

Sustainable Cities & Regions

Transforming Office Parks into Transit Villages

- Steve Raney, Cities21, Palo Alto
- Cut family energy use by 75%
- Background
 - Regional Planning / Trends
 - Smart Growth / Land Use
- “Way out there” solutions
 - Jobs next to housing
 - Culture / behavior
 - Flexpooling – human goodness
 - The final frontier: parking!
 - Personal Rapid Transit, etc..



Global warming & Peak Oil

- Is the U.S. doing enough?
- Sacrifice?
- 85% high-schoolers pessimistic
 - Self-fulfilling.



21.org





Beware LEED CZ

- Cubic Zirconia – fake green
 - Suburban sprawl
- Auto-oriented development
 - Rely on auto for almost all trips
- Single use, low density development
- Separate shopping & working
- LEED ND begins to address.



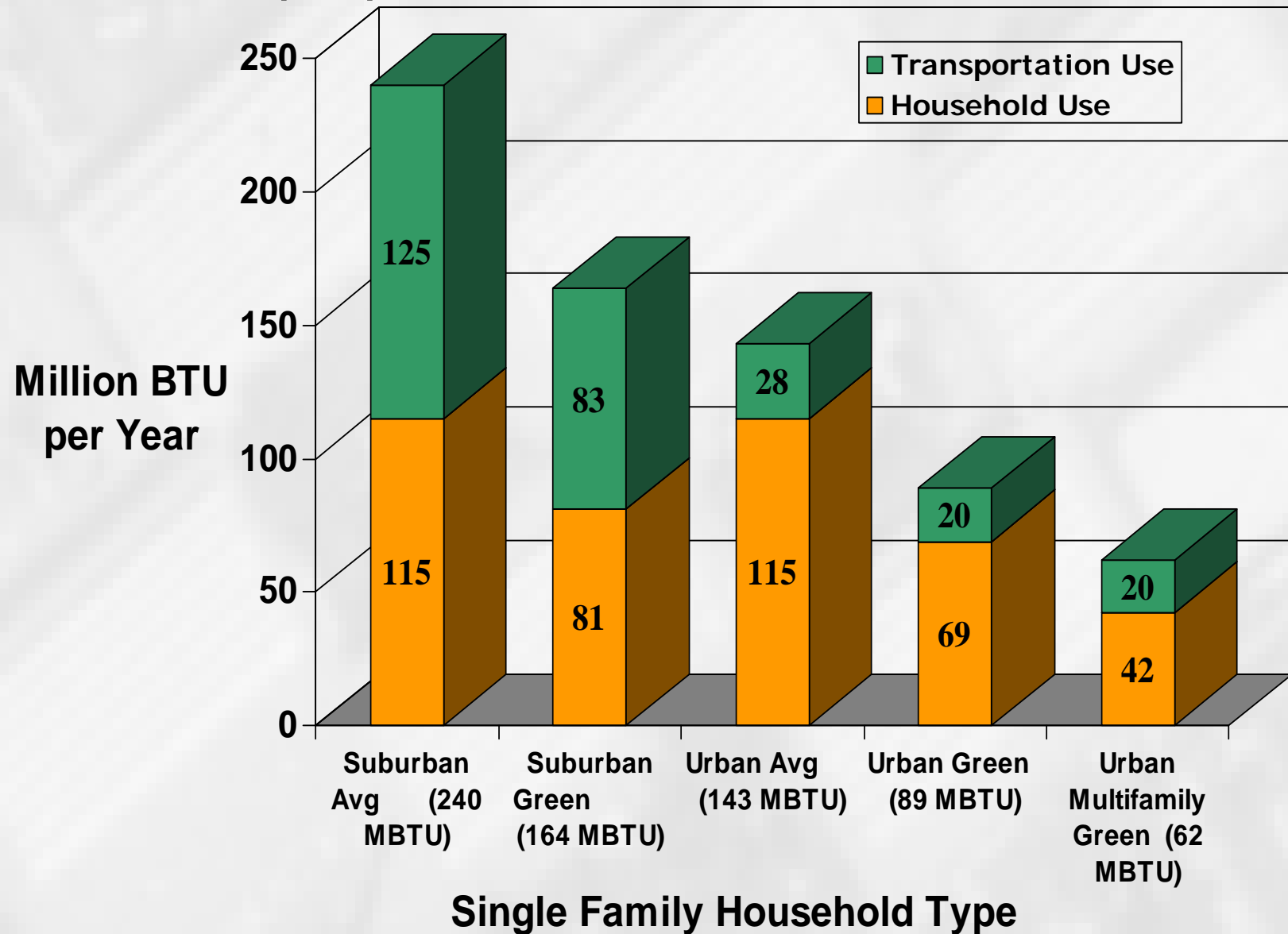
Love drivers, hate walkers

Pedestrians in the Conventional Suburban Environment



Family Energy Consumption

Suburban: disproportionate to rest of world



Smart Growth Magic

- Streetscape and circulation Improvements







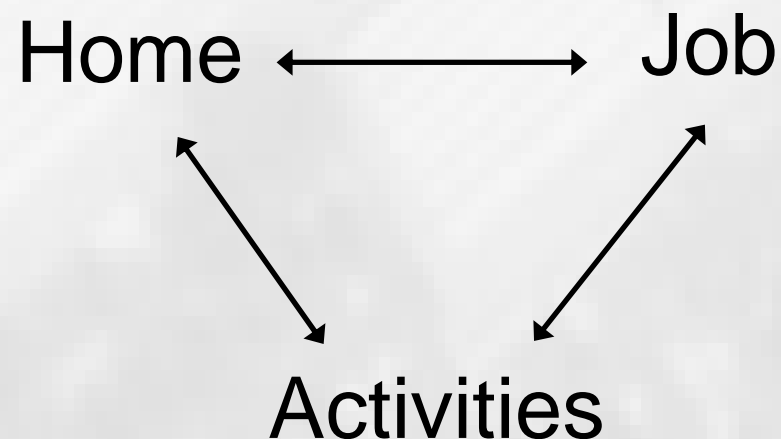


Regional Visioning / Trends

- 30 big U.S. metro regions are “visioning”
 - Fregonese Calthorpe has 80% market share of these studies
- 25 years, 50% population growth
 - Smart growth scenario, 40% mileage increase
 - Sprawl → 50%
 - Things get worse. Only slows the **acceleration of degradation**
 - Current Smart Growth is good, but not a solution
 - Need more, bigger, smarter SG faster, dang it!
- Prepare yourself for Cities21 solution
 - Complex, comprehensive, outside-the-box
 - “not too bad.”

Efficient Human Settlement Patterns

- For each person, minimize the distances in the triangle below. Miles → feet
 - 4 story new urbanist mixed use transit village
→ less than 50% car trips (walk > transit)
 - (GB Arrington, TCRP 102) – “walk to quart of milk”
- πr^2 :: pipes, wires, streets, distribution. Infrastructure cost savings in the billions for Envision Utah. (25% -TCRP 74)



Goals

- 62 MBTU, not 240 → Kyoto
 - Can fed Govt cut family energy by 75%?
- Lower cost of living + upward mobility
- Profit (no govt \$ to scale up subsidized program) → viral
- Unleash human goodness
- → stomp pessimism: show method to solve big problems.



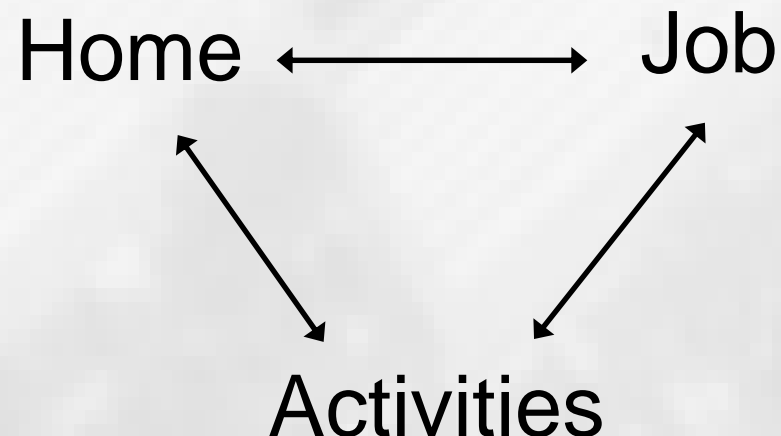
End of Background

- “Way out there” solutions
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 - The final frontier: parking!
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Traffic Reducing Housing

- Priority access to new housing for green commutes
 - Waiting list
 - Green: transit, carpool, bike, short drive
- The most cost-effective suburban traffic reduction policy (ever) .



3 Traffic Reducing Hsng Examples

- Santa Barbara: 42 affordable apartments
 - 40 block walkable, mixed-use downtown
 - Priorities: no cars, work downtown
 - Result: TWENTY cars
- Stanford West: 515 apartments
 - Shuttle bus, biking, hostile to cars
 - 396 Stanford, 96 hospital, 14 Palo Alto, 9 long commutes
 - 10% short-commute rent discount
 - 1,200 less tons CO2/yr
- Redwood City: 800 condos
 - 1 mi from dwntn, bike path
 - Cities21 victory
 - 4 months: green commutes
- 1MM homes: 3MM tons/yr.



Culture: Low Mileage Community

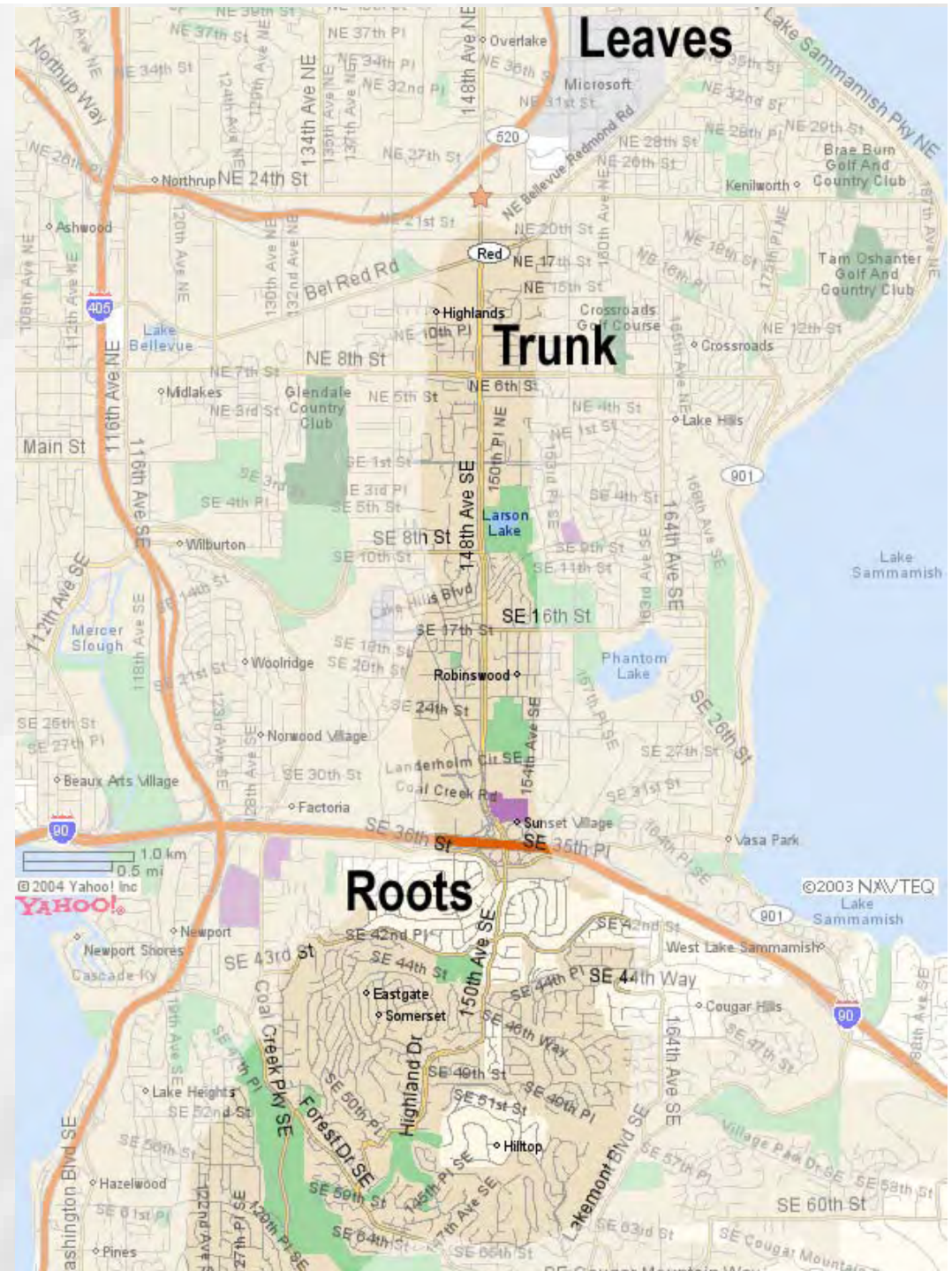
- Exploit human behavior research
- Non auto-centric culture
- Good Deed Doing (make it easy. Comes out in interviews w/ tech workers)
- EBay's online community phenomenon
 - Make friends, achieve social status
 - Self polices bad behavior
- “Communities of Practice” – expertise around a problem domain (less auto mileage).

Low Mileage Scheme

- Big new residential complex
- Everyone signs low mileage pledge
 - Entry condition to obtain housing
 - People are “self-consistent”
- Manufacture a tipping point
 - Positive peer pressure
- Problem-solving think tank. Online & in person
 - Carpool to grocery store, delivery services
 - Ex: Biking learning curve: route, gear, defensive
 - People love to share such self-discovered expertise
- ➔ political will for Pew’s govt solutions.

Flexpooling

- Exploit GIS patterns
- Bus + safe hitchhiking
- RFID & cellular.



Paid Parking / Tragedy of Commons

- Paid parking (at suburban offices) reduces commute trips (and CO2) by 23%
- Tragedy of the Commons – no office wants to be the first to charge → less competitive.
- Need to all “jump in together”
 - Example: smoking ban in bars: Bloomington, St. Paul, Minneapolis
- A Cities21 advocacy attempt.
 - Redevelop parking spaces & distribute “found” wealth
 - Start with \$1 per day & increase each year.

Halve SOV Commutes



- Goals:
 - Remove many cars from suburban offices
 - Current: 80% drive alone, little transit, some carpool
 - Intensify land use / **reclaim parking lots**



PRT – Personal Rapid Transit

- Feeder / Distributor / Circulator
 - Similar to a monorail. [Video](#), [MS Campus](#)
- High service level, no waiting, faster than a car.
 - Non-stop, 30 MPH
 - Bypasses intermediate stations
 - Ride alone or with 1-2 people you choose
 - Convenient stops by buildings (not on street)
 - Comfortable, quiet, safe, no exhaust
 - 24x7
- 6 development efforts underway
 - UK, Sweden, Korea, MN, TX, Dubai.

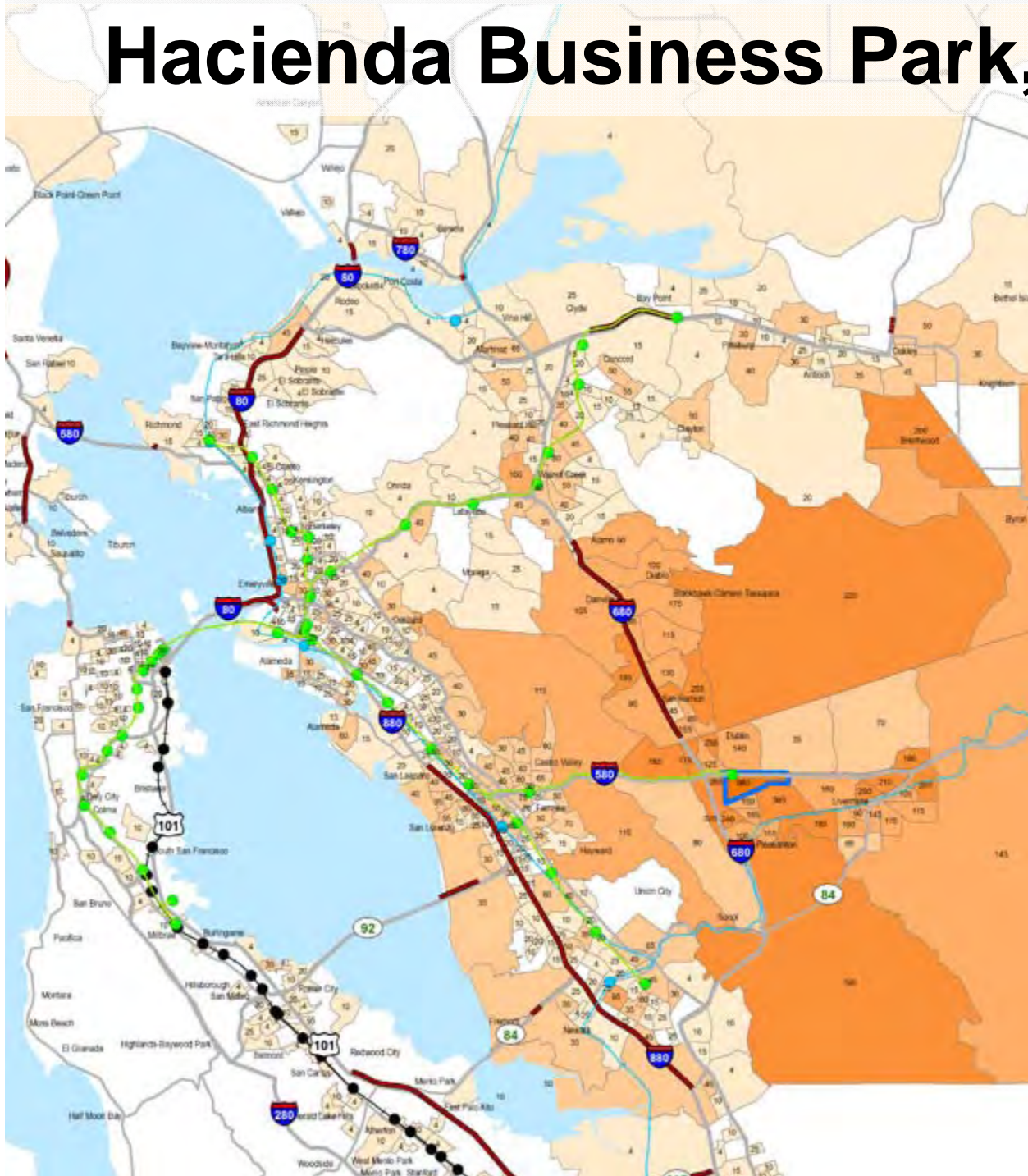


Hacienda PRT

- 15 mi one-way track
- 47 stations
- Huge transit village



Hacienda Business Park, Pleasanton



- 10 MM s.f. (\$3BB)
- 19,000 jobs
 - 84% SOV, 1.7% transit
- End of BART line
- Auto-centered
- 3,500 residents
- “HBP+” 2015
 - 9,500 residents
 - 29,000 jobs
 - 1MM s.f. retail
- 185 U.S. edge cities

Promising Results (85 surveys)

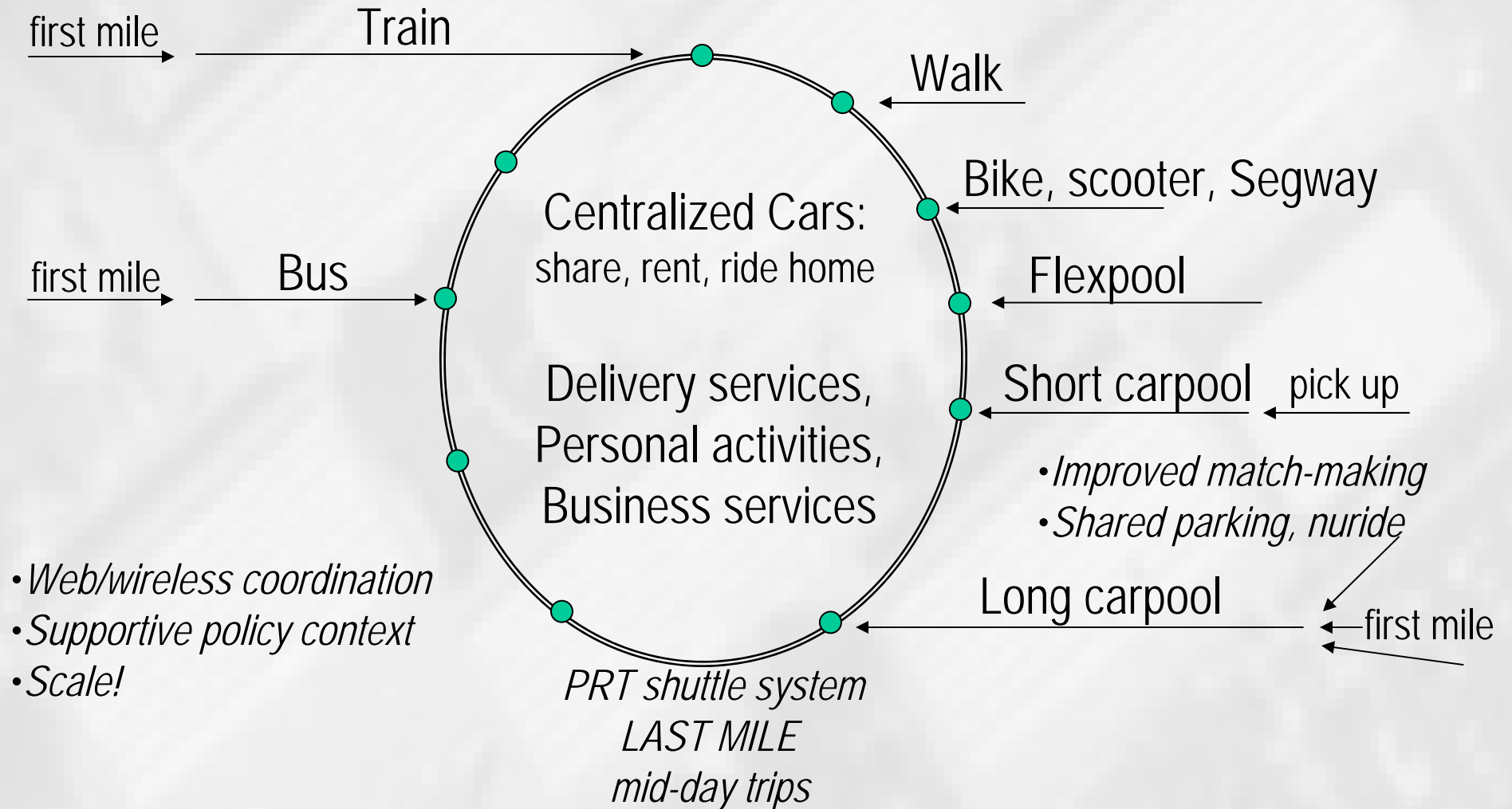
	current mode %	2010 mode %
bike /ped	4.20	10.34
bus	4.08	8.63
carpool	5.99	13.57
flex pax	0.00	4.37
train	10.51	21.28
SOV	73.09	41.84



- Remove 5,000 autos, in-fill 50 acres
 - Huge transit village → land value increase
- 1.4 PRT trips/day/person => PRT: profitable
- Apply to 6M workers in major emp. centers
 - 1.98M cars, 12B VMT, 424M gals, 4MM tons CO₂ .

Comprehensive, Integrated Mobility

Door to Door



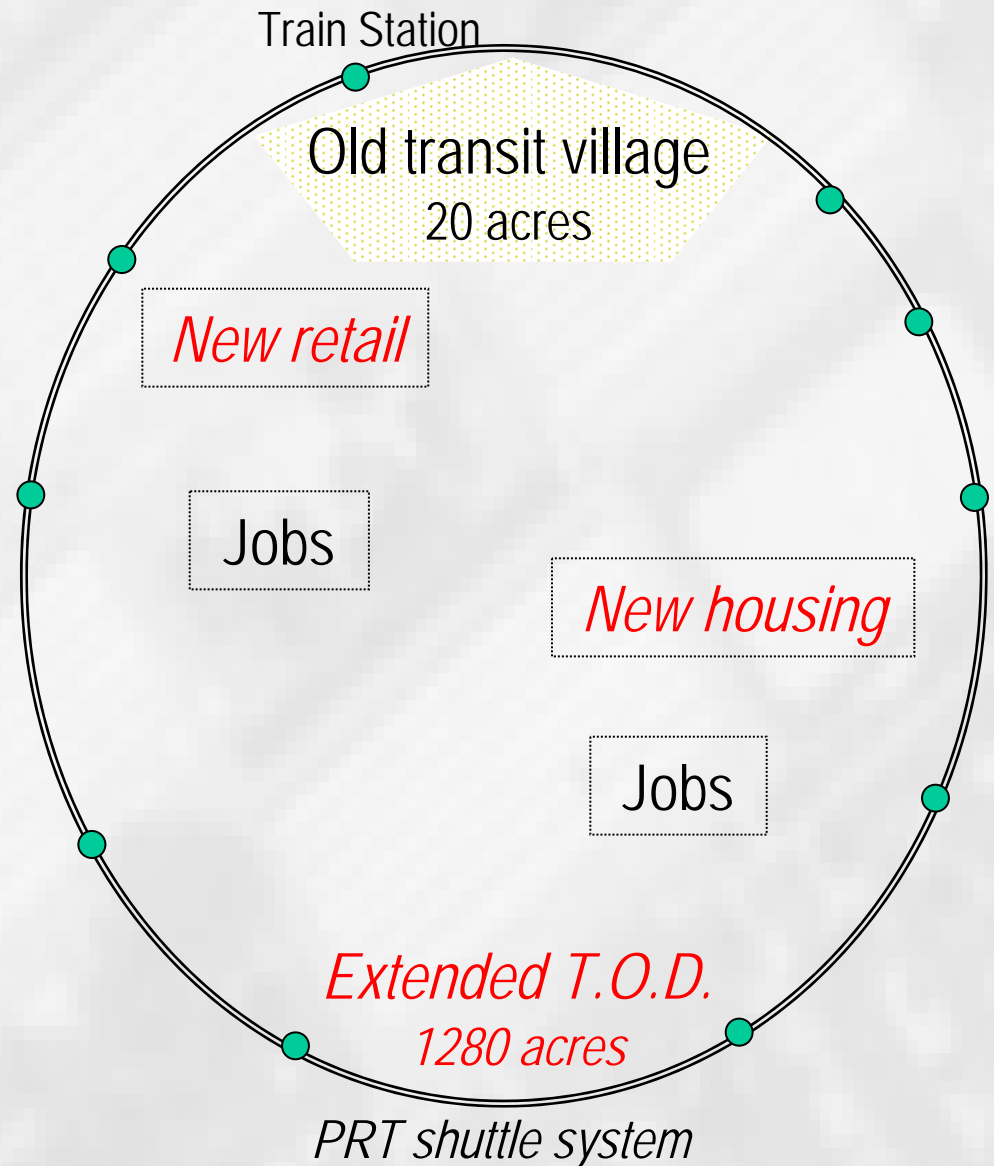
Cellular Solutions

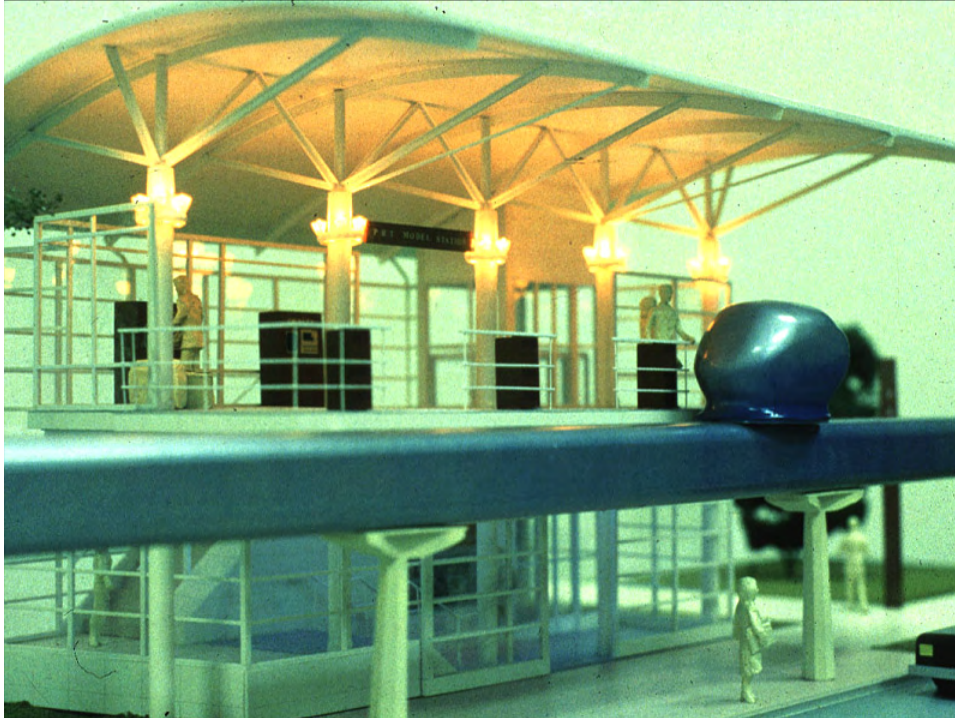
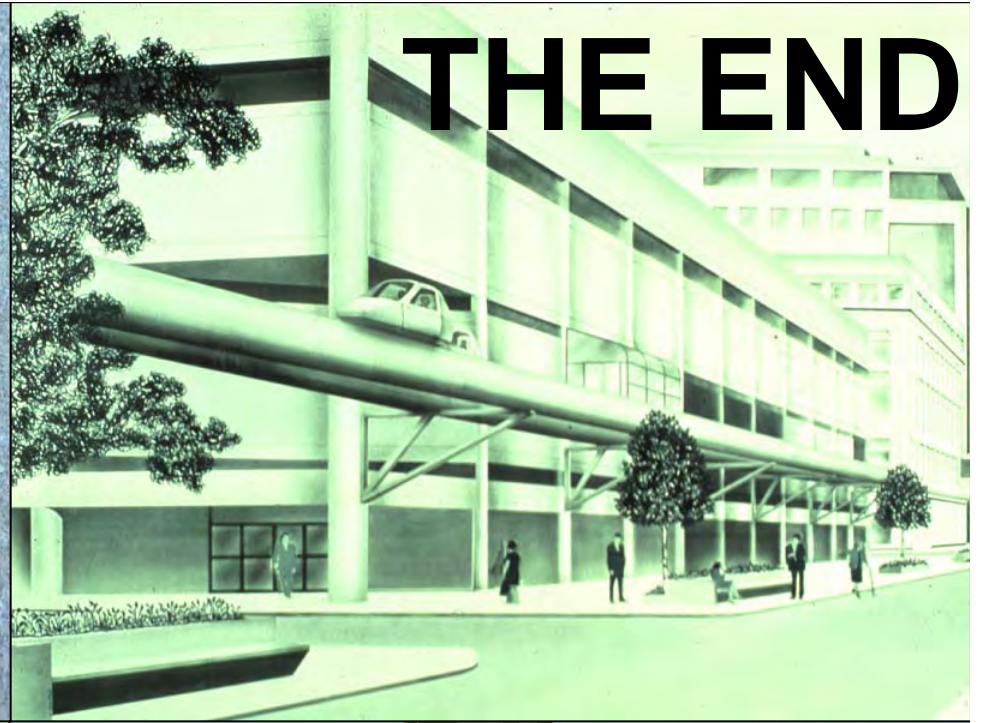
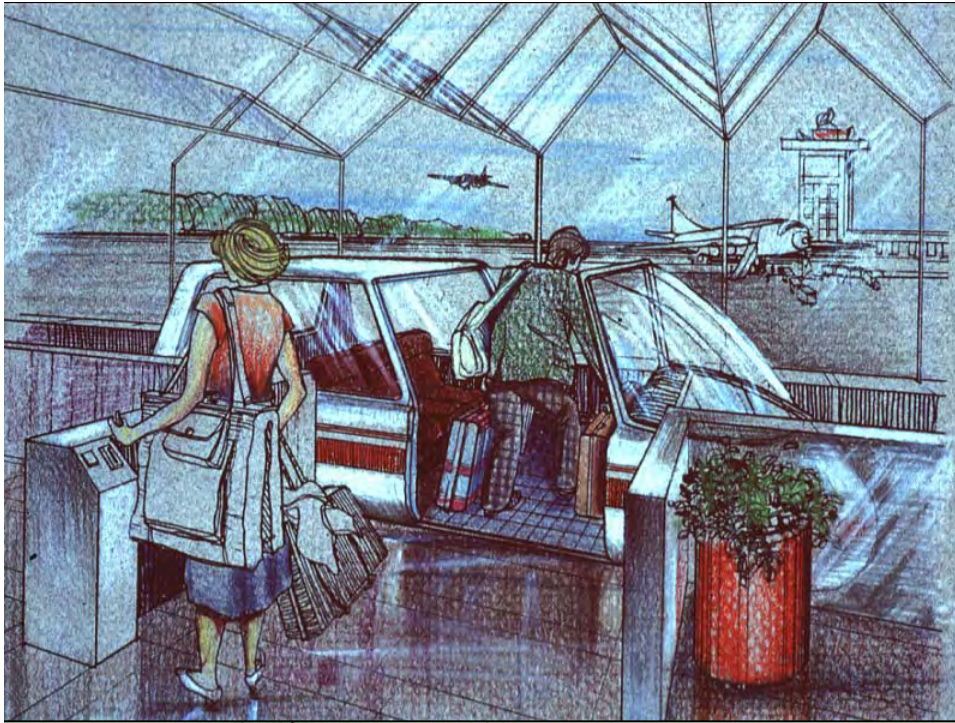
- Marauder's Map (GPS)
 - Transit, rideshare connections
 - Like NextBus
 - Get home safe (Big Sister is watching).



“New Suburbanist” Transit Village

Ever-expanding walkable areas.





THE END

Quantum Innovation / Public Policy

- Political subsystems favor incremental change
 - ag, defense, energy, transit, healthcare, edu, etc.
- Innovations produce winners & losers
- Public sector: huge penalty for failure
- Media stifles innovation, accentuates conflict
- Macropolitical system can impose quantum change – earmarks, etc
 - '79+: mature democracy, entrenched interests
- Billionaires & tech foundations: quantum
- Strong govt: Dubai, China.

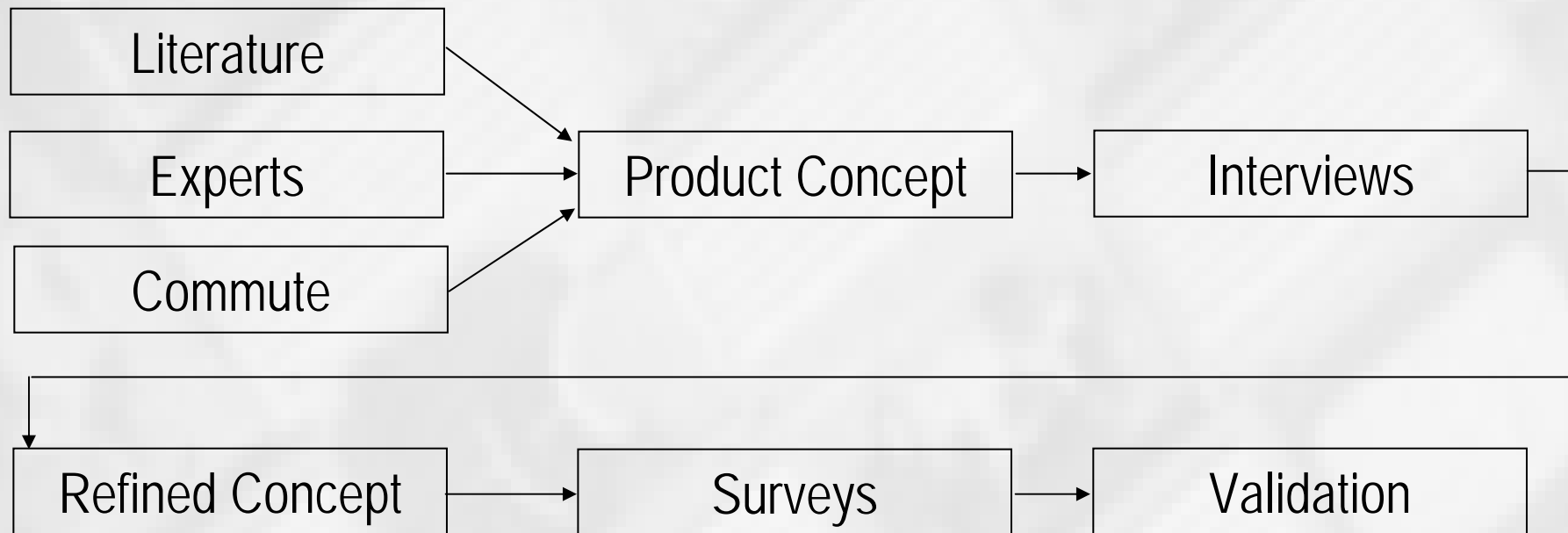


Social Entrepreneurism

- Act local (small \$), think global
 - Fix 1 city → world is saved
 - (viral spread, mutation)
- Govt is not the solution
 - resistant, but good follower.



Customer-Centered Product Research



- Deakin says we need it. Silicon Valley style
- New technology bias
 - High touch / community building is natural
 - Takes on personality of researching organization
- Start with rough business case in mind and refine.

Customer Centered Research

- Large solo driving reduction is hard
- Last mile problem is very important
 - Mid-day trips: 2X value of time
 - Workers are unhappy with bus shuttles
- Each commuter: basket of objections
 - PRT last mile is important, but not sufficient
- 30% time penalty: OK
- Carpool psychology is complex:
 - Matchmaking: anonymous, superficial rejection (web dating)
 - Sleep, uncertainty stress, and safety are important
- Short Caltrain or carpool with PRT: OK
- Customer support: eliminate nightmares
- Stranding: want “no penalty” emergency ride home
- Good commute: “time went fast.”



5 PRT Development Efforts

- ULTra, Cardiff, Wales (1km track, 2 vehicles)
 - Won Heathrow System RFP
 - \$10M investment by British Airport Authority
- Korean Posco/Vectus for Uppsala, \$40M
- Korea Railroad Research Institute: \$30M
- Skyweb Express / Taxi2000, MN
 - (60' track, 1 vehicle). Scale model
- Microrail, TX (60' track, 1 vehicle)
- Dubai procurement
 - no public review!.



PRT Investor Due Diligence

- The Team – entrepreneurial cost control, etc.
 - IBM vs. IBM skunk works. Golem Group
- Control system design (architect spends 1/3 of time writing safety documentation)
- Control system safety certification
 - Public utilities commission?
 - Each SW “version” requires painful re-certification
- Annual operating costs
 - Video surveillance, etc.
 - Insurance for the first system will be high
- Switch reliability (1 fail out of 2M trips → 50 days)
- Performance degrades near capacity (wave-offs).

TrakRide

AM pickup

A: 10 min

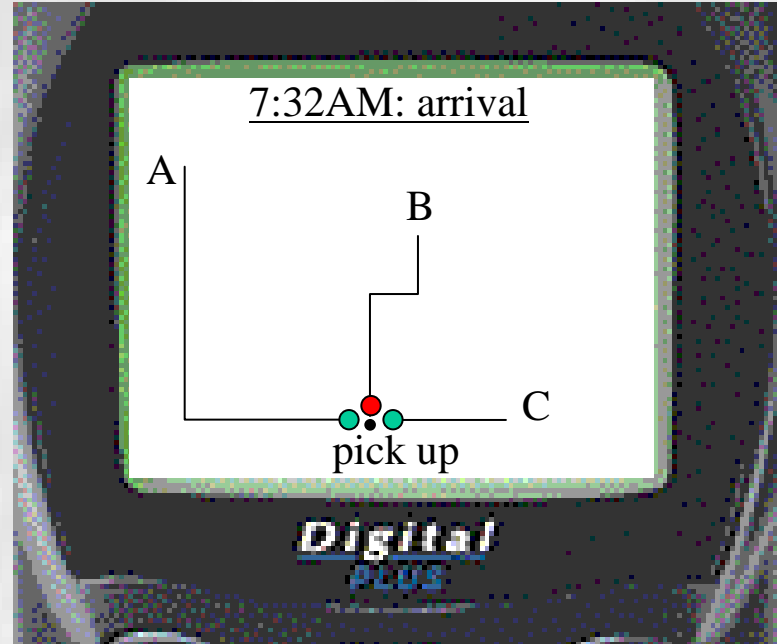
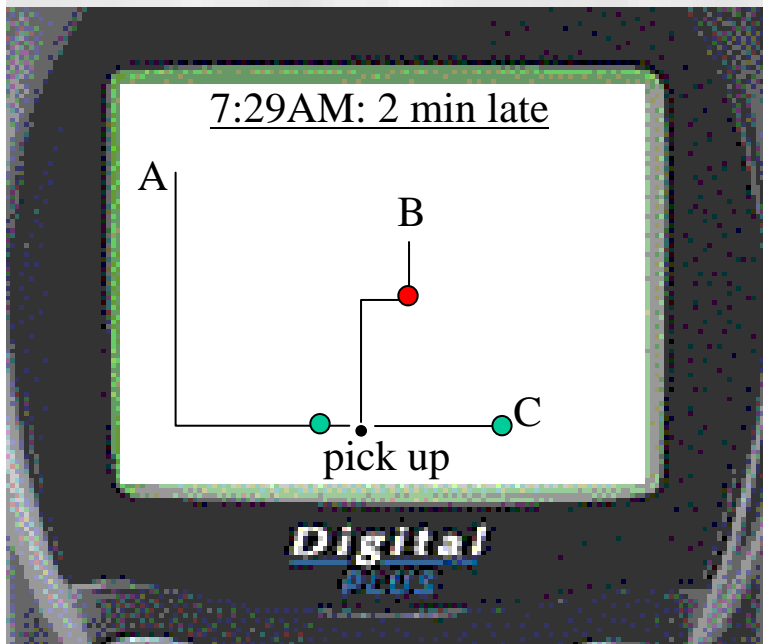
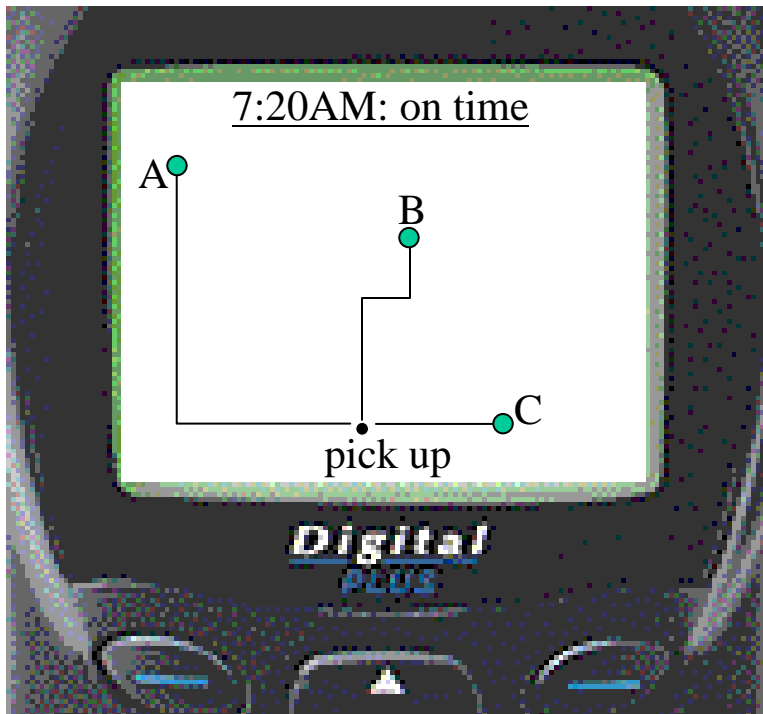
B: 7 min

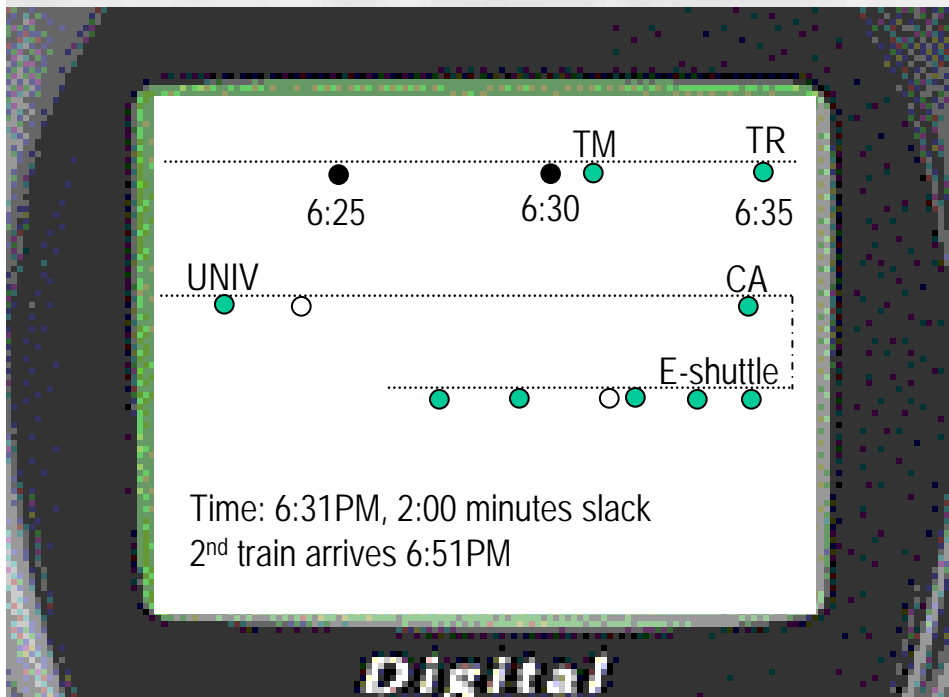
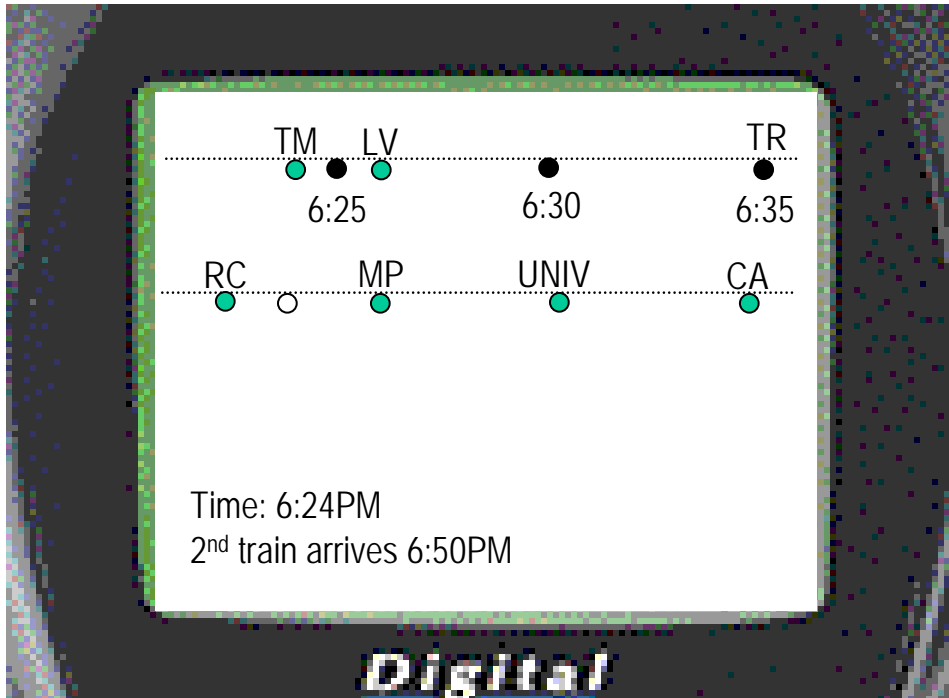
C: 3 min

SMS nudge to
A at 7:10, 7:15

A departs OK
B is 2 min late
C delays 2 min

Encourages
punctuality,
courtesy.
Eliminates
uncertainty.





NextTrain

- When to leave desk
- Race to train station
 - Worker must “win”
- $PRT\ wait = fcn(demand)$
- Slack
- TR: 6:35PM train is on time
- Every 30 sec, recalculate
 - TTAT: time to access train = 1 min walk + 1 min wait + 4 min PRT + 1 min walk + 2 min slack
 - $LV = TR - TTAT$
 - TM: current time
- Small beep @ 5, 2 min to LV
- NextTrain orders PRT vehicle 2 min before LV

PRT Office Park Economics

COSTS	\$M
PRT capital costs, 5 mi	50.0
Shared, automated parking	4.9
Annual PRT O&M	3.0
Pedestrian landscaping	?
ROW acquisition	0.0

ANNUAL REVENUE	\$M/year
PRT farebox	4.9
Caltrain increment	2.7
Ads - personal + wraps	3.5
6,600 parking sp. reduction	4.0
Eliminate bus shuttles	0.3
\$0.50 daily smart parking	1.3
Use guideway for utilities	0.3
total	16.9

OTHER REVENUE	\$M
50 acre housing profit	326.3
-1% job turnover/yr	20.0
Worker hsng preference	?
35% retail sales increase	?
cellular carrier preference	?
Exclusive delivery franchises	?

3 stage path to sustainability (Risse)

- Can't go straight there
- 1) Populist: Consciousness raising, recycling, sea bass, Prius, non-threatening to government
- 2) Fundamental: efficient human settlement patterns. Land-use conversant population, government restructuring. Green building
- 3) Profound: 80% NRG & resource reduction, 4B population, accurate pricing, renewable NRG, diet restructuring, anti-materialism, lower GNP, etc

