Brave New World

Transformations in Transport, and the Consequences They Entail

Mika Aaltonen

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Preface

We are witnessing the escalation of the alternative reality we call virtuality.

Like Alice, we have fallen through a looking-glass to a wonderland, the virtual world where all the elements of human nature are played out, a world overflowing with terrible danger and nearly boundless opportunity.

As it often happens with euphoria, we are addicted to it, at least for the time being.

Even so, geography still matters. Beyond finance, goods arising from the digital world still have to move hither and yon.

There are number of themes by which the future could be explored, but the most encompassing is the transformation in global transport.It will bring the world to us, and it will detonate great risk and opportunity.

Transport is the intersection between virtual and physical worlds. There are limits to what can be done in either world. It is transport that shuttles us between them, making the leverage of the virtual world tangible in the physical.

There are signs of significant change. This report is sorted out accordingly:

- Long-term developments in trade.
- Modes of transport: Airfreight and hinterland rail.
- Lines of maritime communication.
- Politics and geopolitics.
- Ports.
- Dragons be there.

By now, it is possible to see how the changes come together as a fabric and weave the world trade into a new system of systems.

The report envisions a future different from the world we live in today, and stipulates new responses to immediate and long-term challenges.

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Contact: office@port2-0.com

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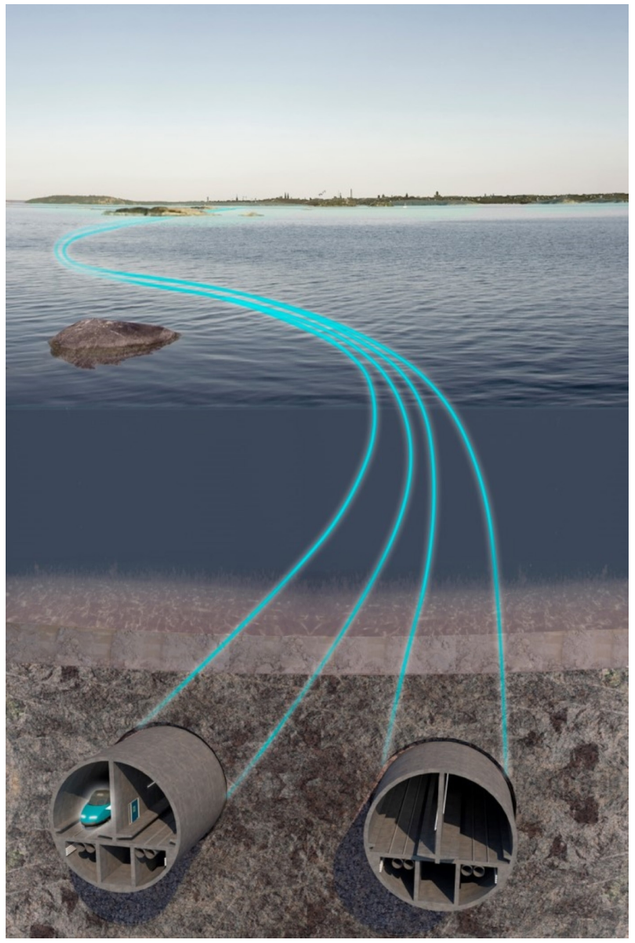


Brave New World

The present globalized economy necessitates steaming basic commodities and intermediate materials back and forth across the world, often multiple times, for the sake of capturing the lowest labour.

China's rise has been fueled by steel production from more than 2,500 small and largely antiquated steel mills, which burn coal for energy, coking coal in the production process, and depends on the environmentally bizarre transit of Brazilian iron ore halfway across the world to Qingdao.

Among the critical change factors there is also the growth in human population.

The instantaneous explosion in the human population has composite effect across all the ecosystems of the planet.[1]

It has taken humans 200 years to increase from 1 billion in 1800 to over 8 billion on November 15th in 2022.[2] The entire planet — all of the flora and fauna — have come under simultaneous assault.

The environmental degradation has been ongoing since human beings became dominant. We have destroyed ecosystems and ecorelationships that have taken far longer to evolve than we. This, when placed alongside climate change, means that the earth cannot be "restored." [3]

It is going someplace new.

Globalization, and maritime trade, which enables it, has created a world in which no country is any longer self-sustaining.

Sometime in 2008, the human species crossed the threshold toward becoming a different animal. An urban creature, geographically divorced from the natural world that still continues to feed and fuel us. For the first time ever, we have more people living in cities than out on the land. Also, for the first time, most of us have no substantive ability to feed or water ourselves. We have become reliant upon technology, trade, and commerce to carry out our most primitive functions.

The world's rural population peaked somewhere around 3,5 billion in 2019. Most of the rural depopulation is taking place in the developing world. The reason for this migration is that people can make money in town. There is no demand for farm labour anywhere in the world.

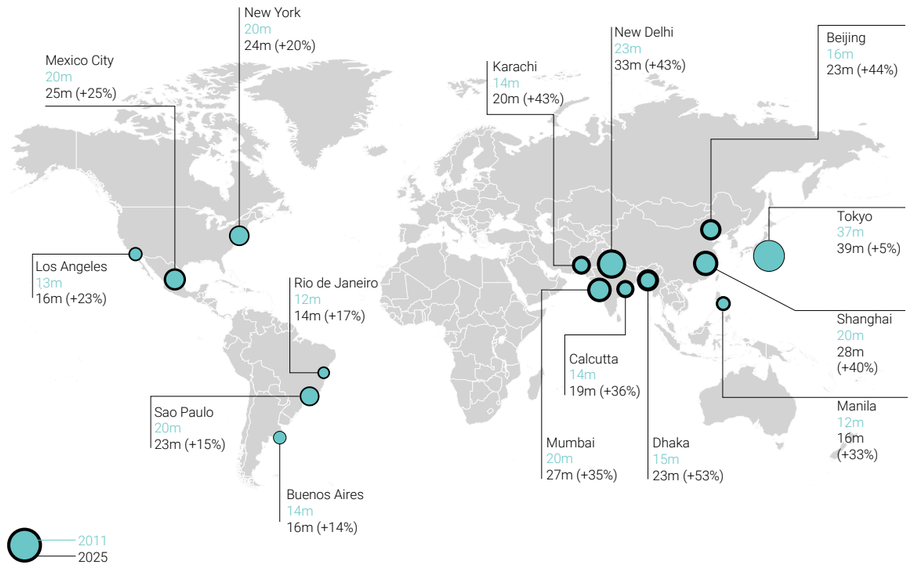
Worldwide, urban centers are shifting east. Of the eight new megacities anticipated over the next fifteen years, five are in Asia, two in Africa, and just one in Europe.

No new megacities are anticipated for the Americas.

Several implications follow.

The World's Megacities Are Set for Major Growth

Population growth of the world's top 15 megacities (millions, 2011-2025)[4]



This means that opportunities to remedy environmental degradation may increase, both from new urban technologies, as well as relieving the burdens of human occupation in the country. This effect could be very profound, ushering in an en-

[1] World Meteorological Organization. Provisional State of the Global Climate 2022.
[2] www.un.org
[3] Persson, L. Et al. (2022) Outside the Safe Operating Space of the Planetary Boundary for Novel Entities, Environ. Sci. Technol. 2022, 56, 3, 1510–1521.

[4] UN-Habitat. World Cities Report 2022

tirely new type of economic marketplace, and we can expect new products will emerge from the demand to make cities more livable. [5]

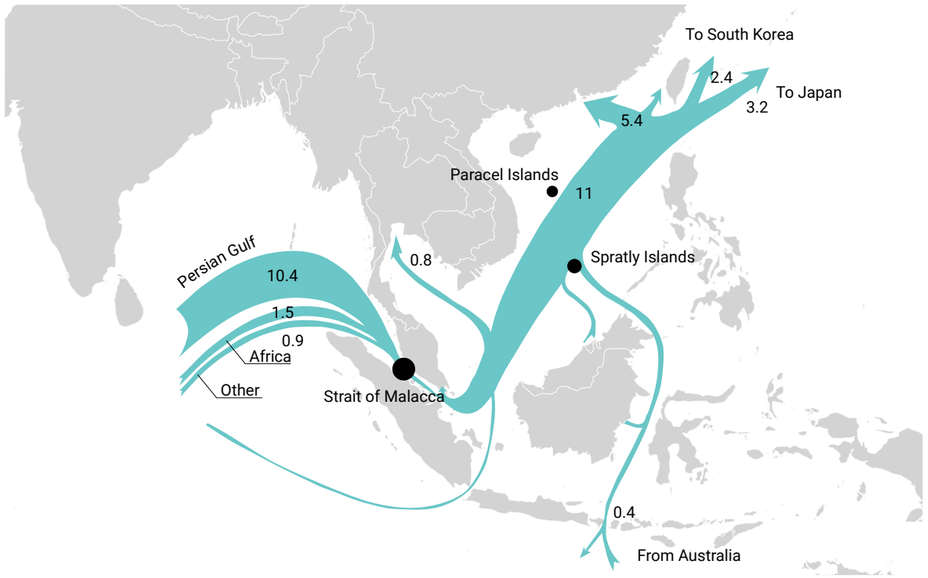
This development points to a world increasingly regionalized.

In a world of megacities, growing alongside the new economies of India and the Far East, it is difficult to find compelling arguments for those regions to buy goods and services from developed nations.

To believe that the present patterns in world trade will continue is to deny the progress the Asian nations have made.

The enormous increase in the world population will be centered

Singapore astride Malacca Strait
Major crude oil trade flows in the South China Sea (2011, million barrels per day)[6]



on 33 megacities. This leads to the creation of "mega-hubs", which compete for access to hinterland markets. The "spokes" of the hubs — with direct access to the consumer markets — will create the competitive edge.

The trend places a premium on any technology or infrastructure that defines access to the consumer, all long-distance logistics costs held relatively equal by a mega-hub system. For all of the ink spilt on the rise of global logistics, especially shipping, in the past 30 years, the less obvious but more important trend in transport may be regional.

Global trade, ultimately, is about local consumption.

In such a world, competitive strategies favour entrepôt enterprises, which become intermediary magnets to attract the distant "long-trade". Such as Singapore pioneered, in which fortuitous geography is leveraged by legal and tax accommodations.

The necessity for new technology, real and virtual, to create both the hubs and spokes, takes real estate on a new importance. Old ports may prove more expensive to upgrade than new ports and hubs purpose-built. Future hubs, especially intermediate hubs, are likely to be where today's ports are not, and where tomorrow's population portends new consumers.

If the trend continues to be in consumer goods, then we should expect that both downstream and upstream, ports of origin and destination will change as the developing economies mature, their populations increase, and markets grow.

[5] Poon, L. (2022) Where the Rapid Rise of Megacities Is Unsustainable, Bloomberg
[6] UNCTAD (2022) Review of Maritime Transport

Long-term Developments in Trade

Terms "globalization" and the "global economy" can be misleading generalizations. What we mean is that trade today is both international and interlinked.

Trade has always been international, or at least conducted across long distances.

It is the "interlinked" part that is different. In one generation and without much warning, the world has assembled itself with into the unlikely linkages we have come to call global value chains:

1. Among the most obvious changes since 1990 is the necessity for nations to trade. After the past 30 years, there are very few non-trading nations in the world. Those that remain are largely poor, socially, politically and economically isolated, and often landlocked. Even criminal sub-areas of nations, such as the drug-dominated areas in Mexico, Columbia, and Thailand, rely on global trade to create the large hoards of cash they generate. Until our times, trade has been largely opportunistic, never obligatory on any large scale.
2. Only 30 years ago much of the world lived behind the walls of communism, and almost completely isolated from world commerce. Outside those walls, consumer goods had two principal sectors: automobiles and a growing selection of electronics, such as cameras, televisions, and music devices. As a result, Atlantic trade dominated Pacific trade.
3. The rise of the Asian economies has created a third great region of commerce on the planet in addition to the Americas and Europe. Though for the last 30 years China has been the most discussed, Korea and Japan collectively are the world's great industrial cauldrons in machinery, automobiles, and ships. Along with Taiwan, they hold a significant share of global information technology and electronics production. Singapore has become a global finance center, and one of the world's great ports astride the world's most important strait.
4. The migration of the global economy to transnational corporations is now nearly complete. This trend has multiple ramifications. For one, it has lead to the aggregation of much of the world's most valuable commodities in the hands of a few corporations. It has also minimized the analytic value of national economic statistics. Import-export figures are less meaningfull as they used to be — much of the movement in goods in and out of borders is reflective of trade between different elements of the transnational subsidiaries. Transnational incorporation has effectively created a new group of actors in world society, which lie outside and to a large extent operate beyond the world's legal frameworks.
5. Under the aegis of global value chains, labour has become commoditized, with the net effect that labourers no longer have bargaining power anywhere in the world.

Three regions

6. The arrival of information technology has migrated the mechanisms of market finance from national to extra-national banking and, as a parallel development, enabled futures derivatives and other financial instruments that are in great measure unregulated to dominate the world's financial activities.
7. The nature of trade has also changed. From the 16th century to the World War II, trade was mainly one way. Profits flowed to Europe from the Far East from spice, tea, and textile trades. What economic trappings arose in the process were afterthoughts, organizational and financial tools, to deal with the plunder.
8. Now there is a different flow of goods, one in which the transit of commodities and intermediate goods flows back and forth across the earth in the development of finished manufactures. [7]
9. The geographic direction, volume and value of today's trade flows are determined from highly volatile extrinsic factors. Such as time-to-market, capital flows, insurance and reinsurance. And complex, often opaque and traunched, global

[7] UNCTAD World Commodities at a Glance 2022

ownership. And, above all, the cost of logistics, both supply and demand. Ultimately, global value chains turn on devalued labour, which is, in effect, what is being transported back and forth across the seas in modern maritime trade.

10. Finally, what is produced has also changed. The world economy is a consumer-driven global economy, with the result that the value of manufactured goods has a high level of volatility, oscillating rapidly amid the temporal abstractions of comparative innovation cycles, disruptive technologies, consumer disposable income, and the perception of value that comes with fad and brand. [8]

All of these developments were made possible by global transport, and none were features of the world economy a generation ago.

The great question is whether such a system, having developed in a single generation, will remain the model for the future.

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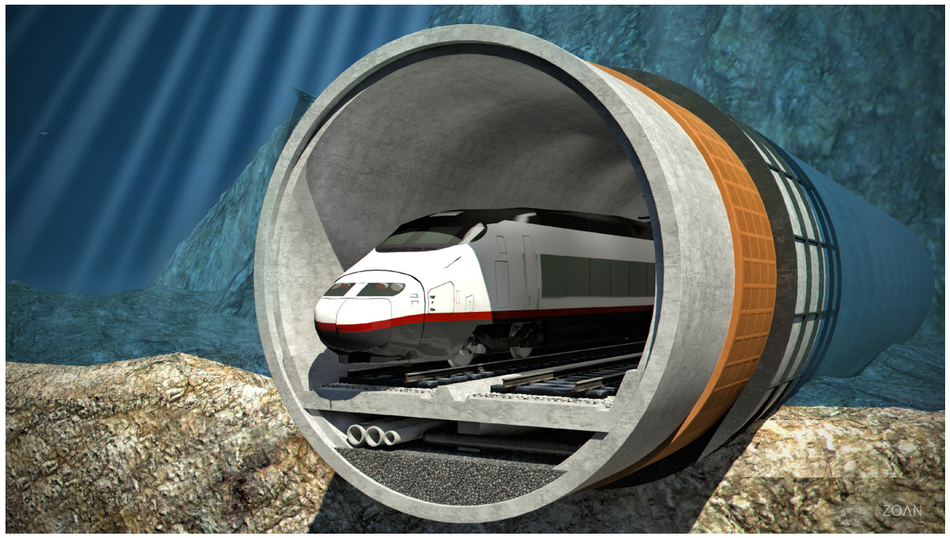


[8] Loescher, M. & Aaltonen, M. (2016) Crossroads – Transformations on the Road to 2040, Aalto Publications

Modes of Transport: Airfreight and Hinterland Rail

Airfreight transport with its low-volume, high-rate profit model is concentrated on manufactures goods rather than delivery of raw materials.

Worldwide, it is the smallest of the transport modalities, in volume, weight and in value carried. It is principally a driver in the far upstream of global value chains, and occupies a niche role in world transport overall.

Airfreight transport plays different roles in logistics chains in different parts of the globe.

In the US and Europe, airfreight is a highly integrated component of an overall intermodal infrastructure. Moreover, relatively short Atlantic flight times, and the large number of good airports facilitates its use between the continents for high-value, small weight goods. It is growing in importance in China as that country extends its inland port system, but is much less used in Japan where high-speed rail is extensive and in South Korea, where distance among production centers and internal markets is negligible. In South America, Australia and Oceania, and Africa airfreight fills gaps in transport that elsewhere might be served by more extensive road and rail.

After the worst downturn in industry´s history, aviation has turned corner on the COVID-19 pandemic. By the end of 2023, most regions will be at—or exceeding— pre-pandemic levels of demand. [9]

FedEx Express, Qatar Airways and United Parcel Service (UPS) have been amongst the world's busiest cargo airlines in recent years.

FedEx Express handles high volume in terms of airfreight flown and has a large dedicated fleet of aircraft. It uses feeder aircraft to and from small and mid-size airports and the huge Airbus A300s and Boeing 777s freight-configured for long-haul routes. It is based in a "super hub" in Memphis.

[9] International Air Transport Association (IATA) Annual Review 2022

Qatar Airways became large pure air cargo carrier (excluding the integrators) and moved up overall.The Doha-hubbed airline has been expanding its freighter fleet over the last few years.

UPS operates more than 500 aircraft from its headquarter in Louisville.

FedEx and UPS have approached airfreight from different directions, and both have been highly successful. Whereas FedEx is focused primarily on airfreight, UPS has an extensive truck-based ground-freight infrastructure providing door-to-door throughout the Americas.

Landward, transport systems are not distributed evenly, or even remotely so, across continents or regions.

There is such a large imbalance in worldwide rail freight infrastructure that it is possible to identify genuinely vast land areas of the world as transport "deserts" in which access by rail into the hinterlands or even across continents is either lacking or inadequate to support economically significant transit. Landward, much of the world is landlocked, railway construction has not provided new routes since its beds were surveyed 150 years ago. [10]

A statistical case is instructive.

About 25 percent of world trade, by value, occurs between countries that share a land border. But that statistic offers little insight into the state of trade in the world because the number reflects the robustness of land-based infrastructure in North America, and the special relationship between the US and Canada.

There are several indispensable missing links worldwide, each of which represents both obstacles to expansion of international trade by land, and also critical political and strategic dilemmas for neighbouring countries:

1. On the northern continent the freight rail infrastructure is the best in the world, but north-south rail connects to South-America are interrupted just south of the Panama Canal at the Darién Gap.

   It is an undeveloped swampland and forest between Panama and Colombia just over 160 kilometers long and about 50 kilometers wide. Darién is the gap for both rail and the Pan-American Highway, which proceed further into South America along the Pacific coasts south to Valparaiso, Chile and then eastward across the Andes via two lines to Brazil, Argentina and Uruguay. Consequently, there is no land route connecting North America with South America.

   The Americas collectively contain two of the largest agricultural areas of the world and vast amounts of commodities, especially of energy, and are home to a large potential reservoir of cheap labour and middle-class consumers. Linked with robust intermodal transport in the future, the Americas would become powerful exporters and self-sufficient importers — an enormously disruptive development to our present construct of globalization.

2. In Europe, though passenger rail is among the best in the world, freight rail connection is highly problematic in a variety of directions.

   From the North Sea ports inland overcrowding the norm on both rail and roadways. East-west railway was improving, but once passage extends into the former Warsaw Pact nations, modernity drops off sharply.

   North-south freight rail is even more problematic. From the Nordic countries to the Mediterranean it is completely lacking, and east of the old Iron Curtain, both passenger and freight rail, and road infrastructure, are minimal and antiquated.

   This has an important strategic effect of isolating large areas within the EU, and the EU from Eastern Europe and Eurasia. It also isolates the great ports of the North Sea from acting as points of economic entry beyond the Ruhr and Saar. [11]

3. More problematic, any European rail improvement eastward and southeastward stops at Russia, which is the largest transport "desert" in the world. Despite considerable marketing efforts to the contrary, Russia's rail and roadways are rudimentary at best and limited in location to the underbelly of the country, which follows the old Tsarist Trans-Siberian route, as does the social, civil, and industrial infrastructure of the entire country. [12] The implications of this are significant not only for the EU and Russia itself, but also for China.

   The routes across Asia are poised to open a passage of immense strategic importance, and along with the transpolar routes, the most disruptive development in transport.

4. In most of Africa all infrastructure is rudimentary, but road and rail are virtually non-existent in any sense of transcontinental or even interregional transport.

[10] Rail Market Reports 2023

[11] Railway freight transport statistics (2022) European Commission

[12] Wolmar, C. (2014) To the Edge of the World: The Story of the Trans-Siberian Express, PublicAffairs

Elsewhere in the world, freight rail and freight trucking are far less intense, and in Eurasia primitive where present and largely absent elsewhere. [13]

Those nations and regions that have access to the sea have linkages of some kind, however limited, to the world markets. Those that are landlocked pay a heavy price, and where land-locked and without sophisticated road and rail, are backwaters.

[13] UNECE Transport Statistics Database 2022

Lines of Maritime Communication

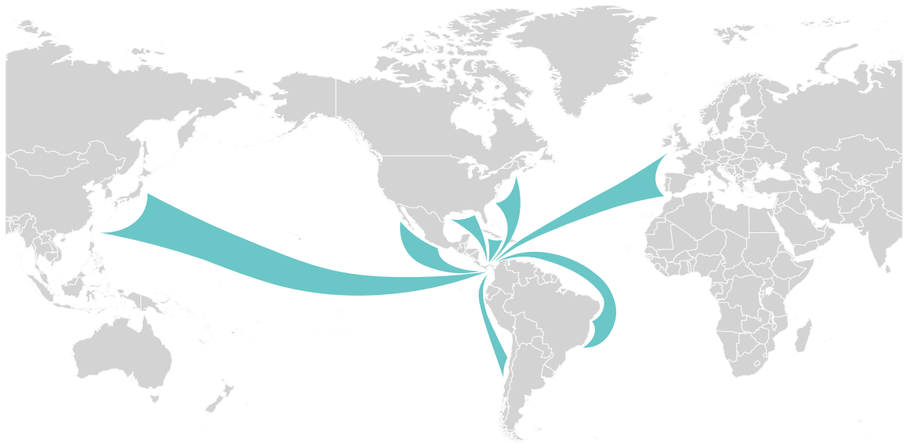
The **Panama Canal** opened in 1914 after 10 years of struggle with terrain and yellow fever, at a staggering cost. In today's dollars of more than $8,5 trillion. It saves almost 8,000 miles on a trip from New York to San Francisco from the treacherous passages at the southern tip of South America.

Although merchant traffic profited from the canal, the impetus for its construction was almost completely strategic.

Without it, the coal-fired US naval fleet, headquartered on the Atlantic, could not move quickly into the Pacific Ocean, where the US territories of Hawaii, Samoa, and the Philippines lay.

From 1904 to 1999, the US controlled five miles of land along either side of the canal. In 1964 riots over sovereignty of the Canal Zone broke out in Panama City and unrest continued.

Panama Canal today [14]
180 trade routes
1 920 ports
170 countries



[14] Connecting the world through the Panama Canal, American Journal of Transportation, April 1, 2021

In 1977, the US signed a new treaty, promised to withdraw from the Canal Zone by the end of 1999 and guaranteed that Panama would assume full sovereignty over the area. Under the treaty, Panama became obliged to guarantee the neutrality of the Canal Zone.

Since then the canal has become increasingly under Chinese influence.

In 1996, Panama decided to auction the rights to manage the canal to a private company. Despite being fourth in its bid behind Japanese, American, and Panamanian companies, the following year Panama awarded the contract to the Panama Ports Company.

It is a subsidiary of Hutchison Whampoa Ltd, which now has exclusive and extensive rights to control both ends of the Panama Canal.

Hutchison Whampoa Ltd is a Chinese company owned by Hong Kong billionaire, Li Ka-Shing, who has strong ties with Beijing. Under the legislation that implemented the contract, Panama granted to Hutchison Whampoa Ltd the ports at both ends of the canal (and the surrounding areas the US used to control, including the former US naval station and air base) for 25 years with an automatic renewal for another 25 years.

A longer view surfaces potential for significant disruption.

The Caribbean is awash in oil. Alone enough, given the right political and economic conditions, to negate flows to the hemisphere from the Middle East.

Latin America is the source of large exports in fruit and agriculture, but its population ranks among the poorest on the planet. It is home to organized crime gangs, which have thrived under decades of poor and corrupt governments and now have assumed local power outside the few bastions of government presence. Columbia is an epitome of organized crime in the mantle of sovereignty, and Mexico has been in civil war for two decades attempting to avoid that descent.

Panama sits in between the final rail link needed to connect the two continents. Into this cauldron, given the right alchemy and several decades at least, Panama has the potential to become an American Singapore.

The **Suez Canal** is the most recent of thousands of years of engineering efforts to open the Mediterranean to the Red Sea. Various ancient canals from the inland Nile are known, with attempts at both east-west and north-south routes. [15]

[15] The Suez Canal: The History and Legacy of the World's Most Famous Waterway (2018) Charles River Editors

The Greek historian Herodotus recorded that the construction of a 100 kilometers east-west route beginning near modern Ismailia, following a caravan route along Wadi Tumilat, cost the lives of 120,000 slaves between 600-500 BC.

The present canal was also constructed with forced labour. More than a million workers laboured over 10 years from 1859 to the opening of the canal in 1869. This took place under the watchful eyes of the engineers of the French Suez Canal Company, which had gained the concession from the Khedive, Sa'id Pasha.

The canal had an immediate and dramatic effect on world trade.

Combined with the American transcontinental railroad completed six months earlier, it allowed the world to be circled in record time, as Jules Verne illustrated in ***Around the World in 80 Days.*** [16]

It also revolutionized shipping.

By 1873, it was the cause of an economic panic, as ships that once carried the goods from the Far East around the Cape of

Suez Canal

[16] Verne, J. (1873) Around the World in 80 Days

Good Hope and the entrepôt ports used to transship cargos all became suddenly obsolete.

Much uncertainty arises from Egypt itself.

As a modern state, it has existed only since 1952 and has taken various forms, including the United Arab Republic, a short confederation with present Syria. It was ruled autocratically by three presidents over the six decades, by Nasser from 1954 until his death in 1970, by Anwar Sadat from 1971 until his assassination 1981, and by Hosni Mubarak from 1981 until his resignation in the face of the 2011 Egyptian revolution.

From 1967 until 2012, except for short break in 1980, Egyptians lived under emergency law.

The Suez Canal can accommodate aircraft carriers of all sizes, including the US Nimitz and new Ford classes of supercarriers. They are the largest warships ever built, and the air and sea lynchpin on which the US, EU, and NATO military operations depend.

Without the canal transit, the US carrier-based strike groups on station in the Persian Gulf or in the Mediterranean Sea could not be rapidly redeployed in crisis, a maneuver critical to many past crises in the Middle East and central to the deployment of force in both Gulf Wars and in Afghanistan.

Losing the canal would force both an immediate crisis and a high potential for a fundamental shift in global power. It would have an immediate impact on the US' ability to support both the EU and NATO defense — including unraveling of the new ballistic missile defense deployments, which in the current military posture of the EU, would leave it defenseless.

It is commonly observed that the **Arctic** is the least known ocean. This is decidedly not true. Great treasure in rubles and dollars has been spent mapping every fathom curve in large parts of the Arctic. Some passages have been transited by submarine for many years. And they were not chosen by accident. They will have economic parallels in the future.

Today we think of the world in equatorial projections, which divides it into distinct north and south and east and west divisions. As the Arctic ice cap melts [17], however, access into the Arctic, to Greenland and the Canada inland seas is considerably facilitated.

The physical and economic geography that results will place an extraordinarily large amount of the world's commodities, wealth, markets, and transport infrastructure within a relatively

[17] YouTube. NASA Climate Change. Annual Arctic Sea Ice Minimum Are 1979 – 2022

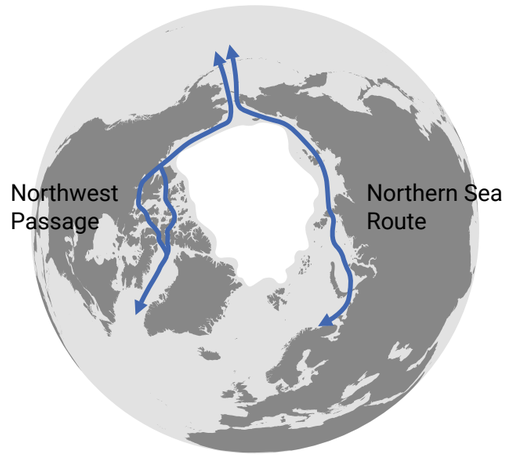
small footprint.

This new North Atlantic Seaboard creates direct economic and transport ties among Norway, Denmark, and Great Britain in Europe, and Greenland, Canada and the US in the Americas, with Iceland in the middle.

In addition to the special historical, political and economic affinity the North Atlantic Seaboard countries already have.

The new lines enable deep transport infrastructure to the Pacific, which is not possible in Eurasia at present. In Europe, the Baltic Sea takes on a new importance, if its infrastructure is developed.

Arctic [18]
Northwest Passage - Northern Sea Route



It is a great oversimplification to focus on the melting North American Arctic in simplistic terms of opening Northwest Passage.

For one thing, there are six different passages from the Atlantic to the Pacific, and several involve quite different regions not just alternative straits, which is largely the condition in the Northern Sea Route. Between the Barents and the Kara Seas there are three options: under, over, or through the islands of Nova Zemlya, but they are all navigational options leading to the same place.

This is not the case in the Canadian archipelago, where choices at Amundsen Gulf in the west and Lancaster Sound in the east lead through different regions. As the Arctic melt proceeds, these regions will slowly grow in local, regional, and global im-

[18] For maps see CIA Factbook

portance — especially the routes into Hudson Bay, between Greenland and Canada, and at the MacKenzie Delta.[19]

Each region will emerge on different climactic timelines.

The Arctic is at its most stubbornly frozen along the northern coasts of Queen Elizabeth Islands. They will emerge on different economic timelines. North America has ample transport infrastructure on land as well as the St Lawrence seaway. Plus, the Panama Canal, and a highly diversified economy. The economic necessity to develop the Arctic passages is not pressing as it is in Russia.

It lends perspective to think of the future North American Arctic, and on a smaller scale, the Barents-Kara region, as one would think of the interconnected island region of Malaysia, Indonesia, and Papua-New Guinea. And to remember, that the North American Arctic is considerably larger.

Melting opens an immense region of waterways and inland seas to direct maritime transit. In North America, they reach very deep into the continent. Hudson Bay and the Foxe Basin alone are larger than the Mediterranean Sea. Baffin Bay, the Davis Straits and the Labrador Sea are larger still than either area. Except for the East and South China Seas areas and the Caribbean, there is no comparable region.

It is useful to think across a sequence of scenarios that will unfold as the melting continues. There is not a port or a passage on either side of the Arctic suitable for commercial use of bulk carriage, dry or liquid, but there are on both sides great harbours and specific destinations that will command attention and investment.

It is idle public relations to say that Murmansk or Churchill will be the great port of the future.

All modern ports require land for wharfs and warehousing. Power, deep draft, shelter and hinterland connection. The most successful ports in the world today have been built from ground up in the past 30 years.

One should look at the Arctic with the eyes of a maritime surveyor, an investment banker, and an industrial engineer.

[19] Östreng, W. (2014) Shipping in Arctic Waters: A comparison of the Northeast, Northwest and Trans Polar Passages, Springer

Politics and Geopolitics

The world's busiest routes are China to Europe and China to the US.[20]

Interestingly, the media has a geographic myopia about these routes. They are always expressed as Europe to China and the US to China. Even maps are drawn that way.

By any measure, after the year 2000, the centerline of world trade is along the longitude of 125 E.

Nine out of ten world's largest container ports are located in the basins of the East and South China Sea. All of the world's container ships and containers are made there. All of the world's major shipyards are there. About ninety percent of the world's steel is made there, and nearly all of the globally transported iron ore, aluminum and bauxite is destined for those waters.

It is worth recalling the reaction of Europe's big three container lines to China´s refusal to approve a proposed shipping alliance among them. Approval would have given the group a 47 percent share of the Far East-Europe route. Yet, China's decision is wholly consistent with all of its actions since Deng Xiaoping unlocked the Maoist handcuff.

A century after the last dying gasp of Imperial China, once prostrate before the European, Japanese and American powers occupying its ports, Chinese merchant shipping is now the largest in the world. All around it, the East and South China Seas and Indian Ocean are poised to hold the largest markets in the world, and many of the world megacities in 2030.

In this view, trends toward regionalism come into sharper focus.

A nation might let its shoe business go belly up, but if it depends on world trade for its economic life, then ships and shipping infrastructure take on a totally different value.

[20] UNCTAD Review of Maritime Transport 2022

It may be that the marketplace will sort out the shoe business, but market forces are only a small part of the stakes in maritime shipping. Shipping has implications that transcend the industry itself. It is one of a handful of commercial enterprises, that are so vital to the nations, that they depend on them, and they cannot be allowed to fail.

Yet, this is precisely what is happening in the **EU**.

In the years following the 2008 financial crash Europe´s strategic position in maritime trade has slipped while its need to export has become all but absolute.

This is new on several levels.

For five hundred years, the UK was the key import-export economy in the world, and the only maritime power in Europe. Today, the Royal Navy is but a shadow of what it once was.

In the **US**, after 100 years of foreign entanglement, the 30 years of brutal combat in the Middle East, every poll of the US voters consistently reflects a rising neo-isolationist sentiment.

North and South America have every commodity needed to conduct a viable economy. They possess large populations of middle-class consumers and even larger sources of cheap labour.

In 2012, for the first time since 1954, the US became a net exporter of crude oil.

Additionally, Canada and Greenland, not Russia, are best poised to benefit from the Arctic melting.

In Asia, China's dominance geographically, politically and militarily is unquestionable.

It is easy to overestimate **China**. Yet, every day its leaders wake up to 1,4 billion people who all have expectations. China has many problems, but at the moment, it holds the rest of the world temporarily hostage.

If the world continues along the same general track of truly global trade, China will play a key role. [21]

In a different scenario, one in which the world regionalizes, the Far East will be home to most of the world's largest cities, with ample labour and an emergent middle-class. Lacking in some commodities historically, especially energy, the region at large and China specifically has new options, which should be closely watched.

[21] World Bank Global Economic Prospects 2023

In the same calculus, it is difficult to see how the EU can stand as a region. Even internally, rail and road within the EU is limited. The Achilles Heel of the great North Sea ports is that modern hinterland freight transport on an East-West axis ends abruptly at the Rhine, and there is no high-speed freight at all on a North-South axis.

Without a viable maritime shipping and access to both local and distant ports, the EU trade cannot recover.

The past 30 years of globalization have not taken place without fundamental directional change.

Against this backdrop, there is the relentless global warming that portends to regular circumpolar navigation above the Arctic Circle, certainly within the next 30 years.

Arctic circumnavigation will require new ships and new ports, as well as new road and rail connections, at least in the Eastern Hemisphere.

We think the impact of both the Northwest Passage and the Northern Sea Route are presently greatly underestimated. We believe both hemispheres, for different reasons, will be modernized and made feasible for commerce as soon as possible.

The Northern Sea Route is absolutely needed to make the transit from East to West in Russia above the Transsiberian line. It is the key to opening up Siberian wealth and Russia´s best option for rapidly building a transport infrastructure inside its borders.

For **Russia**, the stakes are enormous.

The world is full of fossil fuel, and Russia is crucially behind the rest of the world in terms of infrastructure.

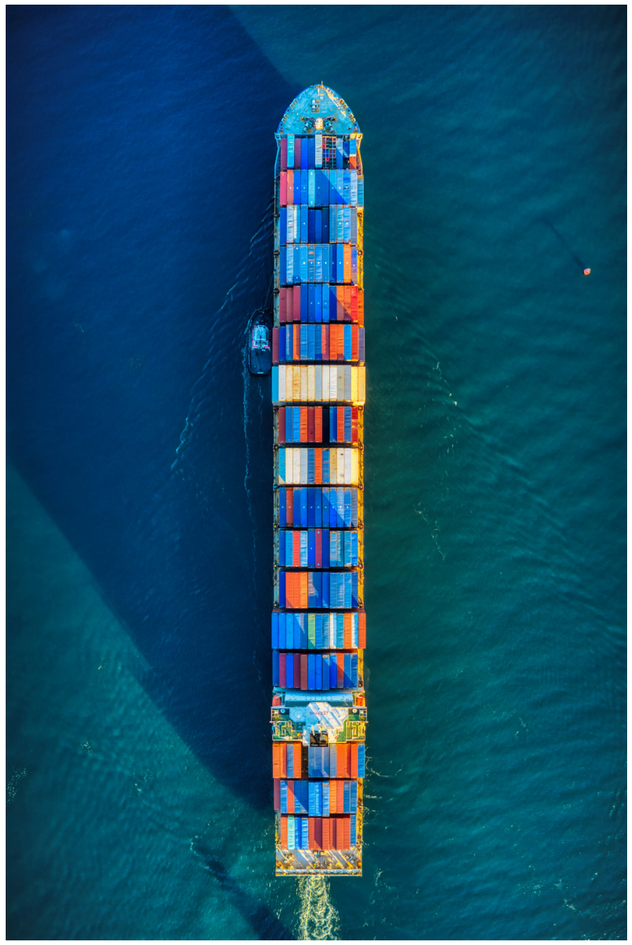
The real value of circumnavigation over the next 30 years will be its role in opening up a new way to circle the Earth.

The melting of the Arctic will open up, for the first time since 1492, vast tracts of largely unexplored land in Greenland, in Siberia, and under the Arctic ice.

The largest amount of riches lies from the Urals to the Pacific. Among the many geological features that cover that vast expanse is the great Siberian Craton. It is 350 million years old, and has an entirely different paleogeologic origins than the rest of the Arctic. [22]

[22] Turunen, E. (2019) Resources in the Arctic, Data sources: Nordregio, NSIDC, PRIO & USGS

In order to make sense of future developments, it would be instructive to reread the worldwide economic turmoil following Spanish exploitation of gold and silver in the New World.



Ports

While predicting the future is folly, planning for it is obligatory.

There is an inherent fault in logic to consider that the key elements of world trade will look tomorrow much like they did today.

Most of what is traded today, by value or by tonnage, did not exist 30 years ago. The same rationale runs directly counter to the experience of the past 100 years, during which shipping collapsed into one of its darkest periods in history. For a time, the seas were almost barren of ships.

The flow of goods at sea have changed fundamentally three times in the past 100 years in response to political developments, not to economic swings or shipping cycles.

In transport, there are definitive horizons beyond which opportunity will be lost. Ports that are not in construction today will not trade in 10 years. Where railway and road does not exist, neither will trade in 30 years.

It is therefore possible to predict the future of transport across much longer planning horizon and with much less risk than the future commodities and goods that will be transported.

To the degree that the future will be an open world requiring intercontinental trade, transport is less an enabler than a limiter. Regions with great connectivity flourish, those with less struggle, and those with none will starve.

World trade does not happen at sea.

It happens via the sea, and only when it is cost-effective to do so. The construction of great ships takes a few years, but from the water's edge to the source of commodities and the consumers of goods, construction takes decades. A choice to

construct new trade lanes involves risk, and so does a choice not to construct them.

The development of standardized containers is one of the great innovations of the 20th century.

Today, more than 90 percent of ocean-going non-bulk dry cargo travels in containers. In the past 30 years alone, the number of containers shipped has increased notably and along the way their use has transformed maritime shipping of intermediate and manufactured goods, and fostered the operational overlay of logistics. Containers are the physical lynchpin that enables global value chains.

Their greatest impact is yet to come.

So far, container shipping has been focused on the maritime leg. On container ships and port infrastructure. Containerization's greatest potential lies in transcending the ocean, linking manufacturing to consumers.

On land, container shipping is a very incomplete fabric.

For all the discussion about transmodal shipping, most of the world's continental rail and road infrastructure has a long way to go before it can provide real connectivity from factory to retail floors.

Hinterland infrastructure takes decades to build and great expenditures of capital. If container transfer begins to take root in the world's hinterlands, world trade will begin to look very different. When containers can be transported via inland rail, road, and air connections to the hinterlands, it makes possible to create distributed production centers, and opens up landlocked markets, because of the reduced logistics costs of containerization.

Future trade will depend on the transport options available at the time.

Transport infrastructure is one of the last determiners in our world that is not a virtual enterprise, which makes it very different from the other underpinnings of the future. What cannot be exchanged virtually must move physically, which takes time, investment, and insight.

Ports are interfaces that bring people and things together.

In the long-term their construction is of strategic importance.

Until the Second World War, only Britain and Japan were dependent on shipping for national survival. And until 1990, most of the goods produced in the world remained on the continents on which they were made. Never in history have we dug up the earth in one place, shipped it around the world to another, and back around again and again an integral part of the industrial process.

Future historians will shake their heads in wonder of the armadas of our time. Ever greater Leviathans that lumber across the globe back and forth — not for gold or spices, but to capture the cheapest labour on the planet, at the cost of great economic fragility, geopolitical risk and environmental sustainability.

Future hubs are likely to be where today´s ports are not, and where tomorrow´s population portends new customers. Favourable geography opens to areas of increasing population.

Often cities, port operators, logistics companies and many others are continuing to operate facilities that no longer address the evolving needs of modern societies.

Ports are portraying many problems, but their redesign evokes potential solutions. [23]

[23] Sorgenfrei, J. (2018) Port Business, De G Press

Dragons Be There

Europe has become dependent on Russian energy, refused investments in defense, and lost its shipping and manufacturing to the Far East.

It stands at a very late hour into danger.

Until the tracts between Western Europe and the Western Pacific are uncivilized and its people lacking in good government and economic promise, dragons be there.

There are additional dangers internal to the **EU**. Today Europe's hinterland freight transport is limited both in size and in direction. To the degree that Germany, or German banks and companies, come to dominate the landward routes to the Far East.

As the EU works its way through its various crises in the future, a map of European land transport should never be too far from hand.

Germany is the economic core of the EU, and so long as linkages like DB Schenker's Trans-Eurasian rail to Duisburg and pipeline projects like Nord Stream are allowed to dominate the pattern of Europe's spatial economic topography, the rest of Europe will be cut off.

Absent development of a modern, networked land transport infrastructure that connects Europe at large, particularly in the north-south direction, large areas of the EU will languish, intensifying the political, social and economic challenges of unity.

If Trans-Eurasian routes are developed as robust, modern and international in character, they can emerge as the keys to a future connected and prosperous Europe and Asia. They will deepen linkages and open commerce. On the other hand, if they are not built, to whatever degree the Far East and Indian Ocean economies gravitate into intra-regional trade, Europe will become increasingly isolated, dependent on a presently declining maritime shipping infrastructure.

Similarly, if Trans-Eurasian routes are allowed to be dominated or monopolized by any single nation—much less an autocratic Russia — Europe's only option beyond shipping closes.

Trade among East Asia and the Americas increases this disadvantage. The Pacific facilitates those trading routes. North America, in particular, and the Eastern Pacific are well-connected. The Panama Canal opens the Caribbean Sea, and enables new transport hubs there and along the northern rim of South America.

Atlantic Europe — the United Kingdom, Norway, Denmark, Iceland, Spain, Portugal and France — is closer to Americas.

It is continental Europe that is odd-man out.

From the standpoint of strategy, at all costs Eurasia must become a conduit to facilitate the movement of ideas and commerce. The geography of Eurasia dictates only a few alternate passages to crossing Russian sovereign territory. Therefore, an isolated Russia isolates the largest trading blocks in the world. Russia is too large and possessed of too many important resources to allow all it to fester and fail. This is the danger behind Russia's chronic failure to develop.

Russia's dilemma has not come out of the blue.

A strategy of dragging **Russia** into a larger world, instead of containing it in place, will present an extraordinary conundrum of truly global proportions.

In the past, the US and Saudi Arabia have been able to constrain Russia by manipulating oil prices and supplies. This has been the essential element of the US foreign policy since the 1980s, and of Saudi policy since the 1950s. Russia's vulnerability to this stratagem has been its long-term failure to create a manufacturing economy. Today, a key factor in Russia's risk is that crude and refined oil exports generate many times the revenue of gas exports, and crude alone accounts for more than all gas and non-oil exports together.

So long as Russia cannot produce anything of value to export beyond oil and gas, and to modernize its governance and economy, its addiction increases against a diminishing supply. This will deepen the risk of collapse in an ever-narrowing vicious cycle. [24]

Time is certainly an issue here.

Russia's foreign currency reserves, built up rapidly during the

[24] Acemoglu, D. & Robinson. J. A. (2012) Why Nations Fail. The Origins of Power, Prosperity and Poverty, Crown Business; Acemoglu, D. & Robinson. J. A. (2019) The Narrow Corridor: States, Societies, and the Fate of Liberty, Penguin; Fukuyama, F. (2019) Identity. Contemporary Identity Politics and the Struggle for Recognition, Profile Books.

2000s when oil prices were extraordinarily high, are being depleted at an alarming rate. Its ability to borrow at reasonable credit rates is limited by its past history and by the estimates of the mid-term, not the long-term, future value of its oil fields. Selling more gas to Asia will not resolve Russia's dilemma. The world is rich in energy, and it is clear that novel forms of energy, such as oil shale and oil sands, will become available to the world when the prices begin to rise. Russian Arctic energy, which is largely natural gas, is going to take a decade or more of high investment in an extreme environment.

Only three sources of funds in the world are large enough to bankroll the Arctic effort — a Western supermajor consortium, a Middle Eastern sovereign fund, and potentially China, which would have to tie up a great deal of capital for a very long time to do so.

Geography matters. Every border of every country is a potential friend and foe.

From a government perspective, Ukraine posed the first opportunity in a long time to extend Europe culturally, economically, and strategically.

It would not only secure Europe's southeastern flank, it would give the EU access to Central Asia, exposing those nations, if only gradually, to law and order. Transport routes would become available, as would access to energy from Central Asia and, more importantly, from Iran.

There would also be long-term alternatives to Russia's monopoly on Eurasia, which the Chinese investment in the Silk Road routes clearly demonstrates. That China bought into Russia's pipelines and energy supplies in 2014 should be seen as opportunistic move. It offered the multiple advantages of securing additional long-term supplies of pipeline gas for its industrial changeover from coal, and of denying those same assets to Japan and South Korea, all the while addicting Russia to China.

China faces three strategic imperatives:

1. It must find a way to undermine its Asian competitors. Soon China will not be able to undercut the Asian labour market prices any longer, but neither it competes in quality for a long time yet. Therefore, if it cannot take market share from South Korea and Japan, the remaining viable grand strategy is to increase their costs, and if possible, reduce their output. Both of which can be vastly facilitated by denying ready access to commodities. Buying up Russian pipelined gas and oil plays right into that strategy.
2. China believes it must push the US out of the Western Pacific. Their strategy for this is exactly the strategy the US employed against Soviet Union. It will force the US into an arms race, which the US defense industry and military readily welcome, having expended much of its material in the past 30 years in Middle East conflicts. China's naval build-up in recent years has alarmed the navy-dominated US Pacific Command, while at the same time Japan has forced the US out of Okinawa. The US can only retrench to Guam, building that island into a fortress at immense cost, miles farther east from China.
3. China must find a way out of the geography constraints imposed by the Malacca Strait. The long-term solution is through to Central Asia via Xinjiang, which gives them access to the energy and mineral commodities.

Even in international strategy, depth in shipping matters. Especially in three areas.

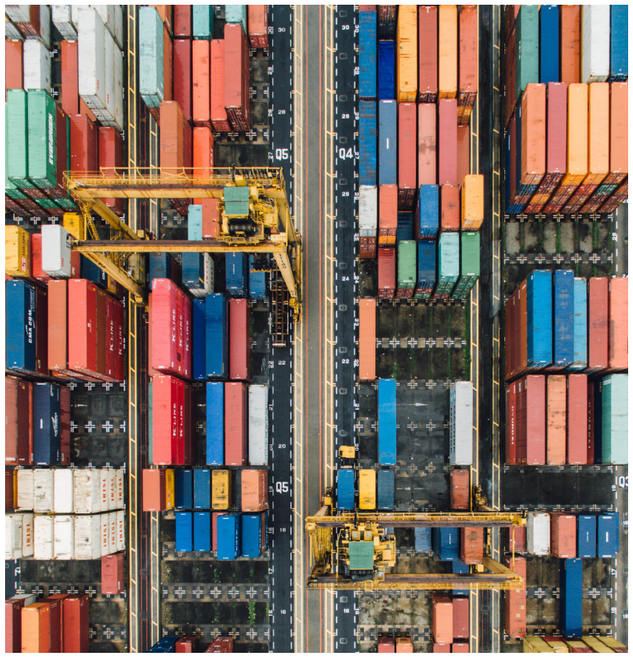
Mastery of **geography** is mandatory. Without it, nothing can be understood in shipping. Shipping is carried out in the physical world, and the planet's geography is very diverse. To speak of trends in shipping in composite terms, such as of ton-miles per route, or to describe the many variants of merchants ships at sea, is to say nothing of value.

One must get beyond the superficiality of **global value chain** diagrams to gain an understanding of the flow of strategic goods in the world economy. And to provide insight where high risk resides, and how potential disruption might occur.

Maritime trade has the additional complexity arising from its multiple dualities. A shipping company may be sovereign-owned, but incorporated, typically in a different nation-state, and still flagged in another. There are also invisible elephants in the industry: those anonymous owners and operators, which have a great impact, both on the industry and in the geopolitical dimension of maritime trade.

Differentiating **knowledge of major ship** types is necessary.

Operating a string of regional tankers is a very different business than that of ocean-going supertankers. Neither have much in common with container shipping. Economics in deep-sea shipping drives size of ships larger and larger, but sharply limits routes and ports. For instance, once one has a working knowledge of container ships, the list of potential terminals for the Northern Sea Route falls short – there really are only few good options.



Author Biography
Mika Aaltonen

Mika Aaltonen is a Ph.D. (Econ.), Associate Professor (Foresight and Complexity), Founder of the Royal Society of Arts Helsinki Chapter, Editorial Board Member of European Foresight Journal, Editorial Board Member of E:CO (Emergence: Complexity and Organisations journal).

He has written 16 books with some of the best experts and for some of the most prestigious organisations in the world, and over 100 articles about foresight, decision-making and societal change. Amongst them are Robustness – Anticipatory and Adaptive Human Systems, The Renaissance Society (with Danish futurist Rolf Jensen), Crossroads – Transformations on the Road to 2040 (with former US Navy strategist Michael Loescher) and Sustainability Manifesto (with renown Shell scenario planner Ian Dunlop and UN Policy Planning Chief Tapio Kanninen).

Mika has worked as visiting researcher at the London School of Economics (UK), the Conservatoire National des Arts et Métiers (France) and the Gregorian University (Italy).

He is a co-founder of PORT 2.0 Limited. A company pioneering the design and construction of new logistics facilities to meet the increasing challenges of sustainability, safety and efficiency in near shore and onshore logistics.

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Sohail Inayatullah
Professor, Tamkang University
UNESCO Chair in Futures Studies
Editor, the Journal of Futures Studies

Brave New World gives us not just insights about emerging futures for the world and ports in particular but as well frames the future through a rigorous analysis of history. It is packed with insights that help us reframe futures and create new strategies. Brilliant work by leading futurist Aaltonen.