

MEMO

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From Integrated Applications (IAP)
ESA **Visa**

To Participants of IAP Integrated Port Logistics Workshop

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Subject: IAP Integrated Port Logistics Workshop - Summary

Background

On 10th March 2016, ESA IAP in collaboration with the Transport Systems Catapult (TSC, UK) and the Satellite Applications Catapult (SAC) held a Workshop on Satellite Applications for Integrated Port Logistics at TSC in Milton Keynes. The purpose of the Workshop was to:

- Build on a previous joint workshop with TSC on multi-modal logistics (Feb 2015)
- Present an analysis of the ESA-IAP transport portfolio conducted during 2015
- Gather further insights into the processes and priorities of port logistics operations with respect to potential applications in “Ports of the Future”

The aim was to take note of recent developments in this sector, to develop topics identified in the previous 2015 workshop and derive a better understanding of first hand User Requirements, which could potentially provide the business case(s) for new, ports related activities under the IAP programme.

The Workshop was attended by 35 participants from port operations and transport logistics industries, Advisers, Universities and the service industry. The workshop was structured as a mixture of presentations and facilitated breakout sessions, with breaks for networking.

Recent Developments

The UK Department for Transport (DfT) published the Maritime Growth Study (MGS) [1] in September 2015. This considers the opportunities and challenges that the UK faces in maintaining its position as a leading maritime centre and where action could be taken to generate growth. In support of this study, Innovate UK commissioned an update of the UK Marine Industries Alliance Technology Roadmap for 2015 [2]. The purpose of the roadmap reports is to identify: global trends, the UK relative competitive position, indicate



prioritised opportunities and supporting technology requirements. Seven priority areas were identified:

1. Whole-vessel integration to deliver more affordable and optimised running with reduced staff and minimised through-life costs
2. Design, integration, manufacture and operation of autonomous vessels and systems
3. Design, manufacture and refit of super yachts, high-end powerboats and high-end sailing yachts
4. Extended use of composites and other novel materials
5. Design and manufacture of specialist vessels for support of the offshore energy and naval sectors
6. Through-life operation and insertion (including refits and conversions) to improve vessel efficiency
7. Decision support systems – including integrated voyage optimisation to deliver just-in-time arrival at port at lowest cost, secure situational awareness and next-generation command and control systems

Satellite applications could have a role in many of these and it is interesting to note that priority 7 (Decision Support Systems) was discussed at some length in the breakout session during the workshop. Separately Innovate UK has published other related reports dealing with a number of these priority items in more detail.

A recent (2015) report by Lloyd's Register's Strategic Research Group, QinetiQ and the University of Southampton "Global Marine Technology Trends 2030" [3] underpins this prospect further and identifies eight technologies with capabilities to transform how the oceans could be utilised and sustained to provide opportunities for future prosperity, growth and well-being. At least three of these technology areas: big data analytics, autonomous systems, and sensors and communications make reference to the capacity and role of satellite capabilities.

According to the MGS, estimates suggest that the direct contribution to the UK economy from the maritime sector, including marine industries, was at least £11 billion Gross Value Added (GVA) in 2012. This is a similar order of magnitude to other important high value industries like the manufacture of pharmaceutical products (£13.3 billion GVA in 2013), the aerospace industry (£6.8 billion GVA in 2013) and the road freight industry (£9.4 billion GVA in 2013). The MGS also reports predictions that seaborne trade will double by 2030 in line with the forecast growth in international trade.

The scale of the opportunity on offer is significant, and the MGS presents a case where the UK has the scope and ability to develop its position as the world's pre-eminent maritime centre. A thriving maritime sector is extremely important in supporting the wider UK economy as around 95% of goods that the UK imports and exports are transported by sea.

In the near term, the European Commission (EC) Horizon 2020 programme is preparing to open a call in September 2016 on the theme of "The Port of the Future" (reference: MG-7.3-2017) [4]. The proposed call identifies ports as essential for the European economy as a global player and for the internal market. Their modernisation is considered



fundamental to ports remaining as one of the main catalysts for supporting efficient operations, regional development and positive impacts on surrounding areas.

Nigel Gardiner's recent interesting article "Another Challenging Year Ahead" [5] provides a useful insight into the current and near term market situation, typified in most sectors by vessel over-capacity. Demand for shipping capacity is forecast to remain strong, bolstered by growth in the long haul export trades, but in the container sector vessel supply is still expected to outstrip demand. In addition, the global port and container terminal industry is facing huge challenges posed by the deployment of ever large container ships combined with the creation of larger shipping line alliances. These factors are combining to place increasing demands on ports such as: segmentation of terminal capacity and rapid obsolescence of berth capacity as vessel sizes increase. For port and terminal operators this means increases in both capital and operational expenditure.

Reference Sources

[1] Maritime Growth Strategy

<https://www.gov.uk/government/publications/maritime-growth-study-report>

[2] Marine Industries Alliance Technology Roadmap for 2015

<http://www.ukmarinealliance.co.uk/content/2015-ukmia-technology-roadmap-released>

[3] Global Marine Technology Trends 2030

<http://www.lr.org/en/marine/projects/global-marine-trends-2030.aspx>

[4] Horizon 2020 Port of the Future

<http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2105-mg-7.3-2017.html>

[5] N. Gardiner (2015) Another Challenging Year Ahead [in] Society of Maritime Industries Handbook and Members' Directory 2016, pp 41-43

<http://content.yudu.com/Library/A3yj84/SocietiesofMarineInd/resources/40.htm>

Presentations in the Workshop

The presentations are summarised below for quick reference. The full presentations and this summary are available via the ARTES Apps website at: <https://artes-apps.esa.int/news/satellite-services-for-integrated-port-logistics-workshop-outputs>

Following a welcome given by the TSC and ESA outlining the objectives for the day, there were a number of introductory talks covering: activities at the TSC on transport and mobility, the nature of innovation, the Integrated Applications Promotion (IAP) programme and ESA's interest and previous experience in transport and logistics, including an overview of relevant Space Assets and examples of previous IAP activities.

This was followed by presentations on: modern satellite technologies in logistics and potential satellite applications of the future (Satellite Applications Catapult, big data projects in maritime and port logistics (Dr Andrew Grainger, University of Nottingham),



port centric logistics as a 'servitisation' strategy of the UK ports (Nikolas Valantasis – Kanellos, Heriot-Watt University), and a view on End-to-End Automation and the Port of the Future (Chris Moody, TSC).

Dr. Grainger was unable to attend the workshop but excerpts of his material were presented for the benefit of informing participants in advance. In particular, helpful diagrams on a typical port ecosystem and relevant factors linked to port resilience / disruption were presented and later re-used in summary form in the later interactive sessions.

Breakout Sessions

Six Breakout Groups were held after the general presentations to promote interaction between participants and stimulate ideas in response to the presentations and discussions. Participants in each group were asked to identify and discuss potential areas where satellite services might facilitate and improve integrated port logistic operations.

Each group then selected its best idea to summarise and present using the “Challenge Canvas” methodology. This is a structured and time-bound approach, which seeks to identify particular challenges and describe them with respect to the most relevant:

- People involved and affected
- Activities – current and proposed
- Context of these roles and activities within the existing system(s)
- Challenges to be faced and overcome in achieving the overall goal

The challenges identified by the six respective groups covered the following topics:

1. Global routing optimisation through end-to-end tracking and visibility. Improve routing decisions and deployment of End to End E2E assets to reduce journey time and save cost/loss/waste by giving better visibility for long term planning, make better use of small port capacity (Phase 1: optimise port to port shipping operations, Phase 2: optimise full end to end supply chain operations - producer to consumer).
2. Reduce and minimise port logistics disruption from natural and human generated events (e.g. security, terrorism). Output would be a secure, reliable, resilient supply chain to minimise impacts on environment and society.
3. Improve vessel call efficiency by the creation of a global, safe, integrated network for information exchange – potentially satellite based.
4. Improve port and supply chain handling of ultra-large container vessels by two-way information exchange between road hauliers and port operators (e.g. estimated time of arrival (ETA) and container sequencing).
5. Incentivise stakeholders to share already available data via open data, open source, open standards approach and achieve a coordinated full E2E supply chain to increase: efficiency, productivity, new business models, reduce emissions and optimise terrestrial transport networks.
6. Better knowledge of freight and people movement would enable port operators to decongest ports by dynamically rescheduling ship arrivals and departures through a Collaborative Decision Making (CDM) tool.

Each group was also asked to consider the wider context of where in the port ecosystem and with what priority the challenge was relevant. This was based on material presented to assist identifying likely stakeholders and impacts. During the presentations of respective challenge canvases, each challenge was mapped by the facilitators on to a simplified diagram of some of the factors identified in Andrew Grainger's presentation material.

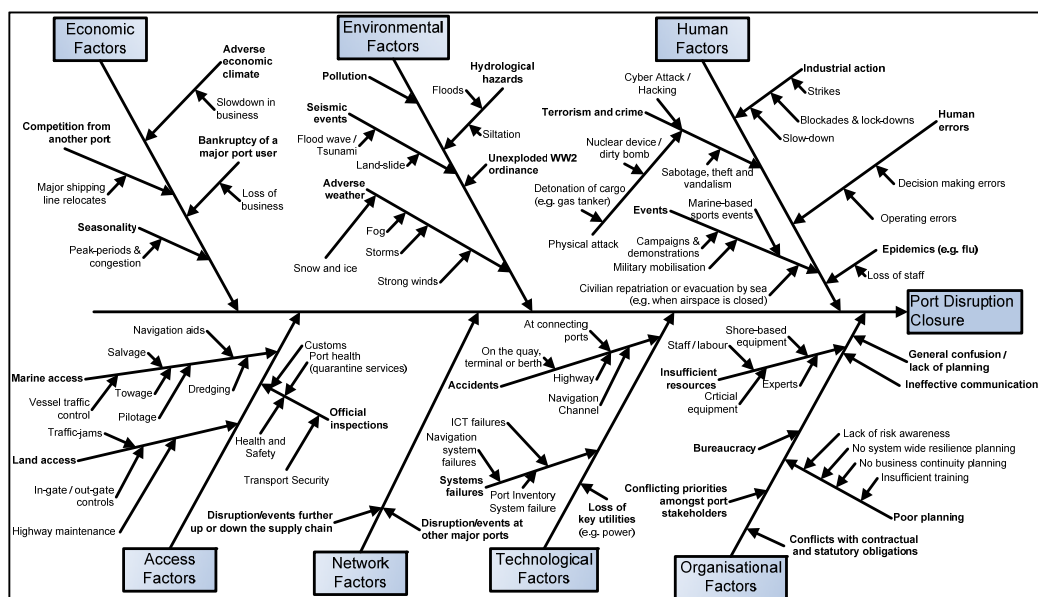
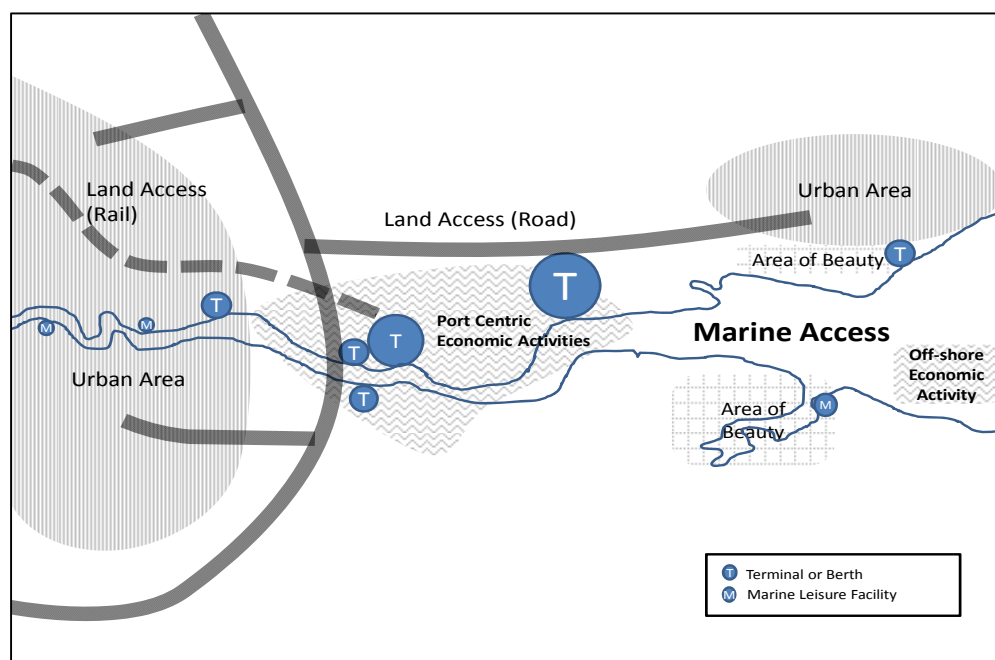


Figure 1: Diagrams of port context and factors affecting port operations from A. Grainger's presentation

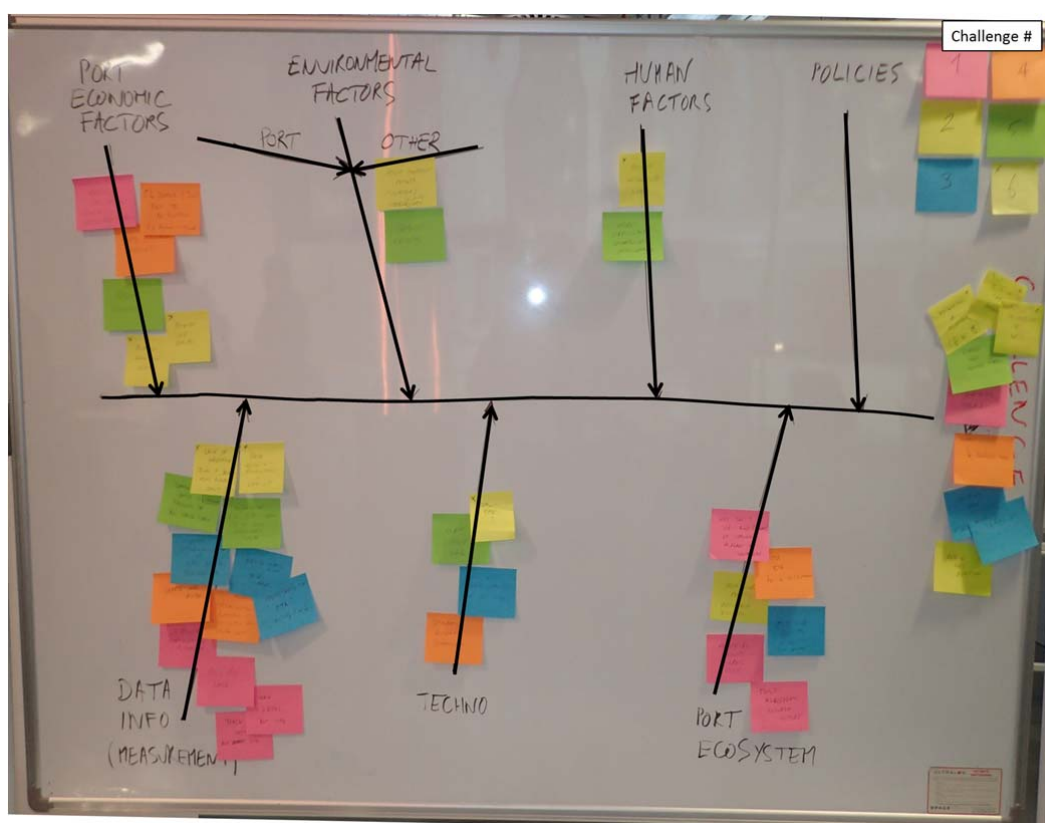
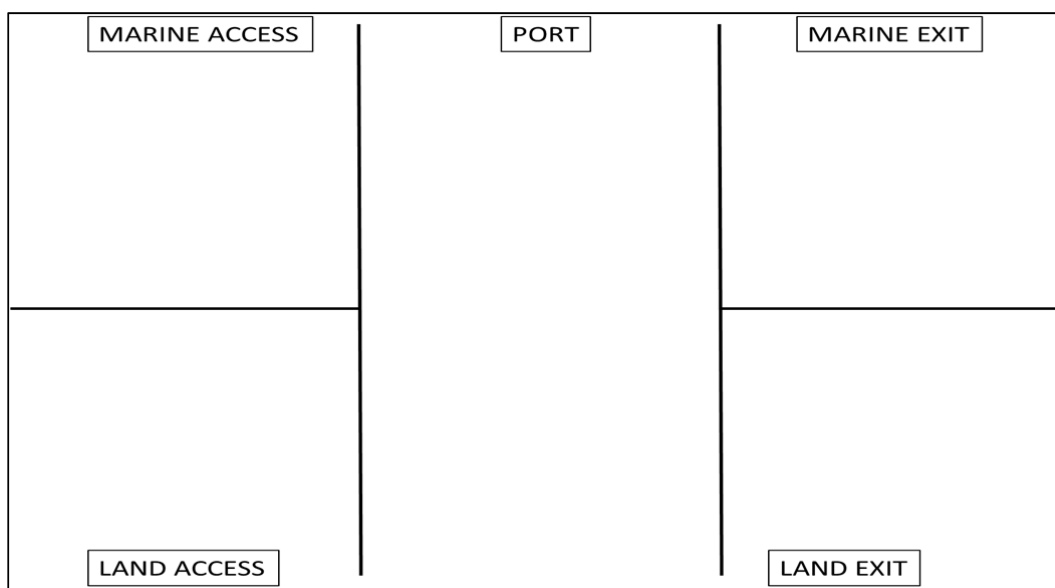


Figure 2: Modified versions of A. Grainger's diagrams in Figure 1 were used during the workshop

It was clear from this mapping that the primary issues most challenges dealt with concerned what are best described as “Information Factors”: data access, data management and information availability issues. “Port economic factors” and more general “port ecosystem factors” were the next most common.

This outcome broadly reflected the main issue identified in the previous (February 2015) workshop; that integrated solutions for transport and logistics are considered a high priority by the majority of players to provide cost efficient and environmental solutions. It also reiterates the need to address priority area 7 (decision Support Systems) identified in the UK Marine Industries Alliance Technology Roadmap for 2015 [2].

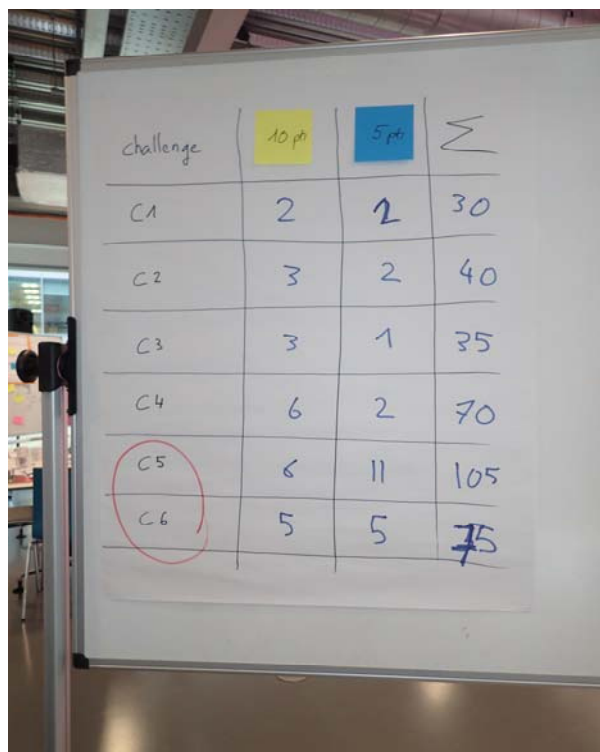
Environmental factors were identified in only a few cases. This contrasted with the previous workshop where reducing carbon emissions was identified as a key issue. Participants at that workshop had indicated that projects and initiatives to tackle this more globally in the transport sector need to be carried out.

There were no clear indications that policy or regulatory issues were considered a high priority.

ESA IAP projects are clearly relevant and there is a need to continue and improve awareness of relevant ESA IAP projects more widely (i.e. including all actors) in the sector.

Participants voted on their opinion of the two best challenges. Each participant had 2 votes to select their preferred challenges. First preference was worth 10 points, second preference was worth 5 points.

Challenge 5 (Sharing Available Data as Open Source for a Coordinated Supply Chain) was the most popular followed by Challenge 6 (Better Knowledge of Freight and People Movement to Help Decongest Ports).



challenge	10 pts	5 pts	Σ
C1	2	2	30
C2	3	2	40
C3	3	1	35
C4	6	2	70
C5	6	11	105
C6	5	5	75

Figure 3: Results of the Vote on Preferred Challenges



Conclusions and Next Steps

The main conclusion of the Workshop was that there are potential needs for increased use of space-based applications in the area of integrated port logistics and ports of the future. In particular, the following areas were identified for further investigation:

- Global routing optimisation.
- Reduce and minimise port logistics disruption from events (e.g. security, terrorism).
- Improve vessel call efficiency via (satellite based?) information exchange network.
- Improve port and supply chain handling of ultra-large container vessels.
- Incentivise stakeholders to share already available data via open standards approach.
- Better knowledge of freight and people movement for dynamic rescheduling.

In addition, there was a great deal of networking and contact established between the participants during the breaks as well as the breakout session. It is anticipated that a number of companies – having expressed an interest in potentially preparing proposals for a co-funded activity – will bring forward their ideas for satellite applications and collaboration at a later date. A number of other potential project ideas were discussed and it is intended to follow up with some of these companies where appropriate.

These can be submitted in response to the ARTES IAP open call and potentially via IAP Open Competitions. Further information on these opportunities are available at:

<https://artes-apps.esa.int/opportunities>

The workshop on 10th March 2016 was prepared in collaboration with, and hosted by, the Transport Systems Catapult. Many thanks to Alina Papiya, Andrew Traill and all the team at TSC for all their excellent, hard work in helping to organise and run the event so successfully.

Challenge Canvases

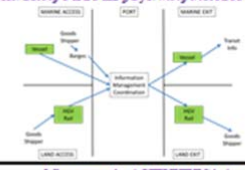
CHALLENGE CANVAS		Facilitator
TEAM 1	6. Challenge Statement - CHALLENGES? - PEOPLE? - ACTIVITIES? - CONTEXTS? - BENEFITS? HOW MIGHT WE (what's the benefits?) Reduce journey time, save losses, by giving better visibility for long term planning and make better use of small port capacity?	
5. Prioritised CHALLENGES / Barriers What are the key CHALLENGES obstructing PEOPLE performing the ACTIVITIES in CONTEXTS?		
- Better routing decisions - Commercial agreements - How to create organisation to provide this service? - Dominated by large ports - Movement of export cargo to different ship(s)		
4. Prioritised CONTEXTS Where are the ACTIVITIES being performed by PEOPLE? Ships not all using market information / data 1. Marine access, port, marine exit 2. Land access land exit		
3. Prioritised ACTIVITIES What are these PEOPLE trying to accomplish? What are they doing? a) Cost ↓ Efficiency ↑ b) Congestion ↓ Quality of Service (QoS) ↑ c) Track status of shipped goods Faster to market		2. Prioritised PEOPLE Who is impacted? Who is the user/customer? Who is performing ACTIVITIES? ← a) Vessel Coordinator (Shipping Line) ← b) Port Operators ← c) Shipper
1. Challenge Area (within Integrated Port Logistics) What Challenge Area are you framing with a Challenge Statement? Improve E2E routing decisions and deployment of assets [Phase1: Port to port, Phase2: End 2 End]		

CHALLENGE CANVAS		Facilitator
TEAM 2	6. Challenge Statement - CHALLENGES? - PEOPLE? - ACTIVITIES? - CONTEXTS? - BENEFITS? HOW MIGHT WE (what's the benefits?) Secure supply chain, reliability / resilience / reduce impact on environment, Reduce impact on society?	
5. Prioritised CHALLENGES What are the key CHALLENGES obstructing PEOPLE performing the ACTIVITIES in CONTEXTS?		
- Lack proper resilience planning and investment for new threats e.g. 1 in 100 events more frequent, cyber (Bigger Ships) - Lack of alternatives - Needs industry / Govt / Regulators across the chain to invest / work together - Lack of performance data: network, forecasting, prediction, new disaster scenarios – built into new system planning		
4. Prioritised CONTEXTS Where are the ACTIVITIES being performed by PEOPLE? Relevant over the full port ecosystem (Marine access, port, marine exit, land access, land exit) - Port - Road network - Distribution network		
3. Prioritised ACTIVITIES What are these PEOPLE trying to accomplish? What are they doing? Moving goods and people safely and efficiently		2. Prioritised PEOPLE Who is impacted? Who is the user/customer? Who is performing ACTIVITIES? - Port authority - Terminal operator - Shipping company - Logistics company - Shipper - Receiver - Customer, local population - Society, local/central govt
1. Challenge Area (within Integrated Port Logistics) What Challenge Area are you framing with a Challenge Statement? To reduce / minimise port/logistics disruption by natural and person generated events (Security, terrorism)		

CHALLENGE CANVAS		Facilitator
TEAM 3	6. Challenge Statement + CHALLENGES? + PEOPLE? + ACTIVITIES? + CONTEXTS? + BENEFITS? HOW MIGHT WE (what's the benefits?) Create "global" integrated, safe network of information exchange system(s) – satellite based (i.e. enabled) _____?	
5. Prioritised CHALLENGES What are the key CHALLENGES obstructing PEOPLE performing the ACTIVITIES in CONTEXTS? → Predictability of berth time → Congestion → Bad weather → Lack of an information-sharing system → Ports not sharing information with vessels → Data security and reliability → Quality of information → Ship needs to know optimal time of arrival		
4. Prioritised CONTEXTS Where are the ACTIVITIES being performed by PEOPLE? Marine side of the port Port (land side)		
3. Prioritised ACTIVITIES What are these PEOPLE trying to accomplish? What are they doing? → Loading / unloading → Transit		2. Prioritised PEOPLE Who is impacted? Who is the user/customer? Who is performing ACTIVITIES? → Shipping lines → Retailers → Port staff → Road/rail haulage
1. Challenge Area (within Integrated Port Logistics) What Challenge Area are you framing with a Challenge Statement? Vessel Call Efficiency)		

CHALLENGE CANVAS		Facilitator
TEAM 4	6. Challenge Statement + CHALLENGES? + PEOPLE? + ACTIVITIES? + CONTEXTS? + BENEFITS? HOW MIGHT WE (what's the benefits?) Improve 2-way information between road haulage and port (ETA container sequencing) _____?	
5. Prioritised CHALLENGES What are the key CHALLENGES obstructing PEOPLE performing the ACTIVITIES in CONTEXTS? • Poor information on port and road haulage • Dynamic scheduling of container collection		
4. Prioritised CONTEXTS Where are the ACTIVITIES being performed by PEOPLE? In port and haulage company planning office		
3. Prioritised ACTIVITIES What are these PEOPLE trying to accomplish? What are they doing? Timely information of arrival and sequence of containers to inform road haulage operations		2. Prioritised PEOPLE Who is impacted? Who is the user/customer? Who is performing ACTIVITIES? • Road haulage industry (fragmented) • Offloading in ports (manager) • Road managers (local authority)
1. Challenge Area (within Integrated Port Logistics) What Challenge Area are you framing with a Challenge Statement? Port and supply chain handling of "ultra large" container vessels		

CHALLENGE CANVAS		Facilitator
TEAM 5	6. Challenge Statement + CHALLENGES? + PEOPLE? + ACTIVITIES? + CONTEXTS? + BENEFITS? HOW MIGHT WE (what's the benefits?) Incentivise stakeholders to share already available data via open data, open source, open standards approach and achieve a coordinated full end to end supply chain to increase: efficiency, productivity, new business models, reduce ? emissions and optimise terrestrial transport networks	
5. Prioritised CHALLENGES What are the key CHALLENGES obstructing PEOPLE performing the ACTIVITIES in CONTEXTS? - Lack of incentive - Lack of trust - Lack of common data base - Poor connectivity - Standards / commonality - Open source model - Philanthropic approach - Common aim Priority areas in port ecosystem: - Port - Marine access - Marine exit - Land access - Land exit		
4. Prioritised CONTEXTS Where are the ACTIVITIES being performed by PEOPLE? Business models operating in isolation Silo based decision making Sub-optimal Lean supply chains → need full speed Data demand → is available, good to go • Scope to do this for Felixstowe, Southampton, Dover		
3. Prioritised ACTIVITIES What are these PEOPLE trying to accomplish? What are they doing? - Mainly driven by work-load (silo decisions) - Move stuff - Efficiency (but sub-optimal, lack of full picture) 2. Prioritised PEOPLE Who is impacted? Who is the user/customer? Who is performing ACTIVITIES? - Suppliers / shippers - Carriers / Logistics companies - Customs / monitors / enforcers - Customers / Retail distributors - Network operators / providers: road, rail, sea, air, waterways		
1. Challenge Area (within Integrated Port Logistics) What Challenge Area are you framing with a Challenge Statement? Incentivise sharing of data Supply chain: Data available but not utilised Data: Incentivise whole supply chain stakeholders to share existing "commercial" data Data visualisation: Data standards incompatibility Data sharing: Self interest → coordination Stakeholder inherent conflict: Each has own agenda Something / silos Unintended consequences of stakeholder demand Self interest → coordination S-AIS an important enabler		

CHALLENGE CANVAS		Facilitator
TEAM 6	6. Challenge Statement + CHALLENGES? + PEOPLE? + ACTIVITIES? + CONTEXTS? + BENEFITS? HOW MIGHT WE (what's the benefits?) Enable port operators to decongest ports by dynamically rescheduling ship arrivals and departures through a Collaborative Decision Making (CDM) tool	
5. Prioritised CHALLENGES What are the key CHALLENGES obstructing PEOPLE performing the ACTIVITIES in CONTEXTS? - Lack of information sharing / integrated information portal with "understandable" meaning - Dealing with collaborative decision making system 		
4. Prioritised CONTEXTS Where are the ACTIVITIES being performed by PEOPLE? - Decongesting the ports to improve hinterland transport - Land access, land exit, vehicles		
3. Prioritised ACTIVITIES What are these PEOPLE trying to accomplish? What are they doing? Dynamic, accurate, real-time scheduling of arrivals and departures		
2. Prioritised PEOPLE Who is impacted? Who is the user/customer? Who is performing ACTIVITIES? Port operators		
1. Challenge Area (within Integrated Port Logistics) What Challenge Area are you framing with a Challenge Statement? Knowledge of freight and people movement		

Pictures





Agenda

Satellite Applications for Integrated Port Logistics

Transport Systems Catapult, Midsummer Boulevard, Milton Keynes, 10th March 2016

10:00 am – Registration

10:20 am – Introductions (Andrew Trail)

10:30 am – Focussed presentations (Part 1; 20 min for each presentation)

11:45 am – Coffee break

12:00 am – Focussed presentations (Part 2; 20 min for each presentation)

01:00 pm – Lunch & networking

01:30 pm – Introductions

1st Brainstorming Session

01:40pm – Brainstorming (What are the challenges within Integrated Port Logistics?)

Challenge Canvas

- Identify particular challenges and describe them
- PEOPLE, ACTIVITIES, CONTEXTS, and CHALLENGES
- Discuss all ideas within a group
- Choose and develop 1 or 2 of the best of them
- Present to delegates - vote

2:25pm – Vote on priority area - each table presents their ideas

2nd Brainstorming Session

03:00pm – Brainstorming (Which challenges can possible be addressed by using satellite applications?)

- Discussion of the most critical challenges
- Second vote (in case delegates wish to change their mind)

03:20pm – Coffee & networking break

04:00 pm – End

List of Participants

First Name	Surname	Company
Suchith	Anand	University of Nottingham
Rob	Anderson	Network Rail
Matt	Blackwell	Costain
David	Brown	University of Portsmouth
Rob	Crabbe	BMT Defence Services
Upendra	Dharmadhikary	Tech Mahindra
James	Douglas	CONTAINERPORT LTD
Ian	Downey	ESA/ECSAT
Rory	Doyle	BMT Group Ltd
David	Elson	Innovate UK
jim	Hammond	Satellite Applications Catapult
Darren	Hankin	BMT Defence Services Ltd
Benjamin	Hodgson	BMT Group
Keith	Holmes	IntoView
Nick	Jones	Transport System Catapult
Nick	Lambert	Satellite Applications Catapult
Bjorn	Madsen	Multi-Agent Technology
Olivier	Marteaux	RSSB
Sean	McCarthy	Satellite Applications Catapult
Roberta	Mugellesi	ESA/ECSAT
John	Nelson	University of Aberdeen
Djamila	Ouelhadj	University of Portsmouth
Alina	Pipiya	Transport Systems Catapult
Adam	Ramsey	Hutchison Ports UK
Vaishali	Rao	Tech Mahindra
Jana	Ries	University of Portsmouth
Steve	Roberts	AECOM
Tony	Sephton	ESA/ECSAT
George	Shaw	General Lighthouse Authorities
Pete	Simmons	Hutchison Ports UK
Argyrios	Stasinakis	MarineTraffic
Julian	Stephens	MJC2
Ian	Stock	Knowledge Transfer Network
Mark	Sullivan	BMT Defence Services Ltd
Andrew	Traill	Transport Systems Catapult
Gary	Umpleby	Hogia Transport Systems Limited
Nikolaos	Valantasis - Kanellos	Heriot Watt University
Mary	Vayou	BMT Group Ltd
Elliot	Watts	Hutchison Ports UK
John	Young	BAE Systems Applied Intelligence

Acronyms

Acronym	Expansion
CAPEXD	Capital Expenditure
CDM	Collaborative Decision Making
E2E	End to End
ETA	Estimated Time of Arrival
GVA	Gross Value Added
IAP	Integrated Applications Promotion Programme
MGS	Maritime Growth Strategy
OPEX	Operational Expenditure
PCL	Port Centric Logistics
SAC	Satellite Application sCatapult
SLS	Service Led Strategies
TSC	Transport Systems Catapult
VAS	Value Added Services