ARUP

Future of Ports

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Future of Ports

This exhibition addresses the changing relationship between ports and urban environments. It looks at the complex systems of transformation and the synergies influencing the future connection of ports and cities.

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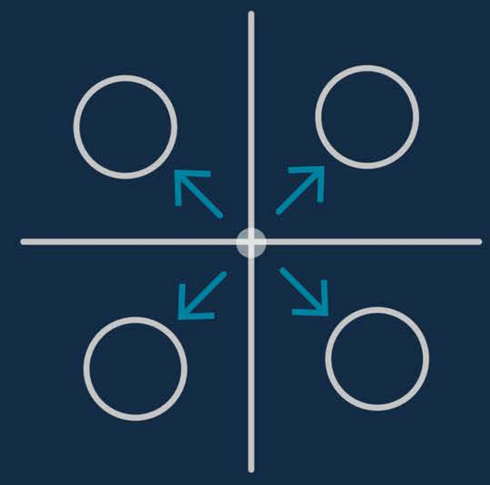
Historically, urban ports have been closely linked to the growth and strategic importance of cities worldwide, enabling access to imports and exports that have proved both financially and culturally lucrative. Of the world's top ten major cities reported by GDP, seven are cities with ports.

In recent years, changing trade patterns and the impact of technology have transformed the functional role of urban ports, undermining the value of their privileged geographical location and challenging the way they conventionally operate. Today, urban ports are under pressure to improve efficiency and increase throughput; this can require significant investment in technology and infrastructure, as well as potential site expansion or relocation.

At the same time, cities continue to grow in population, economic power and political influence, fuelling competition for capital, talent and trade. Cities also face a host of challenges, from dealing with the effects of climate change and pollution to tackling housing shortages and community wellbeing.

Can the potential of existing ports be reconsidered, and connections and synergies unlocked to help address these urban challenges?



Defining pathways to prosperity

This exhibition is part of an ongoing global research project aimed at defining plausible city-based port developments and opportunities for key stakeholders associated with port ecosystems.

It presents a holistic overview of the directions that port development could take, while highlighting the complexity of interrelated influencing factors.

Signals of change suggest the potential to open port precincts and unlock access to their specific clusters of services, technologies and skills, while leveraging their unique waterside location.

Rethinking the future of ports

The context of possible development pathways remains uncertain.

This exhibition welcomes your contribution to the continuing debate and innovative thinking on the future of ports.

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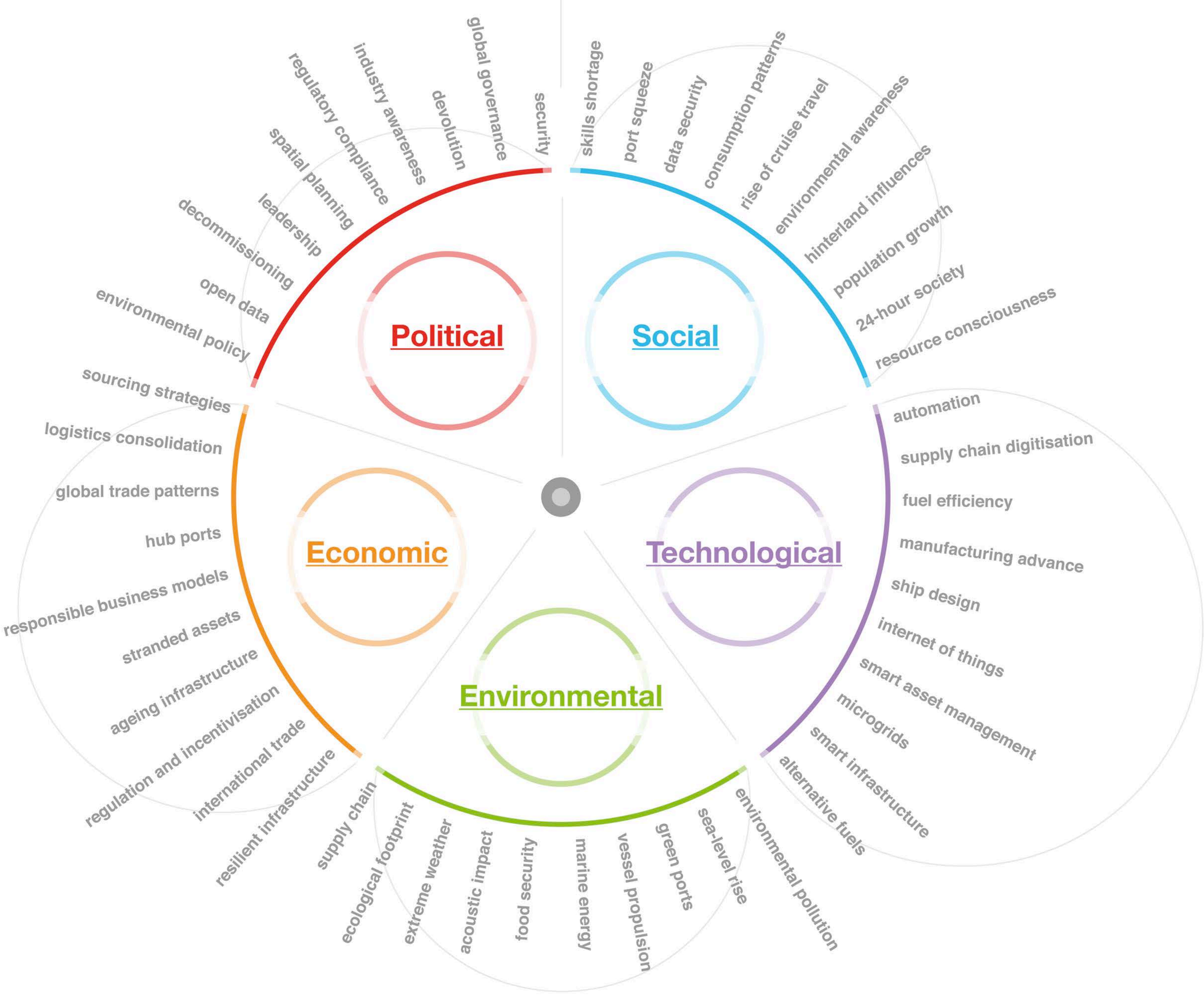
Drivers of change

The 50 trends, from global megatrends to sector-specific drivers, that are likely to critically determine the development of ports in the future.



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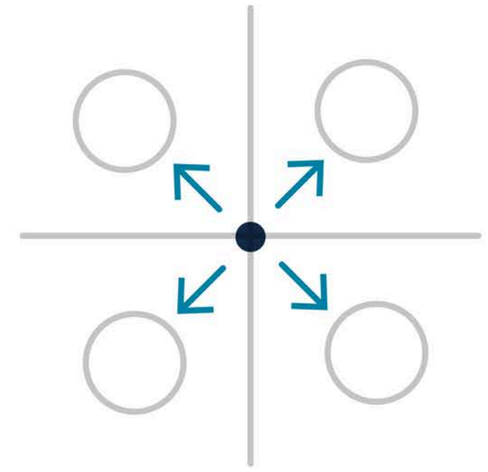
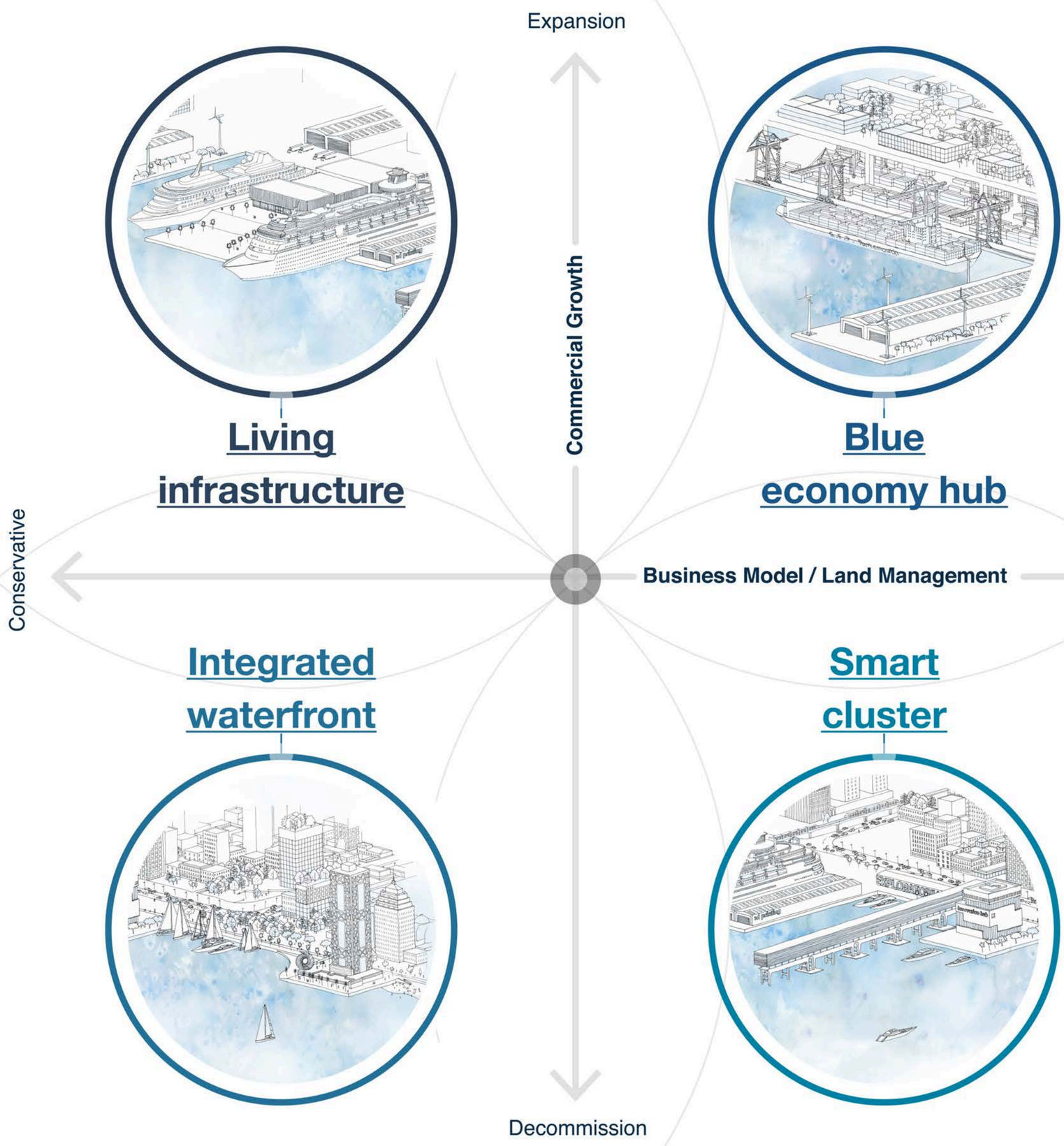
Future Scenarios

Four scenarios reveal the dynamics that are influencing the future of ports, according to their commercial growth trends and the business models applied to their land management.





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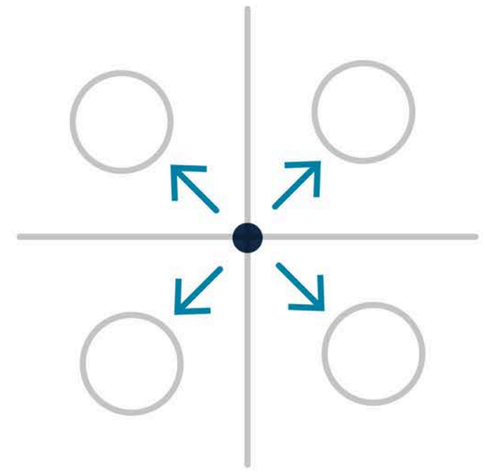
Characteristics of the Scenarios



Each of the scenarios performs differently, with their specific characteristics shown in relation to environment and resources, economy and society, industry and technology, and governance.

Expansion

Commercial Growth

Decommission

Conservative

Experimental

Business Model / Land Management

Living infrastructure

Environment and resources
Land use optimized and maximised, strengthening resilience to shocks and stresses.

Economy and society
Focus on profit maximisation, driven by the growth and intensity of freight and passenger traffic.

Industry and technology
Focus on efficiency and risk reduction, with smart technologies used to facilitate operations.

Governance
Port authorities systematically monitor, control and manage all port activities.

Blue economy hub

Environment and resources
Land conceived as an ecosystem to enhance city resilience, with a drive for reuse, recycling and waste avoidance.

Economy and society
Investment in clean technologies, with attention paid to wellbeing and social equity.

Industry and technology
Smart and innovative technologies at the core of new businesses, alongside renewable energy generation and use.

Governance
Sustainability drive, with port authorities investing in innovation and building a sustainable regulatory environment.

Integrated waterfront

Environment and resources
Land remediation and design of the waterfront as a socio-environmental infrastructure for the city.

Economy and society
Economic revitalisation, population growth and regeneration of socially deprived areas.

Industry and technology
Tertiary activities with smart technologies deployed to enhance the liveability of the city.

Governance
Land left to the city, with port authorities potentially involved in the transformation.

Smart cluster

Environment and resources
Land partially reused and remediated, small-scale and decentralised renewables.

Economy and society
Autonomous enterprise systems and small communities of innovators.

Industry and technology
Clusters of virtually managed, independent businesses operating in circular systems.

Governance
Innovation promotion, with port authorities providing facilities for effective co-operation and to ease connections.

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Integrated waterfront

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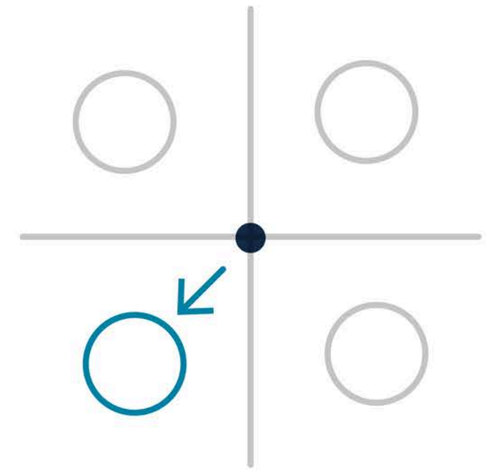
Conservative decommissioning

The change of technological requirements for shipping and the pressure of urban development on port boundaries often result in the decommissioning or delocalisation of ports, leading in turn to waterfront regeneration.
The redevelopment of 127 hectares of HafenCity in Hamburg is an example of a new urban area with a mix of uses including residential, commercial, retail and cultural. **Which placemaking principles and governance processes will lead waterfront regeneration in the future?**



Scenarios

— HafenCity, Hamburg

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Smart cluster

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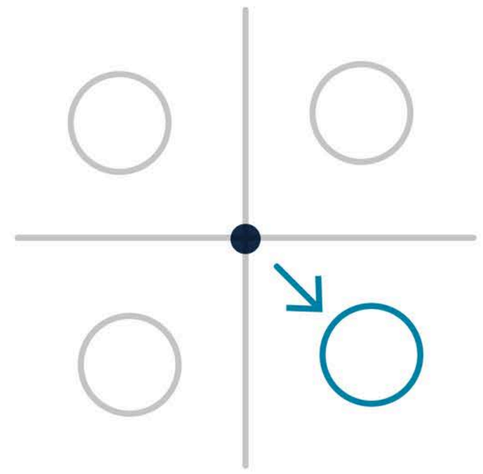
Experimental decommissioning

Even if decommissioned, most ports are central, secure and well-served by infrastructure, so adaptable for innovative industrial sectors such as technology-related businesses. For instance, the Embarcadero in San Francisco, a former commercial and then passenger pier, became a desirable location for technology, design and biotech companies, including a campus for informal education. **How will ports be able to attract innovative industries onto decommissioned land?**



Scenarios

— Embarcadero Exploratorium, San Francisco

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Blue economy hub

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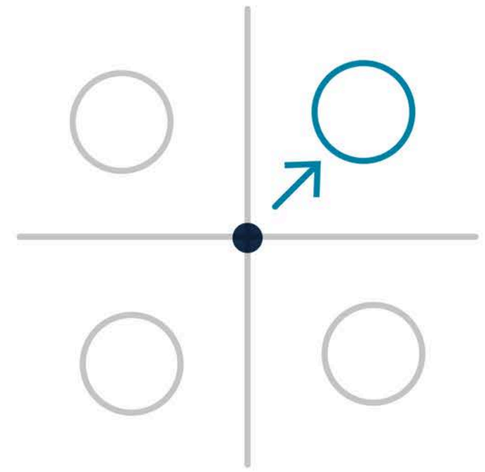
Experimental expansion



Scenarios

Ports offer opportunities to converge social and environmental awareness within a so-called Blue Economy approach, a vision for "improved wellbeing and social equity, while significantly reducing environmental risks and ecological scarcities" (UNEP 2013). Rotterdam is improving its environmental performance by fostering sustainable enterprises (e.g. wind turbines) and by encouraging sustainable innovation (e.g. bio-based industrial clusters and innovation hubs). **Which strategies are beneficial for ports to improve their resilience while having a positive influence on the marine ecosystem?**

— Wind Turbines, Rotterdam

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Living infrastructure

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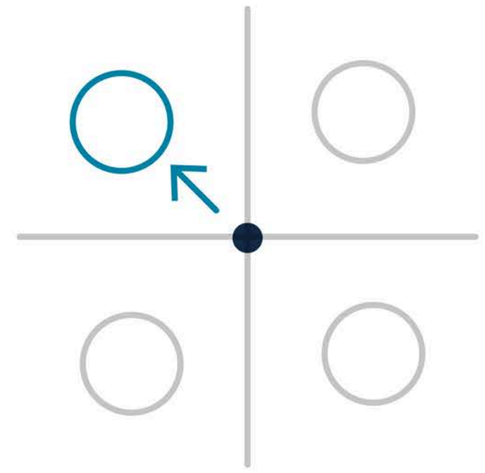
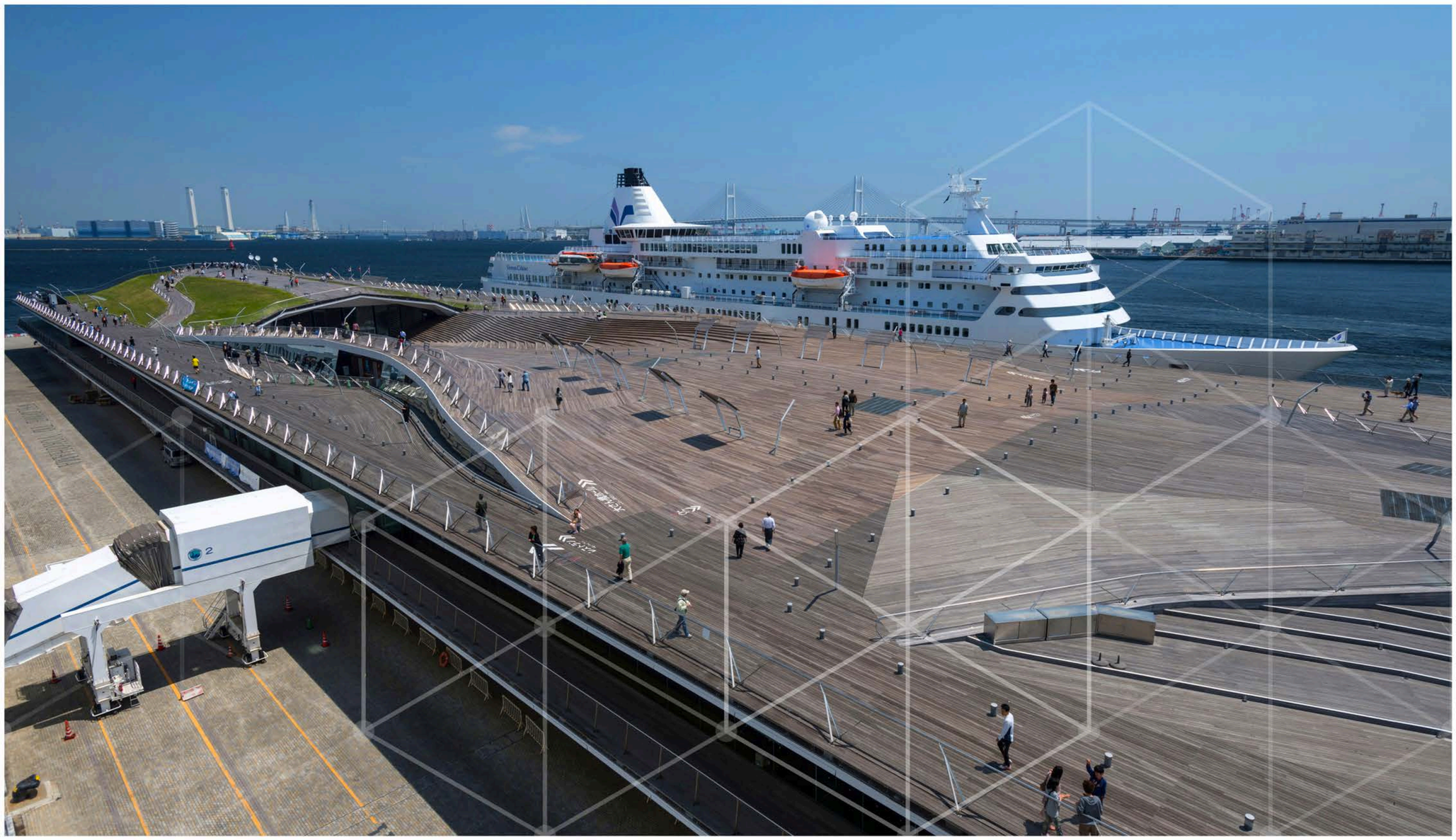
Conservative expansion



Scenarios

Booming cruise tourism and the intensification of commercial port activities mean that a systematic approach and hi-tech smart solutions are needed to fully exploit secure port land. Yokohama turned its former commercial port, Osanbashi, into a renowned cruise terminal. The new terminal functions within a well-designed public space that is able to accommodate intense passenger fluxes. **How will the ports of the future design their facilities to embrace the concept of living infrastructure rather than focusing purely on logistics or practicality?**



— Osanbashi Pier, Yokohama

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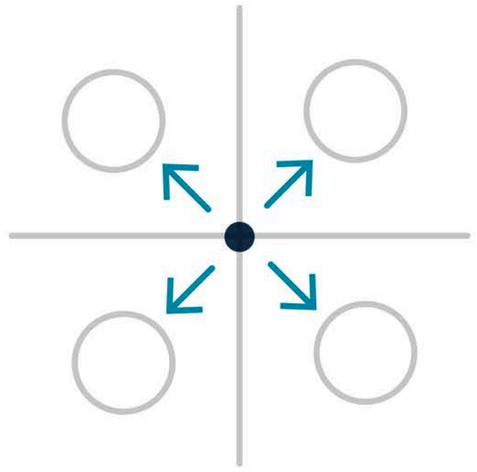

On-site smart energy micro-grid including solar, wind, wave and tidal power

Offices and laboratories sit above the cargo port

Cruise terminal with a public space as a 'gate' to a city

Multi-modal autonomous connectivity to roads, rail and aviation via pods/tunnels

Additional manufacturing functions include 3D metal printing of ship parts

Interactive waterfront landscape with spaces for education and discovery

Cranes made from a light-weight material to reduce load

RO-RO vessels allow the autonomous transfer of cargo on and off the ship

Ports and port perimeters incorporate ecological zones

High capacity railway station connected to the cruise terminal

Disused concrete pier supports new office building above

Blue economy and maritime start-up incubator and maritime museum

Luxury yacht marina

Iconic hotel

Shore-to-ship power solutions reduce noise, emissions and vibrations

Regenerated park, integrated public space

Beach

— Drawing by Mariia Kapitonova