

Efficient Edge Cities of the Future

Revised TRB 2010 Submission Date: November 9, 2009

In Response to Call for Papers from: AP040 - Major Activity Center Circulation Systems, covering:

*Carbon free mobility: reduce carbon or GHG emission via PRT/APM or driverless transit systems.

*Driverless Transit

*Parking interfaces and linkages

*Financing public transit via covered bonds or other public/private partnership mechanisms.

*Applications of PRT/APM to facilitate congestion (parking) pricing.

Word Count: 5,736 + 2 figures * 250 = 6,236.

Author:

Steve Raney (corresponding author)
Cities21
1487 Pitman Ave., Palo Alto, CA 94301
cities21 at cities21 dot org
(650) 329-9200

ABSTRACT: 211 words

A “story-format” 2020 vision is provided to reduce edge city per-capita energy consumption by 50%. The story provides an integrated future vision combining: multimodal transit, ridesharing, demand management, land use, market forces, policy, technology, and paradigm re-thinking. Changing away from an auto-centered, petroleum-based lifestyle represents a lifestyle change, but not a sacrifice.

Web and GPS cell phones help create a “comprehensive new mobility” system to make green transportation seamless and hassle-free. “Paid smart parking” reduces solo commuting by 25%. “Low Miles residential communities” foster green culture, where residents help each other to reduce carbon dioxide. This green culture is created using the same powerful sociological marketing principles that drive consumer society. Housing preference policies are used to select new residents who will travel less and use green transportation. Two-car families sell one car. As the real-estate gradually changes, asphalt-dominated superblocks are transformed into walkable, New Urbanist locales. Walking, biking, electric scooters, and Personal Rapid Transit enable more than 50% of trips (commute, errands, recreation, etc.) to be made without driving alone. Each of the nation's 200 35,000-employee edge cities can be transformed into huge transit villages of two square miles or more. Through this simple step-by-step plan, you'll save money, shed pounds, meet neighbors, linger in more lively places, and pay lower taxes.

1. EDGE CITIES

Two hundred Edge Cities exist in the United States. Edge Cities are major suburban employment centers, averaging 35,000 workers. Many have one million square feet of retail. Roughly 80% these workers commute via Single Occupancy Vehicle (SOV). [1. Edge City]

“Consolidated household energy consumption,” refers to a household’s (a group of people living in a house or apartment together) energy consumption for operating the home (running lights, computers, refrigerators, heating/cooling) and for surface transportation to/from work and activities. The average U.S. suburban household has two adults, drives 24,000 miles per year, and consumes 240 MBTU per year.[2] U.S. suburban “human settlement patterns” (land use and the associated trip distribution created by the people living in that area) are the world’s most inefficient.[2] Hence, it is important to create a more energy (and economically) efficient paradigm for these settlement patterns. [2. Household Energy]

2. WHY TELL A STORY?

At a May, 2005. U.C. Berkeley City and Regional Planning Department seminar, Peter Schwartz explained that 80% of U.S. high school students are pessimistic about the future. If we don't change this pessimism into optimism, then the bleak future will be a self-fulfilling prophecy. Schwartz’s advice was to develop inspirational scenarios for the future to combat this pessimism. [3. Long View] Of interest are stories depicting high quality of life while protecting the climate, enabled through transportation and land use solutions.

Martin Wachs argues that there are challenges with explaining complex transportation sustainability policies. “Societies do not do well with complexity. We need to find a way of reducing our discussion to manageable components, just as we need to find ways of enacting policies through manageable steps and workable components. We need to acknowledge complex relationships among the elements while focusing on them one at a time. We only seem to be able to enact laws and regulations, to take actions, and to set priorities one bite at a time.” [4. Wachs] Story-form future visions targeted for a broad audience provide a way for non-experts to digest a series of interrelated, complex policies where dry academic papers fail. Following the 2010 TRB Theme, story-form visions provide a comprehensible way to convey “Bold Ideas to Meet Big Challenges.”

A successful example of story-form future visions is provided by the California Central Valley Futures Project. They developed a number of stories for the future of the Central Valley, an area faced with severe challenges caused by increasing population. Some stories are inspirational whereas others serve as warnings about poor outcomes will occur without policy intervention. The stories explain complex policy challenges and solutions in an interesting and mass-readable form. The stories were given very extensive coverage by the local press, increasing public understanding and public input into policymaking. [5. Central Valley]

3. LEAD-IN TO THE 2020 VISION STORY

The average edge city resident consumes more energy driving than operating their home.[2] Efficient edge cities minimize the distance between {work, home, and activities}, cutting energy consumption and carbon dioxide production by more than half. Efficient edge cities provide the following benefits:

- lower cost-of-living
- less carbon dioxide produced per person
- happier people from more neighborhood social connections and less time wasted stuck in traffic [12 Bowling Alone]
- higher convenience
- more vibrant street scenes
- better health from more walking
- more mobility for children and seniors
- thriving local businesses serving local customers

- stronger city and school district finances
- greater social and income diversity
- smooth accommodation of large population growth, lessening the need to expand beyond the metropolitan fringe into agricultural land or wildlife habitat

The future vision story is written in an informal style and attempts to be trendy to appeal to younger readers. Vision stories should be written in an informal style, appealing to non-experts.

4. THE EFFICIENT EDGE CITIES 2020 VISION STORY

October 5, 2020

Hello, my name is Emma Raney.

Compared to typical suburban living, I live a life with lower cost of living; more free time; better work/life balance; stronger, more supportive, and more diverse local community; and one-quarter of the energy consumption. My community produces emissions well below Kyoto protocol standards.

In 1963, my grandparents moved to Palo Alto, a fantabulous Silicon Valley suburb. As 20-somethings moving from a Navy enlistment to Palo Alto, "the grands" scrimped and bought a 2,000 square foot house for \$23,000. Palo Alto was a pretty affordable place at that time. By around 2008, the inflation-adjusted price SHOULD have been \$136,000, but was more than 10 times that. Palo Alto had become unaffordable. I was born in 1997 (I'm now 23) and got a job out of college in Palo Alto's large office park, Stanford Research Park (SRP). The question was, where to live? It's nontrivial to live in Palo Alto on a 20-something salary. But, as I was growing up, housing was built within SRP and SRP was transformed into an efficient transit and pedestrian-oriented community.

At first it seemed strange, transforming an office park - a huge, lifeless sea of asphalt parking spaces. But, influential "smart growthers" started agitating for such transformations. [6. Visioning]

Job & housing co-location

I wanted to be less of a drain on the earth and I wanted to be more connected with other people. Given that transportation accounts for about 50% of a person's annual energy consumption, it made sense to live close to work.[2] So I bought a condo in SRP so that I could walk to work. If you live and work in the same place, we'll call that "co-locating" or "colo." Given that colo provides such a large driving reduction, it difficult to imagine making suburbs sustainable without colo.[9] I followed some of the historic "expert planner" discussion about colo. While Brookings Scholar Anthony Downs advised commuters to learn to cope with traffic congestion in the short run, he believed that, in the long run, jobs and housing would eventually co-locate. [7. Downs] From an analysis of current research, Robert Cervero questioned whether co-location would come about without intervention. He concluded that the natural incentives for people to reduce the distance between work and home did not work. "Average journey to work distance has been increasing, jobs/housing balance continues to exacerbate." [8. Cervero] Thus, the colo ordinance was the policy remedy to bring rationality to residential location decisions.

Commute Reducing Housing [9. CRH]

In 2008, the city of Palo Alto passed a "commute reducing housing preference" colo ordinance for new housing in Palo Alto. For new apartments and condos, Commute Reducing Housing (CRH) selects residents with fewer cars who will drive less. This amazing policy reduces gas expense by cutting commute distance and eliminates time spent wasted stuck in traffic. This policy turns out to be the most effective traffic congestion / carbon reduction "weight-loss" program ever devised.

My monthly condo fee is \$100/month. If I switch jobs to where I don't work in SRP and I drive alone, then my condo fees go up to \$200/month. If I commute via transit or carpool outside of SRP, then I'm "medium green," so I pay \$150/month. My SRP employer provides proof of employment once per year. Apartments have

equivalent "apartment association fees" of \$0, \$50, and \$100 per month based on their "commute traffic impact." Thus, residents are incentivized to stay local. I'd be willing to consider job offers from other companies within SRP, but for me to take a job outside of SRP? It would have to be an exceptional offer.

Tipping Point [10. Tipping]

Human beings are complex social animals with entrenched behavior patterns - it's very hard to change attitudes and behavior. I live in a community formed with an in-depth understanding of human-ness - we've brought about a huge collective change in attitudes and behavior.

The problem is the suburban "tragedy of the commons." When people take green alternatives to driving alone (often incurring a loss of flexibility or a slower trip), then society benefits overall from reduced traffic congestion and reduced trip times. Unfortunately, those benefits are enjoyed by the people who continue to drive alone on the less crowded freeways. In essence, "do-gooders provide benefits to do-badders," and there's little motivation for do-gooders to do good. By creating an entire community with a different value set, do-gooders receive the proper motivation/reinforcement and the tragedy of the commons can be overcome. We've made it cool to be green. We've brought about a tipping point. Here's how we did it:

Low Miles Community. [11. Low Miles]

Each resident must sign a "green lifestyle" pledge as condition of obtaining new SRP housing. The pledge calls for driving alone as little as possible. I was soooooo majorly psyched to live in a community where everyone had signed that same pledge, where everyone took "earth stewardship" seriously. Don't tell anyone, but I would actually pay more per month to live here, because of this community. Our SRP community is socially bound together by this pledge - it has allowed our "latent good-deed-doing" inclination to spring forth. I feel a natural affinity with everyone in the complex. Even before I've met them, I trust SRP residents more than "normal humans."

Psychologically speaking, the LMC behavior change pledge is "meaningful," because the pledge is visible/known to the local peer group, changing individual self-perception. Peer pressure further reinforces behavior change and ensures that behavioral norms change permanently. Around 2008, some trendy web sites asked people to make meaningless behavior change pledges in private (invisible/unknown to peers). These pledges were forgotten a few minutes after the last click. Lasting behavior change is much more difficult, but LMCs showed the way.

In suburbia, it takes specialized knowledge to reduce earth abuse. Suburbia is designed for driving alone - solo driving is easy. But moving around by different means? - now that's tricky. For instance, biking has a series of knowledge sub-categories: route selection, safety training, and accessorizing. Grocery shopping in suburbia without a car? That's its own unique knowledge area - I've researched the topic and become one of the local experts. Because we don't waste time stuck in traffic, we have plenty of free time that we plough back into community activities, problem solving, and knowledge base building. It also takes specialized community technology to distribute knowledge to those who need it, when they need it, and to grow innovative new solutions. Our community functions with face to face communication as well as web discussion forums. Experts share knowledge with newbies. People like to help others and build up positive karma; it's just that most communities don't provide the social infrastructure to unleash do-gooding (or "Pay it Forward-ness"). The closest thing to our community is eBay's self-supporting auction community, where experts tutor newbies.

Part of the pledge sets the expectation that people will engage in courteous dialog, and respect the individual choices that people make. It's about working together, not complaining because someone drove their SUV to the grocery store. One or two bad apples could spoil the tone of dialog in the community, but we're not anonymous - we bump into each other regularly, so you don't see people being flamed on the discussion board. If this did happen, our community would self-police away such behavior.

It's not like all the ex-hippies from Berkeley moved to Palo Alto to live in this community. There are plenty of residents who were motivated to live in SRP to reduce their commute and cost of living while increasing their quality of life. Many didn't have green living as a core life focus, but were willing to sign the pledge in order to receive the other benefits. The community is self-reinforcing, it feeds on itself. If anything, I'd say the

community demographic has deeper religious faith than average California suburbs. Some folks have remarked that the community allows them to better express their faith through action.

There are lots of smart and creative people in our community, so a number of new initiatives have been implemented: hard core recycling, composting, rooftop gardens, solar, etc. As similar communities have sprung up across the world, our knowledge experts share knowledge, and we regularly host visitors for seminars and demonstrations. Outside speakers regularly visit to teach us new expertise and plant seeds for new initiatives.

We're not "Bowling Alone"

Our community regularly schedules activities like barbeques, potlucks, musical performances, expert speaker talks, trips to Stanford University athletic events, etc. An extra effort is made to welcome new residents. Plus we regularly communicate on the discussion forums and we always bump into each other. We know each others names. Residents attribute significant value to their lives from being part of our community. We're very different from the soul-less suburban existence exposed in the book *Bowling Alone*. [12. Bowling Alone].

Small housing

My condo may be smaller than what you'd normally think of as a condo. It's a like a studio apartment. It has a folding wall Murphy bed. There are various other compact designs in smaller and larger units in my complex (elevated beds with desks underneath, etc). Some of the world's best space-saving ideas have been brought to Palo Alto. It is sooooo important to go small. "Futon" is the new "bedroom." Housing costs have gone down from the outrageous prices around 2008 (\$1,000 per square foot), but housing costs are still high in 2020. So, I could either rent, or buy bigger 30 miles South, or buy a teeny, tasteful SRP condo and build up equity (the 'Merican dream). [13. MacDonald]

Compared to the rest of the world, part of the problem with U.S. suburbs had been the outsized homes. At the turn of the century, the average American home provided 770 square feet per person.[14] In the rest of the world, only Australia, with 550 square feet per person, came anywhere close. Other countries were significantly smaller, with Japan the smallest, at 136 square feet. SRP helped show Americans that "big isn't better." Smaller homes take much less energy to run and they lead to more efficient human settlement patterns. [14. Brooks]

There's a nice outdoor square in my complex and the neighboring complex, a good place to hang out and chat with random neighbors when I need to get out of my condo. There's a good hang-out café in my complex, with outdoor seating in the square, and the other complex has a library annex that works well for hanging out.

The complex has a variety of unit sizes, some much smaller (and more affordable, if cramped) than mine. Some units are condos, others are rental apartments. Going small is the only way to have housing costs take less of a bite out of a monthly budget. Because of the variety of sizes, the complex supports a broad range of income levels, including low income. The colo traffic reducing housing preference scheme would have never flown if it only created luxury housing - federal fair housing law required a large affordable component. Plus, this "housing product" had to be very different from the neighboring single family homes, so that it wasn't seen as competition.

My car

I don't own a car. Well, I sort of own half of a Prius. I lease a Prius, but it is used by other people during the work day as a carsharing car, and my lease payments are reduced depending on how much others use my car. I don't keep stuff in my car, it's not an extension of my sofa and garage like a typical car would be. If I need a different size car, pickup, or minivan, there are plenty to choose from in the carsharing program. Every SRP resident and worker is enrolled in the carsharing program (though not everyone supplies cars), so there is sufficient scale to make carsharing economics work.

Un-housed vs. Homefull

Someone figured out that our complex needed to support two un-housed people to do our share to address the problem. So we help provide good quality of life for those folks, but we haven't become a huge mecca for loitering.

First off, those two outpatient Iraq War veterans (with a few "issues") are now "homefull," not un-housed. No shivering or hunger pangs are allowed. They have teeny, minimal dwelling units, but, heck, it's a warm place to sleep and shower. The two vets are treated like real people. One is pretty social. I greet her by name and she greets me by name. The other is kind of a quiet loner. I kind of nod a greeting, but he pretty much just wants to be left alone. But he's not treated like he's invisible. Both have work assignments in our complex, it's not a free meal. We're not afraid of them - like every other resident, they care about the safety of our community and provide "eyes on the street" to ensure that nothing funny is going on. A few folks in our community have undertaken special training on how to best integrate these folks. Our association fees subsidize these folks. [15. Livable Cities]

Desegregation and Latino Upward Mobility

I live in a thriving, diverse community with a people of all income levels. The shops, food, art, and music combine to create an international, melting-pot feel. But, it wasn't always that way in Palo Alto.

Before "the transformation" started, SRP employment and Palo Alto residential population was very skewed towards white and Asian. That seemed strange, because Palo Alto's county was diverse. Santa Clara County's residential population from factfinder.census.gov was something like 44% white, 25% Asian, and 24% Latino. In addition, the U.S. Census shows that, in terms of educational attainment and household income, Silicon Valley whites and Asians are the "Haves" and Latinos and African Americans are the "HaveNots."

The traffic reducing housing scheme could have segregated things further if the "Haves" grabbed all the new housing - cha, like they needed handouts. Instead, Palo Alto ensured that SRP housing attracted a high percentage of Latinos (via "affirmative marketing" – marketing to increase diversity is encouraged under the federal Fair Housing Act). This was accomplished by a) keeping housing costs low, low, low, so that lower paid SRP workers could afford these units, b) the developers carefully recruiting a cultural melting-pot retail mix, c) increasing the ethnic food sections at the two local grocery stores, d) augmenting the already strong public school language programs, e) recruiting workers and residents from the local Latino concentrations in East Palo Alto, Redwood City and San Jose, f) holding ethnic themed events, and g) holding local educational and cultural classes targeted towards the Latino population. SRP employers got involved, providing a lifestyle package to low-income folks: {a job, job training, a house, children's afterschool programs, and a better chance at upward mobility}. SRP employees/residents and nearby neighborhood residents volunteer to help this Latino-focused effort succeed. In our complex's community, we've had a number of non-Latinos who've strengthened their Spanish language skills so they could better interact with all residents (second generation Latinos speak great English, adult immigrant Latinos have a broad range of English fluency). Given that Palo Alto enjoys some of the nation's best public schools, it's nice to see Latino kids excelling within the school district, well on their way to realizing the 'Merican dream of upward mobility through hard work.

How I get places

SRP has a personal rapid transit (PRT) system, and I take that to many destinations: grocery shopping, book store, cafes, restaurants, art house movies, the gym, yoga, pilates, massage, soccer fields, play parks for my little nieces, etc. (I walk to work.) At the edge of SRP lies some of the most popular hiking in Silicon Valley - it's called The Dish (named after dish-shaped radar antennae). I take PRT to and from there, taking pains not to sweat inside the PRT vehicles. They installed lockers at The Dish, which allows me to store a towel and control sweat with it. I carpool to church via the low mileage chat community. Our community organizes one trip to the garden supply center per month, and we carpool, often snagging minivans from the carsharing service to carry back lots of stuff. SRP's PRT connects to PRT systems in other large Silicon Valley office parks (there are 10 others). Via this connection, I connect to a larger variety of stores, downtown Palo Alto, a large concert amphitheatre, rollerblading at the edge of the bay, a cinema multiplex, and restaurants in other cities. Very rarely, I get a little carried away and I end up with a bunch of large items to schlep home. Large wheeled carts are available at some stores. I wheel the cart and items onto PRT vehicle, take my items home,

then I wheel the empty cart onto another PRT vehicle where it is re-deployed. It's a bit like an airport luggage cart system.

I take commuter rail to see Sharks hockey, Giants baseball, and plays/cultural events in SF and San Jose. When I go to Stanford for an event, I usually PRT with bike (on occasion I combine PRT with a foldable electric scooter). To get to places, I walk significantly more than a typical suburbanite - I generally travel the first and last trip segment on foot.

Sometimes I don't go places, places come to me. Our community negotiated scheduled delivery services for groceries, drugs, environmentally conscious dry cleaners, locally grown organic produce, bicycle repair, etc.

Grocery Shopping

Car trunks are great for carrying groceries, but using a car to shop is so 2010. If I'm making a significant grocery run, I tote a wheeled, folding Hook & Go via PRT to shop at the grocery store and the farmers markets. No, that's not me in the picture below – I think she's using corn starch grocery bags, but I prefer canvas. I generally grocery shop three times per week - I don't have much pantry space and I like my food fresh, fresh, fresh. Or, I just use my trusty expandable backpack for smaller grocery runs. [16. Grocery]



Figure 1: "Hook & Go" foldable grocery transport

Emancipation from serfdom

Corporate facilities managers and human resources personnel had previously believed in "serfdom." They subsidized employee cafeteria food to keep employees in the building and to keep lunch breaks short, short, short. PRT broke that mindset. Employees now regularly leave the office for fun lunch breaks at interesting places and hang out with real people (not co-workers). It's as if we are allowed to have a life. The trip to restaurants by PRT faster than via car (without the parking hassles) and more enjoyable. The HR people were slow to come around, but they finally figured out that happier employees are more likely to stick around with their company. To me, this is another example of how the Efficient Edge City lifestyle improves work/life balance. Workers want to work in a vibrant place with stuff to do, not in an isolated corporate campus.

Ouch! It costs money to park [17. Parking]

When the PRT was put in, they added in \$0.50 per day parking charges, via a clever automated system. PRT motivated more than half of SRP workers to bike, take transit, or carpool to work. People realized that a car wasn't completely necessary for suburban workers. Once this transformation was in place, SRP was able to gradually crank up the daily parking charges to where it now costs \$8 per day to park. The \$8 pain level stopped even more people from driving alone to SRP. It also costs the same \$8 per day to park at SRP housing - it's turned a number of two-car families into one-car families. As for myself with my "half of a Prius," I get a

bit of parking price break because my car is available for others. The automated parking system was really important, because it allowed SRP a) to have a real-time count of the number of cars within SRP, b) to prove that traffic reduction occurred, and c) to monitor the impact of various programs and promotions. The vocal local Palo Alto neighborhood associations would not have allowed the transformation to occur without the real-time car count proving that traffic was decreasing. All of us Palo Altans appreciate the fact that traffic has gone down while population has gone up.

And our office parking spaces double as spaces for residents. We actually utilize the relatively few parking spaces within SRP 24 hours per day. Someone pulls out to leave work for home, someone pulls in to park for the night.

Personal Rapid Transit (PRT)

We like to think of our PRT system as "transportainment" - it's really fun to ride the system, and we have no end of international "transit-tourists" who simply HAVE to take a ride. These tourists stay at our new, hotel-tax-revenue-generating, city budget-balancing SRP hotels.

PRT is an elevated, 100-mpg-equivalent monorail system with many four-person, driverless, electric vehicles. PRT provides non-stop, no-wait, 25 mph service. Vehicles travel above ground on 16' elevated "guideway." Stations are located near building entrances. Many stations are situated along the route to maximize convenience. PRT is optimized for office parks, airports, universities, and other population centers, where travel by PRT is faster than by car. In these applications, PRT makes carpooling and conventional transit more effective, by solving the "last mile problem."

PRT combines concepts from monorail (Disneyland), automated people movers (SFO Airport), roller coasters, and automated highway systems (Former California Governor Schwarzenegger's GM OnStar van drives itself in the science fiction movie *The Sixth Day*).

Passengers travel alone or with people of their choosing. Vehicle weight minimization greatly reduces the size of the elevated guideway and supporting columns, dramatically reducing construction cost and right of way acquisition. Vehicles flow along the guideway almost like data packets on the Internet, anticipating demand so that wait time is eliminated. In addition to improving commute alternatives, the PRT system eliminates mid-day stranding caused by traditional carpooling/transit, by providing efficient transit to adjoining shops and restaurants.

PRT system capacity is roughly 4,000 person trips per hour per PRT "loop." Systems may have many loops, providing more capacity.

PRT is great for wheelchairs and helps provide a more active lifestyle for folks with poor eyesight or creaky bones. Thus, our little community has attracted a number of retirees.

The SRP PRT system map is shown below: [18. Silver Bullet]

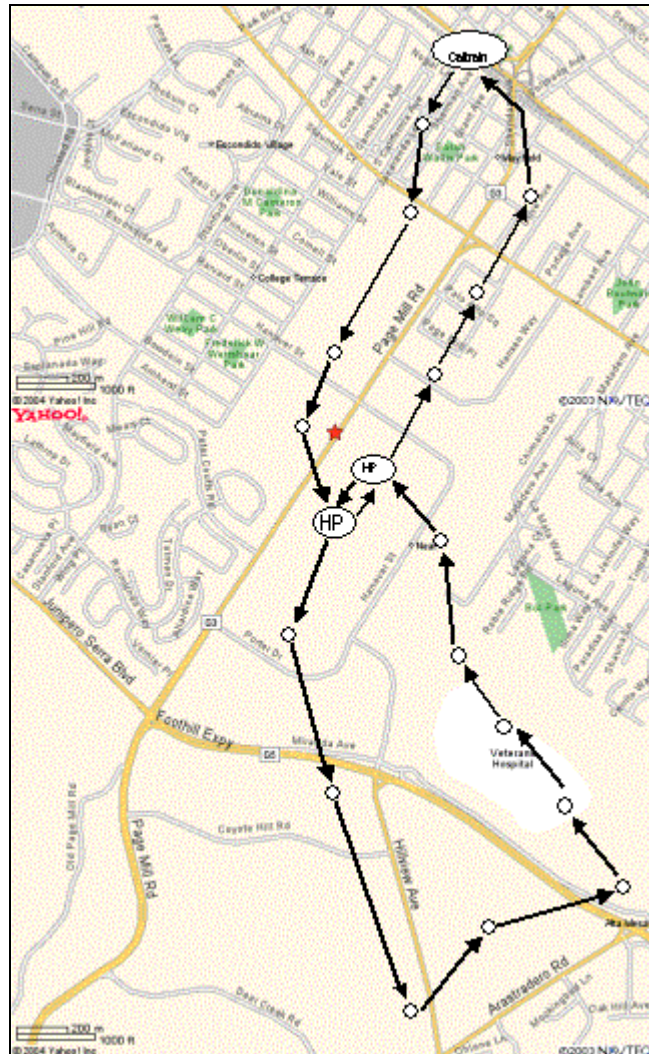


Figure 2: SRP PRT system

Here's an historic (Year 2008) three-minute explanation of PRT technology: <http://www.ultraprt.com/>. The world's first PRT system started operation at London Heathrow Airport in 2010.

Huge Transit Village

Before the SRP transformation, people used to think of a "transit village" as a few acres of development alongside a transit station. SRP brought about the PRT-based transit village that connects two square miles with a network of transit, connected to traditional rail stations and bus stops.

New Mobility

Some clever methods were used to reduce solo commutes to SRP. These often relied on GPS-enabled cell phones (think of the Marauder's Map in Harry Potter, a map where you can track the current whereabouts of all wizards and witches at Hogwarts).

Everyone has a GPS-enabled cell phone handset, to allow software to track our location. Our cell phones are our transportation "command center," an integral part of our transportation. There are a number of applications that assist us:

- "TrakRide" to improve the reliability of carpool rendezvous and increase courteous, punctual behavior.
- "NextTrain" to improve the reliability of train-PRT rendezvous.

- "HomeSafe" to verify that carpools amongst strangers operate safely.
- "QuickCar" to provide five-minute access to cars for centralized car sharing and emergency ride home, using "wireless door key."
- "SpyKids" to maintain secure custody of children during unaccompanied PRT trips.
- "NextSpace" to direct commuters to available parking spaces, with wireless access to automated, shared parking lots.
- "Digital Hitchhiking" allows longer-distance SOV commuters with empty seats to dynamically ridematch and pick up shorter-distance commuters traveling on the same route.

A central database, known as "Big Sister," maintains personal data to support these applications. [18. Silver Bullet] [19. Hitchhiking]

Activism

We're a really active political community and we enjoy undue influence over Palo Alto city council deliberations. It would be out of the question for an anti-green policy proposal to ever pass in Palo Alto. We bring a long-term, big-picture, region-wide mindset to local politics, providing the necessary mandate to bypass the limits of American risk-averse, next-election-focused city deliberations. Initially, we freaked out the establishment, but now we're generally perceived as a knowledgeable, benevolent force for change.

Kitchen Sink

All the standard bits of smart growth and green building were integrated into our community {green rooftops, community gardens, cohousing, etc.}, but I'm running out of space, so I won't go into details. The main point was that the transformation of SRP took best practices as a baseline, and then went well beyond those visions. Huge "superblocks" were transformed via neotraditional residential spines emanating from the inside out. Superblocks (take 8 normal city blocks and remove the internal streets - result is a super block) were then connected via priority bike/pedestrian links (under or over arterials like El Camino Real, Page Mill, and Foothill Expressway) and via PRT.

Conclusions

Efficient SRP housing created a much-desired, brand new housing choice: low-cost, small, vibrant, low environmental impact. It's a housing choice combined with a cultural choice (good-doing, tight-knit community).

The "transforming office parks with housing" model generated a \$326 million real-estate profit, thus spread like a wildfire, covering 200 large U.S. office parks, each with 20,000+ workers, within 10 years. For every two workers, one new resident was added. [Garreau] While these office parks were the villains of traffic congestion, sprawl, and pollution in the 1980's and 1990's, they ended up being the crucial sustainability catalyst in the 21st century. For Palo Alto, annual employee vehicle miles traveled (VMT) reductions are 46M miles and annual pounds of carbon dioxide reduced are 33M pounds. There are approximately 6M U.S. employees working in the 200 largest office parks. Extrapolating the Palo Alto model to the other major office parks removes 1.98M cars and provides the following annual reductions: 11.B vehicle miles traveled, 424M gallons of gas, 8.4B pounds carbon dioxide. [20. Thesis]

Palo Alto's city finances were a mess, but the SRP transformation brought revenue-generating land uses back to Palo Alto. SRP office land values increased by 100%, adjacent residential values by 25%. [21. Value Added]

THE END.

5. RECOMMENDATIONS: FUTURE VISION STORIES

TRB should consider encouraging and facilitating the creation of more inspirational future vision stories, to help communicate innovative, complex solutions to the public and to help create optimism about the future.

A "Call for Future Vision Stories" might include some of the following guidance:

- Avoid providing a list of policy tools. Instead, make your imaginative vision come alive in writing.
- Pick three people in your efficient city and take us through a day in their lives. Make your vision specific. What is life like? How does the city work? Are there new fees? Are there new technologies?
- For ideas, examine some of the California Central Valley Futures Project stories, such as "New Eden" and "Rivers of Gold:" http://www.greatvalley.org/valley_futures/stories/.
- What will your city look like?
- Has government changed? Has the mayor's role changed?
- Describe how you will transform an existing city or region of 10,000 or more people into something that is significantly more sustainable. How much will it change? (Hint: 10% is not sufficient! We're for significant advances, not incremental approaches.)
- Explain how increased sustainability is brought about. Make a strong argument.
- Your scheme should have the potential to spread worldwide to impact more than one million people. Make a strong argument.
- Explain the costs/benefits of your scheme. The more cost-effective the better.

6. ACKNOWLEDGEMENTS

- David Maymudes, Cities21
- Jeral Poskey, Google
- Jim Galanis, Intel
- James Paxson, Hacienda Business Park
- Research Funding Provided by U.S. Environmental Protection Agency Collaborative Network for Sustainability grant program. Diana Bauer, Program Manager.

7. REFERENCES – (Web links last updated July 2009)

1. [Edge City] Joel Garreau. *Edge City*. Doubleday, New York, 1991. In *Edge City*, Garreau provides a list of 185 suburban job centers with 5M square feet of office space. His Garreau Group keeps an updated *Edge City* database, containing recent additions.
2. [Household Energy] Household Energy Consumption analysis by Jonathan Rose & Companies. http://www.cities21.org/HH_NRG_consumption.htm
3. [Long View] Peter Schwartz, author of "*The Art of the Long View*,"
4. [Wachs] "How Can Transport Become More Sustainable?" Martin Wachs. pages 54-62, <http://onlinepubs.trb.org/onlinepubs/conf/CP37.pdf>
5. [Central Valley] http://www.greatvalley.org/valley_futures/index.aspx
6. [Visioning] From Congress for New Urbanism Conference, 2005. Peter Calthorpe (author: *The next American Metropolis*): "We New Urbanists didn't focus on the growth of office parks. This was a huge mistake. Now there's no demand for these office parks. We need powerful strategies for job centers. Eventually these centers will come back." UCLA Professor Donald Shoup (author: *The High Cost of Free Parking*). A) "Our vast deserts of parking represent a land bank for housing." Shoup then showed a vision of "co-locating" jobs and housing via office park surface parking in-fill with street facing apartments, with an example of a Cisco Systems campus in Silicon Valley. "There are thousands of office parks and malls in the U.S. that could be transformed. Grayfields are big opportunities. Office parks can be transformed in ways that few people now envision."
7. [Downs] *Still Stuck in Traffic*. Anthony Downs.
8. [Cervero] UC Berkeley Professor Robert Cervero's lament about co-location comes from his presentation on transportation, land use, and sustainability, at the Dale Prize Awards presentation at Cal Poly Pomona in May 2004. The video link is: <http://video.csupomona.edu/RJZimmer/TransCD-245.asx> . Please skip the first 6 minutes.
9. [CRH] "Commute (Traffic) Reducing Housing," Steve Raney. <http://www.cities21.org/workerHsng.htm>. Report for the U.S. Environmental Protection Agency's "Transforming Office Parks into Transit Villages" Study. 1) CRH is a very cost-effective residential auto trip reduction policy and results in a large commute mode shift change away from solo

commuting. The first application was at Palo Alto's Stanford West Apartments. Commute driving at Stanford West is a tiny fraction of the average Palo Alto resident. CRH saves 3 tons of CO2 per home per year. The author was able to convince a Redwood City developer to pioneer this policy for market rate condominiums at the 800-condo market rate Peninsula Park project. Peninsula Park proposes four housing preference tiers: a) Households that have no adult members who commute. b) Incoming households where all employed adults agree to commute to work via commute alternatives 80% of the time. C) Incoming households where one employed adult agrees to commute to work via commute alternatives 80% of the time. D) Incoming households with one adult member with a 4.0 mile or shorter commute. 2) Without such housing preference, South Bay Area transit-oriented development (TOD) dramatically underperforms compared to East Bay TOD. Housing in cities such as Palo Alto is so desirable that high driving commuters "crowd out" green commuters in the battle to reside next to Caltrain. Per "Travel Characteristics of TOD in California" (Caltrans funded research authored by Lund, Cervero, and Willson), residential TOD by East Bay BART stations produces 40% transit commute mode share (and 50% auto share). Residential TOD by South Bay Caltrain commuter rail stations produces only 17% transit mode share (and 80% auto share). Thus, South Bay TOD, while outperforming adjacent non-TOD (5% or less transit mode share), is still very auto-centered. 3) The report provides a detailed explanation of how to apply this policy within the bounds of the federal Fair Housing Act. 4) The report explains the strong match between job duration and residential duration for apartments and condos (but not single family homes). Apartment and condominium residence duration: Apartments have an average residential duration of from two to four years (research results differ by study). Owner-occupied housing has an average residential duration of eight years, and condominium duration is shorter than townhome duration and townhome duration to be less than detached single family housing duration. Average employment duration, depending on the study is 4.0 years to 6.9 years, with a skewed-to-the-left distribution. Technology jobs have shorter durations, but jobs requiring high educational achievement have longer durations. We expect residential and employment duration to both increase in CRH communities, as quality of life considerations make it more desirable to continue to work and live in the same location. 5) The current U.S. housing market is far from the ideal of an efficiently functioning housing market that we would envision under the theory of Capitalism. There are many obstacles and regulations in place that prevent efficient functioning. CRH is a regulatory tool to improve market efficiency. When a family selects a residential location that creates high mileage commutes, this creates a "negative economic externality" - the family creates negative traffic, particulate pollution, and greenhouse gas emissions, but does not pay for this impact. Instead, the impact is borne by society. CRH is a tool to "internalize" this externality. 6) CRH will reduce employee turnover (by providing workers with higher quality of life and reduced cost-of-living). This will increase productivity and reduce hiring/training costs at profit-seeking Capitalistic businesses. CRH will enable in-fill of congested / built-out places, providing new opportunities for profit-seeking real-estate developers. Public-sector infrastructure costs are 25% less to support residential in-fill than for suburban sprawl (TCRP 102). This cost reduction results in lower taxes on individuals and corporations. Traffic reduction from CRH also has significant benefits by reducing the need to build expensive new transportation infrastructure and by reducing unproductive time lost in traffic for workers and for goods movement.

10. [Tipping] *The Tipping Point*, Malcolm Gladwell.

11. [Low Miles] Low Miles Community Grant Proposal, Steve Raney. From the U.S. Environmental Protection Agency's "Transforming Office Parks into Transit Villages" study.

<http://www.cities21.org/LMC> .

1) LMC groupware and physical proximity will make it easy for the entire residential community to spend just a few minutes per day to make a difference. No tech worker is offering to drive their neighbor around on errands for 45 minutes, but six minutes? That's no problem. LMCs will be a very efficient way to share task-oriented expertise, and once a few residents develop expertise within a particular knowledge sub-domain (such as safe biking routes in Silicon Valley) their pride as self-taught experts leads them to very generously share their knowledge (while subtly conveying their superior knowledge and environmental commitment). In addition, LMC members can expect to get back more than they put in, because their contributions and the contributions of others feed right back into the community. The giving benefit is local. 2) Travel originations and destinations are frequently shared by members of this community, increasing the probability of ridesharing while the positive green social pressure increases the likelihood that ridesharing will be tried. 3) Creates a unique new housing choice: A Low Miles Community provides

- a new housing option, a new type of residential community where all have a shared, "green" vision. This housing choice allows residents to choose to join a new type of local culture - thus it's a housing choice combined with a cultural choice. The nation's top housing policy analysts lament the lack of innovative housing choices, pointing the blame at what they characterize as the "stodgy" real-estate industry. The values/culture community is being tried in a different manner in these examples: Ladera Ranch, Brambleton, Dominion Valley, and Takoma Park. See <http://www.planetizen.com/node/19397> : "A thriving planned community of more than 16,000 people, where various villages are not customized to practical needs, but to what marketers call different values subcultures. Ladera Ranch offers an extreme example of how developers are using the kind of sophisticated market research more commonly used to sell Hummers or Cornflakes to build the very places people live, and in a sense, to try to socially engineer community."
12. [Bowling Alone] *Bowling Alone*, by Robert Putnam. <http://www.bowlingalone.com/> .
 13. [MacDonald] For elegant housing in small spaces, see Donald MacDonald's *Democratic Architecture*: http://www.donaldmacdonaldarchitects.com/publ_bldg.html
 14. [Brooks] *On Paradise Drive*, David Brooks, 2004.
 15. [Livable Cities] This type of (hopefully humane) homeless integration is espoused by the International Making Cities Livable group, <http://www.livablecities.org>, headquartered in Carmel, CA.
 16. [Grocery] "Will suburbanites use "granny" grocery carts?" <http://www.cities21.org/granny.htm> , Steve Raney. Working paper from U.S. Environmental Protection Agency's "Transforming Office Parks into Transit Villages" Study. Includes a national dialog with traffic reduction experts.
 17. [Parking] A) Policy paper submitted for TRB 2010. Working paper: <http://www.cities21.org/paidParking.htm> . B) "Paid Automated Smart Parking Design for a Large Office Park," Steve Raney. November 2005. ITS (Intelligent Transportation Systems) World Congress. http://www.cities21.org/ITSWC_SmartParking_071505.pdf
 18. [Silver Bullet] A) Transportation Research Record: Journal of the Transportation Research Board, Suburban Silver Bullet: PRT Shuttle and Wireless Commute Assistant with Cellular Location Tracking, TRB, National Research Council, Washington, DC, Number 1872, December 2004, pp. 62-70. Steve Raney. http://www.cities21.org/PRT_Wireless_TRB_111503_web.pdf. B) "Method for GPS carpool rendezvous tracking and personal safety verification," Steve Raney. United States Patent 7,136,747.
 19. [Hitchhiking] "Digital Hitchhiking," Steve Raney. Cascadia Center's Breaking Gridlock with Technology Conference, Feb 24, 2004, Seattle. <http://www.cities21.org/CascadiaHitchhikePaper.pdf>. The same concept is given a different name, "flexpooling," for the U.S. Environmental Protection Agency's "Transforming Office Parks into Transit Villages" Study: <http://www.cities21.org/FlexPool.pdf>
 20. [Thesis] "Suburban Silver Bullet: PRT Shuttle + New Mobility Halves Solo Commutes." Steve Raney. Masters Thesis, (Advised by Robert Cervero), U.C. Berkeley City Planning Department. September 2003. <http://www.cities21.org/silverBullet.pdf>
 21. [Value Added] "Transit's Value-Added: Effects of Light and Commuter Rail Services on Commercial Land Values," Robert Cervero and Michael Duncan. Paper prepared for the Urban Land Institute and National Association of Realtors, June 2001: http://www.apta.com/research/info/briefings/documents/cervero_duncan.pdf