



Automated Freight Systems: Current and Future Freight Container Mobility Systems for CA

Requested by
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October 15, 2015

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Executive Summary

Background

This research preliminary investigation (PI) will support the state of California (CA) Governor Brown's Executive Order (EO) B-32-15 (July 17, 2015) for Caltrans and other state agencies to establish clear targets to improve freight efficiency, transition to zero-emission technologies and increase the competitiveness, sustainability and effectiveness of CA's freight system. The PI will explore automated freight systems which utilize electric-rail infrastructure, above and underground, adaptable to transporting twenty-foot equivalent units (TEUs) or other types of freight transport containers (e.g. capsules or pods) and investigate if similar systems are in place today in the United States or elsewhere. Identification of modal shifting strategies specific to the movement of freight containers from shipping port to urban areas (drayage), to distribution centers and ultimately the final scheduled destination will also be investigated.

Summary of Findings

Related Research and Resources

Internet website searches were conducted on the Transportation Research Board (TRB) TRID database <http://trid.trb.org> and Google. Key words used were: TEU's, Automated Freight System and Freight Efficiency Emissions. Due to the compressed timeframe to complete this PI other search words suggested by the requestor were not used. However, sufficient information was obtained relating to the PI request. As for the question: "What type of systems are in place today that can be adaptable to the freight container mobility system?" more time is needed.

The general concept understood to investigate is the movement of freight from ships in urban areas, such as Los Angeles to the distribution center- how these containers are disbursed and where they need to go, how the system infrastructure today results in traffic congestion and air pollution and what systems can be applied to help reduce this problem in the future.

The idea of creating policy incentives toward improving urban goods movement, using dedicated infrastructure such as rail or freight corridors, reducing GHG emissions, incorporating energy efficiency, improving delivery time of goods, and thusly helping the economy in CA are the general ideas used in this literature search.

ATS- Automated Freight System

The research that resulted from the Google searches identified U-Tube videos showing futuristic underground cargo freight transportation pods. High speed rail using magnetic levitation technology was also found. The idea is to create a new infrastructure underground to eliminate container trucks on roads by using a tunnel system. Problems could arise with trying to avoid existing underground utilities (sewer, power lines) and obstacles (water, difficult soils, etc.). No existing systems were found in use.

The TRID searches yielded traffic simulation models for predicting travel times on the rail and road network at the ports of Los Angeles and Long Beach to help manage freight flows and traffic in general. Cooperative Adaptive Cruise Control(CACC) utilizing vehicle-to-vehicle communication, automated truck platooning, connected vehicle/automated (CV/AV) technologies as well as Intelligent and Autonomous Vehicles (IAV's) that dynamically join,

transport containers (up to 40 feet equivalent) and disjoin again helps cope with the increasing container traffic at ports were found during the literature search.

TEUs – Twenty Feet Equivalent Container Units and Freight Container Mobility

It was found that improvements in shipping port productivity/efficiency are needed with the steady increase of international sea freight container trade and the introduction of the world's largest Maersk Triple-E class ships that can carry twice what is currently used, that is up to 22,000 TEU's.

An interesting find was the yearly Swiss Transportation Research Conferences (STRC), which post numerous papers presented on their website. One most notable article is "Optimization of operations in container terminals: hierarchical vs. integrated approaches", dated September 2010. It discusses a promising research trend using the integrated optimization of decision problems that are highly interdependent, yet usually solved hierarchically by port terminal planners. For instance, the simultaneous optimization of berth allocation and quay crane scheduling, or on the landside, transfer and storage planning, which are two important problems affecting the efficiency of the port operations. Congestion issues at the container terminals have been solved with innovative technology, such as yard truck scheduling and innovative crane trucks.

The literature search also found military operations of TEUs. Deployable container solutions used for military operations may be an interesting option to explore.

Freight Efficiency Emissions

A list of 25 pages with 25 records were made available through the TRID database. Another search word that may be used in the future could be "Freight Transport Logistics" or "Supply Chain Management". The top 25 reports that were discovered have been categorized into 5 topic areas: 1.) Regulations, 2.) Operations-Trucks, Ports, Highways, 3.) International, 4.) Warehousing, Supply Chains and 5.) GHG, CO2 Emissions, Fuel Efficiency.

The best report that popped up in this quick TRB literature search was the article by the Transportation Research Board Annual Meeting held in 2015, Paper # 15-3578, which was sponsored by the AT025 Urban Freight Committee. It seems to encompass all concepts described in the PI. The authors developed a mathematical model to simulate the impact that different policies could have on logistics costs, traffic level, congestion and emissions. There were many papers presented at this conference, all related to the topic. The website location is: <http://amonline.trb.org/2015-subject-index?qr=1>. Click on Freight transportation and scroll down to see the several items discussed, some have power point or papers attached.

Another paper of interest was found on Smart Freight: "Applications of Information and Communications Technologies to Freight System Efficiently" with the corporate authors by the American Council for Energy-Efficient Economy.

Gaps in Findings

No actual operations using the modal shifting strategies such as underground automated freight systems, underground transit tubes for container freight, or electric-rail (mag-lev) rail transport infrastructure for cargo was found in this PI.

New infrastructure will take considerable efforts in planning, funding, right of way acquisitions and environmental concerns that will take years to take through to construction and operation. The futuristic ideas are in place which may eventually replace existing methods of moving goods by conventional rail or truck road transportation.

Next Steps

More time is needed and the scope of this literature search would need to be narrowed. A full scale research project may be warranted or a team of experts to decide on a strategic plan with specific goals may need to be developed, which is outside the scope of this PI.

Detailed Findings – Related Research and Resources

Google Search: Automated Freight System (AFS), Twenty Feet Equivalent Units (TEU)

AFS

https://www.google.com/?gws_rd=ssl#q=Automated+Freight+System About 574,000 results 10-9-15



Automated Transport Systems Bury Freight Traffic

<http://www.industrytap.com/automated-transport-systems-bury-freight-traffic-underground/15489>

Feb 9, 2014 - If the technology is cheap enough underground transport system have many advantages over traditional technologies.

Megacities & Metropolitan Areas Need Underground Cargo Transport

Those who have lived in crowded urban areas have experienced streets choked with delivery trucks idling loudly while emitting poisonous, acrid fumes into the air. Many have heard of the “[hyperloop project](#)” recently popularized by Elon Musk, but a huge number of scientists, engineers and companies around the globe have been working on tube-like underground freight transport systems that would provide a solution to the worst aspects of urban traffic congestion.

Capacity Limits of Roads & the Need for Transport Tubes

“Large diameter” tubes, those one foot in diameter or larger, have been conceived for moving freight and packaged goods. [CargoCap](#) of Germany, for example, has developed aerodynamic “Caps” carrying two euro-pallets each and traveling on electric-powered wheels. Lateral guide rollers keep the Caps on the track.

Caps consume low amounts of energy, can be constructed at low cost, have long lifetimes and need minimal maintenance.

<http://www.industrytap.com/automated-transport-systems-bury-freight-traffic-underground/15489>



Click below to watch a U Tube video on this concept

https://www.youtube.com/watch?v=U9G5HzYD_Hc

Evacuated Tube Transport- U Tube

US Dept. of Energy with Oak Ridge National Laboratory

https://www.youtube.com/watch?v=9y_XMwAOfJ0

Future Trains- super magnetic levitation- U Tube

<https://www.youtube.com/watch?v=tZJuqYk3YYE> (1 hour video)

Proposal to have mag lev train to travel from Disneyland in Anaheim, CA to travel to Las Vegas, Nevada at speeds of 180-310 mph, instead of travelling by car on Interstate I-15.

Alstrom Engineering in France uses the LGV high speed train for 20 years operating at 200 mph and is studying to implement a faster AGV high speed train. Trains are most efficient in and more cost effective than other modes of travel, such as aircraft to move people.

[PDF](2005) Financing and Deploying Automated Freight Systems

nexus.umn.edu/papers/AutomatedFreight.pdf by D Levinson and Zi Zou 2005 - [Related articles](#)

<https://ideas.repec.org/p/nex/wpaper/automatedfreight.html> - *Cannot read entire document*

New technologies are bringing Automated Freight Systems (AFS), which aim to reduce congestion, mitigate environmental impacts and enhance public safety, to fruition. The financing and deployment issues of AFS differ from other Intelligent Transport System applications. This chapter briefly introduces major concepts of AFS. The financing strategies for these concepts are discussed, in which the government subsidies play an important role through the use of public-private partnership. Economies of scale and externalities of the current and new systems are discussed. In the discussion of the deployment of AFS, it is suggested that deployment schemes are highly correlated with financing strategies.

Conclusions: Increasing traffic congestion argues for innovations that either enhance the capacity of current infrastructure or divert traffic to newly constructed infrastructure. The concern of the public in environmental conservation, community integrity and 23sustainable development makes the simple expansion of conventional highways more difficult than ever. The innovations in automated freight systems provide opportunities to mitigate congestion, enhance transport productivity, and reduce vehicle pollution without a large amount of land consumption. The number of alternatives for the technology of AFS is large and each results in different scenarios for their deployment and financing.

Financing strategies for the three concepts of AFS discussed in this chapter possess different characteristics in terms of monetary resources, private participation, cost sharing and management. Specific financing schemes should be designed according to these factors.

Government subsidies in the form of loans, grants, or tax breaks may be vital during the early years of AFS to construct infrastructure. The reduced negative externalities of AFS make them good candidates for public investments. However, the instruments of the government subsidies vary according to the deployment scheme of AFS. A comprehensive AFS deployment strategy will prompt the market penetration process, but until a clearer picture of technology and financing emerges, the path of deployment remains murky.

[Automated freight - YouTube](#)

▶ [2:55](#)

www.youtube.com/watch?v=e_Q_OICXeFs

Jul 22, 2013 - Uploaded by Oak Ridge National Laboratory

In this conceptual animation, a container is moved from a ship into the *automated freight system*.

Automated Freight, Goods Movement and Tube Technologies

University of Washington Oct 1, 2015 -

<https://faculty.washington.edu/jbs/itrans/afreight.htm>

Links are provided to several descriptions of automated freight movement technologies. Some are operational, some under development and some are still conceptual. Some are above ground, others are underground. Large scale systems thinking on this topic is particularly noteworthy in the Netherlands and Japan.

See <http://www.capsu.org/library/large-diameter.html> for an overview of recent, global, activity in this field.

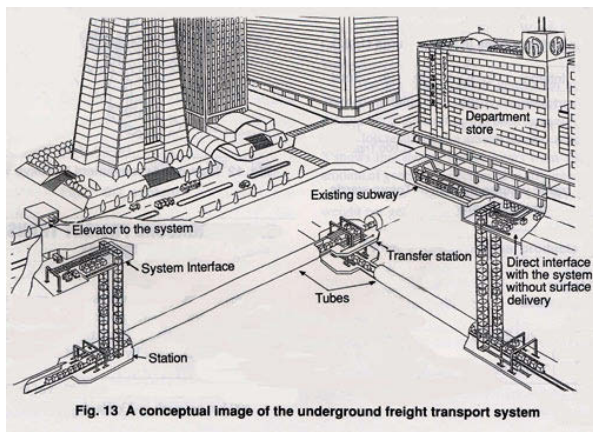
Link to the dramatic [Hyperloop](#) proposal for passenger and freight transportation in partially evacuated tubes

[Link to a City Lab article on the future of US freight movement, 10/2014](#)

Link to [CargoFish website](#) - for automated, area-wide distribution of small goods in cities, in a pipe.

[Volpe report on intermodalism: a 20-year perspective](#)

[Link to German Baumer Group - Airport Baggage Handling technology](#)



Source: Koshi, Masaki, [An Automated Underground Tube Network for Urban Goods Transport](#), IATSS Research, 16:2, 1992

[Autran Corporation](#) - a system with carrier vehicles that will carry autos on platforms, passenger cabins and freight containers

[Capsule pipelines](#) - link to a website that provides considerable information on this goods movement approach.

[CargoCap](#) - innovative transportation system for conveyance of piece goods through pipelines, being developed in Germany. Virtual test system has been constructed and has been in use since 2007. Website include two excellent videos.

[CargoRail](#) - one of the new systems being developed by MegaRail Transportation Systems, Inc., described in a product overview. Also available is [MegaRail's presentation to the Gateway Council of](#)

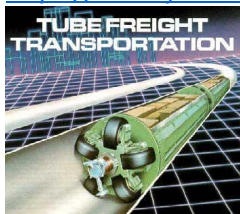
[Governments](#) regarding an application of a CargoRail and CargoTram system to serve the freight movement and air pollution reduction needs of the Port of Long Beach, California, pdf format, 21 pages
Also, see the more recent (September '07) [Port Operating Plan](#), 10 pp. [Click here for the most recent Cargo Rail presentation](#) (October, 2009) Currently (2013) inactive
[CargoTunnel](#) - an underground network concept for goods movement with cities
[Evacuated Tube Transportation](#) - link to a website that provides considerable information on this concept - deals with both people and freight.
[Frog Navigation Systems](#) - link to a website that describes automated cargo applications of guided vehicles in the Netherlands.
[MagneTrak](#) - link to a press release that describes this revolutionary material handling system being developed by MagneMotion and a Swiss company.
[Magplane](#) - link to a website that describes a maglev-based pipeline system currently being demonstrated in Florida. An initial project has been built in Mongolia.
[Magtube, Inc.](#) - link to a website that describes an evacuated tube concept using maglev for moving freight. [See patent for more details.](#)
[MegaRail](#) - link to a website that describes a system that includes an automated freight component, called [Cargo Rail](#), being developed in Ft. Worth, Texas.
[MonoFreight](#) - link to a YouTube animation of a suspended monorail-type automated container transport system
[Pipenet](#) - an innovative system being developed in Italy, website now has a section in English
[Pipeline Transportation](#) - an automated freight transportation system that utilizes linear electric motors (author not doing further work but a good reference paper for previous work on this topic).

HOME

[Public Roads - Tube Freight Transportation, Autumn 1994 -](#)

Federal Highway Administration- last modified 6-15-15

<https://www.fhwa.dot.gov/publications/publicroads/94fall/p94au21.cfm>



Tube transportation systems are inherently high capital cost, low operating cost systems, but the economic feasibility of tube transportation systems carrying general merchandise is unknown as no such system has been built and operated in commercial service. This article is quite comprehensive in the description of the types of tube freight transportation systems.

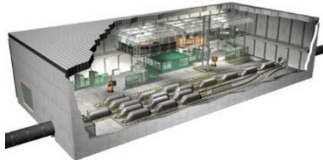
[The Future of Automated Freight Transport: Concepts, Design](#)

www.amazon.com › ... › Industries › Transportation

Amazon.com, Inc. Costs \$150 for this publication Feb 2006

This book explores the many challenges faced by the development and implementation of *automated freight transport systems*.

[A world without trucks: underground freight networks - Low ...](http://www.lowtechmagazine.com/2008/02/a-world-without.html)
www.lowtechmagazine.com/2008/02/a-world-without.html



Feb 22, 2008 - Note that pneumatic *systems* could deliver physical objects, which is hard to do with email or any other *automatic* technology in use today.

[Automated Transportation Logistics and Analysis System ...](http://energy.gov/em/downloads/automated-transportation-logistics-and-analysis-system-atlas)
<http://energy.gov/em/downloads/automated-transportation-logistics-and-analysis-system-atlas>

United States Department of Energy- Office of Packaging and Transportation

The Department of Energy's (DOE's) *Automated Transportation Logistics and Analysis System*

ATLAS is an integrated web-based logistics management system allowing users to manage inbound and outbound freight shipments by highway, rail, and air. ATLAS is based on the core competencies of Automated Transportation Management System (ATMS) and provides an integrated framework for data sharing between Carriers and Shippers.

ATMS became operational in the early 1990s, and underwent a series of major improvements over its lifecycle. An assessment was deemed necessary by DOE to establish current cost reasonableness by reviewing benefits, user satisfaction and assess the long-term management approach (including expansion of site applications) for ATMS, and the viability of alternative logistics management systems. This resulted in the integration of ATMS functionality into ATLAS.

A World without trucks: underground freight networks

Low Tech Magazine

<http://www.lowtechmagazine.com/2008/02/a-world-without.html>

Some Western European countries are getting serious about transporting consumer goods through automated subterranean networks – introducing a fifth transport mode next to road, rail, air and water. This rare combination of low-tech sense and high-tech knowledge could lead to a further economic growth without destroying the environment and the quality of life. Super fast underground cargo transport is a favourite subject of futurologists. Yet, the key to the feasibility of the proposed systems is their very low but constant speed.

Searches related to Automated Freight System

[Automated transportation system](#) [automated transportation management system](#)

TEU

Mostly yielded company products 10-9-15



World Shipping Council Partners in Trade

<http://www.worldshipping.org/about-the-industry/how-liner-shipping-works>

The website has information on the shipping industry, how TEU's are transferred from port to the consumer as well as industry issues. It has animated examples on how products are brought to market and how liner container shipping works in 10 steps. <http://www.worldshipping.org/about-the-industry/how-liner-shipping-works/the-step-by-step-process>. This may aid in identifying what steps could be eliminated or improved upon.

Forecast of Container Vessel Specifications and Port Calls within San Pedro Bay Mercator Transport Group 2005

https://www.portoflosangeles.org/DOC/REPORT_SPB_Vessel_Forecast.pdf

This report summarizes a series of detailed analyses undertaken by Mercator Transport Group, in collaboration with Herbert Engineering Corporation and MDS Transmodal Ltd., for the Ports of Long Beach and Los Angeles, in order to forecast future container vessel activity levels in San Pedro Bay. In producing these forecasts, the Mercator Project Team (Mercator) utilized a three-phased work plan, in accordance with the component analyses contained in the Ports' Request for Proposal. In the third phase, Mercator consolidated its assessments of the various fundamental drivers listed above and built upon its near-term forecasts to project how carriers' global and trans-Pacific service networks would be likely to evolve between 2008 and 2020, in terms of vessel deployment patterns and geographical configurations, as well as in terms of ship sizes and other key vessel characteristics. These projections were then used to estimate vessel service patterns, vessel call activity levels, and load factors – by ship size – for the two San Pedro Bay ports.

Port Call Forecast Results and Conclusions -Container Vessel Forecast For San Pedro Bay Ports:

Because the World Fleet, the Trans Pacific Fleet and the San Pedro Bay Fleet are so very closely inter-related, and because the San Pedro Bay port call forecast is so strongly dependent on the composition and deployment of the vessel fleet, a common forecast tool has been developed that addresses these elements together.

The forecast as developed by Mercator involves a systematic expansion of the number of services and the introduction of progressively larger vessels in each trade. The hypothetical carrier service plans as developed in the prior section provide a guide as to how the service networks will evolve and how they will likely be structured as of 2020. In addition, checks are made at each forecast time point to confirm that -

- the capacity for the overall trade and sub-segments of the trade are in line with expectations for growth
- the number of overall services is consistent with expectations for industry structure and satisfies service frequency requirements
- the vessel size mix is consistent with pre-existing fleets and expectations derived from our deployment feasibility and unit cost assessments
- the rate of vessel retirements or “cascading” of smaller vessels into secondary services does not appear to exceed the level that those services can accommodate.

Based on the analysis of carrier deployment planning issues, and after developing a range of fleet expansion and deployment scenarios, it is Mercator’s view that carriers, following the delivery and integration into service of the considerable quantity of vessels now on order, will eventually introduce single screw ships in the 10000-11000 TEU size category to the Transpacific. 12000 TEU class ships, which we believe would need to be of a higher cost twin-screw design, will prove to be unattractive because their increased operational and commercial challenges are not offset by meaningful cost reductions.

The next size increment beyond the 10000 TEU class will thus be the 14000 TEU class vessel, which we believe will not be deployed into the Transpacific under either the low or medium growth scenarios. Only under the high growth scenario would we expect any of these vessels to be deployed, and then only in limited numbers.

Forecast results for each of the six scenarios (low, medium and high growth, each without and with a change to the Panama Canal dimensions) are contained in Appendix. A brief recap of each is provided in data columns following the conclusion in the report.

Definition of TEU- Wikipedia

https://www.google.com/url?url=https://en.wikipedia.org/wiki/Twenty-foot_equivalent_unit&rct=j&frm=1&q=&esrc=s&sa=U&ved=0CBQQFjAAahUKEwiEq6eZobbIAhVOWYgKHfFSBYM&usg=AFQjCNGIGhBmTP2QhTJqk2h63DCp0nZcgQ

The twenty-foot equivalent unit (often TEU or teu) is an inexact unit of cargo capacity often used to describe the capacity of container ships and container terminals.^[1] It is based on the volume of a 20-foot-long (6.1 m) intermodal container, a standard-sized metal box which can be easily transferred between different modes of transportation, such as ships, trains and trucks.

Stock Trade for TEU’s- Box Ships Inc., a shipping company

<http://finance.yahoo.com/q?s=TEU>

TRID Searches – TEU, Automated Freight Systems

TEU

10-9-15

Title: Estimation of the perceived value of transit time for containerized cargoes

Accession Number: 01573933

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1016/j.tra.2015.04.014>

Record URL: <http://www.sciencedirect.com/science/article/pii/S0965856415001007>

Abstract: This paper proposes a novel method for estimating the perceived value of transit time of containers by shipping lines. The key idea is that a shipping line's published schedule is the optimal decision that minimizes the sum of fuel cost and time-associated costs of the containers adopted by the shipping line. Using the proposed method, the authors find that the adopted values of transit time for nine trans-Pacific services operated by Orient Overseas Container Line and five trans-Pacific services operated by Maersk Line are between US\$5/TEU/day and US\$30/TEU/day. The authors further demonstrate how the adopted value can be used for designing the optimal transit times between ports, analyzing the viability of slow-steaming, checking whether ships should speed up to catch up to connecting ships on other services, and helping to predict the market share of less polluting fuels in view of rules on air emission.

Supplemental Notes: Abstract reprinted with permission of Elsevier.

TRIS Files: TRIS

Media Type: Web

Pagination: pp 298-308

Authors: Wang, Shuaian
Qu, Xiaobo
Yang, Ying

Availability: Find a library where document is available
Order URL: <http://worldcat.org/issn/09658564>

Publication Date: 20150800

Serial: Transportation Research Part A: Policy and Practice
Volume: 78
Publisher: Elsevier
ISSN: 0965-8564
Serial URL: <http://www.sciencedirect.com/science/journal/09658564>

Index Terms: Cargo handling; Containers; Costs; Estimation theory; Optimization; Ship lines; Transit times; Travel time; Value of time

Subject Areas: Finance; Freight Transportation; Marine Transportation; Planning and Forecasting; I10: Economics and Administration; I72: Traffic and Transport Planning

Title: Use of the Delphi method to determine the constraints that affect the future size of large container ships

Accession Number: 01560358

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1080/03088839.2013.870358>

Abstract: Who would have foreseen 40 years ago the launching of an 18 000 TEU container ship? The unprecedented growth of such ships presents an increasing challenge for port infrastructure planners. The paper concludes that during the next 20 years, the growth of container ships will depend on factors related to supply and demand, and to external factors. These factors will be defined as the constraints. These constraints have been determined using a semi-quantitative methodology, which starts with a pre-foresight analysis, then continues with a foresight analysis based on the judgment of experts, using the Delphi technique. The experts' judgment, with a vision shared by 82% of those participating, establishes that the trend for growth in the size of container ships will depend principally on the following factors: economic growth, port access channels, berth depth alongside, air draft, and limitations in natural channels and straits. This result, representing the experts' group vision, is offered as a basis for the establishment of long term policies.

Supplemental Notes: Abstract reprinted with permission of Taylor & Francis.

TRIS Files: TRIS

Media Type: Web

Pagination: pp 263-277

Authors: Gomez Paz, Maria Alejandra
Camarero Orive, Alberto
González Cancelas, Nicoletta

Availability: Find a library where document is available
Order URL: <http://worldcat.org/oclc/2899960>

Publication Date: 20150400

Serial: Maritime Policy & Management
Volume: 42
Issue Number: 3
Publisher: Taylor & Francis
ISSN: 0308-8839
EISSN: 1464-5254
OCLC: 2899960
Serial URL: <http://www.tandfonline.com/loi/tmpm20>

Index Terms: Constraints; Containerships; Delphi method; Forecasting; Long range planning; Policy analysis; Vehicle capacity; Vehicle size

Subject Areas: Marine Transportation; Planning and Forecasting; Vehicles and Equipment; I91: Vehicle Design and Safety

Title: **Out with the old, in with the TEU?**

Accession Number: 01564340

Record Type: Component

Language: English

Source Agency: Northwestern University Transportation Library

Abstract: Linton Nightingale travels to Berlin for the Fruit Logistica trade fair and learns of the growing influence of the big box lines in the movement of perishable goods.

TRIS Files: TLIB

Pagination: pages 32-36

OCLC: 907083509

Authors: Nightingale, Linton

Availability: Available from Northwestern University Transportation Library through interlibrary loan or document delivery
Order URL:

<http://www.library.northwestern.edu/transportation/services.html>

Find a library where document is available

Order URL: <http://worldcat.org/oclc/907083509>

Publication Date: 20150300
Period Covered: March 2015
Serial: Containerisation International
Publisher: T&F Informa UK, Limited
ISSN: 0010-7379
OCLC: 03601838
Serial URL: <http://www.ci-online.co.uk>
Index Terms: Refrigerated cargo; Refrigerated ships
Subject Areas: Marine Transportation; Vehicles and Equipment

Title: **Border-crossing constraints, railways and transit transports in Estonia**

Accession Number: 01554935

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1016/j.rtbm.2014.10.010>

Record URL: <http://www.sciencedirect.com/science/article/pii/S2210539514000728>

Abstract: North-East Europe has served as a general cargo transit area for Russia and other emerging economies of the East for decades. Typically, this activity was initiated with road transport, but after some years of operation, border-crossings became problematic and in some cases even impossible to conduct. Volume of transit transport was therefore severely constrained. As one remedy to sustain transit traffic, the Baltic States have implemented container trains to eastern destinations. Even though, overall transit traffic through Estonia has decreased mainly due to the increased volumes of Russian seaports, the container transit traffic has increased steadily: Volumes were really minor a decade ago, but have increased from several thousand containers up to above 50,000 TEU (twenty-foot equivalent unit) in 2013. This has enabled hinterland transport and incoming container volumes in the port of Tallinn to develop. This research work analyzes not only second hand data regarding Estonian general cargo transit, but also includes case study visits. The case company has established many international container train connections. Container transit traffic has an optimistic

future outlook in Estonia. However, the main operational constraints are related to gauge widths, border-crossing operations, delivery time issues, low price level of road transport, unpredictable Russian market and legislation and infrastructure investments.

Supplemental Notes: Abstract reprinted with permission of Elsevier.

TRIS Files: TRIS

Media Type: Digital/other

Pagination: pp 72-79

Authors: Hilmola, Olli-Pekka
Henttu, Ville

Availability: Find a library where document is available
Order URL: <http://worldcat.org/issn/22105395>

Publication Date: 20150300

Serial: Research in Transportation Business & Management
Volume: 14
Issue Number:
Publisher: Elsevier
ISSN: 2210-5395
Serial URL: <http://www.sciencedirect.com/science/journal/22105395>

Index Terms: Case studies; Containers; Estonia; Freight traffic; Freight trains; International borders; Ports; Russia (Federation)

Subject Areas: Freight Transportation; Operations and Traffic Management; Railroads; I73: Traffic Control

Title: Increasing rail mode share in Fremantle inner harbour

Accession Number: 01545163

Record Type: Component

Record URL: <http://railknowledgebank.com/Presto/co...LTIIYWUtZWFjM2U2OTE0ZDY3&bckToL=VHJ1ZQ>

Source Agency: ARRB Group Limited
500 Burwood Highway
Vermont South, Victoria 3133

Abstract: Intermodal terminals form a critical part of the overall freight system in Western Australia. Rail

freight can be an efficient means of transporting goods where market conditions are suitable and adequate infrastructure is available. The Western Australian government has set a series of strategic priorities to ensure the freight system is developed towards maximising the amount of freight that transported on rail. In 2002, a target was set of 30% rail mode share (versus road) for the Fremantle Inner Harbour. To date, this target is yet to be achieved, although solid progress has been made. The overall planning strategy for the Inner Harbour has included close consideration of the integration of land use and transport logistics. Land use planning for the expansion of the Inner Harbour has linked future development of logistics operations to the planned transport infrastructure, maximising the efficiency and attractiveness of future transport operations in the Inner Harbour. The North Quay Rail Terminal, located within the Fremantle Inner Harbour, is the primary rail link between inland freight precincts and the container port at Fremantle. Rail transport into the port has evolved since the port was first constructed, and the current North Quay Rail Terminal was completed in 2005. As part of a suite of infrastructure upgrades aimed at increasing the rail mode share, the Federal and State governments jointly committed to extending the existing North Quay Rail Terminal sidings from 400m to 690m in length. The planning for the terminal included two primary stages; and configuration. This planning allowed for the current operator operating preferences to be respected whilst allowing for infrastructure upgrades which would be required in future to reach the proposed ultimate throughput of up to 360,000 TEU/annum. Following planning, detailed design was subsequently completed. This design included close consideration of a number of design aspects, including constructability of the works and staging. The construction contract for the upgrade was awarded on 23 October 2013 at a cost of \$AUD31 million. This project will increase the terminal capacity dramatically and will improve rail efficiency and competitiveness as a transport mode. Following upgrades to other system bottlenecks and improvement in market conditions over time, it is planned that the terminal will achieve its goal of handling a 30% mode share of all containers transported through the Fremantle Inner Harbour. Achievement of this goal will provide overall system efficiency benefits and also benefits to the community surrounding the Inner Harbour.

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Pagination: 8p. ; PDF

Authors: Turner S

Monograph Title: Rail transport for a vital economy: CORE 2014: conference on railway engineering, 5-7 May 2014
Adelaide, South Australia

Monograph Accession Number: 01545126

Publication Date: 20140500

Conference: CORE 2014, Rail transport for a vital economy, conference on railway engineering, Adelaide, South Australia, 5-7 May 2014
Location:
Date: 00000 - 00000

Index Freight transport; Freight transportation; Intermodal terminals; Terminus; Transport depot

Terms:**Subject
Areas:**

Freight Transportation; Terminals and Facilities

Title: **Preparing port container terminals for the future: making the most of Intelligent Transport Systems (ITS)****Accession Number:** 01534693**Record Type:** Component**Language:** English**Record URL:** <http://dx.doi.org/10.2495/UT140351>**Record URL:** <http://library.witpress.com/pages/PaperInfo.asp?PaperID=26155>

Abstract: Governments and legislators all over the world view ports and terminals as vital infrastructure assets as they play a critical role in economic growth by attracting and generating trade. A port that does not have the ability to cope with rapidly advancing technologies will not be in a position to foster the development of the trade sector. Their ability to ‘go green’ by reducing their carbon footprint and by being more sensitive to environmental considerations is vital to their success. The future is bringing increased demands for greater efficiency and for more sustainable designs in cargo handling technologies. Moreover, the scarcity of land is forcing port companies to realise higher area utilizations. With the arrival of the next generation ultra-large Triple-E vessels carrying 18,000 TEU (twenty foot equivalent unit), it is important to investigate the opportunities to introduce innovation in the development of terminal operations and the logistics chain. The crucial terminal management problem is how to balance the integration of the current technology with the new state of the art technology such as the Intelligent Autonomous Vehicle (IAV). Although the IAV is not exactly new, what makes it different is that it does not require a guidance system such as rails or transponders set into the ground, to reach its destination. Traffic management and space optimization is a problem with the future development of container terminals. The problem can be solved by having a remote ‘traffic control centre’ directing vehicles to marshalling areas where the containers are handled by IAV’s. The challenge is to find innovative solutions to balance service requirements while integrating automated and non-automated cargo handling equipment in container terminals to ensure sustainability, safety and security.

Supplemental Notes: Abstract reprinted with permission from WIT Press.

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Media Type: Web

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Authors: McGinley, K

Monograph Title: Urban Transport XX

Monograph Accession Number: 01528763

Corporate Authors: WIT Press
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Ashurst, Southampton SO40 7AA United Kingdom

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Conference: 20th International Conference on Urban Transport and the Environment
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Index Terms: Automation; Cargo handling equipment; Container terminals; Intelligent transportation systems; Ports

Subject Areas: Freight Transportation; Marine Transportation; Planning and Forecasting; Terminals and Facilities; I21: Planning of Transport Infrastructure

Title: Columbia River Vessel Arrival/Departure Analysis

Accession Number: 01522209

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1061/9780784413067.046>

Abstract: The recently completed Columbia River deepening (43 feet/13.1 meters) project provides Columbia River ports with opportunities for handling larger vessels. The deepened channel, in conjunction with the LOADMAX numerical hydraulic analysis stage prediction tool, optimizes available navigational depths and consequently maximizes the benefits from recent new dredging work and annual maintenance dredging. As a result, the Port of Portland (Port) requested that an arrival/departure analysis of water depths and transit times for a potential larger class of vessel (i.e., 6,500 TEU container ships) be performed in order to determine if regularly scheduled service is feasible. This paper summarizes the methodology and results of the vessel routing arrival/departure analysis.

Supplemental Notes: © 2013 American Society of Civil Engineers.

TRIS Files: TRIS, ASCE

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Authors: Krcma, Karl
Burnette, Eric
Degens, Sebastian

Monograph Title: Ports 2013: Success through Diversification

Monograph Accession Number: 01523287

Corporate Authors: American Society of Civil Engineers
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Reston, VA 20191-4400 United States

Editors: Bruce I Ostbo
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Availability: American Society of Civil Engineers
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Conference: Ports '13: 13th Triennial International Conference
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Index Terms: Columbia River; Containerships; Depth; Feasibility analysis; Methodology; Ports; Ship operations; Travel time

Subject Areas: Marine Transportation; Planning and Forecasting; Terminals and Facilities; I72: Traffic and Transport Planning

Title: **Bridging the Gap - Cai Lan International Container Terminal, Vietnam**

Accession Number: 01521958

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1061/9780784413067.188>

Abstract: Located 160 km (100 miles) east of Hanoi on the southwest shores of Bai Chay Bay, Cai Lan International Container Terminal is the largest deep water port in Northern Vietnam. Capable of handling a half-million 20-foot equivalent units (TEU) of containers annually, the terminal is strategically located to take advantage of regional growth in agriculture and manufacturing. The addition of this 594-meter-long (1,950 foot), three-berth structure situated between two existing berths completes the development of the 1995 master plan for the port and, more importantly, supplies the region with the additional capacity needed to meet the expected growth in containerized cargo volumes. This paper describes the background, planning, design, and construction challenges involved in creating and implementing a master plan for a modern container terminal located between two existing operating terminals in Northern Vietnam.

Supplemental Notes: © 2013 American Society of Civil Engineers.

TRIS Files: TRIS, ASCE

Media Type: Web

Pagination: pp 1842-1851

Authors: Malla, Ajaya P
Cornell, Christopher B

Monograph Title: Ports 2013: Success through Diversification

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Conference: Ports '13: 13th Triennial International Conference
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Sponsors: American Society of Civil Engineers

Index Terms: Construction; Container terminals; Deepwater harbors; Planning and design; Vietnam

Subject Areas: Construction; Design; Marine Transportation; Planning and Forecasting; Terminals and Facilities; I20: Design and Planning of Transport Infrastructure; I50: Construction and Supervision of Construction

Title: Deltaport Intermodal Railyard Capacity Study

Accession Number: 01521947

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1061/9780784413067.177>

Abstract: Deltaport is the largest container terminal in Canada. It is located in the Port of Vancouver and operated by Terminal Systems Inc (TSI). Approximately 60% of the vessel throughput at Deltaport moves via the on-terminal intermodal railyard (IY). The Port, TSI, and BC Rail (the rail operator for switching) felt that the IY, in its current configuration, was the limiting factor in overall terminal capacity and undertook a detailed simulation study to determine how to accommodate a growth of approximately 50% through the IY. The IY is served by rail-mounted gantry cranes (RMGs). The study first analyzed historical IY RMG productivity. Historical data were used to calibrate simulation models of terminal activity which include rail, vessel, and gate moves. Once a successful calibration was achieved, future cases corresponding to annual throughput of 2.4M annual vessel TEU were simulated with various combinations of numbers of tractors, yard cranes and rail switching. Output from these models of future peak shift operations was used to define a range of likely RMG productivity levels for future operations. These data, along with peaking factors and estimates of downtime for train switching, along with the minimum practical operating distance between RMGs were used to develop annual lift capacity for the IY. These capacity figures were compared to previously calculated values for berth and container yard operations to ensure that the facility was capable of handling 2.4M TEU overall. At the start of the study, it was assumed that the IY would need to be extended in length in order to accommodate the target throughput. The study indicated that - by adding working tracks in parallel, adding RMGs and identifying rail switching methods - TSI should be able to meet the target volume within the existing IY footprint.

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Authors: Sisson, Mark

Monograph Title: Ports 2013: Success through Diversification

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Conference: Ports '13: 13th Triennial International Conference
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Index Terms: Canada; Container terminals; Forecasting; Freight capacity; Freight transportation; Gantry cranes; Intermodal yards; Port of Vancouver; Productivity; Rail marine interface

Subject Areas: Freight Transportation; Marine Transportation; Planning and Forecasting; Railroads; Terminals and Facilities; I72: Traffic and Transport Planning

Title: **Mega Vessels and Quay Walls**

Accession Number: 01521711

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1061/9780784413067.139>

Abstract: In 2011, the shipping company Maersk announced Triple-E class ships, expected to be the world's largest ships in service. Following this, 22,000 TEU container ships may become a future reality. This proposed evolution in vessel size will necessitate engineering evaluation of most modern ports to determine the capacity to receive these mega vessels. Basic infrastructure, such as the entrance channels, basins, turning circles, and the berthing and

waiting areas in a port, must have adequate capacity. Quay walls, jetties, etc. must have sufficient strength to berth and moor these mega vessels safely while supporting heavier quay cranes with longer outreaches. Recently constructed infrastructure in the Port of Rotterdam, designed for Suezmax vessels, was examined to determine if there is sufficient reserve capacity to cope with the much larger 22,000 TEU vessels. The conclusion was that growth in vessel size had been anticipated during the design phase. Therefore, relatively small adaptations were required in the infrastructure. In some scenarios, operational limitations could be imposed to compensate for increased ship dimensions and associated capacity requirements.

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Authors:

Taneja, P
Zwakhals, J W
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Conference:

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Location: Seattle Washington, United States
Date: 20130825 - 20130828
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Index Terms: Planning and design; Port capacity; Port of Rotterdam; Quays; Ships; Size; Walls

Subject Areas: Design; Marine Transportation; Terminals and Facilities; Vehicles and Equipment; I20: Design and Planning of Transport Infrastructure

Title: Scheduling of Intelligent and Autonomous Vehicles under pairing/unpairing collaboration strategy in container terminals

Accession Number: 01489562

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1016/j.trc.2013.04.006>

Record URL: <http://www.sciencedirect.com/science/article/pii/S0968090X1300079X>

Abstract: A new class of Intelligent and Autonomous Vehicles (IAVs) has been designed in the framework of Intelligent Transportation for Dynamic Environment (InTraDE) project funded by the European Union. This type of vehicle is technologically superior to the existing Automated Guided Vehicles (AGVs) in many respects. They offer more flexibility and intelligence in maneuvering within confined spaces where the logistic operations take place. This includes the ability of pairing/unpairing, enabling a pair of 1-TEU (20-foot Equivalent Unit) IAVs dynamically to join, transport containers of any size between 1-TEU and 1-FFE (40-foot Equivalent) and disjoin again. Deploying IAVs helps port operators to remain efficient in coping with the ever increasing volume of container traffic at ports and eliminate the need for deploying more 40-ft transporters in the very confined area of ports. In order to accommodate this new feature of IAVs, the authors review and extend one of the existing mixed integer programming models of AGV scheduling in order to minimize the makespan of operations for transporting a set of containers of different sizes between quay cranes and yard cranes. In particular, they study the case of Dublin Ferryport Terminal. In order to deal with the complexity of the scheduling model, the authors develop a Lagrangian relaxation-based decomposition approach equipped with a variable fixing procedure and a primal heuristics to obtain high-quality solution of instances of the problem.

Supplemental Notes: Abstract reprinted with permission from Elsevier.

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Media Type: Print
Pagination: pp 1-21
Authors: Gelareh, Shahin
Merzouki, Rochdi
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Murray, Roisin
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Serial: Transportation Research Part C: Emerging Technologies
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Index Terms: Autonomous vehicle guidance; Case studies; Container handling; Container terminals; Dispatching; Dublin (Ireland); Intelligent vehicles; Intermodal transfer; Lagrangian functions; Port operations
Subject Areas: Freight Transportation; Operations and Traffic Management; Vehicles and Equipment; I72: Traffic and Transport Planning; I91: Vehicle Design and Safety

Title: Vessel Calls Snapshot, 2011
Accession Number: 01502019
Record Type: Monograph
Language: English
Record URL: http://www.marad.dot.gov/documents/Vessel_Calls_at_US_Ports_Snapshot.pdf
Abstract: This snapshot contains data on calls by oceangoing vessels of 10,000 deadweight (DWT) or greater at United States ports. Vessel capacities are expressed in terms of deadweight tons for all vessel types, twenty-foot equivalent units (TEU's) for containerships and cubic meters (CM) for gas carriers. In 2011, 7,836 oceangoing vessels made 68,036 calls at U.S. ports. Vessel calls were up 7.9 percent from five years earlier, but 13.6 percent from the year before. The recovery was spread over all of the major vessel types. Of

the 2011 calls, 35 percent were by tankers, 32.5 percent were by containerships, 16.1 percent were by dry bulk vessels, 9.1 percent were by Roll-On/Roll-Off (Ro-Ro) vessels, and 5.9 percent were by general cargo ships. In 2011, 98 percent of the tanker calls were by double-hull tankers, up from 83.7 percent five years earlier.

Supplemental Notes: Released: March 2013; Revised: November 2013.

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Authors: Olsen, Ryan
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Corporate Authors: Maritime Administration
Office of Policy and Plans
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Alexandria, VA 22312 United States
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Publication Date: 20130300

Edition: Revised

Index Terms: Cargo ships; Containerships; Ports; Ships; Tankers; United States; Vehicle capacity

Subject Areas: Freight Transportation; Marine Transportation; Terminals and Facilities; I70: Traffic and Transport

AFS

Title: **Optimum Routing of Freight in Urban Environments under Normal Operations and Disruptions using a Co-simulation Optimization Control Approach**

Accession Number: 01572360

Record Type: Project

Language: English

Record URL: <http://www.metrotrans.org/research-projects/metrotrans-utc>

Source Agency: National Center for Metropolitan Transportation Research
School of Policy, Planning and Development
650 Childs Way, RGL 238
Los Angeles, CA 90089-0626 United States

Source Data: RiP Project 39747

Abstract: The complexity and dynamics of the road and rail networks that are also shared by passengers together with the unpredictability of the effect of incidents, disruptions and demand, in temporal and spatial coordinates makes the scheduling and optimum routing of freight a very challenging task despite recent advances in information technologies. Estimating travel times in an urban road network environment is a real challenge especially during incidents and other disruptive events. Current practices rely on historical data and limited available real time information in order to make routing decisions that minimize a certain cost objective which in the case of road network is usually travel time. Incidents, disruptions, changes in demand, planned and unpredictable events may change the historical patterns of traffic, rendering decisions ineffective leading to imbalances in capacity across time and space coordinates. The purpose of this project is to exploit the availability of powerful computational and software tools together with advances in optimization and feedback control for dynamical systems in order to come up with a methodology that can lead to more efficient decisions in freight scheduling and routing. The method relies on the use of real time simulation models, for predicting travel times, traffic flows, fuel consumption and pollution by going beyond to what can be achieved today based on historical and limited real time data. The simulation models are used in a feedback loop with an optimization model and a load-balancing controller. The simulation models receive historical and streaming data and are able to automatically reconfigure themselves to simulate the subsequent effects of incidents and disruptions. They can be used to estimate costs (travel time, fuel consumption, pollution etc.) along different links in the network by fast-forwarding. In addition they can be used to test different decision scenarios before reaching a final decision. The predicted states of the network can be used to generate cost estimates along possible routes, which in turn can be used by an optimizer to calculate the optimum route with respect to space and time. In many cases however routing decisions and expected future demand may easily disturb the states of

the network and change the initially estimated costs leading to an unbalanced network load in space and/or time. A load balancing controller exercises the simulation model and tests different load distributions along the possible routes. The approach leads to an iterative feedback process with the objective of reducing the value of the cost index further till a stopping criterion is met in which case the final decision is applied to the real system. The objective of this project is focused on the effectiveness of the methodology as a tool for freight scheduling and routing in a complex urban environment. The project will investigate whether the use of simulation models operating in real time with optimization and automated control techniques can provide much better decisions than existing approaches that rely on past data and limited real time information. Issues such as speed of computations, scalability, convergence, ability for fast reconfiguration during incidents and disruptions are important research problems. While most of the work will concentrate on developing and analyzing the main components of the proposed co-simulation optimization control approach all simulations, testing and evaluations will be carried out by using a validated microscopic simulation model of part of the rail and road network in the Los Angeles and Long Beach area that includes the two major ports. The deliverables of the project will include the demonstration of the co-simulation optimization control approach and its benefits in upgrading current practices to a new level that takes full advantage of available technologies that include computations and automation of decisions in addition to information technologies. Our experience with traffic models indicates that even though duplicating the real world is an impossible task, simulation models provide much better information than static or equilibrium models and therefore their use in managing freight flows and traffic in general offer a strong potential for dramatic improvements if properly used in combination with optimization and control techniques. This project is aimed to demonstrate this potential as a main deliverable.

TRIS Files: UTC, RiP

Contract Numbers: DTRT13-G-UTC57

Funding: 100000.00

Start Date: 20150701

Performing Agencies: National Center for Metropolitan Transportation Research
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Funding Agencies: Research and Innovative Technology Administration
University Transportation Centers Program

Washington, DC 20590 United States

**Responsible
Individuals:**

Giuliano, Genevieve

Index Terms:

Freight traffic; Incident management; Optimization; Real time information; Routing; Service disruption; Simulation; Urban areas

Subject Areas:

Freight Transportation; Highways; Operations and Traffic Management; Planning and Forecasting

Title:

Repeatability & reproducibility: Implications of using GPS data for freight activity chains

Accession Number:

01563271

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Record URL:

<http://dx.doi.org/10.1016/j.trb.2015.03.007>

Record URL:

<http://www.sciencedirect.com/science/article/pii/S0191261515000508>

Abstract:

As transport modellers the authors are interested in capturing the behaviour of freight vehicles that includes the locations at which vehicles perform their activities, the duration of activities, how often these locations are visited, and the sequence in which they are visited. With disaggregated freight behaviour data being scarce, transport modellers have identified vehicle tracking and fleet management companies as ideal third party sources for global positioning system (GPS) travel data. GPS data does not provide us with behavioural information, but allows us to infer and extract behavioural knowledge using a variety of processing techniques. Many researchers remain skeptical as specific human intervention, referred to as 'expert knowledge', is often required during the processing phase: each GPS data set has unique characteristics and requires unique processing techniques and validation to extract the necessary behavioural information. Although much of the GPS data processing is automated through algorithms, human scrutiny is required to decide what algorithmic parameters as considered 'best', or at least 'good'. In this paper the authors investigate the repeatability and reproducibility (R&R) of a method that entails variable human intervention in processing GPS data. More specifically, the judgement made by an observer with domain expertise on what clustering parameters applied to GPS data best identify the facilities where commercial vehicles perform their activities. By studying repeatability the authors want to answer the question 'if the same expert analyses the GPS data more

than once, how similar are the outcomes?', and with reproducibility the authors want to answer the question 'if different experts analyse the same GPS data, how similar are their outcomes?' The authors follow two approaches to quantify the R&R and conclude in both cases that the measurement system is accurate. The use of GPS data and the associated expert judgments can hence be applied with confidence in freight transport models.

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Authors: Joubert, Johan W
Meintjes, Sumarie

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Serial: Transportation Research Part B: Methodological
Volume: 76
Issue Number:
Publisher: Elsevier
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Index Terms: Activity chains; Algorithms; Freight transportation; Global Positioning System; Human factors; Information processing; Mathematical models; Travel behavior; Trucks; Validation

Subject Areas: Data and Information Technology; Freight Transportation; Highways; Planning and Forecasting; I72: Traffic and Transport Planning

Title: **Exploring the heavy goods vehicle fleet behaviour through simulations: notes from the German toll system**

Accession Number: 01558366

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1049/iet-its.2013.0175>

Abstract: The automatic German toll system is both a software-intensive system

– relying on the on-board units to collect the toll charges due – and a socio-technical system – the user can influence the system behaviour. The overall dynamic system behaviour emerges both from the technical implementation of the system and the users' interaction with the system limiting the effectiveness of common software engineering practices. Simulations are an additional tool to reduce the operational risks and to improve the performance of system development projects. The authors have developed a realistic microscopic discrete event simulation model of the automatic tolling processes to simulate the overall system behaviour at a scale of 1:1. Taking this model their research investigates the effect of the HGV fleet behaviour on the dynamic system behaviour. To that end the system simulation model is accompanied by a separate model of the HGV driving patterns.

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- TRIS Files:** TRIS
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- Pagination:** pp 285-292
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Macos, Dragan
Jestädt, Thomas
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- Serial:** IET Intelligent Transport Systems
Volume: 9
Issue Number: 3
Publisher: Institution of Engineering and Technology
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Serial URL: <http://digital-library.theiet.org/content/journals/iet-its>
- Index Terms:** Automated toll collection; Germany; Human factors; Product development; Quality of service; Simulation; Software; Systems analysis; Truck driving; Trucks; Vehicle fleets
- Subject Areas:** Data and Information Technology; Finance; Motor Carriers; Operations and Traffic Management; I10: Economics and Administration
-

Title: **Commercial Truck Platooning**

Accession Number: 01567081

Record Type: Project

Language: English

Source Agency: Texas Department of Transportation
125 E. 11th Street
Austin, TX 78701-2483 United States

Source Data: RiP Project 39904

Abstract: Commercial Truck Platooning will perform the most practical commercial vehicle platooning effort in the U.S. Existing studies indicate platooning offers major safety and fuel saving benefits that are two critical issues for fleet operators. Truck Platooning, defined as electronically coupling two or more trucks (or vehicles) where the following truck longitudinal and lateral functions are automated to mimic the leading truck while maintain a tight distance. Texas is one of the key trucking hubs in the national supply chain, making it a perfect test bed for developing and implementing this technology. The Performing Agency or "Research Team" offers significant expertise and experience in truck automation.

TRIS Files: RiP, STATEDOT

Contract Numbers: 0-6836

Funding: 1181094.00

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Actual Completion Date: 20160331

Performing Agencies: Texas A&M Transportation Institute, College Station
Texas A&M University System
3135 TAMU
College Station, TX 77843-3135 United States

Funding Agencies: Texas Department of Transportation
125 E. 11th Street
Austin, TX 78701-2483 United States

Responsible Individuals: Badgley, Sonya

Index Terms: Commercial vehicles; Fleet safety; Fuel consumption; Highway safety; Texas; Traffic platooning; Trucks

Subject Areas: Data and Information Technology; Freight Transportation; Highways; Motor Carriers; Safety and Human Factors

Title: Cooperative Adaptive Cruise Control (CACC) for Truck Platooning: Operational Concept Alternatives

Accession Number: 01577574

Record Type: Monograph

Language: English

Record URL: <http://escholarship.org/uc/item/7jf9n5wm>

Source Agency: UC Berkeley Transportation Library

Source Data: Caltrans 2959

Abstract: Cooperative Adaptive Cruise Control (CACC) provides an intermediate step toward a longer-term vision of trucks operating in closely coupled automated platoons. There are important distinctions between CACC and automated truck platooning. First, with CACC, only truck speed control will be automated, using vehicle to vehicle (V2V) communication to supplement forward sensors. The drivers will still be responsible for actively steering the vehicle, lane keeping, and monitoring roadway and traffic conditions. Second, while truck platooning systems have relied on a Constant Distance Gap (CDG) control strategy, CACC has relied on a Constant-Time Gap (CTG) control strategy, where the distance between vehicles is proportional to the speed. For these reasons, a series of trucks using CACC is referred to as a string, rather than a platoon. This report mainly focuses on describing the various CACC operational concept alternatives at the level of individual vehicles, local groups of vehicles and their drivers, and which alternatives should be employed in this research project. These operational concepts can be broken into four categories: string formation, steady-state cruising, string split maneuvers, and faults or abnormal operating conditions.

TRIS Files: CALTRANS, TRIS, ATRI, USDOT, STATEDOT

Report/Paper Numbers: UCB-ITS-PRR-2015-05

Contract Numbers: DTFH61-13-H-00012

Media Type: Digital/other

Pagination: 37p

OCLC: 920485096

Authors: Nowakowski, Christopher

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P.O. Box 942873
Sacramento, CA 94273-0001 United States
Federal Highway Administration
Exploratory Advanced Research Program
6300 Georgetown Pike
McLean, VA 22101-2296 United States

Availability: Find a library where document is available
Order URL: <http://worldcat.org/oclc/920485096>

Publication Date: 20150300

Serial: PATH Research Report
Publisher: University of California, Berkeley
ISSN: 1055-1425

Index Terms: Autonomous intelligent cruise control; Dedicated short range communications; Speed control; Traffic platooning; Trucks; Vehicle to vehicle communications

Subject Areas: Data and Information Technology; Freight Transportation; Operations and Traffic Management; I72: Traffic and Transport Planning

Title: Critical Next Steps for AV/CV Applications in Freight Operations

Accession Number: 01552201

Record Type: Project

Language: English

Record URL: <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3936>

Source Agency: Transportation Research Board
500 Fifth Street, NW
Washington, DC 20001 United States

Source Data: RiP Project 39006

Abstract: Connected vehicle/automated CV/AV technologies offer potential benefits to improve safety and increase efficiency of freight and goods movement in North America. The freight industry is extremely important to the economic vitality of the nation. Trucking is a strong component of this, as over 70% of all freight is carried by truck at some stage in the supply chain. The trucking industry faces critical challenges in maintaining adequate workforce. AV/CV technologies could be useful to fill in the unmet needs with automated resources, raise the status of a career in trucking, and reduce the workload of the driver in long-haul (and other) operations. Truck parking and rest areas are often strategically located to align with hours-of-service limitations. If hours-of-service were modified due to AV systems, national planning for rest areas and en-route facilities could be modified. Truck platooning is commonly identified as a near term application, but to make that a reality a variety of platooning protocols and procedures need to be defined and verified. Automated drayage and automated docking are frequently noted as highly desirable by the trucking industry. The regulatory, policy, and technical aspects of AV technologies on the trucking and freight operations industry need to be evaluated and recommendations developed for state departments of transportation (DOT) and local agencies that are involved with freight operations. The research team will review existing literature and develop a list of key issues and challenges in the regulatory, policy, and operations landscape of freight system operations and identify the pain points or areas where policy and operations strategy changes are necessary to accommodate (or facilitate) CV/AV deployment. In particular, truck platooning concepts should be explored and a list of near-term actions should be developed to answer the key research and policy questions.

Supplemental Notes: Contract to a Performing Organization has not yet been awarded.

TRIS Files: TRB, RiP

Contract Numbers: Project 20-102(03)

Funding: 150000.00

Start Date: 20150201

Funding Agencies: Federal Highway Administration
1200 New Jersey Avenue, SE
Washington, DC 20590 United States
American Association of State Highway & Transportation Officials

444 North Capitol Street, NW, Suite 225
Washington, DC 20001 United States
National Cooperative Highway Research Program
Transportation Research Board
500 Fifth Street, NW
Washington, DC 20001 United States

Responsible Individuals: Rogers, William C

Index Terms: Drayage; Freight traffic; Intelligent vehicles; Mobile communication systems; North America; Parking facilities; Policy analysis; Roadside rest areas; Traffic platooning; Trucking

Subject Areas: Freight Transportation; Highways; Motor Carriers; Operations and Traffic Management; Terminals and Facilities

Title: **Truck platooning: driving the future of transportation**

Accession Number: 01560460

Record Type: Monograph

Language: English

Record URL: <https://www.tno.nl/en/about-tno/news/2...future-of-transportation-tno-whitepaper/>

Source Agency: ARRB Group Limited
500 Burwood Highway
Vermont South, Victoria 3133

Abstract: Truck Platooning is the future of transportation in which trucks drive cooperatively at less than 1 second apart made possible by automated driving technology. Transportation companies benefit from lower fuel consumption and improvements in (driver) productivity, while society benefits from fewer accidents, safer traffic and less congested roads, and lower carbon emissions. In this TNO whitepaper, we explain what platooning is, what kind of benefits it brings for which parties in the supply chain, and the roadmap towards deployment of platooning on Dutch and European roads. Developments in the underlying Cooperative Adaptive Cruise Control (CACC) technology have been ongoing for years, yet widescale deployment of truck platooning is a system-wide innovation challenge that requires a concerted approach of all stakeholders in society. For instance, policy-makers have to contribute supporting legislation, regulators such as the RDW need to develop safety-focussed type approval methodologies, truck

manufacturers and OEM should strive for plug-and-plug compatibility of platooning systems, insurance firms are required to develop new liability coverage schemes, and shippers can urge their carriers and logistics service providers to form as many platoons as possible and change their supply chains, while other road users need to learn to accommodate the two-truck road trains. Right now the political and economic climate is positive for a broad deployment of platooning as initial legislation amendments are proposed to allow testing and experimentation on Dutch roads. For this system-wide innovation, we suggest to establish a Shared Innovation Programme, based on open innovation principles. In the programme, we can jointly work towards commercial deployment of platooning to implement a safe, reliable and efficient two-truck platooning concept by 2020.

TRIS Files: ATRI

Pagination: 35p

Authors: Janssen, R
Zwijnenberg, H
Blankers, I
de Kruijff, J

Corporate Authors: TNO
Delft

Publication Date: 20150200

Index Terms: Advanced vehicle control systems; Advanced vehicle control systems; Advanced vehicle control systems (AVCS); Bunching; Bunching; Innovation; Innovation; Intelligent transport system; Policy; Policy; Research; Research and development; Truck; Trucks

Subject Areas: Motor Carriers; Policy; Research

Title: Innovative and Automated Freight Systems Assess

Accession Number: 01569095

Record Type: Project

Language: English

Source Agency: Texas Department of Transportation
125 E. 11th Street
Austin, TX 78701-2483 United States

Source Data: RiP Project 39967

Abstract: Many innovative and automated freight delivery strategies and technologies have been proposed to address the future freight needs of Texas' growing population. The Receiving Agency (hereafter referred to as "Texas Department of Transportation" or "TXDOT") and local transportation planners need to evaluate operational changes or technology applications to ensure continued, timely flow of commercial freight through the Texas transportation system. Emerging freight delivery technologies, such as automated freight vehicles or airborne small package delivery, and innovative operational freight strategies, such as nighttime off-peak hour deliveries or conversion of managed lanes to truck-only use during high port traffic periods. Are potential ways to better use existing infrastructure. Changes in buying habits of consumer goods toward direct home package delivery also could dramatically shift distribution patterns and increase the number of intercity and local delivery trucks on TxDOT roadways. The primary objective of this project is to establish a process to evaluate freight Operational changes or technology applications in order to ensure continued timely flow of commercial freight through the Texas transportation system. This project will develop and adapt the necessary evaluation metrics for future use. This project will also access several currently proposed freight strategies and technologies to determine which of these should be further evaluated for implementation on the Texas transportation system in future project phases.

TRIS Files: RiP, STATEDOT

Contract Numbers: 0-6837

Funding: 517892.00

Start Date: 20150130

Actual Completion Date: 20151231

Performing Agencies: Texas A&M Transportation Institute, College Station
Texas A&M University System
3135 TAMU
College Station, TX 77843-3135 United States

Funding Agencies: Texas Department of Transportation
125 E. 11th Street
Austin, TX 78701-2483 United States

Responsible Individuals: Odell, Wade

Index Terms: Air cargo; Delivery service; Delivery vehicles; Freight traffic; Port

operations; Texas; Truck lanes

Subject Areas: Aviation; Freight Transportation; Operations and Traffic Management; Planning and Forecasting; Terminals and Facilities

Title: Facility Layout for an Automated Guided Vehicle System

Accession Number: 01574281

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1016/j.procs.2015.07.007>

Record URL: <http://www.sciencedirect.com/science/article/pii/S1877050915014829>

Abstract: The facility layout problem (FLP) aims to minimize the material handling costs by determining the most efficient arrangement of facilities within a space. Among several types of layout structure, bay layout is used in a wide variety of manufacturing contexts of which the workstations are assigned to several parallel bays. Concerning the world trend in automation and advantages of flexibility and space utilization, the Automated Guided Vehicle (AGV) systems are considered in this paper to address the bay layout problems. A two-stage model called Spine Bay Layout is developed to allocate the workstations into several inter-bay systems such that not only the material handling cost can be minimized, but also the flexibility in applications can be enhanced. In order to compare with the conventional system and facilitate the flexible applications, an extended model is presented for the Single Spine Bay Layout. The results show that in comparison with the previous research, the proposed model reduces not only the total cost; but also the solution time. Moreover, due to the high complexity of the model, a sub-model called Allocation Model is proposed to provide the feasibility condition of the two-stage model.

Supplemental Notes: © 2015 Hsiao-Fan Wang and Ching-Min Chang. Published by Elsevier B.V.

TRIS Files: TRIS

Media Type: Digital/other

Pagination: pp 52-61

Authors: Wang, Hsiao-Fan
Chang, Ching-Min

Availability: Find a library where document is available
Order URL: <http://worldcat.org/issn/18770509>

Publication Date: 20150000

Conference: 3rd International Conference on Information Technology and Quantitative Management, ITQM 2015
Location: Rio De Janeiro , Brazil
Date: 20150721 - 20150724

Serial: Procedia Computer Science
Volume: 55
Publisher: Elsevier
ISSN: 1877-0509
Serial URL: <http://www.sciencedirect.com/science/journal/18770509>

Index Terms: Automated guided vehicle systems; Costs; Facilities; Handling and storage; Workplace layout

Subject Areas: Freight Transportation; Planning and Forecasting; Terminals and Facilities; I72: Traffic and Transport Planning

Title: **Automated Vehicles and the Rethinking of Mobility and Cities**

Accession Number: 01554691

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1016/j.trpro.2015.01.002>

Record URL: <http://www.sciencedirect.com/science/article/pii/S2352146515000034>

Abstract: The project CityMobil2 has carried out a forward-looking exercise to investigate alternative cybermobility scenarios, including both niche and large-market innovations, and their impacts on European cities and their transport systems. The paper describes the current status of and main trends in automated vehicles, a preliminary vision of the future city with mobility supported mainly by automated vehicles, and freight distribution. The expected positive impacts derive from the development of car sharing, the reduction of space required for parking vehicles, the possibilities for older people or those with disabilities to use cars, the enhancement of safety, and the improvement of efficiency of the transport system.

Supplemental Notes: © 2015 Adriano Alessandrini et al. Published by Elsevier B.V.

TRIS Files: TRIS

Media Type: Digital/other
Pagination: pp 145-160
Authors: Alessandrini, Adriano
Campagna, Andrea
Site, Paolo Delle
Filippi, Francesco
Persia, Luca
Availability: Find a library where document is available
Order URL: <http://worldcat.org/issn/23521465>
Publication Date: 20150000
Serial: Transportation Research Procedia
Volume: 5
Issue Number:
Publisher: Elsevier
ISSN: 2352-1465
Serial URL: <http://www.sciencedirect.com/science/journal/23521465/>
Index Terms: Aged; Europe; Intelligent vehicles; Mobility; Parking; Persons with disabilities; Urban areas; Vehicle sharing
Subject Areas: Highways; Planning and Forecasting; Public Transportation; Vehicles and Equipment; I20: Design and Planning of Transport Infrastructure

Title: Lehrte MegaHub to open in 2017
Accession Number: 01541638
Record Type: Component
Language: English
Abstract: Construction on an innovative intermodal terminal with automated container sorting technology is getting underway in Lehrte, to the east of Hannover in Germany. It is expected to become a key node in the European rail freight network, as it lies at the intersection of the North Sea-Baltic, Orient/East-Med and Scandinavian-Mediterranean Trans-European Transport Network (TEN-T) corridors. Under development since 1997, the MegaHub project has experienced various interruptions to the process, however it is now expected that trial operation will begin in 2016, with the following year bringing a full start of revenue service. Six transfer racks with a minimal operational length of 700 m, accommodating the longest trains able to run across the TEN-T network, will comprise the centerpiece of the terminal. A fully-

automated container sorting system is the most innovative element of the project.

TRIS Files: TRIS

Media Type: Print

Pagination: pp 67-68, 70

Authors: Muller, Christopher

Availability: Find a library where document is available
Order URL: <http://worldcat.org/issn/03735346>

Publication Date: 20140900

Serial: Railway Gazette International
Volume: 170
Issue Number: 9
Publisher: DVV Media Group
ISSN: 0373-5346
Serial URL: <http://www.railwaygazette.com/about-us.html>

Index Terms: Case studies; Container handling; Freight transportation; Germany; Innovation; Intermodal terminals; Railroads; Sorting; Water transportation

Subject Areas: Construction; Freight Transportation; Marine Transportation; Railroads; Terminals and Facilities; I50: Construction and Supervision of Construction

Title: Online Container Transport Planning with Decision Trees based on Offline Obtained Optimal Solutions

Accession Number: 01542295

Record Type: Component

Language: English

Record URL: <http://www.icms.polyu.edu.hk/Proceedings/Proceedings%20of%20IFSPA%202014.pdf>

Abstract: Hinterland networks for container transportation require planning methods in order to increase efficiency and reliability of the inland road, rail and waterway connections. Earlier proposed centralised methods can in theory find the optimal solution for the multimodal inland transportation problem in retrospect, but are not suitable when information becomes gradually available. Besides real-time up-to-date information on inland services necessary for applying these methods in practice is typically not available. In this paper the authors aim to derive online decision rules for suitable

allocations of containers to inland services by analysing the solution structure of a centralised optimisation method used offline. The online decision support system (DSS) must be able to instantaneously allocate incoming orders to suitable services, without the need for continuous planning updates. Such a DSS is beneficial, as it is easier to implement in the current practice of container transportation than a fully automated planning system, while providing a better performance. A case study is used to show the method's purpose and to compare the quality of the resulting plan with alternatives.

- Supplemental Notes:** Abstract reprinted with permission of Hong Kong Polytechnic University.
- TRIS Files:** TRIS
- Media Type:** Digital/other
- Pagination:** pp 50-60
- Authors:** van Riessen, Bart
Negenborn, Rudy R
Dekker, Rommert
- Monograph Title:** Proceedings of the International Forum on Shipping, Ports and Airports (IFSPA) 2014: Sustainable Development in Shipping and Transport Logistics
- Monograph Accession Number:** 01540053
- Corporate Authors:** Hong Kong Polytechnic University
Department of Logistics and Maritime Studies
Tung International Centre for Maritime Studies
Hong Kong China
- Editors:** Chin-Shan Lu
Petrus Choy
Kee-Hung Lai
YH Venus Lun
Tsz Leung Yip
- Publication Date:** 20140800
- Conference:** International Forum on Shipping, Ports and Airports (IFSPA) 2014: Sustainable Development in Shipping and Transport Logistics
Location: Hong Kong , China
Date: 20140519 - 20140521
Sponsors: Hong Kong Polytechnic University
- Index Terms:** Case studies; Containerization; Decision support systems; Decision trees; Hinterlands;

Intermodal services; Logistics; Optimization; Real time information

Subject Areas: Freight Transportation; Highways; Marine Transportation; Planning and Forecasting; Railroads; I72: Traffic and Transport Planning

Title: Connected and Autonomous Vehicles 2040 Vision

Accession Number: 01539697

Record Type: Monograph

Language: English

Record URL: <https://www.google.com/url?sa=t&rct=j&...kipjOPZJdIGA&sig2=akTbtWT7uy0Qc3i2aPVzPA>

Abstract: The Pennsylvania Department of Transportation (PennDOT) commissioned a one-year project, Connected and Autonomous Vehicles 2040 Vision, with researchers at Carnegie Mellon University (CMU) to assess the implications of connected and autonomous vehicles on the management and operation of the state's surface transportation system. This report explores the impacts of connected and autonomous vehicles on design and investment decisions, communication devices investment, real-time data usage, existing infrastructure, workforce training needs, driver licensing and freight flow as they relate to PennDOT. For each of these areas, a set of recommendations has been provided. As connected and autonomous technologies are advancing, it is recommended that PennDOT take these actions in a timely manner. A timeline for the recommended actions has been provided to help PennDOT plan accordingly. The timelines are based on current available information and the time frames are likely to change over time.

TRIS Files: TRIS, ATRI, USDOT, STATEDOT

Report/Paper Numbers: FHWA-PA-2014-004-CMU WO 1

Contract Numbers: CMUIGA2012 - CMU WO 1

Media Type: Digital/other

Pagination: 163p

Authors: Hendrickson, Chris
Biehler, Allen
Mashayekh, Yeganeh

Corporate Authors: Carnegie Mellon University
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Pennsylvania Department of Transportation

Bureau of Planning and Research, 400 North Street, 6th Floor
Harrisburg, PA 17120-0064 United States
Federal Highway Administration
1200 New Jersey Avenue, SE
Washington, DC 20590 United States

Availability: National Technical Information Service
5301 Shawnee Road
Alexandria, VA 22312 United States

Publication Date: 20140710

Edition: Final Report

Period Covered: 7/11/2013 - 7/10/2014

Index Terms: Driver licensing; Freight traffic; Infrastructure; Intelligent vehicles; Investments; Mobile communication systems; Pennsylvania Department of Transportation; Real time information; Recommendations; Training

Subject Areas: Highways; Planning and Forecasting; Vehicles and Equipment; I20: Design and Planning of Transport Infrastructure; I90: Vehicles

Title: **Huge UPS hub is big on freight**

Accession Number: 01535546

Record Type: Component

Language: English

Record URL: <http://www.progressiverailroading.com/...-and-more-cargo-is-on-the-horizon--40371>

Abstract: The United Parcel Service (UPS) operates the Worldport complex, a major hub next to the Louisville International Airport. Worldport generates a huge amount of freight each day, which is sorted using a highly-efficient automated system and sent on to final destinations. Most packages are collected during the day and sorted at smaller hubs around the world before being air-freighted to Worldport, where they arrive around midnight. In addition to air freight, the complex distributes rail freight through a nearby intermodal terminal. Recent expansions to the complex have improved its capacity, and officials are looking toward further development.

TRIS Files: TRIS

Media Type: Print

Pagination: pp 26, 28, 30-31

Authors: Stagl, Jeff

Availability: Find a library where document is available
Order URL: <http://worldcat.org/oclc/4175009>

Publication Date: 20140500

Serial: Progressive Railroading
Volume: 57
Issue Number: 5
Publisher: Trade Press Publishing Corporation
ISSN: 0033-0817
OCLC: 4175009
Serial URL: <http://www.progressiverailroading.com>

Index Terms: Air cargo; Delivery service; Freight terminals; Freight trains; Hubs; Intermodal terminals; Logistics; Louisville (Kentucky); United Parcel Service

Subject Areas: Aviation; Freight Transportation; Planning and Forecasting; Railroads; Terminals and Facilities; I72: Traffic and Transport Planning

Title: **On-board intelligence for the Furbot: a new concept for urban freight transport**

Accession Number: 01540789

Record Type: Component

Language: English

Record URL: http://tra2014.traconference.eu/papers/pdfs/TRA2014_Fpaper_18047.pdf

Source Agency: Swedish National Road and Transport Research Institute (VTI)
Linköping SE-581 95 Sweden

Abstract: The Furbot project proposes to develop a new concept for urban freight transport. The novelty of the concept is twofold. A new architecture of light-duty, full-electrical vehicle is proposed. A great effort is devoted to energy management: new power train layout integrated in the chassis; new battery and energy management system; regenerative braking... But if attention is given to energy management for one vehicle, the Furbot concept consists in having a fleet of several vehicles offering a new sustainable and very adaptable (evolvable) urban freight transport system. In this article, we focus on the intelligent on-board unit. It has

mainly two functions. First, it offers assistance to the driver: emergency braking, obstacle avoidance, parking assistance, itinerary assistance or adaptive speed control. Second, it proposes automation abilities for the loading/unloading of the payload. Regarding the multi-sensorial perception system, an intelligent human-machine interface is also conceived in order to let the driver choose between the driving modes (fully manual, assisted, automated loading), in order to provide him general information (map, mission, fleet state...) and warn him about safety issues, power caution and vehicle diagnosis.

TRIS Files: VTI, TRIS, ATRI

Pagination: 10p

Authors: Pollard, Evangeline
Pérez, Joshué
Nashashibi, Fawzi

Monograph Title: Transport Research Arena (TRA) 2014 Proceedings

Monograph Accession Number: 01528196

Corporate Authors: Institut Francais des Sciences et Technologies des Transports, de l'Aménagement et des Réseaux (IFSTTAR)
14-20 bd Newton, Cité Descartes, Champs su Marne
77447 Marne la Vallée Cedex 2 France

Publication Date: 20140400

Conference: Transport Research Arena (TRA) 5th Conference: Transport Solutions from Research to Deployment
Location: Paris , France
Date: 20140414 - 20140417
Sponsors: European Commission; Conference of European Directors of Roads (CEDR); European Road Transport Research Advisory Council (ERTRAC); WATERBORNE^{TP}; European Rail Research Advisory Council (ERRAC); Institut Francais des Sciences et Technologies des Transports, de l'Aménagement et des Réseaux (IFSTTAR); Ministère de l'Écologie, du Développement Durable et de l'Énergie

Index Terms: Commodities; Delivery vehicle; Delivery vehicles; Electric vehicle; Electric vehicles; Freight; Handling (mech); Handling and storage; Robot; Robots

Subject Areas: Energy; Freight Transportation; I90: Vehicles

Title: SARTRE automated platooning vehicles

Accession Number: 01530678

Record Type: Component

Language: English

Record URL: http://tra2014.traconference.eu/papers/pdfs/TRA2014_Fpaper_20075.pdf

Source Agency: ARRB Group Limited
500 Burwood Highway
Vermont South, Victoria 3133

Abstract: The SARTRE project develops and integrates solutions to allow trucks and cars to drive in platoons to reduce fuel consumption, increase safety, improve road congestion and increase driver convenience. The lead vehicle in the platoon is driven normally and the following vehicles are automated, allowing the drivers to perform other tasks. The platoon vehicles operate on conventional motorways in a mixed environment with other non-platoon traffic, without requiring changes to the road infrastructure. A demonstration system with two trucks and three cars was operated on test tracks and on the public motorway at speeds of up to 90 km/h and gap sizes from 4-25m. They were used to measure the fuel consumption gains at a range of inter-vehicle gaps, demonstrating the potential for significant fuel savings for both trucks and cars. The business case for the introduction of automated platooning systems in trucks and cars was investigated, and estimates for the costs as well as the benefits were evaluated.

TRIS Files: VTI, TRIS, ATRI

Pagination: 9p

Authors: Chan, E

Monograph Title: Transport Research Arena (TRA) 2014 Proceedings

Monograph Accession Number: 01528196

Corporate Authors: Institut Francais des Sciences et Technologies des Transports, de l'Aménagement et des Réseaux (IFSTTAR)
14-20 bd Newton, Cité Descartes, Champs su Marne
77447 Marne la Vallée Cedex 2 France

Publication Date: 20140400

Conference: Transport Research Arena (TRA) 5th Conference: Transport Solutions from Research to Deployment
Location: Paris , France
Date: 20140414 - 20140417
Sponsors: European Commission; Conference of European Directors of

Roads (CEDR); European Road Transport Research Advisory Council (ERTRAC); WATERBORNE^{TP}; European Rail Research Advisory Council (ERRAC); Institut Francais des Sciences et Technologies des Transports, de l'Aménagement et des Réseaux (IFSTTAR); Ministère de l'Écologie, du Développement Durable et de l'Énergie

Index Terms: Advanced vehicle control systems; Advanced vehicle control systems; Advanced vehicle control systems (AVCS); Automated highway systems; Automated highway systems (AHS); Automobiles; Benefit cost analysis; Bunching; Bunching; Car; Cost benefit analysis; Fuel consumption; Fuel consumption; Intelligent transport system; Test track; Test tracks; Truck; Trucks

Subject Areas: Energy; Motor Carriers; Operations and Traffic Management

Title: Rail trends recap : shared strategies, mixed signals

Accession Number: 01521313

Record Type: Component

Language: English

Source Agency: Northwestern University Transportation Library

Abstract: From growing pains to safety to regulation, the rail industry will cross many challenges in the year ahead, and they all affect shippers. Inbound logistics bring you abroad with Rail Trends conference coverage.

TRIS Files: TLIB

Pagination: p. 193-202

OCLC: 871269879

Authors: O'Reilly, Joseph

Availability: Available from Northwestern University Transportation Library through interlibrary loan or document delivery
Order URL:
<http://www.library.northwestern.edu/transportation/services.html>
Find a library where document is available
Order URL: <http://worldcat.org/oclc/871269791>

Publication Date: 20140100

Period Covered: Jan. 2014

Serial: Inbound Logistics

Volume: 34
Issue Number: 1
Publisher: Thomas Publishing Company
ISSN: 0888-8493
OCLC: 21894848
Serial URL: <http://www.inboundlogistics.com>

Index Terms: Commodities; Freight service; Railroads; United States

Subject Areas: Freight Transportation; Railroads

Freight Container Mobility

Google Search

This search basically yielded industry products to use, such as shipping containers or truck mounted cranes. 10-9-15

Container Mobility Leading Edge Technology for TEU's in Trucking Industry

<http://containermobility.com/#>

Container Mobility Co. uses an innovative crane truck. They have the capability to deliver containers up to 80,000 lbs or 36 tonnes into specific positions, including tight spots that traditional truck deliveries cannot handle.

Shipping Containers for Sale

<https://www.bslcontainers.com/shipping-container-manufacturers/>

Deployable Container Solutions- for Military Use

<http://www.dyteca.co.uk/business-areas-new/systems-integration/deployable-container-solutions/>

Dytecna design and supply containers and shelters for a wide range of demanding applications. Bespoke solutions are tailored exactly to client requirements and delivered by a team with a wealth of experience, capability and engineering excellence. Exsel Dyteca has extensive experience in the design, production and installation of a variety of mobile, static and special to type systems.

Container Terminal- Handling, Transport- Wikipedia

https://en.wikipedia.org/wiki/Container_terminal

Operations Research at Container Terminals: a Literature Update

OR Spectrum Jan 2008 Springer International Publishing

http://link.springer.com/chapter/10.1007%2F3-540-26686-0_1#page-1

Abstract: The current decade sees a considerable growth in worldwide container transportation and with it an indispensable need for optimization. Also the interest in and availability of academic literatures as well as case reports are almost exploding. With this paper an earlier survey which proved to be of utmost importance for the community is updated and extended to provide the current state of the art in container terminal operations and operations research.

Keywords: Container terminal Logistics Planning Optimization Simulation

Problem: Must pay to read this article

STRC Swiss Transportation Research Conferences Lausanne, Switzerland <http://www.strc.ch/>

Optimization of operations in container terminals: hierarchical vs integrated approaches

STRC Swiss Transportation Research Conference Sept 2010 Lausanne, Switzerland

<http://www.strc.ch/conferences/2010/Vacca.pdf>

Abstract

Over the last years, international sea freight container transportation has grown dramatically and container terminals play nowadays a key role within the global shipping network. Terminal's operations have received increasing interest in the scientific literature and operations research techniques are more and more used to improve efficiency and productivity.

In this work we provide an overview of container terminal's operations and associated decision problems. We review state-of-the-art optimization approaches in terminal's management and we discuss what are in our opinion the current research trends. In particular, we focus on the following streams: the integrated optimization of interdependent decision problems, the analysis of issues related to traffic congestion in the yard and the tactical planning of operations.

The discussion is based on the Tactical Berth Allocation Problem (TBAP), an integrated decision problem that deals with the simultaneous optimization of berth allocation and quay crane assignment. Yard housekeeping costs are also taken into account in the objective function. We use the TBAP as a case study to illustrate the benefits of an integrated optimization approach. A comparative analysis with the traditional hierarchical solution approach is provided. Computational results based on real-world data provided by the MCT (port of Gioia Tauro, Italy) show that the additional computational effort required by the integrated optimization approach allows for more efficient solutions.

Keywords: container terminals, berth allocation, quay crane assignment, integrated optimization

STRC- A Multi-Modal Network for MATsim- traffic simulation, map routes, performance and routing

http://www.strc.ch/conferences/2015/Boesch_Ciari.pdf

The approach presented in this paper enables the generation of fully-multimodal MATSim networks and schedules from open data. Only fully-multimodal networks allow the simulation of competition for road capacity between PT and private transport. They are therefore a necessary part of transport simulations in a time when limited road capacity is an issue not only but especially in urban areas. The immense effort that must be invested in any road capacity expansion today, and which is more and more difficult to justify given environmental and social trends, exacerbates the problem and makes it even more relevant. Projects such as NetCap search for alternative approaches to solve this problem. An optimization of the PT supply can lead to capacity increase, but it must be implemented with political sensitivity. The support and review of this optimization with new approaches, such as MFDs in NetCap, enable new solutions.

Rail Infrastructure Maintenance: A new Approach
Freight System Swiss Technology Research Conference
Emile Quinet Paris School of Economics Keynote Speech 2014
<http://www.strc.ch/conferences/2014/Quinet.pdf>

Several European rail lines were compared with mathematical economics equations. Principle drawn from technical analysis: At the start from a renewal, quality of service is high. Progressively, as long as the time elapses, quality of service decreases due to traffic damages, and can be increased through current maintenance. As time elapses, the maintenance level necessary to maintain quality of service is higher, as damages are linked to cumulated traffic. At some point of time, it is better to renew the track than to continue current maintenance.

There are so many articles that may be of interest at this STRC website it would take a few days to read and go through all of these.

TRID Search

Best Topic Found

Title: **Modeling Public Policies on Urban Freight Distribution: Tackling Emissions, Congestion, and Logistics Costs**

Accession Number: 01555493

Record Type: Component

Language: English

Order URL: <http://amonline.trb.org/>

Source Data: Transportation Research Board Annual Meeting 2015 Paper #15-3578

Abstract: The urban environment, logistics performance, and cities' economic competitiveness can benefit greatly from programs that improve logistics efficiency and distribution networks, and as such, these improvements should be on policymakers' radar. Since decisions originating in the private sector affect cities' mobility and green-house-gas (GHG) emission levels, appropriate government responses to these issues are fundamental to achieve sustainable development in urban environments. The objective of this work is to increase the understanding on how policies focused on improving urban goods movement, such as dedicated infrastructure (freight corridors and platforms), traffic regulations (time window deliveries and vehicle constraints), city logistics network optimization, and voluntary cooperation (to achieve better consolidation levels between shippers and carriers), can contribute to economic and social development in

metropolitan areas, whilst reducing or minimizing the emissions of GHGs. The authors developed a mathematical model to simulate the impacts that different policies could have on logistics costs, traffic level, congestion, and emissions.

Supplemental Notes: This paper was sponsored by TRB committee AT025 Urban Freight Transportation.

TRIS Files: TRIS, TRB, ATRI

Report/Paper Numbers: 15-3578

Media Type: Digital/other

Pagination: 12p

Authors: Fioravanti, Reinaldo
Guerrero, Pablo
Chung Cho, Eun

Monograph Title: TRB 94th Annual Meeting Compendium of Papers

Monograph Accession Number: 01550057

Corporate Authors: Transportation Research Board
500 Fifth Street, NW
Washington, DC 20001 United States

Availability: Transportation Research Board Business Office
500 Fifth Street, NW
Washington, DC 20001 United States

Publication Date: 20150000

Conference: Transportation Research Board 94th Annual Meeting
Location: Washington DC, United States
Date: 20150111 - 20150115
Sponsors: Transportation Research Board

Index Terms: Costs; Economic development; Logistics; Mathematical models; Pollutants; Public policy; Sustainable development; Traffic congestion; Urban goods movement

Subject Areas: Economics; Freight Transportation; Planning and Forecasting; Policy; I10: Economics and Administration; I72: Traffic and Transport Planning

Regulations

Title: NAFTA at 20: Time to open the internal borders of North American to cabotage

Accession Number: 01577498

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1016/j.rtbm.2015.07.002>

Record URL: <http://www.sciencedirect.com/science/article/pii/S2210539515000309>

Abstract: The deeply integrated North American economy depends on efficient freight transport systems. This essay examines cabotage in Canada, the U.S. and Mexico from an economic and policy perspective. Cabotage is restricted by a web of regulations in North America that remain pervasive and continue to impose significant restraints on freight transportation. Liberalizing cabotage could improve efficiency/productivity, increase trade opportunities and regional economic integration. Open cabotage could also reduce greenhouse gas emissions. However, reform is difficult because these regulations are linked to tax, immigration and other customs issues and because they protect the interests of domestic transport industries. The creation of a North American trading bloc is a work in progress. While various initiatives since the North American Free Trade Agreement (NAFTA) have failed to advance cabotage, the authors of this report remain optimistic that freer trade in transportation is inevitable.

Supplemental Notes: Abstract reprinted with permission of Elsevier.

TRIS Files: TRIS

Media Type: Digital/other

Pagination: pp 4-14

Authors: Blank, Stephen
Prentice, Barry E

Availability: Find a library where document is available
Order URL: <http://worldcat.org/issn/22105395>

Publication Date: 20150900

Serial: Research in Transportation Business & Management
Volume: 16
Publisher: Elsevier
ISSN: 2210-5395

Serial URL: <http://www.sciencedirect.com/science/journal/22105395>

Index Terms: Cabotage; Economic factors; Environmental impacts; North America; North American Free Trade Agreement; Policy; Productivity; Regulatory reform

Subject Areas: Freight Transportation; Planning and Forecasting; I72: Traffic and Transport Planning

Operations

Smart Freight Transportation

Title: **Smart Freight: Applications of Information and Communications Technologies to Freight System Efficiency**

Accession Number: 01544636

Record Type: Monograph

Language: English

Record URL: <http://www.aceee.org/files/pdf/white-paper/smart-freight-ict.pdf>

Abstract: This paper focuses on the energy savings potential of information and communications technology (ICT) as applied to freight transportation. It identifies savings that can be realized by reducing miles traveled, improving the efficiency of freight networks, and maximizing freight vehicle operations. Case studies are included of companies using ICT to reduce emissions and conserve fuel. Barriers to implementation are reviewed, recommendations made, and the role of public policy is examined.

TRIS Files: TRIS

Media Type: Digital/other

Pagination: 29p

Authors: Langer, Therese
Vaidyanathan, Shruti

Corporate Authors: American Council for an Energy-Efficient Economy
529 14th Street NW, Suite 600
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Publication Date: 20140700

Index Terms: Case studies; Communication; Freight transportation; Fuel consumption; Information technology; Intelligent transportation systems; Pollutants; Public policy; Recommendations; Technological innovations

Subject Areas: Data and Information Technology; Freight Transportation; Planning and Forecasting; I72: Traffic and Transport Planning

Ports

Title: **Multimodal Freight Distribution to Support Increased Port Operations**

Accession Number: 01566137

Record Type: Project

Language: English

Record URL: <http://www.matsutc.org/multimodal-frei...on-to-support-increased-port-operations/>

Source Agency: Mid-Atlantic Transportation Sustainability Center
Charlottesville, Virginia United States

Source Data: RiP Project 37246

Abstract: It is projected that more containers will pass through the major ports of the mid-Atlantic region with the completion of the Panama Canal expansion, and as shippers and carriers find it more efficient to move cargo on larger container vessels. As a result, not only is it expected that a larger number of containers will be unloaded/loaded every time a New-Panamax vessel docks at a port, it is also widely anticipated that these larger ships will concentrate among a small of number ports, particularly those that have deeper channel depths, such as the Port of Virginia. It is going to be vital to the regional economies and to the surrounding areas to be prepared to handle the anticipated increase in container traffic with energy-efficient and environmentally-friendly technologies and transport options. In particular, efficiency in handling high-volume of containers at the ports and in transporting containers beyond the ports is critical. This study will bring together researchers from multiple universities to investigate strategies to optimize container handling inside the terminals, to more heavily utilize inland waterways and rail systems, and to optimize logistics to reduce Greenhouse Gas emissions while maintaining mobility needs. In particular, the team from Old Dominion University (ODU) will investigate port operations strategies where both rail and truck traffic in and out of the port is considered. Interactions between these transport modes, and staging and handling of containers within the port will be investigated. Motivated by the rail connectivity available at the Port of Virginia,

ODU will lead the research effort that will explore the use of rail to more efficiently move cargo out of the port. The team will explore optimization and simulation methods to study various complex interactions and factors influencing the flow of containers over multiple modes. These methods will help identify more cost and energy efficient strategies to handle large volume of container traffic inside the terminals. New models will be developed to understand the feasibility and potential benefits of such strategies. The team from VT will support research in the area of optimization of freight movement within the context of fuel consumption and emission modeling which requires the development of fuel consumption and emission models for the various types of freight modes. Virginia Tech's team will focus on developing the fuel consumption and emission models for various ground transportation modes including trucks and trains. The focus will be on developing models that can be easily calibrated using publically available data. In addition, the VT team will consider developing smart systems to reduce the energy consumption of freight transport (e.g. eco-cruise control systems, eco-adaptive cruise control systems, etc.). While optimizations for network-wide freight logistics have been focused on either flow maximization or total system travel time minimization, little research has focused on the greenhouse gas emissions and fuel consumptions in the context of multimodal freight logistics. The team from UVA will work on formulating and developing an optimization approach for multimodal freight networks to minimize greenhouse gas emissions or fuel consumption. Implementation Potential implementation of project outcomes During this research, the team members will work closely with the Port of Virginia, rail lines (e.g. Norfolk Southern), and the private industry. The developed tools, techniques, and solutions will be shared with them for potential implementation. Various components and algorithms for eco-cruise control systems, eco-adaptive cruise control systems, and eco-routing systems will be developed for more energy-efficient transportation of freight. Impacts Expected benefits and impacts A new suite of modeling and simulation tools and methodologies is envisioned to result from this research that can be used throughout the nation to combat congestion at the ports in a post panama canal expansion era. Development of fuel consumption and emission models for various ground transportation modes including trucks and trains. Impacts of various modes of transporting containers on greenhouse gas emission

TRIS Files: UTC, RiP
Contract Numbers: DTRT13-G-UTC33
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Start Date: 20150101

Actual Completion Date: 20151231

Performing Agencies: Virginia Polytechnic Institute and State University, Blacksburg
Blacksburg, VA 24061 United States
University of Virginia, Charlottesville
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Old Dominion University
Norfolk, VA 23529 United States

Funding Agencies: Research and Innovative Technology Administration
University Transportation Centers Program
Washington, DC 20590 United States
Virginia Polytechnic Institute and State University, Blacksburg
Blacksburg, VA 24061 United States
Old Dominion University
Norfolk, VA 23529 United States

Responsible Individuals: Parkany, Emily

Index Terms: Cargo handling; Container handling; Container terminals; Freight traffic; Inland waterways traffic; Middle Atlantic States; Multimodal transportation; Panama Canal; Port operations; Truck tractors; Trucks

Subject Areas: Freight Transportation; Highways; Marine Transportation; Terminals and Facilities

Title: **Energy efficiency and time charter rates: Energy efficiency savings recovered by ship owners in the Panamax market**

Accession Number: 01535320

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1016/j.tra.2014.05.004>

Record URL: <http://www.sciencedirect.com/science/article/pii/S0965856414001189>

Abstract: This paper presents the first analysis on how financial savings arising from energy efficient ships are allocated between owners and those hiring the ships. This is an important undertaking as allocation of financial savings is expected to have an impact on the incentives faced

by ship owners to invest in more energy efficient vessels. The authors focus on the dry bulk Panamax segment as it contributes to around 50 Mt (5%) of total CO₂ emissions from shipping in 2007 and therefore its importance in terms of environmental impact should not be neglected. The time charter market represents a classical example of the principal-agent problem similar to the tenant-landlord problem in the buildings sector. The authors discovered that on average only 40% of the financial savings delivered by energy efficiency accrue to ship owner for the period 2008-2012. The finding that only part of the savings are recouped by shipowners affecting their incentives towards energy efficiency could consequently have implications on the type of emission reduction policies opted at both, global and regional levels.

Supplemental Notes:	Abstract reprinted with permission of Elsevier.
TRIS Files:	TRIS
Media Type:	Web
Pagination:	pp 173-184
Authors:	Agnolucci, Paolo Smith, Tristan Rehmatulla, Nishat
Availability:	Find a library where document is available Order URL: http://worldcat.org/issn/09658564
Publication Date:	20140800
Serial:	Transportation Research Part A: Policy and Practice Volume: 66 Issue Number: Publisher: Elsevier ISSN: 0965-8564 Serial URL: http://www.sciencedirect.com/science/journal/09658564
Index Terms:	Carbon dioxide; Dry bulk carriers; Energy consumption; Panamax (Ship dimensions); Pollutants; Savings; Shipowners
Subject Areas:	Energy; Environment; Finance; Freight Transportation; Marine Transportation; I10: Economics and Administration; I15: Environment

Trucks

Title: Heavy Truck Cooperative Adaptive Cruise Control: Evaluation, Testing, and Stakeholder Engagement for Near Term Deployment: Phase One Final Report

Accession Number: 01567393

Record Type: Monograph

Language: English

Record URL: <http://atri-online.org/2015/05/27/4410/>

Abstract: Under the Federal Highway Administration (FHWA) Exploratory Advanced Research project “Heavy Truck Cooperative Adaptive Cruise Control: Evaluation, Testing, and Stakeholder Engagement for Near Term Deployment” this document provides a summary of Phase I results for evaluating the commercial feasibility of Driver Assistive Truck Platooning (DATP). DATP is a form of Cooperative Adaptive Cruise Control for heavy trucks (two truck platoons). DATP takes advantage of increasing maturity of vehicle-vehicle (V2V) communications, plus widespread deployment of DSRC-based V2V connectivity expected over the next decade, to improve freight efficiency, fleet efficiency, safety, and highway mobility, plus reduce emissions. Notably, truck fleets can proceed with implementing DATP regardless of the regulatory timeline for DSRC. Results of Phase I research are provided here. Phase I examined industry perceptions of DATP to provide input to a preliminary business case analysis. Technical investigations addressed system modeling and on track evaluations, aerodynamics modeling, operations research to develop algorithms for platoon formation, initial human-machine interface evaluations, wireless communications examining DSRC aspects specific to tractor-trailer combinations, and traffic modeling to assess traffic flow impacts with various levels of DATP market penetration. Appendices include a DATP Concept of Operations and Requirements document. Phase II plans are also described.

TRIS Files: TRIS, ATRI, USDOT

Media Type: Digital/other

Pagination: 135p

Authors: Bevly, David
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Peloton Technology
Peterbilt Trucks

Publication Date: 20150430

Edition: Final Report

Period Covered: 10/2013-12/2014

Index Terms: Algorithms; Autonomous intelligent cruise control; Driver vehicle interfaces; Evaluation; Stakeholders; Tractor trailer combinations; Traffic flow; Traffic models; Traffic platooning; Trucks; Vehicle to vehicle communications

Subject Areas: Highways; Motor Carriers; Planning and Forecasting; Vehicles and Equipment; I72: Traffic and Transport Planning; I91: Vehicle Design and Safety

Title: Reducing Truck Fuel Use and Emissions: Tires, Aerodynamics, Engine Efficiency, and Size and Weight Regulations

Accession Number: 01562733

Record Type: Monograph

Language: English

Record URL: <http://hdl.handle.net/2027.42/109749>

Abstract: This report explores ways in which the properties of trucks and regulations governing them might be modified to improve freight efficiency and reduce fuel use and emissions in the challenging world of transportation economics and environmental stewardship. Trucks are the dominant mode of non-bulk commodity freight transport in the U.S. Compared to all other modes combined (rail + water + air + pipelines), trucks transport approximately twice the amount of freight by weight and approximately 1.8 times the amount of freight by value. Trucking has the most extensive distribution network of any transport mode, having access to over 3.9 million miles of roadways. Improvements in truck freight efficiency can be expected to show direct improvement of the nation's overall transportation system. This study has identified four key focus areas that influence truck and truck freight efficiency: 1. Tire rolling resistance, 2. Aerodynamics, 3. Engine efficiency, and 4. Truck size and weight regulation. Each of the four focus areas are discussed in terms of past and present performance, along with projections to the future. The final section of the report presents estimated potential realistic improvements for each of the four key focus areas, as well as the respective levels of technical challenge.

TRIS Files: TRIS

Report/Paper Numbers: UMTRI-2014-27

Media Type: Digital/other

Pagination: 41p

Authors: Woodrooffe, John

Corporate Authors: University of Michigan Transportation Research Institute
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University of Michigan, Ann Arbor
Sustainable Worldwide Transportation
2901 Baxter Road
Ann Arbor, MI 48109 United States

Publication Date: 20141100

Index Terms: Aerodynamics; Commercial vehicles; Diesel engine exhaust gases; Engine efficiency; Freight transportation; Fuel consumption; Motor carriers; Rolling resistance; Size and weight regulations; Tires; Trucks

Subject Areas: Economics; Energy; Environment; Motor Carriers; Vehicles and Equipment;

International

Title: Estimated impacts of the sulphur directive on the Nordic industry

Accession Number: 01561047

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1007/s12544-015-0158-4>

Abstract: The International Maritime Organization and the European Parliament (EP) have stated that ships must lower sulfur emissions significantly in a specific region in Northern Europe, that is, in the Sulphur Emission Control Area (SECA), where sulfur content in bunkers is not allowed to exceed 0.1 percent. The Nordic companies have been examined somewhat marginally from the point of view of the SECA-directive, and how it will affect the cost-efficiency of the industry. The research data contains information about export to four large European countries that form the biggest markets in Europe for the case mill. The transport costs (freight costs per ton) were taken from the mill database on the customer level. The actual and forecasted mill data was copied into Excel spreadsheets for analysis. Results of this case study strongly indicate that the sulfur directive has direct impacts to the economy of the Nordic bulk industry. When the bunker fuel prices increase from the year 2015 onward, it reflects directly to sea freight prices in the SECA-region. This will noticeably increase the total transportation costs per ton. The sulfur directive will be an additional cost burden for the Nordic industry, which in turn is something that from 2015 onward local European paper mills and other manufacturing industries will benefit from. The sulfur directive will probably indicate that from 2015 onward Central European paper mills and other manufacturing industries will benefit from outside the traditional business environment. The impacts of the sulfur directive will vary heavily from market to market and transportation costs from Finland to Europe can increase by average more than 20 percent in €/t; this can also be an underestimation. Profitability can drop by tens of percentage due to more expensive logistics. Logistics costs' percentage in turnover will increase in the Nordic countries, but existing low oil price (2015) will mitigate the expected price increase of the MDO (Marine Diesel Oil) in the near future.

Supplemental Notes: © 2015 Esa Hämäläinen

TRIS Files: TRIS

Media Type: Digital/other
Pagination: 13p
Authors: Hämäläinen, Esa
Availability: Find a library where document is available
Order URL: <http://worldcat.org/issn/18668887>
Publication Date: 20150600
Serial: European Transport Research Review
Volume: 7
Issue Number: 2
Publisher: Springer Publishing
ISSN: 1866-8887
EISSN: 1867-0717
Serial URL: <http://link.springer.com/journal/12544>
Index Terms: Costs; Environmental protection; Freight traffic; International Maritime Organization; Markets; Pollutants; Scandinavia; Sulfur
Subject Areas: Administration and Management; Environment; Freight Transportation; Marine Transportation; I10: Economics and Administration; I15: Environment

Title: **The CITI project: an update on Australia's first deployment of cooperative intelligent transport systems targeting heavy vehicle safety**
Accession Number: 01563021
Record Type: Component
Language: English
Record URL: <http://acrs.org.au/publications/conference-papers/database/>
Source Agency: ARRB Group Limited
500 Burwood Highway
Vermont South, Victoria 3133
Abstract: Cooperative Intelligent Transport Systems (CITS) is the term generally used to describe a form of Intelligent Transport Systems in which information is shared amongst vehicles or between vehicles and roadside infrastructure such as traffic signals. This has the potential to greatly improve road safety, improve network efficiency and reduce greenhouse gases. The Cooperative Intelligent Transport

Initiative (CITI) pilot will be the first semipermanent CITS field test bed site in Australia. The Objective of the CITI project is to construct a 42 km connected freight corridor test facility in the Illawarra Region of NSW south of Sydney. This will be one of the first large scale test facilities dedicated to Heavy Vehicles in the world. The first stage of the project will fit in-vehicle dedicated short range communication (DSRC) transceivers in up to 60 trucks that regularly travel the planned route. In addition, three signalised intersections are being equipped with DSRC roadside units which will communicate with the trial vehicles. A 40 km/h truck and bus speed zone warning system is also planned for installation at the top of Mt Ousley to alert drivers about to descend the very steep (up to 12 percent downhill gradient) south bound section of the road. This paper will provide an update on the progress of the CITI project and examine issues including project planning, equipment licensing, human machine interface development, data management and participant recruitment.

TRIS Files: ITRD, ATRI

Pagination: 7p

Authors: Tyler, P
Wall, J

Monograph Title: Australasian Road Safety Research, Policing and Education Conference, 12-14 November 2014, Melbourne, Australia

Monograph Accession Number: 01563042

Publication Date: 20141100

Conference: Australasian Road Safety Research Policing Education Conference, 2014, Melbourne, Victoria, Australia
Location:
Date: 00000 - 00000

Index Terms: Australia; Driver information; Driver information; Driver information systems; Driver vehicle interfaces; Exhaust gases; Field test; Field tests; Heavy vehicles; Human factors; Human machine interface; Human machine systems; Intelligent transport system; Lorry; New South Wales; Test tracks; Vehicle emissions; Vehicle to infrastructure communications; Vehicle to roadside communications; Vehicle to vehicle communications; Vehicle to vehicle communications; Warning; Warning; Warning signals

Subject Areas: Highways; Safety and Human Factors; I91: Vehicle Design and Safety

Title: Greening and safety assurance of future modular road vehicles

Accession Number: 01553558

Record Type: Component

Language: English

Record URL: <http://road-transport-technology.org/conferenceproceedings/2014-hvtt13/>

Source Agency: ARRB Group Limited
500 Burwood Highway
Vermont South, Victoria 3133

Abstract: Recent megatrends can be distinguished which have a strong impact on logistic and transport concepts. Such megatrends are typically related to climate change, growing transport demand, urbanisation and scarcity of resources. The resulting logistic and transport concepts are intermodal transport, European Modular System (EMS) and hub & spoke systems (H&S). For the transport modes there is a need for multiples of loading units. This has motivated a consortium, consisting of automotive industry partners, knowledge institutes and universities to investigate these trends with the objective of developing new vehicle concepts that meet the following requirements: 1. Significant reduction of CO2 emission per unit payload; 2. Meeting the (future) needs of logistic companies in terms of flexibility, efficiency and TCO (total cost of ownership); 3. Based on existing modules to facilitate intermodality (rail-road-water-air); 4. Possible usage across Europe for cross-border long-distance road transport; 5. Compatibility with the existing infrastructure; 6. Designed/evaluated by using performance-based standards.

TRIS Files: ATRI

Pagination: 26p

Authors: Nijmeijer, H
BESSELINK, I
Prati, A
Meijs, M
Kraaijenhagen, B
Barth, T
Kural, K
Pauwelussen, J

Monograph Title: Expanding horizons: 13th International Symposium on Heavy Vehicle Transport Technology, San Luis, Argentina, 27-31 October 2014

Monograph Accession Number: 01553537

Publication Date: 20141000

Conference: HVTT13: International Symposium on Heavy Vehicle Transport Technology, 13th, 2014, San Luis, Argentina
Location:
Date: 00000 - 00000

Index Terms: Air quality management; Emissions control; Europe; Freight transport; Freight transport logistics; Freight transportation; Heavy vehicle; Heavy vehicles; Intermodal transport; Intermodal transportation; Logistics; Logistics; Performance based standard (PBS)

Subject Areas: Environment; Freight Transportation

Title: Swiss contribution to Eureka Project Ecovehicle E!7219: Defining road and rail vehicles with a low environmental footprint

Accession Number: 01534403

Record Type: Project

Language: English

Source Agency: Ecole Polytechnique Fédérale de Lausanne (EPFL)

Lausanne CH-1015 Switzerland

Source Data: ITRD E649608

Abstract: The increase in the number of Heavy Duty Vehicles (HDV) is inherently accompanied by increase in congestion, pollutant emissions, noise and energy use as well as infrastructure overuse, all of which have broad societal implications. In addition to affecting the environment, contributing markedly to global warming, significant implications for the health of many residents living along traffic corridors as well as increases in the cost of infrastructure maintenance are logical consequences. Using individual vehicle data, the footprint project (ASTRA 2004/020, ASTRA 2004/008, ASTRA 2010/019) has shown that within every vehicle category there are those with a very high combined footprint considering noise, dynamic load and pollutant emissions. Up to now the Swiss heavy vehicle fee (LSVA) based on the environmental differential charging, has been very successful in reducing the impact of pollutant emissions at source and to the more economical transport of goods. The aim of this follow up project is to develop new instruments to encourage vehicles with a low total footprint. Specifically, to develop methods to include noise as a parameter in the differential charging of LSVA. This is in line with the European noise directive (2002/49/EC) and Swiss policy to develop a long-term strategy, which includes objectives to reduce the number of people affected by noise in the longer term, and provides a framework for developing existing community policy on noise reduction from source. This will be achieved in parallel within a new European project Ecovehicle (E!7219). This project fits well within the key targets of

ASTRA/BAFU/ARE R&D concept
(http://www.ressortforschung.admin.ch/html/dokumentation/Forschungskonzepte_13-16/Forschungskonzept_Raum_2013-16%20d.pdf) defined for the period 2013-2016. Specifically in terms of noise abatement, protection of the natural environment, promotion of further reduction of emissions of heavy vehicles and innovations in promoting a sustainable environment.

TRIS Files: ITRD

Contract Numbers: ITRD ASTRA 2014 001

Funding: 0.00

Start Date: 20140900

Expected Completion Date: 20170900

Performing Agencies: EMPA Abteilung fuer Strassenbau / Abdichtungen
Ueberlandstrasse 129
Duebendorf CH-8600 SUISSE

Funding Agencies: BUNDESAMT FUER STRASSENBAU (ASTRA) / OFFICE FEDERAL DES ROUTES (OFROU)
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Responsible Individuals: POULIKAKOS, L

Index Terms: Ecology; Economic efficiency; Economic efficiency; Emission; Environment; Freight traffic; Goods traffic; Load; Loads; Noise; Noise; Pollutant; Pollutants; Rail bound transport; Railroad transportation; Research project; Research projects; Transport; Transportation; Vehicle; Vehicles; Weight; Weight

Subject Areas: Freight Transportation; Railroads; Vehicles and Equipment; I15: Environment; I90: Vehicles

Title: Road freight energy efficiency and CO₂ emissions in the Nordic countries

Accession Number: 01549166

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1016/j.rtbm.2014.08.001>

Record URL: <http://www.sciencedirect.com/science/article/pii/S221053951400056X>

Abstract: Nordic countries have committed to improve the energy efficiency and decrease the CO₂ emissions of freight transport. The aim of this paper is to compare the energy efficiency and CO₂ emissions in the road industry for the Nordic countries in 2010, in order to identify the key factors and their impact on energy efficiency and CO₂ emissions. A joint analysis method was developed to compare data. Quantitative data was used to conduct a decomposition analysis for several sectors, taking several indicators into account. Statistics from Denmark, Finland, Norway and Sweden include continuous road haulier surveys, national account data and fuel consumption data. The CO₂ emissions of road freight transport in the Nordic countries vary from 1.14 Mt in Denmark to 2.27 Mt in Sweden. While the size of the economy, measured in gross value added (GVA), is a major determinant for the emissions, the differences in transport intensity and energy efficiency also have a significant effect on the total emissions. This study is the first of its kind for the Nordic countries. This research can be used as a first step in a continuous evaluation of the determinants of road freight CO₂ emissions in the European countries.

Supplemental Notes: Abstract reprinted with permission of Elsevier.

TRIS Files: TRIS

Media Type: Digital/other

Pagination: pp 11-19

Authors: Liimatainen, Heikki
Arvidsson, Niklas
Hovi, Inger Beate
Jensen, Thomas Christian
Nykänen, Lasse

Availability: Find a library where document is available
Order URL: <http://worldcat.org/issn/22105395>

Publication Date: 20141000

Serial: Research in Transportation Business & Management
Volume: 12
Issue Number:
Publisher: Elsevier
ISSN: 2210-5395
Serial URL: <http://www.sciencedirect.com/science/journal/22105395>

Index Terms: Carbon dioxide; Energy consumption; Environmental impacts; Pollutants;

Scandinavia; Trucking

Subject Areas: Environment; Freight Transportation; Highways; I15: Environment

Title: Bi-level Optimization Model for Last Mile Retail Cargo

Accession Number: 01542182

Record Type: Component

Language: English

Record URL: <http://www.icms.polyu.edu.hk/Proceedings/Proceedings%20of%20IFSPA%202014.pdf>

Abstract: This paper focuses on the consolidation of last mile retail cargo using an urban consolidation centre, placed strategically in close proximity to high demand traffic locations for a very dense supply chain configuration, which involves four receiving gateways, several hundred retail outlets of varying demand rates daily, and lumpy delivery schedules. The authors model this problem from the perspective of a Stackelberg game model involving the operator (leader) of the urban consolidation centre and the logistics service provider (follower) who manages the last mile delivery. The leader makes his operational decision by considering the derived demand from the follower and from the economic efficiency, environmental emissions, and constraints of highly dependent time windows with penalties for late deliveries. Simultaneously, the follower arranges his transportation plan by considering the cost of the delivery orders from the stores and the time window set by the operator at the upper level.

Supplemental Notes: Abstract reprinted with permission of Hong Kong Polytechnic University.

TRIS Files: TRIS

Media Type: Digital/other

Pagination: pp 306-310

Authors: Qu, Shao-Jian
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de Souza, Robert

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Subject Areas: Environment; Freight Transportation; I15: Environment

Warehousing, Supply Chain

Title: Reprint of “Green supply chain decisions – Case-based performance analysis from the food industry”

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Record URL: <http://www.sciencedirect.com/science/article/pii/S1366554514002117>

Abstract: Environmental impacts, such as GHC emissions, have been introduced to supply chain management as an additional parameter to traditional cost, lead-time and on-time delivery. Supply chain management represents a significant

source of decisions affecting the eco-efficiency of many products. This paper analyses cases from the food industry, mainly order-picking, transportation, warehousing, and distribution aspects from the greening point of view. Three case examples of decisions in supply chain design in the food industry are considered. The results show dependencies between performance measures. Finally, a framework of decisions and their impact on performance is presented.

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Helo, Petri
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- Title:** **Optimization of Empty Pallet Low-Carbon Dispatching Based on Intermodal Freight Transport**
- Accession Number:** 01541388
- Record Type:** Component
- Language:** English
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Abstract: With the wide spread of pallets in containerized transport, and due to low efficiency, high cost, high resource consumption and other shortcomings, the disposable pallets cannot adapt to the future development of containerized transport. A pallet pool can realize the recycling of pallets and improve handing and transport efficiency while reducing the cost and consumption of resources. However, the cargo volume varies in different areas, and certain goods are seasonal transport, making the pallets in the pallet pool mode unbalanced. This paper mainly focuses on railway and highway transport to analyze the dispatching of empty pallets. Based on the carbon emissions, transport time and priority of dispatching, this paper establishes the objective model of minimum cost in order to make the decision on empty pallet dispatching routes and modes of transport. In this paper, the ILOG Cplex software is used to solve the model and verify the feasibility and superiority of the model through a case.

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Authors: Zhou, Kang
He, Shiwei
Song, Rui
Xu, Yue

Monograph Title: ICLEM 2014: System Planning, Supply Chain Management, and Safety

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Conference: 2014 International Conference of Logistics Engineering and Management (ICLEM)
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Sponsors: Southwest Jiaotong University; Shanghai Maritime University; American Society of Civil Engineers

Index Terms: Container traffic; Costs; Dispatching; Empty pallets; Freight trains; Intermodal transportation; Mathematical models; Minimization; Optimization; Pallets; Recycling; Trucking

Subject Areas: Freight Transportation; Highways; Planning and Forecasting; Railroads; I72: Traffic and Transport Planning

Title: **Green supply chain decisions – Case-based performance analysis from the food industry**

Accession Number: 01538457

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Record URL: <http://www.sciencedirect.com/science/article/pii/S1366554514000921>

Abstract: Environmental impacts, such as GHC emissions, have been introduced to supply chain management as an additional parameter to traditional cost, lead-time and on-time delivery. Supply chain management represents a significant source of decisions affecting the eco-efficiency of many products. This paper analyses cases from the food industry, mainly order-picking, transportation, warehousing, and distribution aspects from the greening point of view. Three case examples of decisions in supply chain design in the food industry are considered. The results show dependencies between performance measures. Finally, a framework of decisions and their impact on performance is presented.

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Authors: Ala-Harja, Hanne
Helo, Petri

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Index Terms: Environmental impacts; Food industry; Logistics; Performance measurement; Supply chain management

Subject Areas: Environment; Freight Transportation; Planning and Forecasting; I15: Environment; I72: Traffic and Transport Planning

CO₂, GHG , Fuel Efficiency

Title: **The tractor and semitrailer routing problem with many-to-many demand considering carbon dioxide emissions**

Accession Number: 01552038

Record Type: Component

Language: English

Record URL: <http://dx.doi.org/10.1016/j.trd.2014.10.004>

Record URL: <http://www.sciencedirect.com/science/article/pii/S136192091400145X>

Abstract: The tractor and semitrailer routing problem with many-to-many demand (TSRP-MMD) is investigated in this study. The TSRP-MMD extends the existing studies on the rollon–rolloff vehicle routing problem (RRVRP) to a many-to-many problem with an intercity line-haul network background. To demonstrate and utilize the energy efficiency of the tractor and semitrailer combination, the TSRP-MMD takes carbon dioxide (CO₂) emissions per ton-kilometer as the objective. Because the problem is NP-hard, a modified Clarke and Wright Savings heuristic algorithm (CW) followed by an improvement phase and a local search phase is developed to solve the TSRP-MMD. The integer program is used to find optimum solutions for small-scale problems. The computational results show that the developed heuristics can be efficiently used to solve the problem.

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Authors: Li, Hongqi
Lv, Tan
Li, Yanran

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Serial: Transportation Research Part D: Transport and Environment
Volume: 34
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Index Terms: Carbon dioxide; Demand; Heuristic methods; Intercity transportation; Pollutants; Routing; Trailers; Truck tractors

Subject Areas: Environment; Freight Transportation; Operations and Traffic Management; I15: Environment; I73: Traffic Control

Title: **A Roadmap for Reducing the GHG Emissions of Trucking: Looking Beyond Technology Mandates**

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Source Data: Transportation Research Board Annual Meeting 2015 Paper #15-5762

Abstract: The trucking sector in the US has been receiving considerable attention from regulatory agencies that are seeking to reduce Greenhouse Gas (GHG) emissions. In California, Heavy-Duty trucks are now required to be retrofitted with certain Fuel Saving Technologies (low rolling resistance tires and aerodynamic deflectors), and at the national level emission standards have been introduced that force manufactures to improve the technology of new trucks. This paper finds that these

programs are likely to reduce costs as well as emissions, because extensive evidence shows that most trucking firms are not making these seemingly cost-effective investments in efficiency on their own. This corroborates many previous studies and supports the rationale for these government programs. However, while effective and desirable at first, this regulatory approach based on mandates has shortcomings in the long-run. This paper develops a roadmap for how emission reductions can be achieved in more sophisticated and efficient ways moving forward, based on the results of a policy simulation using a model of the trucking sector and an understanding of the factors causing this ‘efficiency gap’ (e.g. split incentives, uncertainty, search costs, financial constraints). Results indicate that California’s 2020 emission target can be achieved by implementing other interventions that sidestep the root causes of the efficiency gap just as the technology mandates, such as increasing weight limits and managing trucking demand. However, moving past 2020 it is necessary to tackle the efficiency gap directly, to reduce emissions and allow for the introduction of incentives-based interventions that harness market forces (e.g. fuel taxes and technology subsidies). To produce even stronger incentives towards efficiency, strategy complementarity could be exploited and efforts should likely be coordinated at the national level.

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Report/Paper Numbers: 15-5762

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Authors: Guerrero, Sebastian E
Madanat, Samer
Leachman, Robert

Monograph Title: TRB 94th Annual Meeting Compendium of Papers

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Sponsors: Transportation Research Board

Index Terms: California; Greenhouse gases; Heavy duty trucks; Policy; Pollutants; Simulation; Size and weight regulations; Taxes; Trucking

Subject Areas: Environment; Freight Transportation; Motor Carriers; I15: Environment

Title: **Assessment of the Energy Consumption of LNG Carriers and the Impact of Improving the Energy Efficiency on the Natural Gas Supply Chain**

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Record Type: Component

Language: English

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Source Data: Transportation Research Board Annual Meeting 2015 Paper #15-4835

Abstract: With the booming natural gas trade, the Liquefied Natural Gas (LNG) carriers, the primary transportation method for intercontinental trade on natural gas, has been experiencing explosive growth. This study offers a novel analysis that connects 2011 in-use LNG fleet characteristics, global satellite data on ship movement, and literature on LNG trade to assess the long-term prospects for increasing energy efficiency of LNG carriers. This analysis also investigates how efficiency characteristics (such as age, size, technology, operational practices) influence the efficiency of the LNG fleet, and develops a ship stock model to independently track technical and operational efficiency practices in LNG carriers. The findings indicate that industry-leading LNG carriers are about 40% more efficient than industry laggards. This analysis indicates that, by fully embracing the available technical and in-use practices of the low-carbon industry leaders of today, the fleet could reduce CO₂ emissions by 30 million metric tons (MMT) by 2040, or about 8 MMT of natural gas, equivalent to \$4 billion savings in the LNG supply chain. This study has important implications for the shipping industry and policy makers. The industry has to address split incentives to take the advantage of energy-saving opportunities. And

regulations that set targets for the energy efficiency of the in-use fleet may ultimately help the industry harvest the efficiency gains while mitigating the climate impact from the industry.

Supplemental Notes: Alternate title: Assessment of Energy Consumption of Liquefied Natural Gas Carriers and Impact of Improving Energy Efficiency on Natural Gas Supply Chain. This paper was sponsored by TRB committee ADC70 Transportation Energy.

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Authors: Wang, Haifeng
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Index Terms: Bulk carriers; Carbon dioxide; Energy consumption; Liquefied natural gas; Pollutants; Shipping

Subject Areas: Energy; Environment; Freight Transportation; Marine Transportation; I15: Environment

Title: Analyzing the Impacts of Global Transport CO2 Emissions Using Multi-Sectoral Tool

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Record Type: Component

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Source Data: Transportation Research Board Annual Meeting 2015 Paper #15-5209

Abstract: The Global Calculator was built to model carbon dioxide (CO₂) emissions in 2050 based on a variety of user selections for different sectors. This paper focuses on the modeling and results relating to the transport sector, which was developed to estimate an accurate base year as well as aid in determining four different Levels of Effort to reduce CO₂ emissions for six levers: passenger demand, freight demand, mode, occupancy and load, electric or hydrogen vehicles, and vehicle efficiency. Level 1 represents minimal effort made in the sector to reduce emissions, while Level 4 represents the maximum effort the sector can achieve. This model shows us that action or inaction in the transport sector can result in an increase or decrease of 20% in CO₂ emissions from what is considered business as usual, the International Energy Agency (IEA) 6 degree scenario. Vehicle efficiency and mode share are very important for reducing emissions from the transport sector, while effectiveness of electrifying the fleet relies heavily on having a green grid. This also provides a global bottom-up model that can be used to compare both lifestyle and technological changes which will impact future emissions.

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TRIS Files: TRIS, TRB, ATRI

Report/Paper Numbers: 15-5209

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Lefevre, Benoit
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Index Terms: Carbon dioxide; Environmental impacts; Forecasting; Pollutants; Transportation

Subject Areas: Environment; Planning and Forecasting; Transportation (General); I15: Environment; I72: Traffic and Transport Planning

Title: **Environmentally Friendly Driving Feedback Systems Research and Development for Heavy Duty Trucks**

Accession Number: 01554058

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Language: English

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Source Agency: National Center for Sustainable Transportation
Davis, CA United States

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Abstract: Among several strategies to reduce fuel consumption and greenhouse gas emissions from heavy duty trucks, "eco-driving" is one that has the potential to be very cost effective. Eco-driving can be defined as fuel-efficient operation of a vehicle to achieve better fuel economy and lower tailpipe emissions while not compromising the safety of oneself and other road users. The core of eco-driving programs is to provide drivers with a variety of advice and feedback to reduce fuel consumption. The advice and feedback can be provided through various means including websites, classes or training, and in-vehicle driving feedback systems. The University of California, Riverside's Center for Environmental Research and Technology (UCR CE-CERT) researchers

have developed a variety of next-generation eco-driving technologies as part of a three-year Department of Energy research program and now are planning on applying these technologies to heavy-duty trucks to determine their potential at improving fuel efficiency. The developed eco-driving technology includes: 1) Eco-Friendly Fleet Planning; 2) Eco-Routing Navigation, 3) Connected Eco-Driving Feedback, and 4) an Eco-Score and Eco-Ranking System. Three of these technologies (numbers 2, 3, and 4 above) will be adapted and integrated with a state-of-the-art truck driving simulator located at UCR, where experienced truck drivers will comprehensively test the technology across a range of truck driving scenarios. By establishing a baseline of driving, and then introducing the eco-driving technology, it will be possible to quantitatively measure the potential fuel and greenhouse gas (GHG) emission benefits. It is expected that these eco-driving technologies will collectively result in fuel and GHG emission savings in the range of 5% - 20% depending on the driving scenarios

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1120 N Street
Sacramento, CA 95814 United States

Index Terms: California; Driver feedback; Economic benefits; Environmental impacts; Fuel consumption; Greenhouse gases; Heavy duty trucks; Pollutants; Sustainable transportation

Subject Areas: Data and Information Technology; Freight Transportation; Research; I15: Environment

Title: **Towards a global CO₂ calculation standard for supply chains: Suggestions for methodological improvements**

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Record URL: <http://www.sciencedirect.com/science/article/pii/S1361920914001242>

Abstract: Improving the efficiency and sustainability of supply chains is a shared aim of the transport industry, its customers, governments as well as industry organizations. To optimize supply chains and for the identification of best practice, standards for their analysis are needed in order to achieve comparable evaluations. This need for an evaluation standard also applies to CO₂ emission calculations. This research focuses on the transportation within supply chains and possible approaches towards a global standard for calculating its CO₂ emissions. In the recent past, several organisations, national and international, have come forward with possible methods, tools and databases for the calculation of CO₂ emissions along supply chains, but almost all of them do not cover the entire transportation chain. Also standards for CO₂ emissions of products and production in general do exist but they do not take the particular requirements of transportation into consideration. Therefore a global standard specifically for transportation could not yet be introduced. The EN 16258 standard is the only international standard for emission calculation of transportation in supply chains. It was therefore analyzed as a possible starting point for a global standardization approach. Analysis shows it too contains gaps and ambiguities which render comparisons of supply chains difficult. These gaps of the EN 16258 are analyzed, followed by suggestions for methodological improvements for their closure. The research concludes with an outlook on next steps needed towards a global CO₂ calculation standard for transportation within supply chains.

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Authors: Davydenko, Igor
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Index Terms: Carbon dioxide; Methodology; Optimization; Organizations;
Pollutants; Standards; Supply chain management

Subject Areas: Environment; Freight Transportation; Planning and Forecasting; I15:
Environment; I72: Traffic and Transport Planning

Title: **The impact of port operations on efficient ship operation from both economic and environmental perspectives**

Accession Number: 01540016

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Language: English

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Abstract: Recently, shipping lines have focused on efficient ship operation, which relates to energy efficiency issues in shipping and, particularly, to operational issues such that the minimisation of fuel consumption and resulting greenhouse gas emissions. Efficient ship operation in container lines is closely related to the ship's time at sea and ship's time in port. Reduction in port time, thanks to high-quality port operations, allows improvement in the operational efficiency of a liner service by reducing the fuel consumption of a ship at sea and its resulting CO₂ emissions. The main goal of this article is to investigate how time in port affects efficient ship operation in terms of operating costs, CO₂ emissions and externalities. For this, as a methodology, a simulation based upon system dynamics is introduced. Major finding is that less time in port resulting from the improvement of port operations contributes to efficient ship operation in terms of operating costs, amount of CO₂ emissions and external effects in the liner shipping industry. In particular, a sensitivity analysis on efficient ship operation vis-à-vis the quality of port operation shows that bigger ships need to select highly productive calling ports that provide less time in port.

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Authors: Moon, Daniel Seong-Hyeok
Woo, Jong Kyun

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Index Terms: Externalities; Fuel consumption; Greenhouse gases; Operating costs; Port operations; Ship lines; Ship operations

Subject Areas: Economics; Environment; Freight Transportation; Marine Transportation; Terminals and Facilities; I10: Economics and Administration; I15: Environment
