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Transportation management: the next level

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Background

Transportation is at the centre of major supply chain crises. Transportation has recently been affected by factors such as a lack of truck drivers, lack of container capacity and associated price hikes, disruptions caused by incidents in the Suez canal, ports closed due to public health measures, and borders closing as a consequence of (trade) wars and Brexit.

These factors cause disruptions in supply chains, significant cost increases, and lost sales. Transport is a crucial link in the supply chain, and final distribution impacts directly on customer satisfaction. The scope of this whitepaper relates to transport management, encompassing planning, execution, monitoring and payment.

A key recent capability is real-time transport visibility to monitor transportation. This enables appropriate corrective actions in case of deviations, and proactive actions to mitigate impact on product quality and customer service.

This visibility is enabled by new technologies like IoT (Internet of Things) and supporting IT applications, typically hosted in transport control towers.

We focus here on transport control towers, as one of the components of an end-to-end supply chain control tower where information on demand, supply and inventories is being collected and processed. Control towers, and transportation control towers specifically, connect various groups which provide data visibility, which can be used to promote knowledge-sharing and enable corrective actions.

Looking ahead, transport control towers will become a crucial component of future autonomous (or self-steering) supply chains, where decisions will be enhanced or supported by Machine Learning (ML) and Artificial Intelligence (AI).

What is a transportation control tower?

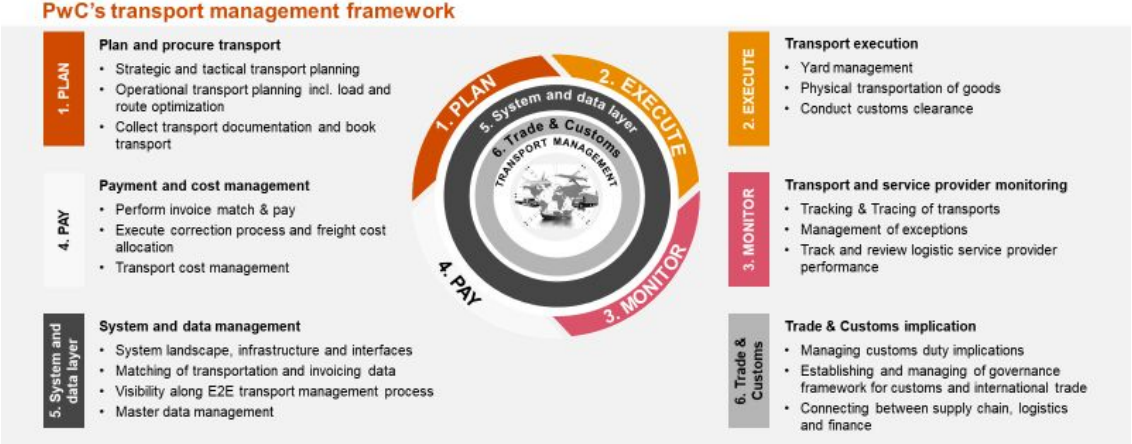
Much has been written in recent years on the subtle and not-so-subtle differences in control tower approaches. In a nutshell, these are procedural, technical, and organisational frameworks that allow for the integration and aggregation of data from different sources across the supply chain. The data is then transformed into actionable insights using advanced analytics and visibility systems with increasing levels of automation.

Control towers are often seen as purely technical endeavours. This could not be further from the truth: dedicated organisational structures are very much a part of a control tower. Capitalising on the potential value of technical visibility is a human endeavour. Event management, internal and external collaboration, analytics, improvement programmes, and so on, must be put in place with clear structures and guidelines.

Transportation control towers are typically used to track, monitor, and manage transportation and inventory movements across the supply chain.

Control towers enable improvements across the whole transportation operation. The centralisation of data, and the associated increased visibility, allows for more comprehensive and streamlined decision-making. Control towers are proving their worth in all facets of transportation management.

This is illustrated in PwC's transport management framework which summarises all related transportation activities. A transport control tower needs to be capable of supporting all of the four focus areas along plan, execute, monitor and pay.



What is a transportation control tower?

01. Plan

Planning of shipments benefits from greater visibility on operations, as better data leads to improved forecasting. Interconnection of different data sources leads to greater horizontal collaboration across the organisation, combining the transportation needs of previously unconnected business units.

02. Execute

Executing transportation is supported via control towers to oversee the movement of shipments from the manufacturing site to the distribution centre, and when fully enabled, finally to the customer.
The most well-known uses of control towers can be found within transport execution departments, ranging from automated order placements to on-the-fly transport mode switches and routing changes. These functions reduce the need for manual processes and enable management by exception.

03. Monitor

Enhanced tracking of shipment location and status (e.g. temperature) during the whole journey enables many of the benefits in all focus areas. Web portals can also provide customers with direct access to this information to better monitor inbound flows.

04. Pay

Control towers allow organisations to take real ownership over transport cost. A single source of data reduces dependence on data from logistics providers.

05. Systems & Data

Integration of transport management into the existing system landscape is key to achieve visibility along the end-to-end process. With integrated master data management and information flows the analysis and visibility of data can be reached. Exemplary is a clear matching between invoicing data which supports the business with additional visibility.

06. Trade & Customs

Along transport management processes customs and duty implications need to be considered. Establishing and managing a governance framework for customs and international trade is crucial for excellent transport management. With the connection between supply chain, logistics and finance transparent solutions can be deployed.

Where is the value of the transportation control tower?

01. Visibility

The first layer needs to accurately reflect current events. Data links between a multitude of sources can provide real-time visibility on transport operations through the use of dashboards and basic alarms. These sources are composed of datalinks between supply chain partners such as forwarders, carriers and warehouses. External reports on consumer trends, weather forecasts, enterprise risks and more are also available. Finally, this layer may be strengthened even further by smart IoT devices. Connected temperature loggers can offer a real-time view of all reefer cargo, enabling companies to react in the event of temperature deviations. RFID tags can update stock levels in near-real time, preventing stockouts and missed orders.

02. AI/ML

Cognitive control towers include a second layer which collects the previous observations and turns them into actionable insights. Determining why certain events occur can be aided by root-cause analysis. Scenario-building simulates how actions will affect the future state of the network and associated risks.

AI and advanced algorithms can significantly increase and automate the second layer, allowing for rapid responses to disruptions. Prescriptive solutions combine predictive models, deployment options, localised rules, scoring and optimisation techniques for decision management to automate complex decisions and trade-offs to better manage limited resources.

03. E2E integrated execution ecosystem

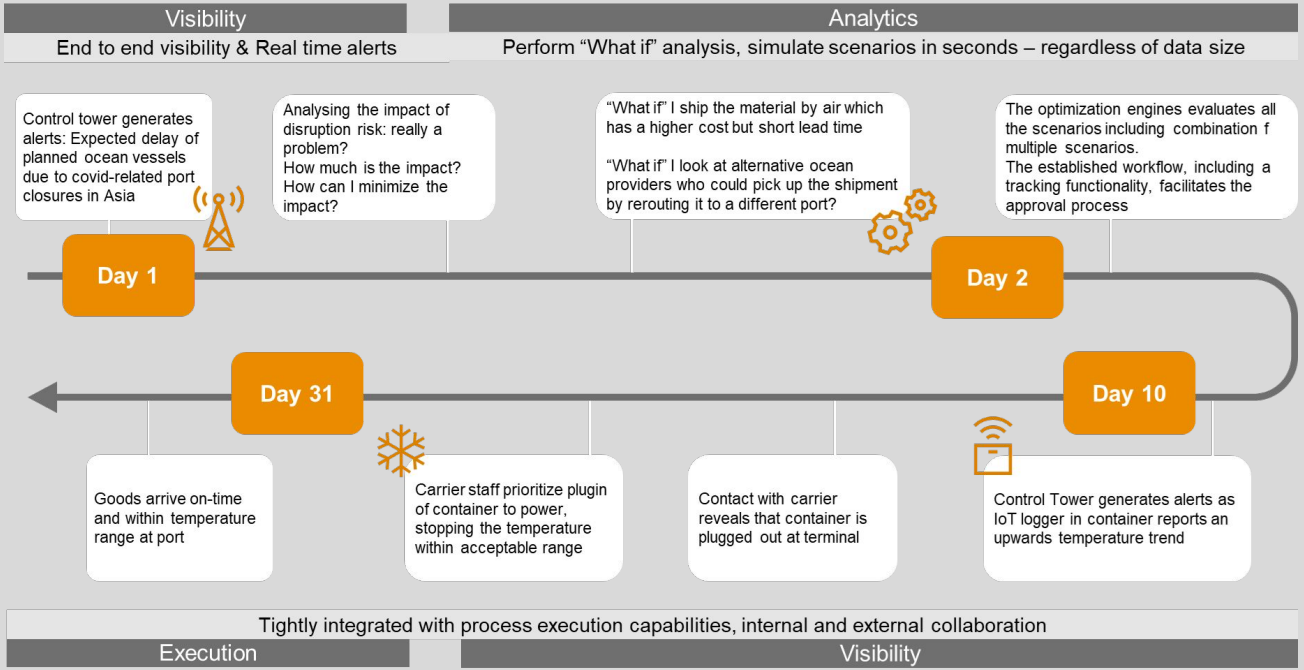
Control towers with a third layer use all the previously acquired information to make recommendations on the best course of action, and in some cases automatically execute them. This brings us even further into the realm of artificial intelligence and machine learning. These decisions can also make use of new innovative solutions such as flexible digital freight platforms (PwC viewpoint) to be more agile and automate transport bookings. This technology will continue to improve over time, as more data and events are fed into it.

Advanced analytics and reporting support decision-making processes and dramatically reduce the time spent in finding data - a persistent problem for many organisations. A data-centric culture is instilled when these reports are widely distributed and regularly reviewed. Both upper levels of management and local branches get objective insights in their performance and KPIs. This promotes course-correction by identifying inefficiencies much faster than was previously possible.

How does it work in practice

All of these innovations are especially useful in today's environment where the impact of the pandemic on all modes of transport has exponentially increased the number of disruptions companies have to deal with.

Example:



How can the full value of a control tower be enabled?

Logistics is an essential part of the supply chain and “Smart Logistics” control tower implementation is a key savings driver and growth lever in today’s world.

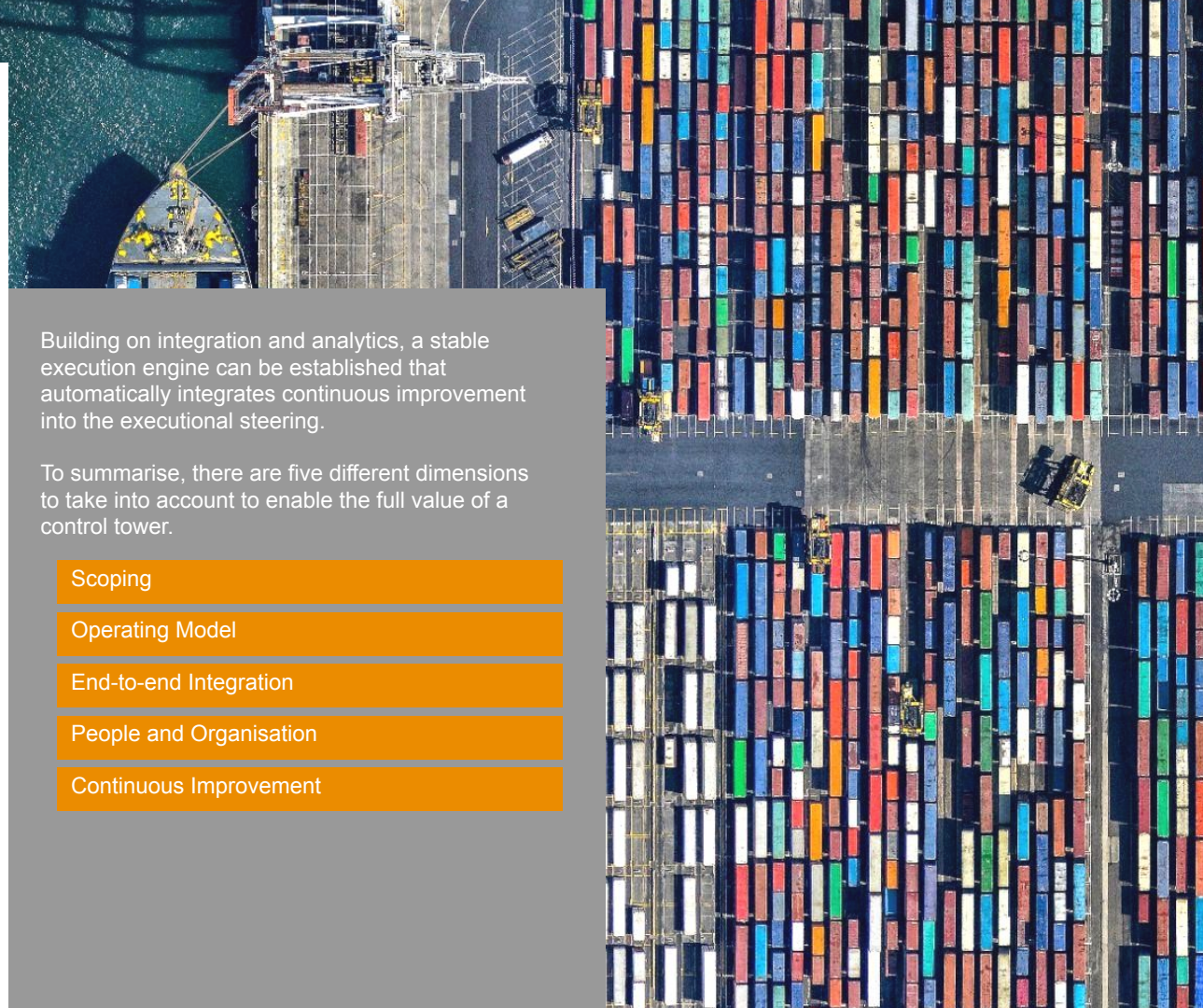
Although the evolution from a traditional supply chain to a connected, digital supply chain may seem complex, the following core dimensions must be considered for every transport control tower implementation.

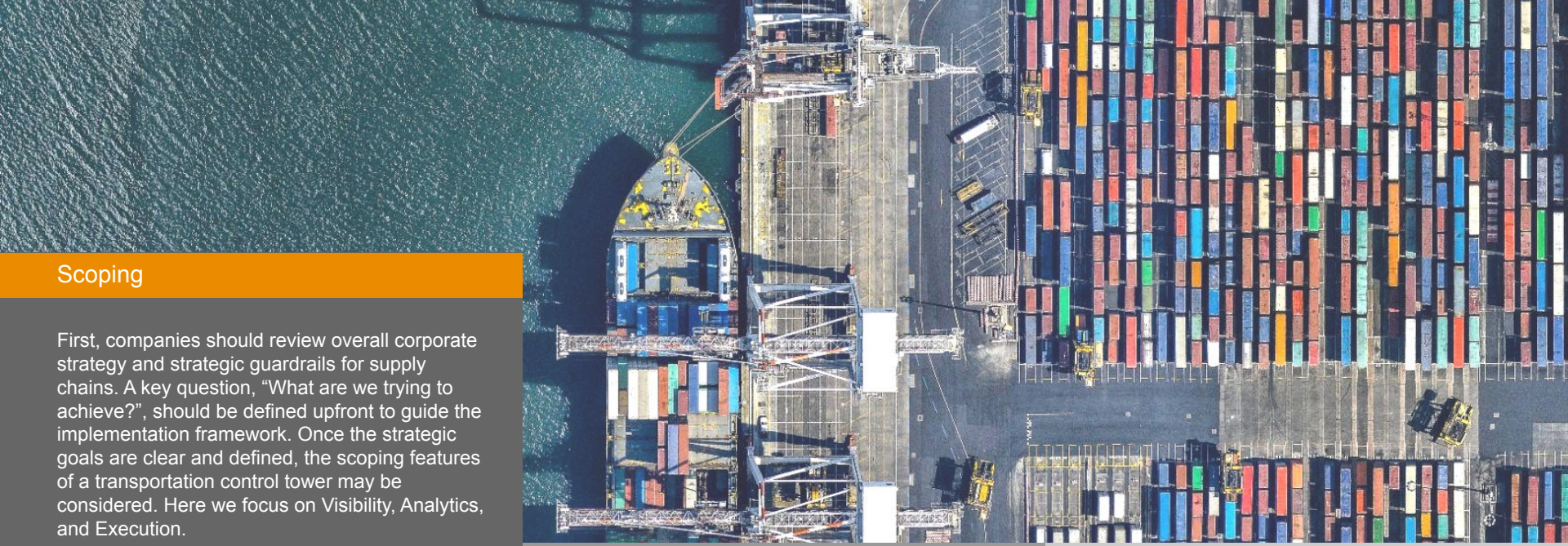
To enable the full value of the transportation control tower, companies must evaluate and define their connectivity needs and business use case. It is crucial to clearly identify the needs and pain points to be addressed by the control tower. This sets the base for a clear scope and operating model decision.

Building on integration and analytics, a stable execution engine can be established that automatically integrates continuous improvement into the executional steering.

To summarise, there are five different dimensions to take into account to enable the full value of a control tower.

- Scoping
- Operating Model
- End-to-end Integration
- People and Organisation
- Continuous Improvement





Scoping

First, companies should review overall corporate strategy and strategic guardrails for supply chains. A key question, “What are we trying to achieve?”, should be defined upfront to guide the implementation framework. Once the strategic goals are clear and defined, the scoping features of a transportation control tower may be considered. Here we focus on Visibility, Analytics, and Execution.

Level 1: Visibility

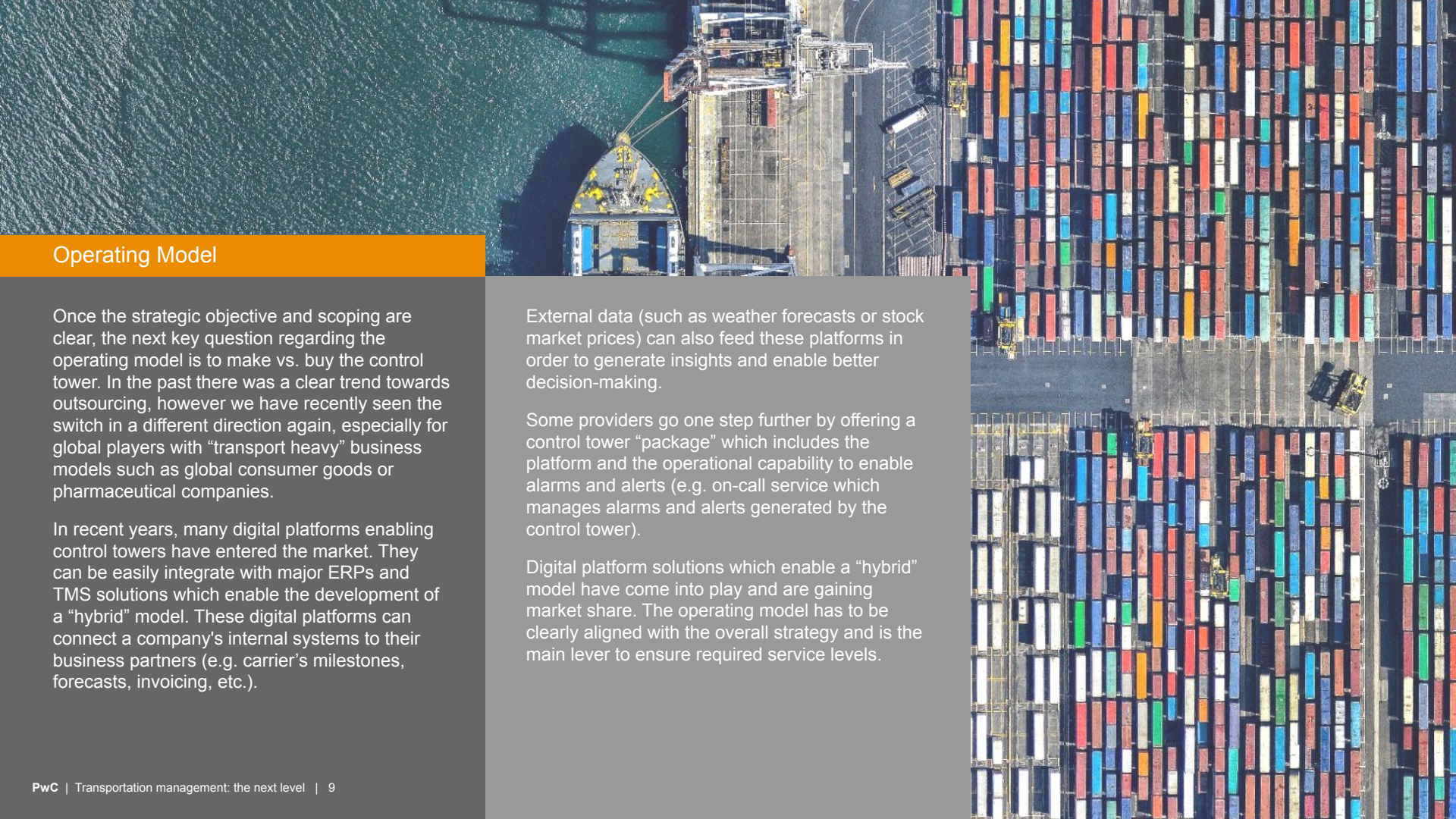
Visibility, as the first layer to the control tower, refers to a platform where transportation status information is collected in order to create full visibility and transparency. Information can be shared with supply chain stakeholders to allow them to further optimise their supply chain (e.g. inventory management by clients). Level 1, answering the question “What is happening now?”, aims to provide real-time information via dashboards and alarm generation.

Level 2: Analytics

The Analytic layer enhances control tower visibility by proposing potential options or solutions based on decision rules, to support more cost-optimal or service-optimal decisions (e.g. re-routing in case of known bottlenecks). Transportation departments are prompted to answer “Why is this happening?” and “How can this be improved?”. Providing root cause analysis and response management enables smarter transportation decision-making.

Level 3: Execution

In the final layer of the control tower, Execution, we integrate the end-to-end ecosystem to combine visibility with artificial intelligence in order to identify the best solution. The key to this layer is that it is prescriptive, meaning continuous improvements and monitoring compliance are embedded.



Operating Model

Once the strategic objective and scoping are clear, the next key question regarding the operating model is to make vs. buy the control tower. In the past there was a clear trend towards outsourcing, however we have recently seen the switch in a different direction again, especially for global players with “transport heavy” business models such as global consumer goods or pharmaceutical companies.

In recent years, many digital platforms enabling control towers have entered the market. They can be easily integrate with major ERPs and TMS solutions which enable the development of a “hybrid” model. These digital platforms can connect a company's internal systems to their business partners (e.g. carrier’s milestones, forecasts, invoicing, etc.).

External data (such as weather forecasts or stock market prices) can also feed these platforms in order to generate insights and enable better decision-making.

Some providers go one step further by offering a control tower “package” which includes the platform and the operational capability to enable alarms and alerts (e.g. on-call service which manages alarms and alerts generated by the control tower).

Digital platform solutions which enable a “hybrid” model have come into play and are gaining market share. The operating model has to be clearly aligned with the overall strategy and is the main lever to ensure required service levels.

End-to-end Integration

Enabling the full value of the control tower is taken a step further with end-to-end integration. Companies may consider connecting the control tower with other functions across the enterprise and to external vendors. Enabling the data integration allows companies to establish multiple communication channels with close to real-time connectivity. Most projects consider integrating or data sharing within the company as their first step. Next companies may extend integration to logistics service providers and 3PLs, allowing for greater partner collaboration and tighter logistics control. For example, accurate forecasts facilitate better transport planning, and if the forecasts change, then it can be addressed immediately. Transportation control towers are a clear lever for supply chain optimisation.

The next level of integration is to allows customers access to the control tower. Allowing customers access to the transportation overview and data provides a game-changing experience for customers. Digitalisation has raised customer expectations for “instant” order fulfillment or just-in-time service. Transportation control towers which grant customers access to order and logistics information promotes customer-centricity.

Finally, B2B integration based on real-time data can play a prominent role in proactive decision-making within B2B partnerships. Examples of integrating key B2B ecosystems include direct B2B integration, connected networks, client webportals and device-tracking.

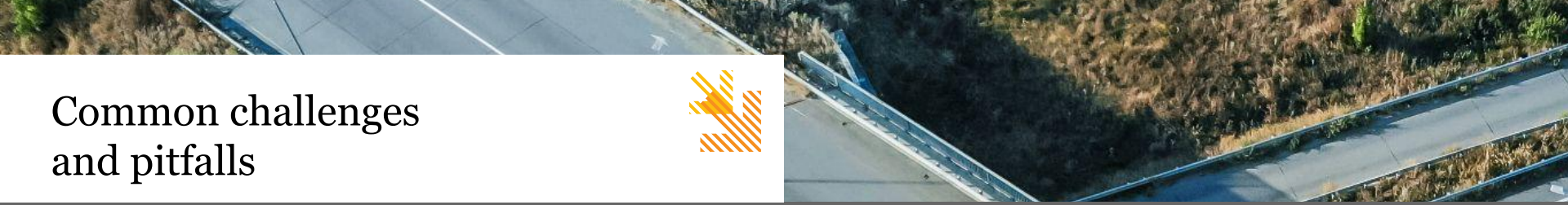
People and Organisation

Implementing and connecting your digital platform is not the final step. As supply chain topics become increasingly important for business transformation, organisational mindsets must also be considered. Firms which implement innovative and new technologies require people and ways of working which complement the digital mindset. Full transport control tower activation must be coupled with capacity building and upskilling in the team. Not only should the transportation organisation understand the control tower outputs (scenarios, alerts and notifications, automated decisions), but firms must rethink their management processes and roles and responsibilities to enable employees to take corrective actions when presented with the control tower data.

Continuous Improvement

Transportation control towers provide management with a view on the day-to-day freight and logistics efficiencies, service levels, and logistics costs. Significant added-value of a transportation control tower stems from the option of continuous improvement on a tactical and strategic level. With this in mind, it's clear that control towers can provide multi-dimensional optimisation.

- **Service level:** Control towers, either focusing on transportation or E2E, visualise the supply chain and provide insights for service differentiation which can in turn enhance the service level. When the data is visualised in a real-time and understandable format, transportation decisions can be taken resulting in maintaining or improving service levels.
- **Resilience:** Supply chain resilience can be improved by a control tower providing an overview of the entire network. In some cases, this identifies opportunities for modality shifts depending on the external scenarios. The recent example of the Suez Canal blocking highlighted the necessity of modality shift decision-making due to external events.
- **Costs:** Continuous improvements within the transportation control tower often focus on continuous cost reduction by determining the best and most cost-effective transport modality. Simulations and 'what if' scenarios can be used to optimise transportation costs.
- **Sustainability:** Sustainability is quickly becoming a differentiating factor within industries as many investors come to regard it as a key performance indicator. Considering environmental and societal impact contributes to the ESG initiative of many multinationals. Transportation control towers are a viable option to bring visibility to logistics and can inform more sustainable decision-making. Information from the transportation control tower, like delivery routes or last-mile distribution, can be used as inputs to calculate and reduce carbon emissions.



Common challenges and pitfalls

The setup of a control tower solution is a complex operation and needs to be defined carefully to ensure a successful implementation. The right functional scope needs to be defined and understood, as well as connecting the right organisational units in the process for real integration that can fully achieve benefits. Implementation must meet the needs of the use cases. This gives rise to two common challenges:

1. Solution setup

The solution setup describes the purpose and functional scope of the control tower solution. This includes the functionalities of the control tower, the information that is visualised and connected as well as the functional focus of the solution.

Most control towers do not result in improvements due to mainly four different points in terms of functionality scoping:

Reactive after the fact

- Issues are reported as/after they occur
- Still in reactive, firefighting operating mode
- Insufficient attention to predictive and preventive measures

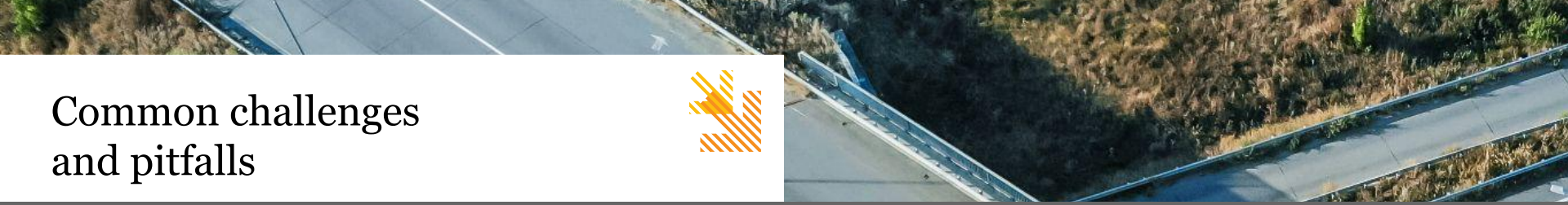
This leads to limited control of incidents and issues. When setting
up the control tower it is important to focus not only on the reporting and visualisation of events as they occur, but also to focus on predictiveness of potential events.

The full improvement potential of a control tower solution can only be achieved when it enables the organisation to actively manage and mitigate events. In practice this means to not only focus on static ETAs but have dynamic data involved to enable recalculation of ETA to ensure that potential issues can be identified before they have an impact.

Not actionable

- Big, colourful displays give a false sense of control
- Information is not actionable
- Raising alerts, but not providing solutions

The solution setup needs to be, simultaneously, easy to understand for the end-users with visuals and access to useful information, and also, to present the information in a way that can help the user to find a solution to mitigate risk. For example, informing of a delay is important, but identifying the root cause of the delay is more important. Based on this, the user can try to solve the problem on his own, or in a more advanced setup, follow the recommendation of the control tower solution. Best practice is to highlight the anticipated event along with the cause, e.g. delayed delivery notification combined with the information that there is a traffic jam which will likely lead to a delayed arrival at the port. Based on this information, mitigation might be still possible, such as switching modality or booking a new slot at the port and on the ship.



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Disconnected

- Operating as an ivory tower
- Disjointed from the rest of the organisation to resolve issues and drive solutions
- No mechanism for root cause corrective action

A common problem is the missing connection of the control tower with the business. The solution needs to be integrated and aligned with the business to ensure added value. Along with the right data connection, the process-wise connection is required. Full potential of the solution can only be achieved if the control tower is built in a way that supports business needs and solves the issues that occur on the business side.

The process needs to be integrated to find the real root cause and drive an appropriate solution. This can only be achieved by full and real integration. Best practice is to connect different functions and business units with the control tower to ensure that the information will not only be displayed in the control tower organisation but also to the right person or function responsible for solving the issue.

One size fits all

- Not focused on critical areas that drive differentiation
- Pulling in too much information; trying to cover too much
- Insufficient prioritisation of issues and alerts

2. Change management

Implementing and operating a control tower also brings certain organisational changes that need to be managed. Control towers significantly change the way of working for transport management departments.

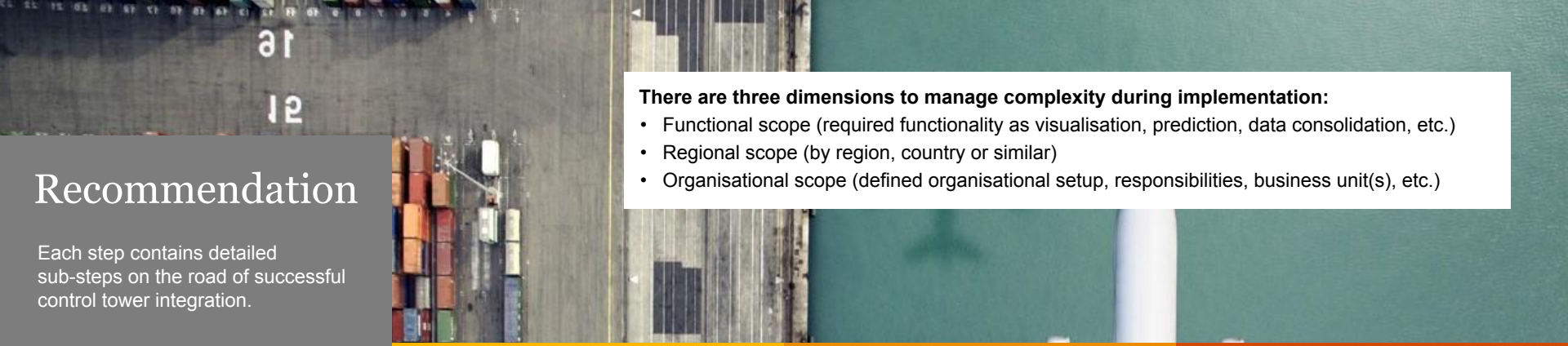
The solution allows transport managers to switch from handling recurring day-to-day tasks towards more value-adding activities such as risk mitigation, optimisation and alert management. The transport management organisation must transform to match these new requirements and to manage the upskilling of transport managers.

Many organisations are not reacting to the new requirements from an organisational perspective. This can limit realisation of the full value of the control tower.

Recommendation

Implementing a control tower is a journey and should follow a use case driven approach. We recommend to follow a clear four-step approach from the outset: understanding, to conceptualisation and design, followed by building and pilot launch, and finally to scaling and evolving. This four-step approach is illustrated below.

1. Understand & Envision	2. Conceptualize & Design	3. Build & Launch	4. Scale & Evolve
Future Needs Understanding	Define Use Cases and Stories	Solution / Partner Selection	Refinement & Industrialization
Control Tower Vision & Roadmap	Control Tower Concept Design	Pilot Project(s) Launch	Scale-up and Roll-out
As-Is Capabilities & Maturity	Digital Assets and Capabilities Required	Rapid Prototyping	Build-out Integration
Opportunities & Business Case	Reference Architecture 1.0	Test & Learn	



There are three dimensions to manage complexity during implementation:

- Functional scope (required functionality as visualisation, prediction, data consolidation, etc.)
- Regional scope (by region, country or similar)
- Organisational scope (defined organisational setup, responsibilities, business unit(s), etc.)

Recommendation

Each step contains detailed sub-steps on the road of successful control tower integration.

1. Understand & Envision

The basis for a successful integration is understanding the future needs, and from these, deriving a control tower vision and roadmap. Understanding business capabilities and maturity is the key to successfully identifying opportunities and calculating the associated business case.

2. Conceptualise & Design

When the vision and roadmap are clear, defining the future state becomes the next step. Use cases and user stories are a good methodology for understanding business users' needs and involving all relevant stakeholders from the beginning. Based on that the concept can be designed. The design identifies and understands the future needs in digital assets and capabilities and includes the necessary reference architecture.

3. Build & Launch

To implement the designed control tower, the right solution and partners need to be selected. Pilot projects are required to start with the first part of the solution and then perform a roll-out. During implementation, rapid prototyping supports agile development and deployment of the solution and delivers testable results. With testing the learnings increase and the first challenges can be solved in a small and manageable environment.

Companies often want to realise everything in the first wave of implementation and aim to cover all relevant information needs with one solution.

4. Scale & Evolve

After implementing the pilot, the solution will be refined and the pilot can be used as a blueprint for industrialisation. With this blueprint, the scale-up and roll-out can take place. After the first roll-out phase continuous improvement and build-out can be started. Ongoing integration of complexity and additional business units can follow.

This approach starts with the strategic questions and concepts and slowly transforms the strategic point of view into operational and tangible actions.

Thank you

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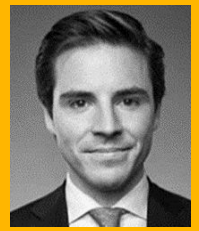

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