

An aerial photograph of a busy port. In the foreground, a large container ship with an orange hull and white superstructure is docked at a pier. The pier is filled with stacks of colorful shipping containers (yellow, red, blue, green). In the background, a city skyline with several tall skyscrapers is visible under a clear sky. The water in the harbor is dark and calm.

**Wipro's Connected
Port Suite**

Today's Container Terminal business is swiftly evolving and market forces are creating greater challenges for the modern operator. These include:

- Reduction in the number of overall carrier clients that they serve, with the continued consolidation of these mega carriers
- The overall TEU volumes have not decreased but the operators are becoming sharper and selective with their Port/Terminal strategies.
- The new carrier groupings demand higher levels of service, at reduced handling charges.
- Capital investments required in enhancing existing and new facilities—the need for greater financial “Returns on Investments”.
- The ability for Terminal Management to predict and handle shifting trade and vessel volumes. Increased capacity, although good for revenue, can create its own problems for

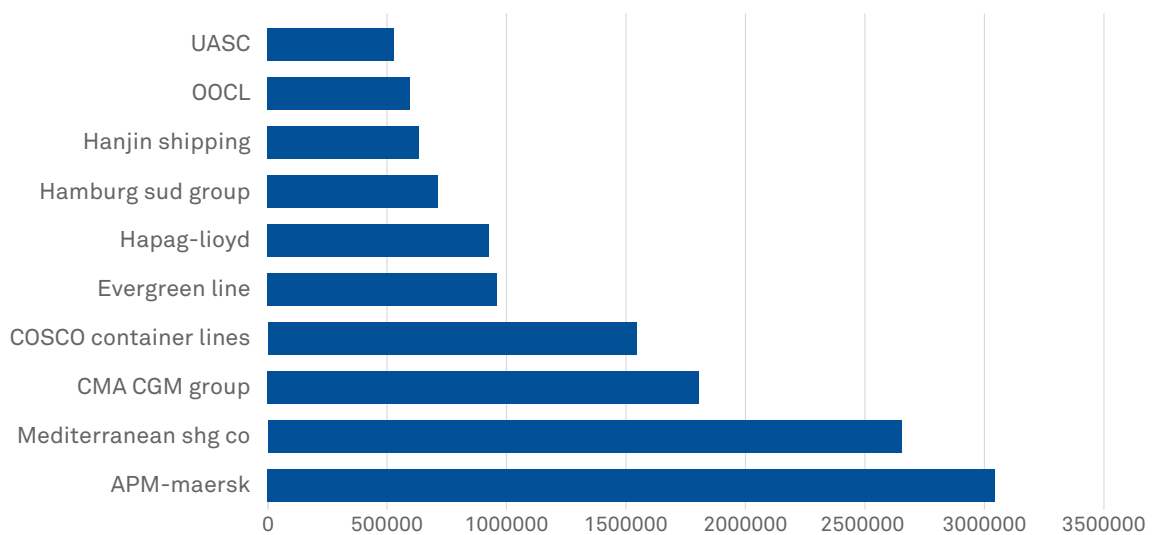
the Terminals in terms of handling and processing the increased traffic volumes. (Assets, Space, internal and external infrastructure, environmental and physical constraints can all create significant issues.)

- The need from an internal view to reduce operational costs, improve productivity, and drive higher levels of safety and standards across their facilities.
- The necessary levels of technology to enable the operators to achieve these objectives, with current IT solutions becoming archaic, with solutions providers struggling to keep pace with change and the demand of the market.
- The lack of IT integration across terminals and especially with the larger global operators that seek to control and manage their global enterprise from a corporate level, looking at stripping out regional costs.

Size matters

Hapag-lyoyd and UASC would rank fifth if they combined their container vessels, ending up with a fleet still only half as big as that of industry leader maersk

■ Current fleet capacity in TEU



Source: Alphaliner (operated fleets as of april 21)

Port operators need to keep evolving and setting new levels of efficiency. This is paramount to the overall success—unlike their carrier clients that can select which terminals they ply their trade, the terminals have to look at large-scale, long-term capital investments.

Much of these outcomes can be achieved through the adoption of “Next Generation” Technology and this is where Wipro is looking to leverage its global recognized IT services to help terminal operators achieve these goals.

“Collaborative, digitalized big data solutions are the future

The question revolves around seeking more efficient ways to handle and manage all aspects of their business especially as the larger, more diverse groups, have varying levels of management and coverage from:

- Terminal Level (day to day operations, responsibility for their own P&L’s)
- Regional level (monitoring and supporting Terminal falling within their geographical perimeters)
- Corporate level (overseeing global strategies, and maintaining corporate control over the regions and ultimately down to a Terminal level).

When carrier groups evaluate their service calls, their objectives will always focus on the following key areas:

- Cargo catchment areas (large conurbations, & key shipper accounts driven from an export/import prospectus.)
- Solid Inland infrastructure and good modes of transport (road/rail/barge/feeder services)
- Main trade routes
- Fast and efficient turn times for their vessels (time to berth, time on berth, minimum wait times)

- Efficient processing of cargo and containers through these facilities. (minimal delays)
- Lower vessel calls (competitive rates)
- Higher levels of customer service
- More information and shared data for greater visibility from pre-arrival to vessel departure—data is the essence of smoother operations.

Wipro has undertaken considerable research into the type of IT solutions that are commonly found across terminals:

- Terminal operating solutions (vendors such as navis, cyberLogitec, jade and RBS are commonly found).
- ERP applications (SAP, ORACLE, Microsoft and IFS are common solutions)
- CRM systems (SAP, ORACLE, & Microsoft dynamics are common)
- Asset management (IBM’s Maximo, Oracle and SAP applications are common)
- Gate automated solutions (Certus, Asia Vision, Camco are the leaders in this field)
- Other solutions such as terminal security, wifi and analytical solutions have been adopted.

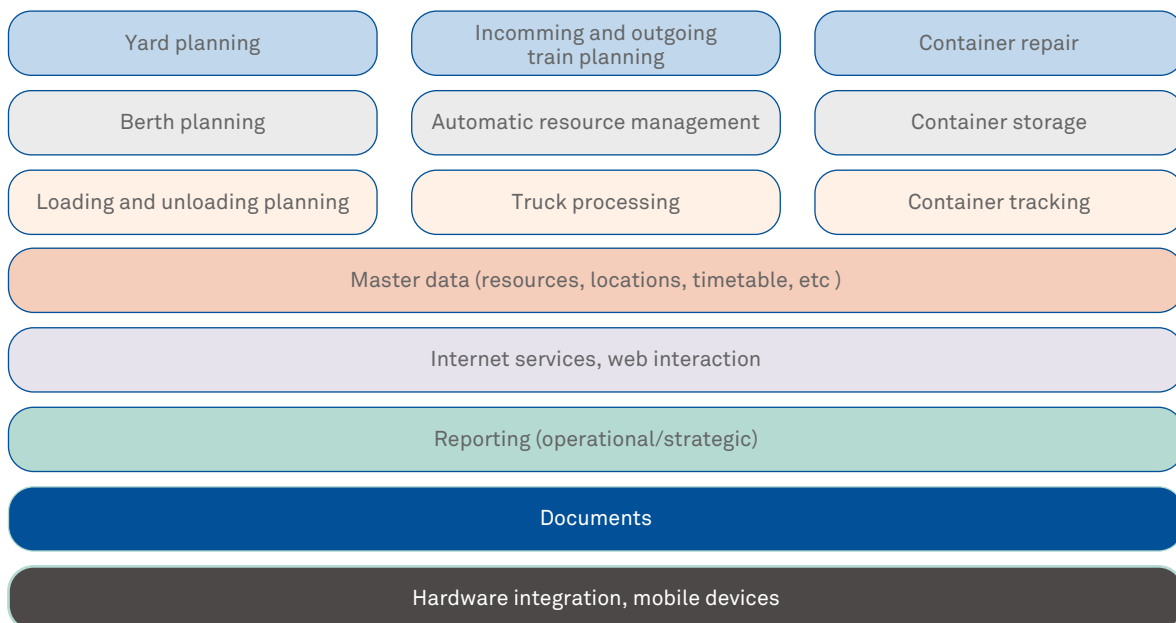


Figure: Overview of a Terminal operations solution ecosystem

These solutions provide considerable data and we established that a lot of time was spent by operational teams in reviewing and manipulating the information and trying to produce meaningful reports. Lots of consolidation in terms of analyzing the data and in many cases, much of it became obsolete before being used in an actual operational mode. Of course, this data would allow management to review and compare in terms of a historical format, but the goal is to become more proactive and be able to react on essential data in a timely manner.

So why do we need Connected Port approach?

We have found that the sheer lack of IT integration is common across the market. The inability to link key solutions and obtain key operational data isn't being accomplished—yes, data is available from all these various sources but the lack of total integration has created blockages in the overall view of the operations.



Wipro is an expert in the field of solution integration. We believe the first phase in driving greater efficiencies across Terminal groups will be the integration and digitalization of these key solutions. Obtaining collaborative “Big Data” will be the first step towards the future.

Utilizing Wipro’s unique design-led approach, we can interface the key operational solutions, allowing for essential data to be extracted which can then reside within our robust platform. Once the data is collected, the ability of Wipro’s advanced analytical engine like the Data

Discovery Platform (DDP) can be utilized. Wipro can help large Terminal organizations save costs through our cloud-hosting offering which could significantly help reduce local and regional IT infrastructure costs.

So, the question is which areas can be digitalized and the role of big data in achieving the type of improved savings that will entice carriers to maintain their calls at facilities while looking at reducing the Terminals’ overall operational costs.

The emphasis will be to address and manage the processes that will allow for the smooth handling and transition of the vessels and cargo entering these facilities. So, we must look at the following areas:

As mentioned above, the carriers can be quite fickle when planning their revised Terminal calls—and we have already touched on the fact that Terminal operators face major capital investments into infrastructure, asset, and technology. So, the answer will be to build a more cohesive “Mouse Trap” for these carriers. Terminals will need to develop even smarter and more streamlined operations that will induce the carriers to maintain their calls or switch to their facilities with the goal of achieving faster vessel turn times, improved service and looking at reducing their overall costs so that maximum yields can be achieved on every TEU handled. A major factor for Terminals to strive for these goals will be in system integration and the ability to become more proactive in dealing with issues before they occur.

massive work orders that will ensure speedier handling.

- Effectively plan vessel ETA and ETD’s, to ensure that maximum berth utilization is achieved.
- The ability to process and handle actual work orders and maintain effective processing and also share essential data with the key management that will allow for management to become proactive and make decisions on the fly, thereby becoming more flexible and responsive.

Equipment asset management

- Managing and maintaining the Terminals handling equipment assets in a more effective manner (Essential for the success of any Terminal is the ability to maintain a highly efficient equipment suite, especially when an average sized Terminal might spend between 70 to 100 million dollars on their equipment (RTG’s, quay cranes, yard hustlers, top lifts, straddle carriers, forklift trucks etc.)
- Ensuring sufficient assets are always available to suffice their continuous work orders.
- Helping to streamline their maintenance and repair programs.
- Ensure maximum financial returns on these assets and track their efficiencies against their daily running costs

Data integration

The ability to provide seamless integration across all operational solutions—from having the data available within the solutions to be able to deliver:

- The ability to capture and process incoming cargo data more efficiently and to ensure that the yard and cargo areas are all prepared and ready for the vessel’s arrival so that minimal time is taken when processing the

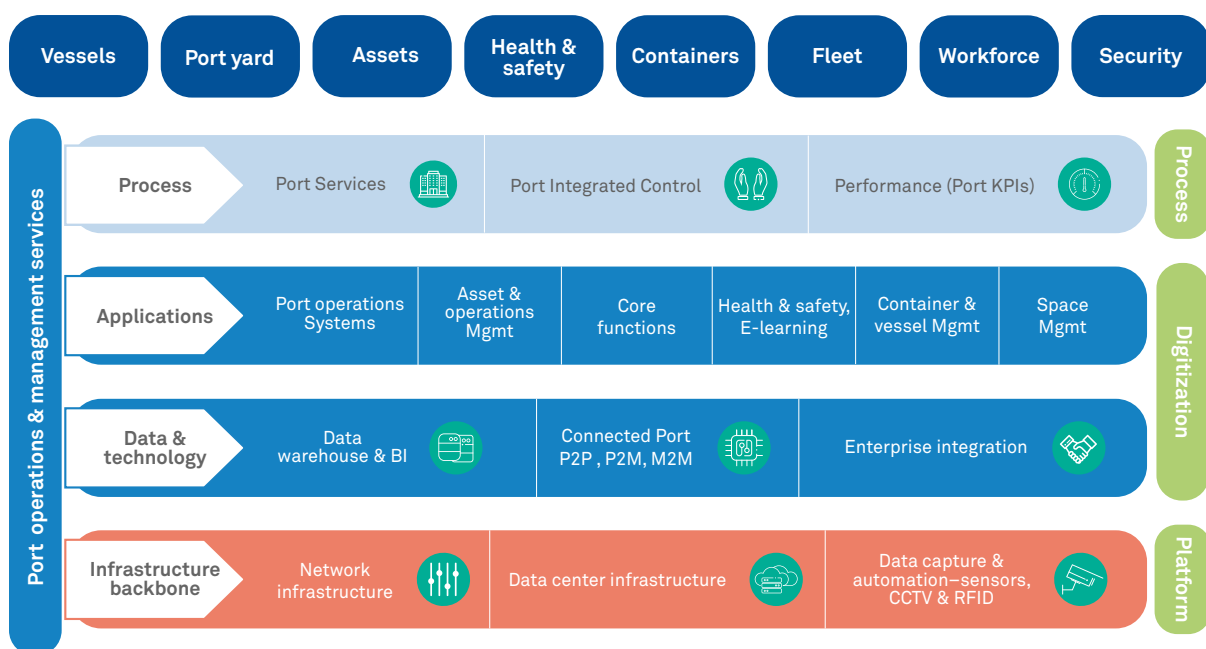


Figure: Connected Port reference architecture

Effective corporate and regional control

- The larger global Terminal operators are all seeking ways to streamline their operations and obtain tighter control at a local Terminal level. There is of course a very fine balance between stripping costs out without creating a major impact to either levels of service or operational efficiencies. However, with today's ability to integrate and share data across multiple locations in a real-time environment will help Terminal groups (APMT, DPW, Hutchinson's, ICTSI etc.) to strip out regional layers of costs and for the corporate entities to have much tighter control on their business at a base Terminal level.
- Providing a combination of cloud and mobility data applications will help to channel data and allow for better control and management across all aspects of the business.

Wipro uses the latest integration tools that allow for seamless connectivity and provides a platform where essential data can be stored—having this data at a centralized location can certainly help to streamline local and regional processes and provide a window of “Big Data” to the corporate level management that seeks to become more “hands on” in their approach.

Wipro's HOLMES advanced artificial intelligence application—the intelligent component of connected Port suite

Data has a shelf life—it's vital that action is taken or the right information is channelled to the right level of management that can act and respond to it in a timely manner. However, Wipro's HOLMES takes big data and provides real-time learning solutions. If we stick with the concept of Engineering—HOLMES can be pre-set with business logic—having the ability to pre-empt and predict when routine maintenance or more essential repairs should be undertaken can help to keep machinery operating longer and reduce potential mechanical failures or breakdowns. If you consider that this will help to keep equipment at a more optimal level, and improve overall safety across the Terminal, then these are all points in favour of deploying HOLMES.

Further helping the Terminals engineers at a local level through our HoloLens VR applications

- Centralized virtual yard planning
- Modelling new green field Terminals or reviewing and remodelling of brown field facilities. (Building models and design in a 4-dimensional environment—mapping projected volume data, and financial data against projected operational growth will allow for mapping capital investments against projected financial returns.
- Building and analysing financial modelling
- Measuring volume breaking points within a Terminal (Equipment, TEU capacity, Vessel berthing, Gate volumes, Road lanes, Rail hub etc.).
- Centralized engineering modelling (helping to provide valuable real-time assistance on repairs and equipment data).
- Providing global, regional and Terminal comparison modelling—mixing different equipment makes into the Terminals in a plug-and-play environment—comparing operational performances and reviewing the most efficient equipment for the job.

What are the tangibles that can be achieved through connected Port application suite?

After Port Infrastructure build cost, assets and equipment constitutes the next biggest cost element.

On average, a medium-sized facility might indeed invest anywhere between 50 to 100 million dollars on operating equipment and when looking at global operators, they might be spending more than 1.2 to 1.5 billion dollars on equipment along with a sizeable annual budget in terms of maintenance and repairs. So, it's vital that the equipment can be run efficiently and with minimal operational downtime.

Connected Port utilizes the latest IoT technology which can be easily retro-fitted to all operating equipment. Due to our neutral approach,

we are not manufacturer-specific and we look at extracting essential operating data from each piece of machinery at source level data including:

- GIS physical location tracking across the facility
- Fuel consumption
- Engine running times
- Tyre pressures
- Service intervals
- Speed of the vehicle
- In service/out of service recording

Connected Port can interface with the essential back-end operational solutions like the Terminal operations, ERP and data can be extracted on the following areas:

ERP

- Make and model of each machine in service
- Number of pieces of equipment
- Data entered service
- Date left service
- Service History (routine and unscheduled issues?)
- Breakdown and warranty work (type of issues faced)
- Asset value (\$\$\$)
- Equipment running costs
- Replacement value
 - Spare parts
 - Fuel consumption
 - Tyre maintenance

Terminal operations system

- Work orders per machine
- Hours operated
- Number of lifts/moves per hour by machine

This level of data can help across all levels of the management from a Terminal to corporate level in measuring the overall performance and running efficiencies of every type and make of equipment running.

The benefits:

Data comparing all equipment

- What is the best equipment running across your operations in terms of:
 - Total Cost of ownership
 - The ability to measure manufacturers' claims with actual operational data.
 - The ability to identify potential recurring faults within the machinery and being able to scrutinize these facts with the Manufacturers (identifying potential equipment flaws and being able to make better purchasing decisions based on real operational data.)
 - Operational costs (fuel costs, spare parts, service Costs)
 - Mechanical reliability (measured against manufacturers' claims)
- The ability to compare manufacturers' equipment.
- The ability to look at Group purchasing and standardizing equipment across the Terminal operations—(achieving greater discounting and improved service and support levels)
- The potential to save millions of dollars across all aspects of your engineering and procurement process.



About the author

“Manish R Kumar is the Global Digital & Consulting Head with the Engineering Construction & Operations (EC&O) vertical in Wipro Ltd that includes Engineering Construction, Real Estate, Smart Cities, Airports & Ports competencies. He is a seasoned professional with over 20 years of diverse experience in the Infrastructure industry globally. Manish currently leads the Digital and Industry Technology practice, is a Smart City evangelist and has Headed IT Functions for Construction Enterprises in the past. Manish has evangelized and delivered successful digital solutions and specific digital value propositions across the globe for smart and 21st century infrastructures including airports, and for enabling construction & real estate enterprises, become more agile and productive

By subject matter experts in Wipro’s EC&O vertical Wipro’s Engineering Construction and Operations (EC&O) vertical. Practice is addressing the revolutionary challenges and a need for transformation that our clients are facing. We are helping our clients explore new ways to improve the efficiency accuracy and transparency of their key business processes while improving overall performance. We are the enablers to help organizations adopt digital transformation and strongly pursue innovation and new market expansion as the key growth strategies so that they can ‘Be Digital’ and ‘Build Digital’.

Our key focus areas are:

1. **Engineering & Construction** covering Architecture Engineering & Construction (AEC) and Engineering Procurement and Construction (EPC) sectors
2. **Operations & Facility Management** covering Facility Management, Real estate and Integrated Infrastructure support services
3. **Airports** focusing on digital airport models aligned to the Airport Service Quality (ASQ) parameters, core airport services and advanced airport solutions



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