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COOPERATIVE LOGISTIC NETWORK INFORMATIONAL SYSTEM DEDICATED TO SME's LOCATED AMONG E60 EUROPEAN ROAD

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Abstract: In this paper is presented the aspects related to the PN II 71-075 grant. In side of SIRLC Project is proposed conceiving and realizing of an informational system for a cooperative logistic network which is worshiped for SMEs located among the Romanian driveway of E60 European Highway. The partnership of formed consortium is going project achievement is proposed its doing for creating organize models and informational programs which are enable to assured access and coordinating the using of logistical infrastructure of SMEs located among the Romanian driveway of E60 European Highway, the companies being initial structured in groups with specific features (clusters).

1. INTRODUCTION

SIRLC Project is proposed conceiving and realizing of an informational system for a cooperative logistic network which is worshiped for SMEs located among the Romanian driveway of E60 European Highway (Bors-Oradea-Cluj-Brasov-Bucharest-Constanta). The European Highway E60 is a highway/freeway which is gone from Brest in Bretannia, France and going from Romania to Constanta, passing by Nantes-Orleans-Basel-Vienna-Budapest-Brasov-Bucharest and has a longer of approx.3380km.

The partnership of formed consortium is going project achievement is proposed its doing for creating organize models and informational programs which are enable to assured access and coordinating the using of logistical infrastructure of SMEs located among the Romanian driveway of E60 European Highway, the companies being initial structured in groups with specific features (clusters).

In the same time is following the possibility application of new logistical concepts and using new technological infrastructures (GPS, GIS) and self-impact about logistical strategies of SMEs. The obtained results will be generalization for any of national driveways.

The logistic models will be elaborated and tested with real data for Romanian driveway of European Highway E60 without lost the connections with logistical structures at national level. Logistical network will be analyzing al national level for extension of possibility development estimation of logistical models realized.

The consortium has been thinking by partnerships in such a way to cover important locations of project (Oradea CO and P1, Cluj P3 and Bucharest P2 and P4), but in some time the partners are composed both university field UNI (CO and P4) and national institutions of research and development INDC (p2 and P3) and not at least of IMM (P1).

During project would be defining characteristics sizes and assessing parameters and will be elaborated methods of SMEs capacity evaluation and them availability for collaboration on logistical plan.

In order to be effective, the logistic system must be easily accessible and usable by all interested users. Among them, a relevant share is kept by SMEs, which constitute a large part of the Romanian economic tissue.

However, on one hand SMEs do not have, by definition, the sufficient dimensions to achieve scale economies in accessing to large logistic facilities, and on the other hand they also often lack resources and experience to adequately optimize their logistic activities.

For these reasons, among the expected results of the project there are procedures and methodologies that promote the coordination and the cooperation of the SMEs.

These are some of the reasons why SMEs nowadays show an increasing tendency towards aggregating into clusters (consortia, industrial districts, zones, areas, etc.) on a territorial basis in order to share common services and facilities, thus achieving higher efficiency and effectiveness levels.

These clusters may have quite different structures, depending on many different factors, such as the industrial sector, normative and legal regulations, economic incentives and facilities, etc.

Project results are suitable to application developments which use clustering methods and their fuzzy versions. Critical paths determination from a dynamic system point of view is realized using neural methods. Project's applications can test models that use cellular automaton algorithm in "narrow places" situations and paths optimization.

The novelty of this approach consists in the use of the methods specific to multi-agent intelligent systems. Strong parallel character of these methods conducts toward reduced simulation times, and implicitly to the decisions optimization.

2. THE PROJECT AIM

In general terms, SIRLC aims at devising organizational models and ICT tools apt to providing the access to, and to coordinating the use of, logistics infrastructures by SMEs groups suitably structured into clusters. Complementarily, new emerging (potential) services enabled by new technologic infrastructures (e.g. GPS, GIS, ubiquitous computing) and how they impact SMEs' operation will be analysed.

3. THE PROJECT OBJECTIVES

The general objective of the project is to study means for SMEs to effectively interact and cooperate in taking advantage of the large scale transport and communication infrastructures using the available and foreseeable ICT tools.

More in detail the Action will comply with some complementary objectives (obviously not excluding other objectives and goals which may emerge during the action and that need to be further defined):

1. to develop procedures for gathering and analyzing information on large transport networks, managed by several different service entities/bodies, oriented to allow a precise performance evaluation and contemplating both organizational and technological aspects;

2. to formulate organizational models, behavioral principles and management procedures for large-scale multi-agent goods transportation networks management evaluation and optimisation, oriented to optimal allocation of resources and technologies and to optimal planning and synchronizing of flows;

Concerning the first of the above objectives, it aims at providing a catalogue of models (either logical or formalised), which could allow to identify the main nodes in a network and to estimate transport flows over large regions. The goal is to have evaluation tools for the most

important transportation lines, together with some Key Performance Indicators such as to derive an estimation of efficiency / effectiveness / cost of the logistic system.

With regard to the second objective, the aim is to develop and apply methods for identifying and optimising both the structure and the management of a large-scale logistic network. To this aim, the potential utilisation of procedures derived from production systems theory, as the Principal Flow Analysis could be analysed, such to derive, in a preliminary way but very easily, an estimation of the most important lines, over which an optimised pattern of transshipment stages could be allocated.

Further, dynamic decentralised optimisation methods can be also developed, such to plan main volumes in time. In this light, a first goal is to define models which allow to verify the adequacy of existing systems as well as of the flow pattern; the second goal is to define system innovation alternatives, based on optimised network structures and related volumes' configurations.

4. THE CURRENT STATE OF THE ART IN LOGISTICS SYSTEMS

Europe is presently devoting a very large wealth of resources to the construction of a continent-wide system of transportation infrastructures following the Guidelines for the development of the Trans-European Transportation Network (TEN-T). According to the revision of April 2004 of TENT1, its total cost is € 600 billion. TEN-T contemplates concepts and implementations such as Trans- European Corridors, Sea Motorways, Intermodal Terminals, etc. This implies a considerable economic and organizational effort which is expected to produce remarkable effects towards providing Europe with an efficient, competitive, cost-effective, as well as sustainable and more environment respectful logistic system.

Nowadays, one of the main objectives in European Transport Policy is to organise these axes of communication as a network, fitting out small and large urban nodes so that they can become platforms to offering intermodal and logistics services. In order to do this, interoperability, intermodality and co-modality need to become an effective reality.

In the following, we delineate the current state of the art in logistics systems, interoperability and intermodal education by recalling some project developed in the EU; until now, each research thread outlined has been studied individually.

Examples of projects about logistics systems at the Small and Medium Enterprises are: BestLog, LOGICAT and I-Log.

BestLog is a DG TREN, "Directorate-General Energy and Transport" project running from 2006 to 2010: the project coordinator is Berlin, University of Technology, Logistics Department – Germany, and the partners are 9 Research Institutes from 9 European Countries: Belgium; Valbonne, France; Valencia, Spain; Oxford, UK; Switzerland; Gothenburg, Sweden; Warsaw, Poland; Prague, Czech Republic. The BestLog project, initiated by the European Commission, will establish an exchange platform for the improvement of supply chain management practice across Europe. The principal aims are the identification, collection and analysis of different ways of promoting and disseminating logistics best practice in the 29 European countries. First, knowledge on logistics best practice can be disseminated to (current or future) logistics professionals by the means of dedicated logistics education programs.

Second, knowledge on logistics best practice can be promoted and disseminated by the professional assessment of logistics systems performance. All partners are further involved into the identification and collection of additional education programmes, awards, and certification programmes in logistics.

The same issue has been dealt with in LOGICAT, a FP4 project "Transport RTD programme" about Concerted Action on Logistics, supply and Demand Chain Management in Europe running from 1999 to 2002, and in I-Log which is a CADSES Interreg III-B running from 2003 to 2005. The development of the I-Log project led to innovative services in the fields of transportation and logistics, in order to support the SMEs' competitiveness and taking into account the environmental impact that these will have on the territory.

Examples of projects about interoperability and ICT are: INTEROP, ATHENA, OSIRIS.

INTEROP is an Network of Excellence - FP6 project running from 2003 to 2006: the project coordinator is Bordeaux, University 1 – France and there are 47 partners from 15 countries coming from numerous sectors. The project aims at creating the conditions for innovative and competitive research in the domain of Interoperability for Enterprise Applications and Software. INTEROP facilitates the emergence of an interoperability research corpus through the fusion of three knowledge components: Architectures and Enabling Technologies, Enterprise Modeling and Ontology. The principal result of this project is the realisation of INTEROP-VLab, the European Virtual Laboratory for Enterprise Interoperability.

ATHENA, "Advanced Technologies for interoperability of Heterogeneous Enterprise Networks and their Applications" is an Integrated Project - FP6 "Networked businesses and government" running from 2004 to 2007, carried out by a consortium made up of 19 leading independent research centers (including Industry Partners, Technology Providers, Academic/Research Partners). The project is addressing this challenge by promoting solutions for enterprise systems and applications of interoperability, which include: Technical Interoperability; Business Interoperability; Community Building. Its program of work is defined for producing results that span the full spectrum of interoperability from technology components to applications and services, from research and development to demonstration and testing, and from training to evaluation of technologies for societal impact. ATHENA is validating the developed solutions in strong pilot activities with industrial users organisations involved in projects.

OSIRIS, "Optimised system for an innovative rail integrated seaport connection" was an ECDG VII, Transport, in the Fourth Framework RTD programme project running from 1997 to 1998: the project coordinator was Stuttgart, PTV Consult GmbH – Germany and the partners were Intercontainer- Interfrigo société cooperative; Société National des Chemins de Fer Belges Bcargo; Kessel und Partner; SCI Verkehr Planungs- und Beratungsgesellschaft mbH (Industries from Germany, Nederland, Belgium); Netherlands Economic Institute. OSIRIS aimed at producing a model solution to the bottleneck and storage problems through the development of integrated rail connections to seaports and the planning of a hub and spoke system between different seaports and the economic regions in their hinterland. It also identifies requirements for an information and communications (I&C) system supporting the business process and the terminal operation.

The same issue has been tackled in STIL (Telematic Instrument for Interoperability for Network enterprise: Digital Integrated Logistics for Regions of Emilia-Romagna). It is a regional program running from 2005 to 2007 about ICT technology.

5. EXPECTED RESULTS

In terms of expected results of the project, they can be classified in three broad classes:

- methodological, i.e., general models and procedures that can be applied to specific data to produce specific results;
- practical – general, i.e., results that are valid for all the situations of the considered type;
- practical – specific, i.e., results that are valid for a specific situation only (cf. the above section Scope of the proposed CA).

More specifically, the following results are expected from the proposed CA:

a) metrics and assessment procedures to evaluate SMEs' interoperability;
b) best practices for present technologies, on the base of the analysis of considered cases;
c) guidelines for the effective use of technologies, based on the results of the previous point;
d) needs, requirements and specifications for future or foreseeable technologies;
e) analysis of the interplay between technologies and operations, based on the analysis of the considered cases.

According to the nature and structure of the S&T objectives and expected results, as illustrated in the previous section, the proposed CA is expected to have three types of products:

- reports,
- a Web Portal of the project.

Reports will contain the results mentioned in the previous section, according to the objectives described there. Reports will be in electronic form, and will be published on the web portal of the project. They will be highly structured, rather than one-dimensional, discursive documents.

Their characteristics will be:

- exhaustively
- clarity and readability
- conciseness.

Accordingly, prolixity will be carefully avoided in reports.

The Web Portal of the project is expected to have at least the following basic functions:

- a working function: it will serve as a working tool for the project, to give space and means to the partners to operate for the project; according to this function, the web portal will contain the working documents of the project, as well as its reports, in draft and final versions;
- a communication function: it will serve to exchange data and information both within the project, and outside it, presenting the project, its findings and results, and promoting discussion, debates, etc.;
- a dissemination function: it will serve to promote activities and events apt to spread the findings and results of the project;
- a connection function: it will show links with other pertinent initiatives of interest for the topics of the proposed CA; scientific, academic, educational, as well as technical, industrial, or even commercial initiatives of interest will be contemplated. This could be the basis for a reciprocity principle (linking the SIRLC portal from the linked sites).

6. CONCLUSION

The logistic system is a very complex one. It always involves many different actors, with different needs, requirements, expectations, habits, etc. Different transportation modes must be not only selected considering efficiency and effectiveness criteria, but also need to be coordinated and synchronized. This requires enormous amounts of resources, not only in financial terms, but also in terms of organizational competence¸ technical knowledge and managerial expertise.

On the other hand, a well designed and properly managed logistic system may produce sensible reductions in freight transportation costs, thus improving the system efficiency, with beneficial consequences to both operators and final customers. But it is also important to point out that cost reduction is only one of the possible effects of a good logistic system, and perhaps not the most relevant one. In fact, a good logistic system also yields added value, in terms of enhanced quality levels for the service provided to the final users, as it improves punctuality, reliability, sustainability, awareness and transparency, thus further enhancing competitiveness of both operators and users of the system.

Moreover, a good logistic system brings also beneficial effects to the society in a wider sense, as it positively affects the congestion and the pollution levels through a wise selection of modality solutions and a better exploitation of the available transportation capacity, thus positively contributing not only to efficiency, but also to safety, security, environment-friendliness and sustainability.

BIBLIOGRAPHY

[1]. R.Tarca, T. Mitran, A. Caraban, s.a. – Analiza sistemului logistic European si in particular al celui romanesc, Raport cercetare, proiect SIRLC, 2007.

[2]. EUROPEAN UNION — CONSOLIDATED VERSIONS OF THE TREATY ON EUROPEAN UNION AND OF THE TREATY ESTABLISHING THE EUROPEAN COMMUNITY (consolidated text) *Official Journal C 321E of 29 December 2006 (*Articles 154, 155 and 156*)*

[3]. Decision 1692/96/EC of the European Parliament and of the Council of 23 July 1996 on Community guidelines for the development of the trans-European transport network, *Official journal L 228, 09/09/1996, p. 0001 – 0104*

[4]. Corrigendum to the Decision 1692/96/EC of the European Parliament and of the Council of 23 July 1996 on Community guidelines for the development of the trans-European transport network, *Official journal L15, 17/01/1997, p. 0001 – 0004*

[5]. Decision 884/2004/EC of the European Parliament and of the Council of 29 April 2004 amending Decision 1692/96/EC on Community guidelines for the development of the trans-European transport network (Text with EEA relevance), *Official journal L 167, 30/04/2004, p. 0001 – 0038*

[6]. Corrigendum to the Decision 884/2004/EC of the European Parliament and of the Council of 29 April 2004 amending Decision 1692/96/EC on Community guidelines for the development of the trans-European transport network (Text with EEA relevance), *Official journal L 201, 07/06/2004, p. 0001 – 0055.*