PANEL 2 – PORT CAPACITY

Moderator: Rex Edwards, Transportation Consultant

If it were last year, we would say the challenge is how do we develop and maintain port capacity to allow desired economic growth under environmental and safety constraints. This year, we now add to that the need to develop military readiness and capability under safety constraints. We have really expanded the challenge.

Among the key issues to be addressed by the panel are what are the solutions to expanding capacity? Technology, operational, institutional, and I would suggest, that some of the questions to be posed to them are (a) what are one or two of the most critical issues to expanding capacity and (b) what are one or two things that can actually be done in the short-term to get things moving? I have been in this field for a long time and I think it is important that we find some ways to actually get things going.

First on the panel today is Jim Brennan, a partner in Norbridge, Inc., a company that provides strategy and management consulting services, international transportation logistics to automotive and pharmaceutical industries. Jim directs the maritime and port consulting practice for them. He's been in the business for 25 years and does a variety of assignments for ports and shipping companies and other maritime-related firms. Before joining Norbridge, he was a partner at Mercer Management Consulting, where he directed the firm's port and intermodal consulting practice. Before that, he sailed as a second officer aboard U.S. flag tankers and coastal tugs. He has a B.S. in Marine Transportation from the U.S. Merchant Marine Academy, and an MBA from Penn State.

Second is Asaf Ashar, who is the group manager for port and intermodal system operations at National Ports and Waterways Institute of the University of New Orleans. He has been there since 1985, and before that was with the Port of Seattle and the Port and Rail Authority of Israel. He has degrees in Industrial Engineering, Marine Management, and Maritime Transport. He has been in the maritime consulting area for over 30 years, does master plans. Most recently he has been working on studies involving fourth revolution containerships, expansion of the Panama Canal, and fast ferries for coastal shipping.

Third is Lauren Kotas, director of marketing and trade development for the Canaveral Port Authority in Port Canaveral, Florida since 1995. She works with cruise and cargo industries and is engaged in attracting new investment and maintaining current activity at the port. She earned the AAPA's professional port manager certification in 2000. She has a degree in Transportation, Travel and Tourism from Niagara University in New York, and received a U.S. Customs House broker's license in 1987.

The final panelist is Jim McCarville, Executive Director of the Port of Pittsburgh, which is one the largest ports on the U.S. inland waterway system. He also currently serves as President of IRPT – the association of inland rivers, ports and terminals.

James Brennan
Norbridge Consulting

There was a very famous commercial by the Miller Brewing Company about ten years ago -- it's headline was "Less is More", and I would like to make a couple of points within that context as it relates to port capacity. First, while there are innumerable ways to look at port capacity, I would suggest there are probably six major drivers of port capacity and I think this applies to any transportation network business:

- The first of these are ***physical capacities***, and those relate to hoist speeds on cranes, how long your berths are, how many hectors of container yard you have, etc. These probably pose what I would say are the theoretical limits to capacity in a transport system.

- The second is ***operational drivers*** and that is really how efficiently someone chooses to operate the physical assets they have been given. This has to do with information systems, as well as just good solid business acumen and common sense -- how to deal with real-time dilemmas that face everyone in the transportation business because it is a business that tends to be driven by random events, far more than scheduled events.

- In the past two years, there has been a lot discussed as it relates to ***environmental drivers*** of capacity. They are significant; they are growing; they will become more important.

- The panel this morning touched on another driver and that is ***security***, which may ultimately come to dominate all the drivers of capacity, depending on what the ultimate solution is.

I would also like to touch on two others that are rarely spoken about, but which I believe at least over the last decade have probably shaped capacity much more than the others:

- The first of these are commercial drivers, the way the shipping lines behave and the way they decide to use a terminal probably has more important on port capacity than the physical or the operational. The prime example is SeaLand and their terminal in Hong Kong. It is a single-berth facility. They have managed to get a million TEUs a year through that facility and it is one berth. Why have they been able to do that? Because the commercial imperative was to have a vessel on the berth virtually 24 hours a day, 7-days a week. That same berth, if it is on the east coast of the United States, handles about 1,500 to 2,000 TEUs per acre per year in a backland, or probably about 100,000 TEUs per berth. That is a commercial aspect on port capacity.

- The second is financial drivers. Most marine terminals around the world today operate in what is a financially deficient mode. If the customer doesn't demand it, they will optimize their bottom-line costs in order to try to maximize their bottom-line margin. I'm not going to operate 24-hours a day if the demand is not there. As a consequence, there is a lot of financial capacity that is untapped in the marketplace because the marketplace isn't demanding it. Despite everything you hear when you go to a NITLeague conference, which

is the freight shipper forum in North America, and they talk about just-in-time and supply chain management and inventory and motion. That is what they speak; however, the way they behave is basically a 5-12-52 operation – I operate five days a week, 12-hours a day, 52-weeks a year, and if you want to deliver my cargo outside of an 8-5 window, I'm not interested – find someplace else to keep it. Until such time as shippers really do go to a 24/7, there are some very real commercial limitations on the shipper side and on the carrier side as it relates to port capacity.

This brings up another interesting topic as it relates to commercial and operational capacity. If one looks at the largest ships being introduced today – not the 12,000 to 15,000 that are on the drawing boards, but just the 7,000 – 8,000 TEU ships that exist today -- the annual capacity generated by one of those ships is essentially 100 times its static capacity. That is based on the ship operating on a round voyage, operating 52 weeks a year on a fixed day service. A string of those ships, be it three in the North Atlantic, be it five to six in the Trans-Pacific, will generate collectively, if it is an 8,000 TEU string of ships, 800,000 TEUs of capacity. Out of the top 25 ports in North America, only about nine of them handled more than 900,000 TEUs last year. One has to ask the question where this industry is going in terms of building ever-bigger ships when you are beginning to get a supply that can be as much as 2-3 times what the demand is, and this includes backhauls and accounting for empties.

If one, instead, doubled the service frequency instead of maintaining the service frequency and doubling the size of the ship, you would roughly double the existing throughput capacity of the North American port system, or any port system for that matter.

If, in fact, tomorrow's brave new world of logistics is not just-in-time defined as "my time", but what shippers are saying, which is build-to-order with time definite delivery (people like Gateway, Dell and some other retailers are at that point today), then it suggests that what the future of the transport system might be. Rather than fewer, bigger ships on fixed day of the week, it will be the same size ships we have today or maybe smaller ships calling 3-4 times per week, which would have a very dramatic impact from a financial, operational and commercial standpoint on the capacity dilemma that this nation and ports around the world face today.

Thank you.

Asaf Ashar
National Ports and Waterways Institute, University of New Orleans

I hope my presentation can provide some partial answers to what John Vickerman challenged us. The NPWI is obviously an academic research institute and we like to look at the broader perspective, a little bit more futuristic thought – appropriate for a presentation at the National Academy of Sciences.

What I see is some kind of duality, which means it is not an issue of capacity, bur rather a dual issue of capacity and capability. Do we have sufficient stuff or do we have the right stuff? The one is quantitative and the other is qualitative. What is a quantitative? This is the issue of what do we have now. In terms of capacity, we can divide it into the terminal itself, and the connections to the terminal. Let's start with the connections because I will touch on that only briefly. Obviously, we have the intermodal linkages, for example the issue of an off-terminal intermodal connection as a highway exit to the ports.

In terms of the terminal itself, we have the three additional components – the berth, the yard and the gate. As you see immediately, the focus is on the yard. If we go to the qualitative issue of capability, we have another split – the horns of a dilemma. Are we going to continue the existing service patterns? We heard earlier from Jim Brennan – are we going to have the same strengths, the three ship trans-Atlantic, the five ship trans-Pacific, the eight ship Asia-Europe which is not of interest here, and the famous pendulums? Supposedly we will then have the move to second generation, or long-term. Are we going to have a structural change in service patterns – what I call the "Fourth Revolution" -- whereby we have a major change resulting in larger ships and the new type of port – what we call pure transshipment ports (PTP).

Let's look at capacity. Obviously, you can build more terminals and John made a calculation of a couple thousand acres or so. He also made the observation that existing terminal capacity can be expanded. How? Let's look at the berth. Obviously we do a quick review of technologies. You have the AGV – an automated guided vehicle, which is already in operation in some ports, including a new one in Singapore. It is not only a device to save on labor, but to provide continuity. You can work 24 hours, no labor is involved there. We are talking now in the industry about a straddle carrier AGV that will allow some kind of buffering. The berth, the gantry will be able to work continuously. My background is in industrial engineering and I can tell you if you take a stopwatch and look at the gantry crane, you will find out that 40% of the time the gantry crane does not work. There are also other issues – the rate itself. We are talking about twin-lifting and maybe we will talk in the future of multiple hoisting. We will divide the operation of the crane into three or four segments and we will work in parallel. We can probably reach 100 moves per hour, who knows.

Now, the yard – what to do with the yard. What about waterfront land and acreage and so on? Obviously, it is related to dwell time. How can we shorten dwell time? Here is a big deal – pricing. This is a panacea that was not used in America, but was used in Hong Kong. Why in Hong Kong do you see a million TEU per berth? Because it is owned or used to be owned by the same shipping line that brings the ship in. If you stay there longer, you pay. You know for yourself if the parking lot costs you $3.00 or $4.00 per hour, you will not stay even one hour longer. But, if in the price of freight you have 72 hours, why wouldn't you use the 72 hours.

Other things you have heard about – high-stacking – this is going on now in the industry and it is 9-high, one over nine – the famous bridge cranes of Singapore. In America, we are still at the age of flying buttresses. We can do miracles here. Obviously, much of the rail-based equipment can be fully automated and again, we are talking about continuous operation.

There is the issue of off-terminalization. We can move the bulk of the activity from the berth to a remote area by shuttle, maybe by barge or any way that will also ease the pressure on the gate, because most of the gate activity would be far away.

What can we do with the gate? You heard from Jim Brennan, the 24/7, the famous one, the pre-clearance, by appointment, and obviously are paperless and mendless gates. We already have automated gates and intermodal gates with no individual there.

What about the other issue – capability? Will we have the same service pattern that we have now, or there will be structural change. Let's talk about the change – it is more interesting. One of the changes that we see, at least in our institute, relates to the future of the Panama Canal. The Panama Canal is under consideration now to be expanded. Once it has been expanded – and I'll show the dimensions – we expect a new service pattern to come into the world that is around the world, but around the equator. The equator probably is the shortest way to go around the world. Around-the-world is a service that can accommodate all east/west trade, which means it can operate the largest ship. If it goes through the equator, it is the shortest one. If you look at network theory, this is a most efficient service pattern. If it comes, then it will probably trigger whole changes in the rest of the transportation system. The ports on the around-the-world service will be only transshipment ports, because nobody needs all the cargo transiting the Panama Canal, for example.

We will see related north/south services that will serve first as north/south trade, say U.S. East Coast to South America east coast; but it will also act as feeders and then regional feeders. This ERTW – equatorial round-the-world -- probably will serve maybe 50% of the trade in 2020, if the Canal is expanded. It can be provided by six ships of 15,000 TEU vessels, which is the new dimension of the Canal, and we could see then utilize only seven ports – none of them in the U.S. What we will see is probably the north/south feeder or direct service and also the remaining direct services, trans-Atlantic and so on.

What about the ships? It is interesting to look at two areas. The first one, the Panamax with a capacity of 4500 TEUs, was basically designed for the lock-sizes of the U.S. inland system and for the Panama Canal, which was inaugurated in 1914. The difference in size from the Panamax to the New-Panamax (capacity of 12-15,000 TEUs) is one to three. The new one. will be somewhere in the 150,000 dead weight range. Today, it is about 60-70,000. In between, you have the Maersk/SeaLand S-Class has a capacity of 7500 TEUs and is the largest ship in operation now in terms of deadweight tonnage (105, 000). There is also the Samsung with a capacity of 9200 TEUs (by the way, the order has been put on hold) and the Maersk/Sealand new type of ship, the R-ship, and then there is the Malacca-Max, the large vessel that was being considered by a Dutch group.

What about these ports and the PTPs? I suggest that the ports that only move cargo between vessels are totally different from the ports we have now, which move cargo between vessel to land. If you go from vessel to vessel, why not do it on the water? One idea is to download all the cargo onto barges and the barges can go ship to shore using from a semi-floating terminal to a feeder. Another option perhaps is to do everything in a true floating environment, including

the cranes, and what you would have is what we call a paradigm shift because the port is coming to the vessel – not the vessel to the port.

The vessel is coming to a protected bay, for example, the entrance is a canal from two sides, some cranes vessels are coming to it, offloading to barges which are going to feeder, and so on.

A colleague of mine did a design along the same lines, using the idea of a floating gantry crane. The company, Liftech, was also involved in the design of the first container crane. Another scheme would be from ship to shore and ship to barge.

Just one additional point before I close – we talked about multiple lifting. You probably remember the LASH system and we used to lift 500 ton barges out of the water. Probably, in order to enable 15,000 TEU ships to be handled in 24 hours will mean we will have to go to multiple box lifts, some kind of multiple units. For example, a lift of 24 units, which is about 300 tons – smaller than the LASH barge. If you do the calculations, this type of operation can generate 1,000 TEUs per hour.

Thank you very much.

Lauren Kotas
Canaveral Port Authority and American Association of Port Authorities

Let me ask a question. How many people in the audience are actively involved in cruise and seaport operations? (No one raised their hands.) How many are wondering why I'm here? (The audience laughed) I'm here for two reasons. When I was a little girl and I thought of vacation with mom and dad, we got in the car and drove somewhere. I have a stepdaughter who is now 25, and when she was growing up and we went on vacations, she thought of getting on an airplane. Kids today are being taken on cruises. When they grow up, they are going to take their kids on cruises.

Why are seaports interested in the cruise business and why are more and more seaports trying to get on the cruise bandwagon? Because right now, it has a much higher return on investment than cargo does.

Anybody here familiar with wharfage rates? Bulk cargoes – what is the typical wharfage rate? 33 cents; 75 cents a ton? Breakbulk cargoes -- what is your typical wharfage rates? $1.50 – 2.25/ton – does that sound right? What are your container wharfage rates? $4.50. The typical wharfage rate for our cruise cargo – we have WOWO cargo – walk-on/walk-off – is $101.00 per ton. On a cruise day, we have an average of 12,000 people who have to get off that ship in a two-hour period. About 30 minutes later, the next batch of 12,000 starts flooding into the port.

Looking at the quarterly report page from the most recent edition of *Cruise Industry News*, we find that there are about 51 new cruise ships coming out in the market between now and the year 2006. It breaks down to five of them in 2001; 14 of them in 2002; 14 the following year; another

11 in 2004; four more in 2005; and in 2006, there are right now two more slated to come out. These 51 ships will not all be put on U.S. ports, but among the U.S. traveling public, less than 8% of them, has been on a cruise, which means there is a tremendous growth market. With the conflicts and war overseas, and with uncertainty in the United States, people are going to want to take a cruise close to home. Yet, they want to a different experience – they want to do something exotic and a cruise fits that.

Cruise ships have been getting larger and larger. If you look at recent trends,; however, you will find that 71% of these 51 new ships are under 2,100-passenger capacity. You have a ratio of one crew member to every three passengers, so you have another 900 crew members onboard this ship – 750 at a minimum. On a really good ship of that size, you would have 1,000 crew members on board.

The port capacity – if you're only thinking water depth and berth, we are fine. The water depth needed for these ships is 35-39 feet – even for the 3,000-passenger ships – 39 feet is fine. In fact, if you tell the Army Corps of Engineers that you're in the cruise business, they'll say "All you need is 39 feet. No way, we're letting you go to 50. It just isn't going to happen – it is not needed."

What is needed in port capacity to handle the cruise business is not just a terminal. They don't want to walk into a cargo facility that is dusty and where perhaps you rolled out a red carpet and brought in a couple potted plants. The cruise vacation does not begin when they get on the ship. The cruise vacation begins when they've put the key in the lock at home and looked at the family and said, "Come on, we're going." That is when their vacation starts. Your seaport facility is part of their vacation experience – they want to be greeted with smiles; they want to be safe; they want to be cool in the summer and warm in the winter; they want to be dry when it rains. When it is dry outside, they don't want to get a sunburn. Your facility has to be shaded, secure, easily accessible.

If you're looking to attract the cruise business and you want to diversify your revenue portfolio, and every good business needs to diversify its revenue portfolio, then you want to look at what is in your backyard to help you attract these people. Do you have enough airlift to bring them in? Airlift was really important, especially before September 11th. In Port Canaveral, we are considered a strong drive market, but we only had 30% of our passengers driving. We handled 3.4 million revenue passengers last year.

After September 11, we actually went out and counted the cars in our parking lots and counted the passengers on the ships and looked at the license plates, and we now have a 59% drive market. But, you still need that airlift. You need to have taxis and shuttles and buses. You need to be able to provision the ships. The ships arrive to a homeport about 6:30 a.m. – they are lashed down to the dock. Then they start looking at what they need to do to provision the ship. By 3:00, everything has to be on that ship – 3:30 at the absolute latest, including the passengers, the baggage, all the provisions. The repair people have to be on and off doing their job. By 5:00, that ship should be sailing up the harbor on its way out to the cruise. It is time-critical. Do you have the businesses nearby to provision the ships? Do you have enough room on your dock to allow the trucks to get on there, unload and get out? How do you process everyone?

When we're talking about capacity in the cruise business, we aren't talking water depth and your pier. We're talking about your landside infrastructure.

Water hook-ups are very important. There is one port that shall remain nameless, but when they have a large cruise ship coming in – like a 2,000-passenger ship -- they have to, over the course of the five days prior to the ship's arrival, get the water from the city nearby because if they do it in one day, they are going to drain the city. In addition, you can't just have a regular hose hooked up to the ship – these ships are so massive you've got to have a high volume hook-up to get the water on that ship in that time constraint. You have to be able to get your waste off of it and out of the port because you don't want that stuff hanging around.

Security costs are huge in the cruise business. We have the most precious cargo of all. I don't care if your port handles petroleum and you think it is precious. I don't care if you have gold. We have people – people are extremely precious. Within probably 72 hours of September 11, we anticipated our increased security costs were going to be about $300,000. Within three weeks, it was $1.2 million. They came to me – and I'm in marketing – they took my marketing budget and cut it in half and said we need the money for security. We're trying to figure out how to pay for it, but we can't be chintzy on it because God-forbid something happens to our people. It is a real big concern for us.

The new class of vessels, the majority of them are at 2,100 passenger and less. Why is that? If they started to get bigger and bigger, and if they have 3,500 passenger vessels sailing out there right now, why are the new builds not continuing to grow? Why are they coming in at this 2,000 range? One of the reasons is they have discovered there are economies of scale. That 2,100 passenger vessels can travel at 22-24 knots, which means that they can call seaports a little further up the coast and still make a Caribbean destination on the East Coast. As a result, Charleston now becomes a viable seaport for cruise. Jacksonville, Florida becomes viable for a cruise if they can get the lift in there – something that didn't happen before. Ports that didn't have a chance of considering diversifying into this new industry now have a chance to consider it.

How long do they have to wait to jump on the trend? Fourteen (14) ships are coming out next year; and another 14 ships coming out the year after that. But, how long does it take to improve the roads into your port so the people can travel in? How long does it take to attract the airlines to get the lift into your nearby airport? What does it take to start up taxi services? (I could tell you nightmares about taxi services.) Canaveral started chasing the cruise business in about 1981 and it took us until the last five years to develop a taxi code. These poor cars in Florida didn't have air conditioning. The drivers were barefoot. They wore t-shirts. It was really not a pleasant experience. They weren't metered. Now, we have safety standards, dress codes, minimum requirements in order to service the Canaveral cruise passengers by taxi. But, what a fight it has been. You have to look at all of these things in your community.

Baggage is another interesting aspect. One of the challenges John mentioned earlier is industry standards. In the cruise business – we are kind of inventing it as we go along. We built a cruise terminal in 1991. It was the first world-class cruise terminal. People came from ports around the world to look at our cruise terminal. It was two stories; however, we had failed to install a cargo

or freight elevator from the first floor to the second floor – what a nightmare. We had these little, skinny escalators – they are putting boxes on little, skinny escalators. Then we realized, okay, we pioneered the 3-4 day cruise market – the first cruise goes out for three days and comes back, and the second cruise goes out for four days, and comes back, and essentially you've taken up a week. What do you do with that beautiful building the rest of the week?

We built our second facility. This time we remembered the freight elevator. But, we looked at the parking lot that was attached to it. People were ripping the radios out of the cars. Thieves realize those cars are parked there for three-four days and nobody is watching them. We have patrols, but it wasn't a 24-hour service. Now, the lots are fenced, with barbed wire.

We were lucky enough to attract Disney. Disney puts trees in their parking lots. Port Canaveral's largest department is now landscape. We have trees in all of our parking lots. We have the most gorgeous parking lots you ever saw. But, it brings us money – positive return on investment. In the days of diminishing federal funding, you have to look at ways to make money. Parking is a profit center for us. It pays to put trees in our parking lots.

I started to discuss baggage areas. How large is the baggage area? Well, that depends on the type of cruise you want to attract. Are your people going out for 10 days at a time, you might have 2,000 people, a 10-day trip – I know some women that would bring 5 large suitcases. I know some men who will bring one little bag no matter how long they are gone. Cruises can be 10 days – 8 days – that is brand-new for Carnival; 7-day cruises are typical. What do you do with the building on the other six days? $500 million was invested in facilities at Port Everglades and they are going to be empty five days a week – that is a crime.

In Canaveral, we have three and four day cruises. We are working with a company who has a 2-2-3 – that is real big for us. Why do we like 2-2-3? Because I want to see a ship in every two days, every two days, and then a third day. The more that ship comes in, the higher the utilization of the facilities, and the more revenue we get. Then, there is a five/two – goes out for five days and goes out for two days. You have to watch the market.

Shoreside demands – connectivity – service – signage. Oh my goodness, if your cruise "cargo" can't figure out how to get to your terminal, they drive around and look lost and they talk back to you. Signage is very important. Multilingual signage is very important – not just in English.

What about crew members? We can't forget them. If the crewmembers on the cruise ship aren't happy, they reflect it in their job. They may say "Oh no, we're going to that port again." We actually went on board the home-ported cruise ships in Port Canaveral and met with the crewmembers. We met with representatives from different departments, organized through the human resources departments of the cruise lines. We interviewed them and asked, what is the number one thing you want to do when you're in port? We were shocked – we didn't realize that the crewmembers don't get the entire day off in the port. If you are in the purser's office, you might have 45 minutes – that's all the free time you've got while you're in port. Another department might have as much as three hours or four hours off the ship. They came up with a list of five things. When they are in the Caribbean, which is where ships from our port go, they get a chance to play soccer and have sports and different camaraderie and different networking

activities. But, when they are in our port is when they need to buy new toothbrushes, new razor blades. The crewmembers on a typical ship represent 50 different nations. They are far away from home. They are away from home six months or more at a time because they are on short-term contracts. The first thing they want to do is phone home. Three hundred people, multiple languages, come off the ship. They want to phone home. But, what do they have to do before they can get to the multiple banks of telephones? They have to go through a minimum of nine "uniforms" in Port Canaveral.

Some of these people are from countries where if a uniform comes knocking on the door, they haven't seen their brother or their father ever again. Uniforms intimidate some of them. They go through the armed security guard. We use private services to help enforce security. They will go through our own port security, which are unarmed – in a beautiful white shirt with little gold things and a badge. Even our parking lot attendants have uniforms – they collect money – want them to look official. We have ladies that work in our cruise terminals that just mingle with the passengers and make sure things are okay – are services needed? Is something spilled? Do they need to clean something? A light blew out – the air conditioning is not working, whatever. All these people have uniforms. Of course, there is also U.S. Customs and the Immigration and Naturalization Service. (While we are speaking of standard facilities, would someone in the audience, if they have the power to do so, please get U.S. Customs and Immigration to agree to use the same space! They want to their own identically sized, identically equipped facilities adjacent to each other. But, they won't share. That is expensive. And, they use them at different times. If they were there at the same time, it would be okay.)

The crewmembers go through the nine badges; finally get their freedom, whether it is 45 minutes or three hours; to phone home. Then, they want to go to the post office because either they are receiving packages from home or they are mailing something home. A lot of them want to buy a money order. They mail money home to help support their families. Then they want to go shopping – whether it be at WalMart or the local mall. The number one thing they buy in our local mall are shoes. A person will buy shoes one week, they will go on the ship, and the following week, they'll come back wearing the shoes and will have 12 pieces of paper with feet traced on it. They will say I want 12 pair just like the ones I'm wearing in these sizes. Our communities learn to do it. Our communities learn to give discounts to the crew members to encourage them to come back to make them feel welcome. Our communities learn to be multi-lingual. If you want be a home port, these are some of the things you have to do.

Thank you.

James McCarville
Port of Pittsburgh Commission

John Vickerman gave us a couple of challenges and that is – do we have the capacity to accommodate future freight flows, and if so, what do we need to do about our infrastructure and what do we need to do about our intelligent transportation system? I'm going to respond to that and also to Jim Brennan's six drivers. I was going to add one more to that list and that is the ***political driver*** that is going to either make all this take place or not. It was referred to earlier as

the lunacy factor, but we are not going to call it that. We are going to call it the political driver, even though the lunacy factor refers to a situation in which you understand something clearly and nobody else seems to understand – and that is really what we're up against.

I was looking earlier to see if I could get somebody to sing for us up here – that old Showboat tune "Ol' Man River". "Ol' Man River, he just keeps rolling along. He don't say nothin'; he must know somethin' he just keeps rolling along." That's how I feel on the inland waterway system. We've got a system and as long as it just keeps flowing along, we are okay – nobody asks a question, nobody wants to do anything about it. Nobody really cares that 51% of our locks and dams on the inland river system are now over 50 years old. I think we have some infrastructure problems and some capacity problems.

We heard this morning that deferred maintenance on the inland river system is now at $600 million, and the Congress – I guess Congress is the one responsible – decided not to invest any more preventive maintenance money. Half of the infrastructure is 50 years old in what they call the low-use rivers. Now, let me give you an example of a low-use river. The Allegheny River infrastructure in the Port of Pittsburgh was built in 1930. In the 1920-30's, a series of locks and dams were built with a design capacity of 3.5 million tons per cargo a year. Almost immediately, it started moving 3.5 million tons of cargo per year, and it has been moving that for the last 75 years. It goes up and down a little bit, but it stays right there. That is defined as a low-use river. It is at its maximum. It has been at its maximum and it is used all the time it can be used, but we're not going to invest in the maintenance of it. I think we have some capacity problems or some different ways of thinking about capacity as a problem.

When we try to define capacity, and there was a good workshop here maybe six months ago that the TRB/Marine Board put on and we talked about capacity and people tried to wrestle with the definition of it. What is the capacity? The easy way to define it is to look at some kind of maximum throughput that we might have in capacity. I understand even the Corps of Engineers goes and uses an average capacity throughput to calculate the average benefits. If we could just get people to drive on highways at average times instead of peak times, we could solve a lot of capacity problems in this country, but we haven't figured out how to do that yet. So, we have the same problem on the inland river system and probably on the deep-water ports as well.

I think we have to think in terms of optimal or efficient levels of capacity and try to drive our theories and our funding flows in such a way that would allow for them, and I think that we all have had a wake-up call in the last several months that just-in-time isn't the solution to everything. We actually have to have redundant capacity. We are talking about some very interesting figures that John put up there – 38% increase in traffic over the next 10 years according to the World Bank. The one I enjoyed was the Gulf gateway, which was the lowest in 1990 it is going to be the biggest gateway in the country by 2020. We hope we are going to be able to put a lot of those containers that come up, or whatever it is that comes up, and put it on the inland river system. That is a very significant change; however, I'm primarily worried about our part of it on the inland waterway system and how we are going to handle it.

There are operational efficiencies too. A question was asked about what can IT do? I am going to say that we need the infrastructure just to handle the cargo that we have right now. We handle

coal, steel, petroleum, chemicals – the products that make the things that middle America builds. We still need to keep building some things. We know we are not going to be able to import everything. But, if we are able to do container-on-barge through a series of locks and dams, we are going to have to figure out how to automate those locks and dams and automate the communications with the towboats coming up so that we can do it in as efficient and expedited way as possible.

We have wonderful exhibits out here of electronic GPS systems, all kinds of things that need to be integrated, packaged for the inland waterway system . . . we are going to need all the help we can get on the IT side. We are going to need all the help we can get on the infrastructure side. But, what we're really going to need help on is the political side. because that is what is going to drive all of these things in the end.

Thank you.

Summary of Q&A Session:

Edwards: It seems to me that on the one hand we are saying we are going to have mega ships with 8,000 – 6,000 TEUs. Jim Brennan is saying that may be too big – there aren't any ports to handle it – how is that going to happen? At the same time, some ask why can't we have the Port of Hong Kong in the U.S. I think one of the issues is that Hong Kong doesn't have the Port of South Hong Kong and East Hong Kong, and 12 other ports in Hong Kong – they just have Hong Kong. The U.S. has dozens of ports. As Lauren mentioned, many of these ports are chasing the cruise business. How is any one going to be the most efficient when they have individual political organizations pushing their development agenda. I think another of the key issues is how do you bring about a situation where the technological innovations can actually occur as opposed to just envisioning them.

Q: I was interested that no one mentioned land use pressures as a capacity issue. Certainly we have seen everything from pressure to build a baseball stadium, to condominiums, and wanting to put public parks on the waterfront. In talking about security this morning, having a public park, or as Canaveral does, a restaurant inside your terminal makes the security issues a lot more complicated. Would anybody like to talk about land use pressures?

Response: If you talk to the Port of New York about Bayonne, or if you talk to Charleston about Daniels Island, or if you talk to Long Beach about the Navy Base, and the list goes on, you will hear about pressures on land use. There is absolutely no doubt that the gentrification of the waterfront, which is a good thing – can be too much of a good thing when it begins to abut a property that has been industrial use since the Revolution. All of a sudden, it becomes an inappropriate use because the abutting property has been developed as a festival marketplace or as a restaurant area or whatever. There is a tacit recognition in this country that waterfront property is a finite resource that needs to be jealously guarded; hence the reason for why it is, in most instances, in the trust of the public domain. However, I think the public domain has lost a little bit of the highest and best use perspective in the context of mixed use and commercial waterfront development, given it is industry that drives the economy even in this information and service area.

Ashar: Perhaps in the same context, the first thing to do is to look at the existing terminal capacity. We are talking about productivity, except that nobody measures it on a uniform and national way in some kind of an organized fashion. This means if you ask John Vickerman how he defines productivity, it will go to the TEUs per acre and immediately we will mention that Hong Kong is 10 times higher than in the U.S. Some of you will talk about berths, etc. However, nobody collects data in a uniform fashion from all ports and spreads it and distributes it. How do you measure? What are the best practices should be available to all? What I think is needed is a national productivity database, some kind of industrial club with industry, government and academia, to publish, collect, the way the Association of American Railroads does by collecting a 1% waybill sample. Let's collect and disseminate information to all. Let's measure; otherwise, we cannot improve.

Kotas – For years, seaports have been asking themselves are we economic development engines, or do we have to produce revenue? What is our goal? The future says we have to be run as businesses. We have to look at ways to not only support the communities of which we are a part, but some of us are governed by cities and some by counties. Canaveral happens to be a special taxing district of the state. We stopped collecting taxes in 1986 because we have a positive bottom line. Ports, by the way, are not allowed to be profitable, but we have a profitable bottom line.

When you look at land use pressures, you have to say, what is the biggest bang for your buck? We do have some raw land left on the waterfront in Canaveral and it is dedicated for cargo. We have it zoned for that. When I talk to people who want to use it now, I tell them no, I'm sorry that land is not available. Frankly, the return on their investment isn't what we can afford to support. We know what it is going to cost us to build some new docks. We know what it is going to cost us to maintain our harbor, and we have to get some bottom line revenue return on that land use. Yes, it is a huge issue because the community says, I want a restaurant there or a bar. A restaurant or a bar isn't going to pay for the harbor. It is huge.

Q: My company is involved in the intelligent transportation system, as well as involved in some of the shipping activities around Alaska. One of the questions that comes up here is, what are you looking at in the future, with the increase in capacity and increase in demand for getting the cargo off to meet the expectation of the shippers or, in Lauren's case, the cruise cargo off to meet the expectation of the cargo? Basically, there is a conflict coming. We see it up in Alaska all the time between getting freight through a bottleneck when you have passengers going through at the same time. That is going to be an increasing problem. There are some technologies out there; but more importantly, the question comes down to, in dealing with the intermodal, what are you looking at or are there any recommendations for managing passenger throughput in addition to cargo throughput when you have bottlenecks at the port edges and capacity is growing?

It is generally on the landside that you start to see conflicts between cargo and passengers. We've been seeing some of it in Alaska. I'm curious to hear what the panelists are seeing in projections as the demand for cruise ships increased and butts up against demand for cargo coming off in just-in-time delivery – and do you see any technologies out there?

Vickerman: It does not necessarily have to cause conflict. There are many cruise facilities that are commingled with cargo, yet it is true that in Port Everglades they tried very hard to consolidate its cruise operations in an area separate and distinct from the cargo operations, which is usually a pretty good idea from a safety and personnel standpoint. Yet, if you look at circulation in and out of the port and how the two entities actually enter and come out, Everglades' solution was to look at an elevated monorail that would actually bring passengers in at a different level from the trucks, in order to sustain and have separate egress and access to the facilities that were generally centralized. In this way, they went to the same location, but did not interfere with the cargo. Yet, it went through the same port in approximately the same geometry. By the way, the automated monorail system was also found to be a highly positive issue from a security standpoint and a determinability of how you would move that.

On the information side, there was both information technology, applicable to both intermodal rail access as well as container access to the cargo facilities. In addition, there were technologies that were applicable on the monorail access in and out of personnel. Even though we have many ports that have combined cruise and cargo operations, I think the general trend, particularly when the demand is up, is to segment or segregate those facilities. But, the access is still through the port and how we do that securely, just-in-time to serve the customer, whoever the customer may be – either the cruise passenger or the shipper – all, in my opinion, would be dependent on adequate, timely information to make that transaction. The art is in how do we safely separate those activities in a port.

Kotas: You have to do everything that John said, and then in addition, we work very closely with our MPO in Central Florida. We are on the freight stakeholders mobility task force. It is communication, planning, and then we totally revamped the roads in and out of the port.

Comment: It has a lot of what Jim talked about. It is what I call "quiche versus cargo". There are a lot of restaurants and a lot of human issues that are in the port that are not necessarily attached or associated with the cargo. I think any port complex needs to go through a fairly good strategic differential of what those uses are, and then a determination by the chartered mandate of the port what should be accomplished within the port complex.

Edwards: I think it gets back to some of the issues we were discussing before in that there is no single cruise port in Florida. They all are involved in it in one way or another. So, you have all these conflicting uses and you can't specialize in one area. Cargo dwells – it sits there and it ruins the cruise experience if it is -- if you can either get it out of the way or as John says, get the passengers in without seeing it, you would be better off.

Q: I would be interested in any comments the panel might want to make in reaction to something I'm told by naval architects and ship operating people. Specifically, that as these vessels have increased in size to 6,000 TEU and up, the size enables the builders to move to twin screw or diesel electric technology and would allow a much shallower draft for the ship. It seems almost counter-intuitive. In other words, when it gets that big by going wider and using a different power plant, not a single plant to twin engine, they can actually have a shallower ship. Do you agree with that?

Ashar – The issue is the size of the propeller. It is not the twin engine. Usually, you can go to 70% of the draft, supposedly. So, if you do twin, then you can do two smaller propellers. That is the key issue. But, generally the deeper the vessel, the more it is closer to a round shape, is cheaper to build. Look at bulk carriers – the big vessel that I mentioned earlier is basically a VLCC with containers. So, it is the largest single engine that has been done. Now, single-engine are going beyond the 100,000 HP to a 16-cylinder in-line. So, the issue of the twin engine is basically out. Probably the larger ships will be single engine – there is no need for twin engine, from what I have gathered through recent research. So, there it is not an issue. The size, the draft of the vessels will be decided by only one parameter, which is the draft of the port. The ships have to go to port. Here the issue is not naval architecture, it is the port and dredging.

Comment – I've had a little different experience from that. At least the naval architects that I've talked to that are still anticipating if the beam gets wider going to a twin-engine propulsion system, part of what is driving that is the low-speed diesel engine that uses marine fuel distillate in a two-stroke fashion, has a lot of air emissions. In fact, as the vessels are experiencing greater environmental concerns, the idea of putting higher stroked, more capable cleaner engines on, and getting to the flow dynamics that if we get so wide, you would have to go to the second shaft, may be able to give us a higher speed engine, twin shafts, and the break-even points that I've seen on that are at about the 16,000 TEU geometries. But, right now most of even the large containerships are low-speed diesel propulsion systems with a single propulsion engine alleyway.

Edwards: It seems most of the talk in the container industry is that there will be a limited number of mega ports on the East Coast. Assuming one or two mega ports exist on each coast or maybe off the coast, does this solve the capacity problem in other ports? Assuming you could get a huge port, if all the other ports become transshipment ports, are they going to be able to handle the demand?

Ashar: Let's imagine, for example, that we are putting a floating part at the mouth of the Delaware River, and from the Delaware River we go with smaller ships not only to New York and Charleston, but perhaps to other ports. The idea here is if we are going from the large to a smaller, we can first employ our existing ports which cannot handle the 15,000 TEU ships, and go to other ports that have come into action, such as Wilmington or other smaller ports. What we have done here is first, generate new capacity of smaller ports and second, we have avoided avoid the pressure on the coastal highway because we will come closer to the end point of the cargo. Theoretically, by going offshore and into large transshipment and not doing transshipments the way we do now, we may gain some port capacity and also ease congestion.

Comment: I think the marketplace and the logistics are going to define for a particular carrier group, consortia or alliance, where the hubs and where the distribution is. I think it is more of a business-related decision, market-share decision, a market-related decision. That is why I believe we don't all end up in one hub in one location because it is unique to the supply chain driven dynamics that relates to that particular carrier, consortia or alliance.

Ashar: The commercial sector may well define, but fortunately or unfortunately, we are now faced with five groups or alliances in the container shipping sector. The least of these is

probably going to be smaller. However, if there are only two or three of them, we are probably not going to end up with as many hubs.

Brennan: If one envisions a world where there are, for the sake of argument, three major alliances in the world, if you ask a container shipping line what is the easiest part of his business, it is the port-to-port operation. If you have three alliances, one could build a case that instead of having load centers, what you have is a web in which there are three consortia partners or three fleets of vessels: one calls Halifax/New York/Charleston; the next one calls New York/Norfolk/Savannah; the third one calls Norfolk/Jacksonville/Miami; and you basically operate a port-to-port service. However, you have increased your geographic coverage in terms of direct call and in terms of service frequency and there are no load centers. I think only the carrier industry knows whether it is going to be three consortia or ten individual lines. But, I think the message is that there are a variety of options out there available to carriers. I have to presume they are exploring them, although with the continued building of ever-larger ships I wonder sometimes within the context of what the demand forecasts are, whether they are or they aren't. But, I think there are two clear answers: (1) nobody really knows how many consortia there will be out there in the future other than it will be fewer than today; and (2) what the ultimate options are. It won't be one; it will probably be some combination of the things we have talked about today.

Q: Could someone on the panel give us an idea for some 'typical' ports in the U.S. of (a) what percentage of the total hours of a week end up actually getting utilized in port throughput operations; (b) the main factors that affect what that percentage is; and (c) whether it is possible, if we can't improve some of the facility-related capacity aspects, that shipping companies will be forced to use some of those less-favorable times of the week? Is that feasible and will that start filling up and get closer to 24/7?

Comment: In terms of how often a facility is used during the week, it is all over the place. But, queuing theory would tell you that if a berth is used more than 50% of the time, you begin to incur delays and no one wants to incur delays. Hypothetically, that suggests you would have a berth utilization of no more than 3.5 days out of the week. In fact, most containerships in big ports today operate 24 hours a day until the vessel is out, but except for the really big ports, it is typically in less than one day. The marine terminals today are still predominantly an 8-10 hour operation, five days a week. Some of the intermodal on the West Coast is an exception. They are certainly not used more than perhaps 12 hours a day, 5-6 days per week, as opposed to 24/7. The reasons for that are economic and because that is the demand the carriers put on the terminals. You tend to find higher utilization of the assets in common user terminals than you do in proprietary terminals because you can handle more lines, and you can better utilize the total throughput to balance against asset utilization.

There is a long way to go. Any terminal operator is more than happy to add an extra person to the gang to get an extra five lifts an hour. It is a question of whether the carrier wants to do it or not. That was one of the two points that I was trying to make. Until the customer, be it the shipper or the carrier, demands more, then the terminal operators are going to basically manage their bottom line against what is the optimal cost for them.

Ashar: There are terminals in the world that have almost 100% utilization. I have seen one terminal recently that every day, all hours, had a ship there – a single berth terminal. People can and do compete at this higher utilization. This goes back to a comment made earlier that until we measure and get some information from North America and from other places, and put it up for people to make their judgment and create this public pressure on the operators, we will never know what is possible.

Q: In response to the last comment, I would observe probably those terminals that are working at that level of utilization have much lower labor costs than terminals in the United States and therefore, the overall economics are probably quite different. In listening to this very interesting panel, it occurs to me that you have stuck with your assigned topic, which is to focus on port capacity. Thinking back to this morning's speakers and looking at the agenda for tomorrow, I wonder whether in your view the port is, at this point, the real capacity constraint in the transportation system? I think Jim's point in well taken. One reason you're not going to have two or three mega ports on the East Coast is that you have more than two or three cities and more than two or three markets in the country. In fact, we must remember that ports are only there to get freight to and from international markets and into the domestic market. As long as the market is dispersed, your freight activity will be dispersed. But, once it leaves the port, it goes into the inland transportation system. I guess my question to the panel is – is the port capacity, in your view, the most serious constraint in that system or not?

Response: I want to second what has just been said – the labor costs, infrastructure that we see in North America are quite different from overseas. If you take a typical container gang, advertised through the PMA, working 2,000 hours per year, and they will make $176,000 per year. The class A labor on that same gang working the same hours, slightly under 40 hours per week, made $83,000 last year. In short, we have very capable labor, highly trained, but they are also expensive assets to deploy. If opening beyond just one shift and going to multiple shifts leads us to look systemically inland, so we have to have someplace to deliver what we are processing through the ship. If we work the multiple shifts, we have to be able to deliver it and that all has to make sense in a competitive, economic arena. In my opinion, you have to take a very big vote toward the economics of any technology or any system that would allow you to do that. Yet, I believe we need to look systemically.

To your second question, are the ports the critical issues? There has been a lot of work recently by USDOT and FHWA, particularly through Batelle's framework analysis that uses the new database, and actually starts to look at congestion points and where that occurs. I guess having gone through that data analysis, my answer would be in areas of urban concentration, we tend to have the compelling arguments for restriction on our landside access. As far as ports are concerned, I can name you ports that do not have that problem. Yet, there are in certain confines, in certain urban concentration areas, where we do have a problem. If you look at the rail system in our country and the end points of that rail system and the proximity to ports and the connectivity or non-connectivity as the connector study told us, it is our urban areas. It is our end points of landside access, both highway and rail, that tend to lead us to believe that those nodes that are trying to connect in those concentrated areas clearly do have a problem. We have other areas that are not. Yet, in some of those other areas, the carriers and the consortia and the alliances have decided to make those areas their centralized hub, even though they are not

capacity constrained, at least in my opinion, because of issues related to shipper requirements and the actual cargo origin and destination logistics flows.

Therefore, the simple answer is yes, there are constraints in some locations, and in other locations, there are not. We are blessed in this country on the East Coast with having quite a few ports. If you look on the West Coast, we have fewer. That tends to give us some easing of those bottlenecks on the East Coast.

Comment: I believe from a perception standpoint, the answer would be yes. From an operational and a physical standpoint, within the context of world standards, I think the answer is clearly no. From a financial standpoint, the answer is absolutely not, and I make that statement from two perspectives. If you look at the capital investment required to renovate, let alone expand, the interstate highway system in this country, for the railroads to undertake the type of capital investment that might be required to alleviate their capacity constraints and map that against the capacity that exists in the ports today, clearly I think the financing challenge of infrastructure is far greater on the landside.

The final comment I would make is that if you look at most of the large container shipping lines today, and you look at their cost structures today, the port-to-port move is about 20% of their total costs. 35% - 40% of that total cost is the landside. Part of that is the terminal, but that terminal is probably a relatively small part of that 35% to 40%. Therefore, I would say from a financial standpoint, from a carrier's economics viewpoint, clearly the landside is far more of the constraint.

Q: I want to get back to the issue of water depth. Listening to the equatorial debate and comments, it sounded like we are not going to need more draft or more depth. However, looking at the 15,000 TEUs, which are supposedly going to be at the 46-foot depth, which gets you up to about 50 feet of draft. The background to that is that in the past year, we have been accusing the *Washington Post* of racing to the bottom for some of this stuff. Similarly, we have a new Chairman of the Transportation Infrastructure Committee who was out in California recently and he posed the following question: "Is it in the federal government's interest to pay to deepen these ports when it is the carriers making those decisions?" I would like to hear a little bit about where you see us going in terms of overall depth, and perhaps what is the role of the federal government in making some of those decisions, rather than leaving it up to the carriers?

Ashar: As we see elsewhere in the world, the largest new ports, all of them, are transshipment hubs. I'm talking about outside the U.S. All the newcomers are transshipment ports. If Jim and I are correct that the number of consortia in the world is going to shrink, then maybe we will have three of them. If these consortia are going to control the entire network, which means mother and feeder, and the place where mother to feeder connect, you might argue that transshipment ports are the business of the shipping line. If I'm moving cargo from my big ship to my small ship, why should the public have a vested interest in it? If that's the case, perhaps all these PTPs or ports that have lots of transshipment, supposedly would be under the control of the carriers and since they are so "non-profitable" and much larger than the port authority, supposedly they should finance their own ports. However, our existing ports, even if they have to cope with a second tier of vessels, even they will need a 50-foot channel.

Here you might argue that up to the domestic or direct call port, the 50-foot channel or so and may be in the public interest, but if you look around at what is happening in America, the same carriers are basically bypassing some ports. You may already have heard that Maersk/SeaLand is going to develop their own future port on their own, outside the port authority of Norfolk. There is also another initial proposal being floated in Savannah and so on. I would suggest that there is a good argument here to question the involvement of the public in these future ports, especially when we're talking about transshipment, propriety terminals and so on. Perhaps a port authority should assume the role of developers, of land providers – for the other investment the risk should be on the shipping lines.

Q: Based on this morning's discussions and what we're going to be discussing tomorrow, a lot of these issues with ports have to deal with public policy and the decision of whether or not Congress wants to put the money into the infrastructure, which as I agree, is necessary. We talked about AIR-21, TEA-21. Those programs have the benefit of having trust funds over the years and that now are firewalled from many other transportation. People talk about SEA-21, but there really isn't any money behind it. What you just proposed, basically, is to take it out of the public policy's eye and then possibly look at not having some secure fashion of looking at what kind of cargo is coming in. Are you saying that in order to get around the issue of infrastructure, increasing it, and to give it over to the carrier and having ports outside of the realm of public policy?

Ashar: No, what I'm saying is different. Maybe I need to give you an example from the shipping side. There is what we call a bare charter, which means you take a bare piece of land and from there on, the development cost is on the end user – a Hutchinson or a Maersk SeaLand for example. Since much of the activities there would be as a transshipment port, between their own ships, the public interest is very limited. Second, they have the financial resources to do it and they do it. They are willing to do it in the U.S. and Norfolk is a major example. They are going to take Craney Island and make it into perhaps the largest port in America. What I am saying is that the public will always be there, but will be at the perimeter, at the land access, water access, security perhaps. But, the issue is risk, and the investment, and the low return that is burdening all port authorities and this should shift towards them. Public port authorities are required, but basically as planners and developers, but not as investors.

Comment: I think you have to be very careful. The Maersk/Sealand issue is that the Cox property south of Craney Island, privately held, 500 acres, just purchased in that process. It is still unclear whether that is going to come to fruition and exactly what its demands would be. There are clearly indications that it would have a much higher degree of warehousing and distribution, kind of centroid functions, than typical. We have very few private port authorities in the United States. Clearly, the Maersk/Sealand issue, the Savannah issue, and some of the proposed issues down in New Orleans, Texas City Terminal, and some of the Benecia Terminals out in the San Francisco Bay area are clear examples of privately owned, terminal infrastructure. However, every one of them depends on channel improvements and the like.

We also have the phenomenon where the port authorities are quasi-government, quasi-private institutions that are very competitive. With the infrastructure already invested and paid for,

particularly channel improvements and the like, I would imagine there will always be an entity willing to negotiate for the opportunity to use them. Although there are logistics and emerging intermodal issues that would say private terminal operations may be in the advantage of some of the major alliances.

Comment: From a capacity standpoint, because that is an important point – the alliances/consortia may control upwards of 55% to 60% of the world's capacity. But, there is not often a linear relationship between capacity and market share. There is NOT. In fact, a carrier or an alliance or a consortium will do things many times that appear irrational in the marketplace.

Comment: My fellow panelist raises a very interesting point and that is if you look worldwide, there seems to be a growing appetite on the part of the private sector to very seriously consider capital investment in port facilities. But, if one looks at North America, so long as policy remains as fragmented as it currently is, it is very difficult for me to understand how a for-profit business with hurdle rates in excess of 10-20%, can undertake $200-$300-$400 million of capital investment and expect to compete in a marketplace where the economics are predominantly still driven by either totally free capital on the public side, or somewhere between no capital carrying cost and 100% capital carrying cost. So long as there is not a clear cut policy as to what government will or won't invest in, whether they are or they aren't economic development engines, to paraphrase Lauren's comments, I think it is going to be the rare instance that you will see a major capital investment by a private sector firm.

Comment: Or, if they do, it is a big risk because of the public policy issues on the other side.

Q: I have a question for the panel overall. In the world of container shipping, we continue to project the larger and larger vessels. Yet, in the petroleum world, the ULCC did not meet economies of scale. As a result, the petroleum industry came back to the smaller vessels. Can we use that as an analogy of the container vessels and the petroleum vessels, or are we really going to see 16,000-18,000 TEU vessels?

Comment: I believe if you look at the history of the tanker fleet, you're absolutely correct. The size of the tanker fleet, at least the top 5-10% of the vessels, the average size has declined over time. They did deliver scale economies when the Suez was closed and the draft was deepened. But, I think there have been two very important things that have driven that decrease in size. One was re-opening the Suez at a deeper draft and wider channels. More importantly is the diversification of supply. The VLCC's were built in an era when there was no Suez and the predominant source of oil was the Middle East. With the closure of the Suez, it led to development of the North Sea oil fields, and to the development of the oil fields in Colombia, and the development of oil fields in Mexico. Essentially what happened was the average length of haul in the world petroleum trades, the crude oil trades, dropped rather substantially. When you look at the average length of haul, the port infrastructure and the relative economics of alternative vessel sizes, the ULCC's and VLCC's could not compete on those shorter routes. As a consequence, the economics began to favor 200,000 – 250,000 dead weight ton tankers as opposed to the 400,000 – 500,000. It was a combination of the change in sourcing on the demand side, in combination with the re-opening of the Suez, which arguably is a supply side

issue, which led to that decline. We are seeing the same type of thing happening on the bulk carrier side with the diversification of the steel-producing industry around the world and also with the declining steel intensity in the world economy. You don't see ULCCs, or VLCCs as you would call them, on the bulk carrier side because the steel-producing countries, in many instances, are now closer to the consuming areas and you can't get the scale economies.

Comment: I completely agree. It is a different econometric going on there. The sourcing issue may be the same, but if we look at manufacturing centroids and the shifts towards the west and Southeast Asia, and is it going to India or is it going to China, those manufacturing centroid shifts in where some of the manufacturing ends of being containerized offshore and the logistics change that bring it to the U.S., the consumption market, are going to drive what that is. I believe we have not seen the top yet in that dynamic. But clearly, the sourcing issue will differentiate what that is. I imagine we will see some carriers irrationally go beyond that barrier once the barrier is at hand.

Ashar: The sourcing issue in containerized cargo is somewhat irrelevant because of the same weird or strange notion of service pattern. The lengths of haul, because of these so-called pendulum services that are the most popular now, are lengthening. A typical so-called pendulum started on the U.S. West Coast, goes all the way to Europe or goes through the canal and goes all the way to the U.S. East Coast. What we have now are ship itineraries that are longer than around-the-world. The around-the-world that I discussed earlier is much shorter. We are talking about 13 ships together. Therefore, the containerized issue has little, almost no similarity to the bulk because of the multiple ports. It is like a bus – you collect a couple passengers here, a couple passengers there, and suddenly you have 40 passengers. So, the multiple port issue is negating. You cannot get the VLCC examples.

How large will it go? Again, it depends on the service pattern. My judgment is that if we do not expand the Canal, and if we continue with the service patterns that we have now, whatever we have on the drawing board will be the largest ships. But, if we expand the Canal to 12,000 or 15,000 TEUs, then we will have a new vessel mix and people will probably straighten up according to it. If there is one single factor that I would look upon, it is the size of the Panama Canal and the 22-wide ship will probably come somewhere in the future if the Canal is extended to 22. Most of the new cranes being purchased for major ports are 22 wide. People are irrational. But, if all of them are irrational, it means that could affect the future.

Comment: I think it is a service capability issue, but I also think it is a service demand issue. On a lot of the pendulum services today, those services are designed around a very fast transit time in key legs: West Coast U.S. to Asia; Asia to a key port in Europe; a key port in Europe to the U.S. East Coast. I think it would behoove every industry forum to do a much greater job of trying to get the demand side of the equation on panels such as this, and by that I mean the shippers. Whether it is the Intermodal Expo, or IANA, or whether it is Containerization International, or whether it is the AAPA Annual Meeting, typically these debates go on and most of the people around are the provider side of the house. The people who are looking at supplying the transport and talking about ever-larger ships and deployments in a void of what the shipper is looking for. At the end of the day, I believe it is going to be the shipper who is going to determine the service demand that will drive the service capability.