

**Building TeleCity
Lessons From The Blue Line TeleVillage**

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Presented At

**Third European Digital Cities Conference
The Road To Deployment**

**Berlin, Germany
December 1-2, 1997**

Introduction

The automobile city (AutoCity) is about 100 years old. In this relatively short period of time, cities with modern economies have become dependent on the private automobile. The early walking and industrial cities were retrofitted to accommodate the automobile. New cities and suburban extensions of old cities were built for the automobile. According to architect Moshe Safdie, "As cars shaped the city, so the city itself is now shaped to require cars." (Safdie, P.127)

Given the incalculable investment made so far to retrofit and build new AutoCities, and the high level of service that the private automobile can produce, it is rational to hope that this solution to urban mobility is sustainable. However, the accumulation of practice around the world suggests that auto-mobility is not sustainable, and has actually degraded other aspects of urban life.

There is a growing consensus in the United States and in other nations with modern economies that the private automobile has become too much of a good thing. Citizens face time-wasting traffic congestion and high prices for personal transportation. Society absorbs poor air quality and high costs of infrastructure construction and maintenance. Civilization faces global warming, fossil fuel depletion and threats of petroleum wars. The situation must change for metropolitan scale organization to be sustainable in the long run and more livable in the short run.

The question is, what comes next? What is the vision of a possible replacement for AutoCity? Will it be affordable? Can we get there from here?

Candidates for the next urban strategy have been proposed and more will be formulated until a new paradigm becomes widely accepted. Proposals include Anthony Downs' New Visions for Metropolitan America, Moshe Safdie's The City After the Automobile, and Peter Calthorpe's The Next American Metropolis. Calthorpe's work has been highly influential in that it has helped define an entire architectural and urban design movement known as *The New Urbanism*. The principles associated with *The New Urbanism* have great promise to improve cities and the strategy proposed in this paper is consistent with those principles.

Interestingly, the new urban strategies do not define a role for information technology. Yet it is these technologies that have experienced the greatest improvements in price-performance ratio in history. While automobiles, highways, and even subways keep getting more expensive to build and maintain, information technologies keep getting less expensive – much less expensive. Furthermore, recent practice has shown that information technologies can substitute for labor and real estate in large organizations, and can empower very small and start-up businesses. These are the very conditions that seem to be required for success in the new global economy.

Ironically, when information technology is discussed in relation to urban design, the focus is on the electronic space currently being "urbanized" by private capital. That is, the concern is for design of

CyberCity, the “urban” organization inside the wire and the collective hard drive. See for example, Howard Rheingold’s Virtual Community, “ and William Mitchell’s City of Bits.

What’s missing is the design for the physical metropolis into which AutoCity must morph in order to become sustainable and provide universal access to CyberCity. In other words, AutoCity can be retrofit with new policies, infrastructure, organizations and practices to make it more human and environment friendly, more cost-effective to operate, and more of a gateway to CyberCity. *TeleCity* is the name I have given to that place.

TeleCity Vision

TeleCity will incorporate the capabilities of information technologies in order to support a high amenity life style that is economically and environmentally sustainable. In the short run, it will physically look a lot like AutoCity because TeleCity will rely on re-use of what exists more than on new construction, except in cases where new towns are being developed. However, the spatial relationships will be made more proximate as many urban functions will be electronically re-located to centers adjacent to residential areas.

In the long run, TeleCity will acquire its own distinctive appearance. Residential and commercial facilities will tend to geographically balance as housing is increasingly built adjacent to existing commercial centers, and a village pattern emerges from the landscape of suburban sprawl.

The following statements characterize life in TeleCity:

- Trips outside of the home are much shorter, usually no more than a few miles.
- Economic opportunities are distributed more equally throughout the region, not concentrated in modern employment and retail centers.
- Village and neighborhood centers facilitate civic participation.
- Most communities include a mixture of moonlighters, free lance workers, self-employed, small businesses owners and employees, and corporate employees – many of whom telecommute.
- Many households choose to own only one automobile and some choose to own none.
- Public transit is different, more local, smart, less route specific, affordable -- and heavily used.
- The highest and best use of freeways is captured for the rapid movement of freight rather than the movement of information workers on their daily work commute.

- As a result of reduced freeway congestion and improved linkages between industrial organizations, the processing speed of the regional economy is very fast.
- Life is experienced at a slower pace as the time conflict between the pace of ground movement and the speed of electronic transactions has been reduced through less need for ground transportation
- Formerly single purpose centers including many shopping centers, civic centers, research parks, school campuses, and office centers are retrofit to become multi-purpose, with each incorporating some functions of the others, including residential in many cases.
- Groups of neighborhoods form a Village which has a center that functions as a point of entry to electronic markets and transactions, and offers rich opportunities for face-to-face interactions among Village members. Most households are within two miles of a Village Center.
- Each neighborhood is served by at least one Neighborhood Center which is a small version of a Village Center – and most households are within walking distance of a Neighborhood Center.
- Centers are actually used by the people that live in proximity to them.
- Village administration encourages self-sustaining neighborhoods in that they offer the resources that enable residents to “co-produce” many government services.
- Some parking lots have been converted to affordable housing or community gardens.
- Ground transportation in neighborhoods moves at a safe pace and the vehicles consist of a mix of human-powered- vehicles, electric carts, new public transit systems, traditional public transit systems, and private automobiles (ranging from state-of-the-art to obsolete).
- Pedestrian movement within villages, especially access to the Village Center, is facilitated by a system of trails with special signs and landscaping.
- Everyone has access (from on-demand to first-come, first-served) to the full range of information technologies at a location no further than either the Neighborhood Center or the Village Center.
- Some homes have state-of-the-art home offices, home entertainment complexes, health centers, and audio and video production units but most homes have a mix of technologies that range between old and new, simple and full featured, poor and powerful.

In the short run, TeleCity does not require new construction nor increases in residential density. The initial pace of transition is, therefore, not dependent on conditions in real estate markets.

There are no technical barriers since it uses off-the-shelf technology. Compared to AutoCity, TeleCity requires only comparatively modest capital investments in infrastructure so that it is an affordable strategy. Finally, the TeleCity model can be used to design new developments and, because residential density is not an issue (as it is for public transit for example), *cities that are fully built-out can be retrofit.*

Since government must play the lead in establishing the vision, and since technology, cost, market conditions and the existing built environment are not barriers, the choice to pursue TeleCity in order to produce sustainable livability within 10 years in many regions is, quite simply, a matter of political will.

TeleCity Strategy

The Strategy provides the means for how to get there from here. The concepts have been tested in several large scale demonstrations of network applications. Some of the policy options may appear infeasible because of the entrenched auto culture. However, the process of political change begins with awareness of alternatives. There are many steps that can be taken in the current environment while waiting for a new political consensus to build. The following is an overview of the TeleCity Strategy.

Bricks and Bits

The strategy depends on a simple insight: The urban form of AutoCity features functions that are widely separated spatially; travel occurs when people need to pursue another function (go to work, go to school, go to the doctor, shop); many functions can be separated from their traditional physical location in a building and re-located to a network; and the spatial re-organization of urban functions can be accomplished by creating multiple points of network access.

In other words, due in part to technological advances, there is a new opportunity to deploy and use network technologies to quickly and affordably re-locate a number of normal trip destinations to residential areas, rail stations and other major transit stops. This would bring economic opportunities, business services, educational opportunities, government services and retail shopping to within walking distance of residential concentrations and bus or rail transit – all without the need for extensive physical construction of new buildings although many existing structures will need remodeling or redesign.

Re-locating a function normally found at a particular geographic location to a network is exactly what happens in the following cases, all of which happen today.

- consumers satisfy some of their banking needs at an ATM,
- students take a distance education class at an off-campus location,
- citizens pay their traffic tickets at a government kiosk,
- employees work at a telework station near home,
- business people hold meetings over an audio bridge,
- work teams complete their collaborative assignments using e-mail, and
- consumers buy clothes over the internet.

While the only existing path to changing urban form is by bricks and mortar additions or amendments, this Strategy of *bricks and bits* adds a significant alternative. A *bricks and bits* approach can effect change more quickly at a fraction of the cost and, in the end, act as a catalyst to the longer run bricks and mortar developments.

Public and Private Roles

Leadership is the most important role in the early going and the role that government can most effectively play. In order to start the transition to TeleCity, government needs to establish the vision, adopt consistent policies and practices, and arrange funding for the non-commercial elements. Already running with scarce resources, government will not be asked to finance the transition out of its general fund.

In the short run, local and regional governments should take the lead in adopting a network strategy for themselves. This means initially conducting trials of teleconferencing, teleservices and telecommuting. Over time, these trials could evolve into a new distributed structure so that government will function more as an aggregator, resource provider, and enabler rather than as a service provider

Local and regional governments can also use the TeleCity vision to revise land use and transportation policies. Municipal transit providers, county transportation agencies and regional planning organizations need to be alert to changes in demand for the new types of public transit that will begin to emerge. The neighborhood real estate owned by public libraries and school districts will need to incorporate additional functions and accommodate adults as well as children.

Government will need to arrange financing for a non-commercial telecommunications system that will reach into neighborhoods and help define villages within the metropolitan pattern. The development of that system will require substantial participation by business and residential communities in the planning and design process.

Government should also establish a regional organization (analogous to a ride sharing agency) to foster trial network applications in the public and private sectors. Without such an agency, progress developing network applications with travel impacts has been slow. Applications that further mobility by shifting an urban function from a building to a network have not been happening on their own. For example, most web pages involve information, advertising or vanity publishing rather than transactions that can displace travel.

In the long run, state and federal governments must establish an *Information Technology Trust Fund* (ITTF) so that the non-commercial aspects of TeleCity can be permanently supported. The ITTF for each region can be fed by fees from the network marketplace (including a portion of the federal spectrum auction revenue), gasoline tax increment, land developer fees, sales tax increment (currently used to develop public rail transit) and other options.

AutoCity receives a substantial public subsidy through the provision and maintenance of a system of public roads and highways whose cost far exceeds revenue from user taxes such as from gasoline sales. A marginal public transit system trying vainly to serve the urban form built for automobility is another type of public expense that is integral to AutoCity.

Aside from this largely leadership role for government -- establishing a vision, adopting consistent policies and practices, and arranging funding for the non-commercial elements -- the transition from AutoCity to TeleCity will occur through private capital and market dynamics. Private capital will develop new consumer options, successful technology markets, new transportation markets, and responsive real estate markets. Just as in the retrofit of walking cities for the automobile, there is a great deal of money to be made in the retrofit of AutoCities for the network.

Five Strategic Elements

The following describes the TeleCity Strategy in terms of five ideal elements. It is unlikely that a real life development situation will allow such a comprehensive approach. Therefore, in practice, transitional AutoCities or fully functioning TeleCities may involve only a few of these elements.

Public Institutions and Private Businesses

According to the Strategy, change in the spatial organization of production and distribution is the engine of change toward TeleCity. This means that, initially, trials of new business practices such as teleconferencing, teleservices or telework should be developed in as many corporations as possible, and that these trials should be conducted in a way that allows them to eventually evolve into a corporate level network strategy.

The centralized bureaucracies and the large central business districts of post-war AutoCity were consistent with the private automobile and the mainframe computer. Today, these bureaucracies

can be dissolved because they are inefficient and ineffective and because a new, comparatively low cost infrastructure is available in the form of ubiquitous microprocessors, desk top computing, and high capacity networks. Changes in urban form and transportation technology can more easily follow from these changes in corporate practices.

In other words, the TeleCity transition depends on public and private corporations using the information superhighway to become more physically decentralized within the urbanized region. This means that eligible employees will frequently work at remote sites rather than the main office, more local meetings will occur as teleconferences, more services and transactions will be available over the network, and inter-enterprise networks will help improve product quality and increase the processing speed in production systems.

In some cases, especially government, a new organizational model may emerge. This model draws on the Toffler's idea of a *prosumer* – where the production activity is so distributed that consumers themselves can co-produce the good or service. An ATM where the consumer performs the data entry for a banking transaction is an example. A self-serve, on-line reservation system for municipal park facilities is another. It is possible to envision a time when the cost of many different services can be drastically reduced because the end-user or even a neighborhood organization has the equipment and skills to co-produce the product or service.

There is a considerable body of experience in the Southern California region with demonstration projects, planning methods, and implementation tactics that involve one or more aspects of corporate network innovations. The projects that I have designed and implemented to test some aspect of the TeleCity Strategy include the Teleconferencing Research and Demonstration Project, the Telework Facilities Exchange, and the Southeast Los Angeles County Teleconferencing Network. One lesson from these experiences suggests that most organizations lack the culture and the resources to change their business practices. Of those willing to try, external assistance can help by identifying opportunities, planning the application, and implementing the plan.

The Blue Line TeleVillage Demonstration Project tracked the actual participation by a wide array of organizations approached by the planning team. The findings suggested that the timing of the approach was crucial, and that the recruitment effort needed to be sustained. These findings are discussed further in the second half of this paper.

The implication of the BLTV findings and the previous demonstration projects is that a permanent regional agency dedicated to fostering network applications is the key to sustained corporate innovation of the type needed for the transition to TeleCity. This organization is discussed further as the fifth element of the Strategy.

Telecommunications

It is useful to distinguish between two broad categories of network function. Network *transmission* is represented by the telephone bill with charges for dial tone and for network usage related to time of day, length of call and distance of call. In the United States, subsidies for transmission have become associated with the policy of “Universal Service.”

The second category can be referred to as network *access*. Access means literally “the ability to enter.” Access technologies, such as telephone handsets, computers with modem, video conferencing units, and kiosks, are needed for a consumer to enter the network (i.e., consume network transmission services). These are usually capital expenses and are not addressed by the existing Universal Service policy based on the 1996 Telecommunications Act.

Access technologies determine or limit the nature of the application available to the consumer. For example, a computer and a telephone handset define different types of network use. More people make telephone calls than use the internet because more people own phones (93% of families) than modem equipped computers (about 15% of families). In contrast, transmission, particularly in a digital world, is relatively indifferent to the application since, during transmission, “bits are bits.” Therefore, the distribution of access technologies strongly influences who participates in what roles in CyberCity – and in today’s AutoCity as well.

Network access technologies can be organized into large families of equipment, furniture and space which are intertwined in the consumer’s application. The families of access technology include home/office-small office (SOHO) system, entertainment system, audio production studio, video production studio, medical center, education/training center, and meeting center. State-of-the-art can cost over \$100,000 for some families of access technologies. Disparities in transmission usage between groups and between neighborhoods will most likely be based on disparities in ownership of access technologies.

Therefore, the prominent telecommunications feature of TeleCity will be its system for providing broadband network access and transmission as a safety net beneath the competitive marketplace, and as a stimulus to that marketplace. The basic unit of the system will be the *Network Access Center* (NAC). Each one will be designed to reflect the needs and interests of the local community. The NAC will aggregate traffic on high-end network access equipment.

The system will include NACs at the village scale (a service area of approximately two mile radius with up to 200,000 residential population) and at the neighborhood scale (a service area of ¼ mile radius with no more than 15,000 people).

Each of the Village and Neighborhood NACs will include commercial facilities with market rates for on-demand, value-added services; government facilities that can be reserved only by government personnel for communications among government agencies and between government agencies and constituents; and non-commercial facilities that offer the same high-end services as the commercial

vendor but at a reduced rate and first-come, first-served availability. The difference between a commercial and non-commercial facility is analogous to the difference between a private country club and a public golf course.

A broadband regional backbone transmission network will be developed to serve the same market segments – commercial, non-commercial and government. The backbone network, financed jointly by public and private sectors, will reach to the neighborhood level where the government and non-commercial services will terminate. The “final mile” connections to individual homes and offices will remain the domain of private network vendors. The backbone network will connect the Village NACs and the six to eight Neighborhood NACs that will be developed in the service area of each Village Center.

The non-commercial network transmission and access facilities together will constitute what could be called the *public transit system on the information superhighway*. This simply and affordably would provide universal access to broadband networks. The Universal Service provision of the 1996 Telecommunications Act limits transmission benefits to public schools and libraries and completely fails to address cost of access.

Real Estate and Urban Form

Currently, most urban regions contain contiguous tracts of single function, relatively homogeneous structures – shopping malls, office parks, research parks, civic centers, school campuses and housing tracts. This separation of land uses ensures that the distance between any origin and destination will require automobile usage.

There will be few such single function centers in TeleCity. The Strategy calls for adding a Network Access Center to each existing single function center in order to import the urban functions missing from each. For example, a NAC at a shopping mall can be equipped and operated to provide government services such as veteran’s benefits counseling, business license applications, and traffic fine payments; health care services such as prenatal counseling and certain types of screening and diagnosis; and non-profit services such as job counseling and job searching. The actual equipment and applications will be determined by the needs and interests of the community in the service area.

The local government can designate those centers that are well served by public transit as *TeleVillage Centers*. They will become places that offer the comprehensive functions of traditional town centers. TeleVillage Centers should be defined so that every neighborhood is served by one within a couple of miles. The Metropolitan Network should be constructed along a route that passes every TeleVillage Center. TeleVillage Centers should be located at rail transit stations whenever possible.

Designation as a TeleVillage Center means that the area has been defined by the local government as a growth center. New “bricks and mortar” construction should be attracted to the TeleVillage Centers so that building-based complementary and supplementary civic, commercial, non-commercial, and housing functions can be added. In this way, private capital will direct the long range development of TeleVillage Centers.

Single function buildings located at the neighborhood level such as libraries and elementary schools can be retrofit with a NAC so that they can offer some of the more popular functions available at the TeleVillage Center. They will be designated as Neighborhood Communication Centers and will perform as satellites of the TeleVillage Center.

The old central business district will remain important because it will be the most effective place for physical contact –work teams meeting face-to-face, goods available for handling, and cultural functions such as fine art and performance that are best consumed in person. Special landscaping will complement additional housing. The Network Access Centers in the renamed Central TeleDistrict (CTD) will offer more and newer network access devices, and a wider range of urban functions than found in the TeleVillage Centers.

These network and urban form relationships are depicted in the 4 figures included below. The initial phase of the Metropolitan Network begins in the rights of way of the rail transit system. Major bus transit intersections can substitute for the station stop in places without rail service.

Basic Backbone Network and TeleVillages shows a generic rail network and stations, with a TeleVillage developed at each station and the fiber backbone network developed in the rail systems rights-of-way. In this Figure, each TeleVillage is shown with a 2 mile radius around its center.

Metro Net Components illustrates the three markets that can be served by the fiber backbone network which corresponds to the three types of facilities in the NAC.

Extended Backbone Network and TeleVillages shows that the fiber backbone would be developed to serve locations that are not served by rail transit. For example, in Los Angeles County, only 22 of the County’s 88 cities are planned for rail service before 2020. The Figure shows the network serving a civic center and a shopping center where, in each case, a TeleVillage Center would be developed.

Extended Network, TeleVillages and Neighborhood Centers shows the fiber backbone network extended from the civic center TeleVillage into neighborhood facilities where a school or public library could host the NCC. The concept of the Metropolitan Network does not extend broadband network service to the private home or business which are left as the domain of the private market.

Transportation

As the system of NACs and the Metropolitan Network are developed and TeleVillage Centers and Neighborhood Communication Centers begin to appear, travel demand should shift toward specific patterns such as home to Neighborhood Communication Center (NCC), home to TeleVillage Center (TVC), NCC to TVC, TVC to TVC, and TVC to Central TeleDistrict (CTD). In other words, the transportation strategy is to quickly and affordably create a functional hierarchy of central places that is much easier than a dispersed region to serve with public transit.

The Strategy should create a new market for local transportation which will revitalize public transit service and stimulate new private market segments. A mix of public transportation services and small, non-polluting, short range, private vehicles will develop to satisfy the many short, intra-village trips that will grow to replace the longer intra-region trips. Pedestrians, bicycles and other people-powered-vehicles, electric golf carts, station cars, short hop buses, smart shuttles, and rail transit will collectively account for a significant percentage of travel, and the private automobile will account for a smaller percentage. After all, even the most ardent car advocate would agree that a one ton, 300 horsepower vehicle is an inappropriate technology for a 1 mile trip in a 25 MPH speed zone.

New Institutions

AutoCity has spawned its share of collateral institutions that help realize the vision of an auto-based utopia. These include government departments of transportation, public transit authorities, the Automobile Club, and Commuter Computer (the former ride sharing agency in Southern California). Similarly, TeleCity will need its own institutions. The following are some examples.

A regional institution is needed to encourage telecommuting, broker distance education, foster teleconferencing, and generally support network applications planning and implementation. This institution will facilitate the transition from centralized to distributed organizations that is at the heart of the transition from AutoCity to TeleCity.

A new organization will be needed to manage the Metropolitan Network. A joint powers authority involving member government agencies is one option.

The Network Access Centers will need public governance. Owner and management models are available from the extensive experience with cable television public access centers.

Assuming that the Information Technology Trust Fund will be established in the long run, a regional organization will be needed to administer the distribution of these funds. One option is to define a formula that automatically distributes the funds to the regional applications support organization, the Metropolitan Network joint powers authority, and the system of Network Access Centers.

Clearly there are different options for institutionalizing these functions, and other functions that have yet to be identified. One of the most essential characteristics is that the new institutions are based on democratic representation.

A prototype Network Access Center was developed to determine the implementation issues of some elements of the TeleCity Strategy. This paper concludes with a description of the Blue Line TeleVillage Demonstration Project.

Blue Line TeleVillage Demonstration Project

Overview

Los Angeles County has a population of 9 million people. The single occupant automobile is the dominant form of transportation where it accounts for 9 out of 10 trips. Only 3.4% of trips utilize public transit. Continued construction of an underground rail system is imperiled due to its cost which exceeds \$300 million per mile. Traffic congestion and air quality are among the worst of any city in the USA.

Although the Southern California regional economy is by itself larger than all but 10 nations in the world, there are large pockets of persistent poverty. Living density is relatively low due to the dominance of the single family detached housing unit. Low density and a relatively high level of random violence have reduced the sense of community and the vibrancy of public places.

Following the 1992 civil disturbance, as part of its search for affordable solutions to regional mobility, the Los Angeles County Metropolitan Transportation Authority (MTA) funded development and implementation of the prototype Urban Televillage adjacent to its Metro Blue Line surface rail system that runs for 22 miles between the central business districts of Los Angeles and Long Beach. The site of the demonstration project was the City of Compton, a mixed racial low density suburban community with an average household income about 65% of the County average. Over 130,000 people live within two miles of the site.

The prototype, known as the Blue Line TeleVillage, cost \$654,000 and required 30 months to plan, develop and operate (for 12 months). The demonstration year was completed March 1, 1997, and the facility remains in operation. The Project was managed by the Drew Economic Development Corporation (a community based non-profit corporation) and designed and developed by Siembab Planning Associates. ISDN network services were provided by Pacific Bell as part of its Education First Program.

The *TeleCity Strategy* defines a practical method to spatially re-organize urban functions in order to meet four objectives related to livable, sustainable cities. These same objectives guided the Blue Line TeleVillage Demonstration Project.

- Enhance mobility while reducing dependence on the automobile,
- Foster local economic development,
- Provide universal access to broadband telecommunications services, and
- Reinforce face-to-face community and public spaces

The Blue Line TeleVillage Demonstration Project used off-the-shelf telecommunications and computer technologies to replicate the functions of a traditional village center. A combination of telecommunications and public transit (bus and rail) were used to initiate improvements in mobility and economic opportunities.

The Blue Line TeleVillage includes a Telework Center, Computer Center, Videoconference Center, kiosks, and a large meeting room. It provides low cost access to a range of services, information and transactions. They include distance education classes, library story telling for children, computer classes, internet access, business mentoring, voice mail, telework stations, public access computers, bank ATM service, and more.

The operations year of March, 1996 through February, 1997 provided a good start – there with 620 members, over 6,000 visits, 22 video conferences, 171 computer classes, 2,020 individuals trained, 10 urban functions, 8 teleworkers, 32 participating organizations, and over 80 more organizations in some state of transition to participation.

BLTV Demonstration Project Description

The Blue Line TeleVillage Center is located adjacent to the Metro Blue Line (a 22 mile light rail system that connects the central business districts of Los Angeles and Long Beach) at the Transit Center in the City of Compton. The Los Angeles County Metropolitan Transportation Authority (MTA) funded TeleVillage planning, development, and a 12 month operational period. The facility deploys a range of off-the-shelf information technologies and provides access to broadband network services. Funding from the MTA required that mobility objectives would be the priority.

The initial design for the BLTV was based on my original policy work for the predecessor to the Los Angeles County Metropolitan Transportation Authority, the Los Angeles County Transportation Commission (see “METRO NET, Fiber Optics and Metro Rail: Strategies for Development,” December, 1992). The design included both a Network Access Center (NAC) and a proprietary government fiber network.

The MTA became interested in the project because of two conditions. First, de-regulation of the telecommunications industry had stimulated interest by competitive local exchange carriers (CLECs) in developing their own networks. This created joint development potential for the MTA through which private capital could be used to construct a network with capacity for both the CLEC and the MTA.

Second, the civil disturbance in 1992 resulted in interest throughout the region to “rebuild LA.” At that time, the only operating rail line with a functional fiber system was the Metro Blue Line that connects the Long Beach and Los Angeles central business districts. The Blue Line runs through the heart of a low income community that was the target of many of the rebuild efforts. Therefore, the project was proposed to be located somewhere in south central Los Angeles, adjacent to the Metro Blue Line.

A community based organization (CBO) from the south central area, Drew Economic Development Corporation, was selected via competitive bid as the prime contractor due to its record of service and its relationship with other organizations serving the area. Siembab Planning Associates provided the design and development expertise under a sub-contract with Drew EDC. Community Resources was the second sub-contractor and provided community organizing expertise. Collectively, these consultants were referred to as the “Drew Team.”

Community participation in project planning was obviously important to success. The Drew Team created a 25 member Advisory Board to represent the needs and interests of the community and help make design choices.

The Martin Luther King, Jr. Transit Center adjacent to the Metro Compton Station in the City of Compton was selected as the best site for the project among the 4 that were considered. The most significant site selection factors included proximity to the Metro Station, available space, building quality, cost of space, and proximity to other activity centers.

The service area for the project was defined as the area within a 2 mile radius of the BLTV Center. This included most of the City of Compton as well as small areas of unincorporated Los Angeles County.

Service Area Characteristics

- Just under 10,000 people live within .5 mile of the project – the outer limit of walking distance. There are 41,600 people that live within 1 mile and 133,700 within 2 miles of the project.
- The market area is in a transition from African American to Hispanic origin with the current population at about 50% each.

- The market area is slightly younger than the County-wide population.
- Home ownership is below the County average near the BLTV Center and the rate increases to exceed the County average as distance from the BLTV increases.
- Housing throughout the service area is less dense than in the County average with density decreasing with distance from the BLTV Center.
- The household income in the market area was 61% to 65% of the average household income in the County.
- Over half the population over the age of 25 lacked a high school diploma compared to 30% of the County-wide population.
- About twice as many people over age 16 in the market area were unemployed compared to the County-wide rate.
- The market area contains a much higher percentage of blue collar workers (62.6% to 66.8%) than the County (40.1%).
- A significant number of workers lack access to a private vehicle and this accounts for a comparatively higher rate of car pooling. Because of the greater tendency to use automobiles, use of public transit is slightly lower than the County average.
- In general, conditions are better and residents are more affluent as distance increases up to two miles from the site.
- There is also a significant number of businesses in the service area. Local businesses can also use many of the TeleVillage services.

Network Access Center: Facilities and Functions

Memberships were sold for a nominal fee of \$10 per year. This allowed the Drew Team to acquire information on the members and encouraged user commitment. In all, there were 620 members and over 6,000 recorded visits by members and non-members.

The six elements of the Blue Line TeleVillage (NAC) and their applications are briefly described next.

Video Conference Center

This room could accommodate 16 people seated in either a classroom or a meeting configuration, or 30 standing. The equipment was a CLI Radiance system with dual 32" monitors. Video conferences could utilize up to six ISDN lines, but three or less were used most often.

There were in all, twenty-four 2-way, interactive video conferences during the demonstration period. Applications included:

- A distance education class provided by California State University at Dominguez Hills for the senior management team from the City of Compton;
- Library services in the form of story telling for children and book tour lectures for adults originating in the Pasadena Public Library. The day care center in the King Transit Center provided the children for the story telling.
- Staff training for professionals at the Compton Library
- Telecollaboration or collaborative problem solving over interactive video. There were two examples; one convened by the Pacific Bell Education First Program that linked 4 remote sites to discuss tactics for improving the use of interactive video; a second involving high school students in Compton and Manual Arts High School in central Los Angeles in which Compton students developed a video tape for Manual to use to promote a housing fair.
- Small business development seminars originating elsewhere in the County and received in Compton.
- Meeting between community members and an executive of the U.S. Federal Transit Administration as an example of a range of possible meetings between constituents and elected officials.
- Meeting between community members and video artists located in Santa Monica, and in Leimert Park, locations on the west side of Los Angeles.

Kiosks

Five kiosks were placed in the main hall of the King Transit Center. These included the Caltrans Smart Traveler kiosk which provided access to basic information about the region's public transit and highway system; an automatic teller machine (ATM) from Wells Fargo Bank; a second ATM from Bank of America, the kiosk of the Housing Authority of the City of Los Angeles which allowed access by the general public to job and consulting opportunities with the Authority and to information about the mission of the Authority; the AIDS Information kiosk provided by the County Museum of Science and Industry which offered a self-guided tour of the facts about AIDS.

Computer Center

The Center was equipped with 12 IBM pentium-90 computers, a local area network with a Compaq ProLia server running under Windows NT, and a Hewlett-Packard laser printer. The LAN was connected to the internet via 4 ISDN lines. The internet provider was Break Away Technologies, located in the Crenshaw district of south central Los Angeles. The initial software on the server included Windows 95 and the Microsoft Office Suite.

Applications included:

- Public access computing -- times when any member of the public could use a computer to pursue personal or business goals.
- Courses for adults and children ranging from basic computer literacy to training in the Microsoft Office Suite. These classes served the general public as well as community organizations such as the Watts-Willowbrook Boys and Girls Club and Los Angeles County drug rehabilitation programs.
- Internet access, especially employment and job training opportunities for adults and exploration experiences for children. The Blue Line TeleVillage registered its own domain. TeleVillage members received their own e-mail address and could create a home page.
- Staff training site for local organizations such as the City of Compton and the Drew-King Medical University.

Telework Center

The Telework Center was physically hosted by the Compton Business Assistance Center of the City of Compton but administratively controlled by the BLTV operations staff. It consisted of two work stations, each equipped with computer, laser printer, telephone, voice mail, and modem. There was, in addition, an Intel ProShare computer for desk top video conferencing which was supported by 1 ISDN line.

Applications included:

- Professional work space for telecommuters -- residents of the greater Compton area employed in businesses located elsewhere.
- Professional work and meeting space for teleworkers -- residents of the greater Compton area who are self-employed and/or a home-based business who need occasional access to a

professional work station. The objective was to encourage start-up businesses and the growth of very small businesses.

- A mentoring program for entrepreneurs offered by professionals associated with a remote Small Business Development Center was set for implementation but canceled due to technical problems at the far end.

Community Meeting Room

The BLTV co-hosted a number of large meetings with influential organizations in the area. These included meetings of the Compton Chamber of Commerce, the Regional Business Assistance Network and the Inner City Computer Society. In addition, the BLTV held a “Women’s Day” for highlighting women’s access to technology and for providing an introduction to skills for success from cosmetics to computers.

Circuit Rider Work Station

One work station in the administrative area of the Blue Line TeleVillage was planned for use by “circuit riders” -- employees of a variety of government agencies who appear at the Blue Line TeleVillage on a regular schedule to provide information or directly deliver services. The US Office of Personnel Management and the MTA each participated in this element of the BLTV.

Progress Building TeleCity

Objectives

Four objectives related to sustainable, livable communities were identified for the TeleCity Strategy and, therefore, for the Blue Line TeleVillage. The following describes the progress toward their satisfaction:

Mobility

The BLTV Final Report discusses in some detail the concept that links a system of TeleVillage Centers to regional mobility. As discussed briefly in this paper, the key is to change the urban form, the structural cause of automobile dependence, by spatially reorganizing urban functions. The following summarizes the progress of the Demonstration Project toward this objective.

- Nine additional urban functions were demonstrated at the transit center and one existing function was significantly expanded over its previous level.

- Membership was concentrated in the three adjacent zip codes, creating the physical proximity that characterizes livable communities, and facilitates transportation mode shifts away from automobiles.
- Data available suggest that the mode profile among members traveling to the BLTV reflected high rates of walking and public transit, especially rail, that is consistent with livable communities. Automobile usage was comparatively light.

Economic Development

The links between the TeleCity Strategy and economic development can be described in terms of the individual, the organization, and the region. A forthcoming paper will discuss these links. The following summarizes the progress of the Demonstration Project toward this objective.

- Almost 2,000 people received training in computer skills.
- Expansion of business opportunities was the community's top priority, and almost 22% of the applications implemented came from the Business Support Cluster.
- The Small Business Development Centers were among the most effective users of the BLTV.
- Linkage of the local material economy to the cyber economy was demonstrated.

Access to Technology

- There were over 6,000 visits to the BLTV, almost all of them to use technology in some form. The kiosks were extensively used.
- Network transmission services and technologies to access the network were available at far below market rates.
- Virtually all the local participating organizations were relatively small and under-capitalized and they gained access to resources through the BLTV that would have otherwise been unavailable.

Sense of Community

- Over 150 community leaders attended a planning meeting to give direction to the Blue Line TeleVillage.

- Twenty-five community leaders participated on an Advisory Board that guided the development of the TeleVillage. About half of them became actively involved in the operations phase.
- The BLTV started the process of becoming a community meeting place -- the Compton Chamber of Commerce held a mixer at the BLTV, the Inner City Computer Society regularly holds meetings and training sessions there, children's service organizations regularly use the Computer Center, kids gather there after school.

Telecommunications:

The BLTV provided network access and broadband transmission well below market prices. The MTA grant paid for the NAC and Pacific Bell's Education First Program provided 8 ISDN lines for switched broadband transmission. Demand during this initial operating period did not justify separate facilities for government, non-profit and for-profit organizations.

The initial design of the Network Access Center reflected community needs and interests and was oriented to business/office and education/training technologies. This did not include entertainment, health care and audio/video production access technologies.

Within the NAC, the Computer Center was the most heavily used. Reasons for this include the drawing power of the internet and the facility's ease of use by individuals on a drop-in basis. The Computer Center developed commercial value as a place for computer training for local employers because of its 12 computers and class room-like environment. In general, the Computer Center will link more directly to economic empowerment than to mobility until such time as urban functions such as retail transactions or government services are commonly found on-line.

The Video Conference Center had more direct links to mobility but was more difficult to use than the Computer Center. Video applications require synchronous communications between at least two locations and the required level of planning and organization was much greater. Considerable effort will be required until a group of organizations become regular users of the capability.

The Telework Center found more significant use by entrepreneurs seeking access to a well equipped business environment than by telecommuters. This is an especially interesting finding in light of the failures of the regional telework centers in Southern California which were open only to telecommuters. In the future, recruitment should continue to attract both groups. A regional marketing agency would play an important role as the number of NACs increase.

Kiosks have promise as dedicated, easy to use devices. The only usage tracking among the kiosks was with the City's Housing Authority Information Center and that device registered over 6,000 users. Computer use requires more skill and perhaps more courage. Therefore kiosks may be one way to bring computer-based urban functions to more people. Like computers and the internet,

many more functions need to be available through a kiosk in order to gain significant mobility benefits.

Circuit Riders had great potential but few government agencies were willing to participate during the demonstration period. Surveys taken at the BLTV indicated consumer interest in the concept. A clear success may be needed in order to attract additional government agencies.

Real Estate

The project provided a good example of the retrofit possibilities. The setting for the project was a low density, suburban residential area with pockets of industrial, retail commercial, and civic activity. The service area has relatively low housing density with a higher rate of single family detached houses and a far lower percentage of structures with 5 or more units than exists in the County. Within the 2 mile radius service area, almost 2 out of 3 houses are single family detached.

No new construction was needed as the project was developed in 2,000 vacant square feet of leased space in an existing building (owned by a municipal corporation), and required about \$80,000 in tenant improvements.

The building already housed other important functions that included the Compton Chamber of Commerce, the Business Assistance Center of the City of Compton and a child care center.

Urban Form

The essence of the TeleCity Strategy is the spatial reorganization of urban functions into multi-purpose centers that create structure within urban sprawl. In order to do this, some functions normally located in a specific building must be re-designed so that they can be placed on a network.

The project was developed in the midst of an existing concentration of urban functions. The King Transit Center was adjacent to a suburban style retail mall and diagonal from the Compton civic center, a complex of government offices that include the U.S. Post Office, County Court Building, Compton City Hall, Compton Library, and Compton Police Station.

Public Institutions and Private Businesses:

The engine needed to drive the transition from AutoCity to TeleCity is innovation by government institutions and private businesses. A "Ladder of Participation" was developed to characterize progress of the 284 organizations that were approached by the Drew Team to participate in the project.

To an outside observer, participation might be something that an organization clearly accomplishes or doesn't. Inside the Project, participation is a process that moves through several stages.

Overall, the process can be characterized as a Ladder of Participation with each step defined as a stage in the process. In this way, an organization could participate by making progress toward implementation even if implementation did not occur during the demonstration period. The Ladder also identifies the work in progress stuck at a step somewhere short of routine use or network strategy adopted.

Ladder of Participation

289	Attempt to contact
178	Step 1. Never responded
111	Step 2. Responded with their initial contact
81	Step 3. Site visit
67	Step 4. Identified applications
45	Step 5. Initiated applications planning
35	Step 6. Completed applications planning
32	Step 7. Conducted a trial
13	Step 8. Implemented additional applications or trials of same application
6	Step 9. Developed routine use
0	Step 10. Adopted network strategy

The ladder shows that progress up the first 3 steps is difficult to accomplish. However, almost half the organizations that were able to identify an application at the BLTV (Step 4) went on to implement that application during the demonstration period.

The following were the most significant barriers to participation by organizations:

- Lack of access to network technology, especially video conferencing but also internet access.
- Large bureaucracies, which require time and resources to locate the appropriate department and person, and where front line people are not allowed to make commitments for the organization.
- Institutional rules such as those that require attendance verification for certain college courses making them difficult to offer as distance education; and day care rules that prevent drop-in child care while a parent attends a class.
- Timing and time – windows of opportunity for introducing innovation close because of staff turnover, crisis, budget cuts, and changing priorities creating a situation which requires the right timing. The best way to get the timing right is to consistently sustain the recruitment effort over a long period of time.

- Lack of resources necessary for organizations to engage in innovative trials – staff members usually lack experience with network applications and can take on only so many special projects.
- Organizational culture which in some organizations resists change and, in others, at least embraces a willingness to try things differently.

Transportation

According to the Strategy, the spatial reorganization of urban functions will result in increased demand for short haul transportation services. People will increasingly walk or choose modes specifically designed for short trips. Over time, new public and private services and technologies should further reduce the role of the automobile.

While the budget for the BLTV did not allow rigorous measurement of mode choice, some data were collected that allow a preliminary analysis. In the following table, the County and Service Area columns show the mode split for the journey to work. The Member column is based on data from the membership data base, and the User Survey data were collected during the last week of the demonstration. Both reflect the mode of choice to reach the BLTV.

The comparison with journey to work is reasonable since a TeleVillage Center should, in time, become a general market place for the community including a place of work for some people some of the time. The data can also be taken to indicate the propensity to use an automobile.

In any case, the research results are promising. The shift of mode choice away from the automobile to walking and public transit is the direction of change desired. It suggests the possibility of adding “station cars” or street legal golf carts to the mix.

	County	Service	Member	User Survey
N	9 million	134,000	620	34
Auto	85.6%	88.3%	70.8%	45.4%
Transit	6.5	6.2	20.2	44.1
Walk	3.3	2.4	9.0	10.3

New Regional Institutions

The applications development functions of the proposed regional agency were completed by the Drew Team during the Project. As the number of NACs and TeleVillage Centers increase, there will be an economy of scale to externalize the applications development function into a permanent agency with region-wide scope. The Project's findings also support the need for sustained support for network innovations by public institutions and private businesses

Options for Initiating the TeleCity Strategy

There are at least 7 options for policy makers and business leaders interested in pursuing a regional strategy for sustainable, livable cities that incorporates the capabilities of information technologies. The first three are the most likely candidates, but the other four might better suit some jurisdictions depending on existing conditions and interests.

Establish Regional Agency

Just as the ride sharing function that is part of AutoCity requires a regional agency to educate, recruit and match riders with drivers, so there is an analogous agency require to support the various elements of TeleCity. The duties of this organization could include educating public and private corporations about the advantages of network solutions, helping those organizations plan and implement network applications, brokering teleconferencing facilities, matching employees to nearby work stations, and so forth. This may become a financially independent agency offering commercially successful services, but at least for 3 to 5 years the agency will require a subsidy from government or perhaps the telecommunications industry since the industry will directly benefit from extraordinary market growth as a result of the success of the regional agency.

Establish NACs at Transit Villages

Virtually every transportation authority in the United States that operates a rail system or a large fixed route bus system has some sort of real estate development program. The goal of these programs is to develop either origins (greater housing density) or destinations (commercial centers) adjacent to the station or stop.

A Network Access Center can add functions to what already exists, or can be used as a catalyst for private market construction activity where none now exists. In either case, a NAC will have the effect of relocating some urban functions to the desired location, more inexpensively and more quickly than if purely physical construction were the only alternative.

Develop a *TeleCity Plan*

A plan for a city can identify options for the village centers and neighborhood centers; determine the route for a wide area network (that would ultimately be connected to the Metropolitan Network), assess the costs of real estate for the centers and the site improvements for each case, determine the functions that are needed in each community, assess the capability for innovation among the various private organizations and public institutions, and identify the priorities for further planning and initial implementation. The TeleCity Plan prepares the governmental jurisdiction to apply for grant funding to implement specific elements.

Develop the *Metropolitan Network*

In some regions a Metropolitan Network is under consideration or is already a reality. In the San Francisco region, the Bay Area Rapid Transit System (BART) has capacity on an existing fiber network throughout its rights of way. The Los Angeles County MTA has in the past considered building such a network and might do so again in the future. The Puget Sound region voted to build a backbone rail network and would be a good candidate to begin planning a Metro Net before rail construction begins. Other regions have some form of surface or underground rail for which the rights of way have not yet been fully developed for fiber. In these areas, the Metro Net might be a good first step toward TeleCity.

Retrofit centers – add a NAC

Virtually every American city has suburban retail malls that are not currently doing well. There are also under-utilized office centers, and public schools and civic centers with vacant land. Each might be a candidate for adding a NAC, particularly those that have space available in existing buildings. In the case of a retail mall, a NAC might, along with new landscaping and facade renovation, become a catalyst to renewed commercial value.

Conduct demonstration projects

Demonstration projects for telework and teleservices seem to be happening in many different places. Telecommuting has been a particularly popular target in Southern California. Since the early 1990s, the County and the City of Los Angeles have each conducted telecommuting trials, and over \$10 million has been invested by regional governments in telework centers.

Demonstration projects typically are hard to sustain. They often do not support a regional strategy, nor are they supported by such a strategy. That is, projects in the same region are often uncoordinated and are conducted from a tactical perspective. They do not accumulate practice that will support the redesign of AutoCity. Nevertheless, demonstration projects can lead to larger and more elaborate projects which at some point themselves become strategic.

New development – include NAC and Metro Net

In jurisdictions where new residential development is planned, a system of NACs should be designed into the land use plan. If it is already designed to be a transit oriented development, a NAC can add urban functions to the commercial core.

Urban Functions That Replace Physical Places Blue Line TeleVillage Demonstration Project

Urban Functions	Physical Places
Public library services	Central library
Arts & culture	Museum Artist studio
Education	High School campus College campus
Meetings Office work place	Office building
Retail sales	Bookstore
Technology access	Community technology center
Training	Training center
Business assistance	Regional Small Business Development
Government program information	Federal Building Los Angeles City Hall
Retail banking	Branch bank

Awards

The Blue Line TeleVillage was designated “Best Practices In California” by Tech Expo in 1996 and qualified as a “Semi-Finalist” in the 1996 National Information Infrastructure Awards even before the facility was open. The project recently received the 1997 Excellence in Innovation Award by the International Telework Association. It was featured in a vignette carried by the CSPAN cable network.

Acknowledgements

The Demonstration Project would not have been possible without the dedicated efforts of staff members of the MTA, City of Compton, Drew Economic Development Corporation, and subcontractors to Siembab Planning Associates. Pacific Bell’s Education First Program provided the essential broadband network services. Los Angeles County Supervisor Yvonne Burke and her Senior Deputy Michael Bohlke provided guidance and support throughout.

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