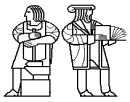

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# ITS: WHAT WE KNOW NOW THAT WE WISH WE KNEW THEN: A RETROSPECTIVE ON THE ITS 1992 STRATEGIC PLAN

**Joseph M. Sussman**
JR East Professor
Professor of Civil & Environmental Engineering
and Engineering Systems
Massachusetts Institute of Technology

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**JOSEPH M. SUSSMAN**
**JR East Professor**
**Professor of Civil & Environmental Engineering**
**and Engineering Systems**
**Massachusetts Institute of Technology**
**Cambridge, Massachusetts**

**77 Massachusetts Avenue**
**1-163**
**Phone: 617.253-4430**
**Fax: 617.258-5942**
**<sussman@mit.edu>**

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# ITS: WHAT WE KNOW NOW THAT WE WISH WE KNEW THEN: A RETROSPECTIVE ON THE ITS 1992 STRATEGIC PLAN


## ABSTRACT

From September 1991 until June 1992, a core writing team, which included the author, worked on what was the first Intelligent Transportation Systems (ITS) strategic plan in the United States. This plan was entitled, "A Strategic Plan for IVHS in the United States". It served to define the ITS program at a national scale in a way that has been characterized as seminal.

The plan, by most accounts, served as the blueprint for the early development of ITS in the U.S. and as the basis for the subsequent plans produced by ITS America, the federal government, various states, and a number of private-sector organizations.

This paper explores numerous aspects of ITS retrospectively, contrasting views from 11 years ago, when the Strategic Plan was produced, with the current reality. Areas discussed include Advanced Traveler Information Systems (ATIS), Advanced Transportation Management Systems (ATMS), reliability, getting the ITS program off the ground in the early 90s, strategic use of information, automated network management, electronic toll collection (ETC), congestion pricing, architecture, commercial vehicle operations (CVO), Advanced Public Transportation Systems (APTS), and regions.

The paper closes by comparing ITS with the Interstate, and finally by discussing the upcoming reauthorization of the Transportation Efficiency Act for the 21st Century (TEA-21) and what has been learned through this retrospective about ITS-related issues on that reauthorization.

# ITS: WHAT WE KNOW NOW THAT WE WISH WE KNEW THEN: A RETROSPECTIVE ON THE ITS 1992 STRATEGIC PLAN

## PREFACE

From September 1991 until June 1992, the author had the unique privilege of serving on the core writing team for the ITS America (then IVHS America) Strategic Plan, entitled "A Strategic Plan for IVHS in the United States".(*1*) The author's sabbatical year from MIT provided an opportunity to be at the very center of the development of the first Intelligent Transportation Systems (ITS) strategic plan in the U.S. It was a once-in-a-career opportunity to be in at a seminal moment of an emerging technology of substantial interest in the author's field of study. The writing team, composed of Michael Sheldrick, Jonathan Arlook, Edward Greene, Craig Roberts and the author, was charged with writing a good deal of the plan as well as coordinating inputs from a variety of committees and groups around the United States, from both the public and private sectors. The plan was subject to intense senior review (Thomas Deen, James Costantino, Lyle Saxton and William Spreitzer), and ultimately was approved by the Coordinating Council and the Board of Directors of ITS America.

The plan, by most accounts, served as the blueprint for the early development of ITS in the U.S. and as the basis for the subsequent plans produced by ITS America, the federal government, various states, and a number of private-sector organizations.

Having said all this, it is clear that there was much the writing team and the ITS community more broadly defined did *not* understand about ITS and what would ultimately be the factors driving its success or lack thereof. Looking back on that 1991/92 effort, while there was much that was right, there was a good deal wrong as well. Some of these omissions were subtle; others were of the form "How could we (the nascent ITS community) not have thought of that?"

Of course, some of these omissions derive from the changes that have taken place in the world over the last 11 years that were to some extent unforeseeable in 1992. For example, while the Internet was beginning to have an impact, few foresaw the extraordinary change in workstyles and lifestyles inherent in that as an information/communication mechanism. The evolution of the environmental movement to one concerned more broadly with sustainability, including economic development, environmental impact, social capital, and so forth, was not yet understood. We knew that globalization was of fundamental importance, but the continued substantial growth of the global economy, fueled in large part by innovations in transportation systems, information systems and communication systems, was only partially seen. The focus on security in the post-9/11 era, did not exist. Demographers were pointing to the importance of the aging society back then. It is more recently that the professional community has really understood the implications of the aging of the baby boomers and their desire to retain lifestyle and mobility at previously experienced levels. And, the notion of developing-country megacities -- cities in excess of 10 million -- was looming on the horizon, where now in 2003, it is established as one of the critical contemporary issues the world faces, from economic development, environmental, and equity points of view. Transportation is a key aspect of dealing with all these issues.

So the world has changed substantially in these 11 years and now, with the benefit of 20/20 hindsight, we can look back at what was not fully understood about ITS and its implications, and what, it is hoped, is better understood now.

The author often uses the term "the planners" or "we", connoting the "ITS community". These are actually points that the author personally did not grasp in the early days of ITS. While

the author was likely not alone in this lack of understanding, certainly some *did* understand back then. So, the reader should consider the points that follow as ideas the author "didn't get right" and not as finding fault with the ITS community, other members of the writing team, or senior reviewers.

## ITS IN 2003: HOW IT COMPARES WITH THE 1992 STRATEGIC PLAN PERSPECTIVE

### Advanced Traveler Information Systems (ATIS)

One of the subsystems of ITS that we thought we had a good understanding of was Advanced Traveler Information Systems (ATIS). We saw this as straightforward, with information being provided to drivers and transit users so they could make good decisions about how to access and utilize the transportation network.

What we did not foresee was the explosion in the methods for delivering traveler information to these drivers and transit users. The idea of the Internet as a source for traveler information had not occurred to us -- indeed, as Harold Worrall of Orlando-Orange County Expressway Authority has pointed out, the word "Internet" does not even appear in the 1992 Strategic Plan. The notion of ubiquitous use of cellular phones as a mechanism for receiving real-time traveler information during a trip was not fully appreciated. Indeed, these cell phones are now a mechanism whereby vehicles can be located and tagged on the infrastructure so travel times on segments of networks can be measured. This gives us a much better sense of the network state in the future, so important to giving good traveler information.

### Advanced Transportation Management Systems (ATMS)

Advanced Transportation Management Systems (ATMS) is the companion subsystem to ATIS. While ATIS is directed to individual customers, ATMS is the subsystem through which we control or manage the transportation network for the benefit of the general public.

Our early view of ATIS and ATMS were as countervailing. ATIS was directed towards "relatively affluent" travelers who could afford to pay for special traveler information; ATMS was directed towards creating a better-operating transportation network for all drivers. The techniques that would be used would include ramp-metering rates, dynamic variable message signs, incident detection and management, variable speed limits, and traffic light setting.

However, it now appears that perhaps the best mechanism that we have to improve overall transportation network performance is by providing *better traveler information*, even if it is to a relatively small percentage of overall drivers. The other network methods mentioned above -- ramp-metering rates, etc. -- may have a positive impact on network operations, but the sense is that properly informed drivers, knowledgeable now about where real-time chokepoints in the network may be, and acting in their own self-interest to avoid them, may have the most substantial impact on network operations improved for *everybody* than any of the techniques described above.

So the notion of ATMS and ATIS as antithetic is wrong. They will likely rise and fall together rather than there being a trade-off between effective ATMS and ATIS. And since ATMS are usually public-sector operated and ATIS private-sector operated, this realization would seem to be quite important for developing public-private partnerships.

### ATIS as a For-Profit Venture

The Strategic Plan envisioned private-sector organizations providing traveler information to

individual users as a profit-making activity, absolutely necessary in the private sector. But at this writing, it is clear that making a profit in this business is very hard. As Jane Lappin of the Volpe National Transportation Systems Center (VNTSC) has said, "There is *no* market for traveler information."(*2*) Free competition from radio stations makes it a very difficult sell; apparently the improvement in information that one gets from more sophisticated ATIS with a wider variety of data sources and a more real-time and route-specific nature is not something that many people are willing to pay for, at least not yet.

So while organizations are making money in ITS, it is mainly through the provision of ITS infrastructure to the public sector rather than through the sale of better traveler information to the public in general.

**Reliability**

In the 1992 strategic planning exercise, we emphasized the benefits in improved travel times to drivers as a key economic benefit of ITS. Time is money, we said. Getting there faster has economic value. While this is true, we overlooked, until quite recently, the importance of reliability to the highway traveler. Reliability is a measure of the variability in travel time between two points. We are all familiar with the fact that on Monday we have a quick half-hour trip from origin to destination, but on Tuesday an accident or storm or construction may cause that same trip to take twice that time. If one is risk-averse about being late, one must build additional time above the "quick" travel time into one's time budget. Often it is wasted time in the sense that one arrives at the destination earlier than one intended. But it is a price one may be willing to pay to avoid, for example, lateness for an important meeting (or even a class!).

In many cases, improved reliability available through real-time information about *today's* trip time is proving to be more important than improvements in average travel time. This has been a phenomenon that has been well understood for decades in freight transportation.(*3*) The trucking industry has won considerable traffic from the rail industry, even charging premium rates, because they provide more reliable trip times. This is because unreliability generates additional inventory costs for the customer. However, the understanding of the importance of reliability for highway travelers, where time management is critical, is relatively recent.(*4*)

Indeed, it turns out that actual highway travel time savings are often ephemeral or rather small. There is little empirical evidence to show that the small improvements in average travel time are economically meaningful. When people get more reliable trips by receiving information about expected travel time and real time before the fact of the trip, some suggest they end up unconsciously converting that into (often non-existent) travel time savings in their minds. What they have actually accomplished has been better *time management* when they receive real-time information about a trip that is about to be on the right-hand tail of the travel time distribution (or even the left-hand tail!).

**Getting the ITS Program off the Ground**

In the 1991/92 strategic planning era, there was a lot of discussion of "Alphonse and Gaston". The planners were concerned that the private sector would not make R&D investments in in-vehicle equipment until they were certain that the public sector would roll out public ITS infrastructure. Conversely, there was concern that the public sector would not do that roll-out unless the private sector had a commitment to in-vehicle equipment.

It turned out this concern was ill-founded. In the U.S., with a very strong Federal Highway Administration (FHWA) in the lead and holding most of the cards (and dollars), the public sector clearly took the initiative in rolling out ITS; the private sector, especially the

automobile manufacturers in the United States, was more lethargic in developing in-vehicle equipment, and probably lags to this very day behind Japanese and European carmakers.

It is interesting that this same pattern of roll-out did not occur in Japan. There, rather than an omnipotent Federal Highway Administration, there was a war of the ministries -- including the Ministry of Transportation, the Ministry of Post and Telecommunications, the National Police Agency, and so forth -- about dominance in their nascent ITS movement. Eventually, the private-sector automobile manufacturers tired of this bureaucratic armwrestling and rolled out their autonomous in-vehicle systems, without waiting for a public-sector commitment to ITS. This demonstrates how institutional form can create differences in the way technologies are developed, as documented by Hans Klein in his MIT doctoral thesis.(*5*)

**Strategic Use of Information**

In 1991/92, the emphasis in the "IVHS" Strategic Plan was the collection of data about traffic conditions in real-time that could lead to more efficient network flows and improving, through traveler information, trips for individual travelers. Of course, this has happened. But what was largely overlooked was the *strategic use* of this same information for transportation planning purposes.

As the author has noted in a previous paper(*6*), prior to ITS, data for strategic network planning -- the adding of infrastructure most particularly -- was ofttimes based on relatively ancient information because the cost of collecting data was so high. Now, with intelligent infrastructure in place collecting information for real-time operations, we have as a quite important side benefit the development of archival data that can greatly improve the quality of planning for strategic network change. Like other notions in this paper, this is clear in retrospect. At the time, our focus was so much on the "modern" applications of real-time data that we largely overlooked the more conventional advantages of large-scale transportation databases that came "for free" with the development of ITS infrastructure.

**Automated Network Management**

The gleam in the eye of the strategic planners in the early 90s was an automated system that collected data in real-time from transportation infrastructure and vehicles, and then, through *intelligent algorithms*, made automatic changes in network operations (i.e., without human intervention), so as to improve traffic flows and provide a better (i.e., faster) trip for travelers. The gathering of real-time data has happened, of course, but algorithms that change network operations have been slow to develop; to the author's knowledge, it is virtually non-existent. Indeed, the author argues that the only ubiquitous automated transportation network management is through traffic light systems that are automatically modified in real-time without human intervention ( SCOOT, SCAT) .(*7*) Other than that, the author believes that all the other network systems are *decision-support systems* for human decisionmakers who look at that data, presumably clearly presented for them, and then make a (human) decision about what to do to enhance network operations. The next evolutionary step, when the computer makes that choice, essentially does not yet exist.

Someday this will likely be the case. But, if someone had told the planners in 1992 that in 2003 this would still be a will-o'-the-wisp, we would have been dismayed.

**Electronic Toll Collection (ETC)**

Another example of the slowness of development that would *not* have been predicted by the strategic planners in the early 1990s is electronic toll collection (ETC). The reader may be

surprised to hear this; certainly many (including the author) would argue that electronic toll collection is the major success story of ITS, with implementations all over the country and abroad. But there are still many states without any electronic toll collection, when the technology has long since been proven. *Who thought it would take so long?* Certainly not the strategic planners.

What is also disquieting is the lack of compatible electronic toll collection systems, even in regions with many small states like New England, where it makes overwhelming sense. The inability of organizations in the public sector to cooperate in the development of common technologies for the convenience of the traveling public continues to be a major barrier to compatible electronic toll collection systems. It is relatively recently that the E-Z Pass system in the New York metropolitan area was implemented after a good deal of "negotiation" among the states of Connecticut, New York and New Jersey. And it is even more recent that E-Z Pass has been made compatible with the FastLane system in Massachusetts. E-Z Pass or FastLane only now is becoming available in New England states other than Massachusetts or Connecticut, where New England, with a number of small states, would really gain from compatible deployment of ETC.

Most ambitiously, we would certainly hope that a nationally-scaled compatible ETC system would be in place. Truckers, for whom long trips across political boundaries are common, would doubtless find this of great value. One could imagine a single transponder in rental cars, where the tolls could simply be added to the bill rather than the driver fumbling for change. But the current reading on getting a truly national system, which the strategic planners in the early 90s viewed as important (and even straightforward), is that it is a long way off due to that old bugaboo: *institutional issues*.

The strategic planners were not naïve about institutional issues; we realized they were going to be very difficult in the deployment of a new technology in a conservative industry. But it is fair to say we grossly underestimated just how difficult it would be. An anecdote: In a talk at the ITS Massachusetts Annual Meeting in 2003, we heard about two variable message signs in rural central Massachusetts obtained "for free" through federal funding not being deployed for more than a year because of bureaucratic quibbling between two small public organizations about who would "really" own and operate them.

**Congestion Pricing**

Congestion pricing, or value pricing as it has also come to be called, was viewed as an important application of ITS technology at the time of the 1992 Strategic Plan. It had the potential to smooth the peaks on congested highways by allowing individual drivers to make a choice about whether they were willing to pay a premium for traveling at a particular hour. It was an idea that Professor William Vickrey first put forth in the 1950s; it was part of the body of work that won him the Nobel Prize in Economics in 1996. Finally it had become technically feasible, based on ETC technology.

Many of us, going back even to the early 90s, have been saying that "congestion pricing is inevitable", but in fact it has taken a long, long time. Earlier this year (2003), London instituted congestion charging in central London, with virtually all drivers paying about $8/day to cross the cordon. Early reports are that this has had a substantial positive effect on congestion. The notion is that if London can do it, perhaps many other cities can also (an argument that does not work for Singapore's success, given their special political environment). So maybe the dam on congestion pricing will break now, but again the timeframe has been much longer than the planners thought.

In the U.S., the idea of high-occupancy toll (HOT) lanes, where single-occupancy vehicles can use the HOT lanes if they are willing to pay a toll, is an important application of value pricing. The author expects to see more such applications in the future. But, frankly, the author expected to see these in the mid-1990s!

Another surprise is who is using the HOT lanes. The conventional wisdom is that the wealthy would "unfairly" take advantage of this service. In fact, working women (not necessarily wealthy) are disproportionate users as they (in our current culture) try to manage professional and personal responsibilities (so facing confiscatory penalties for being late to the day-care center, a HOT toll seems a small price to pay).(*8*)

**Architecture**

Developing a system architecture for ITS was recognized in the 1992 Strategic Plan, but the extraordinary effort this would become was not recognized, *and* certainly the ultimate use of the architecture would not have been predicted.

The ITS architecture was developed in a "fly-off", well-known to Department of Defense and weapons-system development, but virtually unknown to the U.S. Department of Transportation (U.S. DOT). In 1994, four companies, Hughes, Loral, Rockwell and Westinghouse, each with various subcontractors, developed competitive architectures and ultimately the best was selected as the basis for the ITS architecture.(*9*) U.S. DOT more normally would have selected the "best" contractor and used the architecture they developed. But this was a special situation. ITS was the first civilian surface transportation system viewed as technologically complex enough to require an architecture. Some were, and still are, skeptical that it does require that kind of top-down system design concept. In any case, the architecture became a part of the ITS world.

The notion of "regional architectures" that were required (by FHWA) to be "consistent" with the national architecture came later. The author believes it is fair to say there is still not a complete understanding in the ITS community of what the term "consistent" means in this context. This author wrote a column in 1999 trying to clarify what "consistency" meant.(*10*) Others joined the battle, but there is still at least some confusion.

The Federal Highway Administration has used this consistency concept as a mechanism for controlling funds flowing from the federal government to the states. It is fair to say that regional architectures have become a negotiating ground for various public-sector transportation organizations to develop ITS in their regions. It is not clear that it has led to better *integration of transportation operations*, when they are run by a number of different public-sector agencies, as is usually the case.

So, while in the 1992 Strategic Plan architecture was noted as a necessity for ITS because of its technical complexity, the energy and resources that went into the development of this architecture and its current use, now focused more on administrative control rather than technical advance and integration, is a surprise.

Also, the *routinization* of the development of architectures through specialization software such as TurboArchitecture may have had a negative impact on how much deep thinking goes into the development of an *integrated*, high-technology surface transportation system. Moreover, the use of TurboArchitecture(*11*) and other shortcuts may delay the retooling of organizations and interorganizational relationships so necessary for effective deployment of an integrated ITS system.

In the author's view, the architecture grew from a straightforward concept to structure a technical system into a massive effort emphasizing administrative control.

On the other hand, some researchers, including the author, have redefined the regional architecture as an *organizational* concept, for specifying information flows and control hierarchies among participating organizations, with some good results.(*12*)

So, the term "architecture" has come a long way from the concept in the 1992 Strategic Plan, in some ways positive but in some ways less so.

**Commercial Vehicle Operations (CVO)**

The view from the strategic planners was that commercial vehicle operations (CVO) could be an early winner in ITS. Real-time routing of trucks, built on automatic vehicle location (AVL) technology for large truck fleets, was viewed as a mechanism for enhancing productivity. Since trucks are a private-sector enterprise, these productivity enhancements could come directly down to the bottom line. So if UPS, for example, could serve a metropolitan area with 40 rather than 50 trucks providing the same level of service, due to productivity enhancements, that 10 fewer trucks manifests itself in more profit, or perhaps lower costs for shippers. It is fair to say that these technologies have had a positive impact on commercial vehicles and their operation. The planners did not foresee the negative reaction in the trucking industry, which was quite concerned about the federal government having information about their operations for privacy reasons, and also because it might leak to competitors -- and many firms basically said to the ITS community, "We're already doing this; stay out of our hair." Many of these issues have been worked out by now, but it was difficult in the early years.

The other aspect, largely unheralded by the planners, was the substantial positive benefit of the *automation* of *mundane transactions* between truck companies and state regulatory agencies ("one-stop shopping"). Some thought this was not really ITS -- payment of excise taxes, relicensing, … -- and perhaps it is not, but the automation of these transactions has had a quite positive benefit through the CVISN system throughout the United States.(*13*) Its importance was underestimated in the early 1990s.

**Advanced Public Transportation Systems (APTS)**

Some friction existed during the development of the Strategic Plan between the Federal Transit Administration (FTA) and the planners. The FTA felt that initial drafts of the plan were focused almost entirely on highway applications and did not give proper weight to the applications of ITS to public transportation. They were right. After all, at that time the term of art was "Intelligent Vehicle Highway Systems (IVHS)"! Eventually the Strategic Plan had a major section describing Advanced Public Transportation Systems (APTS) and APTS came to be thought of as a potential early winner of ITS. It could improve fleet productivity (as with the trucks noted above) and lower costs for transit properties, as well as provide a higher quality of service for transit travelers through headway control and through real-time traveler information.

Unfortunately, the rhetoric did not match the action in the field. APTS have been much slower to develop than the FTA hoped.(*14*) There are many reasons for this. Transit agencies tend to be cash-poor and risk-averse. Often they do not have the staffs necessary to evaluate and then utilize high-technology systems. It is hoped that someday APTS will have a substantial effect nation-wide on public transportation, but currently the rhetoric outstrips the accomplishment.

**Regions**

Operating at a regional scale in surface transportation was an early dream of the strategic planners.(*15*) Today it is even fair to say that there is a consensus -- in principle -- that ITS gives

us the capability of operating effectively at a regional scale, a scale much geographically larger than was feasible in a pre-ITS era. The idea of the regional architecture described above is one manifestation of this consensus about regionalism and transportation. Applications such as Transcom in the New York Metropolitan Area and TransInfo in the Bay Area are proof that it can be done. But for the most part, regionalism has faltered under the difficulties in overcoming many of the institutional issues in cooperating on transportation needs 1) between the inner city and suburban communities; 2) between states in multi-state regions; and 3) between public safety and transportation operations organizations.

There is no question that a strong theoretical case can be made for regionally-scaled operations in terms of effectiveness and efficiency but, as with many other ITS concepts, the slowness to develop on the ground is a disappointment.

**ITS Compared with the Interstate**

During the creation of the 1992 Strategic Plan, much rhetoric dealt with the equating of ITS with the Interstate System (e.g., ITS as a 21st century equivalent of the Interstate System). In terms of impact, some felt ITS and the Interstate would one day be comparable. It is, of course, early in the game, but thus far the Interstate has had much more profound impacts, both good and bad. The Interstate represented a fundamental change in mobility in the U.S. and helped create enormous economic growth. Nonetheless, it has its critics who speak of adverse effects in cities (e.g., destruction of neighborhoods and urban fabric, sprawl), environmental impacts, and equity considerations. What no one disagrees about is the *magnitude* of the effects of the Interstate on many dimensions.

ITS is, of course, much younger; perhaps the major effect of strategic interest is the use of ITS technologies for supply chain management and freight logistics (and some would argue that movement pre-dated ITS anyway). There has not been a major shift of infrastructure expenditure in highways from conventional infrastructure to the high-tech infrastructure that ITS represents, but this may yet come. (Note that the current Bush administration has not bought into the early ITS rhetoric of "you can't build your way out of congestion" with a big conventional infrastructure program.) In-vehicle equipment (telematics) has had some effect on driving behavior, but not anywhere nearly as importantly as the Interstate did. Electronic toll collection has been a big-impact item, but it could be argued that this is only a convenience at the margin rather than a basic change. Congestion pricing, which *would be* a profound change, has yet to become prevalent, although the signs are beginning to be positive (London congestion charging scheme, as discussed earlier, for example).

So, 11 years after the 1992 Strategic Plan, the strategic impacts of ITS still lie before us and, certainly, we have a long way to go before its impacts approach those of the Interstate.

**Security**

As noted earlier, back in the early 90s, 9/11 was an unpredictable nightmare, and the role of ITS in security was, if stated at all, a modest add-on to a technology focused on safety enhancements and congestion improvements. But now in 2003, almost two years after 9/11, the use of ITS as a tool for enhancing national security is front-and-center on the agenda. Certainly these concerns will make ITS a more saleable technological concept. This is important as we approach the reauthorization of the "Transportation Efficiency Act for the 21st Century" (TEA-21). The allocation of funds for ITS in the reauthorization legislation will have an important impact on future deployment. And this leads, finally, to a more general comment on that reauthorization and the implications for ITS.

**REAUTHORIZATION OF TEA-21**

How can we assure the continued effective deployment of ITS technologies? TEA-21 reauthorization is an instrument that is quite important for the future success of the transportation enterprise in the U.S. And allocation of funds to ITS is an important factor for the future of that innovative segment of the transportation system.

From almost the beginning of ITS, the conventional wisdom has been that ITS must demonstrate *"real benefits"* before it can be fully accepted. Perhaps this is not completely true. The history of transportation investment says otherwise. Here we are, essentially finished with the Interstate; yet there is still substantial debate about the benefits that accrue to society as a result of that extraordinary infrastructure deployment, and whether those benefits have outweighed costs that the sustainability community would point to. Even the railroads, whose major years of building took place in the late 19th and early 20th centuries, have had their impact questioned and, to this day, the role of public finance of those major infrastructure projects is debated.

It is unlikely we will every be able to build an ironclad case for ITS benefits. Indeed, we may still not fully understand what the benefits are! For example, as noted earlier, a recent finding has been that it is reliability and not average travel time that matters in what ITS provides, where for 12 years we have considered improved travel time as the sine qua non of ITS benefits.

But we can build political, professional and public acceptance of ITS. A better job of linking early successes like electronic toll collection to the more general uses of technology in surface transportation is a political approach. Politicians need help from us in characterizing ITS as a *project* to their constituents back home in the same way conventional infrastructure is viewed. The development of the "New Transportation Professional"(*16*), with more technologically-sophisticated people coming into the transportation industry, can lead to professional acceptance of ITS. Taking advantage of the aging baby boomer demographics, that generation's political power, and the desire of that generation to retain their mobility as long as possible is clearly a way toward public acceptance. By allowing people to drive for longer as they age, ITS can build support.

The strategic question for the ITS community is the extent to which bundling these political advantages and early winners into an integrated ITS program is the best political sell, as contrasted with selling each ITS component on its own. Certainly the early strategic planners saw an integrated approach as an advantage. We need now to take a hard look at whether it continues to be so.

**A FINAL WORD**

So, looking back on the 1992 Strategic Plan, while it served as a base for what came later, there were obvious things overlooked; there are things that really happened, although over a much longer time period than had been hoped; some factors were underestimated, such as institutional issues (despite believing we were conservative); there were concepts such as the architecture that greatly expanded from the initial notion of the need for a technical architecture into a concept with a life of its own with more administrative than technical content.

But good progress has been made in ITS. The field has matured. The profession is changing. And in all ITS is an integral part of our surface transportation systems, building on our current successes for years to come. *But*, patience, as always, will continue to be required as we wait for the full impacts of ITS to be felt.

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