Good evening and thank you Hani for that very kind introduction. I am humbled and honored to be with you tonight.
I hope you will forgive me for taking a moment to acknowledge the second and third Patterson lecturers, who in the late 70’s served on my dissertation committee at MIT. It was an amazing period in transportation - the wave of deregulation was beginning, which was Prof Wyckoff’s particular interest esp. with respect to trucking; and unbelievable computing and telecommunications systems were emerging that would alter the way we now manage and plan complex transport networks, one of the many interests of Prof Manheim. I also was part of a remarkable cohort of grad students that included Prof Mamassani, who has finally found the right home.
Before moving to a discussion of our industry let me say a few words about the family I have had the incredible good fortune to work for. You may not have heard of them, but they are one of the most interesting families in America and have had a profound influence on me and my approach to leading and managing.
The Ingram family has deep roots in industrial America going back more than a century

**Late 1800s**
- Wisconsin timber interests that were to become part of the Weyerhaeuser Group

**1940s**
- Petroleum refinery interests with the Koch family, involved first barge operations

**1960s - 1970s**
- Contractor on the construction of the Alaska pipeline
- Largest independent greenfield refinery
- Pioneered the integrated ocean going barge technology now standard around the world

The Ingram’s contemporary roots date back to the late 1800’s – if we reach a little bit we can lay claim to river operations that date back to that period, hauling logs on the Chippewa River – a tributary of the Mississippi. Those interests became what is today the Weyerhaeuser Corporation and for many years the Ingram’s were board members and among their largest stockholders.

In the 1940s, they made their first in a long string of petroleum investments in a refinery and small barge company owned jointly with the Koch family. They later were significant pipeline construction contractors and had international petroleum shipping interests that included pioneering the first integrated ocean tug-barge units, shown in the photo.
In the 1960’s, still retaining their barge interests, they branched into consumer products distribution, first with books and later with audio, video and computer wares. While these businesses are seemingly unrelated most involved extending or creating new uses of proven technologies – the integrated tug-barge units were an example and in the Book distribution business it involved the use of microfiche readers to communicate available inventory to its customers. It’s hard to believe now, but it was a huge advance when state of the art meant mail order and catalogs.

Today, the Ingram business includes our marine transport interests and what is now called Ingram Content Group. It still includes the bricks and mortar business of storing several million physical book titles and delivering them to retailers and individuals around the world, but it also includes storing and retaining a rapidly growing inventory of eBooks to deliver to your reader of choice, or to print on demand.
Over the years, the Ingram’s have also earned a reputation as among the most philanthropic families in the nation and certainly in Tennessee. Bronson and Martha Ingram were especially passionate about Vanderbilt and the performing arts, and their two sons Orrin and John that own the company today have special passions for cancer research, which took their father, and Vanderbilt athletics.

It also allowed me the chance to pursue my philanthropic interests, which have included involvement with several academic institutions like Northwestern and serving on the Board of Seaman’s Church, which is a learning advocate for mariner rights and education – this has included the establishment of two simulator training centers in Paducah and Houston devoted to inland river mariners from our system of course, but from overseas as well.
Turning now to Ingram Marine Group, we are largest operator of towboats and barges in the United States. Last year we generated above $1 billion in sales, moving 100 million tons of cargo using 4000 barges, and 150 towboats.

The network that we operate on is basically the Mississippi river system in the nations’ heartland extending for about 11,000 river miles from the Twin Cities, Chicago and Pittsburgh to the Gulf via two routes and then along the Gulf Coast. The Jones Act – the 100+ year old body of law that governs domestic marine freight service stipulates that all of the assets used by us and our competitors must be US owned, built and crewed. It has some other features as well regarding the treatment of seamen that I will discuss later.
Most of the barges are designed to haul bulk cargos; each can carry between 1500 and 3000 tons drafting 9 to 11 feet and the footprint of each barge is about the size of a football field.
The barges get assembled into flotillas that we usually call tows, even though they are being pushed thru the water with the towboat in the stern. The smallest boats are around 1,000 horsepower; the largest exceed 10,000 HP and can push up to 40 barges – 80,000 tons – in a triples screw configuration using locomotive engines as the unit of propulsion.
My tenure with Ingram began in 1982 when the company had 19 towboats and 250 barges. Most of our growth has been via acquisitions – the largest came in 2002 when as the then 3rd largest carrier we were able to acquire Midland Enterprises, the second largest at the time; and achieved the leadership position we have thus far retained.
Today, the industry is fairly consolidated with 10 carriers having a significant share of the total market and a significant ownership still in the hands of large shippers like Cargill and American Electric Power.
Our basic value proposition to our shippers and economic value proposition to our owners is to exploit the substantial economies that come from operational density over the entire network.
With a large fleet of towboats, we are able to always assign the properly sized vessel to the appropriate river segment and maintain maximum allowable tow sizes – up to 40 barges between St. Louis and New Orleans where the river is free flowing and 15 barges on most of the rest of the system where tow sizes are determined by the number of locks and dams.
Operationally it looks like an airline hub and spoke system and with our size, we are the only carrier able to own and control the hub locations shown on this map that serve as classification yards for our operation. If this feels like the railroad operating plan problem, only substituting towboats for locomotives and tows for freight trains, you’d be exactly right; and the system we developed to manage it, which we call the Advanced Barge Scheduling system, was actually an adaptation of a locomotive management system.
What I will also confess is that we haven’t found our version of the hump yard, which so elegantly solves the problem of assembling freight trains together – the business of assembling our flotillas of barges is still a brute force business that is a lot more Tom Sawyer than Star Wars. The photo insert shows the harbor tugs in action at one of these hubs, which often includes man-handling each barge one at a time.
Over the years, we have invested in the ancillary services that move us a bit up or down the supply chain especially in terms of the services we procure. At most of our hubs, we perform barge repairs with dry docks and shipyard services, but the most interesting is the refueling business. Since it can take up to 3 hours to refuel a large towboat, we operate a network of floating gas stations that can refuel the boats while they are underway. Today we are the largest bunkering operator on the inland system, serving Ingram and other commercial marine operators.

Not all of our efforts to extend our services have been so successful. We’ve tried shipyards for our boats and found that our extended network actually works against their success since the boat never breaks down close to the owned repair location. Terminals for us have also been a mixed bag – the involvement of public port authorities has generally led to a significant overbuilding of throughput capacity and makes it very difficult to extract value as an owner or operator.
So that’s a brief history and profile of Ingram Marine Group – let me turn now to a few comments about the overall state of our part of the domestic freight transport world.
Perhaps the most important characteristic of the markets we serve has been that over the last 15 years, demand has been remarkably stable, and while we've had our periods of myopic optimism, no one is delusional about big changes on the horizon.
This chart depicts the major commodity groups carried on the inland system by the industry – we are almost exclusively a carrier of bulk liquid and dry industrial and agricultural commodities, and while we experienced a significant dip in 2009, our position a few notches away from consumer demand moderated the impact quite a bit.
Another way to look at our industry is in terms of its revenues; and I am often quoted as saying that our industry taken together is about the size of the smallest of the large class 1 railroads. Many of the barge companies are private like Ingram, so the revenue estimate for us is something of a guess, but its certainly directionally right. Despite the revenue disparity shown in the chart, our industry carries a respectable 30% of the 2 billion tons transported by class 1s.
Let me turn now to the supply side of our little micro–economy, where also unlike many market areas, certainly in transportation, we are in relative balance between supply and demand.
For those of us that have spent our whole careers in transport, you can feel like we are somehow unique – with underlying forces that always seem to push supply ahead of demand and with the predictable consequences. The villainy of competitive markets is that they seem to work all too well in transport and elsewhere – I know my counterpart trying to sell books and eBooks and digital content in a world now being dominated by Amazon, Apple and Google thinks they’ve got way more competition than I do. But in transport we have our own set of issues, a few of which are unique.

I think funding sources is perhaps a particularly crucial area – internationally, nations have long treated investments, esp. in the maritime segment, as having a unique place – whether it is direct investing in shipping lines, or support for shipyards, protection of markets and the like. We are certainly not immune to these in the US, and the Jones Act and MARAD loan guarantees have led to market distortions, that may be good or bad depending on which side of the issue you sit.

### Capacity:
**How to Moderate the Boom to Bust Cycles**

Most transport sectors have suffered from periodic windows of “irrational exuberance” that lead to capacity additions, triggered by

- Technological innovation (double-stacking, ship size, etc)
- Special funding sources (infrastructure funds, tax-industrial financing, sovereign governments)
- New capacity is sometimes “easy” to add
- Long-lived nature of assets
- “Blind” extrapolation of historical trends
One of my colleagues who helped prepare this presentation insisted that for a distinguished university audience, I had to have at least one slide with equations – so here it is!

International trade volume growth, especially to the U.S., has been as strong as these charts show. We nearly invested in a major gulf coast port project, convinced that unbridled growth of US bound container traffic and the Panama Canal expansion would justify a “build it and they will come” attitude. The economic meltdown may have saved us, because it’s now clear that there’s not much manufacturing left to move out of the U.S.
But my bluewater counterparts face a huge bubble of new ship capacity, a pretty scary prospect for the carriers I know and perhaps even the shippers. Thankfully, we have dodged this overbuilding problem for now.
In our piece of the maritime world, we have faced two serious periods of self inflicted depression. In the late ‘70’s, the size of the industry’s fleet was nearly doubled in 5 years time, thanks to tax policy, accelerated depreciation, investor tax credit, and rules that entitled passive owners – i.e. doctors and lawyers and dentists – to become barge owners. Marad guarantees gave it all the illusion of legitimacy. The industry was pushed over the brink, full of bankruptcies and those passive investors, got all of the tax losses, but little of the expected income.

We had a brief euphoric period in the mid nineties but nothing like the 70’s, and today, despite a very healthy period for the carriers starting in about 2005, by and large the players have been prudent and responsible about capacity additions, and no new bubble has emerged.
Turning now to our network, our nation is blessed with a very mature and robust system – certainly the envy of the world, even when we account for its warts and frailties.
The system is admittedly old, the first efforts to tame the system and make it useful for navigation and many other purposes occurred as the earliest settlers moved west 200 years ago. Today’s system was fully built out after World War II by the US Army Corps of Engineers and thankfully their work is withstanding the test of time.

We do have a few choke points where traffic levels are now taxing the capacity of the facilities and others that require needed rehabilitation, but on balance the network, even considering all the commercial and noncommercial users is not close to capacity.
Turning to sustainability, it’s a term that may be getting overused a bit these days, but I think it captures much better than “green” what we are all about as a part of the modal freight mix.
It’s certainly only fair to acknowledge that without the rail industry’s massive media blitz to tee us up, we could never run a short ad like this and hope to have any impact at all. And our sustainability proposition is much the same as that proffered for intermodal – if you can aggregate the containers together, rail clearly trumps truck and if you have enough tons to move and the river system goes there, we have unbeatable physics on our side.
Let me turn now to a shipper’s perspective and two of ours in particular that have made big bets on the continued vitality and viability of this marine highway system.
Nucor has emerged as the leading user of electric arc furnace technology to dramatically bend the cost curve when it comes to the manufacture of steel products. They are now the nation’s largest steel producer and as they have grown their # of facilities, they have strategically focused on sites served by the inland river system.
This location strategy has offered them unparalleled access to scrap iron resources around the U.S., which is their primary feedstock and has also provided them with economical access to the world markets both for their inbound raw materials like pig iron and DRI and outbound for their finished products.
A second customer, Holcim, is one of the largest cement producers in the world. The facility shown in the photo is located south of St Louis on the Mississippi River and at a cost of more than $1 billion – it opened last year and is the largest such facility in the world. It included the construction of a protected man-made harbor, shown on the left hand side of the photo off the main river channel, that allows very efficient handling of inbound raw materials and the outbound distribution of a significant portion of the facilities cement production.
Like Nucor, Holcim was vitally interested in being able to economically source their raw materials and access the dozens of potential markets that they are able to serve using carriers like Ingram. And of course, these shippers are counting on the types of service propositions we are able to offer and also the continued support for the network itself from our government.
Let me conclude with some observations about the more national policy issues that keep me up nights. The first involves the gradual attempts to disadvantage commercial navigation interests relative to other waterway users and stakeholders. 15 years ago the battle lines were drawn out in the Pacific Northwest between navigation and salmon on the Columbia Snake River; so far, they’ve fought that battle to a draw. Closer to home, we have the Asian carp invasion of the Great Lakes to contend with.
Asian Carp

- The fish were imported to clean fish farms in the deep south during the 1970s
- Escaped during flooding of the early 1990s and have been making their way north since
- In January, traces of Asian Carp DNA, **but no fish**, were found near Lake Michigan
- Great Lake states are demanding the closure of locks between the Mississippi river system and Lake Michigan
- The Obama administration has issued a proposal that includes limiting lock operations to a few days a week

I won’t sensationalize the presentation by showing footage of this ugly fish that likes to jump out of the water. 20 years ago, it escaped from fish farmers in the south and has since populated large stretches of the Mississippi river system. Where it takes hold, it’s not clear why it does in some places and not in others, it overwhelms many native species as it has on some parts of the Illinois River. It’s come as far north as the Joliet area and so far it either hasn’t tried or the electronic fish barrier, which went in service 7 or 8 years ago, has prevented its migration further north – at least no fish have been found yet above the barrier; just something called eDNA.
The disagreement surfaces with respect to next steps that can help prevent the Asian carp from finding its way into the Great Lakes, and what, if anything, would happen if it did. Several of the Great Lakes states led by Michigan have asserted billions in potential damages and have filed suit to require the Federal government to permanently close the two locks that are among several water connections between the Illinois River and Lake Michigan.

Last week, the Illinois Chamber released a study by DePaul University that estimates the billions in damages to commercial interests if the locks are to be permanently shut. Suffice it to say, there are strong interests on both sides and especially the tour boat industry in downtown Chicago that would be devastated by the closure of the lock adjacent to Navy Pier. And as this map shows there are numerous connections in addition to the two locks – one in fact is just a few miles from here, next to the Bahai temple on Sheridan Road!! It’s hard to know how this will play out, but it doesn’t hurt our case that the occupant of the White House is from Hyde Park.
Another recent battle that went against navigational interests was a result of the massive flooding of New Orleans following Hurricane Katrina in 2005. This photo of a barge, unfortunately one owned by Ingram, became an iconic image of those tragic events.
Massive flooding occurred in several sections of the city and was the result of a massive storm surge from Lake Borne that moved into St. Bernard's Parish overtopping levies along the Mississippi Gulf Outlet and destroying flood walls along the Industrial Canal. Note that there were no breaches along the Mississippi River itself.
This is one photo that tried to capture the magnitude of the storm surge that was funneled into and overwhelmed the flood protection system.
It was one of the breaches, along the industrial canal itself, that sucked our empty barge out of the channel after the flood wall itself toppled. While we were of course drawn into a number of the lawsuits several of which are still ongoing, I am pleased to report that we were exonerated in total and thus I am able to include these images this evening.
It was one of the breaches, along the industrial canal itself, that in all likelihood sucked our empty barge out of the channel after the flood wall itself toppled is shown in these slides. While we were of course drawn into a number of the law suits several of which that are still ongoing to assign blame somehow, I am pleased to report that we were exonerated in total and thus I am able to include these images this evening.
It was one of the breaches, along the industrial canal itself, that in all likelihood sucked our empty barge out of the channel after the flood wall itself toppled is shown in these slides. While we were of course drawn into a number of the law suits several of which that are still ongoing to assign blame somehow, I am pleased to report that we were exonerated in total and thus I am able to include these images this evening.
The Mississippi River levies themselves, as I mentioned, held secure and the main damage there was not flooding but dislocation of much of what was once afloat and in its path. This shows one area south of downtown where flotillas of barges were raised and moved, and ended up sunk or high and dry. Ingram alone had more than 150 barges impaired – either beached or sunk – and remember that each one is nearly the size of a football field and many were loads each with 2000 tons of cargo.
There is of course ongoing debate about what can be done to prevent this from happening again, and while there is really no consensus, there was agreement at least between the local politicians and the Corps of Engineers that SOMETHING had to be done – so, the remedy that they converged on was to close one of the two navigational channels – the Mississippi River Gulf outlet despite the fact that it prevents future ship access to the Port of New Orleans which used to sit along the Industrial Canal.
This Billion $ project, which attempts to erect a large enough wall to withstand a future storm surge at the funnel will be substantially complete in time for hurricane season this year, though we all hope and pray it will not be tested. It at least proves that the Corps can accomplish projects fast if they have the money and political direction to do so.
The second issue which overlaps to a significant degree with the first involves who and how we pay for the ongoing operation and needed capital improvements to the system.
Without going back over all the history of this issue, the seminal event involved a grand compromise that was affected in 1986, and for those with long railroad memories, it was in part a truce between the rail and waterway interests that allowed Lock and Dam 26 above St. Louis to be replaced, and it established a $.20 diesel tax to be paid by towboat operators into a trust fund.
The early projects that are shown here were all accomplished by the Corps basically on time and near their original project authorities. And we were able to fund them with the trust fund dollars from industry matched with general fund $ as contemplated.
The 5 current projects, still under construction are a different story:
- 17+ years to build
- Project costs more than double the authorized amount

**Current Construction Projects**
- Kentucky 1998
- Marmet 1998
- McAlpine 1996
- Lower Mon 1995
- Olmsted 1991

Estimated Construction Time (Years)

Compare that with the situation today. On the 5 most significant projects, the average age from start to completion is now more than 17 years and the most significant one of all, Olmstead, is projected to take a full 25 years to complete and cost north of $2 billion, about triple of the original estimated cost. Beyond the disbelief that any project like this could cost this much, it certainly isn’t affordable by the industry or the tax payers.
This unsustainable situation has led to a consensus that is endorsed by the industry—carriers and shippers alike—supporting a 50% increase in the diesel tax and a reengineering of the project delivery model. But there remain other perspectives that for now are not reconciled into a legislative way forward. The Congress is amenable to the industry consensus, but on both sides of the aisle there is a reluctance to embrace any tax increase and even one endorsed by the payers. Sounds a lot like the gridlock keeping a new highway authorization from moving thru Congress.

I personally would favor a broad freight tax equitably applied to all modes, but I see no viable political path forward here either, especially when we have this odd agreement between the Bush administration, and now the Obama’s OMB, to replace the diesel tax with a lockage or congestion fee in part as an alternative to lock modernization. As proposed, tax would be raised at any lock where traffic volumes grew enough to cause congestion and the need for modernization. There may be a few economists in the audience that find congestion pricing to have some substantial appeal, but from my admittedly parochial perspective, I can’t see how incenting traffic away from the most sustainable freight mode makes sense.
I’m hopeful that this administration will learn better – they certainly get it as witnessed by their own statement of transport guiding principles:

I wouldn’t dare opine about high speed rail except to say that the our industry would kill to get access to just 10% of the $8 billion that is the down payment on a few short legs of their envisioned system.

One of the reasons I think it’s so hard for the administration to make the connection between their well-crafted policies and our issue is the fact that maritime matters are not managed out of DOT – all the real maritime money flows to the Corps inside the Pentagon and the CG inside D.H.S.
Let me conclude with a few comments about safety and one of the most important continuing issues for every freight transport mode – operator fatigue.
In my 25 years at Ingram I have become more passionate about this issue I think than any other – a product of the culture that the owners have instilled in us and the workplace itself. I wouldn’t want to get into a contest about whose workplace is more hazardous, but ours certainly is high on any list – we ask our Associates to constantly perform their jobs at waters edge in all conditions, day and night.
Safety and Crew Endurance

Our workplace is extremely hazardous

- The work is brute force packing and lifting

- Personal injuries are adjudicated under The Jones Act, not Workers Compensation

And the work is strenuous and requires constant teamwork and collaboration as well. It also presents management with a particular set of legal consequences and realities since, like the railroads, our associates are not covered by normal workmen’s compensation laws and rules, but in our case, by the Jones Act, which makes every incident, no matter how small, a possible lawsuit.
Looking back, our culture actually got in the way – we had a tendency to celebrate the captain of the vessel and didn't want to step on his independence and authority. Our record had always been OK, but it took an epiphany moment 10 yrs ago in November for me to begin a rapid reengineering of my own beliefs – we suffered the first fatality since my tenure with the company began, and squarely on my watch.
I swore we would turn ourselves upside down for the better or I would ask our owner to hire someone who could, and we settled on a comprehensive approach to safety management we call Zero Harm.
The results for us have been gratifying. But while we are clearly moving in the right direction, we were finding a remaining external challenge addressing operator fatigue.
As long as I can remember, the NTSB has been fingering fatigue as a leading culprit in transport casualties, maritime included, and this should be no surprise given that we all run 24 hour operations that are anything but rest friendly. I know there are folks in this room that know a lot more about the hours of service battles in both rail and truck; as something of an outsider I could see where the parties were making compromises, but I always felt that they fell short in two key areas: they didn’t encourage workers to get into a cycle that repeated over a 24 hr circadian cycle and they were unpredictable from the worker’s perspective too.
In our operations, we can match work hours with the 24 hour clock, make it routine and predictable except in an emergency, and maintain a work & rest environment for our towboat crews that can be equipped with many of the comforts of home.
We have also been blessed that as this issue has become more prominent, the CG itself was going thru a seachange that they called their prevention thru people approach to casualty reduction. The result has been a collaborative program called CEMS - Crew Endurance Mgt – which I believe is as comprehensive an approach to managing fatigue as exists anywhere in the transport space. The one area, however, where we are still not aligned with the CG is the watchstanding schedule.
Most of our crews work a square watch – 6on/6off/6on/6off for the 21 or 28 days they are aboard their assigned vessel. The science of fatigue has long suggested a longer uninterrupted sleep period – 7.5-8 hours – than this schedule obviously allows. We and others have tried to implement a rectangular watch – 8/4/4/8 – and while we’ve had a long period of cooperation with our crews on nearly all the other changes – like mandatory calisthenics at the start of each watch and heart healthy eating – this change has not been accepted.
So that led me back here to Northwestern and a member of the Transport Center faculty: Dr. Fred Turek, a distinguished sleep researcher; Ingram underwrote a project with him to do a deep dive into our workplace and to help us change or find something better.
The work of Dr. Turek and his team has been amazing

- Recent studies by NASA suggested that cumulative sleep in two blocks has the same efficacy as one uninterrupted block
- An intervention focused on anchor sleep and strategic napping can be effective at increasing cumulative hours of sleep in our workplace
- The work is so promising that our industry’s trade group – AWO – is now funding continued work
- Dr. Turek has communicated the findings to the U.S. Coats Guard, NTSB, and the AWO

What his investigation converged on was quite amazing. He found an unlikely work environment much like ours – astronauts in space – and among the prescriptions that are being pursued there is to schedule sleep in two blocks – I call it an anchor sleep and strategic napping strategy. Many of our crew members were using it already in an adhoc fashion because they found it worked, but what we have discovered so far is with a little encouragement and training they can significantly increase the amount of sleep they are getting within the watchstanding schedule we have long used.

And this work is so encouraging that the industry as a whole is now funding the continuing work here at Northwestern – I can’t tell you yet that the CG has totally bought in, but I think we may actually break new ground – that I hope could also find applicability in the other modes as well.
So let me finish by saying thank you to Hani and the Transport Center leadership for honoring me with this invitation tonight – I hope this quick journey thru a few of the nooks and crannies of our industry has piqued your interest a bit and perhaps there’s a nugget or idea or two that apply in your world as well.

Thank you!