Making the Most of Technology

How to integrate technology implementations with the ‘big picture’
Introduction
Introduction

• Todays port and terminal operators incorporate many different levels of technology, equipment, and innovation
  • Highly efficient operations translate into superior service levels

• This appetite for innovation provides opportunities for optimization, but presents many challenges along the way

• This presentation will discuss:
  • Opportunities and challenges related to technology implementations
  • How to successfully implement technology projects which align with your organizations ‘big picture’ goals and plans
Agenda

• The Why – Opportunities
• The How – Challenges
• Infrastructure considerations
• Equipment considerations
• Technology considerations
• People considerations
• Integrated project delivery methodology
The Why – Opportunities

• Cost and operational efficiencies
  • Promote efficient movement of goods and cargo, not only within ports and terminals, but throughout the entire supply chain

• Customer service and competitive advantage
  • Continuous reliable productivity, without direct impact of human variability

• Increased safety measures
  • Separation of person and machine

• Increased capacity and expansion through densification
  • Increased volumes and velocity, same footprint

• Sustainability and regulatory demands
  • Ability to electrify terminal equipment and optimize drive behavior to reduce energy consumption
Business case is key

• The basic terminal planning question:
  • What are the objectives of successful technology implementation for a container terminal?

• The scale and complexity of technology implementation depends completely on the business case
  • What do we want to achieve and why?

• Important to define “technology”
  • Complexity can range from individual solutions, such as OCR at the ingate, to fully integrated solutions, such as a fully automated container handling
From “Bottom-Up” to “Top Down”

Traditional

Business Case
Operations
Logistics
Equipment
Infrastructure

New
The How – Challenges

• Infrastructure
  • Large capital investment with long-term life requirement

• Technology
  • Advancing quickly, unlimited options, cutting edge or bleeding edge?

• Equipment
  • Large capital investment with long-term life requirement

• People
  • Internal and external stakeholders, all have different priorities
  • New mindset, paradigm shift in skillset, retraining the workforce to work smarter not harder
Infrastructure Considerations
Development Philosophy

• The infrastructure required to support highly complex technology implementations may be fixed for its economic life but can be phased to accommodate continual growth and expansion.

• Early preparation of a well-integrated, long-term masterplan and development plan is a **must**.

• Due to the high cost of capital investment in infrastructure, it must be designed to sustain long term useful life.

• Thorough analysis to predict performance and operating costs for the life of the infrastructure benefits all stakeholders.
Development Philosophy

• Looking back…
  • Historically, terminal operators implemented technology on top of existing infrastructure
  • Lease terms were shorter and there was little appetite for additional infrastructure investment
  • The relationship between terminal operator and port authority was very much a tenant/landlord dynamic

• Looking forward…
  • Port authorities and terminal operators recognize the need to implement advanced technology, which can require significant infrastructure investment
  • Lease terms are lengthening
  • The relationship between terminal operators and port authorities is becoming more similar to a partnership dynamic, where both parties are equally invested
Development Philosophy Example

- Long Beach Container Terminal, MHRP
  - Masterplan designed as a 3.3 Million TEU fully automated container terminal
  - Built in three phases to accommodate growth and expansion
  - Infrastructure designed and constructed to support the business case
- Primary stakeholders
  - Invest significant economic resources in infrastructure design and construction
  - In order to recoup this investment, long useful life was required
  - Stakeholders (OOCL, POLB) signed a historic 40 year lease agreement to guarantee long-term returns on substantial infrastructure investments
Infrastructural Considerations

• Start with basis of design
• Pavement areas
  • Vehicle and wheel load repetition and life cycle cost
• Well-consolidated landfill
  • Critical to minimize total and differential settlements due to dynamic loads created by crane operation, stacked container storage, impact loads from container stacks, seismic events
• Wharf and berth design
  • Quay design loads will depend on crane design, cranes are getting bigger and bigger
  • Berthing and mooring loads, future vessel size 20,000+ TEU
Infrastructural Considerations

• Container storage area
  • Stacking Area – designed for stacked container loads and able to remain level within tolerance
  • RMG rails and beam – settlement and deflections
  • Hazardous – segregation and spill control
  • Grading and drainage – near-zero grading in the stack

• Power systems
  • Redundancy, reliability, 100% fault tolerance

• Future changes
  • Increased vessel size, larger cranes, more automation
Technology Considerations
Technology

• Technology provides the opportunity to enhance or eliminate the human interaction in processes
• Using technology to harness data as a decision-making tool
• How to leverage technology, big picture thinking
  • More Tech = More Data = Better Decision-making
  • Sharing data across the supply chain, two-way exchange
  • Scalability
Technology

• Define your appetite for technology early on
• Determine your risk tolerance
• Decide if you are early adopters or want proven technology
• Turnkey solution or project delivery organization
• Bandwidth to support implementation and continuous improvement
Equipment Considerations
Equipment

• Regulatory requirements
  • Electrification
  • Reduced emissions

• Useful life and ability to adapt
  • More technology on equipment than ever before, no longer just container movers
  • Design for change

• Huge computers, not just ‘container movers’
  • More technical staff required to maintain equipment
  • Different skillsets for technical maintenance staff
  • Shift in labor resources
People Considerations
People

- Getting people to adopt, accept, and embrace technology
  - Resistance to technology and automation
  - Complete change of thinking and skillset
- Internal and external stakeholders
  - Operators
  - Customers
- Retraining of a workforce
  - Paradigm shift
  - Technical aptitude
Integrated Project Delivery Methodology
Integrated Project Delivery

- A successful technology implementation depends on a fully integrated project delivery method
- Each component is interconnected and dependent on one another
- Project delivery must focus on big picture idea where all aspects work in harmony, no silos
Project Organization and Team

Executive/Steering Committee

Project Manager
Reporting
Cost Control
Schedule Control

CORE TEAM

Operations
- Terminal Operations
- TOS
- IT
- Equipment Maintenance

Program Integration Team
Coordinate: Operations & Infrastructure

Infrastructure
- Wharf
- Backlands
- Rail
- Building
- Electrical & Communications
- Gate

Systems Integrator
Project Realization Challenges

• Schedule and cost control
• Interface management
• Vendors/contractor management
• Integration management
• Implementation management
Schedule and Cost Control

• Schedule control
  • Continuous redefinition of must have and nice to have
  • Change impact analysis and adjust realization schedule

• Cost control
  • Budget cost shall reflect the level of unreliability of some of the past costs
  • Take a holistic realization budget view – understand the full cost of ownership
  • Change impact analysis and adjust realization budget
Interface Management

• Interface of project components
  • Infrastructure
  • Technology
  • Equipment
  • People

• What are the touch points and where are the interdependencies?

• Defining the critical path and major milestones
Vendor and Contractor Management

• Multiple vendors must work together to deliver an integrated solution
• Vendors should have concise scope and interface requirements
• How will vendor interaction be managed?
• Diligent management of master schedule and interdependencies is a **must**
• How does vendor/contractor engagement change once the project is delivered?
Integration Management

- Integration Management
  - Integration of systems
  - Integration of systems + equipment
  - Integration of people + systems + equipment
- Typically most technically complex piece of project delivery
- Who will act as the integration manager, understanding the risk?
Implementation Management

• Successful implementation requires a huge amount of planning preparation, and practice

• Testing
  • Systems, equipment, and processes

• Training
  • Operations, M&R, IT, finance, customers, partners, etc.

• Go Live
  • Critical to communicate realistic expectations early on
  • Create a recovery plan
Overcoming the challenges

• Engage stakeholders and project delivery team early on
• Know your business case inside and out
• Define, document, and communicate clear requirements
• Set realistic expectations early on and create a roadmap for continual improvement and optimization
• Plan, prepare, practice ... and repeat!
Thank You

*Jennifer Chase, Sr. Terminal Operations Development Manager*