location information;
- inconsistent/inadequate data standards;
- no end-to-end planning fluency;
- inadequate infrastructure;

- inconsistent regulation;
- historical trading models;
- deficient technical standards;
- poor physical security / access control;
- misaligned responsibility and liability; and
- inadequate infrastructure.

Even as SIMTAG addressed these deficiencies it became clear that new methodology was needed. Hence the development of SIMTAG Portal; the concept of the Registered Journey Plan; the Event Log; the links to global initiatives; and the shape and scope of our two successful demonstrators.

8.1.2 SIMTAG Portal Version 2

The development and testing of the SIMTAG web-enabled Portal (SIMTAG Portal, version 2) and its associated methodology and services is, we submit, the most important result of the entire SIMTAG project.

The SIMTAG Portal stands to enhance the safety, security and efficiency of intermodal transport through many potential applications. Its main innovative features relate to its functionality to assess and react to risk in the intermodal supply chain. It should be able to link with the global US-led intermodal security enhancement initiatives and with the ever-increasing body of regulations which require much more proactive control of hazardous goods, food cargoes etc. than in previous years.

The Portal is capable of being linked to third-party systems, including Enterprise Resource Planning (ERP) systems and other business management systems. It will bring benefits and cost savings even to large global groups in integrated operations. It will be of particular benefit to small and medium-sized enterprises (SMEs) and will greatly improve intermodal transits which do not involve use of on-container telematics. This capability will assist the import and export trades of developing countries.

The Portal will allow selected service providers to achieve connectivity with users of SIMTAG's methodology, the latter being based on production of a registered Journey Plan for each intermodal transit. It allows actors (for example, freight forwarders or consignee interests) or stakeholders (for example, emergency services) to ascertain, from transparent real-time information within their respective authorised enquiry zone, where the cargo is and what is its condition, and to enable them to be aware of any discrepancies within the paper or electronic documentation relating to it.

A description of the SIMTAG Portal, version 1, which we classify as a subsidiary technical Result, is set out in 8.2.2 below. As a proof of concept, it worked fine, and it was successfully trialled in Demonstrator 1. It provided core services, namely those essential to the control of what SIMTAG itself offers; and added-value services, allowing the user to pick from a range of additional services appropriate to a particular intermodal movement.

For Demonstrator 2, the SIMTAG Portal was enhanced with the following features:

- the Portal was re-engineered using a commercial web-portal development tool in order to improve its scalability and manageability;
- the Portal was moved onto a web-hosted facility in order to improve its resilience and reliability;
- user management facilities were extended so that customers could henceforth administer their own user communities;
- the “look-and-feel” of the Portal was refined so as to be easily tailored to individual customer requirements;
- the Journey Registration tools were extended to allow the management of concurrent activities on the same Journey Plan;
- a report function was added to create an overall summary report of a Journey. It can be viewed on screen or exported to other applications, such as Microsoft Excel;
- an enhancement was introduced to provide the user with the ability to tailor the presentation of key fields to suit his specific preferences; for example, as to the frequency and level of detail presented; and
- an XML Schema was defined to allow SIMTAG to take data feeds from a third-party tracking and tracing or cargo monitoring system.

8.1.3 The Basis for Commercialisation

The basis for the commercialisation of SIMTAG by Intermodal Services Limited has sprung from the fundamental belief of the SIMTAG Consortium that the application of appropriate technology to intermodal transportation could improve safety, security and efficiency whilst also delivering commercial benefit. As was stated at page 113 of Deliverable 1a, issued five months into the project timetable, “The SIMTAG Consortium will concentrate on development of a commercial system that stands alone (i.e. can pay for itself).”

It was also confirmed at that time and in the same deliverable that SIMTAG would focus on identifying and demonstrating technology and process that would “improve efficiency within the intermodal distribution process (and) which bring with them associated safety and security benefits”. In doing so, the Consortium’s aim would be “to identify the areas where we can make a significant difference to efficiency and risk reduction rather than concentrating on a wide range of risks where our input will have only insignificant effect, the results will be costly and have very little benefit for users. Our approach will, necessarily be narrow but in depth.”

The Consortium’s analysis had shown that “if we can find technology and process changes to ensure that ‘planned equals actual’, then the root cause of the majority of issues will have been dealt with”. Good ideas and the prioritisation of user needs came from the user workshops, in Teesside and in Antwerp in 2003 and then in Brussels in 2004, and were subsequently addressed in the London workshop in 2004, which gave a good opportunity for us to learn directly from several innovative global service suppliers how their services, when offered via the SIMTAG Portal, could be among those which would meet these needs.

In Section 7: “Outline Planning for Commercial Application and Wider Take-up” of Deliverable 6 (August 2004) it was reported that potential users and the Consortium jointly considered SIMTAG should “reckon to accelerate achieving critical mass by according with obligations faced by supply chain actors (rather than only looking to commercialise its offering in fields of activity where there would be little, if any, regulatory pressure prompting take-up)”. Fulfilling the expectations of the SIMTAG system would, it was clearly recognised, “require the Consortium to take full account of current legislation and regulations and what changes might be in prospect”. Many members of the Consortium had paid close attention to both recently introduced and impending regulations during the Consortium’s survey, enquiry and interview work in WP1. They continued to feed in up-to-the-minute material and reports of the fast-changing international regulatory position as the project continued. Close contact established with the World Customs Organization enhanced and accelerated this process.

At a Consortium meeting in London on 19 September 2003 the Consortium discussed the possibility of setting up a company through which to exploit the Portal. It had already been recognised that the window of opportunity was small and that it was important to work straight away to capitalise on it. It was accordingly considered appropriate that a distinct commercialisation group should be set up, drawn from Consortium members who wished to participate and from non-members who had something to contribute that was outside the particular expertise of the Consortium partners.

As the project coordinator, Thomas Miller undertook to take a lead in establishing this parallel work stream. As it would be led by focus on the needs of customers rather than by technology and R&D, this work involved much continuing, and intensive, enquiry into the needs of leading operators in the intermodal markets. In this respect we were much assisted by Mr Nigel Palmour of APL, one of the largest global logistics operators. We are happy to acknowledge his help gratefully in Section 9 of this report.

8.2 Subsidiary Technical Results

The subsidiary technical results of the SIMTAG project include:

8.2.1 High-level Requirement Specification for the SIMTAG System

The High-level Requirement Specification for the SIMTAG System contains the Consortium’s recommendations for the new systems and processes. The SIMTAG Portal version 2 was designed on the basis of requirements which were all met and which included:

- the concept of a Journey of a single consignment as an essential entity to be managed during and intermodal movement;
- the allocation of a unique identity reference to a Journey, linked to the container identity number;
- the concept of a Journey as a set of Activities with start and end locations and date/times and a responsible Actor;
- the ability to monitor the progress of a Journey and the condition of the goods by the use of remote telematics on the container;

- the ability to share documents electronically among authorised users through a web browser interface;
- the ability for authorised users to view and manage a Journey through a web browser interface;
- the ability for a user community to be defined and managed by a user authorised by the system administrator;
- the ability to enter data automatically from third-party applications by email or other Internet protocol by adoption of an XML Schema; and
- the ability to provide relevant information or services, particularly emergency response services, through web-connected third-party services.

8.2.2 The SIMTAG Portal Version 1

This version of the Portal was developed in-house by TRI-MEX, based on a service-oriented architecture. It integrated from inception EUROWATCH, a police response system; GlobalTracker, an asset tracking and monitoring application; and eSafeTrans, a hazardous materials intelligence system. The functional architecture of the Portal was developed as a result of recommendations and advice from expert subcontractors. It efficiently delivered core services and connectivity to related services, and provided a configurable user interface with security management features.

8.2.3 The SIMTAG Supply Chain Model

The SIMTAG Supply Chain Model (incorporating a risk model) is an electronic supply chain model running on a standard Windows™ PC. The model, originally built during WP1 as a means to record the operation of the supply chain from the data gathered in interviews and research, was extended in WP2 to provide the basis for risk assessment and improvement measurement; this latter using a number of scenarios or “use cases”. Standard technology and terminology were used, drawing on existing models, approaches and public domain methods. The model was kept as simple as possible to facilitate the sharing of the results across the SIMTAG Consortium.

The SIMTAG supply chain model was developed to meet certain clear objectives which included:

- the codification of the complex processes in the supply chain, thereby allowing a common language to describe its current working and recommendations for change to process, administration, operation and data;
- provision of a basis for “bench testing” proposals and recommendations;
- provision of an underpinning standard for the calculation of risk;
- definition of common approaches (scenarios) that allow the number of variables to be reduced, making the problem of assessment and quantification feasible; and
- development of a referenceable baseline for future work.

The design of the SIMTAG supply chain model reflected two principal needs – the definition of the supply chain (its information and physical flows); and the need to test the impact of mitigation strategies on the level of risk. It has four layers, starting at Level 1 with a high-level version of the entire supply chain. Level 2 shows the breakdown of stages in the chain, as to the principal steps and information flows, the responsibility handovers, the identification mechanisms, technology and key performance indicators. It

also addresses the identification of risks, develops a risk “score card,” and forms the basis for the mitigation assessment. Level 3 provides, for selected stages such as nodal changes, a more detailed breakdown of the flow of information and goods. Level 4 provides an Excel breakdown of the stages to facilitate numerical analysis and the definition of the key scenarios used in bench-testing of proposals. The model links process steps to process attributes, including performance metrics, performance targets, and process cost data.

8.2.4 The Telematics Device Used in Demonstrator 1

Because of the stringent requirements of use in hazardous/explosive environments, such as the Lavera petro-chemical manufacturing site which was the point of loading for the intermodal cargo of PIB in Demonstrator 1, a special telematics device had to be built.

8.3 Recommendations

In Section 4.8 of this report we list a number of recommendations for the improvement of security, safety and efficiency of intermodal transport. We align these respectively toward policy makers, processes and standards. They resulted from, or were stimulated by, the interviews in the initial stages of the project, our two demonstrators, and the workshops with representatives of the transport industry. There was a substantial amount of formative work leading to these Recommendations that was captured in Section 4 of Deliverable 6, issued on 9 August 2004. Many were corroborated, and some expanded, linked or refined, by the work of Cluster 2/2004 of the SIT Thematic Network project, where there was opportunity to review a wider range of material in both the public and private sectors as to intermodal security. There was also a detailed presentation and discussion of them in Deliverable 8, submitted on 21 February 2005.

8.4 Results for Individual Consortium Members

The benefits derived by each respective member of the SIMTAG Consortium have been set out in Appendix 1 of the Technological Implementation Plan.

Briefly reviewed, these benefits and expectations, which should be considered as among the results of the SIMTAG project, are as follows:

Thomas Miller, for whom this was the first opportunity to coordinate an EC RTD project, gained much hands-on experience from managing a broad and talented team of ten companies based in different locations throughout Europe. The results of so doing include making a wide range of excellent contacts, not only within the Consortium but also with many of those individuals who attended the workshops, and the commercial entities, research institutes or trade associations they represented. On the strength of these opportunities and the EC Cluster Meeting in Brussels on 22 July 2004 at which SIMTAG was presented, a number of invitations have been received for Thomas Miller to participate in new research proposals and Thomas Miller became a member of ERTICO. Thomas Miller is pleased to have had the opportunity to become the lead shareholder in Intermode Services Limited.

The SIMTAG work gave Thomas Miller a basis to take further its dialogue with many of the leading global logistics groups and with the World Customs Organization. It has also provided another topic and a new range of expertise which the company is able to bring to its ongoing dialogue and participation in several international forums, including the IAPH, ICHCA and FIATA. The links between SIMTAG and the SIT Thematic Network, though truncated by the closure of the latter project, gave access to, and dialogue with, individual specialists and centres of excellence in the public and private sectors whom we would not otherwise have been able to meet as easily. Several of these related directly to the US-led global security initiatives; in parallel others have opened up for us a greater understanding of EC policy and development priorities.

TRI-MEX has been the technology partner in SIMTAG. They too have gained or reinforced a wide number and variety of contacts and new relationships. They have also found that the context of the SIMTAG project has provided credibility when dealing with organisations and suppliers, and in the international arena. The result achieved by TRI-MEX in procuring and operating the sophisticated bespoke telematics device for Demonstrator 1 brought them new technical links and insights. Even more so did the evolution of the SIMTAG Portal.

As a result of the SIMTAG project, TRI-MEX gained hands-on experience of integration of third-party web services and, from the context of the second demonstrator, the designing and use of an XML Schema. They also gained knowledge as to the details of supply chain processes, risk assessment and insurance, and the perspectives of shippers and freight service providers.

ERTICO gained, as a result of the SIMTAG project, an in-depth knowledge of dangerous goods transportation within the EU and established relationships with experts on this subject in the UN and in EU member states. ERTICO also gained substantial knowledge on transportation security issues, solutions, state-of-art, current security initiatives and the location of specialists and knowledge sources on security.

Likewise, SIMTAG yielded for ERTICO great benefit from the thorough analysis of the transport logistics supply chain, which knowledge ERTICO is expecting to put to good use in the contexts of commercial vehicles, Galileo and cooperative systems and in assisting its members towards successful commercial deployment. ERTICO found new contacts outside its core business, especially among shipping organisations, security organisations, the chemical industry, and in the field of hazardous goods. ERTICO perceives the recruitment of Thomas Miller to its membership as adding to its activities the important and beneficial perspective of insurance and risk management.

BP considers that the SIMTAG project's outcome has met its expectations and has been pleased by the opportunity to share expertise and experience with the rest of the Consortium, and to project the shipper's view and requirements of a tool such as SIMTAG, including the important need for SIMTAG to have good integration capability with leading global e-Business network technologies. Through the project BP has been able to assist its own logistics service providers to explore new technology and BP considers that it will be part of its own responsibility, as a shipper, to push for the adoption of something like SIMTAG in its distribution chains.

Isotank has, through SIMTAG, opened up many new contacts, within and outside transport. The shared experience and opportunity to discuss new concepts and approaches will result in some new business methods in the company, while Isotank is pleased to have brought the sharp practical end of its specialist business and supply chain experience to the fore in the Consortium's work. Isotank has, as a result of its dialogue with TRI-MEX in SIMTAG, gained useful knowledge of the potential use for portals and other technical computer devices.

UTT considered the SIMTAG project to be structured in a particularly positive manner. The company and its senior management found much in the project that was interesting and, from an I.T. point of view, most educational. The project allowed UTT to contribute towards the future of safer global intermodal transport and also to establish contacts in non-transport fields. The company especially appreciated the direct and interesting discussion interface with EC DGTREN.

UTT has worldwide reach and has already found its international staff keen to see SIMTAG materialise as soon as possible to assist them with documentation and associated problems.

DEKRA benefited from contributing to the research in WP1 and from its overall material and conclusions. As a result of participating in WP2, they acquired better knowledge of the risks in intermodal chains, a recognition of the advantages of greater transparency, and a new awareness of options for change and approaches to risk mitigation. The SIMTAG Portal initiative gave them interesting input into the development of their own web portal, DekraNet, and towards its commercialisation. They especially appreciated the advice from Mark Holford of ShipServ at the Brussels workshop as to building up a successful business and the presentation by Guy Mason on Business Planning and Exploitation at the final Consortium meeting on 6 December 2004.

METTLE will, as a result of their participation in SIMTAG, use their knowledge of SIMTAG in future EC projects in the intermodality sector. Participating in the SIMTAG project has given METTLE new contacts, new knowledge about the supply chain, and improved technique as to intermodal transport process.

ICL were keen to participate in SIMTAG. In hosting the Antwerp workshop in October 2003 they gained a great deal of insight into user requirements of a portal system such as SIMTAG, especially as to the chemical industry, from which many of their customers are drawn. Their colleagues in the USA were very interested in SIMTAG, particularly as to the impact of the US initiatives on the European end of their business. ICL considers there will be many opportunities to make use of the SIMTAG product in the market.

Crompton were pleased to be asked to participate in SIMTAG as it would be addressing safety, security and efficiency problems in the supply chain. They saw the visibility of the supply chain provided by the SIMTAG Portal as making it possible for those who subscribed to it to be "fast-tracked". Apart from being prospectively a direct advantage to them, the SIMTAG process would also result in more time being available for the port authorities and Customs to inspect other cargo whose provenance might not be so obvious, thereby increasing safety, security and efficiency all round. The results of the

project gave Crompton the view that SIMTAG could play a pivotal role in intermodal transportation in Europe and globally.

8.5 Conclusions of the SIMTAG Project

The Objectives of SIMTAG are set out in Section 3 of this report. The technical achievement has clearly met those objectives. With a focus on avoiding introducing innovation or standardisation incompatible with commercial efficiency, SIMTAG has shown that it has great capacity to improve efficiency in intermodal transport and facilitate change in the manner in which that transport is managed. It has also demonstrated that the SIMTAG web-enabled Portal is a suitable medium through which selected suppliers can deliver beneficial services to intermodal transport users.

SIMTAG's principal methodology is based on its ability to address the discontinuity and lack of synchronicity between the information flows and the physical flows in the supply chain. This capability was built on a carefully developed and thoroughly analysed supply chain model, extended to incorporate a risk model and thereby providing the basis for risk assessment and improvement measurement.

Commercialisation of SIMTAG was, from inception, a clear objective of the project. It is now proceeding apace through Intermodal Services Limited. Great attention is being paid to aligning Intermodal Services Limited's commercial offering to the needs of the intermodal transport industry, both from the point of view of shippers as well as those of intermediaries and carriers. This is especially so in regard to cost and as to the avoidance of process disruption or duplication during take-up.

Even before the SIMTAG Consortium started its work, it had become clear that the US security initiatives introduced after the tragic events of 9/11 would play a key role in changes to intermodal transport. Although the transatlantic second demonstrator originally planned had to be abandoned after Crompton, the shipper of the cargoes involved, sold its Organosilicons Division to General Electric, the SIMTAG Consortium maintained a lively awareness of the need for prospective alignment to the requirements of the US Department of Transportation. Indeed, the arrangement of the substitute second demonstrator as participation by SIMTAG in the Smart and Secure Tradelanes (SST) for Africa feasibility study enhanced this opportunity and focus. SIMTAG was thereby assisted to meet in large measure its underlying aim of being, so far as possible, a practicable and well-tested initiative delivering a truly global methodology.

Among the key elements originally projected for SIMTAG were research and technical development of cargo BlackBoxes. This objective was demonstrated in practice through the procurement and operation of the special tracking device suitable for explosive-risk environment in the first demonstrator. Overall, it soon became apparent that a broad range of technologies capable of fulfilling the BlackBox role was being developed and marketed by manufacturers and systems specialists in worldwide applications. With the agreement of the EC Project Officer, SIMTAG therefore changed its focus radically, away from the technology of data *collection* and towards the management of data *use*. Data collection tools and technologies are being developed at speed by a large number of companies, where competition is based on manufacturing efficiency and R&D budget. The unlocking

of value from this data is currently much less well developed and is unaddressed on anything but a single company narrow purpose basis by some companies operating in the supply chain. This focus on maximising the benefit from data has therefore resulted in a shift by SIMTAG away from the focus on BlackBoxes and towards the development of its own Web Portal and unique data referencing and web services integration. This has opened up an exciting opportunity for SIMTAG to play a much wider role in enhancing the safety, security and efficiency of intermodal transport.

Analysis of the resources required to ensure compliance with the new global security and safety initiatives related to intermodal cargoes and their transportation pointed out real possibilities for SIMTAG to emerge as an important enabler of compliance. Thereby SIMTAG could perhaps look ahead to a plausible and sustainable role in which services, duly authorised, accredited and certified, when delivered via the SIMTAG Portal, could directly facilitate fast-tracking of cargoes and assist as outsourced contractors from international and national agencies.

We have much appreciated the appropriately taut yet approachable and practical guidance we have received throughout the project from Mr Mark Major, the EC DG TREN Project Officer.

Finally, we would like to state that the conclusion of the SIMTAG project with results which we trust meet the expectations of the EU has been due to a great deal of hard work, initiative, stamina and flair on the part of the members of the SIMTAG Consortium. It has been a pleasure to coordinate the Consortium's activity.

9. Acknowledgements

All members of the Consortium participated at a very encouraging Kick-off meeting and indicated clearly which elements and potential outcomes for the project they respectively regarded as most important. That greatly assisted in building the essential platform of work in the early stages of the project. **DEKRA** compiled at short notice a brilliant German translation of the complex Interview document. They and **ERTICO** participated to great effect in gathering material for SIMTAG's survey and review of existing procedures in WP1 and in undertaking an important range of enquiries in the public sector, with police and emergency services, and with international agencies and trade associations. ERTICO thereby also played a prominent role in the interview process. We would like to record our thanks to all the 19 entities who agreed to be interviewed and who thereby gave SIMTAG a lot of extremely important insights and encouragement. **METTLE** kept going stoically in the challenging task of gathering information and national statistics, especially on transport incidents involving hazardous cargoes. We are grateful for all this important work.

The first demonstrator owed much of its success to the readiness of **BP**, **Isotank** and **UTT** respectively to share with the SIMTAG project the perspectives of the shipper, the haulage supplier, and the specialist transport contractor and depot operator. The corridor from Lavera to Hull provided many elements of operational activity which were close to ideal as a basis for SIMTAG's research and for evaluation of its evolving methodology and functionalities. The dialogue with these three SIMTAG participants included much that was related directly to day-to-day operational and management actions and thereby assisted SIMTAG to evolve and evaluate the prospective benefits it can offer to supply chain actors and pointed towards linkage with modern corporate management and logistics systems and Enterprise Resource Planning programs. As the demonstrator proceeded, we particularly benefited from the commitment of the UTT account manager in Lavera, Ms Sylvie Gomez, who also contributed much valuable commentary on SIMTAG's potential to bring about significant cost savings in intermodal transport management sequences. Her colleague Colin Humphrey contributed from his wide experience in the chemical industry to help us align SIMTAG to good practice in respect of hazardous cargoes (and emergency response). On this topic John Wilson of Isotank, who drew out invaluable insights from the realities of supply chain operational response, also shared his front-line expertise, especially showing how pivotal is the need for documentary synchronicity in intermodal transport.

ICL and **Crompton** kindly contributed much to the early thinking surrounding the long-form questionnaire and its use in interviews in WP1. They also helped to plan, and stood ready to operate, the second demonstrator from Antwerp to Richmond, Va., and it was only due to the sale of the Organosilicons Division of Crompton to General Electric, resulting in the choice of a replacement demonstrator, that their involvement in the project became inevitably less intensive.

We are grateful to **Savi Technology, Inc.** for giving SIMTAG the opportunity to collaborate in the SST for Africa Feasibility Study, thereby providing the basis for SIMTAG's replacement second demonstrator and enabling SIMTAG to illustrate the

ability to accept data through an XML interface from a third-party tracking and response system. This collaboration with Savi further illustrated the profile of SIMTAG and its potential to be versatile and cohesive in the provision of global improvements to intermodal transport.

We wish to thank **the Bernard Group** for their willingness, as volunteers, to assist SIMTAG through the medium of corridor 3 of Demonstrator 2, thereby enabling SIMTAG to demonstrate and evaluate the benefits of using the SIMTAG Portal without any on-asset technology. This exercise drew out a key selling-point for SIMTAG in relation to the mass of containers currently in transit which do not make use of electronic seals or other telematic devices but as to which relevant actors can derive significant benefits through SIMTAG in increased safety, security and efficiency in the supply chain.

Isotank, ICL and ERTICO hosted workshops, respectively in Teesside, Antwerp and Brussels, in which delegates brought to the centre of the SIMTAG project much that would otherwise have been very difficult to find out in the field. We appreciated the readiness and energetic work of these three Consortium members and especially also of Colin Humphrey of UTT in attracting a good range of outside delegates to the workshops and in encouraging them to join in lively and usefully hard-hitting discussion. We are grateful to all the delegates, and those who attended the London workshop, who gave freely of their time in spite of their own heavy commitments, and who patiently clarified and expanded on many essential aspects of everyday commercial and operational practice in intermodal transport.

We also wish to thank especially **Nigel Palmour, Europe Claims Director of APL**, who, as a volunteer, gave Thomas Miller and TRI-MEX much sage and practical commentary on the range of issues that arise in global supply chain planning and management.

Michael Onder of the US Department of Transportation gave us a pivotal text on supply chains which greatly assisted our understanding of global supply chains, the build of a four-layer supply chain model, and the compilation of Deliverable 1b “Standard supply chain model for information and physical goods flows” with accompanying CD-Rom in June 2003. Mr Onder also provided US links for the SIT Thematic Network, whose coordinator **Buck Consultants International** assisted ERTICO and other SIMTAG Consortium members in disseminating SIMTAG and in recruiting delegates to the workshops.

We recognised from inception that the work of **TRI-MEX** would be intensive and pivotal throughout the project. So it proved. We would especially like to thank them for taking a good deal of weight at many crucial stages, not least in preparation, operation and analysis of the demonstrators and in their discussions with potential service suppliers. Without their bespoke procurement of the special tracking device the first demonstrator would have been frustrated. They gave a vital lead towards the transition from BlackBoxes to the recognition and implementation of the SIMTAG portal and its associated methodology and services as the key result of the project. In many meetings and at the SIMTAG workshops, their clear and concise technical presentations stimulated contributions from participants not only within the agenda material but across the wider contexts of global logistics and supply chain management.

In relation to the work of Thomas Miller, we would like to give special thanks to **Andrew Webster** who, despite intensive responsibilities and a taxing travel schedule as TT Club Loss Prevention Director, achieved a major breakthrough when he presented SIMTAG to the Strategic Council on Security Technology (SCST) in Washington in October 2003. He liaised effectively with FIATA, the IAPH and ICHCA. The WCO, with which he had detailed discussions in relation to its Integrated Supply Chain Management Guidelines, co-opted him as a member of its Task Force on Trade Facilitation. He also, with **Andy Kings** of TRI-MEX (whose expertise as to portal development and RFID state-of-art is much respected), played a crucial role in bringing about the replacement second demonstrator, by discussions with Savi Technology, Inc. and with the Bernard Group. We would also like to record our thanks to **Guy Mason**, who brought to the teamwork special ingredients in his knowledge of supply chains and the enterprise resource management operations of global retail procurement and from his detailed familiarity with the rail industry and European freight transport integration. His presentational acumen and his ability to draw together enthusiasm and contributions from a wide variety of audiences were demonstrated many times during the project, most of all perhaps when he and Marion Robery presented SIMTAG to the EU Cluster Meeting in Brussels on 22 July 2004.

Thanks should also be recorded to **Alan Bradshaw**, in-house consultant to Thomas Miller and project evaluator, for the expertise he brought to bear on the development of Validation Plans for the two demonstrators. He provided just the right mix of rigour and pragmatism to ensure that the testing of system functionality was fair and correct.

The entire Consortium pulled together with lively democracy and in an informal yet effective style. There was well supported commentary and enquiry from the Consortium at many stages of the project. Members contributed productively in conference telephone calls, in invigorating and often fast-moving debate at Consortium meetings and workshops, and in disseminating SIMTAG in the international arena. To the entire SIMTAG Consortium we offer our thanks. It has been a great pleasure working with them and coordinating the team effort.

Marion Robery
Francis Frost

London
4 May 2005

10. References

1. Reference on page 14 of this report to the conclusions reached by the SIMTAG project that the major supply chain risk to efficiency, safety and security was in the area of information discontinuity. Similar conclusions had been reached by the Smart and Secure Tradelanes (SST) Initiative SST White Paper, May 2003 and presentations at the International Port Security Symposium 20 May 2003, Rotterdam and European Supply Chain Summit 2003, Luzern.
2. Reference on page 38 to “touch-point” resources – those resources necessary to service a container at stages of the supply chain, such as inspection.

11. Glossary

ACSD	Advanced Container Security Devices
ASP.NET	A computer language originally published by Microsoft in 2002, and subsequently enhanced by a community of developers.
ATEX	Equipment and protective systems intended for use in potentially explosive atmospheres “ATEX” – EU Directive No 94/9/EC – is a so-called “New Approach” Directive which provides the technical requirements to be applied to equipment intended for use in potentially explosive atmospheres. It is named after the French “Atmosphère Explosible”. The Directive became mandatory on 1 July 2003. The BP petrochemical plant at Lavera falls under the requirements of ATEX Zone 1.
CEFIC	Conseil Européen de l’Industrie Chimique/ European Chemical Industry Council
CIM	Règles uniformes concernant le transport international ferroviaire des marchandises (Uniform Rules concerning the Contract for International Carriage of Goods by Rail): COTIF, Article 3.1.
CLECAT	European Association for forwarding, transport, logistic and customs services.
CMR	Convention on the Contract for the International Carriage of Goods by Road 1956 (Convention relative au contrat de transport international de marchandises par route 19 mai 1956)
CNC	Compagnie Nouvelle de Conteneurs
COTIF	Convention relative aux transports internationaux ferroviaires (Convention Concerning International Carriage by Rail).
COTS	Commercial Off The Shelf
CSI	Container Security Initiative
C-TPAT	Customs – Trade Partnership Against Terrorism
DotNetNuke	A commercial web-portal development tool
ECSA	European Community Shipowners’ Association
ECTA	European Chemical Transport Association
EDI	Electronic Data Interchange
EPC	Electronic Product Code
ERP	Enterprise Resource Planning (system)
ETA	Estimated Time of Arrival
EU	European Union
Falcom STEPP	A proprietary integrated GPS receiver and GSM modem, used as a core part of the bespoke telematics device.
FEPOR	Federation of European Port Operators
FIATA	Fédération Internationale des Associations de Transitaires et Assimilés (International Federation of Freight Forwarders Associations)
FTA	Freight Transport Association (UK)
GPS	Global Positioning System
GSM	Global System for Mobile Communications is the pan-European standard for digital cellular telephone service.
HTTP	HyperText Transfer Protocol – an Internet standard
ICHCA International Ltd	International Cargo Handling Co-ordination Association International Limited

IL	ICHCA International Limited
IMO	International Maritime Organisation
IP	Intellectual/industrial property (rights)
ISO	International Organization for Standards
ISO TC 104	ISO (International Organization for Standards) Technical Committee on Freight Containers. Standardisation of freight containers, having an external volume of one cubic metre (35.3 cubic feet) and greater, as regards terminology, classification, dimensions, specifications, handling, test methods and marking.
ISPS	International Ship and Port Facility Security (Code)
Namport	Namibia Port Authority
PIB	Polyisobutylene (trade name “INDOPOL”)
POD	Proof of Delivery
RFID	Radio Frequency Identification Device
SCST	Strategic Council on Security Technology
SIT Thematic Network	Safe and Secure Intermodal Transport Thematic Network
SME	Small and Medium-Sized Enterprise
SMS	Short Message System – a system of sending 160 character messages over cellular (GSM) telephony
SMTP	Simple Mail Transfer Protocol
SNCF	Société Nationale des Chemins de Fer Français
SSCC	Serial Shipping Container Code (the EAN.UCC number comprising 18 digits for identifying uniquely a logistic unit – licence plate concept)
SSL	Secure Socket Layer
SST	Smart and Secure Tradelanes
TIP	Technological Implementation Plan
TERN	Trans European Road Network
TREM	Transport Emergency Card
TSA	Transportation Security Administration
TSS	Transportation Security System
UCR	Unique Consignment Reference (number)
UML	Unified Modelling Language
UN	United Nations
UNNO	United Nations Number
UN/CEFACT	United Nations Centre for Facilitation of Practices and Procedures for Administration, Commerce and Transport
USDOT	US Department of Transportation
USTDA	US Trade Development Agency
WCO	World Customs Organization
XML	Extensible Mark-up Language
XML Schema	Definition of XML format
Zone 1	A zone classification under the ATEX Directive, meaning that a potentially explosive atmosphere may occur. This is the classification applied to the BP plant at Lavera.