

Background

Without gasoline, Los Angeles would cease to function and its political and economic institutions would crumble. Organization would dissolve into chaos. This is because, in order for its 150 square mile area of integrated real estate and labor markets to function, millions of gas-fueled private automobiles must be used every day.

Even without that doomsday scenario, the near total dependence of the Los Angeles region on the private automobile has caused undesirable conditions. For example, Los Angeles has the worst air quality of any American city, and traffic congestion saps the regional economy of hundreds of millions of dollars annually.

It is due, in part, to these conditions that Los Angeles has traditionally been the site of many telework innovations. In fact, Jack Nilles first identified the telecommuting work option and coined the term while using Southern California freeways.

But many planners and policy makers advocate telework today also because of its promise to deliver a number of social, economic and environmental benefits. Some of the benefits include:

For the employer:

- work team productivity
- flexible work options that attract the best to the best working conditions
- potential cost reductions in real estate and labor

For the individual:

- improved productivity
- quality of life-family benefits
- reduced travel expenses

For society:

- reduced congestion
- reduced energy consumption
- reduced air pollution

This is often referred to as a win-win-win situation for society, employer, and individual.

Ironically, attempts to demonstrate telecommuting programs have in fact realized many of these promises, especially for individuals and organizations. Yet, in Los Angeles 25 years after the publication of Nilles' manifesto (The Telecommunications-Transportation Tradeoff), and with over a decade of public investments and policies aimed at stimulating the telecommuting work option, telework has not reached significant levels of penetration. The threshold for realizing the societal promises, perhaps a labor force participation rate of 45%,

or about 75% of all information workers, is not within sight. Traffic congestion, air pollution and energy consumption in Los Angeles remain high. The region remains totally dependent on the private automobile -- 88% of the trips from home to work in Los Angeles County are by automobile.

Given this limited success, the question is what policies have been used in Los Angeles to stimulate telework and from what strategy were they inspired?

Stimulating Telework In Los Angeles

In order to answer that question, a slightly more refined concept of telework needs to be defined. Visualize telework in two domains. The first is that of medium to large sized organizations, public and private, with traditional officing practices consisting of a central location, sometimes with branches. These are candidates for the telecommuting work option.

The second is that of free lance workers, entrepreneurs, micro enterprises, small businesses and community based non-profit organizations where the workplace can include home, copy center, small office, storefront, warehouse or factory. Since the work practices of these candidates are defined as more flexible than those in large organizations, successful telework depends more heavily on the resources necessary to gain access to telematics devices and the skills to use them.

Medium to Large Organizations

The following combination of regulations and incentives have been used in the Los Angeles area for stimulating telecommuting among medium and large organizations.

- Air quality regulations were adopted that essentially required employers with over 100 employees to offer the telecommuting work option. These regulations drove employer participation in telecommuting programs during the early 1990's but environmental protection lost political support during the mid 90's economic recession. Such strong regulations have shown no sign of returning as part of the economic recovery that has occurred in the region over the past 2 years.
- Publicly funded telework centers were developed in trials lasting from 1 to 3 years at a cost of over \$10 million. Some were funded using air quality grants, some with mobility grants, and some used both. Most of the facilities have been closed due to persistent low occupancy as public sponsors were unwilling to continue their subsidy without better initial performance.
- An array of government sponsored manuals and support materials provided models and methods to employers interested in the telecommuting work option.

Demand-creating events such as the 1984 Olympic games and the 1994 earthquake have tended to result in short terms increases in telecommuting participation rates that return to normal levels once the event has passed. This has been equally true in San Francisco after its 1989 earthquake and Atlanta after its 1996 Olympics.

Micro Enterprises

There have been few if any policies or programs in the Los Angeles region that support the participation of small and very small organizations in telework. Yet, the following conditions need to be addressed:

- Many individuals and small organizations lack the resources to afford access to robust network technologies, and may even lack the expertise to identify their own needs in terms of telematics options.
- The lack of ubiquitous broadband infrastructure limits the growth of network applications for a variety of urban functions including telework.

Development of a handful of community technology centers in low income neighborhoods over the past several years such as Break Away Technologies and the Puente Learning Center can be considered a fragmented and tangential approach to stimulating telework.

Long Term Considerations

If there is a strategic vision driving these various telework tactics it is that while telework may be a good thing, decisions to adopt it are best left to individuals in their various management roles. According to this strategy, information about the virtues of telework is the best stimulant for those individual decisions.

The aborted short run involvement developing telework centers was led by air quality or mobility policy committees that:

1. Poorly understood the telework phenomenon.
2. Conducted no analysis regarding the appropriate number or location of such facilities.
3. Failed to establish a regional marketing function to support them.

In other words, policy makers botched the tactics, blamed telework for the failure and retreated to the information strategy targeting individuals.

These programs failed to directly attack the single most important impediment to a strategy for stimulating telework -- private automobile use in American society is government

subsidized. The United States is an Auto-Nation and Los Angeles is its quintessential AutoCity.

This makes it all the more prudent to take seriously the predictions of dire consequences for the United States and for global society from continued automobile dependence. Beyond mere urban congestion problems, these include ozone layer erosion, potential military conflict to maintain oil supplies, and instability in urbanized regions if oil supplies are disrupted.

In addition, the world of work is characterized by a growing income disparity between the rich and poor that has been growing annually since 1980. One result has been a frustrated, excluded, increasingly violent under class. At the same time, productivity demands of global competition require flat, flexible, responsive organizations – exactly the structure that would be consistent with telework.

The current global economic instability simply exacerbates these conditions and makes a telework transition that much more difficult to achieve. Therefore, it is safe to conclude that despite the progress of the 1990s, much more needs to be done quickly. Where then should telework advocates turn next?

TeleCity Los Angeles

My hypothesis is that only a comprehensive metropolitan strategy that incorporates telematics will effectively stimulate telework to levels needed for environmental and economic significance. Such a strategy will address land use regulation, public transit systems, new public investment in transportation systems and highways, private transportation options, universal service in a competitive marketplace for broadband services, and the structure of public and private sector organizations. The strategy will coordinate policies in these diverse areas so that they are at least partially self-reinforcing. It will address telework only implicitly.

I have defined an approach that uses telematics technologies to provide the technological infrastructure and the social processes for restructuring cities and regions. The urban model is referred to as a TeleCity. The TeleCity Implementation Strategy is a scalable, transferable comprehensive metropolitan strategy. It spatially reorganizes urban functions into compact centers that facilitate simple trip making and ensures even economic development throughout the region.

TeleCity results from the retrofit of AutoCity in order to provide a gateway to CyberCity.

- In Autocity the urban functionality is located in bricks and mortar at a particular place;
- In CyberCity, urban functionality occurs as bits (as in Mitchell's City of Bits) located inside a ubiquitous electronic space; and

- In TeleCity, urban functionality is by bricks and bits with the bits located wherever specific bricks and mortar has been dedicated to providing physical access to electronic spaces.

A TeleCity is an urbanized metropolitan area in which the existing built environment has been organized into a system of full functioning village centers each with several satellite neighborhood centers. Every village center and neighborhood center contains public, non-profit facilities that permit public access to broadband networks for all members of the community. These facilities are referred to as public network access centers, or NACs. The village centers are referred to as TeleVillage Centers.

Each NAC will provide communication services at non-commercial rates to the general public. The staff will also become brokers and attract the urban functions and services that reflect the needs and interests of the community immediately surrounding the NAC.

The NACs and the network services available through them represent a system of *public transit for the information highway*. That is, this constitutes a policy of universal service to broadband communications in a competitive marketplace.

Land use practices and transportation systems should reinforce the centrality of the designated TeleVillages. The addition of network access centers can transform single purpose commercial centers into multiple function centers and commercial functions can be added quickly and affordably to residential districts.

TeleVillage Centers should be created initially at public transit intersections. The new proximate spatial relationships should eventually become the basis for innovations in short range, flexible public transit and private transportation options. TeleCity creates opportunities for mobility based on walking as well as a market for short range electric vehicles, bicycles and other forms of people powered vehicles.

The structures of private enterprises and public institutions should be encouraged to migrate toward a distributed or network form of organization. This will involve new business practices consisting of network applications that include teleconferencing, teleservices and telework.

In contrast, a telecommuting pilot project effectively does very little to affect the scale of change that is necessary for a transition to a network organization. The transition to a network organization will be characterized by changes in corporate real estate management, personnel hiring and training practices, information technology deployment, automobile fleet management, employee parking policy, and so forth.

AutoCity is marked by uneven spatial economic development with concentrations of capital and investment backwaters. TeleCity counters this tendency by developing public network

access facilities in every village and neighborhood, regardless of income. This provides fundamental access to the means of production in an information economy to low income populations, and provides communication opportunities and institutional services to supplement privately owned technology in high income areas.

In some cases, the public network access centers will stimulate the adjacent real estate market. New businesses will be attracted and new construction may result.

In summary, this is a multi-faceted strategy that integrates consistent policies in the structural elements of urban design – the places (building and land uses), the people (organizations big and small), and the linkages between them -- the transportation and telematics systems. For additional information, see “Building TeleCity: Lessons from the Blue Line TeleVillage,” in Proceedings of the Third European Digital Cities Conference, forthcoming and the “Final Report of the Blue Line TeleVillage Demonstration Project,” Los Angeles County Metropolitan Transportation Authority, September 1, 1997.

Stimulating Telework: Results Of The Blue Line TeleVillage Demonstration Project

The Blue Line TeleVillage Demonstration Project was not associated with a full scale deployment of the TeleCity Strategy. However, the project developed the prototype NAC and a modest set of programs to stimulate telework. The facility was located at the Compton Station on the Metro Blue Line surface rail system that connects downtown Los Angeles to downtown Long Beach. Its primary goal was to improve mobility for the community.

Being a relatively poor city, the community’s objectives involved jobs and job skills. Economic development was a secondary objective and this determined the priority applications that were developed for the infrastructure of the network access center.

The BLTV infrastructure included:

- Computer center with 12 computers and ISDN internet access.
- Video conference center with a dual monitor, group scale system for interactive video conferences.
- Telework Center with 2 semi-private work stations equipped with computers, printer, telephone and internet access. The Telework Center was located in the City of Compton’s existing Business Assistance Center which also provided a meeting room and small business library. The library was equipped with desk-top video conferencing using a single ISDN line.
- Kiosks including 2 automated teller machines (ATMs), AIDs information, public housing services, and information about a variety of transportation services.
- Community meeting room with 300 person capacity.

- Circuit rider workstation, established so that representative of various government agencies could appear in-person to meet with constituents in order to provide information or deliver services.

The project deployed 3 approaches to stimulating telework:

- Programs to support telework by micro enterprises in the short run.
- Teleservice trials with established businesses and public institutions in support of long run transition to a network organizational structure.
- Telework facilities to address demand for facilities-based telecommuting from public institutions.

Telework for Micro Enterprises

The first program focused on the domain of the micro enterprise ranging from individual entrepreneurs to small businesses. Programs that used the entire infrastructure of the network access center were designed for serve different categories of micro enterprise. These included:

- Start-up businesses
- Unemployed persons seeking jobs
- Existing home based businesses
- Established small businesses
- Community based non-profit corporations

The BLTV's infrastructure capitalized the entire community by providing basic, low cost access to facilities that included technology, space, furniture and support staff. The programs added value to the infrastructure. The following core programs were designed for the BLTV:

1. Video-conference meetings with business mentors and counselors associated with state funded resource centers such as the Small Business Development Centers. The meetings included a basic start-up business orientation seminar; other seminars such as financing small business, marketing, and international trade; and one-on-one meetings over desktop video with mentors and counselors
2. Distance education classes in basic business skills offered from colleges and universities such as California State University at Dominguez Hills. The possible classes included accounting, advertising, management, and many others.
3. Computer skills training from basic to advanced offered in-person by BLTV staff, contract trainers, or community members. For example, in one case a member of the Latino Chamber of Commerce used the facility to teach a basic introduction to computers

in Spanish to students from his own organization. Courses included the full range of software options from word processing and spreadsheets to the internet.

4. Telework stations that provided fully equipped offices in a professional environment separate from the computer center. Each telework station provided voice mail, and computer and internet access in semi-private offices.
5. E-mail addresses for all members allowing them to send and receive business correspondence.

In addition to that core, the following programs were offered to unemployed persons seeking jobs and/or new job skills:

1. Assistance conducting on-line job searches with data bases such as the Los Angeles Times, and the United States Office of Personnel Management.
2. Special distance education classes from established colleges and universities including English composition, basic mathematics, accounting, resume preparation and so forth.
3. In-person seminars in the community room presenting specific topics of interest to unemployed persons, such as seminars about careers in banking or in telecommunications, and an educational opportunities day.

In addition to the core, the following programs were offered to established businesses.

1. Computer training facility which could accommodate up to 24 employees at the same time.
2. Video-conferences with business mentors on topics including assessment of existing business plans, advertising and compliance with government regulations.
3. Distance education programs for employees could be imported through contract relationships with local colleges and universities. Courses available included accounting, remedial mathematics, and English as a second language.
4. Video conferencing services were offered for communications with suppliers, customers, business partners or political representatives in Sacramento or Washington DC.
5. Application assistance was offered for a business loan program brokered by the Business Assistance Center for City of Compton businesses.

6. In-person seminars in the community room including specific topics of interest to small businesses, such as seminars by the IRS on tax issues, or various government minority business certification programs.

The next phase of this program was planned to move the BLTV into actual labor and business matching and brokering. For example, in the second year individuals were going to be trained as book keepers in exchange for providing affordable business services to local businesses, particularly Latino businesses for whom the language problem and the tendency to conduct business in cash kept them from obtaining government small business loans. A revolving referral list of individuals who completed the advanced class for any particular software program and who were interested in working free lance was also planned.

Overall, in its first year of operation the BLTV attracted 620 paying members, there were over 6,000 visits, 22 video conferences, 171 computer classes, 2,020 individuals trained, 10 urban functions introduced, 8 users of telework stations, 32 participating organizations and over 112 more organizations in some state of transition to participation.

Teleservice Trials with Established Business and Institutions as a Development Path to a Network Strategy

The second approach to stimulating telework was a long run strategy for providing experience with network applications to established businesses and public institutions as a basis for formulating their own network strategy. This effort emphasized teleservices via interactive video conferencing but also included in-person training for access to particular web pages such as that of the U.S. Office of Personnel Management.

The objective was to encourage organizations to move some of their functionality from a bricks and mortar location to a telematics network. The assumption is that as organizations move to higher rungs on the Ladder of Participation, each will be more likely to adopt telework practices in the long run.

The results of the Ladder of Participation for the first year of operation are as follows:

1. Attempt to contact (no response)	62%	
2. Initial contact (phone call or meeting or letter)	10%	
3. Additional contact – usually in-person visit	5%	
4. Identify possible applications	7%	
5. Initiate planning for applications	3%	
6. Complete planning for applications		1%
7. Conduct a trial for an application	7%	
8. Implement additional applications or trials	2%	
9. Develop routine use	2%	

10. Adopt or connect to a telematics strategy 0%

The Ladder of Participation can also be expressed in the following manner:

Responded – 38%

No further than returning call - 72%

Stopped short of identifying applications - 77%

Able to at least identify an application - 23%

Of those who could identify an application, those who implemented - $32/67 = 48\%$

Known cases where inability to find right person or turnover was main problem - 6

12 known cases where technology was the main problem

Those who responded but lacked technology - $12 \text{ of } 52 = 23\%$

Those who could identify an application but lacked technology - $8 \text{ of } 30 = 27\%$

The key threshold on the Participation Ladder was the ability of an organization to identify a possible network application. Of those organizations able to identify an application, almost half implemented it. Overall, the Participation Ladder suggest how far away organizations in Los Angeles are from a decentralized network structure.

Telework Facilities For Telecommuters

The third approach to stimulating telework at the BLTV was the facilities-based telecommuting option for large employers in the County. This effort produced zero telecommuters during the 12 month demonstration period.

Interestingly, the main barrier to participation was not management resistance. The County of Los Angeles had more employees telecommuting than any other public agency in the nation. The County was expected to anchor the telecommuting aspect of the telework program but administrative conflicts between the City of Compton and the County of Los Angeles kept County employees from participating.

Conclusions

The results of the BLTV provide initial support for the hypothesis that a comprehensive metropolitan telematics strategy can successfully stimulate telework in the short run for micro enterprises and in the longer run for larger organizations. That there were ten organizations contacted for every one that actually participated in an application at the BLTV exposes the myth of the “information superhighway” as a ready marketplace for everyone. In other words, 90% of the organizations contacted for this project were unwilling to experiment with network applications within the 12 month demonstration period.

Indeed, one of the problems of the internet from the perspective of the TeleCity Strategy is the absence of urban functionality. In other words, most web pages provide advertising, vanity publications, or information that would otherwise be available in print form. Retail transactions and transactional government services such as renewing a driver's license or obtaining a birth certificate are only beginning to appear.

Significant levels of telework among micro enterprises will require 1) more affordable access to broadband telematics, and 2) technical assistance in developing and implementing applications. Significant levels of telecommuting will require each organization to develop a network strategy that involves -- and may begin with -- teleconferencing and teleservices.

The initial results are promising enough to support a demonstration of the TeleCity Strategy comprehensively on a regional scale for a three to five year period. The candidate regions need to be willing to make a political commitment to a strategy for reducing reliance on the automobile.

Stimulating Telework for the Millenium

Experience Implementing The TeleCity Strategy in Los Angeles

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