

December 1, 2004

11.947 New Century Cities: Real Estate, Digital Technology and Design

Residential Development in MIT's New Century City

Aligning Incentives and Creating Value

Mark C.K. Lu
MSRED 2005 Candidate
MIT

Introduction

Technology and innovation may fuel the New Century Cities (NCCs) but residential development in these communities must also participate in the creative energy and synergy of the community. Instead of NCC developers envisioning a “world of tomorrow” where perfect pot roasts rise from futuristic kitchen cabinetry, what *existing* technologies could be incorporated into and actively enrich the daily routine of the NCC resident and the NCC community. Notably, what would be feasible but innovative characteristics of residential development in MIT’s NCC?

Each New Century City is the result of intensive planning and the enlightened cooperation between institutions, corporations, and governments. Residential use is a common element to nearly every one of these developments, yet much effort is centered on the technology space and the creative synergy that will result from this unprecedented public and private cooperation. The creators of NCCs have envisioned a dynamic existence for NCC residents but, in many cases, there has been limited attention to the character of the residential space itself. In our own MIT/Kendall/University Park NCC there is a paucity of residential development and the potential of residential space has been minimally explored. Like other NCC housing development,¹ MIT’s residential buildings participates little in the technology element and ideology of the NCC. For instance, the ongoing addition of 400 apartment units at MIT’s University Park grew largely from the city of Cambridge’s requirement for housing rather than by design. The lead developer on the project who, over 20 year period, had the foresight to transform a defunct industrial zone into the University Park life sciences and high-technology center, describes the residential housing within the campus not in terms of innovation or ideology but in solely the context of the building’s shared ‘design vernacular’ with the rest of the development.²

¹ With the notable exception of the ‘Lifetopia’ concept of Seoul’s digital Media City which has actively addressed the melding of technology with urban communities. <http://dmc.seoul.go.kr/english/index.jsp>

² Gayle Farris, President Forest City Development. Comments made during lecture given at MITCRE November 2004.

Exhibit 1: Examples of NCC Residential Development Projects

Century City	Residential	Other	Location	Technology & Amenities
Crossroads Copenhagen Denmark	1500 units	Student residence halls	2 locations – one next to student residences, other development next to IT center, park, metro	Residences adjacent to IT center and university setting
Arabiananta Helsinki Finland	8,000-10,000		“Near downtown”	HelenIT’s Optical Fibre Networks in every building of the new residential and business area in Arabianranta.
Digital Media City, Seoul Korea	Anticipated	Hotel	Main NCC intersection	Part of fully integrated wireless DMC lifestyle
Mission Bay San Francisco CA	6,000 including 1700 affordable 430 additional academic units	Hotel (500 Rooms)	Next to special events plaza with mixed use retail New rail station built to site Multi-purpose park	Internet access WWW and UCSF web New campus will have community center, library, food services Automatic membership for campus fitness center
University Park Cambridge MA	420 Units some affordable	Hotel	Nestled between Biotech center and MIT	Internet Participates in ‘design vernacular’ of surrounding life-sciences technology center
MIT Proper	Student housing	None Planned residential in Kendall Square	University Campus	Limitless opportunity

Residential Place in the NCC

Nearly all the NCC developments have incorporated some kind of residential product into the technology center environment. (Table 1, above, includes a sampling) Residential products in NCC’s include apartments, hotels, student housing, and even short-term suite housing. These products are well-situated and often intertwined with commercial and research buildings, public spaces, or directly adjacent to institutions of learning. Nearby public transportation and major thoroughfare intersections provide open infrastructure gateways to visitors and residents.

All of these attributes contribute to exceptional value in residential development in NCCs. Each NCC by design exhibits the agglomerative location and demographic characteristics that residential developers strive to capture. Here, in the NCC, there is a potent mix of employment, commerce, and ideally, community. These large-scale developments are intended to be *cities* where people work, live, and play in concert or close proximity. NCC residents might be members of high-technology or life-science corporations, academics from sponsor institutions, or any individual or family that wants to take part in the energy of a forward-thinking community with a global perspective. The population that surrounds, supports, or is employed by MIT harbors many of these characteristics but few, other than students, actually live and anchor a residential community within the MIT/Kendall/University Park NCC. Thus, in many respects there is effectively no permanent residential community at MIT.

Location and Integration into the NCC Community

The MIT NCC arguably encompasses some of the most valuable potential space for residential housing in the nation.³ Residential real estate in the greater Boston area ranks as some of the most expensive in the country and Cambridge is no exception. Furthermore, within Cambridge, MIT is framed by acres of river and riverside park frontage. Views of the Boston downtown skyline are some of the best in the city. The campus is bisected by Massachusetts Avenue, one of the main gateways to Boston, and is served by both private and public bus lines and a nearby subway. Cultural satellites of Central, Inman, and Harvard Squares are a short distance away. These fundamental attributes, in combination with the economic diversity that the NCC energy brings, create fertile ground for a stable and successful residential community.

Land for development can be identified throughout MIT. While there are potential sites everywhere, to best harness the density, diversity, and activity of the campus, the intersection of Massachusetts Avenue and MIT's 'Infinite Corridor' represents the strongest confluence of these positive characteristics.⁴ Proposed residential sites for this key physical and cultural intersection are noted in Figure 1. Mixed-use retail,

³ City of Cambridge Housing Market Information: 2003. www.ci.cambridge.ma.us/~CDD/data/housing/hsg_profile_2003.pdf

⁴ Astutely suggested by Professor D. Frenchman.

woven into the fabric of residential life in the NCC. Chosen technologies should add value to the experience of its users but not be cost prohibitive to the developer. An example of just one such medium might be radio frequency identification (RFIDs). Mass production of RFID components has resulted in an attractive pricing and availability in numerous building and retail products. For instance, after work, an NCC resident might leave his or her apartment for light snack before attending a film with friends. He or she pockets a mobile phone/PDA equipped with a barcode reading camera and an embedded RFID tag.⁵ On the way out the door the RFID triggers a sensor to turn off lights and reduce ambient temperature in the apartment. The resident heads upstairs to the top floor lounge café where he or she orders a muffin and coffee and pays by placing the phone to an area on the café countertop. The resident then checks the phone/PDA for one of the many available flexible media rooms throughout MIT,⁶ makes a reservation that is then forwarded by SMS text to a circle of friends. Once at the reserved room he or she waves the phone in front of the door handle to open it and is charged for the room.⁷ Friends arrive and collectively choose an Almodovar film from the thousands of pay-per-view options accompanied by barcodes on the screen. The resident aims the phone at the screen, a transaction is recorded, and the movie begins.

Aligning Incentives – Value proposition

Housing is as much a source of revenue in the NCC proforma as any other component. Indeed, housing may bolster the success of commercial and institutional tenants by providing close proximity housing for staff and a fluid transition between live and work environments. Clearly there is more benefit to residential products in the NCC than simply location. Just as technology must be showcased in the NCC residential setting so should an innovative approach to assessing value. With proper implementation, residential development will have the effect of creating tangible value for the developer and palpable social value for the community.

⁵ “Super Phone” *Forbes Magazine* Sept 20, 2004 pp 177-78. : Kei-Iochi Enoki, a founding father of the mobile Web, is moving beyond e-mail and games to make the phone a remote control for living.

⁶ http://www.regus.com/Flexible_multi-use_space

⁷ http://www.electrocom.com.au/rfid_access.htm RFID Access control
http://www.electrocom.com.au/rfid_elock.htm RFID Door Lock

It has been noted that a fundamental disconnect exists between developers incentive to incorporate high technology and high efficiency hardware into buildings with the upfront capital costs it takes to implement these amenities. Tenants, it would seem, would be the chief beneficiaries of the improvements. High efficiency building design, appliances, and HVAC systems result in lower utility bills for the residents while faster cable, WIFI service, RFID entry, provide convenience and time efficiency not captured by the building's owners. In fact, incorporating these amenities into buildings can offer much desired value to both the tenant and the owner and, through positive externalities, to society as a whole.

One way to achieve this might be bundled rent structure. A streamlined singular monthly fee (or a base rent with a usage ceiling and pro-rata overage) would include rent, broadband access, telephone, electric, water, or other incidentals. Many of these service amenities are offered as a package in the marketplace with significant cost savings with multiple collectivized accounts. Additionally, if the developer has properly created an energy efficient building a bundled flat fee will allow owners to reap the benefits of good design and implementation by unlocking profit between actual operating costs and bundled monthly rent. Low-energy ground source heat pumps, high-efficiency HVAC units and appliances, and occupant use sensors (motion sensor lighting control or RFID HVAC shutoff) should reduce operating expenses. Systems integration products such as Siemens' Apogee system rely on sophisticated software and localized sensors to operate building systems remotely and efficiently, thereby minimizing maintenance costs.⁸ Furthermore, high efficiency appliances such as Bosch dishwashers have the added benefit of greater perceived brand value and a better build quality assures greater longevity in the field.

Other benefits reward careful design and execution. Residential development at MIT might follow the ideological guidelines of the innovative and much publicized Genzyme headquarters recently completed in Kendall Square, Cambridge. This award-winning building, developed by Lyme Properties, focuses not only on environmentally sensitive design and construction, but also on the quality of life of the employee community that it fosters. The building was conceived to attract, inspire, motivate, and retain top research

⁸ For more information on Apogee <http://www.sbt.siemens.com/bau/products/sysintegr/integration2.asp>

and management talent. According to Henri Termeer, the company's CEO, "People feel more creative and there is less turnover...we can justify the capital expense based on this."⁹ If thoughtful design and high technology in an NCC research building can have a positive impact on productivity and retention in the corporate arena so might similar efforts in a NCC residential setting.¹⁰ Retention in the residential setting, where leases are typically one or two years instead of the five- or ten-year leases common to commercial property, is of even greater importance.

A second lesson from Genzyme that might be easily adopted into a residential setting is a conscious effort to provide valuable common space. The top floor of the building, with its commanding views of the city, houses the employee cafeteria where everyone may enjoy the views and be inspired by the space. This communalization of desirable space makes individual 'ordinary' spaces collectively more valuable. Residences at MIT might consist of reduced square footage per unit at market rent (thus, greater rent per square foot) but in return offer access to expansive institutional spaces such as the athletic center, aforementioned media rooms, or vacant evening parking spaces. This effectively generates supplementary income (thus, greater value) for underutilized university real estate with the modification expense limited to installation of RFID access points. Use of these amenities and spaces could either be based on pay-per-use or on tiered access based on rent level.

To minimize the upfront capital burden developers might consider corporate sponsorship. Valuable media attention associated with creating a residential Genzyme building equivalent (with tighter cost parameters) would showcase emerging technologies. Collaboration with companies such as Siemens, Zipcar,¹¹ or Regus,¹² or the RFID industry could be a significant source of revenue. A collection of minor cost savings, from sources as specific as a ground source heat pump sales tax exemption,¹³ will ultimately contribute to the developer's ability to provide better technology and efficiency.

⁹ "Enlightened Behavior: The New Headquarters for US Biotech Company Pushes the Boundaries of Sustainability and Corporate Democracy" Bay Brown, *Architecture*: Feb 11, 2004

¹⁰ <http://www.buildings.com/Articles/detail.asp?ArticleID=1164> The Tenant/Workplace Equation

¹¹ <http://www.zipcar.com/>

¹² <http://www.regus.com/>

¹³ http://www.geoexchange.org/incentives/incentives_ma.htm. GeoExchange: Geothermal Heat Pump Consortium

Conclusion

There is a great opportunity in developing these residential spaces – residential space, because it provides the foundation for a dynamic community, is the crucial solidifying factor for the NCC. Without a strong residential presence drawing innovation and synergy into close proximity, the NCCs are in danger of eroding into branded technology parks. For a mega development to achieve the unique culture and environment of an NCC it must strive to promote a seamless live-work-play environment, attract and retain creative talent, provide economic and social gains for the host city, and foremost, become ‘eminently livable.’ At MIT, as in other NCCs, progressive and thoughtful residential development can enliven the existing community and enrich the texture of the NCC. In many respects the greatest challenge for NCCs will be the value proposition for costly high technology residential development; yet, with careful collaboration and planning developers can generate real revenue from existing underutilized assets, the collectivization of amenities, and efficient building technology that will translate into both social benefits and long-term financial rewards. In so doing, a fully integrated NCC will redefine urban living patterns, standards, and expectations while nurturing the innovation, the research, and the technologies that result.

Selected Bibliography (Not Inclusive of footnoted material)

Brown, Bay. "Enlightened Behavior: The New Headquarters for US Biotech Company Pushes the Boundaries of Sustainability and Corporate Democracy " *Architecture*. Feb 11, 2004

Fulfor, Benjamin. "Super Phone" *Forbes Magazine*. Sep 20, 2004. pp 177-78.

Pearce, Neal. "Great, Green Cities" -- Within Our Power?" *Washington Post Writers Group* (<http://www.postwritersgroup.com/archives/peir0621.htm>)

Weitzner, Daniel J. "Opinion: Buildings Become Information Systems." *CIO* Nov 27 2004.

(<http://cio.co.nz/cio.nsf/0/3082A780C47AE110CC256F580079E483?OpenDocument&More=Special+Feature>)

Useful Links:

Texas Instruments Building Access Control Applications (TI RFIDs)

RFIDs in building use

<http://www.ti.com/tiris/docs/solutions/security/building.shtml>

Association for Automatic Identification and Mobility

RFIDs in Construction Industry

<http://www.aimglobal.org/technologies/rfid/resources/articles/oct03/fiatech.htm> RFID

Building Technology Resources

MIT Building Technology Department: <http://web.mit.edu/bt/www/bt/Research.html>

<http://www.advancedbuildings.org/>