



SEVENTH FRAMEWORK PROGRAMME

VIT

Vision for Innovative Transport

Project partly funded by the EC
Grant agreement no. 222199

SP4-Capacities - Research for SMEs

FINAL PLAN FOR USING AND DISSEMINATING THE KNOWLEDGE

Deliverable D7.2

Release date 29 January 2010

Work package number WP7

Work package title Dissemination and training

Activity Type OTH

DOCUMENT AUTHORS

Renzo Ferraris (ILOG Iniziative Logistiche srl)

Michele Molinari (Molinari Rail AG)

Thomas Keese (WITT Industrie Elektronik)

Rienk Bijlsma (Systems Navigator)

AUDIENCE

The present document is filed as PUBLIC.

Table of contents

USING THE KNOWLEDGE	4
O1.1 STUDY, DESIGN OF A REDUNDANT VISION SYSTEM FOR LOAD/UNLOAD	4
O1.2 PROTOTYPING OF A REDUNDANT VISION SYSTEM FOR LOAD/UNLOAD	4
O2.1 STUDY OF METHODS FOR VERIFYING THE CORRECT TRAIN LOAD	5
O2.2 DESIGN AND PROTOTYPING OF METHODS FOR VERIFYING THE CORRECT TRAIN LOAD.....	5
O3.1 STUDY OF METHODS FOR VERIFYING THE CORRECT TRAIN COMPOSITION	5
O3.2 DESIGN OF METHODS FOR VERIFYING THE CORRECT TRAIN COMPOSITION	5
O4.1 STUDY, DESIGN OF A VIDEO-SURVEILLANCE INFRASTRUCTURE FOR HUMAN OPERATOR SAFETY	6
O4.2 PROTOTYPING OF A VIDEO-SURVEILLANCE INFRASTRUCTURE FOR HUMAN OPERATOR SAFETY	6
CONCLUSIONS	7
DISSEMINATION OF KNOWLEDGE.....	14
RECIPIENTS.....	14
STRATEGY AND MEANS.....	15

USING THE KNOWLEDGE

The knowledge deriving from the single work packages of VIT has been and/or will be used as described in the following paragraphs, referred to the Objectives set forth in section B1.1 of the Description of works.

O1.1 Study, design of a redundant vision system for load/unload
and

O1.2 Prototyping of a redundant vision system for load/unload

The two objectives are treated together as they are actually steps of the same target.

The vision system for load and unload was developed at early stages of the project as the SMEs had pointed out it was crucial as it impacts a qualifying and essential feature of the Metrocarga technology, i.e. the ability of operating under the overhead electric line by handling the load units other than by lifting from the top.

The study concerned three aspects:

1. the type of optical devices and relevant wavelengths to be used
2. the positioning of the devices according to Metrocarga constraints
3. the software controlling the positioning of the lifting columns driven by the visual signals

Item 1 was the hardest, a number of wavelengths was tested from laser to visible light; solutions that were successful in the factory proved inadequate in the outdoors working conditions of the prototype, mainly due to the interference of direct rays when the sun was low on the horizon.

Item 2 was easier to tackle, thanks to the cooperation of the manufacturer of the prototype.

The software tools were developed under item 3 to satisfy the requirements specified by the SMEs. Then, during the tests run on the prototype in the last six months of the project, the SMEs kept making further requests in order to optimize the performances. The software was modified several times and all requirements were met.

All the knowledge developed for this objects under WP3 was immediately transferred to the SMEs and incorporated into the prototype. It proved really effective as it solved the crucial point of rapidly and exactly centering the side slot of the container corner fittings.

The foreground will be used in the future design and construction of Metrocarga equipment.

A possible future development will be for the automation of the “road side” of Metrocarga installations, i.e. the automatic loading and unloading of lorries. This aspect was left behind so far awaiting the successful outcome of the “train side” operation. It is in fact less critical because

loading and unloading of lorries does not affect system performance because it does not use “train” or “real” time”, but out-of-line or “masked” time.

02.1 Study of methods for verifying the correct train load
and

02.2 Design and prototyping of methods for verifying the correct train load

The two objectives are tightly connected, being two steps of the same development pipeline. Due to the challenge of the objectives, the research activity carried out to address them was formulated as a feasibility study.

The original idea was to study a solution for load verification, based on medium distance observations, to be redundant with respect to the close range vision system developed in WP3.

Laboratory tests carried out before month 12 lead us to conclude that the reliability level of such operations based on video signals acquired from a distance is not high enough to meet user requirements. Conversely, field tests carried out within WP3 showed how, a close range view on the corner fittings is effective for such tasks, to the extent that a redundant solution is not needed.

Current railways regulations require that all load units be directly inspected by railway personnel, that was to walk both sided of the train. This procedure takes time (typically a person performs the inspection walking 500+500 m) and will adversely affect Metrocargo key feature of fast operation.

VIT showed that video images of all corner fitting, connected with certainty to each individual load unit, can be sent to the responsible operator that can thus effect his inspection from a control room. Further, the images can be saved for all future occurrences.

The SMEs will illustrate these VIT results to European railway regulating bodies, starting with Italy, Germany, Netherlands and Switzerland, with the objective of obtaining a change in the current standards that will permit the remote inspection of the correct loading of all units.

03.1 Study of methods for verifying the correct train composition
and

03.2 Design of methods for verifying the correct train composition

The two objectives are tightly connected, being two steps of the same development line. Due to the challenges of the objectives, the research activity carried out to address them was originally formulated as a feasibility study.

These objectives have been substantiated in two main research lines:

1. reconstruct the 2D train profile and verify it with respect to the expected load plan.
2. automatically locate and verify the container code numbers with respect to the expected load plan.

Within these tasks, the RTD performers proposed state-of-the-art solutions based on the use of video-cameras installed on the plant for video-surveillance purposes --- that is, no ad hoc hardware is needed for such operations.

The obtained results, confirmed by an extensive set of statistical simulations, laboratory tests on real data, and live tests (carried out in the last 3 months of the project), are very satisfactory. All the difficulties of addressing challenging problems in very variable environments were analyzed and effective solutions were proposed.

The results of the feasibility study is a set of software libraries, working on videos acquired by high quality video-cameras, ready to be integrated to the VIT infrastructure and available to the SMEs.

This knowledge is now incorporated in the Metrocargio system, not as a part of the design of the loading equipment but as an accessory equipment that will add to the performance and reliability of the system. It is important because the SMEs have been focusing primarily on container handling as it was an innovative piece of equipment but the system will be evaluated as a whole on its overall performance from train in to train out. From this viewpoint a number of accessory activities must be taken in consideration, including the paperwork (as paperless as possible according to regulations) to verify and document what load units enter the Metrocargio area, time in and time out, loading sequence, container conditions damage-wise, if seals are in place, customs status etc. The foreground proceeding from this system and from the correct loading verification will be used to tackle with some of these activities.

The SMEs will try to market this system in other fields where recognition of objects and of their identity code may be required, such as gates of truck parks, dockyards, automated handling plants etc.

O4.1 Study, design of a video-surveillance infrastructure for human operator safety
and

O4.2 Prototyping of a video-surveillance infrastructure for human operator safety

The two objectives are tightly connected, being two steps of the same development line. The research and development activity carried out to address these objectives was organized in 3 activities:

1. study and development of video analysis modules (specifically designed to localize and track moving objects)
2. study and development of decision support models (designed to classify people from other moving objects)
3. identification of the acquisition devices (cameras and video recorders) appropriate for the task and the analysed environment (also considering the requirements of objectives O3.1 and O3.2).

The first activity led to the development of a rather complex software module, processing video streams real time and localizing moving objects with a very small miss rate. The second activity was based on the study and the test of many alternative solutions, while the final solution is a rather simple although effective strategy that keeps the computation real time. The third activity was concentrated on testing high resolution cameras and settled on the use of Megapixel technologies. These technologies guarantee a very high quality signal and a very good illumination compensation during night vision.

The results of this work is a software module was made available to the SMEs. Although not yet integrated to the Metrocargo control station (it was not an objective of VIT, this integration phase will be carried out following the Metrocargo development pipeline) the module is currently running stand-alone on a video analysis server provided by one of the RTD performers.

As mentioned in the previous item, this is one of the accessory equipment that will be essential for the overall performance of Metrocargo. The solution devised to assure plant safety will be discussed with the concerned agencies in each country to assure it is accepted.

The system will be proposed as a safety and security device in sensible locations such as ports and airports, dockyards, customs areas etc.

Conclusions

The SMEs have received the knowledge developed in VIT, that is functional to the development of Metrocargo, both as loading equipment and as complex logistic system.

The SMEs have incorporated or used the knowledge and the SW and HW prototypes developed within VIT in the full scale Metrocargo section that was constructed outside VIT and installed in the port area of Savona – Vado.

With such additions the Metrocargo prototype pictured below has become a working demonstrator of the system and a “selling tool” and is being displayed to potential buyers.



The SMEs are actively engaged in promoting and marketing the system and have entered negotiations' with several international entities. Obviously these negotiations need to be kept confidential, so in this report they will be referred to in general terms. Should it be deemed necessary, the names involved will be disclosed in confidence to the Project Officer or other persons designed by the EC.

Metrocargo has two marketing branches, that are both being actively tackled: the port to dry-port service and the creation of an inland logistic network.

On the port to dry-port side, the main focus is obviously on the possible application as the train loading/unloading facility at the service of the deep-water sea platform that is being built by the Port Authority of Savona and that will be run the APM Terminals of the Maersk Group.

Both entities have a strong interest in using Metrocargo: the authorization of building the platform contains the requirement that 40% of the traffic, i.e. about 300.000 TEU/year, be shipped by rail, in order not to burden the road infrastructures. To reach this result by traditional systems, a marshalling yard with 8 to 10 tracks, 300 to 500 meter wide would be necessary. Such an area is not available locally, and it could only be obtained with vast earth moving works. Instead, Metrocargo could assure the required volumes operating on just one track in the available area which is about 50 meter wide. More, the investment in a Metrocargo plant is comparable to traditional, operating costs are lower and the impact in an environmental-sensitive surrounding is much lower. Hence the strong interest of both the Port Authority and APM Terminals in Metrocargo if it would prove efficient and reliable. In fact the Port Authority asked that the prototype be installed in the port area of Vado Ligure and paid some money to that effect.

After seeing the good functioning of Metrocargo incorporating the prototypes developed within VIT, both the Port Authority and APM Terminals expressed themselves favourably on its adoption. Prior to making the final commitment they requested a new set of test under the control of an independent entity, ELSAG spa of the FINMECCANICA Group.

Tests ran over two months showed that 93,1% of cycles were completed without stops, which is very good considering that this is pre-production demonstration prototype. The tests also indicated the need of engineering improvement of specific mechanical solutions and of plant layout.

It is anticipated that the Port Authority of Savona will order a first section of the plant within 2010.

With the support of the Port Authority of Savona an official presentation will be organized in the second half of 2010, inviting the Italian ministers of Industry and Transports, all the Italian Port Authorities and major logistic operators. This presentation will have a wide coverage by the specialized press, bringing the information about the innovative loading system to all major players of the sector.

After the official presentation the SMEs will approach European and North-African port Authorities to illustrate the system and offer a live demonstration.

Regarding the inland network, the SMEs are proceeding as described hereunder.

The initial goal is to create the first element of the network, that has been identified in a first stretch of a north-south line in Italy.

To minimize investments, the first line will be made up by four Metrocargo Terminals and seven end-of-the-line terminals. The reason is that these terminals do not need Metrocargo equipment but the loading and unloading service can be effected traditionally and by paid by the unit. This does not influence the overall performance because in the end-of-line terminals load units are handled off-line, the relevant times not affecting the operating time, that is time of the train. To better explain, loading/unloading a train at in intermediate stop does affect the overall performance, because the train has to stay still during the operation, but loading and unloading when the train has reached the final stop and needs in any case to wait several hours before starting again is irrelevant in respect to system performance.

The following table shows the solution pursued for the first Italian north-south line.



This line could be a part of the intermodal corridor between northern Europe and the Balkan Countries through Piacenza, Rome and Bari in Italy, and other locations to be identified in northern Europe.



Current status is:

- for the line as a whole
 - o it is confirmed that proposed prices are competitive with current road traffic, although the present economic situation forces truckers to offer very low rate
 - o the multinational chemical company PROCTER & GAMBLE set itself the goal to reduce the environmental impact of its logistics by increasing train transport. ILOG is developing with them a logistic solution for transport of goods from the Netherlands to Italy and Greece using an intermodal approach based on Metrocargo.
 - o the Italian freight forwarder NUMBER 1, working mainly for Barilla and other large manufacturers of pasta and foodstuff, had been contacted by ILOG in order to complement the Procter & Gamble flow, that is mainly north to south, with their mostly south to north traffic.
 - o the traffic initially given by P&G and Number 1 is sufficient for the economic viability of the first intermodal line using Metrocargo technology, and it is expected that the operation will start within 2010.

- to ease the start up of the first line and to favour its development in a growing network
ILOG has contact running with the following leading logistic operators:

- Adria Transport, Koper Slovenia
- CEPIM, Parma
- C.F.I, Roma
- CFP Soc. Coop, Modena
- CROSSRAIL, Beura Cardezza (VB)
- Euro Cargo Rail, Paris
- Eurogateway Srl, Novara
- Friultrans, San Giorgio di Nogaro
- Friultrans, San Giorgio di Nogaro
- Friultrans, Cervignano del Friuli
- Geodis – Fret, Clichy ,France
- Geodis - Zust Ambrosetti, Milano
- Geodis - Zust Ambrosetti, Aprilia Latina
- Infra Safety Services Europe, Zurich, Switzerland
- INTERPORTO DI BOLOGNA, Bologna, Italy
- IRT&S International Railway Technology & Services Srl, Roma
- Italcontainer, Milano
- Italia Logistica, Bologna
- Linea Spa, Pozzolo F.ro (AL)
- Linea Spa, Pozzolo F.ro (AL)
- LTE - Logistik und Transport, Graz, Austria
- Luka Koper D.D., Wien, Austria and Koper Slovenia
- Naviland Cargo, Le Havre France
- Nord Cargo, Novate Milanese
- Ökombi GmbH, Wien
- Piacenza Intermodale S.p.A., Piacenza
- Pol-Rail Srl, Cervignano del Friuli (Ud)

- Rainbow S.r.l, S.Polo Podenzano
 - RCA - Rail Cargo Austria AG, Wien
 - RFI, Roma
 - Rossetti Trasporti, Piacenza
 - SADA, Milano
 - SBB Cargo, Basel Switzerland
 - SBB Cargo Italia, Gallarate
 - S.C.A.C., Casteggio (PV)
 - SERFER Servizi Ferroviari, Genova
 - SNCF, Paris - Rungis
 - SNCF FRET BENELUX, Anvers - Belgique
 - SNCF WIEN, Wien
 - TERMINALI ITALIA, Castelguelfo
 - T.I.MO srl, Mortara (PV)
 - TIPES spa, Olgiate Molgora (LC)
 - TNT Group, Hoofddorp, Netherlands
 - Trenitalia, Roma
- ILOG has obtained the support of D'Appolonia SpA, Genova a leading transport engineering company, for the possible introduction of Metrocargo in their planning
 - Touax Rail Ltd, Clonee Co. Meath, Republic of Ireland, a leading train logistic operator, was invited to visit the Vado Ligure prototype. After the visit, plans are being discussed for joint operations
- for one of the intermediate stops (details are kept confidential):
 - the players, including local entities, agreed to invest in the purchase of a Metrocargo terminal – relevant order will be issued within second quarter of 2010
 - the area has been located and made available
 - building designs are being finalized
 - for the other intermediate terminals
 - negotiations with local investors are well underway and are expected to be finalized within second half of 2010

Technically:

- the electro-hydro-mechanical drawings need to be reviewed after the tests run by ELSAG
- the SW controlling the terminal needs to some completion and review after the ELSAG tests
- the SW controlling the network has been designed in its general lines and needs to be completed

Financially, the promoters are negotiating with investors to obtain the resources necessary to complete the technical development and the working capital necessary to build the plants.

The next steps are:

- establishing new companies in European countries with local partners to develop Metrocargo network in each country.
 - o all agreement have been finalized and ILOG METROCARGO ESPAna will be established in July 2010.
 - o negotiations are underway to form local companies in Germany, Switzerland and Austria
- pursuing the opportunity of the sale of one (initially) large Metrocargo plant to the railway company of a non-EC nation. Contacts have been going on for some time through an agent, greatly helped by the video of the Vado prototype, and should be finalized by mid 2010
- making a partnership with a strong Middle East entrepreneur, working on a railway development, to sell 3 Metrocargo plants in their country. Finalization is expected within 2010
- resuming contacts with the CRCTC, the State company of the Republic of China specifically charged with the transport of containers via rail, that is building 18 new terminals throughout the country. Contacts had started in 2005 and continued in 2006, but had to be suspended because the Chinese asked to see a working installation that was not yet available.

DISSEMINATION OF KNOWLEDGE

Technical knowledge deriving from VIT has been passed on to the SMEs participating to the project and, as anticipated in Annex 1, is kept confidential. Dissemination activities focus on sharing the general idea of the project, expressing the importance of computer vision technologies for automation, with a specific reference to the ambitious roadmap of Metrocargo. More specifically, the SMEs plan to disseminate the logistic knowledge relevant to the innovative possibilities offered by VIT technology and the whole Metrocargo project.

Since Metrocargo development is at a crucial stage, dissemination will mainly involve the organization of meetings, demonstrations, and workshops to the benefit of potential partners and customers. All these events will be the occasion to present the work carried out within the VIT project, highlighting its importance within the Metrocargo project.

The VIT project web site <http://www.vitproject.eu/> has been set up and maintained mainly as a repository of documentation to be used by the partners for their dissemination activity. It also contains a public section open to the public.

The remainder of the section will be devoted to a detailed description of the strategies carried out to identify appropriate recipients and setting dissemination activities.

Recipients

VIT and Metrocargo were recently presented to the 7th EIRAC (European Intermodal Research Advisory Council) Plenary Meeting in Brussels on 13/11/2009. There was much interest and many requests of further information followed. Some of the contacts listed below have been originated by this event.

As Metrocargo is aimed at bringing about an important change on logistic policies at European level, the message has and will be conveyed to actors belonging to the categories described hereunder.

- logistic operators
 - o freight forwarders
 - a negotiation table was recently opened with the Dutch branch of a leading international freight forwarder, initially for a daily train from the Netherlands to central Italy
 - o big shippers
 - contacts are well advanced with a large multinational chemical company to shift to rail an initial share of their European shipments, within their general implementation of a green policy

- transport operators
 - o rail companies
 - private rail companies have been contacted about subcontracting the rail transport
 - o agencies or companies owning railway infrastructures
 - contacts are underway with RFI that owns the Italian rail tracks. Much interest from their side, regulatory issues are being examined
 - o trucking companies
 - trucking companies and one of their associations were illustrated the principle of Metrocargo – they are interested in being contracted for door pick up and delivery in the operative areas of Metrocargo terminals, as potentially more interesting than long distance hauls
 - o port authorities
 - the port authority of Savona – Vado is of course very much interested in Metrocargo as it would solve many issues related to the sea platform under construction
 - other port authorities in Italy, Spain and north Africa are awaiting the final tests of the Metrocargo prototype at Vado to start feasibility studies in their own ports
 - o intermodal centres operators
 - Italian centres have been given priority in order to start the first transport line. Negotiation tables are open with eleven intermodal centres for the installation of Metrocargo terminals as part of the initial network
 - o regulating bodies and rail safety agencies
 - contacts will be first pursued in the residing countries of the SME participants (Italy, Germany, Holland and Switzerland), following the preparatory work done before – initial contacts are planned for second quarter 2010

Strategy and means

Dissemination strategy as well as means have been carefully thought of, taking into consideration several factors, and will be carried forward according to the following guidelines:

- avoiding political and technical mistakes that could impair the acceptance of such an innovative system in its early stages
 - o the SMEs intend to capitalize initially on the support of the entities that believe in Metrocargo and are already supporting it
 - o there must be some kind of technical validation of the equipment, that can derive from two sources:
 - practical demonstration of the working prototype to representatives of the “targets”

- technical endorsement by an outside agency – steps have been taken to start a test campaign under the control of a automation company belonging to a major international Group
- gaining cooperation or non-opposition of actors in the logistic trade
 - contacts with operators of intermodal centers to illustrate the business possibilities of becoming part of a network that can greatly expand their operating range
 - contacts with rail companies to illustrate business possibilities
 - contacts with agencies or companies owning the rail infrastructure to illustrate possible traffic increase and seek renting of dismissed in existing railway stations
 - contacts with trade associations of truckers to illustrate the possibility of obtaining contracts for container pick up and delivery in the operating radius of Metrocargo terminal
- gaining support among the institutional bodies
 - contacts to present the new system and illustrate its benefits
- obtaining support or non-opposition by regulating bodies
 - illustration of system features
 - availability to specific tests of modifications
- seeking interest and consent among leading actors that may become trend setters in the sector:
 - direct contact to offer information material and to propose demonstration of the prototype operation
 - one starting event, sponsored by the Port Authority of Savona, aimed at Italian government officers, other Port Authorities and very large logistic operators – to be held in the first quarter of 2010
 - single events aimed at specific categories of operators
 - European state officers and operators, to be held in Spring 2010
 - single presentations to a selected number of international logistic operators or shippers that have already stated their interest to commit traffic to a newborn Metrocargo line – their commitment will convince of the operability of the system other operators and financiers
 - other actors that will be directly contacted and invited to a demonstration
- gaining support among smaller logistic operators and the general public
 - obtaining coverage on specialized press
 - inviting reporters to prototype demonstrations
- gaining support by environment-conscious organizations
 - presentations and demonstrations, illustration of environmental and social benefits

- obtaining coverage in the general press
 - o illustration of the system and of the general benefits
- raising interest in academia
 - o scientific publications by the RTD performers
 - o presentations at scientific conferences, seminars, meetings, round tables