RAIL ELECTRONIC DATA INTERCHANGE IN A BORDER CROSSING POINT IN SOUTH EAST EUROPE: AN ASSESSMENT OF OPTIONS

May 2015

Transport and ICT Global Practice
EUROPE AND CENTRAL ASIA
CURRENCY EQUIVALENTS

(Exchange Rate Effective January 30, 2015)

Currency Unit - Euro
Euro 1 = 1.13 USD

WEIGHT AND MEASURES
Metric system

FISCAL YEAR
January 1 – December 31
## ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT</td>
<td>Accredited Traveller</td>
</tr>
<tr>
<td>AEO</td>
<td>Authorised Economic Operator</td>
</tr>
<tr>
<td>AED</td>
<td>Automated Data Exchange</td>
</tr>
<tr>
<td>ANPR</td>
<td>Automatic Number Plate Recognition</td>
</tr>
<tr>
<td>BCA</td>
<td>Border Crossing Agreement</td>
</tr>
<tr>
<td>BCP</td>
<td>Border Crossing Point</td>
</tr>
<tr>
<td>BDZ</td>
<td>Bulgarian State Railways</td>
</tr>
<tr>
<td>BRC</td>
<td>Bulgarian Railway Company</td>
</tr>
<tr>
<td>CA</td>
<td>Certificate Authority</td>
</tr>
<tr>
<td>CBM</td>
<td>Coordinated Border Management</td>
</tr>
<tr>
<td>CCTV</td>
<td>Closed circuit television</td>
</tr>
<tr>
<td>CI</td>
<td>Common Interface</td>
</tr>
<tr>
<td>CIT</td>
<td>International Rail Transport Committee</td>
</tr>
<tr>
<td>CIM</td>
<td>International Consignment Note</td>
</tr>
<tr>
<td>CMAA</td>
<td>Customs Mutual Assistance Agreement</td>
</tr>
<tr>
<td>COTS</td>
<td>Commercial-Off-The-Shelf</td>
</tr>
<tr>
<td>CTG</td>
<td>Combined Transport Group</td>
</tr>
<tr>
<td>CUV</td>
<td>Wagon notes data for empty wagons</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
<tr>
<td>ECM</td>
<td>Electronic Content Management</td>
</tr>
<tr>
<td>ECN</td>
<td>Electronic Consignment Note</td>
</tr>
<tr>
<td>EFTA</td>
<td>European Free Trade Association</td>
</tr>
<tr>
<td>ENS</td>
<td>Entry Summary Declaration</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>IM</td>
<td>Infrastructure Manager</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communications Technology</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td>ISR</td>
<td>International Service Reliability</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>KM</td>
<td>Kilometer</td>
</tr>
<tr>
<td>MRN</td>
<td>Movement Reference Number</td>
</tr>
<tr>
<td>NCTS</td>
<td>New Computerised Transit System</td>
</tr>
<tr>
<td>NRIC</td>
<td>National Railway Infrastructure Company</td>
</tr>
<tr>
<td>OGA</td>
<td>Other Government Agencies</td>
</tr>
<tr>
<td>ORFEUS</td>
<td>Open Railway Freight EDI System</td>
</tr>
<tr>
<td>OSS</td>
<td>One Stop Shop</td>
</tr>
<tr>
<td>PCS</td>
<td>Path Coordination System</td>
</tr>
<tr>
<td>PKI</td>
<td>Public Key Infrastructure</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>REBIS</td>
<td>Regional Balkans Infrastructure Study</td>
</tr>
<tr>
<td>RID</td>
<td>Radio Isotope Detection</td>
</tr>
<tr>
<td>RNE</td>
<td>RailNet Europe</td>
</tr>
<tr>
<td>RSRD</td>
<td>Rolling Stock Reference Database</td>
</tr>
<tr>
<td>RU</td>
<td>Railway Undertakings</td>
</tr>
<tr>
<td>SAP</td>
<td>Systems, Applications &amp; Products in Data Processing</td>
</tr>
<tr>
<td>SEETO</td>
<td>South East Europe Transport Observatory</td>
</tr>
<tr>
<td>SLA</td>
<td>Service Level Agreement</td>
</tr>
<tr>
<td>TAF TSI</td>
<td>Telematics Applications for Freight, Technical Specifications for Interoperability</td>
</tr>
<tr>
<td>TAP TSI</td>
<td>Telematics Applications for Passenger, Technical Specifications for Interoperability</td>
</tr>
<tr>
<td>TIP</td>
<td>Trade Information Portal</td>
</tr>
<tr>
<td>TIS</td>
<td>Train Information System</td>
</tr>
<tr>
<td>TMS</td>
<td>Traffic Management System</td>
</tr>
<tr>
<td>UCC</td>
<td>Union Customs Code</td>
</tr>
<tr>
<td>UIC</td>
<td><em>Union des Chemins de Fer, International Railway Union</em></td>
</tr>
<tr>
<td>UN/CEFACT</td>
<td>United Nations Centre for Trade Facilitation and Electronic Business</td>
</tr>
<tr>
<td>UN/EDIFACT</td>
<td>UN Electronic Data Interchange For Administration, Commerce and Transport</td>
</tr>
<tr>
<td>UNECE</td>
<td>United Nations Economic Commission for Europe</td>
</tr>
<tr>
<td>UseIT</td>
<td>Uniform System for European Intermodal Tracking and Tracing</td>
</tr>
<tr>
<td>VPN</td>
<td>Virtual Public Networj</td>
</tr>
<tr>
<td>VR</td>
<td>Finnish Rail Operator, formerly known as <em>Valtion Rautatiet</em></td>
</tr>
<tr>
<td>W3C</td>
<td>World Wide Web Consortium</td>
</tr>
<tr>
<td>WCO</td>
<td>World Customs Organization</td>
</tr>
<tr>
<td>WMI</td>
<td>Web Manual Input</td>
</tr>
<tr>
<td>XML</td>
<td>Extensible Markup Language</td>
</tr>
<tr>
<td>ŽS</td>
<td><em>Želzenice Srbije, Serbian Railways</em></td>
</tr>
</tbody>
</table>
ACKNOWLEDGEMENTS

This Report is based on a study made by KGH Group AB and has been prepared by Carolina Monsalve (Senior Transport Economist), with support from Klaus Juergen-Uhl (Senior Rail Advisor, Consultant). The team would like to thank Juan Gaviria (Practice Manager), Baher El-Hefnawy (Lead Transport Economist), Ellen Goldstein (Country Director), Mamta Murthi (Country Director), Antony Thompson (Country Manager), Tony Verheijen (Country Manager), Nichola Dyer (Country Program Coordinator), Raymond Bourdeaux (Program Leader), Frank Jost (DG Move, European Commission), Nedim Begovic (Railway Expert, South East Europe Transport Observatory), peer reviewers Martha Lawrence (Senior Transport Specialist), Antoine Kunth (Senior Railway Specialist), Jean-François Arvis (Senior Transport Economist), and Ramesh Sivapathasundram (Lead Information Officer). Special thanks go to Eolina Milova (Senior Operations Officer), Toma Yanakiev (Operations Officer), and Albena Sasonova (Program Assistant) from the Bank’s Sofia office, and Svetlana Vukanovic (Transport Specialist) and Desanka Stanic (Program Assistant) from the Bank’s Serbia office. The team would also like to acknowledge the many formal and informal contributions of officials from Serbia, Bulgaria, border officials at the Joint Border Zone in Dimitrovgrad, and RailNet Europe. We are grateful to all other stakeholders for their frank and open engagement in the project. Finally, we would like to thank Dorsati Madani (Senior Economist) and the Multi-Donor Trust Fund for Trade and Development for financing this activity.
# TABLE OF CONTENTS

EXECUTIVE SUMMARY ................................................................................................................................. i

INTRODUCTION .................................................................................................................................................. 1

RAIL ELECTRONIC DATA INTERCHANGE ................................................................................................. 4
  Introduction .................................................................................................................................................. 4
  EU Regulations ............................................................................................................................................. 7
  EU Border Crossing Practice ..................................................................................................................... 9
  Technical Aspects of Information and Data Exchange ............................................................................ 11
  Summing Up .................................................................................................................................................. 17

DIMITROVGRAD RAIL BORDER CROSSING PRACTICE ........................................................................... 18
  Legal Framework ....................................................................................................................................... 18
  Rail Border Crossing Parties .................................................................................................................... 20
  BCP Processes .......................................................................................................................................... 22
  Technical Aspects of Information and Data Exchange ............................................................................ 23
  Overall Assessment ................................................................................................................................... 26
  Recommendations ...................................................................................................................................... 30

OPTIONS ANALYSIS ...................................................................................................................................... 32
  Introduction ................................................................................................................................................. 32
  Processes, Information, and Data Exchange Requirements .................................................................... 34
  ICT and Technical Options ....................................................................................................................... 36
  Assessment of Options ............................................................................................................................... 42
  Option 3 ....................................................................................................................................................... 45
  Conclusion .................................................................................................................................................... 48

Annex 1: Definitions ........................................................................................................................................ 52
Annex 2: BCP Process Scenario ..................................................................................................................... 53
Annex 3: Raildata ............................................................................................................................................ 55
Annex 4: Work Packages for Implementation of Option 3 ........................................................................... 57
EXECUTIVE SUMMARY

Introduction

Within the European Union (EU), rail transport is currently the least integrated transport mode. This leads to delays, extra costs, and insufficient use of rail freight, especially for time-sensitive cargo. This also represents a missed opportunity in terms of moving towards a greener transport modal split within the EU. Rail freight, for which international activity represents 50 percent of total activities, will not be able to develop fully if border crossing rail operations do not deliver a better service for shippers and freight operators who require seamless trans-national transport as is possible by road, air and sea. Observing that the modal split of rail in the EU is stagnating at around 16 percent after years of decline, the European Commission proposed a regulation on a European rail network for competitive freight—to be based on a number of rail freight corridors—which entered into force on November 9, 2010. Regulation No 913/2010 makes it mandatory to create a European rail network for competitive freight based on international freight corridors, recognizing that the need to strengthen the competitiveness of rail freight requires a corridor approach, involving corridors that cross national borders. The EU’s adoption in 2010 of a corridor approach focusing on international rail freight has important implications for EU member states, accession and candidate countries, in terms of approaching rail freight investments and performance from an international corridor perspective with enhanced cross-border coordination, with the ultimate aim of increasing the attractiveness of rail to potential freight customers.

Delays in rail transport caused by border-crossing transit times are one of the key factors affecting the competitiveness of rail transport vis-à-vis other transport modes—increasing logistical costs and creating a negative perception of rail, in terms of reliability, predictability, and punctuality. This is not a problem unique to South East Europe—evidence from the Austrian Court of Auditors indicates that in the 2010, 55 percent of delays in rail freight in Austria were caused by delays in train handover at national borders. Nevertheless, the problem is more acute in South East Europe, and suggests that tackling rail infrastructure investment needs, in and of itself will be insufficient to allow a rapid increase in the modal share of international rail freight, in the absence of measures aimed at addressing delays at border points.

Rail corridor performance in South East Europe is generally poor in terms of commercial speeds achieved and modal share, reflecting a potential largely unfulfilled to date. As the 2009 Bosphorus Europe Express test run along Corridor X revealed, commercial speeds can rise dramatically if border-crossing delays are reduced—even without major improvements to rail infrastructure. While improved performance was not related to electronic data interchange (EDI), the test run demonstrates how improvements in rail border crossing points (BCPs) are possible when a corridor level approach is adopted and there is political commitment among the participating countries. The general drive by a number of countries to upgrade key rail infrastructure to 160 km/hour at great expense is not necessarily as cost-effective as substantial reductions in border-crossing delays, which come at limited expense and require no or very limited infrastructure expenditure. The Corridor X test run thus serves as an important lesson to governments and rail companies in the region on what can be done along a specific rail corridor if a regional approach, focusing on harmonization, synchronization, and cooperation, is adopted.
In 2011 the World Bank published a new report, *Railway Reform in South East Europe and Turkey: On the Right Track?*, a study that examined the challenges facing the railways of the region assessing progress made by the state rail incumbents in: (i) institutional reform; (ii) operating and financial performance; and (iii) integration. The 2011 Report found that progress in integration had been limited, despite the significant market segment for international rail freight transport, particularly along the main international corridors, Corridor X and Corridor IV. The expansion of the EU rail networks to the new member states, candidate, and accession countries has created a significant opportunity for rail freight. However, this potential remains unrealized, due in part to strong competition from other modes, but also due to a number of other more attainable factors, particularly at the border-crossings. The findings show that a critical element in reducing border-crossing times is effective cooperation among incumbent rail undertakings and rail infrastructure managers—particularly across national boundaries.

The 2011 Report found that across most of South East Europe communication across rail BCPs was limited to telephones, faxes, and e-mails, as well as manual copying of documentation. Most of the existing telematics applications for freight in the region have been developed and implemented according to national norms and standards. This hampers the continuity of information services across borders, a key factor for ensuring the quality of international rail services, notably in the fast-growing segment of international freight services. The main potential of introducing EDI at rail border crossings in South East Europe is in the reduction of dispatching times. This would allow pre-approval messages in an electronic format to be generated automatically when a train is on route. It would apply to requests for locomotives and handover trains, and electronic transmission of all necessary commercial and train documents. It would minimize the paperwork that would need to be physically carried and whose losses often lead to delays. One of the recommendations of the 2011 Report was to further integration and improve performance along an international freight corridor by introducing a pilot scheme to test EDI transmission between select border stations, with the aim of reducing dispatching time and hence the time a train stops at the border.

The objective of this Report is to address this recommendation by assessing whether it makes sense to introduce a pilot EDI in a rail border crossing point in South East Europe. It aims to make a preliminary assessment of the various technical options in terms of hardware, software, and communication requirements of such architecture, taking into account that any technical solution proposed needs to be adapted to the countries in question, given existing infrastructure and European regulations. The ultimate aim is to improve rail border crossing performance in South East Europe by the use of EDI to improve integration.

The selection of the pilot border crossing point was guided by four major considerations. The first and most important criterion was that the border crossing point should be located in an important international rail freight traffic corridor in South East Europe. This narrowed the selection to Pan European Corridor X which connects Salzburg-Ljubljana-Zagreb-Beograd-Nis-Skopje-Thessaloniki with its four branches: A: Graz-Maribor-Zagreb B: Budapest-Novisad-Beograd, C: Nis-Sofia and D: Veles-Bitola-Florina. This corridor connects Germany, Austria and Central Europe to Turkey and Greece, and thus has the potential to carry significant rail freight traffic. A second criterion was that the border crossing point should be in a member state of the South East Transport Observatory (SEETO). These first two criteria narrowed the potential border crossing points to those between Serbia and Hungary (Subotica), Bulgaria (Dimitrovgrad), and Croatia (Schid). A third criterion was that the border crossing point should be a joint border area. With these criteria in mind, Dimitrovgrad was selected. Dimitrovgrad has a significant volume of traffic and potential for rail to attract some of the freight currently
transported by road. There are private actors involved on the Bulgarian side, there is a joint border zone in operation, and there is a level of technical readiness and willingness to participate in the study.

**Rail Electronic Data Interchange**

Automated exchange of data or electronic data interchange (EDI) is defined as automated exchange of structured electronic messages for use in another system or organization. By using a defined protocol both sender and receiver can verify that the message is formally correct and can be used for further processing. EDI communication is characterized as an exchange of information between two server applications and usually between two organisations and parties. EDI between two parties must be initiated by some kind of event or information—for example, this can be a train passing a certain position or information within a document pointing out the next BCP or a lead railway undertaking (RU; having the assignment from the customer) transferring a consignment note to an RU and a pre-arrival declaration to customs.

EDI requires a common network and defined interfaces both to transfer information and to interpret the information received. Standards defined by the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) and World Customs Organization (WCO) may be used to simplify integration with customs administrations especially for actors having interchange with many customs administrations. Technical protocols must be established across a range of factors, including the network, security, messages structure, as well as the content of the message to be able to exchange electronic information.

EU regulations currently in force require EDI between RUs, infrastructure managers (IM), Customs authorities as well as with other government agencies. Since 2006 the Telematics Applications for Freight – Technical Specifications for Interoperability (TAF TSI), Regulation EC 62/2006 has been in force dealing with definitions of the interoperable data exchange between infrastructure managers (IMs) and RUs; the regulation is law for all EU member states. Regulation 62/2006/EC contains technical specifications for information services at the border crossings within the EU and the EU borders with non-EU states if the non-EU state accepts the regulation. Since Western Balkans countries are accession and candidate countries, they are likely to transpose and implement the regulation in the medium to long-term. It should be noted that some EU member states are not yet compliant with this regulation as implementation is ongoing.

The experience from the Norway-Sweden and Finland-Russian Federation rail border crossing experience is that high levels of trust between involved parties, which creates opportunities for minimizing unnecessary controls and activities. Removing the need for a stop at the border is the most advanced solution. However, it requires open access to the national rail network and authorized procedures facilitating exchange of electronic information—no member state of SEETO is at a stage where this is feasible in the short-run. As an EU candidate country, Serbia needs to devise solutions for improving rail BCP performance that are in line with the EU acquis. Advanced state-of-the-art rail EDI in the EU requires investment in costly systems, with much of the communication taking place between central systems of neighbouring countries along the corridors or in the wider economic region. It requires a high level of trust and the readiness to align national legislation and regulatory frameworks to the EU acquis. International integration is a major target for a rail corridor, with full

---

1 Present traffic volumes have decreased to approximately one passenger train and five cargo trains per day. A future increase in volume would heighten the importance of EDI and electronic information exchange.

2 In a joint border zone state authorities of neighboring states can carry out controls in both national territories, railway companies of the neighboring states can carry out dispatching without needing additional licences or safety certificates. This is the case in Dimitrovgrad with the exception of border police and customs actions.
corridor level integration developed between data centres of involved actors and cannot be achieved at one BCP. However, there are intermediate steps possible, in particular in the realm of electronic exchange of data that render feasible a significant reduction in border processing time, even without legal and regulatory changes. Its application would increase the competitiveness of rail in the South East Europe region.

Dimitrovgrad Border Crossing Practice

A best practice BCP limits the number of activities carried out at the BCP. At a BCP like Dimitrovgrad, where usually no change of train composition is required, this can be taken as far as removing the need to stop at the BCP and subsequently the need of personnel at the BCP (passenger traffic excluded). This is the situation described in the Swedish-Norwegian border case study. This requires a high level of trust, electronic communication, technical equipment, certification programs as well as open access to the railway networks. An EDI solution compliant with all the requirements of EU legislation and all the operational requirements from actors involved is a major undertaking. It is out of the scope of a pilot project in a single BCP as it would involve many actors and stakeholders both at a national and international level.

However, in the short-term Dimitrovgrad should keep existing procedures, but provide access to more advanced real-time information. This cannot always be done using EDI, as information will not be available in electronic form, as the sender and the receiver of such information do not have defined EDI interfaces. However, other kinds of information technology (IT) can be used to give earlier access to information to support working in parallel, as opposed to the current situation of sequential work. The short-term operationalization of the recommendations proposed should be governed by the following principles: (a) re-use existing solutions if possible, which can be as simple as sharing user interfaces with other authorized parties; (b) whenever possible TAF/TAP TSI messages must be used; (c) focus on solutions that affect BCP lead time; (d) focus on stakeholders that need to be convinced that EDI may be beneficial, including decision makers (political and management) and operational personnel; and (e) focus on highest volume scenarios which are freight transit.

From a BCP lead time perspective, the recommendation is that the pilot should focus on the following (numbers indicate priority): (i) freight trains; (ii) establishing reliable internet connection; (iii) providing RU access to consignment note and wagon list information to complete railway and customs formalities; (iv) providing access to track and trace information (arrival time) since it will enable preparations for arrival and work to be done in advance and keep manual coordination between parties (using telephone) to a minimum; and (v) provide mobile access to consignment information in order to support technical and commercial controls.

Options Analysis

This Report argues that the development of a pilot solution for one BCP—Dimitrovgrad has been analyzed but the solution proposed is applicable to other BCPs in South East Europe—has to reduce long lead times at the border taking into account the readiness of involved parties to exchange electronic information. It is important to emphasize that the selected BCP is only one BCP in an international railway corridor and that paper documentation will still be required for other BCPs along the corridor. The pilot solution also has to ensure that no new operational tasks are introduced which could result in longer lead times. Lastly, it needs to be borne in mind that parties active in Dimitrovgrad may be hesitant to finance investments to address the situation at one BCP, when overall performance is a result of the situation in all rail BCPs in one country or the BCPs along the entire international railway corridor.
Four different solutions were identified to provide a short-term solution that could be implemented quickly, assuming there is buy-in from concerned parties in Serbia and Bulgaria:

- Option 1: No pilot solution
- Option 2: Use ICT solutions available in the market
- Option 3: Use existing solutions, electronic information, and document scanning
- Option 4: Develop a local EDI solution

Option 1 was a conservative do nothing option, with no short-term pilot solution—with a view to focusing on ongoing initiatives for a long-term solution—and the other three options (Option 2-4) presented three short-term pilot alternatives; from reuse of existing solutions to the development of a tailor made solution. The intention of the EU legal and regulatory framework, including the TAF/TAP TSI regulation, is that each party needs to be responsible for their own part of electronic integration. This means that all parties need to invest in their own solutions, which then need to be integrated with other parties in order to be able to exchange electronic information. Parties are likely to do this if they can use their solution at as many BCPs as possible and willingness to make integration investments for a BCP local pilot is considered low. For this reason, a local BCP pilot is considered a low-cost, transitional, quick-time-to-market solution addressing long BCP lead times that could garner support from relevant stakeholders.

Taking the present situation into account the project recommends a short-term solution that reuses existing solutions available on the market to integrate these into a BCP local web portal that can be used by all parties at the BCP. This solution reuses existing information giving actors immediate access to necessary information to support parallel workflows speeding up border procedures. The solution proposed, Option 3, can work even when not all information will be available in electronic and structured format. The project sees it as the only feasible option for a pilot addressing the present situation. Option 2 and Option 4 could result either in longer BCP lead times due to manual entry of data or in high integration costs as long as these EDI solutions are not introduced in the totality of the corridor or region. These latter options are likely to be questioned by the parties concerned due to the high integration cost for one BCP.

**Option 3**

The recommended solution, Option 3, makes use of already existing electronic consignment notes and wagon information available in the central system of the RU, which can be electronically received at the BCP. When the information is not available in electronic format existing paper documents arriving with the locomotive driver would be scanned and made available to all actors at the same time using electronic based workflows, enabling parallel workflows regardless of how information is initially received. When electronic consignment notes are available, as for the movements coming from the north, the information available in the Serbian central systems, already Raildata integrated, can be shared to all participants making scanning of paper documents redundant. The presentation of information to end users would be equivalent regardless of how information was made available—scanned or available as structured information—using a portal concept, an electronic gateway unifying the information received electronically from the central systems of the RUs and others or from scanners in order to process them.

The portal concept will align existing user interfaces—consignment notes, wagon lists, and track and trace information—of all actors together with scanned document information. Manual workflows such as technical controls would be supported by access to different kinds of documentation and information using mobile
equipment such as tablets. This type of application/portal will not require access to local mobile app frameworks and the recommendation is a HTML5 portal to make mobile and desktop access flexible. Electronic integration with Customs would be possible when electronic consignment note information is available, but is deemed to be too ambitious for a pilot as it would require changes at a national and international level or be too expensive for RUs. No regulatory or legal changes are foreseen with Option 3.

Option 3 involves BCP input solutions and a BCP server with a portal solution to present consignment notes, wagon lists, track and trace information, among others using existing web applications available at Serbian Railways using the portal solution. A scanner and scanner application is necessary in order to scan paper docs when these are not available in electronic format. It also includes existing electronic information (structured) available at Serbian Railways and possibly other RUs/IMs that are willing to make user/web interfaces presenting consignment notes, wagon lists, track and trace, etc. Lastly, it requires terminals and devices—including inspection devices and applications to assist technical controls—so that all parties involved at the BCP can access information simultaneously and work in parallel. This option requires three types of software applications:

- **Scanner application:** Application to scan and support definition of flexible workflows for each stakeholder using general Electronic Content Management (ECM) Software together with Document Scan and Indexing Solutions.³

- **Consignment note and wagon list information application:** Consignment note information—originating from north routes entering through Subotica—exists in Serbian Railways’ central systems (TAF/TAP TSI and Raildata) and can be made available to Dimitrovgrad actors (RU, IM, Customs and Border Police) using the current intranet application used at Serbian Railways.⁴ Actors could then work more in parallel and it would also be possible to integrate the NCTS system of Serbia when operational. Information not available in electronic form would be scanned. As soon as other RUs are prepared to exchange structured information (EDI) the Serbian Railways solution (TAF/TAP TSI and Raildata compliant) and other TAF/TAP TSI compliant implementations can be used to reduce the need for manual scanning and manual processing based on information available in the portal concept (web portal).

- **Mobile control solution:** Provide access to scanned and/or structured consignment note and wagon list information using mobile equipment. The content management solution proposed for the scanner application needs to support feeding back information from commercial and technical controls. The mobile solution then gives access to relevant information and function to report results of technical controls using tablets.

The technical infrastructure and hardware to support Option 3 include scanners, servers, data storage solutions, tablets, and a Wi-Fi solution covering rail yard needs, as well as investments to improve internet reliability.

The preliminary cost analysis suggests benefits exceed costs and a potential reduction of border crossing times for Option 3 estimated at 35 minutes. The estimated cost of the pilot, at a little over Euro 100,000, is small

---

³ A number of ECM and scanning software exists on the market that scan, identify and classify information as well as initiate defined workflows for each stakeholder, such as Microsoft Share Point, Alfresco ECM, PSIGEN Capture, and ORION ScanIT.

⁴ When the pilot project is concluded a reassessment of availability of electronic consignment notes, wagon lists, and track and trace information would need to be made to minimize the need of scanning paper documents.
compared to the cost of rehabilitating and upgrading one kilometre of rail track to 160 km/hour and this could readily be a component of an international financial institution financed rail project. Taking this and other factors into consideration the recommendation is to invest in a short-term pilot at Dimitrovgrad. In parallel, other obstacles (such as availability of locomotives, access charges etc.) affecting BCP lead times, but not related to electronic data interchange, must be addressed in parallel. Option 3 does not require amendments to the Border Crossing Agreement.

It is equally important not to lose sight of developing electronic data exchange solutions on an international rail corridor or regional level, compliant with TAF/TAP TSI. This would make the long-term solutions more financially attractive. The application of the recommended Option 3 would not be an obstacle to the development in parallel over the medium to long-term of a corridor level or regional level EDI solution. If a decision is made to introduce a BCP local pilot it is important that the pilot short-term solution does not compete with already operational solutions and ongoing initiatives—Option 3 does not raise these issues. If implemented, it would be necessary to closely monitor the effects of the local pilot, before considering extending this approach to other BCPs in the region.

At present, there are two major activities in South East Europe that are dealing with border crossing issues. The first is the Regional Transport Study (REBIS update) being developed for South East Europe Transport Observatory (SEETO) members—this is financed by the EU through the Western Balkan Infrastructure Framework and managed by the World Bank—aims to develop a Priority Action Plan for enhancing the efficiency of the infrastructure of the network, identifying infrastructure and non-physical improvements. The second is an EU financed study to support the implementation of the strategic work program of SEETO. This second study will also develop an Action Plan for road, rail and ports, proposing short-term actions to improve border crossing performance in the region. The first draft of the Action Plan will be presented to the SEETO Steering Committed, DG Move and DG Near in 2015 and this is expected to be endorsed by SEETO ministers. Inclusion of the proposed pilot EDI for Dimitrovgrad in such an Action Plan could create the political commitment and momentum to translate this idea into a solution that has the political backing necessary for implementation.

**Recommendations**

With the above in mind, the Report makes the following recommendations:

- **Ongoing public and private initiatives to implement rail EDI in Serbia and Bulgaria are further supported and promoted as these will provide a long-term solution that will considerably reduce lead times at all BCPs in both countries. Investment in a short-term/pilot solution that would improve BCP performance in Dimitrovgrad until long-term solutions are operational.**

- **Consideration is given to making a wider assessment of the generic situation in South East Europe in order to support ongoing initiatives in an optimal way. This should be done in close cooperation with international institutions such as RailNetEurope, SEETO, and the EC in order to focus on coordination of efforts and to adopt an international rail freight corridor perspective.**

- **Implementation of Option 3 on a pilot basis. It is the short-term pilot solution providing all actors access to information in electronic form by reuse of existing information such as scanned paper documents and**
structured data. The information that is required is electronic consignment notes, wagon lists as well as track and trace data. IT infrastructure and software needs to be procured and installed to enable electronic information access. The procurement and use of other technologies supporting commercial and technical controls—track and trace, hot box detection, among others—must be standardized and coordinated from a national, international, and company level and should not be part of any short-term pilot solution.

- Other actions that would improve border-crossing times in Dimitrovgrad include: (a) a One Stop Shop for rail infrastructure path allocation across borders; (b) single window for customs where customs officials from neighboring countries sit in the same office in a joint border zone or share information electronically; (c) passenger control on moving trains; (d) corridor interoperability would likely reduce transit times by not requiring changes of traction at BCPs and no change of locomotive drivers at BCPs; and (d) upgrading rolling stock to avoid less reliable, ageing rolling stock that require frequent maintenance interventions and an increased need of technical inspections. However, these are outside the scope of this Report. With a view to improving performance at the border, other challenges that affect rail border crossing lead times need to be assessed using a Time Release Study (World Customs Organisation), as the absence of electronic data interchange is only one of the factors contributing to delays at the borders. These need to better understood in order to improve border-crossing performance.
INTRODUCTION

1. Within the European Union (EU), rail transport is currently the least integrated transport mode. This leads to delays, extra costs, and insufficient use of rail freight, especially for time-sensitive cargo. This also represents a missed opportunity in terms of moving towards a greener transport modal split within the EU. Rail freight, for which international activity represents 50 percent of total activities, will not be able to develop fully if border crossing rail operations do not deliver a better service for shippers and freight operators who require seamless trans-national transport as is possible by road, air and sea. Observing that the modal split of rail in the EU is stagnating at around 16 percent after years of decline, the European Commission proposed a regulation on a European rail network for competitive freight—to be based on a number of rail freight corridors—which entered into force on November 9, 2010. Regulation No 913/2010 makes it mandatory to create a European rail network for competitive freight based on international freight corridors, recognizing that the need to strengthen the competitiveness of rail freight requires a corridor approach, involving corridors that cross national borders. The EU’s adoption in 2010 of a corridor approach focusing on international rail freight has important implications for EU member states, accession and candidate countries, in terms of approaching rail freight investments and performance from an international corridor perspective with enhanced cross-border coordination, with the ultimate aim of increasing the attractiveness of rail to potential freight customers.

2. Delays in rail transport caused by border-crossing transit times are one of the key factors affecting the competitiveness of rail transport vis-à-vis other transport modes—increasing logistical costs and creating a negative perception of rail, in terms of reliability, predictability, and punctuality. This is not a problem unique to South East Europe—evidence from the Austrian Court of Auditors indicates that in the 2010, 55 percent of delays in rail freight in Austria were caused by delays in train handover at national borders. Nevertheless, the problem is more acute in South East Europe, and suggests that tackling rail infrastructure investment needs, in and of itself will be insufficient to allow a rapid increase in the modal share of international rail freight, in the absence of measures aimed at addressing delays at border points.

3. Rail corridor performance in South East Europe is generally poor in terms of commercial speeds achieved and modal share, reflecting a potential largely unfulfilled to date. As the 2010 Bosphorus Europe Express test run along Corridor X revealed—connecting Germany and Slovenia to Turkey—commercial speeds can rise dramatically if border-crossing delays are reduced—even without major improvements to rail infrastructure. While the improved performance in the test run was not related to EDI, it demonstrates how improvements in rail BCPs are possible when a corridor level approach is adopted and there is political commitment among the participating countries. The general drive by a number of countries to upgrade key rail infrastructure to 160 km/hour at great expense is not necessarily as cost-effective as substantial reductions in border-crossing delays, which come at limited expense and require no or very limited infrastructure expenditure. The Corridor X test run thus serves as an important lesson to governments and rail companies in the region on what can be done along a specific rail corridor if a regional approach, focusing on harmonization, synchronization, and cooperation, is adopted.

---

5 The Bosphorus Europe Express service is a result of the coordinated efforts of railway undertakings and infrastructure managers of Slovenia, Croatia, Serbia, Bulgaria, and Turkey. The focus was on how to increase the train’s speed along the corridor and how to optimize activities at border stations. A contribution to the transit time reduction at the test run was the introduction of an interoperable multi-system locomotive and diesel locomotive. Under these specific conditions test train reached its destination within 35 hours, compared to 57-64 hours previously.
4. In 2011 the World Bank published a report, *Railway Reform in South East Europe and Turkey: On the Right Track?*, a study that examined the challenges facing the railways of the region assessing progress made by the state rail incumbents in: (i) institutional reform; (ii) operating and financial performance; and (iii) integration. The 2011 Report found that progress in integration had been limited, despite the significant market segment for international rail freight transport, particularly along the main international corridors, Corridor X and Corridor IV. The expansion of the EU rail networks to the new member states, candidate, and accession countries has created a significant opportunity for rail freight. However, this potential remains unrealized, due in part to strong competition from other modes, but also due to a number of other more attainable factors, particularly at the border-crossings. The findings show that a critical element in reducing border-crossing times is effective cooperation among incumbent rail undertakings and rail infrastructure managers—particularly across national boundaries.

5. The 2011 Report found that across most of South East Europe communication across rail BCPs was limited to telephones, faxes, and e-mails, as well as manual copying of documentation. Most of the existing telematics applications for freight in the region have been developed and implemented according to national norms and standards. This hampers the continuity of information services across borders, a key factor for ensuring the quality of international rail services, notably in the fast-growing segment of international freight services. The main potential of introducing electronic data interchange (EDI) at rail border crossings in South East Europe is in the reduction of dispatching times. This would allow pre-approval messages in an electronic format to be generated automatically when a train is on route. It would apply to requests for locomotives and handover trains, and electronic transmission of all necessary commercial and train documents. It would minimize the paperwork that would need to be physically carried and whose losses often lead to delays. One of the recommendations of the 2011 Report was to further integration and improve performance along an international freight corridor by introducing a pilot scheme to test EDI transmission between select border stations, with the aim of reducing dispatching time and hence the time a train stops at the border.

6. The objective of this Report is to address this recommendation by assessing whether it makes sense to introduce a pilot EDI in a rail border crossing point in South East Europe. It aims to make a preliminary assessment of the various technical options in terms of hardware, software, and communication requirements of such architecture, taking into account that any technical solution proposed needs to be adapted to the countries in question, given existing infrastructure and European regulations. The ultimate aim is to improve rail border crossing performance in South East Europe by the use of EDI to improve integration.

7. The selection of the pilot border crossing point was guided by four major considerations. The first and most important criterion was that the border crossing point should be located in an important international rail freight traffic corridor in South East Europe. This narrowed the selection to Pan European Corridor X which connects Salzburg-Ljubljana-Zagreb-Beograd-Nis-Skopje-Thessaloniki with its four branches: A: Graz-Maribor-Zagreb B : Budapest-Novis Sad-Beograd, C: Nis-Sofia and D : Veles-Bitola-Florina. This corridor connects the economic power houses of Germany, Austria and Central Europe to Turkey and Greece, and thus has the potential to carry significant rail freight traffic. A second criterion was that the border crossing point should be in a member state of the South East Transport Observatory (SEETO). These first two criteria narrowed the potential border crossing points to those between Serbia and Hungary (Subotica), Bulgaria (Dimitrovgrad),

---

and Croatia (Schid). A third criterion was that the border crossing point should be a joint border area. With these criteria in mind, Dimitrovgrad was selected. Dimitrovgrad has a significant volume of traffic and potential for rail to attract some of the freight currently transported by road. There are private actors involved on the Bulgarian side, there is a joint border zone in operation (excluding border police and customs actions), and they have a level of technical readiness and willingness to participate in the study.

This Report begins by reviewing rail electronic data interchange, with an overview of the relevant EU legal framework and how rail EDI works, illustrated with two examples from Europe. It then turns to an assessment of Dimitrovgrad border crossing station, including the actors involved, current dispatching processes at the border, the information and data systems in use, and concludes with an assessment and recommendation. The last chapter explores the alternative options for introducing electronic data interchange in Dimitrovgrad and recommends a preferred course of action. It should be noted that the options could also be applied to other BCPs in the SEETO region.

---

7 Present traffic volumes have decreased to approximately one passenger train and five cargo trains per day. A future increase in volume would heighten the importance of EDI and electronic information exchange.

8 Subotica has also a significant volume in line with the one in Dimitrovgrad, there are also private actors involved this time on the Hungarian side. However, there is at present no joint border zone in place and the technical readiness is low. Vrbnica/Bijelo Polje has more or less the same volume of traffic, but has much less freight by road, which makes the potential for attracting road freight less likely. There is no joint border zone in place and the technical readiness is low. There are no private railway actors at either side of the border. The interest to participate in a pilot is high.
RAIL ELECTRONIC DATA INTERCHANGE

Introduction

9. Automated exchange of data or electronic data interchange (EDI) is defined as automated exchange of structured electronic messages for use in another system or organization. By using a defined protocol both sender and receiver can verify that the message is formally correct and can be used for further processing. EDI communication is characterized as an exchange of information between two server applications and usually between two organisations or parties. EDI between two parties must be initiated by some kind of event or information—for example, this can be a train passing a certain position or information within a document pointing out the next BCP or a lead railway undertaking (RU) receiving the assignment from a customer, transferring a consignment note to an RU and a pre-arrival declaration to Customs.

10. EDI requires a common network and defined interfaces both to transfer information and to interpret the information received. Standards defined by the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) and World Customs Organization (WCO) may be used to simplify integration with customs administrations especially for actors having interchange with many customs administrations. Technical protocols must be established across a range of factors, including the network, security, messages structure, as well as the content of the message to be able to exchange electronic information.

11. The general idea of EDI using a scenario relevant to this study is illustrated in Figure 1. The lead railway undertaking (RU), in this instance a German RU creates the consignment note. The consignment note is transferred from the lead RU data centre to the next RU—for example, the Hungarian RU—and further on to RU1 (in this case the Serbian RU) arriving in Dimitrovgrad to hand over the train to RU2 (in this case a Bulgarian RU). The RU1 data centre transfers the consignment note to the RU2 data centre. The RU1 personnel in Dimitrovgrad may access consignment notes from their data centre and use their system to support them in their operations. In a similar way, the RU2 personnel in Dimitrovgrad may access the consignment note in their system and use their system to support their operations. The RU responsible for submitting a declaration for customs formalities transfers a declaration from its data centre to the customs data centre. Customs officers access information and perform formalities as required. The importer submits the Customs Declaration using their own system to communicate with Customs (EDI by definition) or some kind of web portal provided by Customs to...

9 XML and EDIFACT are two commonly used techniques to encode and structure electronic messages having similar characteristics. Extensible Markup Language (XML) is a markup language that defines a set of rules for encoding documents in a format which is both human-readable and machine-readable. The United Nations/Electronic Data Interchange For Administration, Commerce and Transport (UN/EDIFACT) is the international EDI standard developed under the United Nations—it provides a set of syntax rules to structure data, an interactive exchange protocol (I-EDI), and standard messages which allow multi-country and multi-industry exchange.

10 Within the United Nations framework of the Economic and Social Council, the United Nations Economic Commission for Europe (UNECE) serves as the focal point for trade facilitation recommendations and electronic business standards, covering both commercial and government business processes that can foster growth in international trade and related services. In this context, the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) was established, as a subsidiary, intergovernmental body of the UNECE Committee on Trade, mandated to develop a programme of work of global relevance to achieve improved worldwide coordination and cooperation in these areas.

11 The rail consignment note is a transport document used in rail shipments. It confirms that the rail carrier has received the goods and that a contract of carriage exists between the trader and the carrier. Key details to be provided in the note include a description of the goods, the number of packages and their weight, and the names and addresses of the sender and recipient.
submit electronic information. Users, such as BCP personnel, access information from the server applications available at the data centres using their workstations. This way of integrating and providing information required by another actor is crucial to shorten BCP lead-time.

**Figure 1: Electronic Data Interchange**

![Diagram of Electronic Data Interchange]

Source: KGH Group AB.

12. A number of parties are involved in a railway BCP, and normally include the following:

- **Infrastructure Managers (IM).** Two or more infrastructure managers are concerned, one in each country. The technical handover is the responsibility of the IMs.

- **Railway Undertakings (RU).** Two or more railway undertakings, one in each country. A RU is the party responsible for the train and the goods being transported. The commercial and operational handover are the responsibilities of the RUs.

- **Customs.** If the BCP is an EU/non-EU border then two Customs Administrations are involved.

- **Border police.** If the border is an external border (not internal as defined in the Schengen agreement), two border police administrations are concerned.
• **Other government agencies.** Other border authorities such as phyto-sanitary, sanitary, radiology authorities. In many cases the customs authorities are responsible to work on their behalf.

• **Shipper or freight forwarder.** A shipper or freight forwarder is a person or company that organizes shipments to get goods from the start point to a final point of distribution. A forwarder normally contracts with carriers to move goods/cargo.

• **Traders (importer, exporter, or owner of transit goods.** Traders normally cannot be observed at the BCP but they play a significant role as the holder of the goods and the main source of information concerning the goods in question.

![Figure 2: Handover Procedures at a BCP](image)

13. In general the information needed by the parties before a train arrives is as follows: estimated time of arrival, actual time of arrival type of train (passenger or freight train), planned time of departure, and consignment and wagon information. This information enables all parties to prepare prior to the arrival of the train speeding up the procedures at train stop (Figure 2). Once the train has arrived at the BCP, it triggers five activities—called “technologia” in the South East Europe region—at border station 1: (a) commercial hand-over; (b) technical hand-over of the wagons; (c) border police control; (d) customs control; and (e) exchange of locomotive (if the border station 1 is the traction exchange point). Once the handover is terminated, the same procedures are carried out at the border station 2. If the BCP is a joint station, the above activities are carried out in the same station. The sooner the information arrives at the BCP the sooner the stakeholder can prepare the hand-over, thus reducing the time spent on the handover procedures.
EU Regulations

14. EU regulations currently in force require EDI between RUs, infrastructure managers (IM), Customs authorities as well as in certain cases also with other government agencies. Since 2006 the Telematics Applications for Freight – Technical Specifications for Interoperability (TAF TSI), Regulation EC 62/2006 has been in force dealing with definitions of the interoperable data exchange between IMs and RUs; the regulation is law for all EU member states (Box 1). Regulation 62/2006/EC details technical specifications for information services at the border crossings within the EU and the EU borders with non-EU states if the non-EU state accepts the regulation. Since Western Balkans countries are accession and candidate countries, they are likely to transpose and implement the regulation in the medium to long-term. It should be noted that some EU member states are not yet compliant with this regulation as implementation is ongoing.


16. The UCC is part of the customs modernization agenda of the EU, serving as the new framework regulation on the rules and procedures for customs. The use of electronic data-processing techniques and electronic systems will support the application of the UCC. In order to support the development of electronic systems, Implementing Decision of April 29, 2014 establishing the Work Programme for the Union Customs Code was adopted. A description of the electronic systems and the target dates for starting operations is attached as an annex to that Decision. The complete deployment of all of the electronic systems required by the UCC are to be implemented by December 31, 2020.

17. Rail Corridor X with the Dimitrovgrad BCP between Serbia and Bulgaria connects Germany, Austria and the central European markets with Turkey and vice versa, making Serbia and Bulgaria important as transit countries. The vast majority of consignments are on transit to the final destination and are not imported or exported into Serbia or Bulgaria. The EU common transit procedure is used for the movement of goods between the EU member states, the EFTA countries (Iceland, Norway, Liechtenstein and Switzerland), and Turkey (since

---

12 Adoption of the EU aquis means there are more actors in a rail BCP, due to the splitting of monopoly railway companies and the opening of the market to private railway undertakings, amongst others. However, this does not prevent EU member states from achieved good rail BCP performance, suggesting that with political commitment and goodwill, technical solutions can result in fast BCP performance.

13 A similar arrangement as TAF TSI exists for rail passenger transportation called Telematic Application for Passenger (TAP TSI).


The procedure is based on the Convention of May 20, 1987 on a common transit procedure. The rules are effectively identical to those of Community transit.  

**Box 1: Telematics Applications for Freight Services**


- When (at which point in a specific process)
- What (which kind of information and content) has to be sent to
- Whom (partner or partners) and
- How (which format) the data must be exchanged between the partners.
- Where (reporting point) location under contractual agreement where the information must be exchanged between the partners.

TAF TSI defines

- What do we want to communicate (Defined TAF TSI Messages)
- How we want to communicate it (TAF TSI Message structure)
- When do we want to communicate it (TAF TSI Process)
- With whom do we want to communicate (TAF TSI Process)
- Where is the location we are talking about (TAF TSI Location Reference F.).

TAF TSI reduces IT complexity for single players:

- Who are my partners (TAF TSI Company Reference F.)
- Where (IT world) are my partners (TAF TSI Metadata)
- How to connect to my partner (TAF TSI Metadata)
- How to translate some existing messages (TAF TSI Metadata and Common Interface).

The TEN-T-funded Strategic European Deployment Plan for the implementation of TAF TSI (TAF SEDP) was developed by the rail sector in 2006-2007. The European Railway Agency has taken over the deliverables of this project which are now included in ERA Technical Documents (TDs) and are referred to in the annex to the Commission Regulation on TAF TSI as amended by Commission Regulation (EU) No 328/2012. Changes to these technical documents are managed by the European Railway Agency.

The target date for functional implementation, without the Train Identifiers (TID) is established during 2018. The target date corresponds to the end of calendar year, although some functions may come in earlier. Target dates were chosen if 80 percent or more of the respondents have indicated a final implementation. The target dates are based on the corresponding TAF-TSI function to be implemented.


---

16 Community transit is used for customs transit operations between the EU Member States and is in general applicable to the movement of non-Community goods for which customs duties and other charges at import are at stake, and of Community goods which between their point of departure and point of destination in the EU have to pass through the territory of a third country.
The transit regime in Europe requires the use of a New Computerised Transit System (NCTS). NCTS is a European wide system, based upon electronic declaration and processing designed to replace the paper based common transit system, providing better management and control of both Community and Common Transit. It involves all EU Member States and the EFTA countries. The NCTS solution in each country is connected to all other countries, using a central domain in Brussels, providing links between some 3,000 European customs offices and has replaced the paper-based system. In order to connect on-line with NCTS traders need the capacity to generate electronic transit messages and send and receive these messages to and from specific national NCTS solutions. Connected traders receive electronic responses advising of key decisions during the procedure, such as acceptance of declaration, release of goods and notification of discharge. It is usually not possible for traders to have a direct interface with NCTS. They are only able to exchange defined structured messages with the system.

**EU Border Crossing Practice**

A Border Crossing is a complex environment involving many actors. The consignor and the consignee, RUs, IMs, traction companies, customs, border police, other government agencies such as phyto-sanitary and sanitary authorities as well as authorities responsible for licenses and permits, among others. Actors in possession of wagons and actors responsible for maintenance of rolling stock may also be involved and these multiple actors often operate on both sides of the border. In the EU, practice varies depending on a number of factors, including but not limited to whether the BCP is between two Schengen states or not, whether customs procedures are harmonized or not, and to compatibility issues related to cross-acceptance of rail vehicles (traction and wagons), drivers licence, and other matters of interoperability. It is also important to keep in mind that detailed information required and/or available originates from actors often not present at the border crossing such as the consignor and the consignee. This information is sent to the lead RU and to other actors in the supply chain where the transport is initiated, making integration and forwarding of information a complex matter.

State-of-the-art border crossings have established a high level of mutual trust making it possible to work in cooperation and not to repeat tasks. Regional or bilateral rail agreements are important to facilitate trade and minimize costs. They require integrated processes and harmonized legislation as well as significant national and international investments in IT. Access to information is important but information quality is what really matters.

Figure 3 illustrates the parties involved and the required information flow. It visualizes back-office work at a central location using available information for risk analysis and administrative tasks as well as the back-office work done at the BCP. A number of technical solutions that identify, collect and guide the movements support the border processes. When an inspection or control is necessary technical solutions such as non-intrusive inspection techniques, solutions to discover technical malfunctions on vehicles, among others, assist the officers performing controls.

The information flow is global and relevant information is made available to actors at the BCP. For this to be possible information must be available in an electronic format and the legislation needs to be in place that requires compulsory electronic submission. Before the transport of goods is initiated, the participants must be able to find information about their obligations and be able to submit electronic applications for necessary licenses, permits and certificates. Information about obligations must be accessible in electronic form by using a Trade Information Portal (TIP). It must be possible to submit the transport order to the contracting party and to use this information throughout the transportation. As shown in Figure 3 this integration and transfer of
information is carried out between central systems of the involved actors. When transport arrives at the border, the actors present at the border access relevant information available in central systems of each party.

Figure 3 - State of the Art Rail Border Management

Note: ANPR=Automatic Number Plate Recognition, OSS = One Stop Shop, RID = Radio Isotope Detection, TMS = Traffic Management System.
Source: KGH Group AB.

23. A state-of-the-art border management is complex and can be implemented in different manners. It requires national and international cooperation and planning as well as standards and harmonized legislation to support and guide the implementation. It is characterized by these main principles:

- Trust between involved parties such as authorities, private sector, traders, operators often making it possible for one party to perform tasks on behalf of another;
- Solutions are designed for all modes of transport;
- Reduction in the number of tasks performed at the border crossing, for example by the introduction of authorization programs (Trusted Traders) and by moving activities from the border upstream;\(^{17}\)

\(^{17}\) The introduction of authorisation or accreditation programs (trusted traders) is one mechanism to address the challenges related to trade facilitation and security. The accreditation programs make use of the processes of the involved private sector actors since they are also interested in a safe supply chain. A secure and monitored supply chain will make it possible to manage movements in a more effective manner. A high level of trust has to be established between the actors involved for this to materialize.
• The flow of information between the owner of the information and the one requiring the information (not via someone else as this creates problem from a data protection point of view, commercially or legally);
• Data exchanged in line with international standards;
• IT solutions established at a national and international level and kept at a minimum at the BCP. The IT infrastructure at the BCP is more or less limited to personal computers, mobile solutions and technical equipment for track and trace solutions and solutions supporting technical controls;
• Single Windows ensure that information is submitted only once and then forwarded or shared with relevant parties;18 another feature of a Single Window is to enhance communication of decisions;
• Technical equipment standardized at a national or international level;
• Risk assessments and analysis used to avoid unnecessary controls (customs controls, customs clearance, technical controls, commercial controls among others); and
• The time required at the border is minimized using principles of One Stop Shop (OSS).

24. OSS in this context means a body that designs and allocates an international train path. The applicant receives all information, including the timetable, fees and technical parameters that enable one to use the path. Any applicant can purchase rail infrastructure border services—such as path, shunting, and communication—from infrastructure managers.19 The rules and regulations of the OSS are specified in a joint network statement, which can be an annex to the network statement required by Directive 2012/34/EU. The increased coordination of trains necessary for an international train path normally leads to reduced transit times.

25. To summarize, in an electronically integrated BCP border activities would be limited. Most activities would take place inside a country, be it in an inland terminal or in the offices of the shippers supported by the respective data centers to avoid unnecessary stops at the border. This requires a high level of mutual trust, electronic communication and associated technical hardware and software, open access to rail networks and other rail service facilities as required by EU legislation.

Technical Aspects of Information and Data Exchange

Railways

26. In this section, railways border-crossing procedures are described from a technical point of view to highlight current practices at EU rail BCPs. Compliance with existing legislation and the integrated procedures of private and public operators requires the support of a number of information exchanges. Information exchanges listed below though not exhaustive reveal the systems required to enable smooth processes and integration:

• Electronic Network statements
• Harmonised train composition
• TAF TSI

18 The single window principle for freight customs means that all customs services should be carried out by the customs authorities of both countries at one location in the Joint Border Zone.
19 An applicant in this context refers to a railway undertaking or an international grouping of railway undertakings or other persons or legal entities, shippers, freight forwarders and combined transport operators with a public service contract or commercial interest in procuring infrastructure capacity (including rail service facilities).
- TAP TSI
- Register of infrastructure
- Register of rolling stock (National Vehicle Registers)
- European Register of Authorised Vehicle Types
- Entity in Charge of Maintenance (ECM) with defined specific interchanges
- Reference files
  Unique locations and company reference IDs
- Train run information
  Train run forecast, train location information, service disruption
- Train preparation
  Train ready and train composition messages
- Infrastructure restrictions
  Existing infrastructure restrictions on the network
- Short-term Path Request
  Short-term path requests information flow between IMs and RUs.
- Consignment Order (Customer subset)
- Consignment Notes information

27. As highlighted in Box 1, TAF/TAP TSI is one of the most important frameworks that enable information exchange and the information exchange can be visualised in Figure 4. The figure shows how each party integrates their internal systems by using the Common Interface (CI) to connect and exchange information on the Internet Protocol (IP) network. In addition, actors like Raildata and RailNet Europe (RNE) are present with International Service Reliability (ISR), Open Railway Freight EDI User System (ORFEUS), Path Coordination System, (PCS), and Train Information System (TIS). Raildata is a UIC Special Group, providing common IT solutions to RUs covering 70 percent of rail freight transport in Europe, while RNE (RNE) is an association that was set up by a majority of European Rail infrastructure managers and allocation bodies to enable fast and easy access to European rail.

28. At present, most TAF/TAP TSI implementation across EU member states is partial, focusing mainly on messages in the Train Running\(^{20}\) and Path Request\(^{21}\) group of messages. Bilateral proprietary solutions and the use of a shared IT-solution are common ways to integrate partners. As a way to make solutions independent of technical equipment, TAF/TAP TSI has specified Train Running Information messages to update RUs and IMs about running trains. IMs are then updating RNE’s Train Information System (TIS) with real-time data concerning international passenger and freight trains.

29. Most European railway actors make use of extensive ICT support. Some processes are still manual, but commonly used ICT-solutions are used for scheduling, resource management, passenger and seat handling, wagons and vehicle registers, real time information about trains and train positions, train path allocation, consignment notes, licensing systems, train composition, reference data such as technical rules, and customs clearance communication. Track and tracing systems are in use and often specific to each RU while standardized message exchange (TAF/TAP TSI) ensures that incompatible positioning systems are not an issue. All of this

\(^{20}\) Information flow between during train run includes train run forecast, train location information and service disruption.

\(^{21}\) Information flow between IMs and RUs for short-term path requests.
highlights that it is a major undertaking to make railway information exchange electronic and this is ongoing work in most EU member states.

Figure 4 - TAF/TAP Peer-to-Peer Information Exchange

![Architecture Supporting Peer2Peer](image)

*Note: CA is certificate authority, PKI is public key infrastructure, and PCS is path coordination system. Source: KGH Group AB.*

30. Figure 5 provides an overview of the solutions that are in use at present. The green boxes are common solutions (and functions performed) that mainly exist to support the actors in international traffic, and the grey boxes are internal IT systems of the IM, RUs and authorities. The characteristics of internal systems may vary, but the functions needed are general. RUs and IMs IT solutions are often a mix of (a) internal solutions; (b) common solutions for shared information; (c) web-based solutions used manually; and (d) integrated solutions using standardized message interchange.

31. Internal RU and IM production systems can be made available to each other using TAF/TAP TSI and the Common Interface (Figure 6). The Common Interface may support various techniques to obtain access to legacy data from timetable systems and other production systems. Data is then pre-processed, normalized, translated and validated for further transmission on the data network as TAF/TAP TSI compliant data to be used by the receiving party.

32. UIC’s e-Rail Freight project and the Raildata implementation made with ORFEUS (Annex 3) are one of the most widespread approaches to exchanging information between European RUs. ORFEUS became the central element for the exchange of commercial data between co-operating European RUs. Raildata solutions are integrated with RNE TIS often considered as a frontrunner of TAF/TAP TSI. ORFEUS helps the rail sector to achieve the original target: run trains without a paper trail and ensure pre-arrival information in BCPs and logistics centers. E-Rail Freight focuses on replacement of paper transport documents with electronic information through the Electronic Consignment Note message (ECN), developed in cooperation between CIT (content

---

22 TAF/TAP architecture drawing: Peer2Peer communication and integration. RUs, IMs, as well as IT systems like ISR, ORFEUS, Reference Data/Meta Data among others are integrated through the CI-Common Interface implemented by each party.
definition) and Raildata (technical design). This ECN message and comprehensive ECN message exchange scenario are implemented through ORFEUS.\(^{23}\)

**Figure 5 - RU and IM ICT-solutions**

![RU and IM ICT-solutions diagram]

*Note: GOETHE is a wagon utilization system, ENEE are the UIC location codes (system), and RSRD is the rolling stock reference database. Source: KGH Group AB.*

**Figure 6 - TAF/TAP TSI Communication**

![TAF/TAP TSI Communication diagram]

*Source: KGH Group AB.*

---

\(^{23}\) Automated information is also used for the location and status of wagons, goods and traction. The objective is to monitor the running time of long-distance trains such as trains between Sweden and Italy. Various satellite (radio frequency identification data) or transponder solutions are used by wagon holders and RUs to render wagon use more efficient and optimize turnaround time. With the introduction of the General Contract on Use for Wagons (GCU) since 2006 wagon holders are responsible for the transport of their wagons on the networks. This also requires a monitoring system at BCPs to ensure that wagons are dispatched as quickly as possible.
**Customs**

33. Customs procedures at the border can be summarized as follows. Depending on the mode of transport a pre-arrival and pre-departure declaration is submitted by the party responsible for the transport, or his/her representative within a stipulated time before arrival at the border (for rail 2 hours); this applies for goods entering or leaving the EU. Risk analysis using the pre arrival and departure information is performed to identify consignments that need to be controlled. At the arrival of the goods at the border, the party responsible for the transport notifies Customs and presents the goods to Customs, who then declares a customs procedure such as transit, import, export or some special procedure. The customs declaration required for clearance can be submitted electronically or in hard copy, and risk assessments for fiscal purposes can be carried out. Goods are released when goods are present at the border and customs formalities has been finalized. This process exists in alternative flows depending on the status of the trader, the customs procedure in question, and mode of transport, among other factors. Other controls (phyto-sanitary, sanitary or radiology) can be performed by other agencies present at the border.

34. Exchange of information between customs authorities requires enabling national legislation and a regulatory framework. Often a Customs Mutual Assistance Agreement needs to be in place as well as subsequent agreements on data confidentiality detailing the type of information to be shared and in what manner. A coordinated border management agreement is one way to further enhance cross border cooperation. Customs often have extensive ICT solutions. Figure 7 presents a general customs ICT portfolio.

![Customs ICT portfolio](source: KGH Group AB)

**Border Police**

35. Systematic passport control at an internal border of the EU is subject to restrictive conditions under the Schengen Agreement—for example, danger of terrorism, hooliganisms, illegal migration flows or special events. To manage the risk of criminal activity between EU member states cooperation between police authorities has been strengthened and more focus has been given to monitor EU external borders. This way of working is at
present best practice and means that no passport controls within the Schengen space are carried out. Border police use of a number of intelligence sources and watch-lists established both at a national and international level, such as the Schengen Information System (Watch-list), Interpol/Europol (Watch-list), and national databases (Watch-list). Border police usually also have access to technical equipment such as passport readers and inspection equipment.

**Case Study 1: Norway/Sweden Rail BCPs**

36. The only theoretical difference comparing a BCP at the border of Norway and Sweden to the situation at Dimitrovgrad is that both Sweden and Norway are in the Schengen area so there is no interaction with border police. The border between Norway and Sweden is an external EU border within the Schengen area since Norway and Sweden are both in Schengen, but only Sweden is a part of the EU. The level of cooperation between both countries is high, with Swedish and Norwegian Customs cooperating since 1959, when the two countries signed an agreement where their respective Customs Administrations were empowered to perform customs control and clearance on behalf of each other.

37. For some BCPs Norway handles both export from EU and import into Norway and Sweden does the opposite. BCPs with lower volume of trade are manned with either Norwegian or Swedish Customs officers who have clearance and controls for both countries. For reasons of data privacy, a Swedish Customs officer working at a BCP manned with Swedish officers formally acts as a Norwegian Customs Officer when handling Norwegian tasks using the Norwegian IT system Twin. There is no connection between the IT systems of the two countries, except for the common database used for NCTS (transit declarations) and communication between the transport administrations. A train coming from Norway does not stop at the border, as all declarations for goods on board the train are submitted electronically without any supporting documentation. If a consignment is selected for control, the control is performed when the train stops at the first station in Sweden. The same circumstances apply for a train destined to Sweden. All information relating to a train is transmitted through a central system-to-system communication from the Swedish systems at the Swedish Transport Administration to the Norwegian Transport Administration and vice versa. The actual information, such as path request, is done electronically using a web-based solution, Pathfinder,24 or using a manual form submitted on the Swedish side to the Swedish Transport Administration. The only information carried by the train driver is the train wagon list and information regarding dangerous goods if any are on-board. There are no stops at the border for changing engine or for any technical inspections and the driver is licensed to drive on both sides of the border and takes the train to its final destination without any stops.25

**Case Study 2: Russian Federation/Finland BCP**

38. The Russian Federation-Finland border provides an example of a rail BCP between an EU and non-EU border, and a Schengen and non-Schengen area, as is the case in Dimitrovgrad. For illustrative purposes, the scenario is a Russian operator moving goods from Russia for further movement by the Finnish operator VR Transport (VR) at the Muslova/Vainikkala BCP. The trains from Russia to Finland originate from St. Petersburg rail yard where the train is composed, with the train stopping at Muslova rail yard before the border where

24 [http://www.trafikverket.se/PageFiles/157602/chapter_4_allocation_of_capacity.pdf](http://www.trafikverket.se/PageFiles/157602/chapter_4_allocation_of_capacity.pdf)

25 For passenger trains a similar approach is used except if there is any customs control of the passengers this is performed on the train while in motion where the officers embark the train at a railway station (with a scheduled stop) in Norway and disembark at a station (with a scheduled stop) in Sweden or vice versa.
Russian personnel prepare the documentation for border crossing. Russian Customs is working from Muslova on the Russian side. When the train leaves from Muslova Russian Customs goes to the border. The Russian RU will send electronic pre-notification to VR (usually already long before it leaves), including the wagon list, cargo, hazardous goods, and weight. Russian locomotives haul the train to Vainikkala on the Finnish side, where locomotives are changed—Russian locomotives cross the border in both directions, while Finnish locomotives never cross the border. Commercial and technical inspections are performed in Vainikkala, with Finnish Customs in Vainikkala responsible for customs clearance and controls.

39. In terms of systems, Finland and Russia are using the Russian system, RAJA, for information exchange at the border. When creating a train Russian RU will transfer information from their internal systems to RAJA, VR will take the train information from RAJA to their own internal system. All waybills are on paper, but will be submitted electronically in the future, while information about hazardous materials are planned to be harmonized by end 2015. Close-circuit television (CCTV) is deployed at the border crossing and the train composition is verified using the pre-notification information. All the information exchange is between RUs, with no information exchange between IMs other than that for signalling purposes. Information related to the goods is available electronically in the Russian and Finnish IT systems, which is a prerequisite for electronic exchange of data.

**Summing Up**

40. The experience from the case studies highlights that high levels of trust between involved parties creates opportunities for minimizing unnecessary controls and activities. Removing the need for a stop at the border is the most advanced solution. However, it requires open access to the national rail network and authorized procedures facilitating exchange of electronic information—no member state of SEETO is at a stage where this is feasible in the short-run. As an EU candidate country, Serbia needs to devise solutions for improving rail BCP performance that are in line with the EU *acquis* and EU legislation. Advanced state-of-the-art rail EDI in the EU requires investment in costly systems, with much of the communication taking place between central systems of neighbouring countries. It requires a high level of trust and the readiness to align national legislation and regulatory frameworks to the EU requirements. However, there are intermediate steps possible, in particular in the realm of electronic exchange of data that render feasible a significant reduction in border processing time, even without legal and regulatory changes. Its application would increase the competitiveness of rail in the South East Europe region.
Legal Framework

41. An Agreement on border control between Serbia and Bulgaria in the Dimitrovgrad Joint Border Station (Border Crossing Agreement; BCA) was signed on April 15, 2005 and has been in force since 2006. It introduced a zone in which the authorities of both states could jointly carry out controls and allowed Customs and border police of both countries to jointly check passengers on moving passenger trains. Bulgarian RUs are allowed to enter the border zone without requiring a Serbian licence, but need the permission of Serbian Railways, abolishing the border crossing monopoly of the Bulgarian and Serbian state railway undertakings. The agreement guarantees the freedom of organizing rail border procedures without using compulsory state RU procedures (technologia). Since the BCA was signed, Bulgaria has opened up its railways to private actors, but the existence of private rail companies is not reflected in the BCA, as at the time of signature there were only state rail companies.

42. The existing BCA between Serbia and Bulgaria does not fulfil the requirements of EU legislation, which have to be observed by all third countries having formally applied for membership to the EU via an association agreement. To be in conformity with the EU rail legislation, a BCA has to fulfil certain requirements set out in the EU Directive 2012/34/EU, in particular Art. 14.1:

- **Free access to the railway networks.** Although required by Serbia’s railway law, there is only free access to the zone in the BCP Dimitrovgrad. Bulgarian RUs—and Serbian RUs not belonging to Serbian Railways—are not allowed to enter into the Serbian rail network.

- **Independence of the infrastructure manager.** The Serbian infrastructure manager is not independent, since Serbian Railways is both the railway undertaking and infrastructure manager. However, the Government of Serbia is planning to break Serbian Railways into separate passenger, freight, infrastructure manager companies, as well as a holding company.

- **Existence of a charging scheme for network access and service facilities.** To date, no charging scheme for RUs exists in Serbia.

43. EU regulations currently in force demand One Stop Shop for infrastructure capacity. This means that request and answers relating to the use of railway infrastructure capacity along the international freight corridor must be supported. With OSS the customer goes to a single place to reserve capacity and a joint body takes care of the coordination. On the corridor section where Dimitrovgrad is situated, OSS has not yet been introduced.

44. Bulgarian Customs and border police are at present not operating in the Joint Border Zone at Dimitrovgrad. Bulgaria is in the process of entering the Schengen Agreement, which does not allow carrying out passport controls on non-Schengen territory. The Bulgarian border police is no longer allowed to work at the Dimitrovgrad BCP, which potentially contributes to increasing border-crossing time as it applies the Schengen Border Code EU Regulation 562/2006.
45. As an EU candidate country, Serbia is aligning its legislation to be in conformity with the EU acquis. Serbia’s Customs Administration is preparing to introduce NCTS and will join the Common Transit Convention on June 1, 2015. However, it is unlikely that NCTS will be used for international rail transport since under current EU legislation rail can use a simplified procedure—using only the CIM consignment note—and by doing this the requirement to furnish a guarantee, mandatory under NCTS, is waived. The use of simplified procedures for rail transit will be abolished with the new Union Customs Code (UCC) that will enter into force in May 2016, although transitional rules are likely to delay full implementation until at 2020.

46. The UCC and its implementing provisions cover all customs procedures in Bulgaria. The current code was written when paper documentation was the only way to communicate with customs and mandatory requirements to submit electronic declarations existed only for a few procedures such as pre arrival and pre departure declarations and export declarations, since pre departure data is submitted together with export data. On the other hand, simplifications such as the use of authorized consignor or consignee require mandatory electronic declarations. There is also EU legislation that supports the use of electronic signatures allowing customs declarations to be submitted electronically, but it is only when the UCC enter into force—again with transitional rules until 2020—that electronic submission of customs declarations will be made mandatory. The transitional rules, by means of implementing acts issued by the EC, have not yet been finalized. As a result, the actual date of electronic signature implementation for different types of declarations is not yet known.

47. The EU Data Privacy Act regulates EU information sharing and any bilateral agreements between EU member states and third countries on information sharing are subject to this act. An individual EU member state is restricted in what it can agree with non-EU member states. In order to exchange EU customs data with non-EU member states a Customs Mutual Assistance Agreement is required, however such agreements do not normally cover automatic sharing of data, but only sharing data upon request.

48. At present, it is not possible to submit electronic declarations to customs in Serbia. Paper declarations are submitted and data is keyed in by customs in their national IT system. As Serbia plans to accede to the NCTS on June 1, 2015, electronic submission of transit declarations must be supported; this is planned to be in operation on June 1, 2015 if an EU audit finds that all obligations are fulfilled. For other types of declarations, Serbia also prepares to make it possible to submit them electronically. To simplify customs procedures legal persons can apply for authorized economic operator (AEO) status both in Bulgaria and in Serbia. This status opens up the possibility for simplification of customs procedures and reduces the number of controls made by customs due to the lower risk such operators pose. At present, neither Bulgarian RUs nor Serbian Railways have such a status.

---

26. An authorized consignor/consignee is a trader authorized by the European Commission (Regulation 2454/93) to receive or dispatch consignments under transit procedures without having to present goods and documents directly at the customs office.

27. One of the main elements of the security amendment of the Community Customs Code (Regulation (EC) 648/2005) is the creation of the AEO concept. On the basis of Article 5a of the security amendments, Member States can grant the AEO status to any economic operator meeting the following common criteria: customs compliance, appropriate record-keeping, financial solvency and, where relevant, appropriate security and safety standards. The status of authorised economic operator granted by one Member State is recognised by the other Member States. This does not automatically allow AEO to benefit from simplifications provided for in the customs rules in the other Member States. However, other Member States should grant the use of simplifications to authorised economic operators if they meet specific requirements and without re-examining criteria that have been already checked. See: [http://ec.europa.eu/taxation_customs/customs/policy_issues/customs_security/aeo/index_en.htm](http://ec.europa.eu/taxation_customs/customs/policy_issues/customs_security/aeo/index_en.htm)
**Rail Border Crossing Parties**

49. Key parties at Dimitrovgrad BCP are the rail companies. Serbian Railways (Želzenice Srbije, ŽS) is the state-owned railways created on March 1, 2005; Serbian Railways is the only actor on the Serbian rail market. However, significant rail reforms are expected by end-2015, including the break-up of Serbian Railways into separate freight and passenger service companies, infrastructure manager, and holding company. Following reforms in 2002, Bulgaria has two state railway companies, a rail operator and an infrastructure manager. Rail operation was the responsibility of the Bulgarian Railway Operating Company (BDZ EAD) and infrastructure management was the responsibility of National Railway Infrastructure Company (NRIC). In 2007, BDZ EAD was reorganized as a holding structure with three subsidiaries established as legally independent companies along three separate lines of business: BDZ Passenger Transport, BDZ Cargo, and BDZ Traction. The reforms have led to the entry of private freight operators, most of them operate in Dimitrovgrad. One of them, the Bulgaria Railway Company (BRC) has its own dispatcher stationed there. Other actors are active in the BCP—these have been identified from field visits as well as from the border handover process defined in the BCA. Figure 8 presents the key parties in both Serbia and Bulgaria, while Table 1 provides details on the responsibilities of each party. A role that has no specific tasks defined in the BCA is the Station Master or Chief of Station, who is in charge of the railway station and is responsible for daily operations.

![Figure 8: Parties and Actors in Dimitrovgrad](source: KGK AB Global)

---

28 Bulgarian State Railway (BDZ), mentioned in the BCA is now the railway undertaking BDZ and NRIC is the infrastructure manager, due to the separation of infrastructure and operations in Bulgaria.
42. Preliminary discussions with stakeholders reveal diverse reactions to the proposal of a pilot EDI in Dimitrovgrad. The Serbian Ministry of Transportation, Construction, and Infrastructure and Serbian Railways are open for improvement and cooperative for a pilot funded by third parties, arguing that while they already have similar solutions in operation elsewhere—notably the Subotica BCP—they are interested in new ideas. Serbia’s Ministry of Finance and Customs Administration are introducing NCTS and have no existing data exchange with railways at present. Their views are general positive with regard to EDI, as this would facilitate the process, as Customs Administration cannot take part in EDI at present.

<table>
<thead>
<tr>
<th>BCP Stakeholder/Party</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serbian Customs</td>
<td>Managing Customs Clearance and Customs Border Control</td>
</tr>
<tr>
<td>Serbian Border Police</td>
<td>Managing passport controls and immigration issues</td>
</tr>
<tr>
<td>Serbian Railways Manoeuvre Workers</td>
<td>Managing operational switching and yard manoeuvres</td>
</tr>
<tr>
<td>Serbian Railways Storage Man</td>
<td>Making commercial train review and storage review</td>
</tr>
<tr>
<td>ŽS Foreman Shunter</td>
<td>Responsible for assembling of trains</td>
</tr>
<tr>
<td>Operator on ŽS Terminal</td>
<td>Managing handover to next IM</td>
</tr>
<tr>
<td>ŽS Internal Train Dispatcher</td>
<td>Responsible for internal dispatching at the railway station</td>
</tr>
<tr>
<td>ŽS External Train Dispatcher</td>
<td>Responsible for external dispatching on the rail network</td>
</tr>
<tr>
<td>ŽS Train Inspectors</td>
<td>Performing technical reviews of train</td>
</tr>
<tr>
<td>ŽS Machinist</td>
<td>Performing technical reviews of train</td>
</tr>
<tr>
<td>ŽS Checker</td>
<td>Responsible for train inventory</td>
</tr>
<tr>
<td>ŽS Rates Clerk</td>
<td>Responsible to calculate or initiate calculation of tariffs and duties</td>
</tr>
<tr>
<td>Bulgarian Customs</td>
<td>Managing Customs Clearance and Customs Border Control</td>
</tr>
<tr>
<td>Bulgarian Border Police</td>
<td>Managing passport controls and immigration issues</td>
</tr>
<tr>
<td>Inspector Services of Republic of Bulgaria</td>
<td>Planning and performing inspections</td>
</tr>
<tr>
<td>NRIC Train Dispatcher</td>
<td>Manage permissions and disposing of trains</td>
</tr>
<tr>
<td>BDZ EAD Train Inspectors</td>
<td>Performing technical reviews of train</td>
</tr>
<tr>
<td>BDZ EAD</td>
<td>Not applicable, has no value added tasks in the scenario described.</td>
</tr>
<tr>
<td>BDZ EAD Transport Commercialist</td>
<td>Commercial Train Review and managing documentation such as consignment notes and bill of lading</td>
</tr>
<tr>
<td>Train Driver</td>
<td>Driving locomotive</td>
</tr>
</tbody>
</table>

*Source: KGH Group AB.*

43. Bulgaria’s Ministry of Transport, Information Technology, and Communications is introducing a new Cargo Transport Management System that has the same objectives as the pilot, but at a national and international level. They support measures that improve railway competitiveness, but emphasize that speed and project results depend on financial resources. The Ministry of Finance and the National Customs Agency of Bulgaria have the necessary systems and interfaces for electronic exchange; the case needs to be made on what the additional gains from introducing a pilot solution at Dimitrovgrad are.

---

29 These views are not official views from the institutions in question, but reflect the views of officials met during the preparation of this Report.
BCP Processes

44. At Dimitrovgrad a number of formal activities are being conducted, such as export and import clearance, transit procedures, change of locomotives, technical inspection and brake tests, and commercial and technical handover of the train. These formal activities result in an average stop of about 5 hours for freight trains. During a field visit to the BCP it was observed that Serbian and Bulgarian RUs carry out jointly the handing over of trains, Serbian Railways is responsible for the path allocation on the Serbian rail network, while the Bulgarian RU contacts the Bulgarian IM (NRIC) for permission to enter into the Bulgarian rail network. Serbian Customs and border police carry out clearance of goods and persons. Bulgarian Customs and border Police are not present at the BCP.

45. A detailed process of work has been defined and agreed between the involved parties related to preparing for the arrival of a train, management of the actual arrival, train stop, and the departure—the BCP handover procedures. Annex 2 illustrates in detail the individual tasks and parties, each actor being assigned a task and a time slot to accomplish a given task involved in this process, assuming a scenario of an international transit freight train with cargo and empty wagons with mixed composition. The process can be divided into three main stages: (a) activities performed before arrival; (b) activities performed during train stop; and (c) activities performed at departure. Annex 2 details when activities are carried out (before, during train stop and departure) and the relation between activities in time.

Box 2: Handover Procedures at Dimitrovgrad Involving State Rail Undertakings

Before train arrival, the involved parties prepare for arrival. Activities such as clearing the track, preparing for activities performed during the train stop such as manoeuvres, commercial and technical controls and inspections as well as preparing for dispatching. Compared to the current situation, access to accurate information about the schedule and deviations from scheduled operations would benefit a number of actors preparing for arrival. Access to accurate information about the train would benefit preparation for train arrival. Information such as train composition, passengers and personnel, goods to be exported, transited, and imported among others, would speed up the train stop and would enable work before arrival and enable a verification focus during train stop.

During the train stop, a number of actors are involved in shunting, technical and commercial controls and inspections, receiving and managing documentation, validating seals, customs export declarations, and customs import declarations, border police migration controls, among others. Immediate access to all relevant documentation without faxing, copying, delivery, among others would facilitate working in parallel. Presently actors need to wait until paper documents are available. Access to electronic consignment notes would reduce the need for manual verification of train information. Technical solutions for technical controls would reduce the time or even eliminate these kind of controls and would increase the quality of these controls. Lastly, sending pre-arrival information to customs (export, import and transit) would allow the adoption of a risk-based approach and enable faster customs clearance and would facilitate identifying when controls are necessary.

Preparing for departure and final dispatch of the train include requesting permission to enter track, ensuring route protection, permissions, and dispatching. Access to permissions and dispatching information for all parties would reduce the number of interactions (phone among others) necessary at departure and speed up the process.

Source: KGH Group AB.

46. An analysis of the chosen scenario—a train arriving from Serbia—and the BCA shows that Serbian Railways begins to perform activities when train arrives, when these are completed Serbian Customs starts to perform their activities. Once Serbian Customs has cleared the exit by handing over the documents to the
commercial dispatcher of ŽS, the documents are handed over to the commercial dispatcher of the Bulgarian RU, who then prepares documents for Bulgarian Customs. Once the Bulgarian Customs have finalized entry documentation in Dragoman (Bulgaria) and informed the Bulgarian commercial dispatcher, the train is cleared for entering Bulgaria. Each party starts their work when the previous party has finished, but internally within each organization, activities are conducted in parallel, sometimes having access to paper documents, sometimes without access to paper documents. Box 2 assesses the handover procedure at each stage, assuming the Bulgarian state RU is active. This suggests that access to a consolidated view of what activities have been performed and cleared would make the final dispatching less error prone and would speed up the process. Planning for track access, locomotives, and personnel would benefit from access to schedules and resource planning information.

47. The private freight RUs operating in Bulgaria are not covered by the BCA/technologia and the process described above. The process of one of the private actors, BRC, is similar to the case of state RUs, but differs to some extent. BRC has its own representative at Dimitrovgrad who is in full electronic exchange with the main dispatcher of BRC and via e-mail communication with the Bulgarian infrastructure manager (NRIC) to apply for path allocations for trains leaving for Bulgaria. There is no electronic data transmission with Serbian Railways nor border authorities. For trains arriving from Serbia the main problem is communication: late information on train arrival time at Dimitrovgrad, the absence of electronic transmission of rail documents, and imprecise information when commercial dispatching by Serbian Customs is finished and the papers are handed over by the Serbian commercial dispatcher. The result is that BRC cannot apply on time for a path allocation with the NRIC, leading frequently to additional delays since the train cannot depart from Dimitrovgrad without path confirmation. Preliminary path reservation bears the risk that short-term cancellation might lead to penalties or BRC has to pay for the path as if it had used it (conditions in the network statement of NRIC). Total dispatching time averages 60 to 120 minutes. On the Bulgaria-Serbia route the main problem is communication but not as complex as in the Serbia-Bulgaria route. For example, the path allocation can be carried out on time since BRC has control over train movement. Although NRIC is about to introduce in 2015 a new SAP system for its management information system, this excludes communication with other infrastructure managers.

Technical Aspects of Information and Data Exchange

48. Information and data exchange between railway actors at the Border Crossing Zone is focused on three different data sets:

- **Track and trace information.** Information about estimated time of arrival as well as deviations from scheduled operations. For some trains the information is available to the Station Master, but it is not used for daily operations;

- **Consignment notes.** Documents prepared by a consignor and countersigned by the carrier containing information about the movement and the goods. Due to the large volume of transit at Dimitrovgrad, this information is received from other countries in paper format. Information in the CIM consignment note is in accordance with the CIT-CIM consignment note and includes information such as: consignor, consignee, goods information (harmonized system and description), destination or delivery point, commercial specification, freight rates and additional services levied by the RU, invoicing and payment

---

30 International Rail Transport Committee (CIT) CIM consignment forms can be found at [www.cit-rail.org/en/freight-traffic/forms/](http://www.cit-rail.org/en/freight-traffic/forms/)
instructions, customs movement reference number (MRN), and weights. Information is received from the
train driver and shared in sequence, handing over the documentation between different parties at the BCP.
Each actor then adds information to the consignment notes, such as additional rates for services at the
border, commercial and customs seals, K-200, among others. The present process has not yet taken into
account the interoperability requirements of TAF/TAP TSI regulations, which have not been implemented
in Serbia.

- Wagon lists. Information about the train and wagons is used at train handover to the next infrastructure
  manager using the K-2\textsuperscript{32} document and KOL-65\textsuperscript{33} document to hand over the wagons.

49. In the context of this Report, discussions have been held with RailNetEurope (RNE) concerning
TAF/TAP TSI information exchange from an infrastructure manager perspective. Some progress has been
achieved to date in the region, with neighbouring countries’ information exchange to some extent compatible,
exchanging Train Running Messages (using Train Information System) and Path Requests (using the Path
Coordination System). Relevant data is collected from the Infrastructure Managers Systems. Train Composition
Messages in compliance with TAF/TAP TSI are not commonly implemented in the region, still being paper
based or implemented in a proprietary fashion.

50. Sharing of information using EDI requires access to electronic information and a regulatory framework
to share and transfer information. In order to understand EDI options, it is important to first understand the
existing systems of each stakeholder. Earlier studies (SEETO 2009) described communication across BCPs as
being limited to telephones, faxes, and e-mails, as well as manual copying of documentation, which is not the
case at present. Serbian and Bulgarian parties have central IT systems in operation, some of which are available
to Dimitrovgrad personnel. Table 2 summarizes the ICT solutions currently being used by different parties.
Some of the differences reflect the factor that Bulgaria is an EU member state. Thus, electronic submission of
customs declarations is different when goods enter Bulgaria (EU member state) or enter Serbia (EU non-member
state). It is not possible to submit electronic declarations to Serbian Customs. As mentioned previously, systems
are under development starting with transit (NCTS) and later followed by import and export. Some types of
electronic declarations can be submitted electronically to Bulgarian Customs like pre arrival and pre departure
declarations and transit declarations in NCTS.

\textsuperscript{31} Wagon List
\textsuperscript{32} Bill Of Lading
\textsuperscript{33} Exit List
Table 2: Existing ICT Solutions in Dimitrovgrad

<table>
<thead>
<tr>
<th>Stakeholder/Actor</th>
<th>Existing ICT solutions Serbia</th>
<th>Existing ICT solutions Bulgaria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customs</td>
<td>A national transit, import and export system is in operation. Submission of electronic declarations is not supported. Serbian Customs are working to introduce NCTS as required by the EU acquis. Electronic transmission of information is not yet planned.</td>
<td>NCTS is in operation and supports electronic declarations. Electronic information is not exchanged with Serbia or Serbian Customs in Dimitrovgrad. National transit needs to be manually started using NCTS for goods arriving from Serbia.</td>
</tr>
<tr>
<td>Border Police</td>
<td>Border police have access to national and international systems containing intelligence information and watch lists. Mobile equipment to read and check passports, compare with watch lists and intelligence information is being introduced in Serbia, but is not yet available in Dimitrovgrad BCP. Border police have technical inspection equipment, such as cameras, among others.</td>
<td>There is no need of electronic information from other actors, since Bulgarian border police at the rail BCP is connected electronically with the road BCP and via its HQ in Sofia with Interpol and via Interpol again with the Serbian HQ in Belgrade. Technology such as passport readers, among others is used.</td>
</tr>
<tr>
<td>Infrastructure Manager</td>
<td>IT system available in Dimitrovgrad used to report arrival of train and to prepare and print an agreed document numbered KOL-65 paper document to hand over to Bulgarian counterparts.</td>
<td>No IT system in use in Dimitrovgrad BCP.</td>
</tr>
<tr>
<td>Railway undertaking</td>
<td>IT system to handle train position and estimated time of arrival is operational and available to the Station Master. IT system to manage consignment notes is in operation in Serbia, but only used for transport coming from the north (Subotica BCP), once the train has been handed over to ZS. Information is sent from the central system of the Hungarian RU arriving at Subotica and further processed by central systems of ZS. Users access to this system is available at Dimitrovgrad but can only be used for trains coming from north. Only the Station Master has access to the system/information and paper documents are still necessary if the train goes to other countries. According to Serbian Railways, the consignment note information and estimated time of arrival information can be made available for all actors in Dimitrovgrad using the RU Extranet/Internet. This would make it possible for Customs and other actors to prepare and work in advance to train stopping. Serbian Railways is a member of Raildata and HitRail, making EDI integration possible with other RUs and IMs. The central systems of Serbian Railways already exchange information with other actors and they are prepared to exchange information with new RU/IMs. TAF/TAP TSI is supported up to the level supported by RailData solutions. Integration with State Consignment notes are exchanged on paper and no IT systems are used in Dimitrovgrad BCP. BDZ is developing a new Cargo Transport Management System and the first module is planned to be implemented in the near future. This will only be used for internal management of cargo and transports. A module to be implemented by the end of 2015 to allow data exchange with other RUs (Hungary, Czech Republic, Slovakia), but not with Serbia, is included. Electronic exchange of data with NCTS will also be implemented in Module 2. Future implementation of the new system in Dimitrovgrad is dependent on funding.</td>
<td></td>
</tr>
</tbody>
</table>

34 This started in Subotica because it is a key BCP for the so-called block trains Sopron – Turkey.

35 As soon as other RUs are prepared to exchange structured information (EDI) Serbian Railways’ solutions (TAF/TAP TSI and RailData compliant) and other TAF/TAP TSI compliant implementations can be used to reduce the amount of manual work.
Hungarian and Slovenian RUs are already in operation, but not with Bulgarian RUs.

Due to Raildata, RU has access to the following EDI systems:
- ORFEUS (Open Railway Freight EDI System) – Consignment note CIM data exchange
- ISR (International Service Reliability) – Wagon movement and status reporting
- Use IT (Uniform System for European Intermodal Tracking and tracing)

The new Cargo Transport Management System will replace a number of systems used at present:
- Wagon Fleet Management System
- Tariffing/pricing System
- Consignment note tariffing and invoice system
- Cargo Statistics system
- Received consignment notes system
- Foreign wagons accounting system
- Bulgarian wagons accounting system
- Revenue system
- Ferry wagon system
- Wagon maintenance system (keeping track of maintenance operations and forecasting) and wagon repair system
- Personnel management system
- Accounting system

Other systems exist and a lack of integration regarding these has been identified as a problem. The purpose of the new system is compliance with EU regulations, to allow exchange of information with Customs and other government agencies as well as to manage a mix of electronic and paper consignment notes.

An IT system for the issuance of tickets for international traffic is used for passenger trains.

Annual time schedule is published on its website.

Train composition and changes to train composition announced to Serbian counterparts via email.

Private
Bulgarian Railways Company (BRC) is one of the private companies operating in Bulgaria having a market share in freight of 20%. The Dispatcher at Dimitrovgrad is in full electronic exchange with main Dispatcher of BRC. Path allocation is made sending e-mails to the Bulgarian infrastructure manager (NRIC).

Shared/General
At Dimitrovgrad network and Internet is available and shared. IT infrastructure that is used includes network, computers, printers, and internet (the latter appears to be slow and at times unreliable).

Source: KGH Group AB.

Overall Assessment

51. Earlier studies have concluded that the top four reasons for delays at the BCP of Dimitrovgrad are due to late arrival of locomotive, radiological control, customs and personnel (shunting and station personnel). These can be addressed by access to and use of information that will assist in planning and parallel operations, which will reduce the border crossing time. Dimitrovgrad station personnel have confirmed the relevance of the findings from the SEETO 2009 study—the majority of delays are caused by late arrival of locomotive and various controls. The reasons for possible delays found in the exchange of information include: (a) sequential processes/workflow, Customs receive documents after RU and IM have completed processing documents; and (b) personnel making technical and commercial controls (breaks, seals among others) do not have information from consignments notes available. The latter make notes that later need to be verified by operators at the terminal. The main advantage of an EDI solution is that actors would have access to necessary information when needed, enabling work in parallel and reducing BCP lead times.
An assessment of the current situation in Dimitrovgrad reveals that processes are more or less paper based. Some basic IT exists that supports specific tasks as described, but in general electronic information is not available, while central IT systems exists and are being developed. The key observations are as follows:

- **No advance train arrival information and paper based workflow and processes.** The workflow and processes are manual and work cannot begin before the actual arrival of the train. The documentation accompanies the train and the locomotive driver hands over paper documents at arrival and the same papers need to accompany the departing train. Documents received—such as the wagon lists, consignment notes and commercial and customs seals—must be validated and verified at arrival at the train stop, affecting stoppage time. When all procedures are finalized, documents are signed and stamped to confirm compliance before being handed over to the next party.

The current approach and lack of pre-arrival information do not allow for any preparations or work to begin before train arrival. Tasks are initiated when documents are available to each party and tasks are performed in a sequence following the paper documents. When one actor finishes the documents are-handed over to the next party in line, limiting parallel work. At train arrival the engine is disconnected before the locomotive change track to be able to drive close to the station building. After that when documents are handed over to station personnel the operators start processing. Technical reviews (break tests among others) and commercial reviews (checking seals among others) are carried out in parallel, but without access to documents. Access to pre arrival information in case of special treatments transporting hazardous would reduce lead times.

Only the Station Master has access to an IT application with information about train arrival from Serbian network. For certain trains information about number of wagons, weight and consignment notes is also available. Other parties like Customs, border police, Bulgarian rail actors would benefit from accessing access this information. Information about trains arriving from Bulgaria is not available in electronic form at the BCP.

- **Customs IT system available at the BCP.** Serbian National Transit, Import and Export systems are in use at BCP. Electronic submission of documents is not possible at present though systems are under development. Since the consignment note information often originates from a RU further away than Serbia or Bulgaria, consignment note information is generally not available in electronic structured form making electronic transfer of data to customs a challenge. Transport originating from North of Serbia (Subotica) already use electronic consignment notes and this information could be used to transfer relevant documentation to customs. Customs IT systems presently accepts electronic information only for some types of declarations.

Introduction of NCTS in Serbia and further development of central integration to submit NCTS messages is a positive step, with transitional rules is likely to be fully implemented only 2020. Meanwhile, Bulgarian border police and Customs have IT systems and technical tools, but these are not operational at the Dimitrovgrad BCP since the parties are not present.

- **IT equipment and internet connection available at the BCP.** Internet and a few computers are available at the BCP. The number of computers is limited and the capacity of the internet connection is reportedly low and unreliable.
• **Focus on freight movements to have maximum benefits.** The number of passenger trains passing Dimitrovgrad is few compared to the number of cargo trains. Border police do not express any interest in access to passenger lists among others, prior to arrival. The ICT hardware and ICT infrastructure requirements are covered by solutions proposed for freight. Taking all this into account the focus should be on freight, where the impact is greatest.

• **Train inspection reporting.** Train inspections are performed without access to train documentation and reporting is paper based.

• **Seal verification.** Rail yard personnel perform seal verification without access to train documents and reporting is paper-based. When station personnel verify compliance, there are risks of mistakes and redundant work stemming from the need to verify seals again.

• **Level of trust between actors.** The level of trust among the parties is low. This is reflected in the controls made by different authorities a number of times during a run. Communication and cooperation supported by legislation and mutual agreements need to be actively promoted to increase understanding and the level of trust between the actors in the rail corridor.

• **Other government agencies.** Interaction with other government authorities (OGA) usually involved in import and export procedures is rare in Dimitrovgrad since the main freight flow is transit. Transit does not require to the same extent as import and export the involvement of agricultural and phyto-sanitary administrations, and EDI with these parties must be seen as out of the scope of a local pilot.

• **Track access charges.** Serbia has not implemented track access charges in the Serbian rail network. For this reason, no charges are levied if trains stand at Dimitrovgrad longer than the allocated path allows them to. It is therefore cheaper for the Bulgarian RUs to wait at Dimitrovgrad free of track reservation charges than moving the already dispatch train to Dragoman and pay charges while waiting for the Bulgarian IM to allocate a path for them.

53. Corridor electronic data transmission is standard on EU international train paths, with standards to facilitate such integration defined and a legal and regulatory framework supportive of such an approach. Nevertheless, a number of potential obstacles to introducing EDI in Dimitrovgrad have been identified:

• **Interest in participating in pilot.** The desire to take part in a pilot is an important factor and the interest varies among parties concerned;

• **Structured electronic information.** Information about track and trace, consignment notes, and wagon lists is not available in electronic structured form. Manual input of information for electronic exchange is likely to extend lead times and be counterproductive. As manual data entry is not an option, another way is to make sure that information is available to central systems of concerned parties and to make EDI integration at a national and international level. This long-term task is ongoing in both countries concerned;\(^\text{36}\)

\(^{36}\) Paper documents would be needed at upcoming stops and a local pilot cannot remove tasks like stamping and signing documents.
<table>
<thead>
<tr>
<th>Area</th>
<th>Assessment and Recommendation</th>
</tr>
</thead>
</table>
| Track and trace information | Track and trace information is not available for all trains and IT systems to present information are not available to all actors/parties at the BCP.  
**Recommendation:**  
Give all parties access to track and trace information to assist planning and preparations. |

| Transport and consignment information | RUs  
- Electronic consignment information is not available for all consignments.  
- IT systems are not available to all RU actors at the BCP.  
IM:  
- IT systems to transfer wagon list information are not available.  
Customs:  
- Electronic Customs Declarations (transit) is not available in advance/pre-arrival.  
- Electronic Consignment and Wagon list information is not available to key in Customs Declaration on behalf of RU.  
Border Police:  
- Have no needs of transport/consignment information or passenger information.  
Other Government Agencies (OGAs):  
- Controls made by OGAs are to be seen as an exception. EDI with these parties must be considered as a future development. IT systems are not available.  
Electronic pre-arrival information from the OGAs could sometimes save physical controls.  
**Recommendation:**  
Electronic consignment information and wagon list are by far the most important issues from a BCP lead time perspective. Access to this information for RUs and Customs—in the form of a Customs Declaration—is the highest priority from an EDI and BCP lead time perspective. Giving Bulgarian RUs access to information earlier makes it possible to submit Entry Summary Declarations earlier, which has potential to reduce lead time.37 |

| Technical and commercial controls | Technical and commercial controls are done without any consignment information making the reporting of technical and commercial controls an issue. As the seals, and wagon numbers are not available to be verified in the rail yard they are noted on paper and back at the office these are validated with the consignment information. In case of deviations there is a need to verify that the information received on paper is correct.  
Technical solutions used are far from best practice, but technical controls are seldom the reason for delays and would be expensive to address, as this would require technical equipment to be installed on rolling stock. Having mobile access to electronic information would mean that technical and commercial controls could be done in the field.  
**Recommendation:**  
Give access to electronic consignment information to yard personnel making it possible to verify correctness of seals and wagon numbers, instead of just reporting to office personnel for them to do the verification. |

| Technical equipment ant IT network | Lack of reliable internet connection results in having to re-enter and re-submit information which affect BCP lead times and delays.  
**Recommendation:**  
Upgrade Internet connection and upgrade Service Level Agreements (SLA). |

*Source: KGH Group AB.*

---

37 Entry Summary Declaration are electronic messages that must be sent to Customs a certain time before entering or leaving the EU.

29
• **Standardized technical infrastructure (national/company level).** Investments in technical equipment to support track and trace, hot-box detection among others, in a limited pilot is not economically feasible due to the size of the rolling stock—the number of trains and wagons that would need to adopt the technology would be too high. Introducing this kind of technical equipment is something that needs to be planned and managed at a national, international, or company level and not at the level of a single BCP;

• **Simplified transit and NCTS.** Electronic NCTS declaration is supported in Bulgaria, but is not used since simplified transit using CIM (non-electronic) can be used without a financial guarantee as required by NCTS. It will be difficult to convince RUs to use NCTS before it is mandatory due to the cost of guarantees.

54. As mentioned previously, an earlier study recommended the establishment of electronic data exchange between two BCPs, connecting all personnel at one BCP to a single solution. There are a number of issues with this recommendation. Firstly, data protection legislation will be a challenge since the party forwarding information is not the owner of the information. Secondly, the recommendation is not in line with TAF TSI specifications and the proposed solution would need to be abandoned in case of EU accession. Thirdly, if further liberalization of railways takes place, actors will probably not accept a solution like this, as they have already invested in TAF TSI compliant solutions and would like to reuse their solutions in South East Europe.

**Recommendations**

55. A best practice BCP limits the number of activities carried out at the BCP. At a BCP like Dimitrovgrad, where usually no change of train composition is required, this can be taken as far as removing the need to stop at the BCP and subsequently the need of personnel at the BCP (passenger traffic excluded). This is the situation described in the the Swedish-Norwegian border case study. This requires a high level of trust, electronic communication, technical equipment, certification programs as well as open access to the railway networks. An EDI solution compliant with all the requirements of EU legislation and all the operational requirements from actors involved is a major undertaking. It is out of the scope of a pilot project in a single BCP as it would involve many actors and stakeholders both at a national and international level.

56. However, in the short-term Dimitrovgrad should keep existing procedures, but provide access to more advanced real-time information. This cannot always be done using EDI, as information will not be available in electronic form, as the sender and the receiver of such information do not have defined EDI interfaces. However, other kinds of information technology (IT) can be used to give earlier access to information to support working in parallel, as opposed to the current situation of sequential work. The short-term operationalization of the recommendations proposed should be governed by the following principles: (a) re-use existing solutions if possible, which can be as simple as sharing user interfaces with other authorized parties; (b) whenever possible TAF/TAP TSI messages must be used; (c) focus on solutions that affect BCP lead time; (d) focus on stakeholders that need to be convinced that EDI may be beneficial, including decision makers (political and management) and operational personnel; and (e) focus on highest volume scenarios which are freight transit.

---

38 SEETO (2009), Electronic data interchange (EDI) systems, Specific Project Result No.8.
39 Option 3 does not require joint tasks carried out by parties from Serbia and Bulgaria, but working in parallel requires coordination to know what each party is doing and when.
57. From a BCP lead time perspective, the recommendation is that the pilot should focus on the following (numbers indicate priority): (i) freight trains; (ii) establishing reliable internet connection; (iii) providing RU access to consignment note and wagon list information to complete railway and customs formalities; (iv) providing access to track and trace information (arrival time) since it will enable preparations for arrival and work to be done in advance and keep manual coordination between parties (using telephone) to a minimum; and (v) provide mobile access to consignment information in order to support technical and commercial controls.
OPTIONS ANALYSIS

Introduction

58. Advanced electronic data interchange (EDI) integration requires major investments to central ICT solutions of each party and should be focused not on an individual border crossing point (BCP), but all BCPs between two neighboring countries, or better still, with a focus on a rail corridor, in order to improve performance along the entire corridor. One poorly performing BCP has knock-on effects throughout the entire rail corridor, potentially undermining its competitiveness vis-à-vis other competing rail corridors or road transportation. This suggests the need to develop coordinated EDI solutions across key Pan-European rail corridors, in order to make international rail freight flows easier to manage and to ensure that border delays in one BCP do not pose negative externalities for other countries along the corridor. Such an approach requires national and international planning and coordination to be feasible, and changes to legislation and the regulatory framework, as well as amending border-crossing agreements. This is an ambitious, but long-term objective for Corridor X.

59. There have many initiatives launched in the last five year to improve the electronic data interchange in South East Europe, mostly in the road sector or in the EU member states when it comes to rail. Their results are yet to be seen at Dimitrovgrad rail BCP, where the processes still are mostly manual using paper documentation in a sequential mode. As the objective of this report is to develop a pilot BCP solution for Dimitrovgrad that could potentially also serve as a template for other BCPs in South East Europe the focus is on assessing short-term solutions, by adopting a solution to reduce BCP lead times by enabling parallel work that speeds up processes.

60. It would be counterproductive to introduce a parallel solution that would compete with long-term solutions that under development at present. A number of ongoing initiatives have been identified, but probably more initiatives are ongoing that must be supported and governed by national and international parties and such initiatives must be supported and promoted. These include, but are not limited to the following:

- **Serbian Railways Raildata and TAF/TAP TSI implementation.** Already operational at the northern borders of Serbia and can be further used to reduce manual work at other BCPs. These solutions would require other RUs to be willing to exchange information.40

- **Introduction of NCTS and customs e-declarations by Serbia’s Customs Administration.** NCTS will enable streamlined transit movements and electronic information to Customs, while e-declarations will introduce the possibility of submitting customs declarations electronically. At present, it is only applied for the road.

- **Bulgarian Cargo Transport Management System.** This is a management and resource planning system that will replace a number of existing systems and allow the exchange of electronic information.

---

40 TAF/TAP TSI, Hermes, Raildata or by other means.
• **Bulgaria implementation of TAF/TAP TSI.** Bulgaria is starting TAF TSI implementation with the frontrunner application RNE Train Information System (TIS). TIS delivers real time train data concerning international passenger and freight trains.

• **Bulgaria Customs e-customs solutions.** These are already operational and an important part of the overall EDI solution.

• **Private sector initiative.** Ongoing private RU initiatives to manage track and trace and consignment note information as well as Customs communication.

61. Fully automated electronic management of documentation of a railway corridor requires the conditions set out in Table 4 to be fulfilled in all countries that are traversed. When internal IT systems of each party are operational, an obvious next step will be to start sharing information using TAF/TAP TSI standards and Customs interfaces as well as interfaces with other government authorities. These requirements can only be met in the long-term, but any short-term solution proposed should have the long-term goal in mind in order to avoid investments that are not compatible with the longer term goals.

<table>
<thead>
<tr>
<th>Party</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure managers</td>
<td>Internal automated systems made available to RUs by using EDI interfaces as defined by TAF/TAP TSI. Integration with every RU using the infrastructure is necessary.</td>
</tr>
<tr>
<td>Railway undertakings</td>
<td>Internal automated systems made available to other RUs by using EDI interfaces as defined by TAF/TAP TSI. Integration with every RU using the infrastructure is necessary.</td>
</tr>
<tr>
<td>Customs</td>
<td>Customs Declaration Systems made available to RUs by exposing EDI interfaces as defined by Customs legislation and frameworks. Integration with every RU (national and international) that is supposed to submit/exchange information.</td>
</tr>
<tr>
<td>Border police</td>
<td>N/A (in Serbia and Bulgaria).</td>
</tr>
<tr>
<td>Other government agencies (OGA)</td>
<td>OGA systems made available to RUs by using EDI interfaces as defined by their needs and frameworks. Integration with every RU (national and international) that are supposed to exchange information.</td>
</tr>
<tr>
<td>Shippers or freight forwarders</td>
<td>Needs to integrate to the lead RU in a manner defined by the lead RU.</td>
</tr>
</tbody>
</table>

Source: KGH Group AB.

62. This chapter reviews the processes and requirements to support parallel workflows in Dimitrovgrad, as well as the information and data exchange requirements needed. It then presents alternative options for introducing new ICT and technical solutions on a pilot basis in a single BCP. It concludes with a recommendation on the proposed option that can be considered a short-term solution to improve performance at Dimitrovgrad. An indicative economic assessment is provided to support the decision to invest in this solution, as well as detailing required regulatory and legal changes if any, cost of procuring and installing the recommended EDI technology, as well as estimated annual operating and maintenance costs.
Processes, Information, and Data Exchange Requirements

63. Processes in Dimitrovgrad are currently executed in sequence. The processes start when paper documentation is received from the locomotive driver and each party waits for this to reach them before they can start their actions. At the end of the process, paper documents are handed over to the locomotive driver that will take them and the train back on route again. If work could be done in parallel—as illustrated in Figure 9—it would represent a genuine improvement when compared to current practice. Incoming documentation must be available to all actors to enable parallel workflows, and when this is the case technical train reviews can be performed in parallel with commercial train reviews and customs formalities can be initiated instead of waiting for commercial procedures to take place first. The train driver will still need all paper documents to be stamped and signed before the train can depart, since all paper documents are required at upcoming stops. This implies that all paper documents still need to pass all actors for signatures and stamps, but at that time all formalities can be already finalized using information available in electronic format.

Figure 9 – Schematic Representation of Parallel Workflows

Source: KGH Group AB.

64. Border Police have a limited need for electronic information at present—although they would benefit from train pre-arrival notification—as they still need to control all passports and already have access to the information they need when making controls. Serbia’s Customs Administration is not ready to receive electronic information at present. Meanwhile, Bulgarian Customs are ready to receive electronic information but the cost
of financial guarantees required when using NCTS makes it less interesting for RUs to submit electronic information. However, as with the Border Police, customs controls would be expected to benefit from train pre-arrival notification. To make parallel workflows possible the estimated arrival time, consignment notes and wagon list information (transport/train and cargo) must be available to all actors at the same time, when the train arrives, or even better, before the train arrives. The pilot solution must focus on providing access to information at train arrival or whenever possible before arrival. IT requirements to support parallel workflows have been identified and are presented in Table 5, while Table 6 presents specific information exchange requirements that the options need to satisfy.

Table 5: Key Requirements of the Rail EDI Solution

<table>
<thead>
<tr>
<th>FURPS+ Classification**</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>(F)unctionality</td>
<td>1. Provide access to Consignment Note/Wagon list information to conduct railway and customs procedures, by (a) providing access to already existing electronic consignment notes; (b) supporting management of paper consignment notes; and (c) supporting viewing information but still paper documents have to be stamped and signed to be used at next station.</td>
</tr>
<tr>
<td></td>
<td>2. Provide access to Train Tracking/Track and Trace information, including: (a) access to existing electronic information (existing Serbian web solution); and (b) manual entry by dispatcher when signal is given (replacing current procedure using telephone)</td>
</tr>
<tr>
<td></td>
<td>3. Support commercial and technical controls and reporting of controls by (a) providing access to consignment information using mobile equipment; and (b) submitting outcomes of technical and commercial controls</td>
</tr>
<tr>
<td></td>
<td>4. Ensure that unauthorized access to data is not possible</td>
</tr>
<tr>
<td></td>
<td>5. Provide an audit trail of system execution (log) to verify who has done what.</td>
</tr>
<tr>
<td></td>
<td>6. Provide printouts.</td>
</tr>
<tr>
<td>(U)sability</td>
<td>7. The solutions must not require more than one day of training to start operation.</td>
</tr>
<tr>
<td>(R)eliability</td>
<td>8. 24/7 access to information and systems, including reliable internet connection.</td>
</tr>
<tr>
<td>(P)erformance</td>
<td>9. Solutions must be efficient from a cost perspective.</td>
</tr>
<tr>
<td>(S)upportability</td>
<td>10. All user deliverables must be available in Serbian.</td>
</tr>
<tr>
<td></td>
<td>11. All user deliverables must be available in Bulgarian.</td>
</tr>
<tr>
<td></td>
<td>12. All deliverables must be available in English.</td>
</tr>
</tbody>
</table>

Source: KGH Group AB.

Table 6: Specific Information Exchange Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Specifics</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. RU and IM information exchange</td>
<td>• Train number</td>
</tr>
<tr>
<td></td>
<td>• Number of traction unit</td>
</tr>
<tr>
<td></td>
<td>• Wagon List</td>
</tr>
<tr>
<td></td>
<td>• Operational data of the train (length, weight)</td>
</tr>
<tr>
<td></td>
<td>• Time schedule (planned/requested)</td>
</tr>
<tr>
<td></td>
<td>• Special handling of wagons</td>
</tr>
<tr>
<td></td>
<td>• Dangerous goods and extraordinary loads</td>
</tr>
<tr>
<td></td>
<td>• Action train path (delays)</td>
</tr>
<tr>
<td>14.</td>
<td>• Train number</td>
</tr>
</tbody>
</table>

---

41 The costs of guarantees, as described earlier, and the fact that EDI interfaces do not always exist to submit consignment information in the form of declarations to Customs and other authorities makes requirements to be able to submit electronic information to these parties less important in the short-term. However, giving all parties access to information supporting parallel workflows may assist and speed up procedures.

42 FURPS is an acronym representing a model for classifying software quality attributes (functional and non-functional requirements).
ICT and Technical Options

65. Four alternative options have been considered to improve the exchange of data between parties at the Dimitrovgrad BCP, including the option of not introducing any new ICT and technical solutions in the short-term, focusing instead on long-term solutions. As stated earlier, international best practice is integration through exchange of data between systems deployed centrally in bordering countries. There is no doubt that this is the future of railway integration. As previously described this has already started and must be continued. One example is Serbian Railways’ use of TAF/TAP TSI and Raildata solutions for transports originating from the north (Subotica). As soon as more RUs are prepared to exchange structured information (EDI), this can be further extended.

66. To be able to do a first assessment of available options the ICT principle “reuse-buy-build” is valid. The principle suggests: (a) reuse: If reuse and further development of existing solution is possible, this is often the best option; (b) buy: If commercial off-the-shelf (COTS) products exist on the market, the second best option is to buy or at least evaluate the possibility of using already existing software. This option requires integration work and sometimes modifications of existing products; and (c) build: If no other options exist, the last option is to develop new software.

67. With the above principles in mind, the following options have been identified and are further investigated:

---

There are options: direct links (information transfer from customs to customs) or indirect links (information transfer from trader to customs). However only the indirect link is an option when the BCP is between an EU and non-EU member state in order to avoid complex data protection issues.
• Option 1: No pilot solution
• Option 2: Use ICT solutions available in the market
• Option 3: Use existing solutions, electronic information and document scanning
• Option 4: Develop a local EDI solution

Key questions are (a) who will be the ‘owner’ of the pilot; (b) who will be responsible for maintenance and operations or solutions proposed; and (c) how will costs of software and hardware be split. This is of particular relevance to Options 2, 3, and 4 since the solution is to be shared between private and public parties.

Option 1: Do Nothing

68. Option 1 is the do nothing option, with no short-term pilot solution introduced, but instead policymakers focus on supporting long-term initiatives. This option means no new pilot applications or infrastructure would be introduced in Dimitrovgrad.

Option 2: Use ICT Solutions Available on the Market

69. Raildata is the international organization of European Cargo Railway Undertakings, established as a special group of the International Union of Railways (UIC). The main purpose of Raildata is to design, develop and run IT services to support the freight railway business of its members. On the European market, Raildata is a solution with widespread usage, having about 17 RUs as members and about ten of them use the services ORFEUS and UseIT to exchange consignment note and wagon list information. Currently four main applications are operational:

• ORFEUS (Open Rail Freight EDI User System): Consignment note CIM data exchange
• ISR (International Service Reliability): Wagon movement and status reporting
• Use IT (Uniform System for European Intermodal Tracking and Tracing): Intermodal trains status reporting
• WMI (Web Manual Input): Web interface to participate in a common pre-arrival exchange.

Applications Use IT and WMI are integrated with the ISR application. Further details concerning Raildata can be found in Annex 3.

70. Raildata solutions are already in use by Serbian Railways in Subotica, this development was largely driven by the use of this system in Hungary—introduction of Raildata in the Subotica BCP was important to reduce handover time. The situation in Dimitrovgrad is different, as Bulgaria is not at present using Raildata. A pilot implementation of Raildata in Dimitrovgrad would ensure that all information at the pilot BCP would be available in electronic form. A reason to have it available in electronic form is if there are further investments in automation and EDI. This option must be considered a temporary one and will be redundant when long-term corridor-wide solutions are implemented. Using this option requires integration of existing structured data available for each RU and IM, otherwise manual inputting of information will be necessary for each consignment, which would be counterproductive.
Consignment notes that are already available in ORFEUS and in UseIT/ISR may be reused in a BCP pilot installation. In cases where integration and use of existing electronic information is not possible the WMI system of Raildata—community cloud for data capturing—can be used to capture consignment note information and track and trace information. This would need to be done manually by the parties at the BCP and then made available to other parties using the ORFEUS, ISR, Use IT and WMI system. Manual input is time consuming and affects BCP lead times, and must be factored in as it could potentially go against the target of reducing border handover times. At present, electronic information is available for rail transport originating from the north—from the start of Corridor X and up to Subotica in the north of Serbia—and this could be made available using Raildata web interfaces to parties in Dimitrograd. Bulgaria’s BDZ EAD is a UIC member and Raildata is open to all UIC members, making it possible to use Raildata solutions either as local BCP or as central solution. It is important to remember that when a train departs paper documents needs to accompany the train to be used at upcoming stops as long as the pilot solution is not implemented at every train stop and BCP along the rail corridor.

Figure 10 - Rail Data Architecture: Pilot Scope

Note; IS RU is the information System of Railway Undertakings, Lusis Paris is the physical location in Paris for central Raildata services, and Hermes VPN is Hermes Virtual Private Network. Source: KGH Group AB.

For the short-term, the Raildata option with a pilot scope would be used to capture information already available and to support entering and sharing information. This means that Raildata option would be used as a local system, except for the integration with already existing Raildata solutions. The Raildata option does not include a mobile solution to support information access for technical and commercial controls and reporting which must be added. The interface for the RU's would be the same, regardless of how the information initially was made available (scanned or available as structured information). Electronic integration would be possible when electronic consignment note information is available and when authorities are in a position to exchange information—issues previously described such as cost of using guarantees would hamper integration with Customs. No significant regulatory or legal changes are foreseen, but only minor adjustments of infrastructure,

44 Hermes VPN is a pan-European, secure, and fully managed IP network interconnecting European railway companies and applications. For further information see www.hitrail.com.
including the installation of software and hardware and minor activity adjustments like manual entry of information as well as starting to work on new electronic information, as well as minor adjustments. One of the advantages of this option is that Raildata would be used both for electronic information and for information keyed in manually and facilitate future integration with all members of RailData as well as others using Raildata support for TAF TSI.

Figure 11: Schematic Representation of Option 2

73. Concretely, the Raildata option requires that Raildata applications be installed on BCP Server, with input terminals to enter information from paper documents (Consignment notes, wagon lists etc) and inspection devices to assist technical controls. RU and IM servers need to be integrated using Raildata internal communication or TAF/TAP TSI integration. If authorities and other government agencies (OGA) were in position to receive electronic data (EDI) this would be possible thanks to the availability of structured electronic data. A mobile control solution would provide access to consignment note and wagon list information using mobile equipment, and a mobile solution to assist technical and commercial controls would need to be developed and integrated with the Raildata solutions. The mobile solution then gives access to relevant information and function to report results of technical controls using a tablet.

74. Option 2 requires national investments in central systems and infrastructure supporting automatic transfer of data or the use of the Web Manual Input (community cloud) for exchange of data. Investments in BCP local infrastructure, such as extended network and Internet access as well as a rail yard Wi-Fi solution to support mobile access (controls) is required. Investments in Internet reliability are required. No new technical solutions, such as hotbox detection or track and trace solutions are required.
Option 3: Use Existing Solutions, Electronic Information and Document Scanning

75. This option makes use of already existing electronic consignment notes and wagon information available in the central system of the RU, which can be electronically received at the BCP. When the information is not available in electronic format existing paper documents arriving with the locomotive driver would be scanned and made available to all actors at the same time using electronic based workflows, enabling parallel workflows regardless of how information is initially received. When electronic consignment notes are available, as for the movements coming from the north, the information available in the Serbian central systems, already Raildata integrated, can be shared to all participants making scanning of paper documents redundant. The presentation of information to end users would be equivalent regardless of how information was made available—scanned or available as structured information—using a portal concept, an electronic gateway unifying the information received electronically from the central systems of the RUs and others or from scanners in order to process them.

Figure 12 – Schematic Representation of Option 3

Source: KGH Group AB.

76. The portal concept will align existing user interfaces—consignment notes, wagon lists, and track and trace information—of all actors together with scanned document information. Manual workflows such as technical controls would be supported by access to different kinds of documentation and information using mobile equipment such as tablets. This type of application/portal will not require access to local mobile app frameworks and the recommendation is a HTML5 portal to make mobile and desktop access flexible. Electronic integration with Customs would be possible when electronic consignment note information is available, but is deemed to be too ambitious for a pilot as it would require changes at a national and international level or be too expensive for the RUs. No regulatory or legal changes are foreseen with Option 3.
As illustrated in Figure 12, Option 3 involves BCP input solutions and a BCP server with a portal solution to present consignment notes, wagon lists, track and trace information, among others using existing web applications available at Serbian Railways using the portal solution. A scanner and scanner application is necessary in order to scan paper docs when these are not available in electronic format. It also includes existing electronic information (structured) available at Serbian Railways and possibly other RUs/IMs that are willing to make user/web interfaces presenting consignment notes, wagon lists, track and trace, etc. Lastly, it requires terminals and devices—including inspection devices and applications to assist technical controls—so that all parties involved at the BCP can access information simultaneously and work in parallel. This option requires three types of software applications:

- **Scanner application:** Application to scan and support definition of flexible workflows for each stakeholder using general Electronic Content Management (ECM) Software together with Document Scan and Indexing Solutions.\(^{45}\)

- **Consignment note and wagon list information application:** Consignment note information—originating from north routes entering through Subotica—exists in Serbian Railways’ central systems (TAF/TAP TSI and Raildata) and can be made available to Dimitrovgrad actors (RU, IM, Customs and Border Police) using the current intranet application used at Serbian Railways.\(^{46}\) Actors could then work more in parallel and it would also be possible to integrate the NCTS system of Serbia when operational. Information not available in electronic form would be scanned. As soon as other RUs are prepared to exchange structured information (EDI) the Serbian Railways solution (TAF/TAP TSI and Raildata compliant) and other TAF/TAP TSI compliant implementations can be used to reduce the need for manual scanning and manual processing based on information available in the portal concept (web portal).

- **Mobile control solution:** Provide access to scanned and/or structured consignment note and wagon list information using mobile equipment. The content management solution proposed for the scanner application needs to support feeding back information from commercial and technical controls. The mobile solution then gives access to relevant information and function to report results of technical controls using tablets.

The technical infrastructure and hardware to support Option 3 include scanners, servers, data storage solutions, tablets, and a Wi-Fi solution covering rail yard needs, as well as investments to improve internet reliability.

**Option 4: Develop a Local EDI Solution**

Option 4 is the development of a tailor made local EDI pilot solution for Dimitrovgrad. In this scenario, RUs would need to make investments to integrate into the BCP solution. Solutions to automate RU handover procedures would be a major investment and would not manage consignments without electronic information, requiring manual entry. Option 4 is the same as Option 2, except that it

\(^{45}\) A number of ECM and scanning software exists on the market that scan, identify and classify information as well as initiate defined workflows for each stakeholder, such as Microsoft Share Point, Alfresco ECM, PSIGEN Capture, and ORION ScanIT.

\(^{46}\) When the pilot project is concluded a reassessment of availability of electronic consignment notes, wagon lists, and track and trace information would need to be made to minimize the need of scanning paper documents.
would not use an ICT solution available in the market but would build one from scratch. This option is less attractive, as it does not support ongoing initiatives, including use of Raildata by Serbian Railways, and because a corridor level approach suggests the need to take existing ICT solutions currently in use in Europe or build a custom solution for the international rail freight corridor, as opposed to one BCP along the corridor.

Assessment of Options

79. In the long-term a well-integrated solution compliant with EU regulations that uses technical equipment and exchanges data in a standardized fashion with other countries and across an entire rail corridor is crucial, in order to reduce border crossing times. What is proposed as a short-term solution needs to keep this fact in mind support this long-term objective.

80. Table 7 lists for Options 2, 3, and 4 the advantages and the disadvantages of each of the solutions proposed. All three options meet the requirements specified in Table 5 and Table 6. The options presented are not foreseen to require legal changes for the introduction of a pilot, but they would require revisions to the Dimitrovgrad BCA.

81. As stated previously, Option 2 (Raildata) is already in use by Serbian Railways in Subotica as well as by other railway companies in Europe as one approach to be TAF/TAP TSI compliant and in a position to exchange electronic messages and information. The only reason to adopt Option 2 at a local BCP pilot is to have all data available in electronic form for all trains accessing to Dimitrovgrad. To ensure this is the case requires manual input of data as well as EDI integration of actors, which makes this option costly and time-consuming. One of the issues with Option 2 is that ongoing initiatives create a situation where parties are not interested in making parallel investments with authorities who are not ready to exchange electronic information. Only when legislation makes it mandatory to exchange electronic information will actors invest in central IT systems that can receive electronic information do Option 2 and Option 4 represent a genuine advantage over Option 3.

82. Option 2 also creates risks related to the introduction of new tasks, resulting in longer lead times, since the time to key in information will be longer than the time to scan paper documents. This would be counterproductive as the objective of the pilot in Dimitrovgrad is to reduce time spent at the BCP. Option 2 is more complex to introduce at a BCP as it requires central IT departments to forward already existing information. Option 4 suffers from similar shortcomings, but it is less attractive as an option as it requires building a customized EDI solution for one BCP, when an alternative system, Raildata, is already in use in Subotica—the customized solution is more costly. The long-term solution may require a customized EDI solution, but at the level of the rail corridor as opposed to one BCP, to make the costs of integration for the different actors worthwhile.

83. Option 3 is adapted to the present situation, it does not require major investments, nor does it compete with ongoing long-term initiatives. While this option means that Dimitrovgrad BCP will continue to work with unstructured information, it will reduce BCP lead times by allowing border handover procedures to be conducted in parallel, as opposed to sequentially. Option 3 represents a quick time to market solution, having the same short-term effects/benefits as other options, at the lowest price level. As long-term solution already exists and are being developed in Serbia and Bulgaria. Option 3 is the only short-term/ pilot solution that the project can recommend. Long-term solutions covering all BCPs and trains along the corridor need to continued and
coordinated to make rail Corridor X competitive vis-à-vis other rail corridors and against road and short-sea transportation. A broader assessment of ongoing long-term initiatives, to assess and ensure full coordination of all parties involved in the railway corridors traversing South East Europe, involving private rail actors, also appears necessary.

Table 7: Advantages and Disadvantages of Each Option

<table>
<thead>
<tr>
<th>Option</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| Option 2\(^\text{47}\) | - Reuse existing structured data  
- Requires deploying an existing solution in combination with development/reuse, a balanced approach  
- May be further developed into a long-time solution if ongoing initiatives do not succeed  
- Low risk as it use an existing solution already in operation. | - Creates a “digital island” that need integration with all parties involved  
- Manual input of data is needed and may result in longer lead times for some trains  
- Requires RU to invest in integration software to make sense, but might be seen as in conflict with long-term initiatives of each RU  
- Costly to introduce  
- Advanced and will require training  
- Works well at Serbian BCPs having access to Raildata information but might work less well in other countries if Raildata information is not available (more manual entry).  
- Limited to freight trains |
| Option 3 | - Reuse of already existing data/information  
- Uses existing solution in combination with development/reuse, a balanced approach  
- No new/extra tasks introduced (photocopying documents would be replaced by scanning)  
- Low risk using existing solutions  
- High level of control (not depending on external factors)  
- Works on all trains (also passenger trains) | - Could be perceived as a low technology solution (scanned paper documents used in combination with existing user interfaces) with limited impact and would require active buy-in from all actors at the BCP to shorten BCP lead times. |
| Option 4 | - Has the potential to be a long-term solution deployed centrally if ongoing initiatives run into problems. | - Competes with ongoing initiatives.  
- Creates a “new digital island” that need integration with all parties involved.  
- RUs might not be interested in investments required to integrate with this short-term solution.  
- Development of a new solution carries more risks and is more expensive. Any positive impacts may not be reached, if not implemented at many BCPs to justify the investment costs. |

Source: KGH Group AB.

\(^{47}\) Costs estimates from Raildata have not been possible to obtain, although costs may be lowered due to the fact that Serbian Railways already uses Raildata in Subotica.
Table 8: Comparisons of Options

<table>
<thead>
<tr>
<th></th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
<th>Option 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>No pilot solution</td>
<td>Use ICT solutions already available on the market</td>
<td>Use existing solutions, electronic information and document scanning</td>
<td>Develop local EDI solution</td>
</tr>
<tr>
<td><strong>Legal</strong></td>
<td>N/A</td>
<td>BCA does not need to be amended. Subsequent agreement may be required among the stakeholders (RU/IM/Customs).</td>
<td>BCA does not need to be amended. Subsequent agreement may be required among the stakeholders (RU/IM/Customs).</td>
<td>BCA does not need to be amended. Subsequent agreement may be required among the stakeholders (RU/IM/Customs).</td>
</tr>
<tr>
<td><strong>Introduced</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Investment</strong></td>
<td>N/A</td>
<td>150,000</td>
<td>106,500</td>
<td>Customized solution more expensive than off the shelf Option 2</td>
</tr>
<tr>
<td><strong>Cost (Euro)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Annual</strong></td>
<td>N/A</td>
<td>43,140</td>
<td>32,525</td>
<td>N/A, but likely to be similar to Option 2</td>
</tr>
<tr>
<td><strong>Cost</strong> (Euro)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Integration</strong></td>
<td>N/A</td>
<td>High since the option is based on BCP local solution.</td>
<td>None since Serbian railways could already display existing information via internet/intranet</td>
<td>High since the option is based on BCP local solution.</td>
</tr>
<tr>
<td><strong>costs</strong> (RU/IM)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td>N/A</td>
<td>Mobile Control Solutions can be used with long-term options.</td>
<td>Mobile Control Solutions can be used with long-term options and document scanning can be used until all IM/RUs are integrated.</td>
<td>Mobile Control Solutions can be used with long term options.</td>
</tr>
<tr>
<td><strong>Source</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: KGH Group AB.

42. Table 8 compares the four options along several dimensions, although a comparison of time-savings between the four options is intentionally absent. Manual key-in of information—if the pilot solution is not integrated with RU and IM information systems—will reduce time savings, making Options 2 and Option 4 generate time-savings that may not be significantly higher than Option 3, while requiring integration of RU and IM systems, which will result in additional integration costs. For these and other reasons, time-saving and cost saving comparisons must be handled with care—the differences in time savings between Options 2, 3, and 4 could be insignificant. On the other hand, if all parties are interested in integration and integration is successful, further automation can be done and time saved at the border could be much larger as would happen with full implementation of the long-term TAF TSI compliant solutions. Automation using technical equipment and EDI can result in up to 70 minutes reduction of time—compared to estimated time-savings of 35 minutes under Option 3—leaving only time for physical manoeuvres and dispatching. 48

---

48 Additional technical, administrative, and legislative (open access) changes can remove the task of changing locomotive and drivers, technical inspections (by applying mutual trust agreements –already existing in EU border crossings, which in the long-term can even remove the need to stop at the border leading to in reality zero minutes of dispatching time.
43. No regulatory or legal changes are required for Option 3. The BCA (Art. 5) already renders possible the introduction of new telecommunication equipment. Option 3 is a shared solution of all involved participants in the pilot and its management—the development, operations and maintenance of the hardware and software—requires subsequent agreement among the participants of the test.

44. Estimates from previous studies suggest that the introduction of EDI can reduce BCP lead times by 70 percent. However, this assumes state of the art EDI with highly automated procedures combined with the use of sophisticated technical equipment, such as hotbox detectors for example, removing the need for manual controls. This is the target for the long-term solution, but such reductions in lead times cannot be achieved with Option 3. At present, the main processes are performed in sequence even if some sub activities/tasks are done in parallel. Gains in lead times will occur when main activities are performed in a parallel mode. A conservative approach to estimating likely lead time reduction is adopted, in order to not create unrealistic expectations for the short-term pilot. According to the BCA, border procedures take 170 minutes—although some earlier studies suggested that in practice this could be as high as five hours—while the target is 135 minutes, a gain of 35 minutes. Table 9 provides a breakdown of current and projected lead times and an explanation of changes, while Figure 13 presents graphically the difference between the current and projected scenario. The pilot as such will not remove the need for performing the same manual activities that are currently performed, nor will it speed up each activity performed, but performing them in parallel will reduce lead times.

45. To convert the estimated time savings—35 minutes per train—into a quantitative economic benefit, it is assumed that each day of reduced travel time is worth 1 percent of the value of goods transported. The value of good transported is assumed to be Euro 12,000 per wagon, with a typical train composed of 20 wagons, suggesting a value of good transported of Euro 240,000 per train. The time savings are equal to 1 percent of the value of goods transported times the reduction in lead time divided by 24 hours, comes to an economic benefit of Euro 58 per train. Assuming four trains per day passing by Dimitrovgrad this translates into an annual economic benefit of Euro 85,167.

46. Assuming a reliable internet connection the recommendation is to use a cloud setup to host the proposed software and hardware. No new servers are installed at the BCP, instead they are accessed in the cloud using Internet. The concept is known as Cloud Virtual Private Server and requires only desktop and mobile equipment at the BCP. Extensions of the pilot to other BCPs would be cost effective. Table 10 provides procurement and installation indicative cost estimates for the hardware and software. The price of the equipment, infrastructure and software may differ depending on the specific products selected. Cost estimates are based on a virtual server running Linux and a High Level Service Level Agreement Level. Maintenance costs are estimates to be equal to 25 percent of all investments (Euro 106,500) covers licence costs as well the monthly costs of the virtual server and internet connection (Table 11) or Euro 32,265 per year. The return of investment is likely to take 1 to 2 years, and with a 12 percent discount rate, the NPV over a four-year period is Euro 99,224.

Euro 12,000 times 20 wagons 0.01 value times 35 minutes divided by 1440 minutes (24 hours) comes to Euro 58 per train. If this is multiplied by 4 to account for four trains a day and then by 365 days, the annual benefit is Euro 85,167.
Table 9: Border Lead Times: at Present and with Option 3

<table>
<thead>
<tr>
<th>Actor</th>
<th>Current Situation</th>
<th>Projected Situation with Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serbian Railways</td>
<td>Present: 40 minutes</td>
<td>Target: 35 minutes</td>
</tr>
<tr>
<td></td>
<td>Many actors are involved and having access to documents may result in a slightly</td>
<td>The proposed solutions are less error prone and the timesaving could be substantially more for some</td>
</tr>
<tr>
<td></td>
<td>shorter process (photocopying of documents done at present will be exchanged with</td>
<td>trains. An example is when seals are checked without access to paper documents. When notes of the</td>
</tr>
<tr>
<td></td>
<td>scanning documents and electronic distribution to other parties).</td>
<td>control are checked at the station and found not to be in line with documentation the wagons need to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>be re-examined which is time consuming. Access to mobile solution and information will make it</td>
</tr>
<tr>
<td></td>
<td></td>
<td>possible to verify while inspecting.</td>
</tr>
<tr>
<td>Serbian Customs</td>
<td>Present: 20 minutes</td>
<td>Target: 10 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Customs work could commence 20 minutes earlier with access to information. Overlaps for verification,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>stamping and signatures will be necessary.</td>
</tr>
<tr>
<td>Bulgarian RU</td>
<td>Present: 20 minutes</td>
<td>Target: 0 minutes</td>
</tr>
<tr>
<td></td>
<td>Need to submit Entry Summary Declaration. This is not part of the BCA/“technologia”</td>
<td>Would be done in parallel with Serbian Customs.</td>
</tr>
<tr>
<td></td>
<td>at present (legal requirements introduced in EU 2010).</td>
<td></td>
</tr>
<tr>
<td>Bulgarian rail technical inspector services</td>
<td>Present: 20 minutes</td>
<td>Target: 20 minutes</td>
</tr>
<tr>
<td>Bulgarian Customs</td>
<td>Present: 50 minutes</td>
<td>Target: 50 minutes</td>
</tr>
<tr>
<td></td>
<td>A train is not allowed to enter EU/Bulgaria earlier than 2 hours after Entry</td>
<td>Activities can begin in parallel with Serbian Customs, but this would require single window</td>
</tr>
<tr>
<td></td>
<td>Summary Declaration submission. This sometimes leads to longer BCP lead times than</td>
<td></td>
</tr>
<tr>
<td></td>
<td>specified.</td>
<td>arrangement, which will be difficult as long as Bulgarian Customs is not active on Serbian</td>
</tr>
<tr>
<td></td>
<td></td>
<td>territory.</td>
</tr>
<tr>
<td>Bulgarian Customs controls</td>
<td>Present: 10 minutes.</td>
<td>Target: 10 minutes</td>
</tr>
<tr>
<td></td>
<td>Checking of seals.</td>
<td>Less error prone (see Serbian Railways above).</td>
</tr>
<tr>
<td>Train permission and paper document</td>
<td>Present: 10 minutes</td>
<td>Target: 10 minutes</td>
</tr>
<tr>
<td>handover</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: KGH Group AB.
**Table 10: Procurement and Installation Indicative Cost Estimates**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit Price (Euro)</th>
<th>Number of Units</th>
<th>Total Cost (Euro)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Costs are operation costs</td>
</tr>
<tr>
<td>Desktop clients</td>
<td>500</td>
<td>20</td>
<td>10,000</td>
<td>Number of clients/desk computers are estimated based on the number of actors present in Dimitrovgrad. The estimate assumes 20 clients and the setup is a desk computer and necessary peripherals.</td>
</tr>
<tr>
<td>Production Scanner</td>
<td>4,000</td>
<td>2</td>
<td>8,000</td>
<td>Enterprise class scanner</td>
</tr>
<tr>
<td>Tablet Clients</td>
<td>500</td>
<td>6</td>
<td>3,000</td>
<td></td>
</tr>
<tr>
<td>Wi-Fi</td>
<td>30,000</td>
<td>1</td>
<td>30,000</td>
<td>Wi-Fi controllers, access points, switches and cables for building and rail yard coverage</td>
</tr>
<tr>
<td><strong>Software Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Scanner Application</td>
<td>2,500</td>
<td>1</td>
<td>2,500</td>
<td>Scanner software (validation, indexing, release to Content Management System)</td>
</tr>
<tr>
<td>(b) Consignment note and Wagon List information</td>
<td>10,000</td>
<td>1</td>
<td>10,000</td>
<td>Server license</td>
</tr>
<tr>
<td>Application: Content Management System</td>
<td>3,000</td>
<td>1</td>
<td>3,000</td>
<td>Client license for 20 users</td>
</tr>
<tr>
<td>(c) Mobile Control Solution:</td>
<td></td>
<td></td>
<td>20,000</td>
<td>Mobile extension for consignment note and wagon lists and reporting workflow; 200 hours at Euro 100 per hour</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>106,500</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Source: KGH Group AB.*

**Figure 13: Dimitrovgrad BCP Lead Times**

![Figure 13: Dimitrovgrad BCP Lead Times](image)

*Source: KGH Group AB.*

42. It is considered unlikely that a single party is interested in taking responsibility for solutions and even more unlikely that a single party is interested in financing proposed solutions. The project recommends
sponsorship by an international financial institution and that a single contractor manages the development, operation and maintenance of the pilot. The development and implementation of the proposed short-term solution could be fast—the work plan below provides initial project planning. The pilot will commence by the development of a solution to reuse existing information and to scan consignment notes. The solution will also provide track and trace information and distribute this information to relevant parties. The information will be made available at the offices of each party (to view or print). The project recommends developing a mobile solution as a next step after a successful initial implementation to support technical and commercial controls. Annex 4 presents a number if work packages or phases for the development of the solution.\(^\text{50}\)

Table 11: Operating Costs

<table>
<thead>
<tr>
<th>Cost</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet connection</td>
<td>As a reference a reliable High Speed Internet connection is about Euro 50 per month</td>
</tr>
<tr>
<td>Service and support</td>
<td>Included in maintenance costs and service level agreement</td>
</tr>
</tbody>
</table>

Source: KGH Group AB.

Table 12: Net Benefits of Option 3 (Euros)

<table>
<thead>
<tr>
<th></th>
<th>Implementation year</th>
<th>Running year 1</th>
<th>Running year 2</th>
<th>Running year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAPEX</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial investment</td>
<td>-106,500</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>OPEX</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yearly benefits</td>
<td>85,167</td>
<td>85,167</td>
<td>85,167</td>
<td>85,167</td>
</tr>
<tr>
<td>Depreciation (4yrs)</td>
<td>-26,625</td>
<td>-26,625</td>
<td>-26,625</td>
<td>-26,625</td>
</tr>
<tr>
<td>Annual operating costs</td>
<td>-5,640</td>
<td>-32,625</td>
<td>-32,625</td>
<td>-32,625</td>
</tr>
<tr>
<td>Undiscounted net result</td>
<td>52,902</td>
<td>25,917</td>
<td>25,917</td>
<td>25,917</td>
</tr>
</tbody>
</table>

Source: KGH Group AB.

Conclusion

43. This Report argues that the development of a pilot solution for one BCP—Dimitrovgrad has been analyzed but the solution proposed is applicable to other BCPs in South East Europe—has to reduce long lead times at the border taking into account the readiness of involved parties to exchange electronic information. It is important to emphasize that the selected BCP is only one BCP in an international railway corridor and that paper documentation will still be required for other BCPs along the corridor. The pilot solution also has to ensure that no new operational tasks are introduced which could result in longer lead times. Lastly, it needs to be borne in

\(^{50}\) The work packages aims to describe how development and implementation can be set up. The tasks specified in each work package are not exhaustive.
mind that parties active in Dimitrovgrad may be hesitant to finance investments to address the situation at one BCP, when overall performance is a result of the situation in all rail BCPs in one country or the BCPs along the entire international railway corridor.

44. Four different solutions were identified to provide a short-term solution that could be implemented quickly, assuming there is buy-in from concerned parties in Serbia and Bulgaria. One option (Option 1), was a conservative do nothing option, with no short-term pilot solution—with a view to focusing on ongoing initiatives for a long-term solution—and the other three options (Option 2-4) presented three short-term pilot alternatives; from reuse of existing solutions to the development of a tailor made solution. The intention of the EU legal and regulatory framework, including the TAF/TAP TSI regulation, is that each party needs to be responsible for their own part of electronic integration. This means that all parties need to invest in their own solutions which then need to be integrated with other parties in order to be able to exchange electronic information. Parties are likely to do this if they can use their solution at as many BCPs as possible and willingness to make integration investments for a BCP local pilot is considered low. For this reason, a local BCP pilot is considered a low-cost, short-term, quick-time-to-market solution addressing long BCP lead times that could garner support from the relevant stakeholders.

45. Taking the present situation into account the project recommends a short-term solution that reuses existing solutions available on the market to integrate these into a BCP local web portal that can be used by all parties at the BCP. The solution reuses existing information giving actors immediate access to necessary information to support parallel workflows speeding up border procedures. The solution proposed, Option 3, can work even when not all information will be available in electronic and structured format. The project sees it as the only feasible option for a pilot addressing the present situation. Option 2 and Option 4 could result either in longer BCP lead times or in high integration costs as long as they are not introduced in the totality of the corridor or region. These latter options are likely to be questioned by the parties concerned due to the high integration cost for one BCP.

46. The preliminary cost analysis suggests benefits exceed costs and a potential reduction of border crossing times for Option 3. The estimated cost of the pilot, at a little over Euro 100,000, is small compared to the cost of rehabilitating and upgrading one kilometre of rail track to 160 km/hr and this could readily be a component of a international financial institution financed rail project. Taking this and other factors into consideration the recommendation is to invest in a short-term pilot at Dimitrovgrad. In parallel, other obstacles (such as availability of locomotives, access charges etc.) affecting BCP lead times, but not related to electronic data interchange, must be addressed in parallel.

47. It is equally important not to lose sight of developing electronic data exchange solutions on an international rail corridor or regional level, compliant with TAF/TAP TSI. This would make the long-term solutions more financially attractive. The application of the recommended Option 3 would not be an obstacle to the development in parallel over the medium to long-term of a corridor level or regional level EDI solution. If a decision is made to introduce a BCP local pilot it is important that the pilot short-term solution does not compete with already operational solutions and ongoing initiatives—Option 3 does not raise these issues. If implemented, it would be necessary to closely monitor the effects of the local pilot, before considering extending this approach to other BCPs in the region.

48. At present, there are two major activities in South East Europe that are dealing with border crossing issues. The first is the Regional Transport Study (REBIS update) being developed for South East Europe
Transport Observatory (SEETO) members—this is financed by the EU through the Western Balkan Infrastructure Framework and managed by the World Bank—aims to develop a Priority Action Plan for enhancing the efficiency of the infrastructure of the network, identifying infrastructure and non-physical improvements. The second is an EU financed study to support the implementation of the strategic work programme of SEETO. This second study will also develop an Action Plan for road, rail and ports, proposing short-term actions to improve border crossing performance in the region. The first draft of the Action Plan will be presented to the SEETO Steering Committee, DG Move and DG Near in 2015 and this is expected to be endorsed by SEETO ministers. Inclusion of the proposed pilot EDI for Dimitrovgrad in such an Action Plan could create the political commitment and momentum to translate this idea into a solution that has the political backing necessary for implementation.

Recommendations

49. With the above in mind, the Report makes the following recommendations:

- Ongoing public and private initiatives to implement rail EDI in Serbia and Bulgaria are further supported and promoted as these will provide a long-term solution that will considerably reduce lead times at all BCPs in both countries. Investment in a short-term pilot solution would improve BCP performance in Dimitrovgrad until long-term solutions are operational.

- Consideration is given to making a wider assessment of the generic situation in South East Europe in order to support ongoing initiatives in an optimal way. This should be done in close cooperation with international institutions such as RailNetEurope, SEETO, and the EC in order to focus on coordination of efforts and to adopt an international rail freight corridor perspective.

- Implementation of Option 3 on a pilot basis. It is the short-term pilot solution providing all actors access to information in electronic form by reuse of existing information such as scanned paper documents and structured data. The information that is required is electronic consignment notes, wagon lists as well as track and trace data. IT infrastructure and software needs to be procured and installed to enable electronic information access. The procurement and use of other technologies supporting commercial and technical controls—track and trace, hot box detection, among others—must be standardized and coordinated from a national, international, and company level and should not be part of any short-term pilot solution.

- Other actions that would improve border-crossing times in Dimitrovgrad include: (a) a One Stop Shop for rail infrastructure path allocation across borders; (b) single window for customs where customs officials from neighboring countries sit in the same office in a joint border zone or share information electronically; (c) passenger control on moving trains; (d) corridor interoperability would likely reduce transit times by not requiring changes of traction at BCPs and no change of locomotive drivers at BCPs; and (d) upgrading rolling stock to avoid less reliable, ageing rolling stock that require frequent maintenance interventions and an increased need of technical inspections. However, these are outside the scope of this Report. With a view to improving performance at the border, other challenges that affect rail border crossing lead times need to be assessed using a Time Release Study (World Customs
Organisation), as the absence of electronic data interchange is only one of the factors contributing to delays at the borders. These need to better understood in order to improve border-crossing performance.

51 http://www.wcoomd.org/en/topics/facilitation/resources/~media/01713916ED2A4BD38DC119C5E64B890D.ashx
# Annex 1: Definitions

<table>
<thead>
<tr>
<th>Concept</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCP</td>
<td>Border Crossing Point is a place between two countries where travellers, goods and vehicles are inspected. Formal procedures of involved stakeholders are conducted to transfer responsibility among themselves.</td>
</tr>
<tr>
<td>EDI</td>
<td>Electronic Data Interchange is automated exchange of structured electronic messages for the use in another system and organization. The sender of information must have access to required electronic data and the receiver must share a defined interface to be able to communicate.</td>
</tr>
<tr>
<td>Hot box detection</td>
<td>Technical solution to assist technical controls of wagons and locomotives. More specifically, it is used to check that axle bearings are not overheated, but is often combined with other techniques to reduce the need for manual technical controls.</td>
</tr>
<tr>
<td>HTML5</td>
<td>A language standardised by the World Wide Web Consortium (W3C) used to structure and present content in a web browser. HTML5 supports both mobile and desktop access in a generic way.</td>
</tr>
<tr>
<td>IM</td>
<td>Infrastructure Manager has the meaning given to it in the Railways and Other Guided Transport Systems (Safety) Regulations 2006, save that for the purpose of the Code, the term is limited to those infrastructure managers who hold a safety authorisation issued in respect of the mainline railway. In this Report, the term IM is used as the entity responsible for railway infrastructure.</td>
</tr>
<tr>
<td>Parties</td>
<td>Interested parties is a legal term in railway legislation (EU and national legislation) and includes all parties that are involved in BCP agreements and procedures—infrastructure managers, railway undertakings, sometimes freight forwarders and shippers, customs, border police, sanitary and phyto-sanitary authorities, and border commissions (government, rail regulators). Railway associations are only involved indirectly via their members.</td>
</tr>
<tr>
<td>RU</td>
<td>Railway Undertaking has the meaning given to the term ‘transport undertaking’ in the Railways and Other Guided Transport Systems (Safety) Regulations 2006, save that for the purpose of the Code, the term is limited to those railway undertakings who hold a Part B safety certificate issued in respect of the mainline railway. In this Report term RU is used for entity responsible for the rail freight service and train.</td>
</tr>
<tr>
<td>TAF TSI</td>
<td>The aim of the TAF TSI is to define the data exchange between Infrastructure Managers (IMs) and Railway Undertakings (RUs) and between the members of these two groups, with regard to rail freight transport.</td>
</tr>
<tr>
<td>TAP TSI</td>
<td>Telematics Applications for Passenger Services, Technical Specifications for Interoperability. The aim of the TAP TSI is to define European-wide procedures and interfaces between all types of railway industry actors (passengers, railway undertakings, infrastructure managers, station managers, public transport authorities, ticket vendors and tour operators).</td>
</tr>
<tr>
<td>Track and trace solutions</td>
<td>Technical solutions to keep track of trains and wagons, such as RFID tags, optical licence plate readers, automatic train recognition systems among others.</td>
</tr>
</tbody>
</table>
Annex 2: BCP Process Scenario
Annex 3: Raildata

ORFEUS

Handling of paper transport documents is very costly and presents serious technological limitations for the railway transport. With aim of future paper-less technology, major European railway undertakings deployed information systems to collect and process data about their consignments. The next logical step was to inter-connect these companies' systems to exchange consignment information of international transports. For this purpose, central system called ORFEUS was developed.

ORFEUS is an information system developed and operated by Raildata. Since 1995, ORFEUS provides the electronic data exchange of the consignment note data between the co-operating railway undertakings using its central database. In the first step the data are sent in parallel to the paper CIM consignment note (or CUV wagon notes data for empty wagons). In 2006 the ORFEUS was migrated to the XML-CTD message using system, in particular to fulfil the requirements related to the coming into force of the new international rail transport law CIM. ORFEUS enabled re-engineering of the European freight rail logistics. Data are delivered by the forwarding railway undertaking to ORFEUS and from there distributed to other railway undertakings involved in the transportation. With ORFEUS it is no more necessary to collect the consignment or wagon note data on the borders or at takeover. This way the system improves the speed and reliability of international freight rail transport and enables significant cost savings.

The eRailFreight project focuses on replacement of paper transport documents by electronic data exchange. In this project the railway organizations - International Rail Transport Committee (CIT), International Union of Railways (UIC) and Raildata - collaborated on implementation of the Electronic Consignment Note message (ECN). Based on CIT’s legal and functional specifications, Raildata developed the technical specifications for the ECN exchange. The ECN message and the comprehensive ECN message exchange scenario were integrated into ORFEUS application. Thus, ORFEUS became the core of a central scenario for exchange of commercial data between co-operating European railway undertakings. Thanks to ORFEUS, the rail sector has tool to achieve the original target: run transports paperless.

The ORFEUS members use the consignment data for incoming traffic procedures. The following railway companies take part:

- CFL (Luxembourg)
- Green Cargo (Sweden)
- Rail Cargo Austria (Austria)
- DB Schenker Rail Deutschland (Germany)
- DB Schenker Rail Scandinavia (Denmark)
- DB Schenker Rail Nederland
- RENFE (Spain)
- SBB Cargo (Switzerland)
- B Logistics (Belgium)
- SNCF Fret (France)

This information is taken from the Raildata website. Available at: http://www.raildata.coop.
• Trenitalia Cargo (Italy)

**WMI**

• Basic idea is to provide Community Cloud for data capturing
• The intention is to support RUs with little IT to join the international data exchange.
• Philosophy:
  o Simple tool
  o User friendly environment
  o Basic data set
  o Easy extendable architecture
  o Support for users
• First step covers tool to receive, update, create and forward Train Pre-advice (Hermes 30) messages
• The tool is developed and ready for testing and production already.

Web Manual Input offers to railway undertakings having low or small IT facilities a user friendly web interface to participate in the common train pre-advice exchange by providing for each RU a separate account in which received train pre-advices can be viewed, printed and downloaded allowing easy integration into the office tools used by the RUs and train pre-advices can be created. In the future capturing and forwarding of wagon / train movement events and consignment notes is planned.
**Annex 4: Work Packages for Implementation of Option 3**

<table>
<thead>
<tr>
<th>WP 1</th>
<th>Inception</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td>To initiate the project, gather initial inception of scope and stakeholders, and develop work plan and technical approach for the project based on input from selected option.</td>
</tr>
</tbody>
</table>
| **Description of tasks** | The following tasks are included in this work package:  
- Planning;  
- Kick-off meeting;  
- Define Work plan; and  
- Define ownership and sponsorship of products and solutions to be delivered. |
| **Deliverable** | Work plan |

<table>
<thead>
<tr>
<th>WP 2</th>
<th>Establish Infrastructure and scanning and distribution of documents/information to relevant parties$^{53}$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td>Develop solution to scan consignment notes and to provide track and trace information as well as to distribute this information to relevant parties. The information will be made available at the offices of each party (to view or print) to support parallel work.</td>
</tr>
<tr>
<td><strong>Description of tasks</strong></td>
<td></td>
</tr>
</tbody>
</table>
- Create KPI baseline (measure time required to perform tasks following a number of trains arriving and departing)  
- Reassess availability of electronic consignment notes, wagon lists and Track and trace information for the BCP of selection (to minimise the need of scanning paper documents).  
- Software products and infrastructure products selection  
- Procurement of products  
- Detailed task level process/workflow design  
- Requirements specification (detailing requirements provided)  
- IT Development  
- IT Testing and verification  
- Deployment |
| **Deliverable** | Limited solution deployed |

<table>
<thead>
<tr>
<th>WP 3</th>
<th>Operationalize pilot</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td>Initial operation, verification, and adjustment of solutions and implementation</td>
</tr>
<tr>
<td><strong>Description of tasks</strong></td>
<td></td>
</tr>
</tbody>
</table>
- Training and change management  
- Start of operation  
- KPI follow up  
- Support  
- Maintenance and adjustments (corrective and preventive maintenance) |
| **Deliverable** | Adjustments and training |

<table>
<thead>
<tr>
<th>WP 4</th>
<th>Mobile solution to assist technical and commercial controls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td>Develop mobile solution (reuse information and distribute using mobile equipment) to support technical and commercial controls.</td>
</tr>
<tr>
<td><strong>Description of tasks</strong></td>
<td></td>
</tr>
</tbody>
</table>
- Develop specific workflows to assist technical and commercial controls  
- Develop mobile interfaces (user interfaces)  
- Deployment (servers and mobile equipment)  
- Education and change management |
| **Deliverable** | Full short-term solution |

*Source: KGH Group AB.*

$^{53}$ As part of this a task level is to configure electronic workflows taking into account different types of trains.