



# **Container Port Strategy**

## Summary and Conclusions

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Roundtable

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International Transport Forum  
2 rue André Pascal  
F-75775 Paris Cedex 16  
[contact@itf-oecd.org](mailto:contact@itf-oecd.org)  
[www.itf-oecd.org](http://www.itf-oecd.org)

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## Executive Summary

### What we did

The most competitive ports of the future will be those that most effectively accommodate developments in maritime shipping whilst successfully adapting to developments in the hinterland. Most major ports are located in cities and tensions between landward and maritime side policies are frequent; achieving mutually acceptable interactions between port and city is crucial. The challenges container ports face and the problems they have to solve were addressed at an ITF Roundtable on Container Port Strategy organised in Buenos Aires in April 2017. Buenos Aires and its neighbouring ports exemplify the issues faced by many city ports and the location of the meeting was chosen to help inform policy making both nationally and internationally. This publication provides the summary findings of the Roundtable, in addition to the papers that formed the basis of the discussions, in three papers with an international perspective and a final paper focusing on the situation in Argentina, in particular Buenos Aires where most of the Argentinian container traffic is concentrated.

### What we found

Effective port planning requires a thorough understanding of the way the needs of shippers are likely to develop in the future. This sounds self-evident, but all too often port planners and policy makers have little knowledge of the main exporters and importers using the port and the related cargo flows.

Port planning has often been mainly a question of timing, when to phase in expansions, with projections based on the extrapolation of past trends. This certainty is gone. Some ports have already developed long-term planning frameworks that include scenarios in which cargo volumes decline. Conversely, structural reforms can drive a step-change increase in the volume of trade.

The size of container ships in service is increasing with much more cargo to handle per ship. This puts huge stress on equipment and labour, with high idling rates between ship arrivals. This increases the need for flexibility in port labour forces and for pooling arrangements between terminals. Larger ships also require deeper and larger access channels, longer and stronger quay walls and bigger cranes. Larger yard capacity is required to deal with peak traffic and to provide buffer capacity in the connection with hinterland transport modes. This requires a lot of space. Terminal operators, port authorities and hinterland transport companies have to respond and often taxpayers cover the cost. Shipping companies reap benefits from the larger ships but are not responsible for many of the associated costs. Consequently, the total supply chain costs of larger ships may surpass the cost savings for shipping companies.

Increasing ship size has accelerated the trend for concentration among shipping lines, with a combination of horizontal and vertical integration that could lead to a freight transport system with very limited choice for shippers. This challenges the regulatory capacity of even the largest economies to address potential issues of abuse of market power. Review of the legal frameworks that provide antitrust exemption for conferences and alliances appears due.

Whereas port activities are conditioned by developments on the sea side, many of the constraints are felt at the land side, in particular in the immediate environment which in many cases is the city. The interface for port and urban traffic is the port gate. At the core of most successful port gate planning is some sort of appointment system.

Despite examples of good practice, finding solutions for port-city traffic problems can be difficult. Re-routing truck access roads to relieve congestion and environmental impacts can lead to discontent in the neighbourhoods that now have to suffer additional truck traffic. Mitigating peak truck traffic could mean more truck noise at night. Although solid stakeholder consultation processes can help to improve policy measures, they cannot always resolve the trade-offs inherent in managing port-city traffic. Urban port congestion could also be relieved by stimulating alternative hinterland transport modes, including inland water transport and freight rail.

Larger container ships tend to be less compatible with upstream urban ports because of their nautical depth requirements and the need for space on the land side. Some of these ports might compensate by offering superior access to markets through location and hinterland connectivity but in many parts of the world the acceleration of increasing container ship size raises the question of port relocation. Port relocation is nevertheless not always a panacea. It makes most sense when key port assets have reached the end of their life-cycle, if the opportunity costs of the port land are high – i.e. where there are opportunities for high value land redevelopment – and if there are attractive alternative port sites available. Much of this depends on local circumstances.

The maritime supply chain is fragmented. The performance of firms in that chain has improved significantly over recent decades. The new efficiency frontier for maritime supply chains are the interfaces between stakeholders. Examples of such interfaces and performance bottlenecks include: ship waiting time, unproductive terminal moves, terminal dwell times and waiting times for trucks, trains and barges before handling. These are all points at which at least two stakeholders are involved and where inefficiencies are the result of a lack of effective communication, co-ordination and alignment.

Argentina currently has an opportunity to redesign its containerised freight transport system. The three concessions for the terminals at the port of Buenos Aires (Puerto Nuevo) will all expire in 2020, which raises a number of fundamental choices. Theoretically, there are three possible long-term location perspectives for container ports in Argentina: going upstream, going downstream or staying in Buenos Aires – each with their distinct advantage: closeness to main exporters, closeness to deep sea (so less need for dredging) or closeness to the main consumer market and differing implications for landside accessibility. If maritime accessibility and spatial constraints in Buenos Aires' Puerto Nuevo do not improve, shipping companies might reach a point where leaving Buenos Aires out of their direct intercontinental connections is in their best commercial interest.

## **What we recommend**

### **Introduce demand-driven and flexible port planning**

Port planning should consider a full range of potential scenarios for trade and containerisation. Uncertainty implies that capacity expansion should be designed to be as modular and flexible as possible.

### **Assess the merits of developing new container ports thoroughly**

Public policy tends to focus on developing large hub ports, often seeking to expand transshipment. A thorough assessment of costs and benefits for transshipment ports is warranted, considering the small transshipment margins and the large costs of transshipment ports that are covered, usually, by the public

purse. Not all ports can be hubs and feederling is often more efficient. As shipping becomes increasingly concentrated around a smaller number of hubs, feederling will become more prevalent worldwide. Relocation of container ports to non-urban areas can be a viable option, but optimal decisions are very much case-specific and require a solid analysis of market prospects and the costs and benefits involved.

### **Implement port-gate policies, such as truck appointment systems**

Port-gate appointment systems provide truck drivers with time slots in which they can deliver and pick up a container. The effectiveness of such systems is increased if it is coupled to measures to increase the visibility of cargo flows, for example via port community systems for information exchange within the port – and through the more extended cargo community systems, covering information related to dry ports and hinterland transport. Truck appointment systems gain in effectiveness if introduced together with truck waiting areas and incentives to enforce the system, i.e. charges for late delivery or pick up, usually used with the option making a simple telephone call or web-based re-booking to reschedule and avoid penalties.

### **Stimulate co-operation between stakeholders in the maritime logistics chain**

The efficiency of maritime supply chains is determined by the interfaces between stakeholders. These are all points at which at least two stakeholders are involved and where inefficiencies are the result of a lack of effective communication, co-ordination and alignment. Such bottlenecks can only be solved via collaboration of the stakeholders involved in the maritime supply chain.

### **In the Argentinean context, strategically assess the long-term location options for container ports**

The expiration of the existing terminal concessions in 2020 requires a policy response that could include expansion of container operations in Puerto Nuevo to meet growing demand in the short and possibly the medium term. However, at some point in the longer term other options will also be needed. Feederling to hubs outside Argentina will certainly continue to be an important part of efficient options. In this respect, a thorough strategic discussion is warranted on the benefits and costs of the different location options for container ports in Argentina.



## The container port of the future

The most competitive ports of the future will be those that most effectively accommodate developments in maritime shipping whilst successfully adapting to developments in the hinterland. Most major ports are located in cities, with frequent tensions between landward and maritime policies, thus achieving mutually acceptable interactions between port and city is crucial. The challenges container ports face and the problems they have to solve were addressed at an ITF Roundtable on Container Port Strategy organised in Buenos Aires in April 2017. Buenos Aires and its neighbouring ports exemplify the issues faced by many city ports and the location of the meeting was chosen to help inform policy making both nationally and internationally. This publication provides the summary findings of the Roundtable, and is published together with the papers that formed the basis of the discussions: three papers with an international perspective and a final paper focusing on the situation in Argentina, in particular Buenos Aires where most of the Argentinian container traffic is concentrated.

### Maritime developments

#### Maritime trade growth

Since the global financial crisis, trade growth has been moderate, trailing behind many of the projections on which port developments are based. In many world regions, trade volumes have only very recently reached pre-crisis levels, reflecting the stagnation of the last decade. In most regions trade levels are considerably lower than those projected by the maritime consultancies on which most port development plans are based. These projections often extrapolate past growth rates, ignoring the possibility of cyclical growth patterns. As a result, there is currently more container port capacity than is justified by trade volumes; analysis of planned future container port capacity indicates that in most places there will be more than enough container port capacity for several decades to come (ITF, 2016a).

Underlying this growth lag is a more structural trend of GDP growth generating less trade growth than before. This trade to GDP growth-multiplier was around three during the 1990s, but has recently decreased to around one. This means that current GDP growth rates generate three times less trade than in the nineties. Explanations for this development might be that the limits of global outsourcing have been reached, with supply chains starting to regionalise, driven by higher labour costs in China. Within a broader time frame, the multipliers of around three might be historical exceptions rather than the norm.

In addition, it is possible that the limits of what still can be containerised have been reached. The process of containerisation has driven much of the growth of container shipping and container ports, with in turn containerisation of general cargo, refrigerated cargo and then bulk cargo. This containerisation is driven by the efficiencies and economies of scale that containerised shipping can provide, but its potential depends on the way in which ports are designed. Some parts of the world still have few dedicated terminals and one can expect to see container traffic grow quickly there once dedicated terminals start to emerge. For more mature container markets much slower rates of endogenous growth are likely. For some goods, the case for containerisation depends on the cost differential between shipping in container

ships and in bulk ships, which depends to a large extent on oil prices, which are highly volatile. High oil prices penalise containerisation. This is, for example, the case for grain shipments in Argentina.

Research to date on the future of global value chains is fairly inconclusive (De Backer and Flaig, 2017) and it is possible that the trade-GDP growth multiplier will increase again driven for example by the emergence of India as a manufacturing hub or increased shipment of commodities in response to successful decarbonisation of the energy sector or 3D printing. This is of great importance to port development, as freight transport is a derived demand, dependent on the demand for traded goods; there is limited evidence to suggest that investment in port infrastructure of itself induces demand.

The price elasticity of maritime transport is also an important factor. Over recent decades, maritime transport costs have decreased spectacularly, as a result of containerisation and the development of open registries. In consequence, the share of maritime transport costs in the price of traded goods is now very small, with changes in maritime transport costs having negligible impact on consumer behaviour. One might argue that the price of maritime transport is too low because it does not take into account externalities, including air pollution and climate change, and because in some cases the costs of canals, ports and access channels are not recovered. Some of the externalities have recently been addressed by regulation, which will increase the costs of maritime transport in the coming years. For container shipping alone, upcoming sulphur emissions regulation that will be effective in 2020 could represent additional costs of USD 5-30 billion per year (ITF, 2016b). New ballast water management requirements will also add costs to the shipping sector. A possible carbon price for shipping could add more cost. Despite the low price elasticity for maritime transport, these cost increases might have distributional effects on trade flows, with general price increases penalising peripheral regions. A number of countries – including Argentina and Brazil – have raised this issue in the global debate on reducing greenhouse gas emissions from shipping and the issue of national trade impacts from GHG emission mitigation measures is included in the IMO Initial GHG Strategy, agreed in April 2018. At the same time, one could argue that local logistics costs contribute far more to the lack of competitiveness of certain peripheral countries than ocean freight costs.

### **Port capacity planning**

Changes in shipping costs and demand have consequences for port planners and policy makers. Policymakers might want to reflect on scenarios in which port traffic declines in the future. Whatever new research might bring to light, in terms of possible future development of trade flows, one cannot exclude the possibility of continuing stagnation of maritime trade, or even decline of maritime trade in some regions. Conversely, structural reforms can drive a step change increase in the volume of trade, something that might drive container traffic in Argentina.

Port planning has often been mainly a question of timing; there was a high probability that more cargo would come, the only question was when and how to phase in future port expansions, with projections based on the extrapolation of past trends. This certainty is gone: the decline of port volumes is a real possibility. Some ports (Rotterdam, Vancouver) have already developed long-term planning frameworks that include scenarios in which cargo volumes decline. Such exercises could be highly relevant for many other ports; in particular those that are highly dependent on handling of fossil fuels, like oil and coal.

The uncertainty with regards to maritime trade growth would also suggest the need for more flexibility in port planning. This flexibility suggests the possibility of accelerating development when demand increases quickly and delay port investment plans when demand lags. In practice, this means preparing for different scenarios, with land reservations for potential expansion and quick and smooth procedures for decision making, planning approvals and procurement.

More than ever, there is a need for ports to understand where the cargo comes from that generates traffic for the port. This sounds self-evident, but all too often port planners and policy makers have little knowledge of the main exporters and importers using the port, and the related cargo flows. Effective port planning is not possible without a thorough understanding of the way the needs of shippers are likely to develop in the future.

### **Ship size**

The size of container ships has grown quickly over the last decade. Their capacity has doubled, with the latest mega-container ships capable of carrying more than 20 000 standard containers. The driver of this development is the search for economies of scale by shipping companies. These economies of scale should theoretically provide benefits for shipping companies, but are in practice hampered by underutilisation of the ships and the overcapacity created by massive ordering of these mega-ships. It should also be noted that the returns to scale are decreasing: the cost savings related to ever larger ships get smaller with each round of upsizing and have become marginal.

The upsizing of container ships has effects on all trade lanes, independent of developments in the real economy. There is a cascade effect. New mega-ships deployed on the Asia-Europe route replace vessels operating that route, that now find new deployment on other routes, which leads to other replacements along all the trade lanes. This cascading effect has a logic of its own, as ship owners want to deploy their newest and most efficient assets, irrespective of demand. For example, the average capacity of container ships calling on the South American East Coast has increased by around 50% over the last five years whereas trade volumes have stagnated.

One of the obvious effects is the larger call size of ships in ports: more cargo to unload or load per ship. This tendency is already visible in many ports and will become more widespread in the coming years as more of the ordered mega-ships are delivered and enter service. The effects on ports are challenging: peaks from mega-ships increase the volatility of port operations, placing a huge stress on equipment and labour at some periods and high idling rates at other times of the week. This increases the need for flexibility in port labour forces and pooling arrangements between terminals operating in the same ports.

Larger ships also require various infrastructure adaptations. They need deeper and larger access channels, longer and stronger quay walls, higher cranes with more outreach and terminals that are strong enough to carry heavier equipment. In addition, the peak load generated by mega-ships requires larger yard capacity to deal with peaks, as well as buffer capacity with regard to the connection of the port to hinterland transport modes. This requires space. Terminal operators, port authorities and companies taking care of hinterland transport cover many of the related costs. Frequently, it is ultimately the government and taxpayers that pay. Shipping companies reap benefits from the larger ships but are not responsible for many of the associated costs. Consequently, the total supply chain costs of larger ships may surpass the cost savings for shipping companies (ITF, 2015).

Upsizing of container ships has fuelled overcapacity in container shipping, and as such resulted in its limited profitability over the last years. The first mega-ship orders were placed when the world economy was still trying to recover from the economic crisis, soon followed by orders from almost all major container carriers, based on the wish to have similar cost advantages, rather than based on demand for such ships. As a result, an overcapacity of around 30% has been created in a few years, entirely caused by the newly ordered mega-ships. This overcapacity has depressed freight rates and overall profitability of the sector over the last years, from which a recovery began only slowly in 2017.

## Concentration and vertical integration

One of the consequences of larger ships is increased concentration in the container-shipping sector. Larger firms are needed to finance the new ships and to fill them. This has taken the form of mergers and alliances. The new generation of container ships (the mega-ships) have set in motion a wave of mergers and acquisitions that have seen the disappearance of eight of the top 20 carriers since 2014: most of these via mergers and acquisitions, and one (Hanjin) because of bankruptcy. As a result, the concentration of the sector has increased: the top four container shipping companies had more than half of the capacity in 2016; the figure was around a quarter in 2000.

In parallel, the dominance of alliances has increased. Alliances are agreements between shipping companies to share slots on vessels. These vessel-sharing agreements, made possible by exemptions from competition law, have become more important in the mega-ship era, as they allow medium-sized carriers to join forces, and order and deploy mega-vessels together. This in turn has prompted even the largest container carriers to join forces in alliances, resulting in a larger coverage of capacity by alliances than ever before. Moreover, the number of alliances has decreased, from six to four, and then down to three as of April 2017, resulting in a situation in which almost all of the East-West container trade lanes are controlled by three large alliances.

The combination of mergers and alliances has huge impacts for most containerised trade lanes. The East Coast of South America is a case in point. The capacity of intercontinental container traffic calling in this region is largely in the hands of the two carriers in the 2M Alliance: Maersk and MSC, together controlling 62% of capacity in 2017. The acquisition of Hamburg Süd by Maersk has contributed to the steep concentration rates in the region in 2018.

The effects of container shipping concentration on ports are daunting. They have strengthened the hand of shipping companies in negotiations with container ports and resulted in shifts of cargo to another port in cases where ports do not want to conform to all of the demands of carriers for lower tariffs, infrastructure investment and additional services. A similar power play is at work between carriers and terminal operators. The concentration of the carrier side has often not been mirrored on the terminal side – including in Argentina, which has resulted in an increase of unproductive inter-terminal moves, especially in ports where carriers each have their own dedicated terminal.

Carriers are not only merging (horizontal integration), but also incorporating other parts of the freight transport chain (vertical integration), in particular the container terminal industry. Whereas carrier-owned terminal operators held 18% of total container port capacity in 2000, this had more than doubled by 2016, when they attained a 38% market share. Part of this increase is caused by a very active acquisition strategy of the Chinese carriers COSCO and China Shipping (merged with COSCO in 2016), but most of the largest carriers, including MSC and CMA CGM have increased their terminal portfolios. Whereas vertical integration could lead to more internalisation of costs (e.g. terminal infrastructure adaptation costs) and better alignment of shipping operations and terminal operations, it could also pose challenges.

The combination of horizontal and vertical integration could lead to a freight transport system with very limited choice for shippers. Risk strategies of shippers often consisted of spreading risks, so engaging with different shipping companies to minimise supply chain risks. This strategy has become increasingly impossible due to concentration and alliances. If shipping companies start to offer whole supply chains, there is a risk that supply chains get “locked in”. Consolidation in combination with larger ships has reduced the frequency of weekly services and the number of direct port connections, resulting in the emergence of a hub-and-spoke system.

Such hub-and-spoke systems rely on a few large hubs where transshipment takes place, loading from larger to smaller ships (and vice versa) that call at a series of smaller feeder ports, the spokes. Two of the three current alliances have a widespread network of ports that can be used in such a hub-spoke configuration. This has been facilitated by deeply engrained political willingness to subsidise transshipment activity, despite its limited contribution to local value added or employment. Many countries have developed or are developing some sort of a hub port, in many cases driven by strategic ambition rather than commercial viability. In some cases, such as Singapore and Rotterdam, transshipment activity helps to ensure maritime connectivity that these ports would not have had if they were only gateway ports for their regions. However, a thorough assessment of costs and benefits for transshipment ports is warranted, considering the small transshipment margins but the phenomenal costs of transshipment ports often covered by the public sector (e.g. the port of Yangshan benefiting from a USD 2 billion subsidy).

Restrictive cabotage regulation, often justified by governments because it would guarantee domestic seafarer jobs, can frustrate national hub port ambitions, well-illustrated in the case of Argentina, where foreign shipping companies use Montevideo or Brazilian ports as their hub instead of Buenos Aires, since national cabotage restrictions would require Argentinean flagged vessels for that option. It is noteworthy that the Chinese authorities have gradually opened up cabotage legislation, also to facilitate the hub position of Shanghai port.

### **Possible port sector responses**

Developments on the maritime side can be problematic for the port sector. It might be compelled to invest in or retrofit infrastructure to become “mega-ship ready” with no direct return on investment, as the alternative could be empty ports. Consolidation and vertical integration have strengthened the hand of shipping companies in this game, whilst mega-ships instead of solving supply chain bottlenecks have added new ones and made port operations lumpier and less flexible. What policy responses are possible in this context? We suggest three possible avenues: more port co-operation, more stringent competition regulation and a reconsideration of the balance between the public and private sector.

More port co-operation could take the form of port mergers, alliances of ports and more central co-ordination of port policies. Mergers of ports are increasingly taking place, to create more critical mass and to counter consolidation in the container shipping industry. Many of these mergers are bottom-up initiatives, such as the ones in Seattle-Tacoma and Virginia-Savannah, but national governments sometimes also direct such mergers, e.g. in Japan and Italy. A less far-reaching form of co-operation could be realised by creating alliances between ports in the same region (e.g. the North Adriatic ports) and with the same characteristics (e.g. the ports gathered in the Chainport initiative, pioneered by the ports of Hamburg, Los Angeles and Antwerp). A different sort of alliance could be explored for terminal operators within the same port, in particular to pool some of the assets, such as equipment and labour, in order to deal with the cargo peaks from larger ships, which might require exemptions to competition regulations in some countries. Central governments could also co-ordinate the port functions in a country, in order to avoid duplication of public infrastructure. An extension of this could be a supra-national form of co-ordination of port functions and specialisations, in embryonic form present in the EU Trans-European transport network (TEN-T) and its core ports.

A second set of measures relates to competition regulation. Alliances are possible, because of existing legislation and regulation, in particular the EU consortia block exemption for liner shipping and the US Ocean Shipping Act. Both reflect the transition from a world of shipping conferences to a more restricted form of co-ordination via vessel sharing agreements in what was a fairly fragmented industry. Now that

the situation of fragmentation has been replaced by one of concentration, reconsideration of legal frameworks that allow for alliances makes sense. More focus should be given to the monopsony power of liner shipping that risks eroding public investment in ports and related infrastructure. In addition, competition regulation might want to take better account of the vertical integration tendencies in the containerised transport sector.

Finally, the public-private balance needs to be considered. All too often, the public sector picks up the bill of infrastructure adaptations needed because of the unregulated behaviour of a few global shipping companies. Many of these costs cannot be recovered via tariff increases, because of competition between ports and the wish of governments to keep their ports attractive, even if that means subsidising them. Governments could develop shared principles on investment in port infrastructure that might minimise the risk that liners play out ports against each other. The public sector often follows misguided port policies: not all countries need to have a hub port. A comparative study on costs and benefits of hub port development could shed more light on this issue.

## **Port-city interface**

Whereas port activities are conditioned by developments on the sea side, many of the constraints are often felt on the land side, in particular related to the interface with the immediate environment, in many cases the city. Most large ports are still urban ports and this urban environment creates challenges with regards to traffic planning, land use and governance.

### **Traffic planning**

The immediate interface for port and urban traffic is the port gate: the entrance to the port, usually at the boundary of port and city. Badly managed port gates can create major traffic problems for cities. They sometimes attract crime and deteriorate whole urban neighbourhoods. Conversely, poor connections of the port with the city or hinterland can considerably slow the flow of cargo and could make an otherwise attractive port much less competitive. Both port and city authority have an interest in arranging for a smooth port-city traffic interface. In the majority of port-cities, this primarily concerns truck traffic.

At the core of most successful port gate planning is some sort of appointment system. This means that truck drivers are provided with time-slots in which they can deliver and pick up a container. This can be considered a no-regret option: in almost all ports in which this has been introduced, truck waiting times and truck turn-around times in terminals has gone down. The effectiveness of such systems is increased if it is coupled with measures to increase the visibility of cargo flows, for example via port community systems (PCS) – which increase information exchange within the port – and through the more extended cargo community systems (CCS) covering information related to dry ports and hinterland transport. There is growing experience with such systems in a range of ports and countries, including Valencia, Le Havre, Dakar and Abidjan. Truck appointment systems gain in effectiveness if these are introduced together with truck waiting areas and incentives to enforce the system.

Truck waiting areas basically provide a separate area away from the port gate for truck drivers to wait for their allocated time slot. In this way, they do not hinder regular urban traffic and do not take up valuable port area. Such truck waiting areas are located closely to the port and might in some cases also provide dedicated access to the port area. The location of truck waiting areas determines, to a large extent, the flows of trucks in and out of the port. The ZEAL truck waiting area in Valparaíso made it possible to

re-route truck traffic from inner-city roads to a ring road around the city. Inspections can also take place in such areas, as they do in ZEAL, turning these into dry ports. The creation of ZEAL has reportedly reduced the turn-around time for reefer containers from 15-16 hours to 5-6 hours. Similar truck waiting areas are being conceived in ports of developing nations, e.g. the port of Cotonou in Benin.

In some cases, truck appointment systems come with incentives, both positive and negative. This can take the form of truckers being fined if they do not show up at the agreed time-slot, but also fines to be paid by terminal operators if they do not respect the schedule of allocated slots. A special incentive scheme was introduced in LA/Long Beach with the PierPass scheme and its traffic mitigation fee: a fee to be paid by truckers if they showed up at peak hours that would be waived if truckers came to the port at off-peak hours. This system managed to shift a considerable part of the port truck traffic to the nights when urban roads are less congested.

Despite some good policy practices, finding solutions for such port-city traffic problems can be difficult, as discussed in the accompanying paper of Peter Hall. In some cases, re-routing of truck access roads could lead to discontent in the neighbourhoods that now have to suffer additional truck traffic. Mitigating truck traffic could mean more truck noise at night in the neighbourhoods in close proximity to the port. Although solid stakeholder consultation processes can help to improve policy measures, they cannot always resolve the trade-offs inherent in managing port-city traffic.

More than ever, river transport is interlinked with sea transport, as a way to mitigate the impacts of port trucking. As a direct consequence, actors within the inland waterway transport sector are increasingly integrated in the contemporary logistics chains. There are however large differences between river basins. In the already mature systems efforts are required to maintain existing infrastructure, to be complemented by more data management, co-ordination and guidance. Systems under development, in Asia and South America, are facing high investment demands, but show high implementation capacity if river transport development forms part of larger regional projects. Embryonic systems, such as in sub-Saharan Africa, are still used in a traditional manner, but have great potential for improvement. In addition, a distinction can be made between basins with large agricultural and mineral freight potential, such as the USA, South America and the Danube, and industrial river basins that are more diversified and where services and port installations are designed to play a role in distribution of container traffic and to move energy resources.

Finally, port hinterland connectivity could be improved by more use of freight rail transport. This hinterland transport mode can help to reduce freight costs for longer distances in most countries, reduce air pollution, reduce road congestion and facilitate the evacuation of many containers over a short period. As such, it might be one of the possible ways to adapt to larger ships and the larger peak loads that they generate in ports. Developing freight rail transport is connected to various challenges including social challenges as in some locations freight trains will utilise rail infrastructure shared with passenger trains.

## **Land use**

Port cities risk falling victim of their own success. In the best cases, port development drives local economic development such as manufacturing and trade-related services, which increases local wealth and the economic attractiveness of the area. This translates into higher land prices, which make port functions close to the city less sustainable: it raises the opportunity costs of port land and increases the pressure on ports to use their land for more lucrative urban development. Residential and business developments are much less land intensive and tend to generate more revenues per square metre. This is a tendency common to many port-cities, only intensified with the rise of “global cities” which has

transformed local property markets into global property markets, resulting in spectacular increases in real estate, which has driven port functions out of many of these global cities.

The result could be the relocation of a port outside the city. This can be considered the most radical form of spatial port-city disintegration that often takes a more gradual character, with the port withdrawing from the city in stages. Port relocation makes sense when port infrastructure has reached the end of its life cycle, when opportunity costs of port land become very high and when good options for alternative port sites are available.

If well planned, this could be a win-win option for both port and city. The port could find a site that is better suited to the requirements of modern container shipping, such as sufficient depth, long linear quay lines and spacious terminals, well connected to hinterland transport networks. The city could use the land that the port liberates for development of an urban waterfront, often a unique opportunity for urban revitalisation.

Larger container ships tend to make most upstream urban ports less appropriate because of required nautical accessibility and space. Some of these ports might compensate for their constraints by offering superior hinterland connectivity but the acceleration of container ship size increases raises the question of port relocation in many parts of the world. Port relocation is not a universal panacea: it makes most sense if an urban port has reached the end of its life cycle, if the opportunity costs of the port land are high and if there are attractive alternative port sites available. Much of this depends on local circumstances. Detailed assessment will be needed in each case to establish costs and benefits of port relocation, including costs of establishing landside connectivity between the new port site and existing facilities remaining in the urban core. Attention to the process of port relocation requires serious consideration, as port relocation can bring various additional challenges that could be minimised if well-planned and co-ordinated. In Singapore, for example, the planning for the transformation of city terminals into urban waterfront area is taking place at the same time as the planning for a new extra-urban port to the west of the city, the Tuas port that will bring total annual container handling capacity of the Singapore port to 65 million TEUs.

## **Governance**

Good governance facilitates the smooth management of port-city interfaces. Co-ordination and alignment of port and city policies requires interaction between the port authority and city authority in one form or another. It is difficult to generalise here considering the large differences between countries with respect to functions and responsibilities assigned to port and city authorities: some cities have full control over their ports, but this is not the case in most countries, where the national government plays a dominant role in port policies. Also the extent of city responsibilities in land use planning, transport and economic development differ significantly from country to country.

Port-city governance mechanisms tend to be asymmetric. In most countries, cities have an official position in port bodies, whereas the inverse is not often the case. In the case where cities do not have a lot of incentives to develop their port – for example, because they do not get the tax revenues related to port activity – they could use their position on boards or supervisory bodies to block rather than supervise port plans. Urban planning often ignores port plans, or limits future port expansion, for example by allowing urban expansion close to port limits, leading to encroachment on land needed for development of the port.

Decisions on port investment are driven more than anything by local tax revenue impacts but the governance bodies established to direct port development need to keep a strategic focus that



encompasses the economy of the entire region the port serves. Port supervisory boards often tend to forget their strategic role and often use board meetings to direct management decisions to promote narrow interests rather than the economy as a whole.

Policy alignment can also be achieved via central government interventions. Examples include conditional grants, which create different dynamics than purely local revenue sources. Central governments also tend to prioritise their investments via an implicit or explicit port hierarchy, e.g. as deployed in China, which could bring some more policy coherence in port systems characterised by huge competition between local actors.

Alignment of policies not only requires interaction between port and government authorities, it ideally also includes a wide range of stakeholders, such as maritime services industry, business organisations, NGOs, labour unions and academics. Ports such as Rotterdam and Vancouver have engaged in long-term scenario planning that includes extensive consultations with such stakeholders. This should serve as an example for many ports. In general, a new conception of relevant stakeholders is often needed, in which real estate developers and local neighbourhood organisations are included and the public is actively consulted.

## **Towards a holistic freight transport system**

The maritime supply chain – here defined as the string of actors involved in arranging door-to-door transport that includes a sea leg – is fragmented. There are many actors involved in this supply chain and interfaces are often not particularly smooth. The result: inefficient supply chains, which incur unnecessary costs. We might have reached the point where the efficiencies that can be reached by more collaboration between actors in the supply chain are higher than the efficiency gains within the silos of the respective actors.

Alignment is sometimes difficult because of limited concentration. That is, some transport sectors are characterised by high shares of small and medium-sized enterprises. For example, the trucking industry in many countries has a very large number of single truck companies. Similarly, barge companies often consist of an owner that operates one barge. Such atomisation makes it difficult to align sectors. This fragmentation also makes it difficult for sector organisations to represent and organise the different companies. Alignment is also sometimes difficult because one sector is much more concentrated than others.

The performance of many stakeholders has been improved significantly over recent decades. An example is ship turn-around times in ports. Since the 1990s, average container ship turn-around time has declined from several days to approximately one day. Such productivity gains have been driven by investment in new infrastructure and equipment, such as more and better performing container cranes. Many of these improvements have taken place in developing economies; this is logical as the potential for improvement is larger there. Globalisation of transport operations and supply chains has led to a convergence of performance in different parts of the world. Similar improvements within silos have taken place with regards to container dwell times and maritime transport costs.

The new efficiency frontier for maritime supply chains are the interfaces between stakeholders. Examples of such interfaces and performance bottlenecks include: ship waiting time, unproductive terminal moves, terminal dwell times and waiting times for trucks, trains and barges before handling, as well as optimisation of interactions at the end of the chain, e.g. between shippers and truckers. These are all moments where at least two different stakeholders are involved and where inefficiencies are the

result of lack of communication, co-ordination and alignment. It is here that efforts for developing new performance indicators should be focused.

The extent of such barriers could be very substantial. The scale of inefficiencies is difficult to establish, because these determinants typically do not enter in traditional maritime performance indicators. However, some of the existing evidence in selected places shows that the inefficiencies could be large. E.g. in Buenos Aires, half of the ships calling at the port have waiting times of half a day on average. According to some industry metrics, each second of time lost costs shipping lines EUR 1, which gives an indication of the millions of Euros lost each day due to waiting time. Unproductive crane moves in container terminals regularly represent 10% of total moves, undermining the profitability of operations.

Such bottlenecks can only be solved via collaboration of the involved stakeholders extending to all the actors in the maritime supply chain. For example, a smooth entry of a ship into a port requires that the ship arrival is planned for at the exact time when a berth, pilot and tugboat are available, so that no time is lost waiting for any of them. This requires communication and alignment of their actions. Similarly, reduction of unproductive moves could be achieved via stronger collaboration on stowage and yard planning by carriers and terminal operators, so that boxes are positioned in such a way in yards and ships that the number of unproductive moves is minimised. There is some anecdotal evidence that terminals with the strongest co-operation with carriers also manage to achieve the highest ship handling productivity rates.

## Argentina as an illustration

Improving trade and infrastructure is central to the agenda of the Argentina's government, which intends to invest in ports, railways, roads and waterways. Since it took office in December 2015, the government has brought import licenses into line with WTO procedures and lifted or reduced export taxes. Argentina recently abolished an insurance levy of USD 85 per container for which no corresponding service was provided.<sup>1</sup> These trade-friendly measures will facilitate maritime trade and should stimulate growth in cargo handling at Argentinian ports.

The government's transport agenda for 2016-19 contains many elements that should improve freight transport and maritime trade. It is based on three strategic pillars (infrastructure investment; connectivity and safety; quality and sustainability), covering all modes and providing an investment envelope of USD 30 billion. While most of these funds are reserved for roads, a substantial part is also to be invested in freight rail and ports, in particular the port of Buenos Aires (USD 1.5 billion). Goals to be achieved in 2019 include an ambitious increase of rail freight transport of 50% and faster and more reliable water transport.

Within this context, Argentina illustrates a number of aspects for needing holistic freight transport planning and the necessity to take into account the whole supply chain. Although the current government is taking steps to tackle bottlenecks within the freight transport network, such as investments in freight train networks and a reservation system for the port of Buenos Aires, until very recently some of the basic data for understanding freight flows and their value for the Argentinean economy, fundamental to developing an overall freight transport strategy, has been missing. A first step is to systematically map current cargo flows and their projections for the future: where are the exports and imports generated, how could these best be facilitated, and what would that mean for a port system?

Strategic planning of port development should begin with the outlook for economic activity to be served by the ports. The starting point needs to be the establishment of scenarios for the development of existing traffic and for the potential development of new markets. This has been the approach taken, for example, by the Ministry of Transport and Communications in Chile in examining the need for a large, new deep-sea container port to serve the region around Santiago (ITF, 2015). Argentina has recently acquired a solid basis to undertake this exercise for the ports of the Rio de la Plata with completion of the preliminary analysis of freight flows in 2016 under the Ministry of Transport's *Estudio Nacional de Cargas*. One example of the new markets expected to emerge for the River Plate ports is the export of lithium from salt deposits in northern Argentina. The ITF Roundtable focused on container ports and dedicated a special session to Argentina's main container port, Buenos Aires. At the same time, bulk cargo continues to be essential to Argentina's importers and exporters and many of the other Argentinean ports, more specialised in bulk cargo. This would deserve attention in future work.

Almost irrespective of the inland cargo flows, the port of Buenos Aires is constrained by the challenges from the maritime side. As an upstream estuary port its attractiveness is affected by the way in which larger ships can or cannot access the port; the main constraint is the lack of depth in the Rio Plate estuary, connecting Buenos Aires with the open sea. Our analysis in the paper "The container port of Buenos Aires in the mega-ship era" suggests that it might make less sense in the future for shipping companies to accept continuously declining utilisation rates of ever larger ships when they call Buenos Aires, running vessels partly empty to ride higher in the water. The port also lacks space and is encroached upon by urban development, resulting in road congestion. In short, the position of Buenos Aires as one of the main ports in the East Coast South American port system cannot be taken for granted.

If maritime accessibility and spatial constraints in Buenos Aires' Puerto Nuevo do not improve, shipping companies might reach a point where leaving Buenos Aires out of their direct intercontinental connections is beneficial. Traffic to and from Buenos Aires could in that case be assured via feeder services with ports like Montevideo, Paranagua or Santos. With regards to transshipment cargo, it should be noted that Buenos Aires is the dominant container port in Argentina, but in fact not used as the main hub for other Argentinian ports. A large share of Argentina's grain exports is transported via the port of Rosario to deep-sea ports like Santos in Brazil where it is transhipped to larger ships before continuing. Similarly, much of the cargoes coming from the south of Argentina use ports like Bahia Blanca, Ushuaia, Puerto Deseado, Puerto Madryn and Mar del Plata and go to Montevideo in Uruguay or to ports in southern Brazil where the cargoes are transhipped to larger ships. Using the port of Buenos Aires is not an option as it adds cost and travel time considering its location more than 200 kilometres upstream on the River Plate. Feeder services to hub ports in other countries should not be viewed as a failure of policy when, as in this case it is the most efficient solution because of physical geography. The efficiencies achieved reduce the costs of trade for Argentina fostering overall port activity and economic growth. Although enough cargo flows are generated in Argentina to justify an Argentinian container port hub, the upstream location does not make Buenos Aires suited to such a role.

Buenos Aires is an interesting market for a global terminal operator, but not at any cost. It is the gateway to Argentina, second largest economy in South America, with huge potential for growth. Buenos Aires is one of the few places where all four large global terminal operators have a terminal. However, this is not a guarantee for future interest. The place of Buenos Aires within the port system of the East Coast of South America is under pressure. If other ports in the region – with deep-sea access and larger terminals – increase their attractiveness, shipping companies might decide to cut Buenos Aires out of some of their loops where cheaper alternatives are available, e.g. in the form of hub-and-spoke networks. So the interest of potential bidders for future terminals in Buenos Aires cannot be taken for granted.

In the short term there is not a lack of container port capacity – although most of this capacity might not be suitable for the ship sizes that will soon come to the East Coast of South America. Currently available capacity amounts to almost 3 million TEU handling capacity in the Buenos Aires region (Puerto Nuevo, Exolgan and Tecplata), which is around double the volume handled at the moment. If all of the possible extensions and announced plans would be realised, this capacity would even rise to almost 4 million TEU. Argentina has – in a way- the ideal opportunity to redesign its containerised freight transport system. The three concessions for the terminals at the port of Buenos Aires (Puerto Nuevo) will all expire in 2019, which raises a number of fundamental questions: under which conditions would it make sense to continue having port activities at the current location; are there alternatives for the port of Buenos Aires that should be considered; and if so, how could these be made to work most effectively in the interest of Argentinean shippers?

Theoretically, there are three possible long-term perspectives for the location of container ports in Argentina: going upstream, going downstream or staying in Buenos Aires – each with their distinct advantage: closeness to main exporters, closeness to deep sea – so less need for dredging – and closeness to the main consumer market. The main export volumes come from the industrial and agricultural heartlands between Buenos Aires and Cordoba, 700 kilometres North West of the capital, so upstream on the River Plate and Parana River. The main disadvantage of upstream ports (limited draft) is the mirror image of downstream ports that have direct deep-sea access so no draft limitations. Finally, the main consumer market is Buenos Aires, which is in between the main exporters and deep sea. The strategic discussion on the ideal location of container ports in Argentina basically has to treat this dilemma: the way that these benefits and drawbacks are weighted – implicitly or explicitly – determines the outcome of that discussion. A new upstream port could minimise truck movements in Argentina, possibly limit total transport costs for Argentinian exporters, but will not be able to attract the vessels currently calling ECSA ports, so it could mean the loss of direct intercontinental calls of container ships to Argentina. The upstream port might in that case need to rely on foreign hub ports, such as Montevideo or ports in Brazil that have direct deep-sea access. This might open up the possibility of high-frequency connections of fairly small size.

Plans for a new downstream port at Punto Indio have frequently been floated, including by the previous government that reserved land there for port development. Although this would save time for shipping companies that would not need to sail up the River Plate, it is not clear if this would result in lower transport costs, as most of the cargo would need to be transported to inland destinations by truck, as it would probably be too close to Buenos Aires for rail to be a competitive option. The area is not highly populated and hinterland connections would need to be constructed to link the port to main consumer and production areas. Moreover, the location is reportedly less attractive than it might seem, as water depths are still relatively shallow, so dredging would still be needed and the access channel might be difficult to maintain.

The final option would be to continue having a major container port in Buenos Aires and adapt this for larger vessels. This option would imply widening and deepening of the access channels in the River Plate, creating linear quay lines instead of the current finger pier-structures, enlarging the container yard capacity and increasing the capacity to handle trucks and trains on the terminal. This could take several forms: restructuring and amalgamating the three current terminals or adding a new offshore port at the location of the current port. The consequence would be a substantial increase in the number of port-related truck and train movements, and related negative impacts for congestion and air quality.

The Argentinean government is oriented towards expanding the port in Buenos Aires. This orientation is driven by a range of concerns, including employment and urban development. One of the elements is

preservation of terminal jobs in Buenos Aires, which concerns the approximately 2 500 workers in the three terminals in Puerto Nuevo. In the interests of efficiency, instead of opening a call for bids for three terminals, the government envisages consolidating the three terminals into one and granting a concession to one operator or consortium. Although this might guarantee jobs, the new operator of the consolidated terminal will likely employ fewer than the current combined number of workers. Another motivation of the government is to develop part of the port land into an urban waterfront, possibly combined with port functions related to cruise shipping.

AGP, the port authority of Buenos Aires, also has plans for improving the port, described in the paper “The container port of Buenos Aires in the mega-ship era”, based on restructuring the current terminals by filling in some of the finger piers, strengthening quays, dredging berths and enlarging turning basins. Plans developed by consultants go further, adding a new offshore port – via landfill and construction of a new breakwater – just in front of the existing port. Part of such investments would be made by the government and the other part by the new concessionaire. As these investments are substantial, authorities are considering a duration for the new concession of the order of 35-50 years. At the same time the authorities would insist that works are tied to demand triggers that would ensure flexibility and adaptation to the market at each stage.

Although the expiration of the existing terminal concessions in 2020 requires a policy response that could include continuation and expansion of container operations in Puerto Nuevo in the short and, possibly, medium term, one could wonder what long-term options are most appropriate. In this respect, a strategic discussion is warranted on the benefits and costs of the different options for container terminal operations in Argentina in the longer term. Consultation between stakeholders to establish a common strategy for port development in the region will be essential for productive investment in new capacity. The government has made a good start, not least through the discussions at the Roundtable meeting, but could benefit from a deeper reflection on the destination and origin of trade flows in Argentina and the most suitable container port system to accommodate these.

There might also be a governance conundrum to solve related to the interplay of private and public ports. There is a series of grain and soybean bulk terminals along the Parana River, with 15 terminals on 60 km of river. In peak season there are 15 000 truck trips a day to these ports and congestion problems are widespread at the port entrances and on surrounding roads. Truck waiting areas are inadequate and trucks routinely queue for a day, doubling the cost of vehicle hire to take produce to the ports. In order to solve this bottleneck, an appointment system was recently introduced at the Rosafé terminal complex, so that no truck is allowed to reach the area without an appointment assigned by the terminal. The governance conundrum related to the dry bulk terminals is exacerbated by the lack of a port authority; as these are all private sites with no local authority interest. Neither city authorities nor the province regulate these ports. This governance vacuum needs to be filled and the river authority is probably best placed to co-ordinate improvements. The Undersecretariat of Ports at the Argentina Ministry of Transport has suggested a sanctions and fines system to be introduced in all ports which would increase the effectiveness of port supervision. Investment in truck parking facilities is required and a simple, mobile phone-based system of reservations for truck access to terminals might go a long way to cutting delays and cutting congestion on the roads. Similar congestion problems are typical of Brazil and many other countries. In Colombia, port communities have been established to address the governance issues, for example in Buenaventura, with positive results. The policy challenges related to the interplay of private and public ports were at the core of the ITF Ports Policy Review of Chile (2016). Some other port systems also lack port authorities, e.g. in Hong Kong where the port falls under Unit 5 of the Hong Kong housing authority.

The government has announced major infrastructure investments that should improve the freight transport system connecting the ports to their hinterlands. In particular this is the case for the investments in road infrastructure and freight railways, specifically aimed at better connecting North West Argentina. Inland waterway transport along the Parana and Uruguay rivers through the industrial and agricultural heartlands is under-developed, a legacy of cabotage restrictions and other barriers to trade. There is currently no river service for containers to Buenos Aires, with only dried goods carried for export, and containers bound for transshipment in Montevideo. This is the result of multiple customs clearance requirements making costs prohibitive; containers exported from Rosario via Buenos Aires port require customs clearance at both Rosario and Buenos Aires. Containers exported via Montevideo require clearance only at Rosario. This is a clear anomaly that could and should be rectified without delay. Moreover, export credits are only available for shipments departing Buenos Aires, stifling traffic from other ports. On the Yangtze river ports in China, reform of a similar situation has seen container traffic from Nanjing for transshipment in Shanghai's Yangshan port grow rapidly following the decision to issue export credits in Nanjing, despite the 24-hour barge trip compared to five hours by road. This illustrates the potential for modal shift when barriers are removed. Cabotage restrictions are also a barrier to barge trade on the Parana River, with Paraguayan barges excluded from cabotage and allowed only to pick up loads bound for Montevideo, diverting traffic to the roads.

Government policy with respect to hinterland connectivity of the port of Buenos Aires might have mixed results. An important project in this respect is the Paseo del Bajo project that will connect the Buenos Aires-La Plata and Illia highways, whilst creating new green spaces in the El Bajo area of Buenos Aires. Its aim is to relieve congestion in the city and improve the North-South connections with 12 new lanes over six kilometres, including a semi-underground road of four lanes intended for heavy vehicles. This new access will allow freight traffic to exit the Buenos Aires-La Plata highway, cross the centre without traffic lights and to enter the port directly. This could improve travel times. However, as part of the works associated with the Paseo del Bajo project, the national government is putting some key port land up for sale: the railway sidings at Empalme Norte (Retiro) and practically all of the customs warehouses adjacent to the container handling facilities in Puerto Nuevo. This might complicate rail access and detract from value added logistics services in the port as it takes rear space away from the port necessary to keep the port operational.

## Note

<sup>1</sup> Such redundant revenue raising levies are frequent in the sector. For example, in Mexico, a recent OECD regulatory policy review recommends reviewing a customs pre-validation process, which costs about USD 16 to USD 20 per container, but does not appear to reduce exposure to inspection or regulatory sanctions in any way (OECD, 2017). The service is currently operated by the customs broker association but could be integrated into the country's on-line single window documentation system without charge.

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## List of participants

### Chair

Mr. Trevor HEAVER Professor Emeritus, UBC Sauder

### Participants

Ms. Julieta ABAD	Senior Transport Specialist, Interamerican Development Bank
Mr. Michele ACCIARO	Associate Professor, Kuehne Logistics University
Mr. Yann ALIX	General Delegate, SEFACIL Foundation
Mr. Jonathan BEARD	Head of Transportation & Logistics, Arcadis
Mr. Antoine BEYER	Professor, University Cergy-Pontoise
Mr. Carlos CABRERA	Terminal 4, Buenos Aires
Mr. Patrick CAMPBELL	Centro de Navegación
Mr. Gustavo DELEERSNYDER	Secretario de Planificación de Transporte
Mr. Angel ELIAS	Ente Administrador Puerto Rosario (ENAPRO)
Mr. Rafael FARROMEQUE	Ports & logistics expert, Development Bank of Latin America
Mr. Claudio FERRARI	Professor, University of Genoa
Mr. Gustavo FIGUEROLA	Terminal Rio de la Plata
Mr. Federico FRANCHINI	Consorcio del Puerto Bahia Blanca
Mr. Darío GONZÁLEZ	Subsecretaria de Puertos y Vias Navegables, Ministerio de Transporte
Mr. Peter HALL	Professor, Simon Fraser University
Hr. Hercules HARALAMBIDES	Professor, Erasmus University Rotterdam
Mr. Harald JAEGER	Senior Advisor, Chile Ministry of Telecommunications & Transport
Mr. Juan Alberto LARRAGUE	Senior Transport Specialist
Mr. Carlos LARGUI	BACTSSA Terminal 5, Buenos Aires
Mr. Juan Francisco LINARES	Consorcio del Puerto Bahia Blanca
Mr. Ramiro LOPEZ SAUBIDET	Administración General de Puertos
Mr. Ramiro MARTIN	Subsecretaria de Puertos y Vias Navegables, Ministerio de Transporte
Mr. Juan Jose MENDEZ	Secretario de Transporte del Gobierno de la Ciudad
Mr. Olaf MERK	International Transport Forum



Mr. Jorge METZ	Subsecretaria de Puertos y Vias Navegables, Ministerio de Transporte
Mr. Andreas MEYER	Consultant
Mr. Alexis MICHEA	Head Logistics unit, Chile Ministry of Telecommunications & Transport
Mr. Gonzalo MORTOLA	Administración General de Puertos
Mr. Roberto MURCHISON	Terminal Zarate
Mr. Ricardo NEGRI	Secretario de Agricultura, Ganadería y Pesca
Mr. Roberto NEGRO	Exolgan
Mr. Gylfi PALSSON	Lead Transport Specialist, World Bank
Mr. Stephen PERKINS	Head Research and Policy Analysis, International Transport Forum
Mr. Luis PETRINA	Dock Sud
Mr. Diego Fernández QUEREJAZU	Terminal Puerto Rosario (TPR)
Mr. Rodolfo ROCCA	Consorcio de Gestion Puerto la Plata
Mr. Arturo ROJAS	Consorcio del Puerto Quequen
Mr. Ricardo SÁNCHEZ	Deputy Director CEPAL
Mr. Matias SKET	Subsecretaria de Puertos y Vias Navegables, Ministerio de Transporte
Mr. Edgardo SPAGNOLO	Consorcio del Puerto Bahia Blanca
Mr. Richard THIVIERGE	Former Director-General, Transport Canada
Mr. Marten VAN DEN BOSSCHE	Director Global Connectivity, Ecorys
Mr. Pablo VILAR	Subsecretaria de Puertos y Vias Navegables, Ministerio de Transporte
Mr. James WANG	Associate Professor, University of Hong Kong
Mr. Gordon WILMSMEIER	Kühne Professorial Chair in Logistics, University of Bogota
Mr. Luis ZUBIZARRETA	Cámara de Puertos Privados y Comerciales

## Container Port Strategy

This report examines how ports can accommodate changes in maritime transport (such as the arrival of mega-ships) while adapting to developments in the hinterland (notably in their host cities). It presents considerations and recommendations for policy-makers to help find a mutually beneficial balance between port and city, with a special section dedicated to Buenos Aires and its container port. The publication summarises the results of a Roundtable held in Buenos Aires in 2017.

### **International Transport Forum**

2 rue André Pascal  
F-75775 Paris Cedex 16  
+33 (0)1 45 24 97 10  
[contact@itf-oecd.org](mailto:contact@itf-oecd.org)  
[www.itf-oecd.org](http://www.itf-oecd.org)