What is it?

"Intelligent transportation systems encompass a broad range of wireless and wireline communications-based information, control and electronics technologies. When integrated into the transportation system infrastructure, and in vehicles themselves, these technologies help monitor and manage traffic flow, reduce congestion, provide alternate routes to travelers, enhance productivity, and save lives, time, and money."[1] They are an important part of the 21st Century transportation system.

20th vs. 21st Century Transportation

Contrasting the 20th with 21st Century Transportation		
System	20th Century	21st Century
Vehicles	Steel and fiberglass	Steel, fiberglass and Composites
Vehicle control system	Driver	Intelligent/autonomous systems (GPS, GIS, other vehicles)
Fuels	Hydrocarbons	Biofuels, hydrogen, electricity, compressed gases and hydrocarbons
Infrastructure	Loosely integrate	Integrated structures using sensors, and dynamic multi-channel messaging
Regulation of movement	Congestion relief is hard	Highly regulated ITS: congestion, accidents, travelers information, goods movement, etc.
Organization of infrastructure	Local	Statewide standards and protocols
Logistics and tracking	Paper and scanners	Scanners, RFID tags, computing in infrastructure

ITS involves the use of multiple computer and communications technologies to improve the efficient and general mobility of all vehicles under congested conditions (including public transport and trucks) on an telematics (involves sensors, global positioning systems (GPS), computers, communications equipment) enhanced and managed transportation infrastructure.

[1] ITS America website: www.itsa.org

California is rich in road, rail, port, and air transportation assets (Attachment: Map of Major Transportation Assets and Corridors). For example, in 2003 there were 169,580 miles of maintained roads in California[2] traversed by 855,000 autos, 176,000 trucks, 51,000 trailers, and 24,000 motorcycles, totaling 1,105,000 registered motor vehicles.[3]

The number of vehicles miles driven has increased every year, even during recessions, growing from 51 billion vehicle miles traveled in 1967 to 153 billion in 1997. This represents a 200 percent increase representing nearly 2.8 times the percent increase in population growth (Attachment: Vehicle Miles Traveled from 1967-2004). Vehicle-miles traveled are expected to be over 30 percent higher in 2005-06 than in 1991-92.[4] According to California Department of Transportation: "Over the next 10 years [2000 through 2010], the population of California is expected to increase by 6 million people (18 percent) with a corresponding increase in vehicle miles of travel of around 27 percent. …Congestion is growing at an average annual rate of 10 percent."[5] State Capital outlays and lane miles constructed are also falling far short of the need. The number of hours of delay for the average traveler and trucker more than doubled from 1982 through 2003, going from 123 hours to 365 hours. In 2003 alone, the total cost of congestion was $17 billion.[6] A second study found that shippers and carriers see a penalty of between $25 to $200 per hour when delayed, depending on the value of the product. The cost of unexpected delay adds another 50 percent to 250 percent in shipping costs.[7]

Between 2002 and 2020, the value of imports through California seaports could nearly double and the value of exports could almost triple. An estimated $23.7 billion ($7.2 in Northern California and $16.5 in Southern California) is immediately needed to improve

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[2] Department of Finance, Table J-1, "Milage of Maintained Public Roads in Each County by Jurisdiction, 2003". http://www.dof.ca.gov/HTML/FS_DATA/STAT-ABS/tables/i1.xls

Source: California Department of Transportation, "Intelligent Transportation Systems Deployment Initiatives," 2000. p. 8.

[3] Department of Finance, Table J-4, "Motor Vehicle Registration by County of December 31, 2003". http://www.dof.ca.gov/HTML/FS_DATA/STAT-ABS/tables/j4.xls

[4] Legislative Analyst Office, 2005-2006 Budget Analysis.

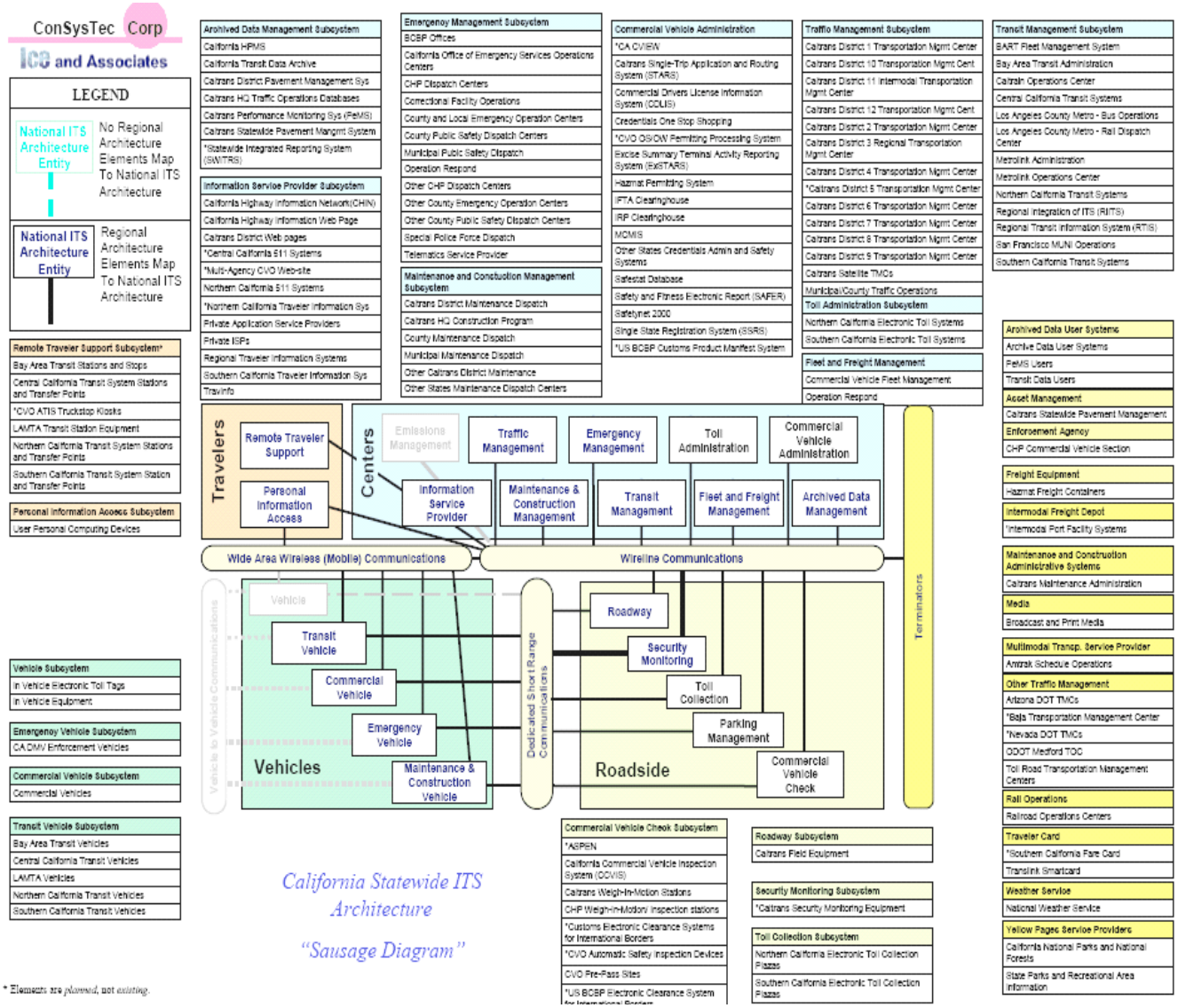
[5] California Department of Transportation, *Intelligent Transportation Systems Deployment Initiatives*, 2000.

[6] Value of travel time delay was estimated at $13.45 per hour of person travel and $71.05 per hour of truck time, and excess fuel consumption was estimated using state average cost per gallon. The cost to the customer due to delay in goods delivery was not estimated but would be considerable.

[7] US Department of Transportation, Federal Highway Administration (2001?) *The Freight Story*. P. 5.

the goods movement infrastructure.[8] Ignoring the goods movement problem could affect 1 in 7 trade related jobs in California.[9]

The Elements of California's Projected ITS



[8] California Marine and Intermodal Transportation System Advisory Council, Northern California Marine Transportation Systems Advisory Council, and Southern California Marine Transportation Systems Advisory Council (2003). *California Marine Transportation System Infrastructure Needs*, p. 2.

[9] California Business Transportation and Housing Agency, California Department of Transportation (2002). *Global Gateways Development Program*, p. 1.

Which industries are likely to be Affected?

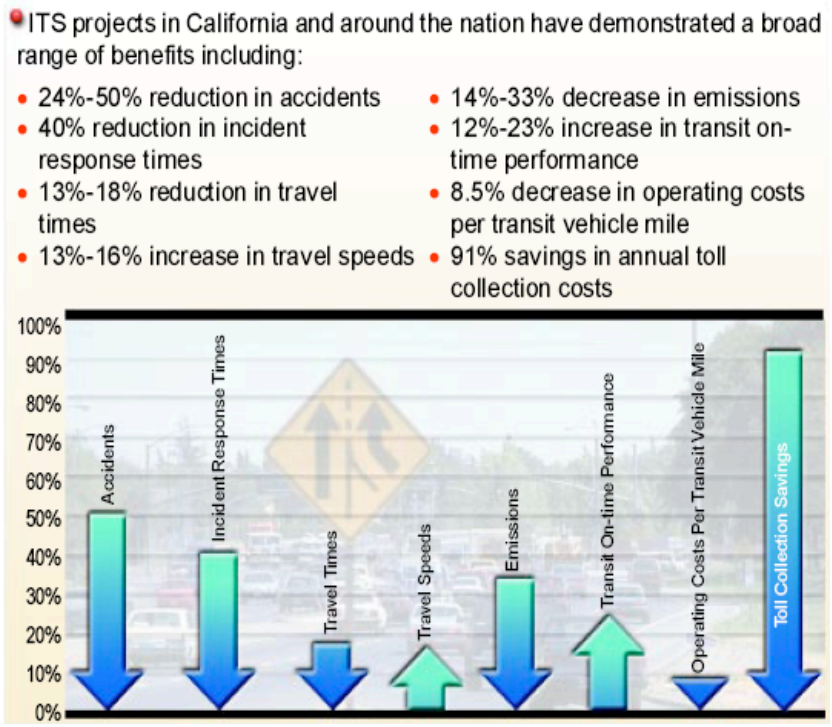
State and local government transportation agencies, automobile and automobile accessories manufacturers, communications, software, and a multitude of other industries will be affected (see "Attachment 1 The Technology Based Elements of an Intelligent Transportation System"). The public infrastructure side of ITS, and the related private sector includes a set of technologies that enable the coordination of a very complex system of multiple services and activities that make the transportation and goods movement system safer, more productive, and efficient while reducing air pollution and other negative effects without pouring concrete on additional land. These key technologies that come together in various configurations that produce a multitude of interconnected products include:[10]

- Information management technology including software
- Sensors (magnetic, ultrasonic, microwave, pressure, temperature, presence of activities of various kinds)
- Video cameras and other related visualization technology
- Human factors analysis
- Signaling devices (stop lights, freeway signs, and related information systems)
- Geo-Positioning Systems (GPS)
- Geographic Information Systems (GIS)
- Large scale transportation simulations
- Radio based and other communications systems
- Pavement management
- Internet
- Advanced speech technology. Speech technology can be used to get personalized traffic updates, hear about the state of their car, place a phone call, ask for driving directions or tune their radio.
- PDA and cell phone integration. Bluetooth® technology wirelessly connects a driver's cell phone and PDA to the vehicle's electronics system, allowing drivers to speak to make and receive calls, receive meeting reminders and access important data through the car audio system.
- Web services. Drivers can use voice controlled Internet access to avoid traffic jams, tune in to the news or identify the best bargain for fuel.
- Customized navigation. Points of interest can be found or the quickest route identified using Global Positioning System (GPS) and MapPoint® technology.
- Hands-free phone.
- Remote diagnostics. This technology tells the driver of potential car problems and maintenance updates.

[10] This list is derived from what would be necessary to carry out various applications. It is also derived from partial lists presented in the articles, plans, and texts consulted for this study.

What products are on the market today or are expected to be in the near future?

The list of industries that could be affected are indirectly identified by Attachment 1 which lists both technologies and products that are on the market today or could be in the next few years. Since the whole area is very new, these products will "shake-out" as the market and technologies evolves, requiring constant workforce retraining.



Where are Advanced Transportation related companies and Government agencies located in the Innovation Corridor?

Government and industry are mutually involved in implementing ITS systems. These are the areas mostly like to see new ITS jobs emerging. In 2004, regional ITS plans existed for 18 regions:[11]

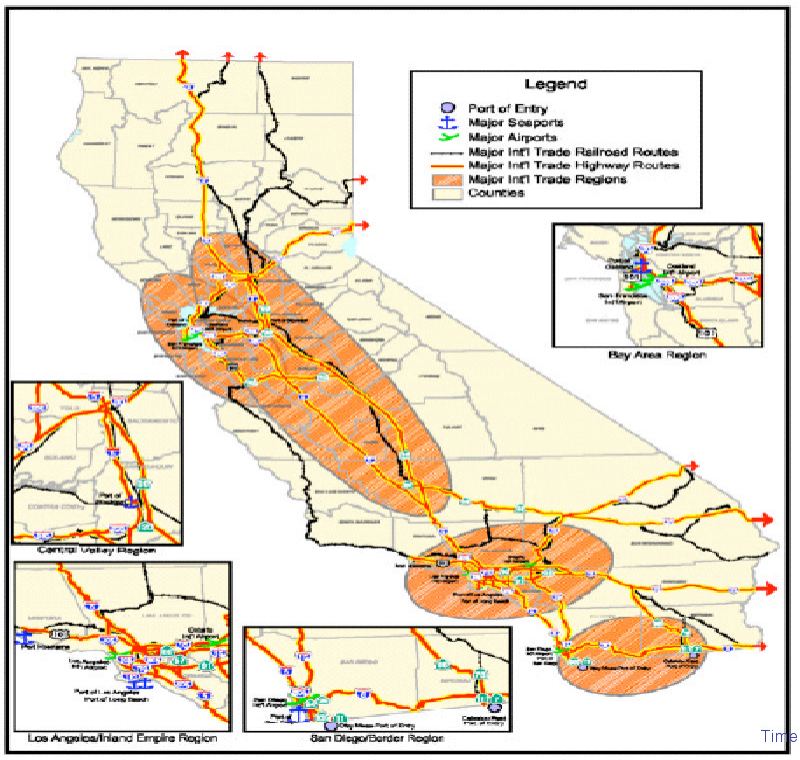
- Bay Area
- Central Coast
- COATS (California – Oregon Advanced Transportation Systems)
- Imperial County
- Inland Empire
- Los Angeles – Arterial Architecture
- Los Angeles – RIITS (Regional Integration of Intelligent Transportation Systems)
- National Parks

[11]California Department of Transportation (2004) *California ITS Architecture and Systems Plan*.

- North Valley (includes Butte County and others)
- Orange County
- Sacramento Area
- San Diego
- San Joaquin Valley
- Sierra Nevada
- Southern California
- Tahoe Basin
- Tahoe Gateway
- Ventura County

Intelligent Transportation System related companies are concentrated in Los Angeles and Alameda Counties, with suppliers located throughout the Innovation Corridor.

GoCalifornia Priority Corridors



How many new jobs will be created or affected by the new technology?

Nationally, one out of every seven jobs in the United States is transportation related. The transportation sector employed over 4.4 million workers in 2002. More than 60 percent of these workers are either in freight-related occupations or in jobs that directly support freight transportation.[12] Nationally, an additional 1.7 million workers are employed in transportation equipment manufacturing and another 4.5 million in transportation-related industries such as automotive service and repair, highway construction, and motor vehicle and parts dealers.[13] Transportation-related occupations also make up a significant portion of the employment of non-transportation industries such as truck drivers, freight arrangement agents, and freight-moving workers in the wholesale and retail industries. In 2002, there were about 9.2 million people employed in transportation-related occupations such as these. California has 424,494 Transportation workers.[14] "Appendix 2: Projection of the Number of Transportation Workers Needed by 2010", identifies occupational titles, number employed and expected in transportation related occupations by 2014. The vast range of industries involved in Intelligent Transportation Systems suggests that there will be far more jobs openings by 2014.

Estimate of Potential Size of California ITS Employment and Training Workforce (Duplicated Count)

California Estimated Workforce Training Requirement	2005	2008	2010	20015
Alternative Fuels	88,500	102,660	119,086	138,139
Government (State Infrastructure Deployment, operations, and maintenance)	34,000	39,440	45,750	53,070
Government (City, County Deployment, Operations, and Maintenance)	13,680	15,868	18,408	21,353
Transit and Ground Transport	65,020	75,423	87,491	101,489
Transportation Related Manu-	48,000	49,000	51,000	54,000

[12] This share is a BTS estimate based on description of labor categories in the North American Industry Classification System (NAICS) and the Standard Industrial Classification (SIC).

[13] USDOT BTS 2004.

[14] Elias Lopez and Alicia Bugarin (2004). *The Manufacturing Sector and Job Training in California*. California Research Bureau.

facturing and Maintenance				
Transportation Support Activities	116,528	135,172	156,800	181,888
Autonomous Vehicles 4,000 to 5,000 business @ 20 employees in 20 yrs	25,000	29,000	50,000	58,000
Goods Movement Logistics	384,000	445,000	516,000	598,000
Warehousing and Supply Chain	317,832	368,685	427,675	496,103
Gross Total	660,560	766,250	905,210	1,050,043
Estimate of number of retiring workers creating new positions (30 percent or more)	198,168	229,875	271,563	315,013

What skills will the new workforce require?

In transportation—particularly in freight transportation—productivity from 1991 to 2000 rose 53 percent for rail, and 23 percent for trucking. The basic factors that affect labor productivity are increased use of equipment such as IT per worker and improvements in the organization of the logistics and other related processes, including the information technology used in production and management of the infrastructure itself.[15]

Improvements like these can continue to increase in California if ITS is installed. It will take a trained workforce to do so and to maintain it.

[15] BTS Issue Brief "Productivity Growth in Transportation" (USDOT BTS 2003)