



INTERNATIONAL UNION  
OF RAILWAYS

# STUDY Eurasian rail corridors

What opportunities for freight stakeholders?



Paris, September 2017

# The study assesses the viability and the actions needed to promote existing and South-Eurasian routes and their connection to RFCs

## Background and project objectives

- > With the continuing economic development, cargo traffic flows between Asia and Europe are expected to increase
- > Rail transport on the Asia-Europe route is increasing as well but its share stays small. Disadvantages regarding border crossings, reliability, infrastructure and other factors are still holding it back. Dropping sea freight rates aggravate the competition with sea freight
- > Nevertheless, business initiatives to improve the competitiveness and quality of rail transport are growing on the Northern Eurasian rail routes and, more recent, on the Southern routes
- > Especially China, Iran and Turkey are investing and promoting the Southern infrastructure links to Europe along the former Silk Road trading routes
- > At the same time, Europe is investing in its cargo rail by creating common standards for the interoperability of networks in the nine Rail Freight Corridors and the Trans-European Transport Networks

### Assessment of the viability of the Eurasian rail freight routes, with a focus on Southern routes and the interconnection with European Rail Freight Corridors

- 1 Overview on the traffic volumes, market players, infrastructure and performance of the rail routes – forecasting their development and potential until 2027
- 2 Assessment of key success factors, best practices and impeding factors for the initiatives
- 3 Recommendations for stakeholders on how to improve/reset their business activities and market the new alternatives as well as migration plan for UIC to support its members

# Eurasian rail freight has big potential for future growth – To realize it, stakeholders should further improve their services

## Key messages

- A** The study assesses the status and development of Eurasian rail freight, with a focus on Southern routes and the interconnection with European Rail Freight Corridors
- B** From a volume of ~140,000 TEU in 2016, a total rail potential of ~640,000 TEU is forecasted for 2027
  - > After a historic CAGR of 140% between 2014-16, a CAGR of 15% is forecasted for 2017-27
  - > Significant volume coming from shift from sea
- C** Strong improvements in infrastructure/terminals, customs, procedures and frequencies have enabled the growth in recent years. Important features that need to be improved further are reliability, balance of transport volumes and competitive pricing
- D** Southern rail routes will only have a small share of the rail cargo transport between Asia and Europe. Their potential lies in the connection of new regions and freight flows
- E** At present, European RFCs are only weakly interconnected with Eurasian rail freight – Customer needs are not fully covered
- F** To foster a sustainable development of Eurasian rail freight, market players should improve the efficiency of their operations, tailor their products to evolving customer needs and explore the options of new markets

# Twenty expert interviews were conducted with various stakeholders of Eurasian rail transport and European RFCs

## Interview list

### Specialized operator

- > Far East Land Bridge (FELB)
- > InterRail Holding
- > Trans Eurasia Logistics (TEL)
- > United Transport and Logistics Company (UTLC)

### European Rail Freight Corridor

- > RFC 3
- > RFC 6
- > RFC 6 and 7 (MAV)
- > RFC 7 (Rail Cargo Carrier)
- > RFC 8 (DB Netz, Captrain)

### Railway

- > DB Cargo
- > KTZ Express

### Association, other

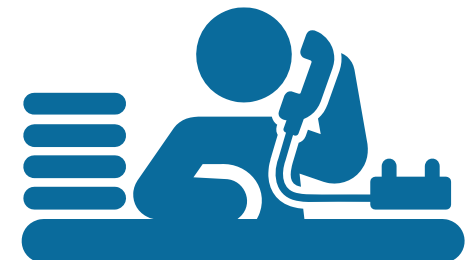
- > Association des Utilisateurs de Transport de Fret (AUTF)
- > International Rail Transport Committee (CIT)
- > Duisport
- > I.I.S. Innovative Intermodal Solutions

### Forwarder

- > Schenker Europe

### Shipper/customer

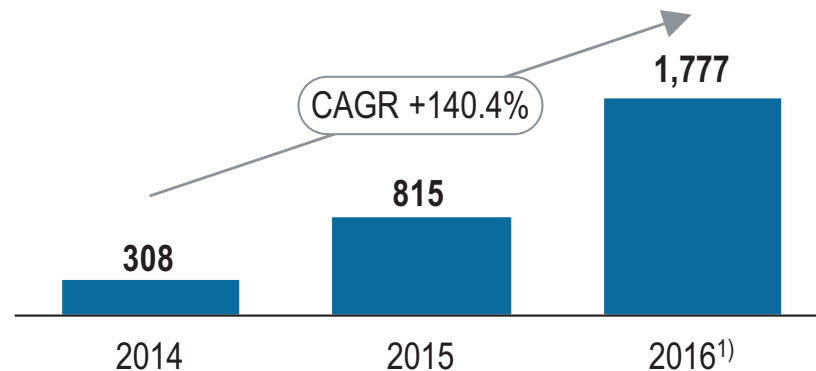
- > HP
- > L'Oreal



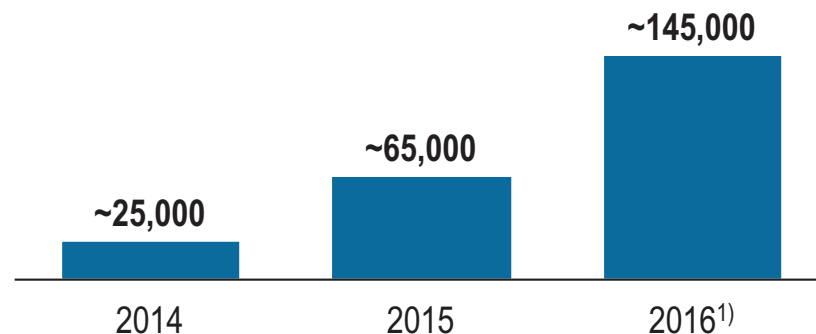
# Eurasian rail cargo transports have grown significantly, but still have a low intermodal market share

## Development of rail freight between Asia and Europe

Transport between China and Europe via rail [Trains]



Transport between China und Europe via rail [TEU]

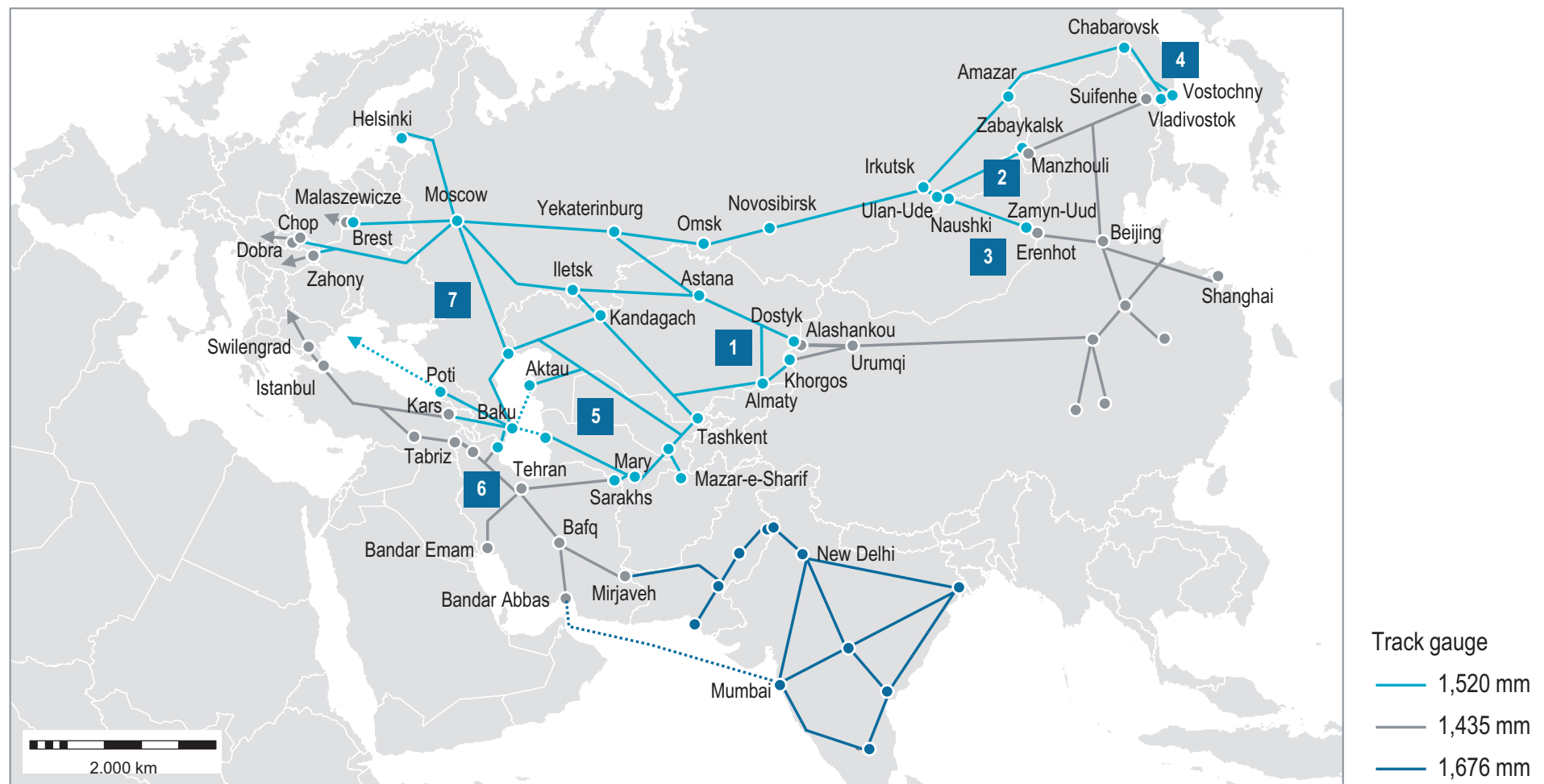


- > Improvements driving volume development on Eurasian rail routes
  - Reduction of transit time and increased punctuality
  - Increase of destinations to 15 in Europe and 16+ in China
  - Reduction of freight rates, subsidies from China's OBOR initiative
  - Targeting of suitable customers and regions e.g. Western China
  - Ease of border crossings through common consignment note, Eurasian Customs Union and local improvements
  - Upgrading and extension of infrastructure e.g. in Kazakhstan
- > However, market development and competition from other transport modes prevent rail transport from reaching higher market share
  - Freight rates for container shipping have fallen significantly since 2011. Price level of rail transport is now 3 to 4+ times higher than shipping (Shanghai Shipping Exchange rate SCFI for Europe in March 2017 under USD 900 per TEU)
  - Economic growth rates in China cooled down and the overall trade between Asia and Europe stagnated in 2015 and 2016
  - Still room for efficiency and quality gains in waiting times and processes for border crossings and customs, reliability and client information etc.

1) Roland Berger calculations based on interviews with several players, e.g. DB Cargo, TEL  
Source: EATL, DB Cargo, CRIMT, press research, Roland Berger

In addition to the Europe-Asia routes in place in North Asia, new routes via Iran and Turkey are developed for rail cargo

Main Eurasian routes with track gauge (schematic)<sup>1)</sup>



1) Conical projection to minimize visual distortion of distances; numbering based on route usage for Eurasian rail cargo transport

Source: UNESCAP, Roland Berger



Routes 1 and 2 are the fastest and most used routes with high reliability and good infrastructure – Alternatives need to be improved

## Route assessment

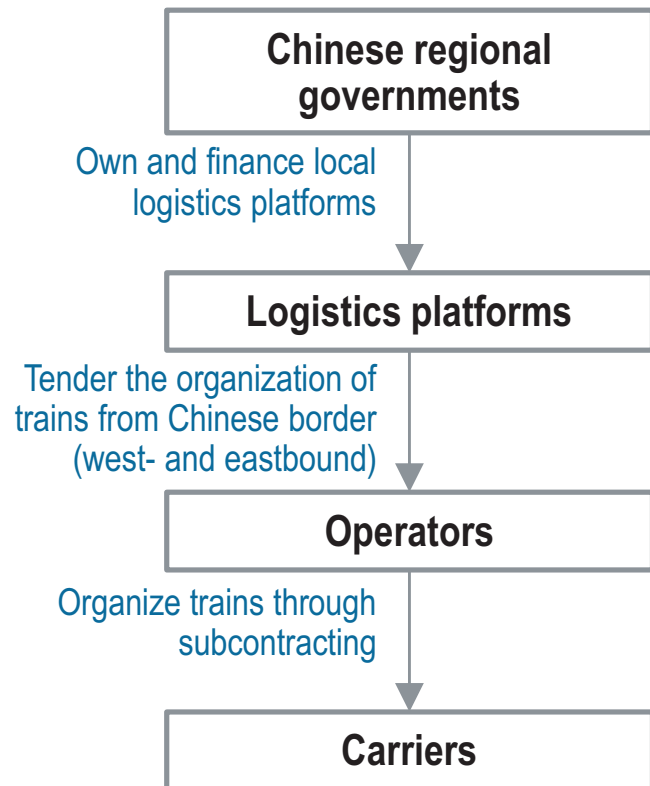
| Route   | Length      | Transit time <sup>1)</sup> | Capacity and Comments  |
|---|-------------|----------------------------|--|
| <b>1</b> Via Alashankou/<br>Dostyk or Khorgos<br>(Kazakhstan) | > 10,000 km | > 16-17 days               | > High reliability, good infrastructure<br>> Sufficient capacities, new terminal in Khorgos                  |
| <b>2</b> Via Manzhouli/<br>Zabaykalsk (Russia)                | > 11,000 km | > 17-18 days               | > High reliability, good infrastructure<br>> High volume but limited free capacity in Zabaykalsk             |
| <b>3</b> Via Erenhot/Zamyn-<br>Uud (Mongolia)                 | > 10,500 km | > 18-19 days               | > Alternative to route 2, additional border crossings<br>> Weak infrastructure in Mongolia, limited capacity |
| <b>4</b> Via Suifenhe/<br>Vostochny (Russia)                  | > 11,500 km | > 18-19 days               | > Suitable route for traffic from South Korea<br>> High reliability, good infrastructure                     |
| <b>5</b> Via Dostyk or<br>Khorgos/Baku                        | > 12,000 km | > 19-23 days               | > Alternative for traffic to Southern Europe<br>> Two times RoRo shipping <sup>2)</sup> , limited capacity   |
| <b>6</b> Via Khorgos/Tash-<br>kent/Tehran                     | > 12,500 km | > Hardly used              | > Weak infrastructure, route has to be developed<br>> Limited capacity                                       |
| <b>7</b> Via Tehran/Baku/<br>Moscow                           | > 13,500 km | > Hardly used              | > Suitable route for traffic from India to Europe<br>> Weak infrastructure, route has to be developed        |

1) Fast/Speed rail services can achieve a smaller transit time 2) Roll-on/roll-off shipping, rail cargo is driven on/off the vessel  
Source: Company information, EATL, Roland Berger

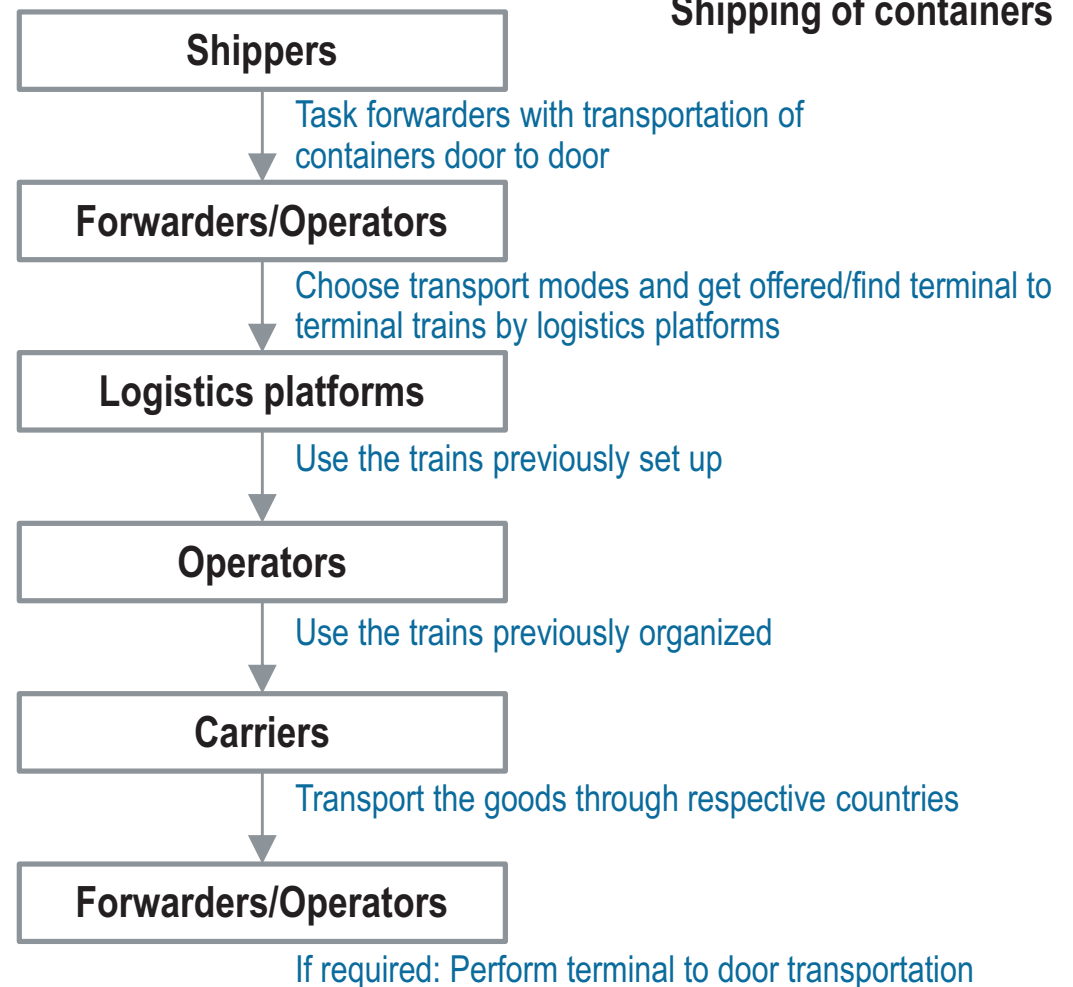
# Value chain of Eurasian rail cargo transport can be divided into setting up the trains and shipping the containers

## Organization of Eurasian rail cargo transport

### Set up of trains



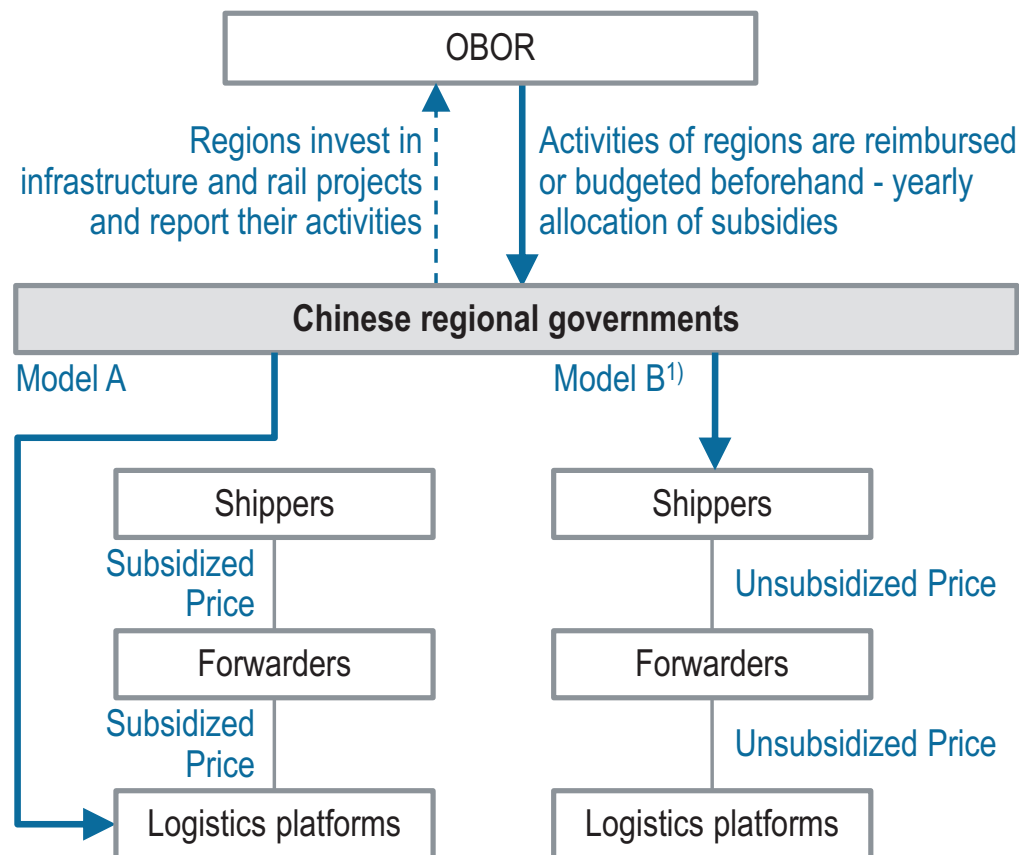
### Shipping of containers





# Subsidies are most often used by logistics platforms – First signs of consolidation visible

## Deep Dive: Rail freight subsidies in China



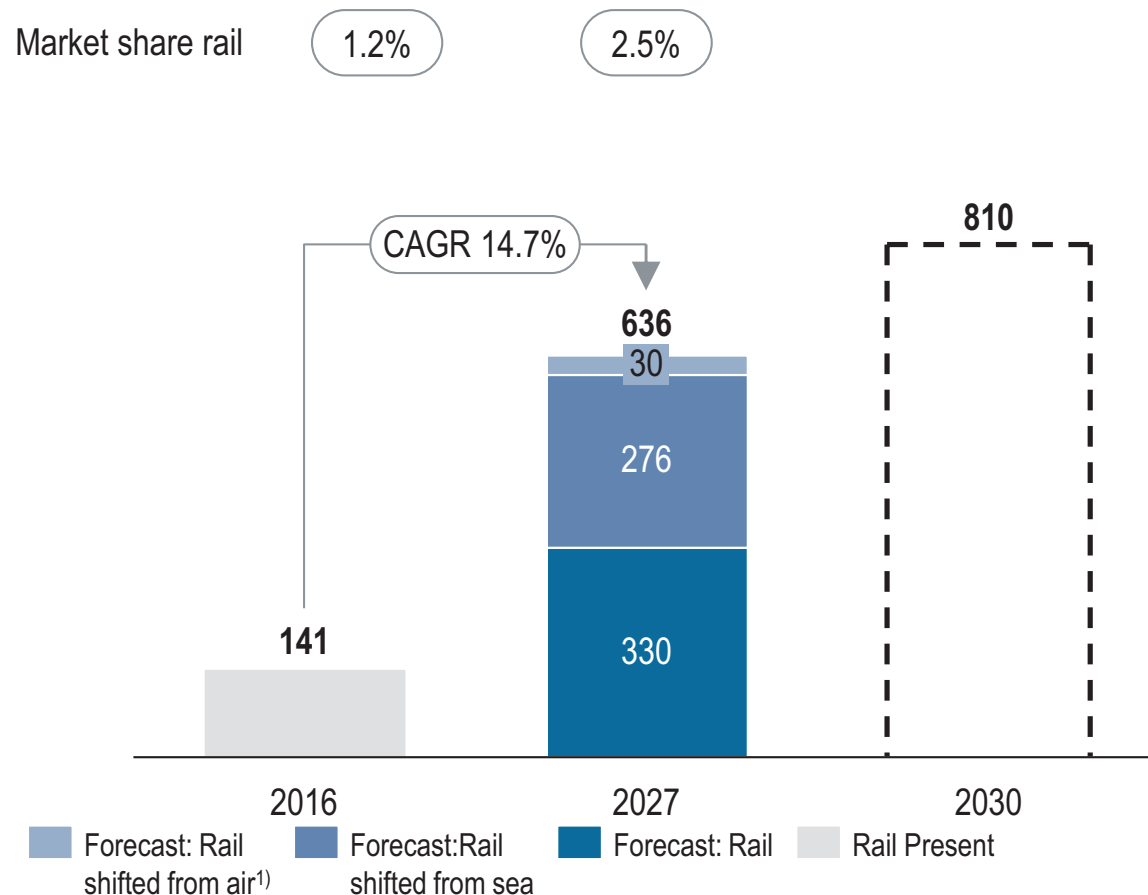
- > Subsidies are part of OBOR program
  - Amounts differ among regions in the range of USD 1.000–2.500/TEU
  - Examples for independent regional governments offering subsidies: Chongqing, Chengdu, Wuhan, Yiwu, Zhengzhou
- > Subsidies are expected to decrease in the next years: While no official information is provided yet, some subsidies are currently planned until 2020 (e.g. Wuhan)
- > Moreover China's central government takes more control over the emerging complex network of Eurasian trains
  - Creation of the "China Railway Express" brand with thousands of new shipping containers bearing its new logo to replace the many individual brands in June 2016
  - Announcement of the creation of three main Eurasian routes with transshipment hubs for further distribution as part of the new five-year plan to improve the China-Europe rail network, in October 2016<sup>2)</sup>

— Subsidies      — Shipping Contract

1) Rather used with big shippers      2) The current network stretches over 39 lines from Chinese cities to Europe

# For 2027, a total rail potential of around 636,000 TEU is forecasted – Significant amount coming from shift from sea

## Rail potential base case forecast ['000 TEU]



- > Total rail potential includes
  - Existing rail volumes increasing over time
  - Shift from sea to rail, including growth of sea transport
- > Shift from air as potential, but small (in terms of volumes) upside
- > 636 k TEU can roughly be translated into 21 trains per day in 2027 (assumption: 82 TEU per train<sup>2)</sup>)
- > Due to separate analysis TEU volumes of South Asia, Turkey and Iran trade with EU 28 not included
- > Extrapolated forecast until 2030 shows a total rail cargo volume of 810 k TEU

1) Rough estimate based on shift factors of 5% from overall Asia-Europe air traffic    2) Length of an European train

# The logic of shifts to rail transport is associated primarily with transit time and price, suitable goods and rail acceptance

## Logic and assumptions of rail shift scenario

### Transit time and price

- > Pure transport rates not decisive for high-value container, but time as decisive differentiation of rail to sea that can justify a price premium
- > In a comprehensive view, fast transport times generate monetary savings from working capital and lead time benefits
- > Reliability is key, especially for time-sensitive goods

### Suitable goods

- > Specific commodities qualify more for rail transport, e.g. high-value goods
- > Out of these, time sensitive goods justify shift to more expensive rail transport

### Rail acceptance

- > Acceptance of rail as alternative to sea shipping still not fully established
- > Acceptance rate decisive to determine if full shift potential can be achieved

### Shift logic

- > Due to high value of goods that impacts working capital and lead time benefits, product groups most relevant for shift are
  - High-tech, computers, electronics
  - Metal products, vehicles and automotive parts, spares
  - Foodstuff and animal fodder
  - Chemicals
- > For time-sensitive containers, more reliability and a shorter transport time in comparison to sea freight can justify a shift

# Timing and reliability stay key success factors – Operations have improved but market still sees further improvement potential

## Prioritization and evaluation of success factors – Analysis of interviews

| Parameter                    | Importance for rail link | Gap 2017 <sup>1)</sup> | Changes since 2011 and comments   |
|------------------------------|--------------------------|------------------------|---|
| Transport time               |                          |                        | <ul style="list-style-type: none"> <li>&gt; Speed gains of approx. two days since 2011</li> <li>&gt; Gaps seen mostly inside Europe (slow transportation, delays)</li> </ul>  |
| Reliability                  |                          |                        | <ul style="list-style-type: none"> <li>&gt; Rail now more reliable than sea</li> <li>&gt; Especially shippers still see need for improvement and more information</li> </ul>  |
| Balanced quantities          |                          |                        | <ul style="list-style-type: none"> <li>&gt; Continuously smaller eastwards transport volumes, changing only slowly</li> <li>&gt; Alternatives like stepwise returns make transport more complicated</li> </ul>        |
| Target goods                 |                          |                        | <ul style="list-style-type: none"> <li>&gt; Suitable goods are targeted and LCL offers were introduced</li> <li>&gt; Still potential, e.g. in chemicals, temperature controlled goods and air freight</li> </ul>      |
| Price                        |                          |                        | <ul style="list-style-type: none"> <li>&gt; No pure price competition but more competition through low sea freight rates</li> <li>&gt; Potential for more cost efficiency and less dependence on subsidies</li> </ul> |
| Frequency, flexibility       |                          |                        | <ul style="list-style-type: none"> <li>&gt; Frequency increased strongly in last years</li> <li>&gt; Many trains are still on request instead of regular trains</li> </ul>  |
| Target geographical coverage |                          |                        | <ul style="list-style-type: none"> <li>&gt; Network has increased in past years</li> <li>&gt; Next step should be consolidation for more efficient geographical coverage</li> </ul>                                   |
| Availability                 |                          |                        | <ul style="list-style-type: none"> <li>&gt; Imbalance of traffic complicates return of platforms/containers</li> </ul>  |
| Customs                      |                          |                        | <ul style="list-style-type: none"> <li>&gt; Improvements in customs in the last years, partly seen as "solved problem"</li> <li>&gt; More potential at Chinese border and through electronic documentation</li> </ul> |

Legend: Higher filling of harvey balls shows higher importance; higher filling of gap shows higher gap, direction of arrow shows progress since 2011 (upwards = positive, downwards = neg.)

1) Gap depicts overall view of established routes (Northern routes), progress arrow can be flat/negative if expectations have risen at the same time as results

Source: Expert interviews, Roland Berger

# Whereas time improvements are seen as "nice-to-have", reliability improvements are still seen as crucial by several parties

## Reliability

### Delays mainly occur at the border to or in Europe

- > There were no comments on delays in China and positive mentioning of Russian and Kazak reliability
- > However reliability issues were mentioned for Europe
  - In general many locomotive changes and waiting times for drivers
  - Low and changing prioritization of rail freight when passing through countries
  - Bottle necks at Brest, at Polish-German border and when continuing in the Netherlands
  - Many diversions and interruptions due to (little or ) uncoordinated construction sites

### Mixed view on reliability

- > Reliability of rail freight has improved strongly and is now higher than sea freight reliability
  - "[Rail is the] most time-accurate shipping mode" (DHL, Intermodal Europe Conference 2016)
  - Sea freight reliability on Asia-Europe route is about 70%<sup>1)</sup>
- > Shippers share this view only partly
  - Rail might be more reliable than highly unreliable sea freight but shipper still see needs for improvement
  - European capacity constraints and a lack of information about exact arrival times are given as biggest pain points
- > Operators should adjust operations proactively to growing volumes (in general and for seasonable peaks) as continuously reliable service is key for client satisfaction during times of volume growth

### More information could improve view on overall reliability

- > Delays are said to be lower than one day which is less than 5-10% of the transport time
- > However there is little information on the arrival time once a delay has occurred
  - Arrival terminals need information for capacity planning
  - Shippers need information for production/selling purposes
- > The established tracking of container positions is not enough in these cases as a current position does say nothing about track availability and waiting times

1) Drewry containership reliability from May 2016, Drewry Carrier Performance Insight

# On Southern routes, the same success factors and expectations are highlighted by stakeholders – A bigger gap will have to be closed

## Success factors on Southern routes

### Operators are open for Southern routes...

# 1

#### When they offer a competitive service level and price

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- > Operators and shippers named same success factors as for Northern routes
- > Southern routes face challenges concerning time, reliability and price through many border crossings and/or transport mode changes
- > Southern routes need high efficiency gains to fulfill client requirements leading to low expectations of shippers for Asia-Europe transports

# 2

#### To target new O/Ds or goods along the routes

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- > More potential is seen for new O/Ds along the routes (Central Asia, Iran, Turkey and connections to Southern Asia) that offer new markets
- > For this traffic, rail has a stronger competition from truck and short/deep sea transport in comparison to existing Eurasian rail cargo transport

# 3

#### To bypass capacity or political constraints of Northern routes

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- > Important factor of Southern routes is the ability to bypass potential constraints on one/some routes, making shippers more flexible
- > Examples are constraints for goods transported e.g. fresh food or dangerous goods
- > Development for this reason is probable due to strong political will



# Southern routes' share of the traffic potential for 2027 is projected to reach 19,000 TEU corresponding to 3% of Eurasian rail traffic

Trade volume distribution 2027 ['000 TEU]



■ Origin and destination (O/D) countries

## Methodology

- > Countries identified as preferred partners for Eurasian rail freight through Southern Routes: Bulgaria, Greece, Romania,
- > Calculated share of 3% of forecasted EU 28 GDP for 2027

## Preconditions for upside expansion case

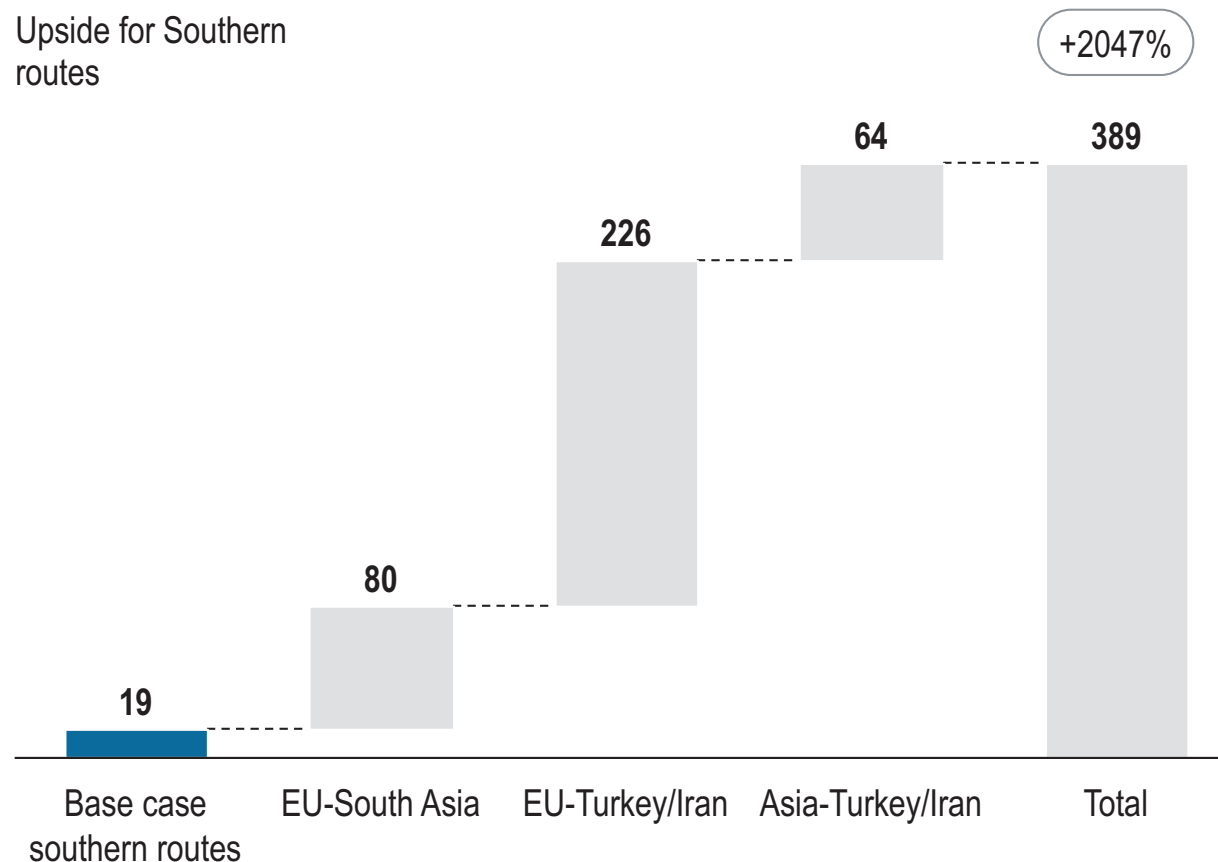
- > Higher infrastructure capacity is needed to make Eurasian rail freight possible in bigger quantities and requires further investments on Southern routes
- > Shorter transit times as well as lower rail prices for international transit is necessary to make Southern Routes competitive, especially in Turkey, and requires a clear political will



The traffic on the Southern routes would reach 389,000 TEU, if other expected international traffic is accounted for as upside

## Upside scenarios 2027 ['000 TEU]

Upside for Southern routes



### Forecast

- > India, Pakistan and Bangladesh rail freight traffic was forecasted based on same method as O/Ds through Eurostat database
- > Turkey and Iran traffic calculated in both directions to Europe and Asia<sup>1)</sup>



















### Preconditions for upside scenario

- > Ensuring price competitiveness with sea transport as time advantage decreases with closer proximity
- > Addressing issues of security and trans-border shipments, customs and bureaucracy
- > Economic growth and political stability in Iran, Turkey, as well as between India and Pakistan

1) Rough Turkey-Asia forecast based on data in USD provided by Turk Stat and applying average values identified through Eurostat

# Gaps are larger for Southern routes and have to be overcome to establish a viable Southern alternative

## Evaluation of success factors for Southern routes (Silk Road and TRACECA<sup>1)</sup>)

| Parameter                    | Importance for rail link <sup>2)</sup>  | Gap 2017  | Comments regarding Southern Routes   |
|------------------------------|---|---|--|
| Transport time               |    |    | <ul style="list-style-type: none"> <li>&gt; Speed slower than Northern routes (e.g. 17-20 days China-Turkey)</li> <li>&gt; Long distance, more border crossings/customs or mode changes</li> </ul>   |
| Reliability                  |    |    | <ul style="list-style-type: none"> <li>&gt; No established regular services yet</li> <li>&gt; Trial services TRACECA (DHL 2016) with delays of more than 4 days each</li> </ul>  |
| Balanced quantities          |    |    | <ul style="list-style-type: none"> <li>&gt; Smaller eastward transport volumes are expected</li> <li>&gt; Need to examine possibilities for stepwise transports</li> </ul>   |
| Target goods                 |   |   | <ul style="list-style-type: none"> <li>&gt; Target goods in European O/Ds for Southern routes (East Europe) and in new O/Ds (Turkey, Iran) need to be specified and seasonality considered</li> </ul>  |
| Price                        |  |  | <ul style="list-style-type: none"> <li>&gt; Even bigger competition from sea freight through shorter distance and good accessibility of Middle East and East European countries</li> <li>&gt; High network costs in Iran and Turkey</li> </ul> |
| Frequency, flexibility       |  |  | <ul style="list-style-type: none"> <li>&gt; Routes not established as regular services yet</li> </ul>  |
| Target geographical coverage |  |  | <ul style="list-style-type: none"> <li>&gt; Routes not established as regular services yet</li> </ul>  |
| Availability                 |  |  | <ul style="list-style-type: none"> <li>&gt; Routes not established as regular services yet</li> </ul>  |
| Customs                      |  |  | <ul style="list-style-type: none"> <li>&gt; Many transit countries are not part of a customs unit (Ukraine, Iran, Azerbaijan and Turkmenistan)</li> </ul>  |

Legend: Higher filling of harvey balls shows higher importance; higher filling of gap shows higher gap

1) Transport Corridor Europe-Caucasus-Asia    2) Same importance as for general Eurasian transport

Source: Expert interviews, Roland Berger

# Numerous projects and initiatives are active to improve the quality of Southern rail routes

## Initiatives on Southern routes (extract)

- |                             |  |
|-----------------------------|--|
| <b>CAREC<sup>1)</sup></b>   | <ul style="list-style-type: none"><li>&gt; Strategic partnership of 11 Central Asian countries and six multilateral development partners</li><li>&gt; Implementation of 6 multimodal transport corridors, implementation of related infrastructure projects</li><li>&gt; Projects are financed to a high extend by the Asian Development Bank and other development banks</li></ul>  |
| <b>TRACECA<sup>2)</sup></b> | <ul style="list-style-type: none"><li>&gt; Intergovernmental commission between the European Union and 14 regional member states</li><li>&gt; Strengthening economic relations, trade and transport in the regions of Caucasus and Central Asia, ensuring a multimodal transport network as alternative to other corridors</li><li>&gt; Improvement of transport policy, harmonization of legislation, development of safety systems</li></ul>   |
| <b>OBOR<sup>3)</sup></b>    | <ul style="list-style-type: none"><li>&gt; Initiative started by China to better integrate different parts of Asia, Europe and Russia through economic, social and cultural cooperation, which includes investments in railway infrastructure and terminals along the Southern routes</li><li>&gt; No formal plan but rather goals filled in opportunistically as country level negotiations allow</li></ul>   |
| <b>Other</b>                | <ul style="list-style-type: none"><li>&gt; Numerous countries of the region are investing in infrastructure projects on the Southern routes</li><li>&gt; Projects comprise the construction of new rail lines (e.g. Turkey, Azerbaijan, Iran), upgrading existing rail lines, modernization/construction of ports and terminals (e.g. Turkey, Azerbaijan, Georgia, Turkmenistan)</li><li>&gt; TITR<sup>4)</sup>: Transit countries cooperate (with the help of a Coordinating Committee) in developing and implementing this transport corridor from China to Europe via Central Asia and the South Caucasus</li></ul> |

1) Central Asia Regional Economic Cooperation

2) Transport Corridor Europe-Caucasus-Asia

3) One Belt, one Road

4) Trans-Caspian International Trade Route

Source: Information of concerned bodies, press research, Roland Berger



# The focus of operators and railways should be on operational efficiency and on customer-friendly product development

## Recommendations for operators and railways

### Streamline operations

- > Negotiate efficient border/terminal operations
- > Tackle punctuality problems and minimize locomotive/driver changes in Europe
- > Optimize cost structure for sustainability without subsidies

### Participate in new opportunities

- > Target and develop products for trends, e.g. e-commerce, temperature-controlled goods

### Use new regions as steps to Asia

- > Market transports to/from Central Asia to China as options for stepwise increasing traffic

### Improve information/transparency

- > Share information on arrival times
- > Track reliability and use big data tools to optimize operations

### Broaden services

- > Increase share of regular trains
- > Develop sets of additional services

### Communicate infrastructure needs/client expectations in Europe

- > Communicate infrastructure needs/client expectations for international traffic
- > Improve market orientation of RFCs

## Operators and railways

### Evaluate and develop Silk Road markets

- > Implement measures to improve service quality on Southern routes
- > Research market potential of South Asian & Middle Eastern economies



UIC is the world-wide organisation for the promotion of rail transport at a global level and collaborative development of the railway system. It brings together some 200 members on all 5 continents, among them rail operators, infrastructure managers, railway service providers, etc. UIC maintains close cooperation links with all actors in the rail transport domain right around the world, including manufacturers, railway associations, public authorities and stakeholders in other domains and sectors whose experience may be beneficial to rail development. The UIC's main tasks include coordinating the business needs of the rail community, developing programmes of innovation to identify solutions to those needs and preparing and publishing a series of documents known as IRS that facilitate the implementation of the innovative solutions.



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