The Future of ITS

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Keynote Presentation
Intelligent Transportation Society of America
Eleventh Annual Meeting
Miami Beach, FL
June 4, 2001

Congestion has reached a boiling point

"*Never before in this century, except during the two world wars, has the country's transportation system been as stressed as it is now*" – *Washington Post 5/15/01*

The Washington Post

Bad Traffic Grows Worse, Study Says

...st highway bottlenecks listed

Slow going getting slower

Congestion is the No 1 political priority
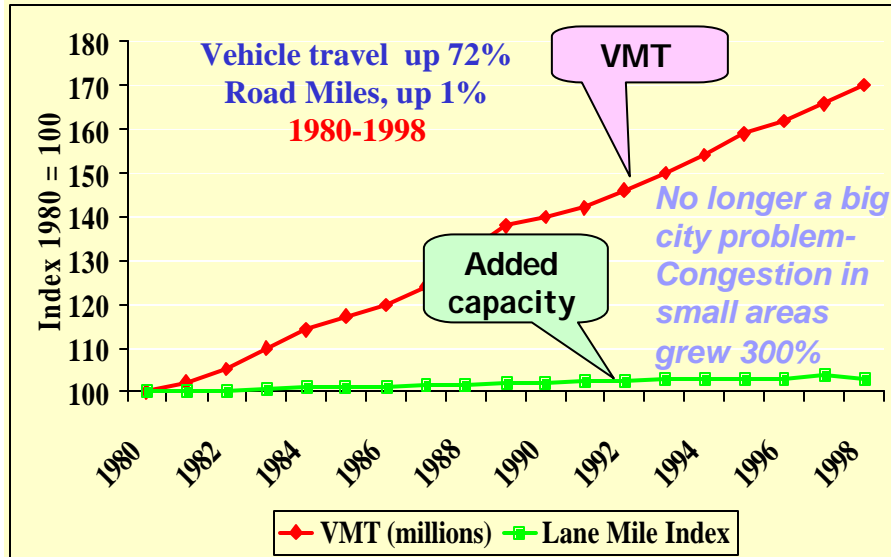   – Rep Young

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The future of ITS has a lot to do with the political pressures of today.

One of those pressures is congestion -- In many places it has reached a boiling point

A recent Washington Post article said that never before in this century, except during the two world wars, has the country's transportation system been as stressed as it is now.
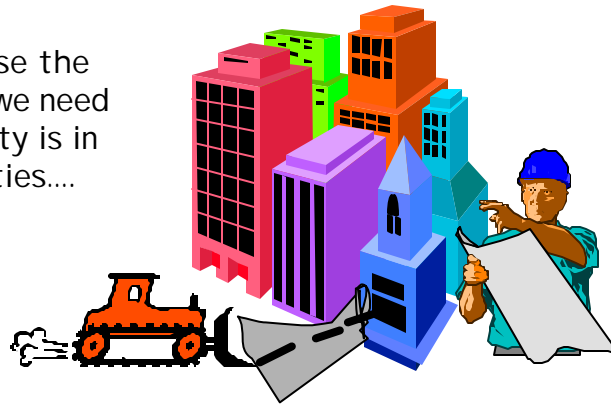
This is why….

And here is the reason why.

In the last two decades, vehicle travel increased 70 percent while road capacity increased only slightly more than 1 percent.

Construction is part of the answer

Because the place we need capacity is in the cities....

What little we can build will be terrifically expensive.

I agree with Alan Pisarsky when he eloquently argued at the Transportation Research Board that we've got to stop saying we can't build our way out -- as if constructing new capacity was not part of the solution.

It has to be a part of the solution. A big part!

But that construction will be VERY expensive and politically painful. Because where it is needed most is in the heart of metropolitan areas.

Transit will have to play a much bigger role…..
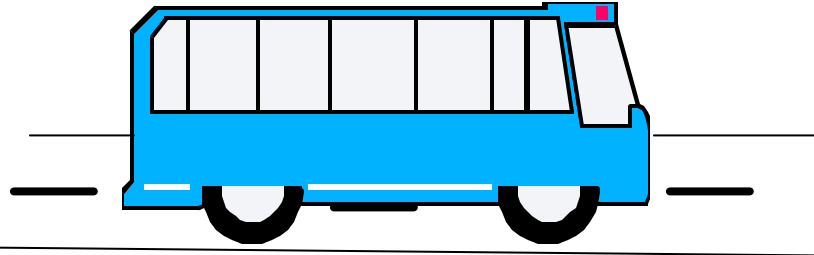
But significant new rail capacity will face the same hurdles as new highway capacity …much of the transit burden will have to be shouldered on the existing overtaxed road system

Transit will have to play a much bigger role. Indeed, ridership is growing at an unprecedented level.

But new rail capacity, which would avoid the congested highways, will be just as difficult and expensive to build as new highways.
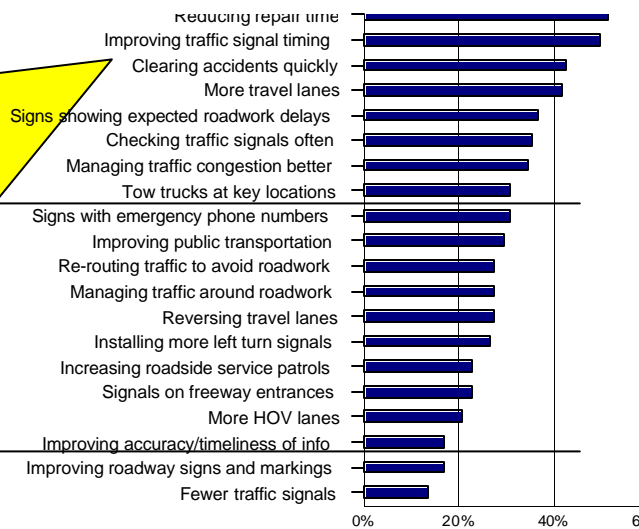
But we will have to do it.

The point is…
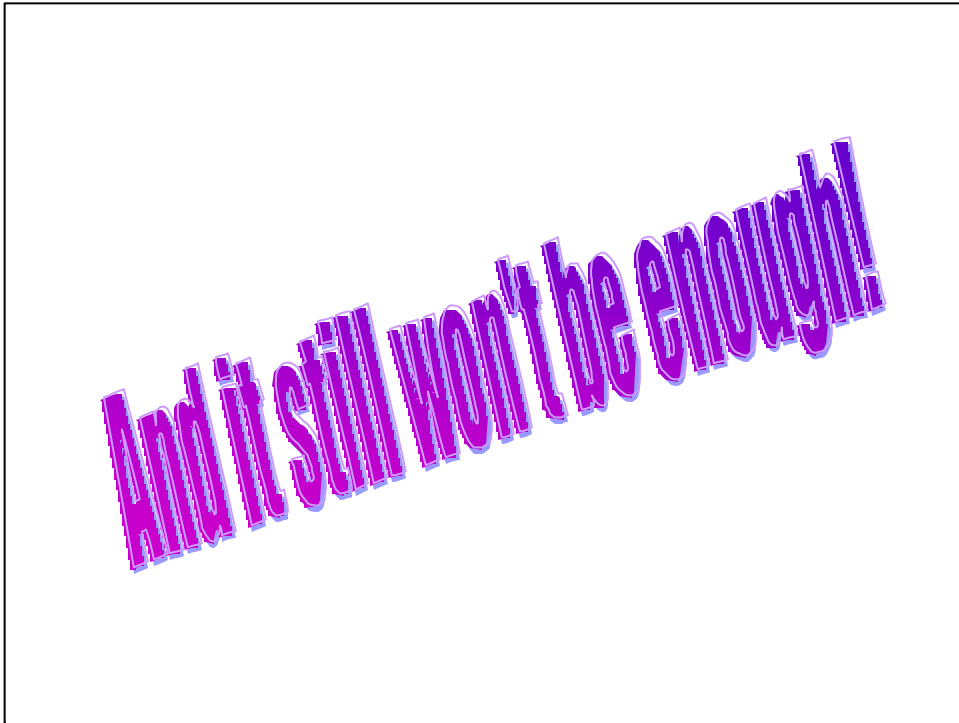
The point is:

Even with these very expensive and politically painful investments, it still won't be enough!

Preferred Improvements

2/3s of all responses called for improved operations of the road or transit system

Reducing repair time
Improving traffic signal timing
Clearing accidents quickly
More travel lanes
Signs showing expected roadwork delays
Checking traffic signals often
Managing traffic congestion better
Tow trucks at key locations
Signs with emergency phone numbers
Improving public transportation
Re-routing traffic to avoid roadwork
Managing traffic around roadwork
Reversing travel lanes
Installing more left turn signals
Increasing roadside service patrols
Signals on freeway entrances
More HOV lanes
Improving accuracy/timeliness of info
Improving roadway signs and markings
Fewer traffic signals

0%   20%   40%   6

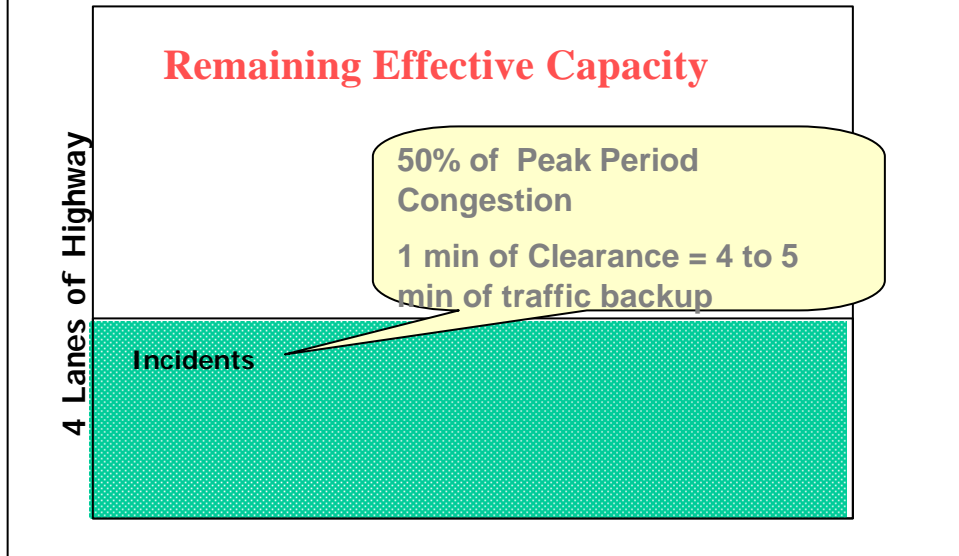*Percentage of "Great Help" responses shown*

Interestingly, the American public seems to sense that already.

In a recent poll, when asked a variety of questions about what they thought would help the traffic flow situation, two thirds of the solutions were operations solutions, many of which are underpinned by ITS infrastructure.

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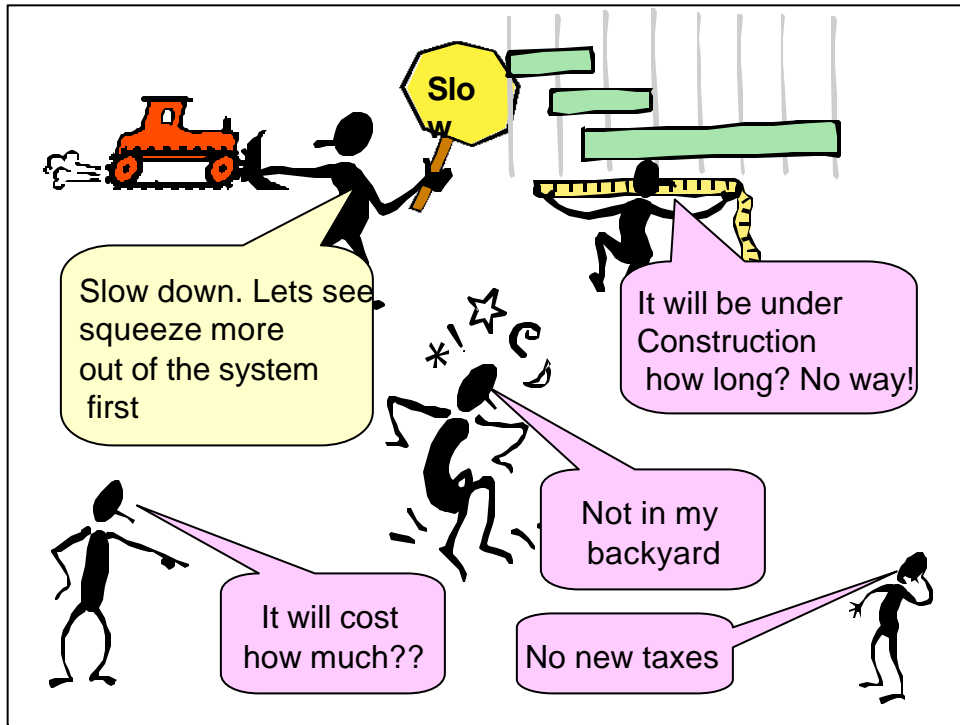
Americans seem to be saying – get as much out of the system as you can before you construct new capacity – because new construction costs me a lot – in taxes, in work zone delay, in stress on my environment.

Besides, some congestion can't be solved just by construction…..

Remaining Effective Capacity

4 Lanes of Highway

50% of Peak Period Congestion

1 min of Clearance = 4 to 5 min of traffic backup

Incidents

And the fact is - - some aspects of congestion can only be dealt with by engaging technology to make the system operate better.

For example, the Texas Transportation Institute recently reported that more delay is caused by incidents than by recurring peak period congestion.
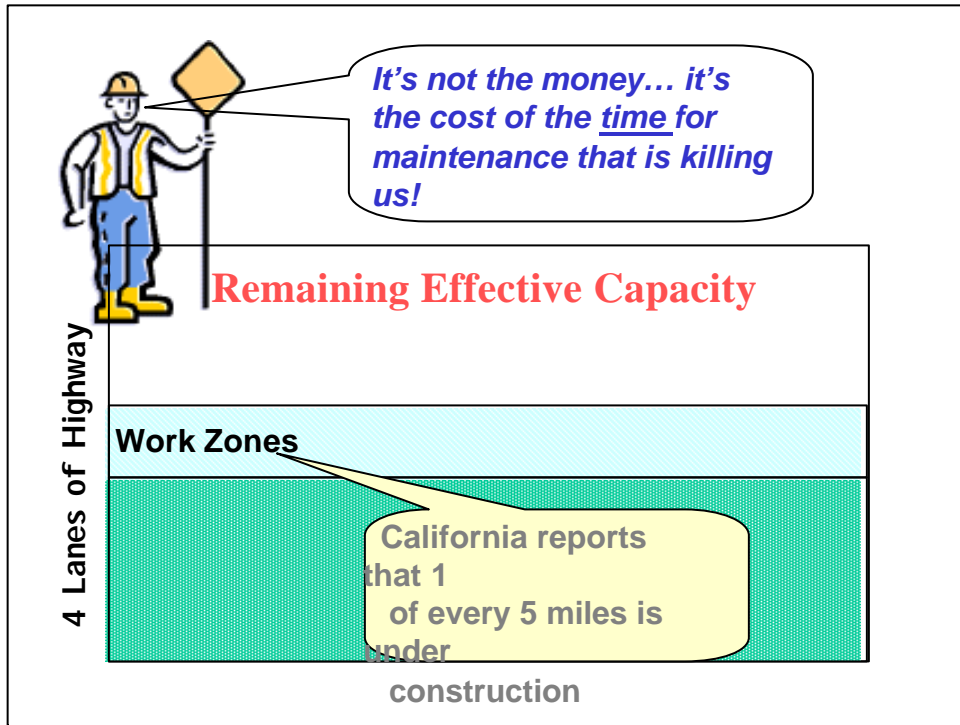
Add to this the effect that Work Zones have on capacity as we are try to maintain the system we have. In doing so we are often further squeezing down capacity.

And it isn't a temporary phenomenon. California estimated that 1 in every 5 miles of their system is under construction at any given time.
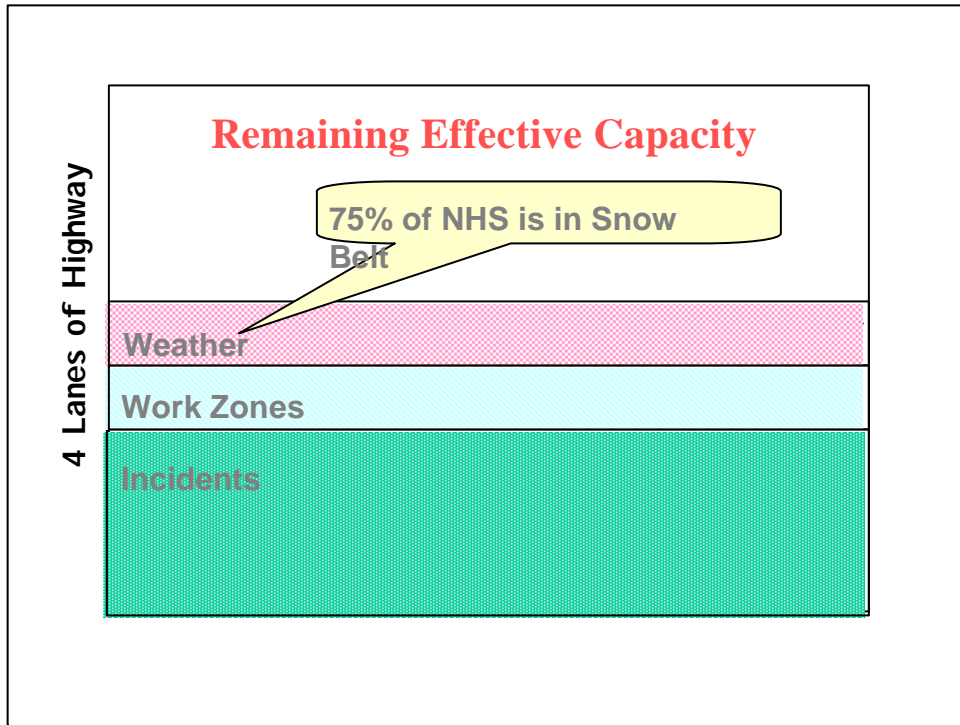
And then there is weather, which also squeezes down the system capacity.

75% of our system is subject to snow, and even a larger portion to capacity-restricting rain.
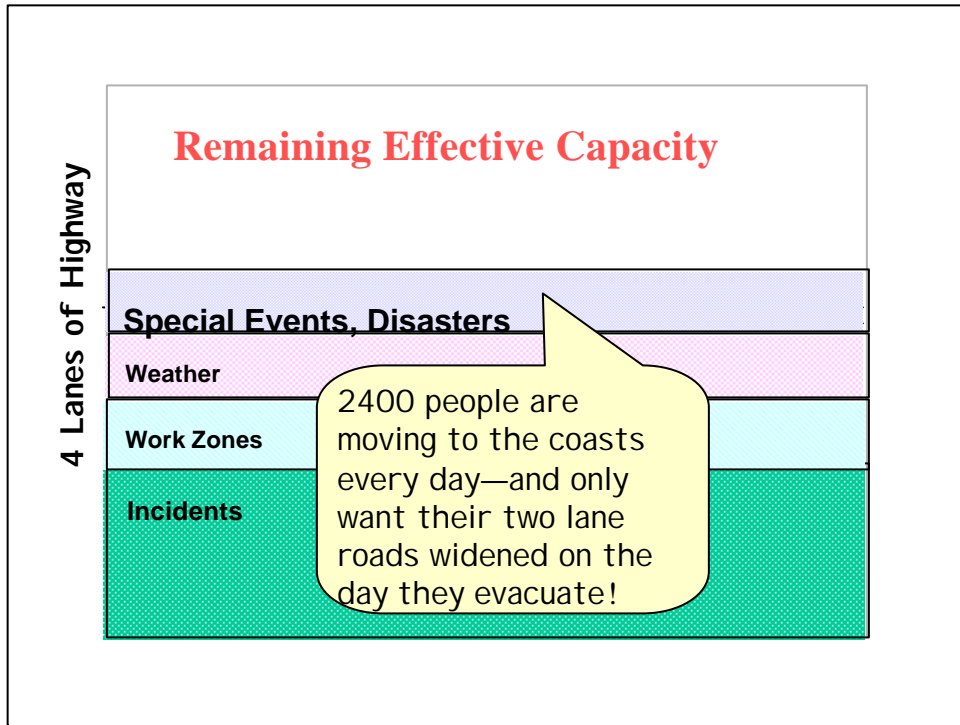
Finally, there are more and more stadium events, concerts, tournaments and other major events – coupled with natural disasters such as hurricanes.   These natural and man-made mass evacuations must be counted as additional phenomena that restrict the normal operation of the system.

So….on any given day our existing, very crowded system has a very high probability of operating with much less than the capacity than actually exists.
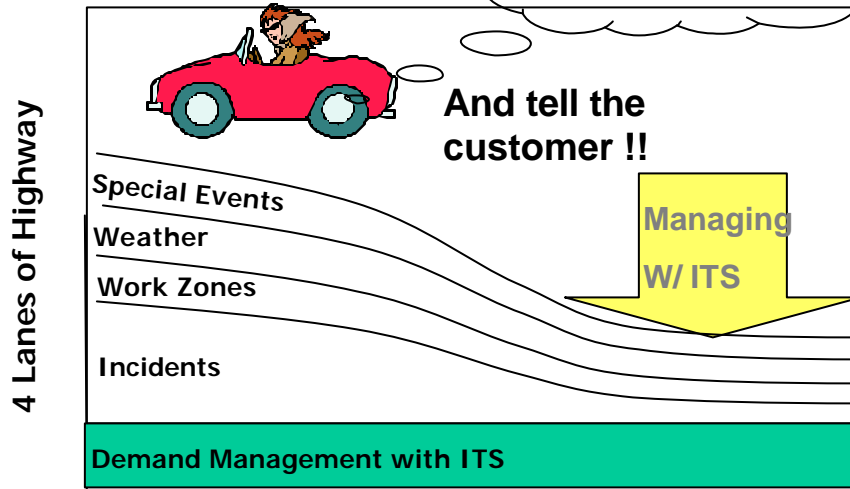
Using technology to manage these planned and unplanned capacity robbers can go a long way to "taking back the road".

It is a strategy of operating the system to minimize the effect of these events and at the same time communicating with customers to

1. Give them back some control over their own mobility

2. And by doing so more effectively managing demand to meet existing capacity

If we are to avoid choking on congestion,
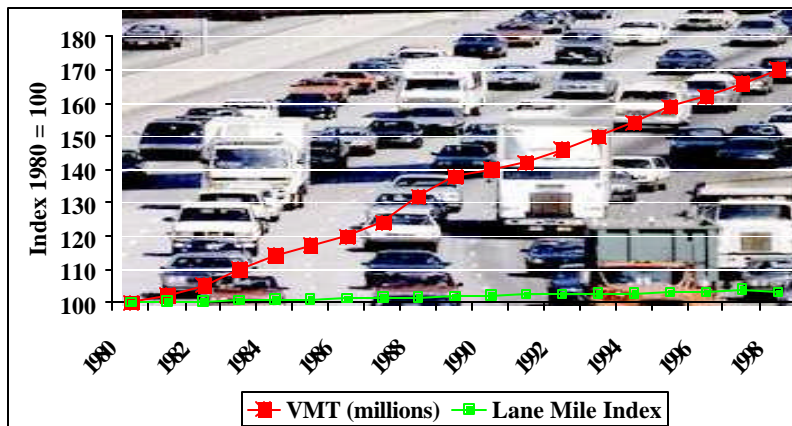
Managing with technology MUST become a major part of the solution

All this makes a powerful argument that if we as a nation are going to avoid choking on our own traffic, managing the system with technology must be a major part of the solution.

"During my tenure as Secretary of Transportation, the benchmark of success for ITS will be the deployment of Intelligent Transportation Systems."

Secretary Norman Mineta, ITS America National Summit, April 18, 2001

Recognizing this, Secretary Mineta recently challenged us with turning our attention to an even more aggressive deployment in a speech he gave at the (ITS America) 10 Year Program Plan Summit.

"During my tenure as Secretary of Transportation, the benchmark of success for ITS will be the deployment of Intelligent Transportation Systems."
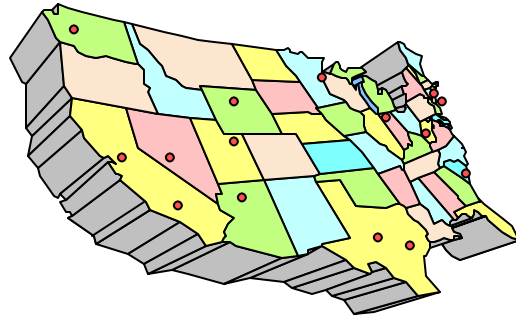
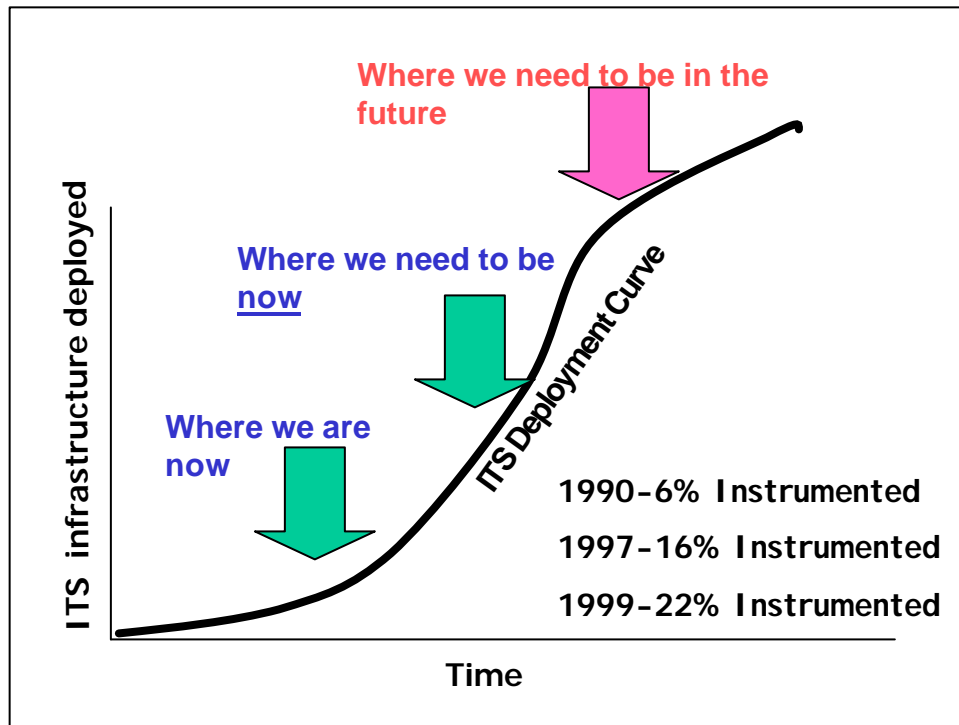Secretary Norman Mineta, ITS America National Summit, April 18, 2001

Haven't we been deploying?

10 metro areas had complete enough system to estimate system wide reliability measures

Now one might well say – haven't we been focused on deployment for at least the last 3 or 4 years?

Yes, we have – And we've made good progress. We have what might be called "spots" of infrastructure across the United States

The chart shows an "ITS Deployment Curve" with "ITS infrastructure deployed" on the vertical axis and "Time" on the horizontal axis.

- **Where we need to be in the future** (pink arrow)
- **Where we need to be now** (green arrow)
- **Where we are now** (green arrow)

1990–6% Instrumented
1997–16% Instrumented
1999–22% Instrumented

The problem is …. We're here and the need for its data infrastructure is here!

And within less than a decade it is likely to be here.

We are not deploying what I might call a data infrastructure fast enough –

   To gives us the ability to respond precisely in a weather event

   To allow us to manage – with peak performance precision– an unplanned

   event

   To allow signals to respond to real time surges in traffic

Phil Tarnoff has estimated that about 6% of our network was instrumented in the early 90's, About 16% of it was instrumented in '97, and 22% instrumented by the end of the century-- at that rate we've got 10 to 15 years before we get a fully instrumented system. We will likely be out of time by then.
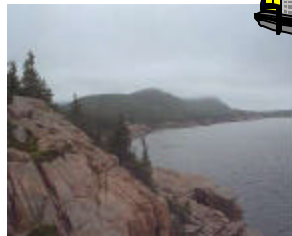
Everyone needs data!

Precision Weather Response
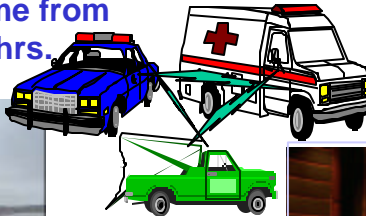
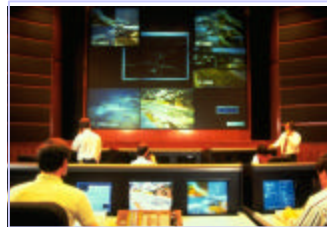**Military -- Cutting deployment time from 60 days to 72 hrs.**

Growth in coastal evacuation needs

National Park Management

Precision Medical Response

The demand for cheap, relatively ubiquitous and relatively uniform "content" or data – otherwise known as ITS infrastructure has become acute

The military is trying to reduce deployment time from 17 power projection platforms across the country from 60 days to 72 hours – that requires, among other things, total visibility of the system performance

The emergency management community is looking at the Hurricane Floyd evacuation as the tip of the iceberg ….again they need total visibility as well as system management capability over long distances

Weather response teams need far more sensing capability and system visibility if they are to respond with precision to prevent total system shutdown in an ice and snow storm.

Our National Parks are now turning to traffic management to preserve these precious resources – they too, need data down stream of the park entrance to be effective

Our public safety and medical communities increasingly cannot afford less than precision response to a traffic incident
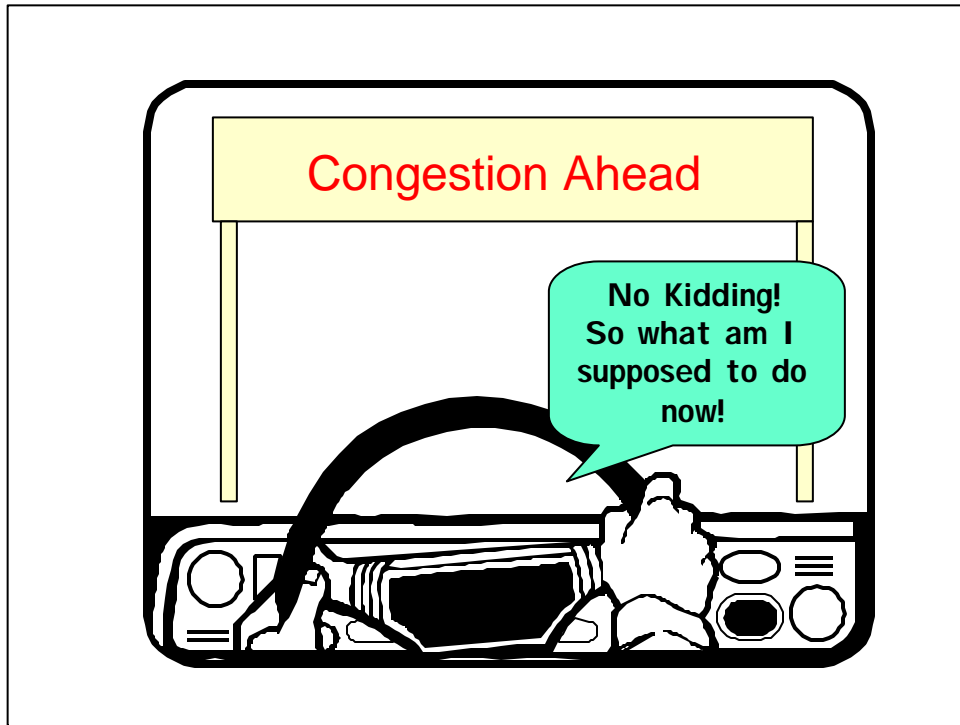
And if we are to ever get beyond Secretary Mineta's favorite symbol of what is not working in congestion management in our major metropolitan areas – we've got to move from 20 percent instrumented to 60 to 80 percent of the system producing information – whether that is from the public sector or private sector

And we've got to expand our current focus on freeways to major arterials as well.

Data -- automatically collected, somewhat standardized, integratable and, system wide at an appropriate scale, I believe has become the holy grail for both the private and public sectors.

Although I see some truly exciting possibilities for capturing this holy grail emerging from the private sector, such as using cellular telephones or a vehicle with total situational awareness as a probe, no business models has emerged that can provide a return on an investment of the scale we are talking about.

And, in spite of TEA - 21 opening up major portions of the trust fund to ITS infrastructure deployment, it is not happening at that scale in the public sector either.
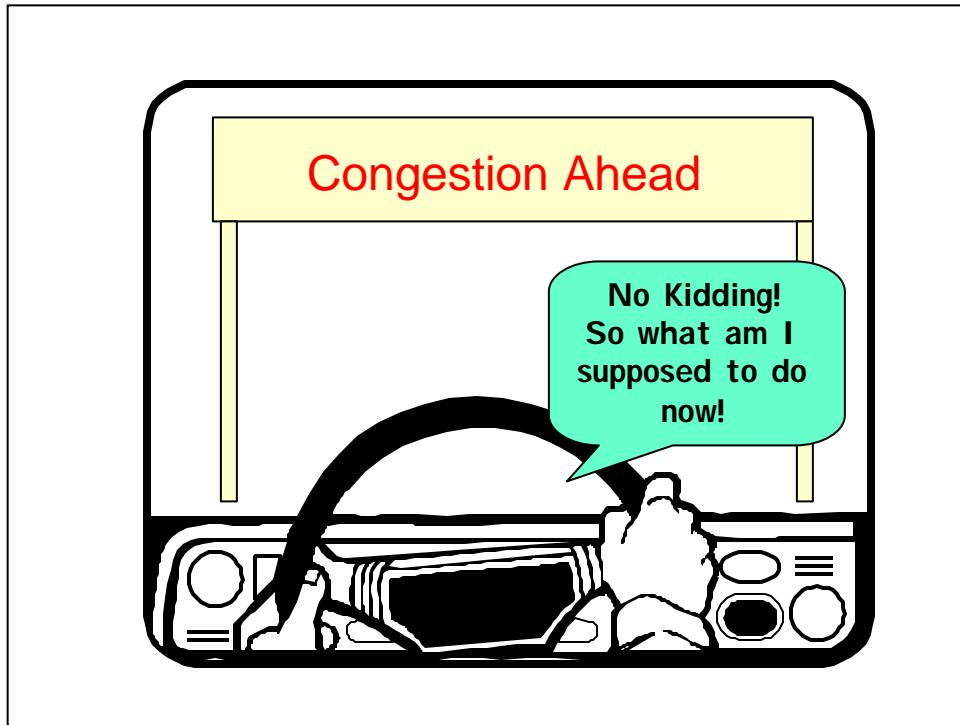
Data, however is only the first step in having technology enabled system.

Operations becomes a significant part of the desperately needed congestion solution.

Once we have the data, whether it is from the public sector or private sector, we need to be able to use it in a meaningful way to help people.
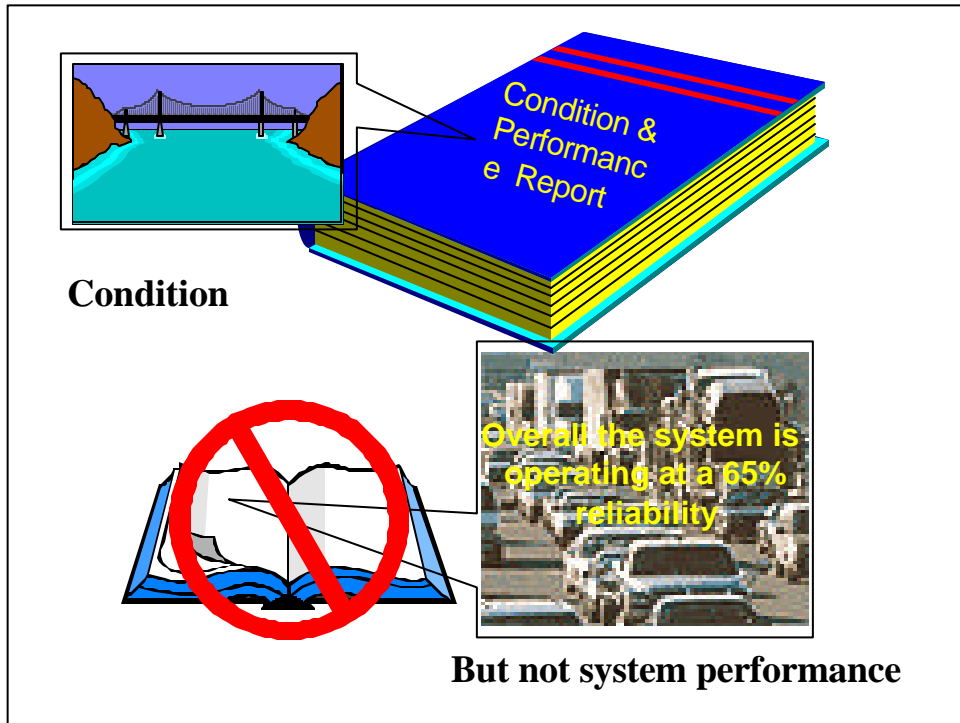
Secretary Mineta's symbol "congestion ahead" illustrates the point.

The issues behind a sign like this point to a need for major cultural, and institutional reform.

From a project based culture…..

Good morning, Mr. Jones, the system is running at about 80% reliability this morning. Allow about 5 min. extra and use the 14th St. exit

...To one driven by performance and customer service

We are, by in large, a project driven culture, with project driven policies and project driven legislation.
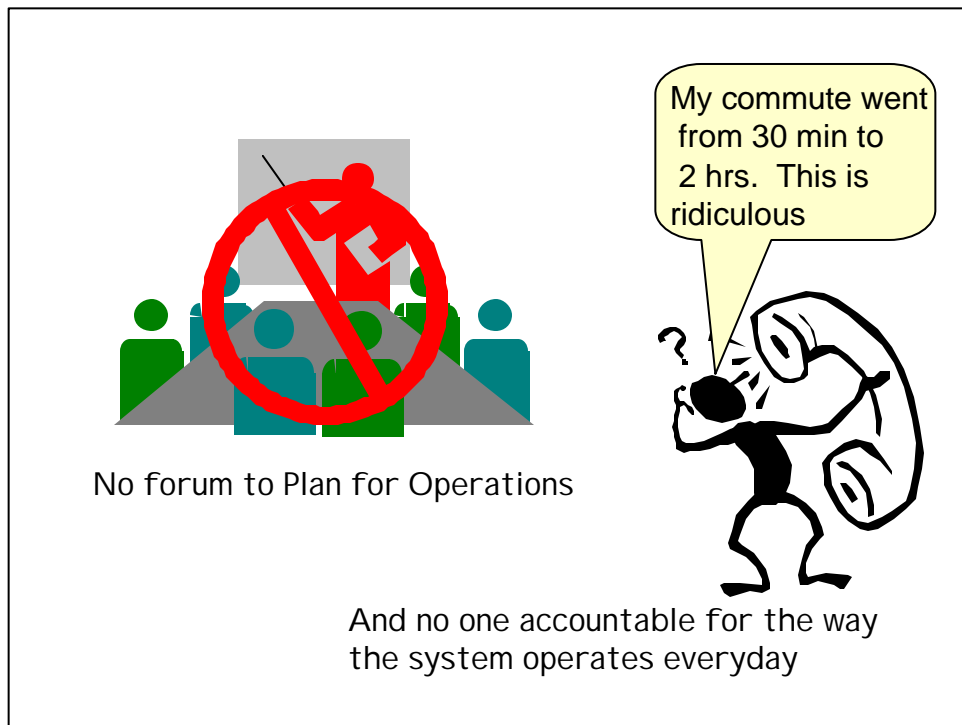
As a result, we have managed with relative ease to get some 2200 overhead message signs up after all and numerous TOCs -- before we had sufficient content to make them truly useful. Signs and buildings were projects that could be designed and built – they fit the existing culture.

The problem is, they have to be operated! And that stretches the underpinning organizational fabric of the highway culture! It is like asking the construction company that built the shopping center, to now turn around and run it. That company probably is not organized, staffed or even financed in a way that would allow it to do that. In many – but I hasten to add not all– instances, neither are we! Institutional transformation will be essential!

Condition & Performance Report

Condition

Overall the system is operating at a 65% reliability

But not system performance

It is telling that the Federal Highway Administration makes a detailed report to Congress on the condition of the Nation's pavement and its bridges but we say relatively little on how well the system performs – in terms of serving the customer on a daily basis.

Part of the reason is that while we have numerous measures of highway infrastructure condition -- we have relatively few measures of system performance.

My commute went from 30 min to 2 hrs. This is ridiculous

No forum to Plan for Operations

And no one accountable for the way the system operates everyday

Another telling symptom is the challenge we have seen in just pulling the right players together to develop architectures or 511 services.

In many urban and rural areas there is not a planning forum that routinely draws the operators -- police, parking, traffic, special events people and so on together – on a weekly or even monthly basis to anticipate upcoming construction, upcoming weather, special events to fine tune responses to the truly unexpected incident.

There is no institutionalized planning process for operating the system – the way we developed the "3 C" process for capital investments.

The result is no one is accountable for the way the system is operated TODAY!   Who do you call to yell at if you had a miserable commute? Who gets fired if the system routinely breaks down? In a transit property – you know who to call, and the CEO knows who gets fired!

What is it going to take to achieve Peak Performance?

ITS infrastructure

Integrated planning, execution & accountability - institutionalized

Performance Measures, tools, data

Communicate with public

Spend the money it takes

If technology is going to be harnessed to take on what is truly becoming a national crisis of congestion, I believe, five elements are essential

1. ITS infrastructure

2. Institutionalized Integrated planning Execution and Accountability – which
   is institutionalized so it isn't a one time event

3. Performance Measures – to help hold agencies accountable for their performance

•   Communication with the customer

                    AND FINALLY

5. Spending the Money it Takes -- Operations is not a low cost alternative to
        capacity expansion any more than system preservation is.
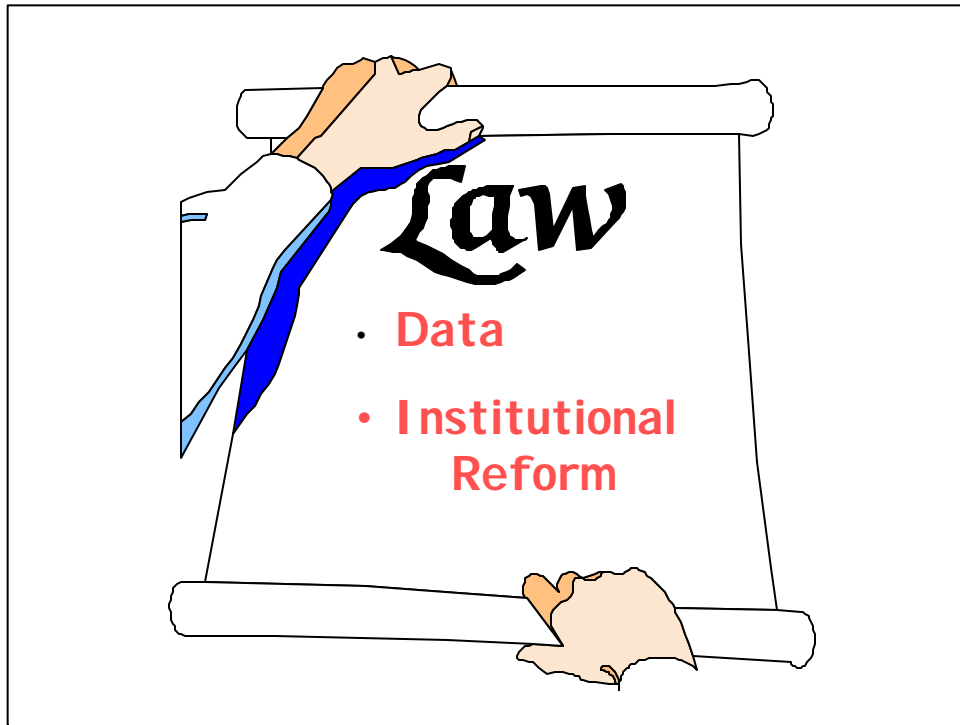
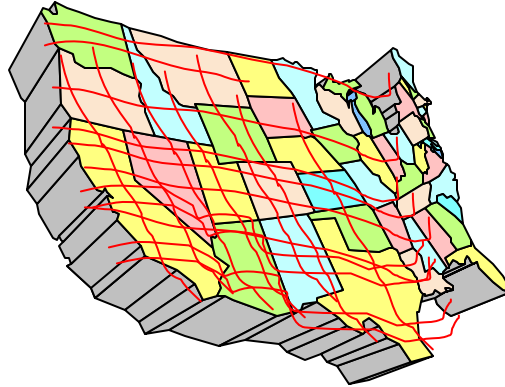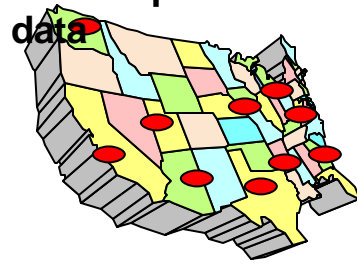As we move into reauthorization, I believe these two issues:

Data

Institutional Reform

must be high on the agenda, not just for the ITS community, but for the sake of the nation. Otherwise we will not be able to meet the crisis of congestion that is looming ahead.

Themes for reauthorization: Data

From Spots of data

To a nationwide network of data

A Public Private Partnership

In taking on the challenge of making a quantum leap in our information network I don't think we should have a knee jerk reaction that this is an old style massive public works project – carried out by the public sector.

It is my own belief that the only way we get there is with a genuine national public private partnership – meaning
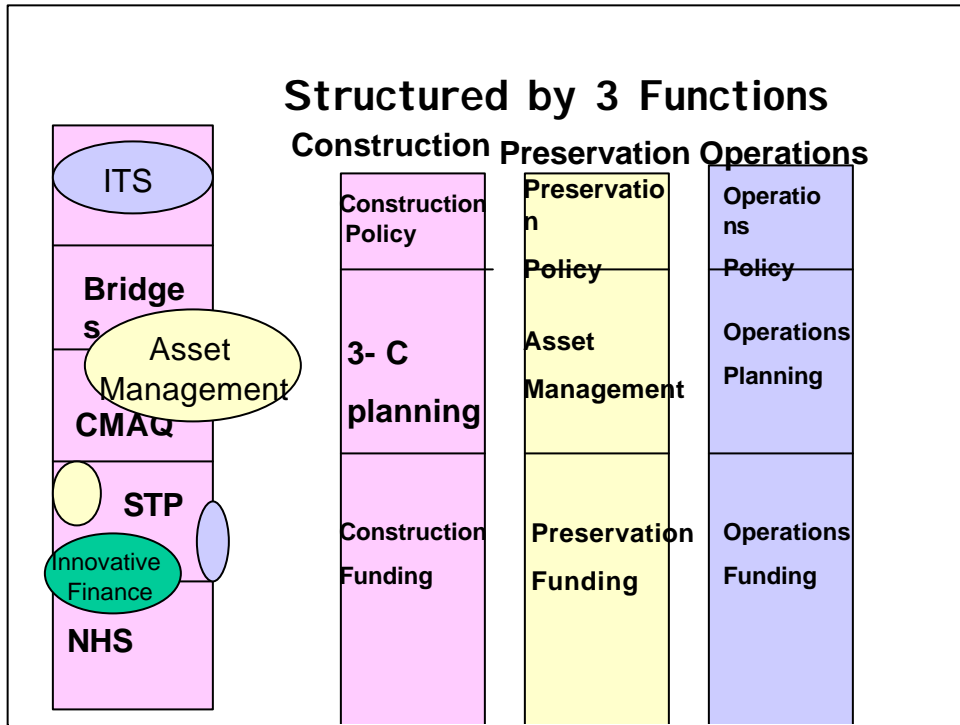
Shared risk

Shared benefit

Shared contribution

I don't think we've done anything like it before. It is going to take some hard thinking – something that I believe this institution is uniquely suited to do and thus I challenge the organization to explore and find how we do it together.
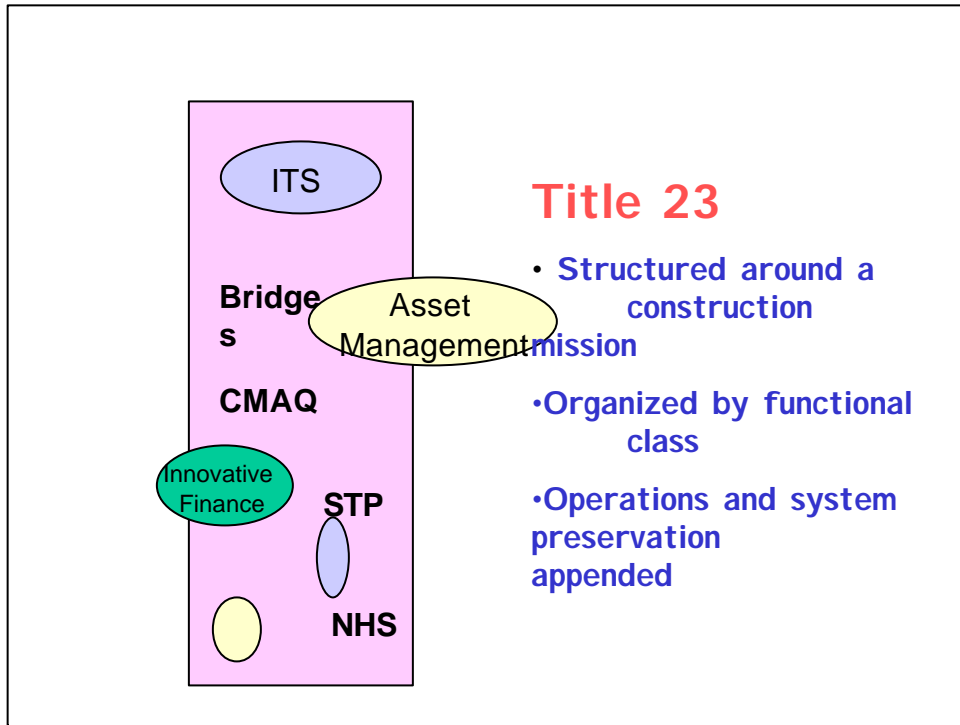
Institutional reform is an even bigger challenge. Let me challenge your thinking with this concept

The structure of Title 23 (Title 23 of the U. S. Code of Federal Regulations)– which governs much of the national highway policy might be depicted something like this –Organized and funded by functional class with key elements of operations and systems preservation appended.

Structured by 3 Functions

Construction	Preservation	Operations
Construction Policy	Preservation Policy	Operations Policy
3- C planning	Asset Management	Operations Planning
Construction Funding	Preservation Funding	Operations Funding

Left column (pink): ITS, Bridges, Asset Management, CMAQ, STP, Innovative Finance, NHS

Perhaps it is time to rethink the mission and the underpinning policy and define three missions in our legislative structure

Construction

Systems preservation

And Operations – each with their own planning process, unique to that function, and with their own financing structure.

Stage 1 – Automate existing processes

Stage 2 – Transform the processes and organization

Hold on…we are about to enter Stage 2

Let me close by drawing on an observation made in the introduction of the 10 year program plan.

It suggests that there are two stages of automation:

The first stage, the stage we have been in, is to automate existing processes.

In the second stage, the information developed from automation allows the enterprise to see problems in a new way – and literally transform business and organizational processes.

Hold on – we are about to enter stage II.