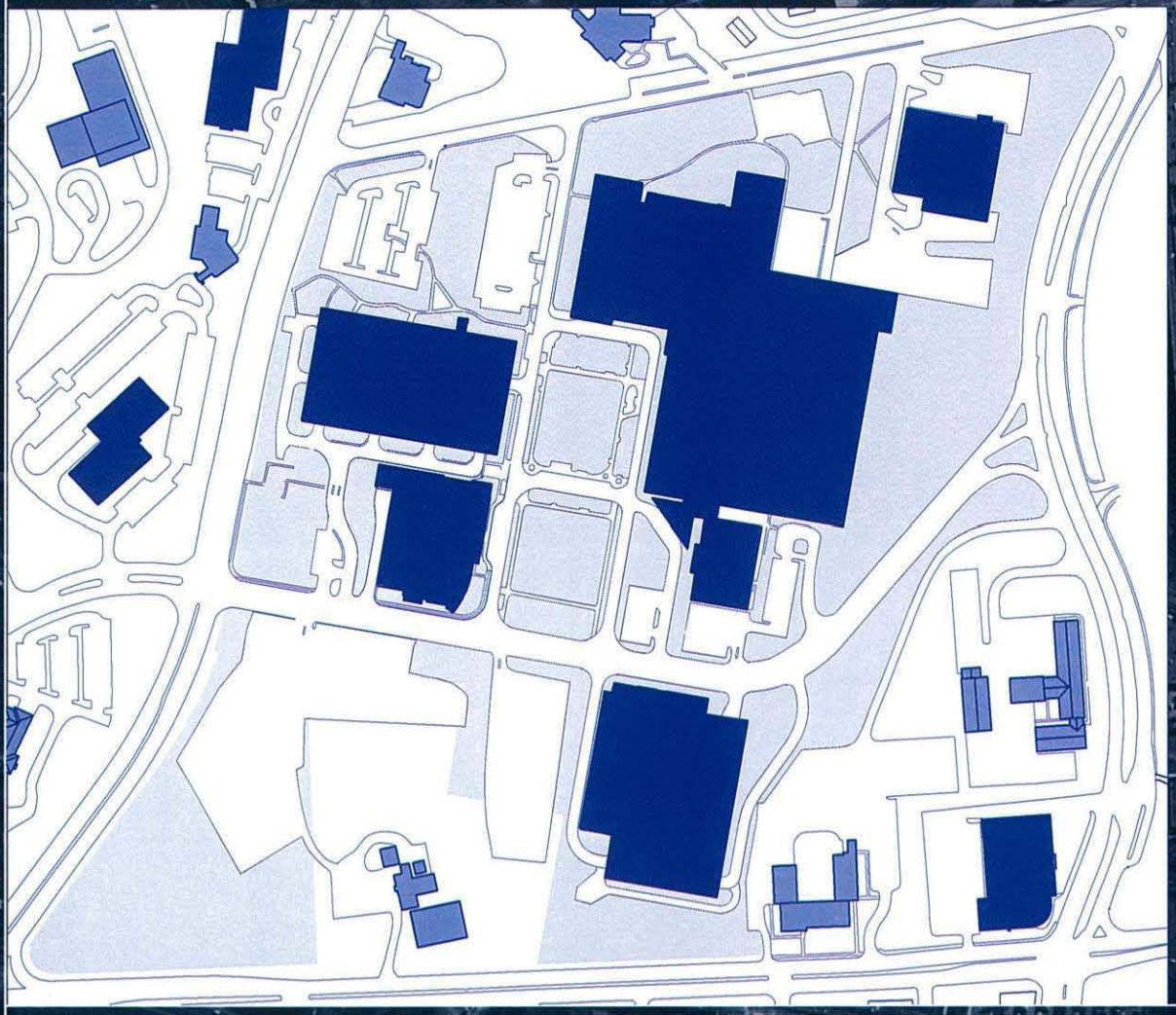

UMass Medical Center Master Plan

Massachusetts State Project UMW 0301 ST1
Volume II

Programming

- Programming Goals
- Education Research Visioning Report
- HealthCare Visioning Report
- State Outreach Visioning Report
- Education Center Program
- Space Projection Summary

Tsoi/Kobus & Associates
TK&A #23024-000
November 2005

University of Massachusetts Medical School

Division of Capital Asset Management

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TSOI / KOBUS & ASSOCIATES
ARCHITECTS

University of Massachusetts Medical School

Section I. Programming Overview

I. PROGRAMMING OVERVIEW

The UMass Medical School (UMMS) and the adjoining hospital, operated by UMass Memorial Health Care (UMMHC), are planned to substantially expand during the next ten years. In order to project the physical construction required to accommodate and facilitate the operation of these expanding organizations, a three-level approach to programming was employed. Programming was conducted on a coordination level for the Hospital, on a strategic level for Research and on a detailed functional level for Education.

Venues for this three-level approach included:

- Visioning Sessions
- Informational Meetings
- Space Programming Workshops

Visioning Sessions

Two Visioning Sessions were held to examine current and future trends in medical education, research and healthcare. Facilitated by experts-in-the-field, these broad-reaching, strategic-level discussions explored the interrelationships within the tripartite mission of academic medical centers. Case studies, national benchmarking and brainstorming techniques were used to explore the influence of these emerging trends on the future UMMS campus.

Themes explored included:

- Changes in teaching pedagogy and education curriculum
- Emphasis on translational and clinical research
- Economic pressures in healthcare reform and delivery
- Facilities response to emerging technology
- Growing interdependence and crossover among education, research and healthcare endeavors

Informational Meetings

Informational meetings were held with select focus groups to identify other programmatic and operational considerations influencing the future campus. Focus groups included the following.

The State Outreach Visioning Session provided an overview of UMMS' off campus sites and programs including Commonwealth Medicine. Several off campus education and research facilities were identified for potential relocation and consolidation to the main campus. Commonwealth Medicine, operated by UMMS, provides medical care to state agencies such as the state prison system, Division of Youth Services, Department of Mental Health and Department of Public Health. Although not the

highest priority, there are advantages to co-locating Commonwealth Medicine to the main campus.

The Education Policy Committee provided feedback to the preliminary education center program draft. The faculty reinforced their most pressing space deficiencies, including classrooms, student commons and library.

Space Programming Workshops
A series of programming workshops were held to develop a detailed space program projection for the Education Center component of the master plan. Existing space inventories, validated through walkthroughs of existing teaching facilities and a review of floor plans, were used to benchmark UMMS' current facilities and as a springboard for future space projections.

To initiate the process a Kick-off Meeting was held with administrators, faculty and staff from the larger UMMS and UMMHC community. Following the kick-off meeting, smaller workshops were conducted to focus on individual program components including:

- Student Affairs
- Anatomy
- Classrooms
- Clinical Skills Center
- Library/Learning Center
- IS/IT

After the first round of workshops, preliminary findings were presented to the UMMS School Committee. Feedback from this committee was taken to a final round of workshops with each of the program focus groups.

Programming outcomes are as follows:

Coordination level programming for the Hospital
At the time of this study, UMMHC was initiating a programming and strategic planning study. Space program information was not available for coordination with the UMMS master plan. Future space capacity estimates were based upon UMMHC's goal to achieve a top 10 ranking.

Strategic level programming for Research
Future capacity projections for the Research component were based upon the UMMS' goal to reach the top 25 of NIH-funded medical schools. Target research grant dollar levels were translated into needed square footage based on average dollar density levels.

Detailed functional level programming for Education
Education Center detailed space projections were built up through user discussions in the workshops and presented to the Executive Steering Committee for final review.

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University of Massachusetts Medical School

Section II. Education Research Visioning Report

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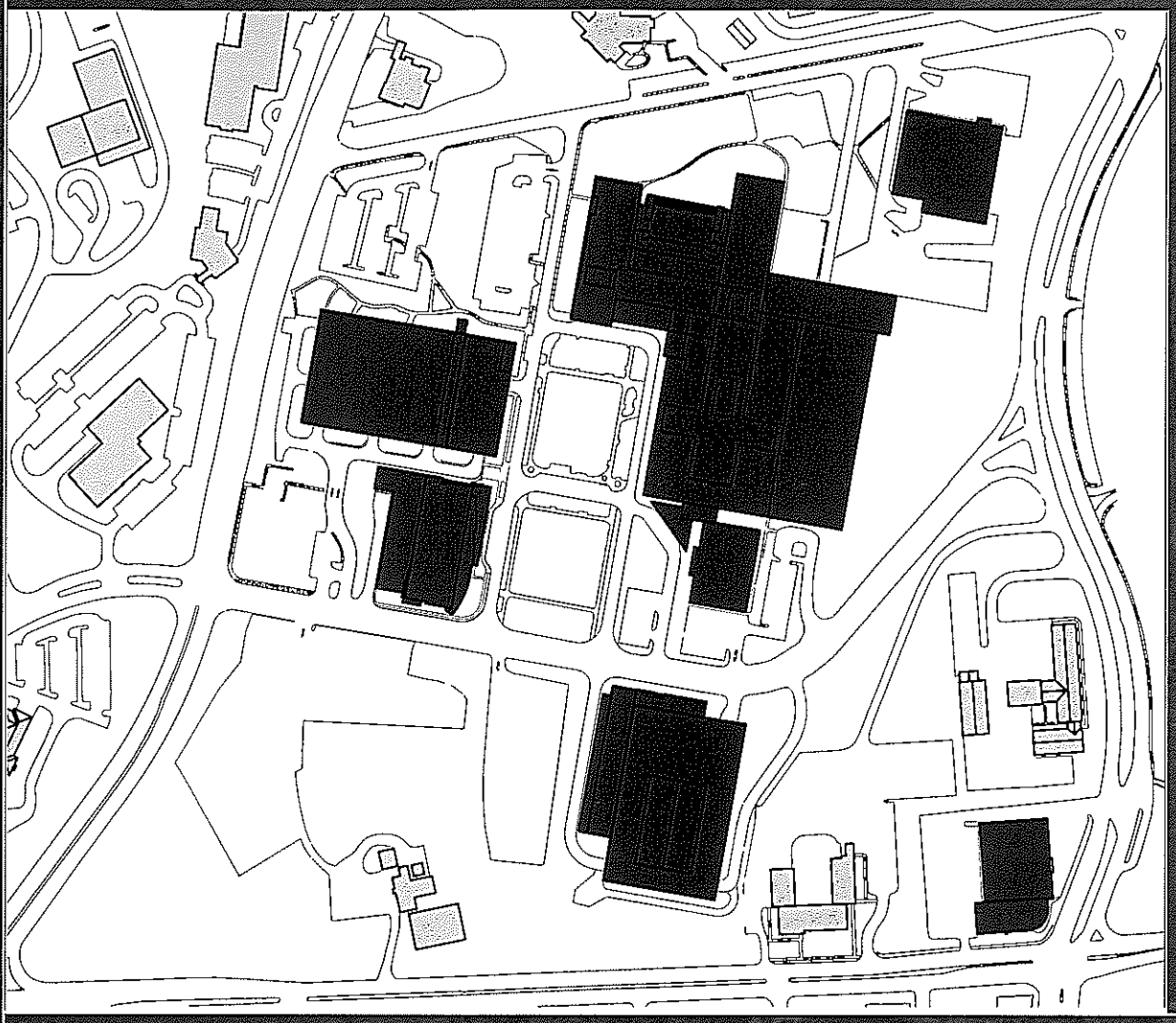

UMass Medical Center Master Plan

Massachusetts State Project UMW 0301 ST1

Education Visioning Session

Report Issued by:
Tsoi/Kobus & Associates
TK&A #23024-000
May 2004

University of Massachusetts Medical School
Division of Capital Asset Management

I. OVERVIEW

To initiate the medical school programming effort for the UMass Medical School Master Plan, a two-hour Visioning Session was held to discuss current and future trends in medical education. This discussion was co-facilitated by experts in the field ... David Greer, MD and Frank Rothman, PhD.

Frank Rothman, PhD, is Provost Emeritus and Professor of Molecular Biology at Brown University. He serves as a senior advisor to Project Kaleidoscope and has published numerous articles, papers and books including co-author of *Then, Now, and in the Next Decade: A Commentary on Strengthening Undergraduate Science, Mathematics, Engineering and Technology Education* (1999).

David Greer, MD, former Dean of the Brown Medical School, has published extensively on medical education. Dr. Greer is a major figure nationally in the development of primary care, a member of the Institute of Medicine of the National Academy of Sciences, has been active in health care at high levels in Massachusetts for 40 years, and served as chairman of the Board at the University of Massachusetts, Dartmouth. Since retiring, he has been active on a number of fronts, most recently in advising the faculty at the Memorial Hospital in Pawtucket, Rhode Island, where much of Brown's primary care and family medicine activities are centered. David has a background in Community Health and Geriatrics and before coming to Brown, did pioneering work on health care for the elderly.

Participants from the medical school included representatives from the Chancellor/ Dean's office, Faculty Administration, Graduate School of Nursing, Graduate School of Biomedical Sciences, Undergraduate and Graduate Education, School Services, Student Body, and Planning Services.

Each school and department gave an overview of their current programs and how they relate to existing facilities both on and off campus. There was a general desire to maintain the strong culture of collaboration and interaction that currently exists on campus. Some attribute this collegial spirit to the size of the existing campus as much as to the people. As the campus grows in the future, the campus plan should serve to reinforce the collaborative culture.

2. MEETING REPORT

AGENDA May 12, 2004

The Medical Education Vision
University of Massachusetts Medical Center Master Plan
Mass State Project UMW 0301 ST1

Facilitated by: Frank Rothman, Ph.D. and David Greer, M.D.

10:30am	Introductions: Carol Chiles, TK&A
10:35am	Visions for the Academic Health Center: Program priorities and initiatives, 2005-2020
11:20am	Role of partners in the planning and future involvement in programs: • UMass Memorial Health Care • Off-campus hospitals and other associated facilities
11:30am	Impact of the program vision on space planning: preliminary thoughts • Faculty/student, student/student and faculty/faculty interactions • Integration of basic science and clinical education • Greater integration of research into the educational programs • Education of Ph.D. students in clinical perspectives • Special needs of residents and fellows • Communications • Electronic (wired or wireless?) • Face to face, small groups, social spaces • Library Services • Physical connection between campus buildings? • A more prominent and visible center of gravity/presence on the campus for the School? • Animal Care facilities
11:50am	Brainstorming a case study, e.g. translational medicine
12:10pm	General discussion and next steps: Jack Synnott TK&A
12:30pm	Adjournment

MEETING NOTES

Mass State Project UMW 0301 ST1/TK&A #23024-00
UMass Medical Center Master Plan
May 12, 2004

Jack Synnott

Present:
Aaron Lazare, MD, UMMS
Tim Fitzpatrick, UMMS
Michele Pugnaire, UMMS
Joe McLaughlin, UMMS
Cheryl Scheid, PhD, UMMS
Dodie Harper, UMMS
Kathleen Thies, UMMS
Marilyn Leeds, UMMS
Deborah Harmon Hines, UMMS
Anthony Carruthers, UMMS
Jared Auclair, UMMS
Julie Hanaford, MD, UMMS
David Greer, MD
Frank Rothman, PhD
Eric Haugen, UMMS
Joanne Petmezis, UMMS
Tracy Burns-Martin, UMMS
Andrea Badrigan, UMMS
Sandra Beling, UMMS
Robert Houlihan, UMMS
Leigh Emery, UMMS
Sarah McGee, UMMS
Ruven Liebhaber, UMMS
Alan Chuman, UMMS
Elaine Martin, UMMS
Deb DeMarco, UMMS
Heather Lyn Haley, UMMS
Kathie Miller, UMMS
Schuyler Larrabee, DCAM
Ed Tsoi, TK&A
Rick Kobus, TK&A
Carol Chiles, TK&A
Jack Synnott, TK&A

Distribution:
Attendees
Tom Manning, UMMS
Mike Williams, DCAM
Lori Matthews, TK&A

1. Introductions
   - Carol Chiles, TK&A's Principal-in-Charge, introduced the purpose and format of the meeting as well as the guest speakers: Dr. Frank Rothman and Dr. David Greer.
   - Dr. Greer opened the discussion with a brief summary of the objective of this meeting and questions intended to provoke a response:
   - What does UMMS want to accomplish?

2. UMMS Vision and Goals
   - What are your priorities for undergraduate medical education, continuing medical education and other programs?
   - What are their research priorities in bench science, clinical, and Translational.
   - What are the clinical drivers for faculty, students and residents?
   - What does the future look like?
   - Dean Lazare gave a broad overview of the campus. There are the inevitable questions and tensions raised when the issue of resources is at stake.
   - The Graduate School of Biomedical Sciences is doubling in size, putting pressure on facilities.
   - The current facility is inadequate compared to Lazare Research Building (LRB). The thought has been to move all wet bench function to new space and use the current facility for dry bench research.
   - UMMS may want to build another small research building for this purpose. It was envisioned to be between the current building and LRB, linking the two.
   - UMMS faces some obstacles such as simulations technology being located off campus.
   - UMMS wants to further integrate the Nursing program into the school.
   - The Nursing School operates at a high school nearby and has summer programs on campus.
   - UMMS wants to push the medical school to be in the forefront and commit the necessary resources to accomplish that goal.
   - The Dean indicated that the area for "standardized patients" is located off campus. It must be relocated to this campus.
   - The existing student fitness room is very inadequate.
   - The two case method classrooms built seven years ago cannot meet the current need.
   - The 160-seat auditorium is used for Continuing Medical Education (CME) and conferences.
   - Continuing Medical Education is located in Shrewsbury. Over 1,200 people per month come through that facility.

3. Graduate School - BioMedical Sciences (GSBS) - Anthony Carruthers
   - The Graduate School needs a classroom that can accommodate an entire class. The Goff Case Method classrooms are at capacity. The first 1 1/2 years of Graduate School are focused on core curriculum, then into the lab.
   - They also need electronic access to the library, particularly journals, and in lecture theatres.
   - The LRB is wonderful for research but doesn't provide quiet space for students to study, write, have small discussion groups, etc.
   - Computer availability to students is the greatest need, access to virtual learning opportunities.

- Schedule is key to GSBS's survival - lots of small group rooms need to be accessible.

4. Medical School - Michele Pugnaire
   - Current space needs, in part, drive the schedule and curriculum. Can we establish a means to videoconferencing/virtual meetings?
   - Experience indicates 6 sessions at 10 students each is optimum size for learning.
   - Graduate students are out working in the clinical system. On call space is a clinical responsibility. Conference space responsibility is debated.
   - Computer based testing will grow and require space to do it.

5. Nursing School (GSN) - Doreen Harper
   - There is a nursing shortage nationally and locally that UMMS has to deal with.
   - The faculty size of the school has tripled and is still growing.
   - They have developed a Graduate Entry Pathway program to develop nurses from other majors in 1 year (sit for license) followed by 2-3 years of residency. No space is available on campus so this program is five miles away on Queen Street. Evening courses are not desirable for this new program.
   - Typical graduate nursing students are enrolled to pursue a specialty.
   - UMMS also has a robust enrollment of Nursing PhD candidates, which will serve to replenish the nursing faculty.
   - Nursing needs seats, computer testing, and laboratory space. Current admits will create this space need.
   - The conventional nursing program offers a lot of evening courses to ease the space crunch.
   - Faculty are able to get research grants but space is not available to implement the research. Nurses are more likely to participate in dry clinical research, such as population science, rather than wet bench research.
   - Development of interdisciplinary space is needed to integrate nursing and medical programs.
   - It is difficult to coordinate Amherst campus (doctoral education) with Worcester campus.
   - Commonwealth Medicine (state services - $150 million of mental health, correction services, etc.) also requires the nursing program to respond - generally off campus.
   - Didactic testing and clinical testing is the same as for medical students.
   - GSN has need for teleconferencing / videoconferencing to tie the various locations together.
   - There is no space for faculty meetings.

6. Relationship to UMass Memorial Hospital Campuses - Aaron Lazare
   - 3 major campuses are Lakeside (UMMS), Memorial and Hanneman.

- One-third of student critical training occurs at the main Lakeside campus.
- Other affiliated campuses, including Leominster, Marlborough, Clinton and Wing, are generally not used by the Medical School.
- It is in the best interests of both the hospital and Medical School that the Lakeside campus be a strong flagship for the system, impacting recruitment of department chairs, faculty and students.
- The Medical School is in better financial shape than the hospital and the hospital's facilities are largely outdated. New construction has begun on ED and surgical expansion.
- The hospital and Medical School currently have a good working relationship, which has resulted in collaboration on facility upgrades.
- Student generally rank other UMMS teaching hospitals better than Lakeside in evaluations.

7. Integration of Basic Science and Clinical Activities - Aaron Lazare
   - Basic science education is done from a very humanistic perspective. Many students will be trained in clinical trials.
   - In the core curriculum, not all students are exposed to pathology. This may change with the recruitment of a new Chair in Physiology.

8. Library - Elaine Martin
   - A study was done 2 years ago that projected a growth of 20,000 SF from the current level of 40,000 SF.
   - The growth is mainly in student study space, growth of the collection, and new technology.
   - The current space is crowded and noisy in part because of the adjacent atrium.
   - The study did not anticipate the growth of the Graduate School or the Nursing Program.
   - The campus does not have a student center, so the library functions as a student center / cultural center by virtue of its location and function.
   - The study proposed several options for the Library expansion, with some suggesting relocating in conjunction with a new research building.
   - UMMS is now a regional library with a $5 million grant.
   - High end Computer access is a significant issue whether provided for in the Library or elsewhere. There are currently 80 public ports with 75 in constant use.
   - The existing 110 study carrels are under used. Small group study rooms are much more popular.

9. General Discussion
   - In an Academic Health Center setting there should be more emphasis on health and wellness. One suggestion would be to expand the fitness center to include faculty, students, staff and even the community.

- Does the school need a more visible presence and image? There will be new entrances to both the medical school building and the hospital.
- A new external signage package has just been put to bid. It will mark entrances from surrounding roads.
- There is a potential need for a 400+ seat auditorium for school and conference seminars/meetings. Their largest sessions now are for about 200 people and they do have to turn people away. This is the geographic center of the UMASS campus system.
- Scheduling is a critical success ingredient. They currently schedule 18,000+ hours of time in 20 – 25 venues.

10. Case Study in Translational Medicine
    - Molecular medicine is a way to talk about translational research.
    - Sullivan, Rossini and Mello are three researchers who are already working in Translational medicine.
    - The Chairman of Medicine is recruiting Translational people, basic scientists who are focused on bench to bedside.
    - The biggest facility issue is the transfer of data and analysis between the clinical side and the research side. There are two different Information Systems platforms, Health Insurance Portability and Accountability Act (HIPAA) restrictions, etc. At the medical school, both academic and administrative computing are on the same system.

11. Campus Planning Opportunities
    - Urgent question: New Medical Office Building, 120,000 sf. What is best use? Ambulatory, standardized patients / robotics, ambulatory teaching?
    - Place for faculty to meet.
    - New research building to link LRB and original education building could include technology center, relocated wet labs (pathology), library.
    - Create a link to all existing and future medical education buildings with a major amenity in each, i.e. LRB = cafeteria, next research building = library, original building = auditoriums.
    - Convert original building to dry clinical research.

12. Next Steps
    - The programming process will continue with sessions scheduled for June 9th and 30th. TK&A will develop an outline of program areas for discussion and work with Tim Fitzpatrick and Jean Falcone to arrange the timing and participants in those sessions.
    - For the first session TK&A will have plans of the current campus indicating space utilization, including clinical, research, and Medical School space.

- TK&A will review our current data with UMMS staff over the next days to compile an accurate picture of the existing space.
- TK&A will provide some benchmarking program data of other institutions as a basis for initial discussions.
- TK&A highlighted the following sub-groups of space to be addressed in the new sessions:
  - Classroom space drivers
    - Classroom contact hours for each section, i.e., undergraduate, graduate, nursing, etc.
    - Campus location
    - Physician/Instructor availability
    - Anatomy location and pedagogy
    - Support functions, storage, etc.
  - Clinical Skills Center space drivers
    - Separate unit, or
    - Based in shared clinical setting
    - Organizational concept
    - Service to off-campus institutions
  - Center for Simulators, Robotics and Virtual Procedures space drivers:
    - Separate unit(s) or distributed
    - IS/IT support
    - Co-location with other functions such as Anatomy?
  - IS/IT space drivers:
    - Clinical, Research, School integration
    - System management and support system
    - System applications
    - System education
  - Administration space drivers:
    - Single Unit or distributed
    - Projected growth
    - Location

End of Meeting Notes

3. SUMMARY COMMENTS

After the Visioning Session, Frank Rothman and David Greer offered the following observations and summary remarks. These remarks were developed based on their experience with similar institutions, limited research of UMMS' education curriculum and discussions with UMMS' education group in this two-hour session.

Frank Rothman, PhD

1. The "chemistry" in the group seemed to be good. Dr. Lazare appeared to be an effective Chancellor who provides strong leadership, but allows his Deans and other leaders to exercise authority in their areas of responsibility.

2. The relationship with John O'Brien at the hospital seems to be excellent. The potential synergism is most important. Dr. Lazare characterized some of the facilities at the Hospital as "outmoded."

3. Proposed expansions are key to the planning to be done. A major one appears to be in Nursing, where the faculty (and presumably, the students) are expected to triple. This will require new space, a significant portion of which can be joint with the Medical School.

4. Expansion in the Graduate School of Biomedical Sciences appears to be planned primarily in the population-based fields, which do not require high-tech laboratories. This is a fertile area for joint spaces and programs with the Medical and Nursing Schools. But there is a problem with the fact that important basic science departments (e.g. cell biology) are in the old Medical School space, much inferior to the Lazare Medical Research Building (this is not true of the Department of Molecular Medicine (Mike Czech, Chair), which chose to stay in Biotech II). Dr. Lazare's solution, which sounds reasonable to me, is to build a new research area for those departments and use the space vacated for the expansion in population-based studies. Connection of the new space and of Biotech II to the Lazare Medical Research Building is a desire to be looked at carefully.

5. There is an obvious need of several units for additional large lecture space, both for an occasionally used hall that seats more than the largest current hall, and for classes that cannot currently be accommodated, not because of size, but scheduling. My suggestion of a jumbo lecture hall (I think 600 seats), which can be divided into two halls was very well received. However, noise crossover (not mentioned) is a problem, which can be solved with careful design. The jumbo hall would allow the campus to host conferences, which would generate income.

6. There also seems to be a shortage of small teaching spaces for the Graduate School, though it was mentioned that virtual classrooms might change that. This was one of very few mentions of novel technology, which may be standard in ten years. TK&A may have to take a proactive position in promoting the technology of the near future.

7. Teleconferencing has obviously been adopted, and there are more events than can be accommodated. As I pointed out, this may be a good place for a short-term fix. Teleconferencing for residents seems to be sorely needed, and can also facilitate a lot of activity with outlying partners, including the Arts and Sciences campus at Amherst.

8. There was some disagreement about social space, with the librarian arguing for maintaining the present system (with additional space), which uses the library to house the chief social space. A graduate student agreed with her, but the Dean of the Graduate School leaned to at least considering my suggestion of having a student center take over this function. The programming process will undoubtedly develop these alternatives. It does seem as if the Lazare Medical Research Building does not provide much quiet space for people to read or write, and this will need to be created.

9. The librarian needs/would like a lot more space for the collections and for group seating. This request is partially independent of the social space issue.

10. The current extensive assessment of courses does not look at the influence of type of space on the pedagogy, and it was suggested that this may be worth doing.

David Greer, MD

In general, I was struck by the ambitious, across-the-board expansion plans, at a time of fiscal austerity. Research seemed their highest priority. The Graduate School plans to double in size and enrollment, stressing bench science. To do this they feel they need a new research building focused on "wet" science. Ideally, this would be a building between the Medical School and the current research building. This new building should house an expanded library, approximately double the size of the existing library, with study rooms for small groups of students. The link building should also contain an auditorium with more than 150 seats to accommodate the increased number of students.

The Nursing School also plans a major expansion, including tripling the size of the undergraduate school and developing Masters and PhD programs. I noted no specific discussion of what that would require in terms of expanded facilities. Several

discussants mentioned the need for more classrooms for small groups of students and the need for a central facility for student rest and recreation.

There was some discussion of the role that the affiliated institutions, including the hospitals, might play in future development, but I got the impression that insufficient consideration had been given to those potential resources. Hospitals frequently house the faculty of the clinical departments and provide research and related facilities for them, as well as instructional facilities for students.

PEER INSTITUTIONS

School Name	Year Established	First Class	Type
U of Southern Alabama College of Medicine	1969	1973	Public
U of Arizona College of Medicine	1961	1971	Public
UC Davis School of Medicine	1963	1968	Public
UC San Diego School of Medicine	1962	1968	Public
UConn School of Medicine	1963	1968	Public
U of Hawaii at Manoa John A. Burns School of Medicine	1965		Public
Southern Illinois University School of Medicine	1969		Public
University of Kentucky College of Medicine	1960		Public
Louisiana State U School of Medicine in Shreveport	1965	1973	Public
Uniformed Services University of the Health Sciences	1972	1976	Public
UMass Medical School	1962	1970	Public
Michigan State University College of Human Medicine	1964		Public
University of Minnesota - Duluth School of Medicine	1969	1972	Public
University of Missouri - Kansas City School of Medicine	1960	1971	Public
University of Nevada School of Medicine	1969		Public
University of South Florida College of Medicine	1971		Public
UMDNJ - Robert Wood Johnson Medical School - NJ	1962		Public
Stony Brook U Health Science Center - School of Medicine	1960	1971	Public
The Brody School of Medicine at East Carolina University	1972		Public
Medical College of Ohio (Toledo)	1964	1969	Public
Northeastern Ohio Universities College of Medicine	1973		Public
Wright State University School of Medicine	1964	1976	Public
University of South Carolina School of Medicine	1973	1977	Public
James H. Quillen College of Medicine of E. Tenn State U	1974		Public
The Texas A&M University College of Medicine	1971		Public
Texas Tech U Health Sciences Center School of Medicine	1969		Public
University of Texas Medical School at Houston	1969	1970	Public
Joan C. Edwards School of Medicine at Marshall University	1972	1978	Public

TOP 25 - FISCAL YEAR 2002

Public Medical School NIH Ranking

	Public Rank	Overall Rank	2002 Total Awards	2001 Total Awards	% change	Anatomy Rank	Anesthesiology Rank	Biochemistry Rank	Family Practice Rank	Genetics Rank	Medicine Rank	Microbiology Rank	Neurology Rank	OB/GYN Rank	Orthopedic Surgery Rank	Other Basic Sciences Rank	Pathology Rank	Pediatrics Rank	Pharmacology Rank	Physiology Rank	Psychiatry Rank	Surgery Ranking
UCSF	1	4	$ 313,335,255	$ 303,214,901	3.34%		5				2			1								
University of Washington	2	6	$ 260,434,828	$ 222,507,127	17.05%			3									1					3
UCLA	3	9	$ 241,869,389	$ 201,097,654	20.27%								1									
University of Michigan	4	11	$ 224,089,198	$ 203,254,062	10.25%					9												
University of North Carolina	5	14	$ 190,347,057	$ 170,782,162	11.46%																4	
UC San Diego	6	15	$ 185,421,004	$ 163,944,593	13.10%				2													
University of Alabama	7	17	$ 176,906,233	$ 170,379,277	3.83%							2										
University of Texas SW	8	19	$ 161,590,721	$ 144,649,172	11.71%														1			
Univerity of Colorado	9	20	$ 154,375,419	$ 137,030,596	12.66%													3				
University of Iowa	10	25	$ 131,301,535	$ 129,456,504	1.43%										1							
University of Wisconsin	11	27	$ 123,528,949	$ 99,297,948	24.40%																	
University of Minnesota	12	29	$ 118,326,042	$ 111,000,943	6.60%																	
Oregon Health Sciences University	13	30	$ 117,658,179	$ 102,913,908	14.33%																	
University of Virgina	14	31	$ 116,030,585	$ 103,697,502	11.89%	3														12		
University of Maryland	15	32	$ 111,251,948	$ 87,688,914	26.87%																	
University of Utah	16	38	$ 94,880,211	$ 81,797,128	15.99%																	
UMass Medical School	**17**	**40**	**$ 92,666,053**	**$ 82,396,949**	12.46%	**12**	***NR***	**27**	**23**	**20**	**36**	***NR***	**52**	**57**	***NR***	**1**	**35**	**21**	**27**	**18**	**46**	**55**
Indiana University	18	41	$ 90,928,755	$ 82,149,258	10.69%																	
University of Cincinnati	19	42	$ 89,159,803	$ 74,957,038	18.95%																	
University of Texas Galveston	20	46	$ 73,464,172	$ 61,685,911	19.09%																	
University of Illinois	21	47	$ 67,823,880	$ 61,681,558	9.96%																	
University of Texas San Antonio	22	48	$ 67,496,583	$ 62,117,253	8.66%																	
Medical University of South Carolin	23	49	$ 67,315,831	$ 56,167,734	19.85%																	
Ohio State	24	50	$ 65,661,748	$ 58,679,624	11.90%																	
University of Arizona	25	51	$ 64,980,304	$ 56,208,437	15.61%																	
2001 UMass Rank		**37**				**12**	***NR***	**30**	**23**	**17**	**39**	***NR***	**51**	**51**	***NR***	**5**	**45**	**18**	**44**	**14**	**45**	**74**
2001 UMass Rank - Public Only	**16**					**4th**				**7th**						**3rd**		**10th**		**8th**		
2002 UMass Rank - Public Only						**4th**				**9th**						**1st**		**11th**		**7th**		

NR = Not rated

■ Top Public in Data Group

RESUME

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Professor of Molecular Biology, Cell Biology and Biochemistry (Research), Brown University
Senior Advisor, Project Kaleidoscope

EXPERIENCE

Consulting and Advisory Groups

- Steering Committee, New England Governors' Biotechnology Cooperative, 1989-90
- Consultant on science education and facilities: Baylor Univ., Drew Univ., St. Olaf College, SE Louisiana Univ., Stetson Univ., Tulane Univ., Univ. of Massachusetts Medical School, Univ. of Portland, Univ. of Scranton, Wesleyan Univ., Wheaton College (MA)
- Evaluation team for accreditation - Boston College, 1996
- Medical Research Committee, Progeria Research Foundation, 1999 to present

Provost (Chief Academic Officer), Brown University 1990-1995

- Provided leadership to all academic units (total budgets = $171 million):
  - arts and sciences departments in the College and Graduate School,
  - the School of Medicine,
  - libraries, computing, research administration, museum, and student services
- Helped formulate and implement a university-wide strategic plan at a time of reduced budget growth, more effectively linking academic and financial planning
- Set and articulated academic goals in a successful $535 million comprehensive campaign
- Participated in major projects including:
  - recruitment of minority scientists through partnerships with historically black colleges;
  - reform of high school education through the Coalition of Essential Schools;
  - restructuring of the Thomas J. Watson, Jr. Institute of International Studies;
  - construction planning of a $30 million Undergraduate Science Teaching Center for chemistry, environmental science and geology
- Task Force on the Brown University School of Medicine and its affiliated hospitals, 1995

Dean of Biology, Division of Biology and Medicine, Brown University, 1984-1990

- Provided leadership for faculty in biological and basic medical sciences:
  - Introduced innovative courses for freshman which emphasize experimental and field work related to a theme (e.g. biological timekeeping), dramatically raising enrollments
  - Improved the research climate for newly hired faculty
  - Program Director, Howard Hughes Medical Institute Grant for Undergraduate Biology Teaching, 1988-1993, $1,000,000
- Provided oversight for planning and construction of a $16 million addition to the Biomedical Center, for research laboratories, classrooms and animal care facilities

Faculty member, Brown University, 1961-1997

- Teaching:
  - introductory level courses: biology, molecular and cell biology, genetics;
  - freshman seminar: A Scientific Revolution: Molecular Biology 1943-1966;
  - advanced undergraduate/graduate courses: biochemistry, molecular biology, microbiology, biochemical genetics, developmental biology, biology of aging;
  - supervision of postdoctoral trainees and Ph.D., Master's and Bachelor's theses;
  - enrichment courses for high school teachers and minority students
- Research in molecular genetics and developmental biology:
  - Regulation on gene expression in *E. coli;* development of *D. discoideum;* biology of aging
  - Obtained nine research grants from the National Science Foundation, 1961-1984
  - Collaborator on grant from Progeria Research Foundation, 2001-2
- Committee and administrative assignments (selected)
  - Chair, Biology Curriculum Committee, 1969-71; 1984-90;
  - Founding director, Graduate Program in Molecular and Cell Biology, 1976-1982;
  - Director, Predoctoral Training Grant in Molecular and Cell Biology, 1979-1984

EDUCATION

University of Chicago, B.S. 1948; M.S. 1951
Harvard University, Ph.D. in chemistry, 1955
Massachusetts Institute of Technology, fellow in molecular genetics, 1957-1961

AWARDS

- Medical Science Students' Award for Excellence in Teaching, 1971, 1972, 1973;
- Elected Fellow of the American Association for the Advancement of Science, 1993
- Citation from Tougaloo College (Mississippi) for "visionary leadership and staunch commitment to the Minority Access Research Grant" 2001

PUBLICATIONS (selected)

Torriani, A. and Rothman, F.G., 1961 - Mutants of *Escherichia coli* constitutive for alkaline phosphatase, J. Bacteriol. 81:835-836

Rothman, F.G. and Byrne, R., 1963 - Fingerprint analysis of alkaline phosphatase of *Escherichia coli* K-12, J. Mol. Biol. 6:330-340

Garen, A., Levinthal, C., and Rothman, F.G., 1961 - Alterations in alkaline phosphatase induced by mutations, J. Chim. Phys. 58:1068-1071

Wilson, M.C., Farmer, J.L., and Rothman, F.G., 1966 - Thymidylate synthesis and aminopterin resistance in *Bacillus subtilis,* J. Bacteriol. 92:186-196

Rosen, B., Rothman, F.G., and Weigert, M.G., 1969 - Miscoding caused by 5-Flourouracil, J. Mol. Biol. 44:363-375

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Rothman, F.G., and Alexander, E.A., 1975 - Parasexual genetic analysis of the cellular slime mold *Dictyostelium discoideum,* Genetics 80:715-731

Marin, F.T., and Rothman, F.G., 1980 - Regulation of development in *Dictyostelium discoideum:* IV. Effects of ions on the rate of differentiation and cellular response to cyclic AMP, J. Cell. Biol. 87:823-827

Kaleko, M., and Rothman, F.G., 1982 - Membrane sites regulating developmental gene expression in *Dictyostelium discoideum,* Cell 28:801-811

Rothman, F.G., 1987 - Gene-protein relationships in *Escherichia coli* alkaline phosphatase: Competition and luck in scientific research. In: Torriani-Gorini, A., Silver, S., Yagil, E., Rothman, F.G., and Wright, A., editors, 1987 - Phosphate Metabolism and Cellular Regulation in Microorganisms, American Society for Microbiology, Washington, DC pp. 307-312

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http://www.pkal.org/pubs/cov/index.html

DeGroot, A.S., and Rothman, F.G., 1999 - In Silico Predictions; In Vivo Veritas (News and Views). Nature Biotechnology 17:533-534

Rothman, F.G., and Narum, J.L., 1999 - Then, Now, and in the Next Decade: A Commentary on Strengthening Undergraduate Science, Mathematics, Engineering and Technology Education.
Project Kaleidoscope, Washington, DC http://www.pkal.org/news/thennow100.html

Rothman, F.G., Narum, J.L., Kolvoord, R., and Wattenberg, F. (eds.), 2002. Information Technology in the Service of Student Learning. Project Kaleidoscope, Washington, DC
http://www.pkal.org/documents/it_roundtable_report.pdf

RESUME

DAVID S. GREER, M.D., M.A.C.P.

447 Albany Street Fall River, MA 02720

Dean of Medicine Emeritus
Professor of Community Health
Division of Biology and Medicine
School of Medicine
Brown University

EDUCATION

BS, (magna cum laude), University of Notre Dame, 1948
M.D., University of Chicago School of Medicine, 1953
Internship, Yale-New Haven Medical Center, 1953-1954
Residency in Medicine, University of Chicago Clinics, 1954-1957

PROFESSIONAL EXPERIENCE AND APPOINTMENTS

Medical Director, SSTAR Family Healthcare Center, July 1995 - 1998
Director, Ambulatory Care Center Development, Memorial Hospital of Rhode Island 1995 -
Acting Director, Office of Generalist Physician Programs, Association of American Medical Colleges, April 1993 - April 1994
Clinical Professor of Health Care Science, George Washington University School of Medicine & Health Sciences, July 1, 1993 -
Dean Emeritus, Brown University School of Medicine, September 1992
Dean of Medicine, Brown University, July 1 1981 - September 1, 1992
Professor of Community Health, Brown University, July 1, 1975 - 1995, emeritus 1995 -
Chairman, Section of Community Health, Brown University, July 1978 - October 1981
Associate Dean of Medicine, Brown University, August 1974 - July 1981
Director, Family Practice Residency Program, Brown University, The Memorial Hospital, 1975 - 1978
Assistant Clinical Professor in Medicine, Tufts University College of Medicine, 1971 - 1978
Clinical Associate Professor of Community Health, Brown University, July 1973 - June 1975
Director of Medical and Administrative Affairs, Earle E. Hussey Hospital (Chronic Disease and Rehabilitation), Fall River, Massachusetts, 1972 - 1975
Chief of Staff, Department of Medicine, Truesdale Clinic and Truesdale Hospital, Fall River, Massachusetts, 1971 - 1974
Practice of Internal Medicine, Truesdale Clinic, Fall River, Massachusetts, 1957 - 1974

Medical Director, Earle E. Hussey Hospital, Fall River, Massachusetts, 1962 - 1972
Senior Clinical Instructor in Medicine, Tufts University College of Medicine, 1969 - 1971
President of Medical Staff, Truesdale Hospital, Fall River, Massachusetts, 1968 - 1970
Chief of Staff, Department of Medicine, Fall River General Hospital, 1959 - 1962
Instructor in Endocrinology and Medicine, University of Chicago, 1957
United States Public Health Service Fellow in Medicine, University of Chicago, 1955 - 1956

PUBLICATIONS

1. David S., Greer D. Social Marketing: Application to Medical Education, Vol. 134, No. 2, pp. 125-127, 2001.
2. Banaszak-Holl, J., Greer, D. Changing Career Patterns of Deans of Medicine, 1940-1992. Academic Medicine Vol. 70, No. 1, pp. 7-13, 1995.
3. Smith, S., Greer, D. MD 2000. Journal for Minority Medical Students pp. 34-38, Fall 1994.
4. Greer, D. Urinary Incontinence in the Elderly. Rhode Island Medicine Vol. 77, No. 8, pp. 281-283, 1994.
5. Greer, D., Nair Bhak, K., Zenker, B. Comments on the AAMC Policy Statement Recommending Strategies for Increasing the Production of Generalist Physicians. Academic Medicine Vol. 69, No. 4, pp. 245-260, 1994.
6. Banaszak-Holl, J., Greer, D. Turnover of Deans of Medicine During the Last Five Decades. Academic Medicine Vol. 69, No. 1, pp. 1-7, 1994.
7. Greer, D. Altering the Mission of the Academic Health Center: Can Medical Schools Really Change? In: Education of Physicians to Improve Access to Care for the Underserved: Proceedings of the Second HRSA Primary Care Conference, March 29-31, 1990. Rockville, MD; Health Resources and Services Administration, 1990.
8. Greer, D. Hospice Care for the Elderly. In: Improving the Health of Older People: a World View, R. Kane, J. Evans, D. Macfayden, eds. Oxford University Press, New York, 1990.
9. Friedman, C.P., de Bliek, R., Greer, D., et al. Charting the Winds of Change: Evaluating Innovative Medical Curricula Academic Medicine. Vol. 65, pp. 8-14, 1990.
10. Greer, D. Faculty Rewards for the Generalist Clinician-Teacher. J. Gen Int. Med. Vol. 5 (Suppl), pp. S53-S58, 1990.
11. Greer, D. International Health Academic Medicine. Vol. 64, No. 1, pp. 14-15, 1989
12. Mor, V., Murphy, J., Masterson-Allen, S., Willey, C., Razmpour, A., Jackson, M., Greer, D., Katz, S. Risk of Functional Decline Among Well Elders. Journal of Clinical Epidemiology. 42(9): 895-904, 1989.
13. Greer, D. Medicine in the University. Perspectives in Biology and Medicine. Vol. 32, No. 1, pp. 73-79, 1988.

14. Mor, V., Greer, D., Kastenbaum, R. The Hospice Experiment: Is It Working? Johns Hopkins University Press, Baltimore, MD, 1988.
15. Greer, D. Quality of Life Measurement in the Clinical Realm. Journal of Chronic Diseases. Vol. 40, No. 6, pp. 629-630, 1987.
16. Greer, D. and Rifkin, L. The Immunological Impact of Nuclear War. In: The Medical Implications of Nuclear War, Institute of Medicine, National Academy of Sciences. National Academy Press, Washington , DC, 1986.
17. Greer, D. Hospice as Advocacy. In: Advocacy in Health Care. J. Marks (ed.) Humana Press, Clifton, NJ, 1986.
18. Greer, D., Mor, V. An Overview of National Hospice Study Findings. Journal of Chronic Diseases. Vol. 39, No. 1, pp. 5-7, 1986.
19. Greer, D., Mor, V., Morris, J., et al. An Alternative in Terminal Care: Results of the National Hospice Study. Journal of Chronic Diseases. Vol. 39, No. 1, pp. 9-26, 1986.
20. Morris, J., Mor, V., Greer, D., et al. The Effect of Treatment Setting and Patient Characteristics on Pain in Terminal Cancer Patients: A Report from the National Hospice Study. Journal of Chronic Diseases, Vol. 39, No. 1, pp. 27-35, 1986.
21. Goldberg, R., Mor, V., Greer, D., et al. Analgesic Use in Terminal Cancer Patients: Report from the National Hospice Study. Journal of Chronic Diseases. Vol. 39, No. 1, pp. 37-45, 1986.
22. Morris, J., Suissa, S., Greer, D., et al. Last Days: A Study of the Quality of Life of Terminally Ill Cancer Patients. Journal of Chronic Diseases. Vol. 39, No. 1, 47-62, 1986.
23. Greer, D. Hospice: From Social Movement to Health Care Industry. Transactions of the American Clinical and Climatological Association. Vol. 97, pp. 82-87, 1985.
24. Katz, S., Greer, D., Beck, J., Branch, L., Spector, W. Active Life Expectancy: Societal Implications. In: America's Aging: Health in an Older Society. National Academy Press, Washington, DC, 1985.
25. Greer, D. and Mor, V. How Medicare is Altering the Hospice Movement. Hastings Center Report, Vol. 15, No. 5, pp. 5-10, October 1985.
26. Greer, D., Mor, V., Morris, J., Sherwood, S., Kidder, D., Birnbaum, H. "An Alternative in Terminal Care: Results of the National Hospice Study." In Evaluation Studies: Review Annual. L. Aiken and B. Kehrer (eds.) Sage Publications, 1985.
27. Katz, S., Brach, L., Branson, M., Papsidero, Jr., Beck, J., Greer, D. Active Life Expectancy. New England Journal of Medicine, Vol. 309, pp. 1218-1224, November, 1983.
28. Greer, D., Mor, V., Sherwood, S., Morris, J., Birnbaum, H. National Hospice Study Analysis Plan. Journal of Chronic Diseases, Vol. 36, No. 11, pp. 737-780, November, 1983.
29. Greer, D. Brown University and the Practice of Surgery, Rhode Island Medical Journal, September, 1983.

30. Greer, D. and Mor, V. The National Hospice Study, Priorities in Health Statistics 1983, Proceedings of the 19th National Meeting of the Public Health Conference on Records and Statistics, pp. 153-157, August, 1983.
31. Birnbaum, H., Mor, V., Greer, D. Home Care in Hospice. Caring, Vol. 2, No. 6, pp. 40-44, June, 1983.
32. Greer, D. Hospice: Lessons for Geriatricians, Journal of the American Geriatrics Society, Vol. 31, No. 2, pp. 67-70, February, 1983.
33. Sherwood, S., Greer, D., Morris, J., Mor, V. and Associates, An alternative To Institutionalization: The Highland Heights Experiment. Ballinger Publication Company, 1981.
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35. Greer, D., Aronson, S. "Failure as a Criterion for Medical School Admission" In: Journal of Medical Education, Vol. 55, July, 1980.
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37. Bomberger, D., Carp, F., Eckert, K., Greer, D., et al. :Housing Organization and Designs for the Elderly" In: Health and Human Resources: The Elderly. Report from a Workshop Considering Problems Identified by the Intergovernmental Science, Engineering, and Technology Advisory Panel. December 12-14, 1978, Warrenton, Virginia. Washington, DC, American Association for the Advancement of Science.
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39. Sherwood, C.C., S. Sherwood, J.N. Morris, V. Mor, J.W. McClain, and D.S. Greer, "The Clinical Assessment of Interviewable Rhode Island State Chronic Hospital Patients." A final report in connection with a contract with the Rhode Island Department of Mental Health, Retardation and Hospitals, published by DHEW/ HRA, Maryland, April 1977.
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41. Greer, D. The View from the Medical Monastery, Free Church Press, November, 1976.
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45. Sherwood, Sylvia, and D.S. Greer, "A Study of the Highland Heights Apartments for the Physically Impaired and Elderly in Fall River," a revised updated version of an article published in Housing and Environments for the Elderly, 1976. Also published as a chapter in Environments and Aging: Concepts and Issues, T.O. Byerts (Ed.) Gerontological Society, Washington, DC.
46. Granger, C. And Greer, D. Measurement of Outcomes of Care for Stroke Patients STROKE, 6: January-February, 1975.
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EDITORIAL BOARDS

Academic Medicine
The Hospice Journal
Journal of Medical Education

COMMITTEE AND CONSULTANTSHIPS

Senior Scientist, Center for Primary Care and Prevention, Brown University, 1994-
Chairman, Community Health Needs Assessment Program of Fall River, Partners for a Healthier Community, 1995-1999
Member, Board of Trustees, Bristol Community College, 1995-
Member, Case Western Reserve Visiting Committee for the School of Medicine, 1994-1998
Member, Board of Directors, Stanley Street Treatment & Resources, Fall River, Massachusetts, September, 1994-1999
Chairman, Search Committee for Assistant Professor of Geriatric Medicine, Miriam Hospital, 1994
Chairman, Search Committee for Associate Dean of Medicine (Primary Care), Brown University School of Medicine, 1993
Chairman, Geriatric Program Advisory Committee, Brown University School of Medicine, 1993-1994
Chairman, Primary Care Task Force, Brown University School of Medicine, 1993-1994
Visiting Professor of Medicine, Georgetown University School of Medicine, 1992-1993
Scholar-in-Residence, Association of American Medical Colleges, 1992-1993
Member, Board of Overseers, Dartmouth Medical School and the C. Everett Koop Institute, 1992-1999
Member, Board of Trustees, Visiting Nurses Association of Rhode Island, 1992-1993
Member, National Advisory Committee, Robert Wood Johnson Foundation Generalist Physician Initiative Program, 1992-1999
Member, Executive Committee, A. Alfred Taubman Center for Public Policy and American Institutions, 1991-
Member, International Medical Scholars Program, Association of American Medical Colleges, American Medical Association, 1988. Chairman, 1990-1991.
Member, Administrative Board of the Council of Deans, Association of American Medical Colleges, 1988-1992
Member, Liaison Committee on Medical Education, Association of American Medical Colleges, 1988-1993.
Member, Board of Trustees of Charleton Memorial Hospital, Inc., 1988-1993
Member, Advisory Board, Kaiser Faculty Scholar Program in General Internal Medicine, 1987-1992.
Fellow, Kellogg International Fellowship Program in Health, 1986-1989.

Visiting Scholar, Division of Geriatrics, Nuffield Department of Medicine, Oxford University, England, January - June 1986.
Visiting Fellow, Green College, Oxford, England, January - June 1986
Non-residential Fellow, Green College, Oxford, England, 1986 -
Member, Institute of Medicine, Medical Implications of Nuclear War Symposium Planning Committee, 1985 - 1986
Member, Advisory Committee on Health Services, Brown University, 1983- 1995
Member, Council for International Studies, Brown University, 1982
Chairman, Brown University Medical Council, 1981-1992
Chairman, Brown University Medical Faculty Council, 1981-1992
Chairman, Hospice Management Committee, Brown University, 1981-1985
Member, Brown Affiliated Hospitals Administrators Association, 1981-1983
Member, Undergraduate Curriculum Review Committee, Brown University, 1981- 1982
Member, Institute of Medicine of the National Academy of Sciences, 1981-
Member, Academic Advisory Committee, Long Term Care Gerontology Center, Brown University, 1980 - 1984
Member, Steering Committee, Long Term Care Gerontology Center, Brown University, 1980 -1982
Member, Medical Faculty Council, Brown University, 1977-1992
Board of Directors, Health Planning Council, Inc., Providence, Rhode Island, 1976-1984
Member, Medical Advisory Board, Meeting Street School, 1976-1980
Member, Professional Advisory Committee, Meeting Street School, 1975-1980
Board of Directors, Association of Home Health Agencies of Rhode Island, 1975-1980
Chairman, Medical Advisory Committee, District Nursing Association of Fall River, Massachusetts, 1968-1985
Member, Committee of Health Consequences of Bereavement, Institute of Medicine, 1982-1984
Acting Director, Long Term care Gerontology Center, Brown University, 1982-1983
A founding Director & Member of Board of Directors, International Physicians for the Prevention of Nuclear War, Inc., (receipt of Nobel Peace Prize in 1985), 1980-1985
President, Independent Living Authority, State of Rhode Island, 1975-1982
Chairman, The Governor's Commission on the Provision of Comprehensive Mental Health Services in Rhode Island, 1980-1981
Internal Consultant to the Student Life Office, Brown University, 1980-1981
Trustee, Southeastern Massachusetts University, 1970-1981; Chairman, Board of Trustees 1973-74
Chairman, Search Committee for Assistant Dean of Medical Student Affairs, Brown University Program in Medicine, 1980
Member, Health Planning Council, Committee on Chronic Hospital Care, Providence, 1979-1980
Member, Health Planning Council, Committee on Regionalization of Health Services in Rhode Island, Providence, 1979-1980

Chairman, Committee on Aging, Jewish Federation of Rhode Island, 1978-1980
Chairman, Medical Advisory Committee, Ladd Center (Developmental Disabled), 1978-1980
Member, Brown University Advisory Group on Health Education, 1978-1980
Member, Professional Relations Committee, Rhode Island Group Health Association, 1978-1980
Executive Committee, Cancer Control Board of Rhode Island, 1975-1980
Project Co-Director, Study of Independent Living, Highland Heights Housing for the Handicapped and Elderly (Funded b H.E.W. and HUD), 1970-1980
Medical Advisor, Fall River Housing Authority, 1968-1980
Member, Accreditation Task Force Committee, Brown University Program in Medicine, 1979
Chairman, Committee on Aging, Jewish Affairs Committee of Fall River, MA, 1977-1979
Member, Board of Directors, American Cancer Society (RI), 1977-1979
Member, Professional Education Committee, American Cancer Society (RI), 1977-1979
Member, Stroke Committee of the Rhode Island Heart Association, 1975-1979
Chairman, Central Rhode Island Task Force on Pediatrics, Health Planning Council, Providence, Rhode Island, 1978.
Member, American Association for the advancement of Science, Interdepartmental Science, Engineering and Technology Advisory Panel: Study Group on Housing Organization and Design for the Elderly, Warrenton, Virginia, 1978
Member, Committee on Evaluation of Home Care, Metropolitan Nursing and Health Services Association of Rhode Island, 1978
Chairman, Committee on Primary Care in Graduate Medical Education, Brown University, 1977-1978
Member, Long-term Care Committee, Rhode Island Professional Service Review Organization, Providence, Rhode Island, 1977-1978
Planning Committee, Home for the Aged, Providence, Rhode Island, 1976-1978
Governor's Advisory Task Force for the Institute of Mental Health, State of Rhode Island, 1976-1977
Chairman, Mayor's Senior Citizens Task Force, City of Providence, Rhode Island, 1975
American College of Physicians Medical Knowledge Self-Assessment Examination Committee, 1973
Project Director, Title III Program, Older American's Act, Fall River, Massachusetts 1969-1973
Board of Directors, Council on Aging, Fall River, Massachusetts, 1966-1972
Delegate, White House Conference on Aging, 1971, 1981
Member, Governor's Task Force on Quality of Care, Medicaid Program, Commonwealth of Massachusetts, 1969-1970
Board of Directors, Homemaker-Home Health Aide Service, Fall River, Massachusetts, 1968-1970
President, Southeastern Massachusetts Heart Association, 1965-1967

Medical Advisor to Mayor, City of Fall River, 1960-1962
Board of Directors, Family Service Association of Fall River, 1959-1962
(Numerous visiting professorships, commencement addresses, lectureships - list on request)

PROFESSIONAL SOCIETIES

American Geriatrics Society
Institute of Medicine
Rhode Island Medical Society
American Medical Association
International Society of Rehabilitation Medicine
American Congress of Rehabilitation Medicine
Gerontological Society
Diplomat, American Board of Internal Medicine, 1960; recertified, 1974
Master, American College of Physicians, 1988
Massachusetts Medical Society
Fellow, National Board of Medical Examiners
American Clinical and Climatological Association

HONORS AND AWARDS

Distinguished Service Award, Bristol Community College, 1985
Doctor of Humane Letters (honorary), Southeastern Massachusetts University, 1981
Cutting Foundation Medal for service to religion and medicine, Andover Newton Theological Seminary, 1976
Master of Arts, ad eunundem, Brown University, 1975
Distinguished Service Award, University of Chicago Medical Alumni Association, 1973
Jewish War Veterans Auxiliary, Outstanding Citizen Award, 1973
National Rehabilitation Association, Certificate of Meritorious Service, 1972
Outstanding Service Award, Massachusetts Easter Seal Society, 1970
Alpha Omega Alpha, University of Chicago, 1953

TEACHING

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Teaching Rounds, Internal Medicine

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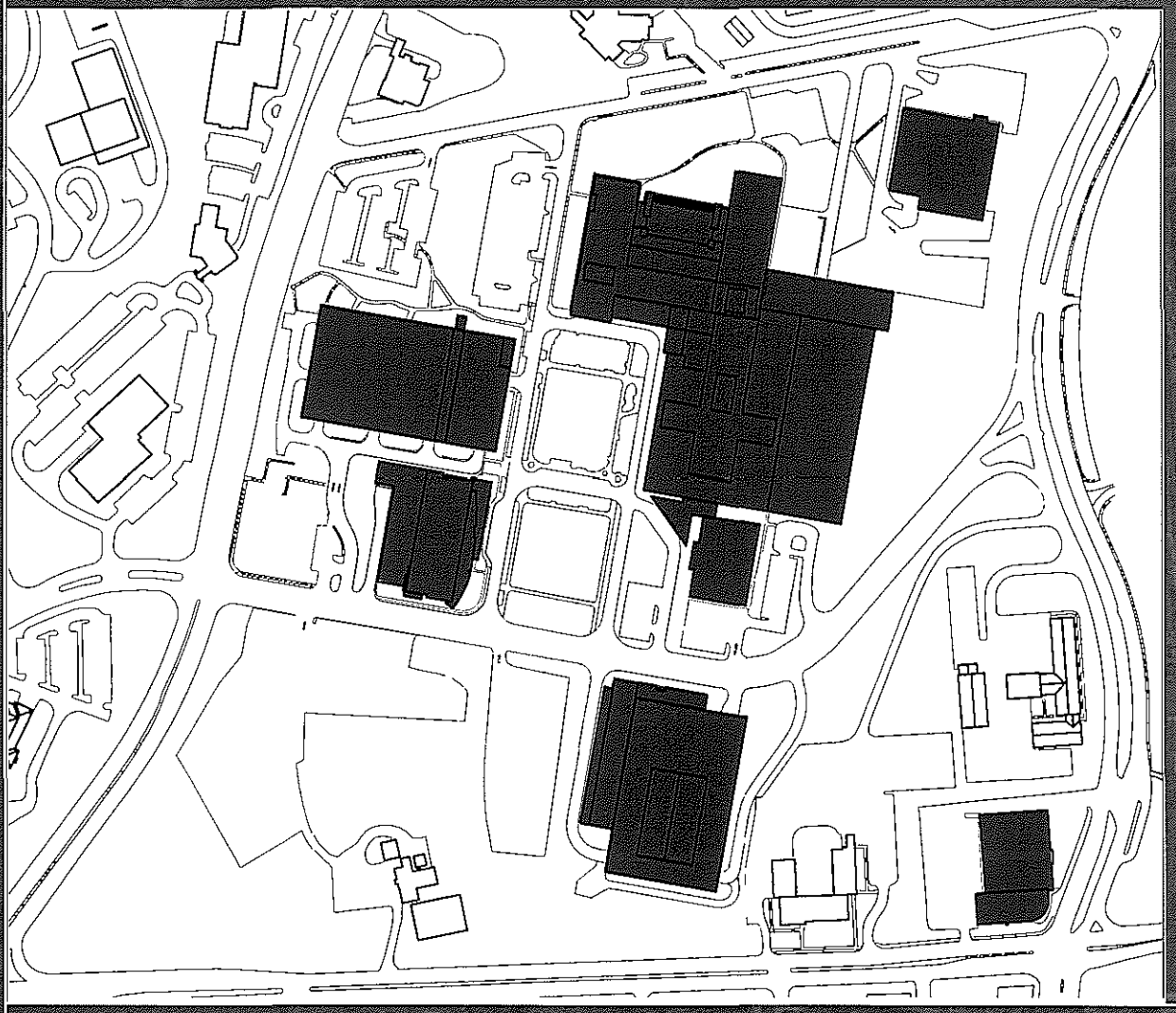
Project Kaleidoscope website, www.pkal.org

TSOI / KOBUS & ASSOCIATES
ARCHITECTS

University of Massachusetts Medical School

Section III. HealthCare Visioning Report



UMass Medical Center Master Plan

Massachusetts State Project UMW 0301 ST1

Healthcare Visioning Session

Report Issued by:
Tsoi/Kobus & Associates
TK&A #23024-000
June 2004

University of Massachusetts Medical School

Division of Capital Asset Management

TABLE OF CONTENTS

I. OVERVIEW

To initiate the master planning effort for the UMass Medical Center campus, a three-hour Visioning Session was held to discuss current and future trends in healthcare practice, delivery and education. Expert in the field Jerome H. Grossman, M.D., facilitated this discussion.

Dr. Grossman is Director of the Harvard/Kennedy School HealthCare Delivery Policy Program, Chairman Emeritus of New England Medical Center, former Chairman of the Federal Reserve Bank, and has served as Chairman for numerous committees at the Institute of Medicine of the National Academy of Sciences. Dr. Grossman's presentation and remarks were drawn from his extensive experience in the healthcare systems, information technologies, finance, community service and development of innovations and reforms in the medical care delivery system.

Participants from the University campus included representatives from UMass Memorial Health Care, the Medical School's Chancellor/Dean's office, Clinical Chairs, and Planning Services.

Dr. Grossman gave an introductory presentation based on his research for Harvard's Kennedy School of Government. In this 30-minute presentation, he highlighted key financial, technological and social drivers that are challenging the ways that healthcare will be administered and delivered in the future. Dr. Grossman commented that space planning questions are surrogates for the questions regarding the evolution of healthcare systems.

A general discussion followed in which representatives from the hospital explored ideas about their future facilities and services. Dr. Grossman encouraged a "flexible box" approach to space planning with an eye toward consumer driven, outcome based services.

2. MEETING REPORT

AGENDA June 10, 2004

The Health Care Vision
University of Massachusetts Medical Center Master Plan
Mass State Project UMW 0301 ST1

Facilitated by: Jerome Grossman, M.D.

2:00 pm Introductions: Rick Kobus, TK&A

2:10 pm Patient Care Trends and Drivers
- More acute inpatients
- Bimodal clinical operations
- Innovative acuity management
- Increased flexibility
- Consumer oriented health care
- Changes in population demographics

Technology Trends
- Complex diagnostic and treatment technology
- Information systems
- Opportunities for shared technology with Education/Research

3:00 pm Impact of the program vision on space planning: preliminary thoughts
- How do you see your business evolving over the next 5 to 10 years?
- What do you see as growth areas at the UMMS campus?
- What is working well?
- What doesn't work well?
- What do you see as your highest priorities for change at UMMS?

5:00 pm Adjournment

MEETING NOTES

Mass State Project UMW 0301 ST1/TK&A #23024-00
UMass Medical Center Master Plan
June 10, 2004

Jack Synnott

Present:
Rick Stanton, UMMS
Tim Fitzpatrick, UMMS
Wendy Warring, UMMHC
Paulette Seymour, UMMHC
Dana Swenson, UMMHC
Andrew Sussman, MD, UMMHC
David Ayers, MD, UMMS
Daniel Lasser, MD, UMMS
John Baker, UMMS
Ron Beckner, UMMS
Deb DeMarco, UMMS
Eric Haugen, UMMS
Jerome Grossman, MD
Schuyler Larrabee, DCAM
Ed Tsoi, TK&A
Rick Kobus, TK&A
Carol Chiles, TK&A
Jack Synnott, TK&A

Distribution:
Attendees
Tom Manning, UMMS
Ruven Liebhaber, UMMS
Mike Williams, DCAM
File 23024-00

UMMS Healthcare Visioning Session
The purpose of the meeting was to discuss current and future trends in health care that may inform the Master Plan at the Medical School campus. Representatives from the Medical School, UMass Memorial Health Care, DCAM and TK&A were in attendance.

1. Introductions
   - Rick Kobus, TK&A Senior Principal, introduced the purpose and format of the meeting, as well as the guest speaker, Dr. Jerome Grossman.

2. Dr. Grossman opened the discussion with a presentation of work that he is doing at the JFK School of Government focusing on four building blocks that make up the health care system: financing, regulating, purchasing and providing. Owing to the nature of today's discussion, Dr. Grossman focused primarily on the latter two subjects. The following is a synopsis of Dr. Grossman's observations and comments.

- Where is health care going? What will be the impact on facilities?
- The big "time bomb" out there is Medicare, not Social Security.
- More and more benefit systems are converting to "defined contribution" rather than "defined benefit" plans.
- As a result, patients will pay more for their care and choose more of what they want.
- There may also be a trend to give deductions in premiums for healthy living behaviors.
- Rather than having "units" of payment, there will be payment for conditions treated. This could result in a savings of 20% and have the same outcomes. Payment based on "outcomes," not "services."
- Even though health care is 15% of the GNP in the U.S., there is no equivalent federal agency such as the FAA or Federal Reserve.
- Medicare has now established Health Savings Accounts (HSAs) that will change the way you pay for clinical services.
- Information and communications technologies will allow more distance medicine, including communications between, among and with patients, doctors, nurses and consulting physician specialists.
- Engineering tools and modeling will allow for better predicting an otherwise very unpredictable patient population need.
- Brought together, these evolving technologies will allow for systems design and implementation of the "ICU in every room" concept, where general use units are converted with a "wireless box." Improvements in diagnostic and therapeutic capabilities and equipment miniaturization and the ability to be transmitted on the Internet will lead to more care provided at a distance.
- Related issues include refocusing research around systems or diseases such as cancer and the neurosciences.

3. General Discussion:
- The Mayo Clinic is reorganizing some of its processes to address the issues raised here as an Integrated Systems model.
- The use of simulators is increasing as their capabilities increase. This becomes a cost saving technology.
- Quality will become the prime issue, technology will enable that to happen more in the future.
- Issues of space and facilities will become surrogates to technology.
- Patients will get websites enabling them to access their records and other health care records. Patients will be able to make more of their own decisions regarding care and treatment options.
- At Penn they made the decision to not build more beds. The same course was taken at the New England Medical Center.
- Will care in hospitals end? No, but it will continue to evolve in the direction of

care for the sickest and weakest. What form that will take is uncertain.

- "This is like trying to fix a 747 while it is in the air."
- In Massachusetts for example, there are approximately 6 million residents. Of that total, approximately 4.5 million reside in the Boston metropolitan area, 1 million in the UMMS area and .5 million in the western part of the state.
- We will be in the same economic box in 10 years.
- Again, health care is 15% of the economy with less than 2% use of technology.
- The Mayo Clinic runs a virtual in Dubai and one in Minnesota.
- Tufts has a 3 layered payment system - as an example of what may be a trend in the future.
- MGH could be considered a brand name that attracts patients.
- Dr. Grossman posited that there would be 3 levels of care in the future: Intensive care, in a hospital setting with direct involvement of health professionals; Community hospitals that may become an extension of the family quarters, like assisted living - the ICU in every room concept; and outpatient care where patients will be able to self manage their care more through electronic transmission of data and even treatments.
- Patient will be able to self manage their care more through electronic transmission of data and even treatments.
- Physician email responses will not become significant until it becomes a reimbursable activity.
- Space design is often static. Architects need to design facilities that are not static. We know hospitals will have to change in response to these new technologies; our designs should remain flexible enough to allow this change to occur.
- Rick Stanton noted that UMass Lowell's on-line education program has been successful, but has proven that some physical presence is necessary for it to work.
- Primary care doctors may fulfill the role of "concierge medicine," the gateway to advice and referral to specialized care. The patient may be advised on his/her options, attendant risks and costs and given the option of selecting their own treatment.
- What is a "medical home?" Self care with medical knowledge.
- The new facilities at UMass Memorial Health include 10 ORs, a SICU and an Emergency Department. The building is structured for a 5 or 6 story addition. Need to study how many future beds.
- The Benedict Building was built in 1988 as a temporary facility and is becoming dysfunctional.

4. Wendy Warring made the following comments regarding the status of UMass Memorial's facilities planning.
   - The recent HOK Study is not a programming or masterplanning tool. It was a "focus" study regarding medical surgery capacity, cancer center location and cardiology.

- The hospital needs guidance in knowing what are the right questions to ask regarding a masterplan for the future. Need next stage preparation ... break down planning to accommodate today's operation while building for the future.

- Some questions that the hospital is currently asking of themselves:
  Develop low cost campus centers?
  What appeals to patients ... consumer driven services?
  What are existing deficiencies?
  Future patient demands ... family services?

End of Meeting Notes

3. SUMMARY COMMENTS

Presentation for the University of Massachusetts Medical School
Presented by: Jerome H. Grossman, M.D.
June 10, 2004

PUTTING IT ALL TOGETHER

The Building Blocks to Create the 21st Century Health Care Delivery System

For the past three years, industry leaders have been meeting to discuss possible strategies to reengineer the health care system.[1] This year they have focused on four building blocks that make up the system: financing, regulating, purchasing, and providing. The first is the financing of a system that would provide basic universal coverage, being developed by Victor Fuchs. The second, still in the research stage, involves the establishment and integration of a regulatory body or bodies to oversee the system. The third is the evolving realities of purchasing. Finally, there is providing and the evolution of the delivery system. The first two still require intense research and political opportunity. On the third and fourth, the purchasers and the delivery system, we are well underway.

Financing and regulation I'll discuss briefly at the outset. Then we will take up purchasing and finally the delivery system.

The Financing of Basic Universal Health Insurance

Although the time does not seem ripe for moving ahead with a strategy for universal coverage, to not include it in a vision for a 21st century program would be derelict. One of the most thoughtful proposals is being developed by Ezekial Emanuel and Victor Fuchs. Called "An Efficient, Equitable Approach to Universal Coverage,"[2] it would establish a semi-autonomous agency similar to the Federal Reserve with commissioners serving a term not coterminous with the President. Rather than setting interest rates to minimize inflation and maximize employment, the agency would balance the setting of a basic health benefit against the cost of a dedicated value-added tax. The job of balancing a tax against basic benefits in an agency protected from political interference has much appeal.

In the Fuchs plan, those who wish to obtain more health care could purchase supplemental coverage with after-tax dollars. This proposal would be different from the HSA passed as part of the Medicare Reform Act. The HSA as written is triply tax-

[1]JFK School of Government Health Care Delivery Program at http://www.ksg.harvard.edu/cbg/hcdp/
[2]Ezekiel Emanuel and Victor Fuchs, "An Efficient, Equitable Approach to Universal Coverage," presentation of preliminary plan to Harvard University Kennedy School of Government Health Care Delivery Policy Program, Scottsdale, Arizona, February 2004

free (going in, earnings on available dollars in account, and coming out for medical uses). In the Fuchs plan, the general budget would be freed of the existing tax losses, e.g., corporate and Medicaid. Given the tax implications, one gives universal basic insurance coverage, the other in reality is limited to people with sufficient incomes to invest, similar to 401(k)s. (Although companies as well as individuals can make deposits, the end result could be like a 401(k) but with the catastrophic coverage requirement.)

In setting the basic benefit, staff would monitor productivity—balancing advances in quality that have significant value from those that do not. Just as the determination of productivity affects the Fed's monetary policy, health care productivity would affect the scope of basic benefits. Such a balance might well send producers of drugs and devices to reduce costs or significantly improve quality—measured quantitatively. The agency would use data from semi-autonomous agencies, including the FDA, CDC, and ARCQ to determine the best balance of cost and quality.

A Government Regulatory System

Introduction

In remarks to the Boston Economic Club, Alice Rivlin noted,

> *Just about everybody has concluded that a high-performance economy has to be one in which the dominant motivation behind economic activity is a pursuit of personal gain. What is not widely recognized is that the easy part of a free-market economy is the market part. The hard part is creating the public policy environment within which the market can operate effectively....*
>
> *First, if markets are to work, there have to be rules of the game about property rights, bankruptcy, contracts, and not injuring others in specified ways. Second, there have to be social, environmental, and other public policies in place to handle the fact that people and companies operating in their own interests tend to load costs onto others when they can and leave behind those unable to fend for themselves. And third, there are genuine public goods – armies and navies, police, roads, parks, and public health services – that private investors operating on their own will not provide.*[3]

Metaphors

It is not that we do not have effective regulatory agencies for many key industries—we do, and they address safety and quality, standards, standard reporting, transparency, grievances, arbitration and tort law. Industry and government efforts have transformed whole industries—the FAA and NTSB ensure the safety and efficiency of civilian air transportation, the SEC and Congress, by allowing the integration of the financial services industries, permitted multiple silos to be merged.

[3]Alice M. Rivlin, "Challenges of Modern Capitalism," *Regional Review,* Federal Reserve Bank of Boston, Volume 12, Number 3, Q3, 2002, remarks to the Boston Economic Club on April 17, 2002

We have begun to undertake the research that would give health care a government agency that could address issues now handled by a wide variety of SROs or by Medicare and Medicaid as a part of their responsibilities. Since quality and safety have been on the top of our agenda most recently, the metaphor we have used is the Federal Aviation Agency. Similar to health care, the civil air transport system depends on complex interrelated activities to reach the level of safety required and regular and unscheduled monitoring to keep the system safe. Civil air transport has only gotten safer over the past 25 years. While there are those who say the consequences to the air transport team are more catastrophic than to health professionals, there is much we can learn from their procedures and policies. Perhaps the most important one is that the ancillary agency, the National Transportation Safety Board, does not report to the FAA. The NTSB has a well-staffed capability not only to understand accidents, but to continuously test ways to improve the system, which has led to both safer and more efficient transportation.

Another metaphor is found in the Federal Reserve System, where the Fed as a semi-autonomous agency, in addition to setting interest rates, carries out significant supervision and regulation. What makes it relevant is that it shares the function with the Executive Branch Office of the Comptroller of the Currency, and with state banking commissioners. Health regulation is also spread throughout the federal and state governments. How does the banking system remain strong and open and responsive to public need? An example is the Community Reinvestment Act.

Also within the financial world, we have the SEC, which includes FASB where standard vocabulary and reporting are maintained. Although an SRO, its standards reinforce transparency and performance comparisons. Another agency of the SEC is the National Association of Security Dealers, the SRO that licenses dealer-brokers and—perhaps of greater interest to us—carries out an arbitration function to determine cause and appropriate compensation before ending in court.

It is our goal to develop a model for a health care system regulatory agency. As Alice Rivlin remarked, balancing a market system and public policy is a dynamic and necessary function in the 21st century world.

In addition to the metaphor approach, we are doing research on recent strategies to improve regulatory results. They include performance-based, management-based, and risk-based regulation.

Purchasing Health Insurance

The inclusion of HSAs in the Medicare Prescription Bill (Medicare reform bill) is perhaps the most important legislative change in the past 30 years (since HMOs). Along with consumer-defined health plans already being offered by a number of

firms, small and large, it signals changes in the purchasing structure. Jack Rowe from Aetna reports steep growth in uptake and that United Health Group has tripled its membership.[4]

From Third Party to First Party

This shift in the insurance structure coincides with the burden of premium increases shifting from companies to employees and retirees. Most labor negotiations now involve maintaining health benefits rather than wages. In Medicare payments, Part B increased 6.2 percent while CPI payments increased only 2.6 percent.[5] From the late 1990s to the present, the average employee contribution went from 10 percent to 30 percent, while large numbers of companies either decreased or eliminated retiree supplemental benefits.[6]

From Defined Benefit to Defined Contribution

Some have suggested that the pattern in health care insurance looks similar to that seen in retirement benefits. Not suddenly—but over a number of years—corporations (except those that are unionized) shifted from defined benefits to defined-contribution retirement funding. The 401(k) plan offered a strategy for tax-free contributions from employees that rolled over and were portable.

The patient-defined health plan and Health Savings Accounts seem to be moving in that direction with a few significant differences. First, these plans require catastrophic insurance with a minimum $2,000 deductible, but then include a cash deposit to patients and freedom in how they want to spend it. We propose three additional features: (1) is a carve in of additional dollars for those with chronic disease or high risk for it, (2) means-testing deductibility and cash doughnut hole, and (3) for patients who keep good habits of health promotion, disease prevention, and compliance with chronic disease protocol, reduced payment for both catastrophic insurance and a bonus cash deposit.

Economic researchers, in the field of behavioral economics (awarded a Nobel in 2001), have been studying participation in 401(k)s. The results have been very interesting. In a 401(k), there is a complicated array of choices: the voluntary sign up, matching contributions, asset allocations, and the ability to withdraw money when changing employment. The research demonstrates that "homus economus" does not, in real life, act rationally. In an article entitled "Libertarian Paternalism Is Not an

[4]J. Rowe, Harvard Interfaculty Program for Health Systems Improvement Stakeholders Meeting, Boston, MA, Harvard Faculty Club, February 25, 2004.
[5]A.H. Munnell and A. Sunden, *Coming Up Short: The Challenge of 401(k) Plans,* Washington, DC: The Brookings Institution, 2004 (forthcoming)
[6]Kimberly Blanton, "Unhealthy Increases, Employees at Small Firms Hit Harder by Health Plan Costs," *Boston Globe,* February 18, 2004, D1

Oxymoron," Cass Sunstein and Richard Thaler cite a study of 401(k)s in which participation soared when enrollment was automatic and opting out required effort, rather than the usual structure in which employees must opt in. The idea is that choices can be structured such that the default serves the goal, which in this case is increasing savings rates. No freedoms are abridged.[7]

If we are indeed moving to a similar system for health care, we have an enormous education job to do, even if we employ libertarian paternalism. What plan to take? (How much risk)? What doctor to choose? What tests to have? What treatment and by whom?

Insights from the behavioral sciences are of increasing import because of the juxtaposition of Information Technology and Communication (ITC) and consumers' integration of the Internet into their daily behavior, and also the growing recognition of the importance of health promotion to disease prevention. The consumer is now able and expected to partner with providers to achieve an effective health care system. How do population health, epidemiology, and behavioral economics come together to develop strategies that produce better health and medical care with the fewest "defects," opportunities missed, and treatment processes not followed?

We have also begun to segment the new partnership by division of responsibility according to the degree of health or medical care. Isham's work suggests a way to think about the progression of health needs and the transition of responsibility between patient and either health plan or care team.

As patient-defined plans and HSAs are rapidly being added to the offering, plans are using predictive risk techniques and disease management programs to control premium costs (not risk). The companies who do a better job clearly will be able to limit premium increases. Another example of libertarian paternalism is the changing use of disease management programs (for wellness, chronic disease, or catastrophic disease). A voluntary offering of employers up to now, a number of companies are requiring participation and demanding reduced costs from those companies providing these programs to insurers—a sign of employers' acceptance of these programs.[8]

Finally, based on the segmenting of consumer populations, plans are assembling networks for niche markets rather than only freedom of choice models. Results from a market survey segment health professionals by how they would prefer to relate to their patients. Recognizing differences and matching preferences is one of our ongoing research programs.

[7]Cass R. Sunstein and Richard Thaler, "Libertarian Paternalism Is Not an Oxymoron," AEI-Brookings Joint Center Working Paper No. 03-2; U Chicago, Public Law Working Paper No. 43; U Chicago Law & Economics, Olin Working Paper No. 185
[8]Ibid

The Provision of Health and Medical Care

Charged with satisfying the many conflicting needs of patients and caregivers, the health care delivery system must recognize that it is not the first to face major challenges to the way it operates. Other industries in this country have been forced to change, often because of competition from foreign companies that have been able to provide products at lower cost and higher quality. Customers have demanded that U.S. companies become more competitive or face the prospect of economic failure. While the pressures and the ultimate consequences to the health care delivery system are not identical to those of other industries, it is clear that the experiences of industries that have successfully adjusted can serve as a useful guide to the health care industry.

Two major changes have occurred in health care delivery. The first was organizational, consolidation to reduce overcapacity and to gain market power in negotiation with managed care companies. The second was the revelation that safety and quality of medical care are variable and that new studies continue to cast them as low. After the landmark study *Crossing the Quality Chasm,*[9] a wave of projects looked to improve various aspects of safety and quality. However, as we round five years, there is an emerging understanding that individual projects alone cannot improve the system to the extent needed.

Rather there is recognition that the system itself is in need of change. In a recent *New York Times* article entitled "Running a Hospital Like a Factory, in a Good Way," Don Berwick is quoted, saying whether in industry or in health care, "quality strategy gives a unified vocabulary for thinking about production as a system with a focus on customers."[10] With the emergence of a common vocabulary for clinical, economic, and managerial aspects of the system, the possibility of success in transforming the system is greatly improved.

Two more trends bode well for the future. In the past five years, major advances in the social and behavioral sciences and in the information technology and communications industry have occurred and have important implications for health care delivery.[11] Second, economists have made great progress in understanding the measurement of productivity in service industries. Work by Jack Triplett and Barry Bosworth confirms that the great spurt in productivity is in the service industries.[12] Building on advances in productivity measurement in services, we can accelerate our research into health care productivity.

[9]Committee on Quality of Healthcare in America, Institute of Medicine, *Crossing the Quality Chasm,* Washington DC, National Academy Press, 2001

[10]Andrea Gabor, "Running a Hospital Like a Factory, in a Good Way," *New York Times,* February 22, 2004

[11]S. Zuboff, *The Support Economy: Why Corporations are Failing Individuals and the Next Episode of Capitalism,* Viking: New York, NY, 2002

[12]Barry P. Bosworth and Jack E. Triplett, "Services Productivity in the United States: Griliches' Services Volume Revisited," Brookings Institution, Washington DC, September 2003

Lower Cost and Higher Quality = Productivity

If we wish to design a health care delivery system to achieve quality and efficiency, we must be able to measure quality and efficiency. With a system in place to track and measure productivity, lowering costs and improving quality could become a reality. In the report *At What Price?*, published by the NRC in 2002, there is a chapter entitled "The Special Case of Medical Services." In it Ernie Berndt outlines the reasons medical care is not like any other service industry. He raises the key question of whether the BLS should measure the medical CPI based on medical inputs or medical outcomes. With the advances in service industry research, and the evolution of medical care to include evidence-based medicine and disease management, significant data sources on outcomes are becoming available. On the quality side, health services researchers and insurance companies are developing and testing measures for outcomes of episodes of illness and chronic conditions. The claims data of insurance companies have been rearranged into condition or episode "groupers." These advances make it possible to test the recommendation that Ernie Berndt made:

> *BLS should select about 15 to 40 diagnoses from the ICD (International Classification of Diseases), chosen randomly in proportion to their direct medical treatment expenditures and use information from retrospective claims databases to identify and quantify the inputs used in their treatment and to estimate their cost. On a monthly basis, the BLD could reprise the current set of specific items (e.g., Anesthesia, Surgery, Medications) keeping quantity weights temporarily fixed. Then, at appropriate intervals, perhaps every year or two, the BLD should reconstruct the medical care index by pricing the treatment episodes of the 15 to 40 diagnoses—including the effects of changed inputs on the overall cost of those treatments. The frequency with which these diagnosis adjustments should be made will depend in part on the cost to BLS of doing so. The resulting MCPI price indexes should initially be published on an experimental basis. The panel also recommends that the BLS appoint a study group to consider, among other things, the possibility that the index will "jump" at the linkage points and whether a prospective smoothing technique should be used.*[13]

Just recently, the Bureau of Economic Analyses let a contract to begin testing the recommendation. Simultaneously, a number of individual efforts are underway in academic centers.

Of equal import, because health care delivery is a service industry, there have not been the usual productivity measures and metrics against which engineering design, development, and improvement can be targeted. Productivity brings together the measures of costs and improvements in quality and social benefit. The application of

[13]Charles L. Schultze and Christopher Mackie (eds.), *At What Price?: Conceptualizing and Measuring Cost-of-Living and Price Indexes,* Washington DC: National Academies Press, 2002

productivity measurement techniques, together with engineering experience and application, represents a particularly fertile interdisciplinary area of research.

It is possible to take conditions (the 15 priority conditions to begin) and, adjusting them for severity both clinical and functional, examine the full resources used in caring for each condition. In our research, these will be derived from three sources: claims data; clinical data; and disease management protocols.

These advances in technology and in understanding health care as a service industry ready us for an organized transformation of the health care system that is focused and rigorous.

First Priority: Establishing Cost and Quality Improvement in Health and Medical Care (Productivity)

The Genomic Analogy

Think of productivity measures as the gene library where, rather than genes being tested against disease implication, our condition library contains severity-adjusted conditions (both clinically and functionally) and the evidence-based best demonstrated process for achieving outcomes that include the clinical, technical, function, service, and trust.

This construct of productivity brings together in the same vocabulary the issues of equality, safety, and costs. As quality and safety problems appear with painful regularity, costs of care are continuing to increase at rates multiple of the CPI, making the transition to "productivity metrics" a fundamental and critical next step in creating a viable delivery system. Again, to use the genome analogy, simply knowing what is in the library does not move the operation of the system to a new place. Just as genomics is exploding into interdisciplinary systems biology, productivity metrics must move the delivery system ahead.

Embracing Productivity and Systems Engineering

In engineering there already exist tools and techniques, broadly grouped as systems engineering, that have been used in other industries for many years. While medicine is a special case, the general knowledge and specific applications create the opportunity for a system focus for the delivery system, with engineering tools and techniques being married to the delivery of care. A soon-to-be-released study jointly developed by the NAE and IOM, calls for the establishment of a permanent program that combines the advances in productivity with the tools of information technology and techniques from engineering.

Complex Interdependent Systems

To bring order and improvements to health and medical care delivery, the report

proposes using the approach of engineering to complex interconnected systems as a framework to carry out the next stages of translation to practice. Once again recognizing medicine as a special case, the report separates the complex interconnected system into four levels: the patient; the front line team; the organization; and the environment.[14]

The Patient

Fifty years ago, with the post-World War II construction of a nation of community hospitals, the patient was brought to the site where all modalities of care could act upon him, and a single chronological comprehensive record was kept as documentation of the diagnosis, the plan of treatment, and the result of that treatment. The doctor was the process and plan designer and the nurse the foreman. The patient was the passive recipient of the care.

It was then that we embarked on the knowledge quest that created such expansion that medicine was divided into increasing sub-specialties in order to keep someone up to date on the rapidly advancing knowledge and practice. Soon after, the advent of HMOs sought savings through the reduction of unnecessary hospitalizations and length of stay.

Fifty years later, medicine has moved from the hospital as a place where care was concentrated to a myriad of sites with no coordinator or overall designer. The patient has gone from "passive" to "active," both as coordinator of his own care with no easy way to do so and as active participant in diagnosis and treatment decisions.

Imagine we recreated the nurse call button as a home-based or portable device. We would return the connectivity to 7x24x365. You ask where we will get the nurses to respond to the population at large when we are faced with a nursing shortage today. Advances in the coordination, analyses, decision supports, and data collection devices of such micro size and cost enable us to turn the home into an ICU. Not only does that improve timely oversight of critical parameters, but it allows decision support to respond and take appropriate action itself. And to anticipate the question—that does not take away from the unique skills of the doctors and nurses to interpret symptoms and signs to make appropriate decisions for each patient. The growth of evidence-based medicine and the ability to undertake mass customization of a standard plan—by matching patients' complete data against a decision base—moves the production of routine but complicated medicine into the modern era.

This year alone will see enormous advances in remote monitoring, biosensors, asynchronous language systems, the net and the web, and now ultra-wideband

[14]E.B. Ferlie and S.M. Shortell, "Improving the Quality of Health Care in the United Kingdom and the United States: A Framework for Change," *Milbank Quarterly* (2001): 79: 281-315

wireless networks that will greatly enhance our capabilities to gather and transmit *information*. New capabilities will be fully realized within an information infrastructure that collects data and then connects it to all the other nodes required for health care delivery.

Not only will this improve the quality of care, it will also address the documented growing dissatisfaction of patients with the quality of their interaction with the care system.

The Front Line Team

One of the most clearly articulated descriptions of the front line team is described in an article "Microsystems in Health Care" by Nelson et al.[15]

What is a front line team? A clinical microsystem is a small group of people who work together on a regular basis to provide care to discrete subpopulations of patients. It has clinical and business aims, linked processes, and a shared information environment, and it produces performance outcomes. Microsystems evolve over time and are often embedded in larger organizations. They are complex adaptive systems, and as such they must do the primary work associated with core aims, meet the needs of internal staff, and maintain themselves over time as clinical units.

Since the publication of *Crossing the Quality Chasm*, there has been significant work on the attributes of the team. Ed Wagner has thoughtfully laid out the progress they have made in improving performance of the team. He concludes that progress has reached a much improved but still only adequate stage. To our thinking, it is time for research and experimentation to transition to the next stage using engineering practices and tools. Imagine that after reviewing a patient's data, both from the patient's input and the data in the EMR, the team has available a protocol for the diagnosis and care of the patient (as well, at Mayo, of the last 400 cases with similar findings), makes customizing changes, and sends the protocol forward for execution.

It is here that flexible manufacturing techniques can ensure that no handoffs are dropped and no results data escape review. The team member would have a "cockpit" available for monitoring the patient's condition. Thus, many safety and quality problems would be significantly decreased if not eliminated, as the team or the accountable individual would be aware of the patient's condition around the clock. As in avionics, sophisticated programs monitor raw data, assess it for any important change and limit transfers to the team member to important information. This system would employ knowledge in pursuit of care quality and safety.

[15]E.C. Nelson et al., "Microsystems in Health Care: Part I. Learning from High-Performing Front-Line Clinical Units," *Journal of Quality Improvement,* 28(9): 472-497, September 2002

The Organization
It is at the level of the organization that flexible manufacturing is carried out. The organization's overall climate and culture for productivity, as well as corporate decision-making and human resource practices, create the "learning organizations."

The Environment
With standardized vocabulary and reporting, the environment is able to use data for many things, from post-introduction surveillance of drugs and devices, to front-line signals for detection of bioterrorism incidents. The CDC could trace communicable diseases; policy makers would be able to model and simulate the impact of legislative and regulatory actions.

How are these complex interdependent systems managed? Engineering tools and techniques have successfully made such systems more productive in terms of quality and cost.

Engineering in the Service of Medicine
Within the framework of complex interdependent systems, we can divide engineering contributions into two large opportunity sets:

- Information Technology and Communications
- Engineering tools and techniques

At each level of the system the backbone is the information system. A number of information technology companies are moving to this next generation. They have taken concepts from other industries and adapted them to medicine. While they still have the same front-end systems, they have much more sophisticated capabilities, which at present few health care systems can use.

Information Technology and Communications
Health care delivery is almost entirely dependent on information, which today is housed in a myriad of silos. So many errors and missed opportunities come from not knowing key information. Handoffs between silos are very difficult and fraught with unreliability.

ITC advances in power, ubiquity, and declining cost are making the tradeoff between capital expense and productivity (both cost and quality) too significant not to be one focus of the national effort. The advances in microsystems and biosensors make it possible to collect patient data at long distance, continuously, and at low and declining cost.

Microsystems: Making Every Room an ICU

> ***While improvements in handling information could have dramatic effects on making the health-care system more efficient and on eliminating errors,***

much more will be needed to meet the challenges that will confront us during the coming decades. We will somehow have to provide much better monitoring and diagnostics to substantially more patients, and we will have to do it with fewer nurses and physicians. Microelectronics, by itself, can only interface with other electronic systems, occasionally displaying data for interpretation by physicians. While software to distill data into conveniently readable forms and suggest treatments may emerge, just as systems for checking drug interactions are emerging today, none of these systems will fully meet the challenges of the health care system unless we can obtain better data in the first place.

In parallel with developments in microelectronics, there has been a move to develop sensors based on the same technology. The resulting integrated sensors have evolved to microelectromechanical systems (MEMS), and combined with microelectronics and wireless interfaces are now emerging to form wireless integrated microsystems (WIMS). These microsystems (Wise, 1996, 2002) will merge sensors with embedded microcomputers and wireless transceivers in volumes of 1cc or less and operate at power levels below 1mW, consistent with long-term operation from batteries or even energy scavenging from the environment. They have the potential to turn every hospital room into an intensive care facility. They are small enough to be worn comfortably and unobtrusively, communicating with a bedside receiver that, in turn, communicates with monitoring stations and the larger health care facility. While present-day examples of such systems are still few and limited in performance, they are emerging. Blood oximeters, heart rate monitors, and temperature sensors are all candidates for WIMS use, and swallowable capsules for internally viewing the digestive tract have been reported. Wearable devices for blood pressure (hypertension), breathing patterns (sleep apnea) and other variables are certainly possible in the near term. The major challenges in this area are the interfaces with the body itself, but technology now appears ready to address an expanding array of such problems.

Swallowable capsules for all kinds of internal viewing and measurement could significantly improve our ability to diagnose a variety of conditions and could improve the quality of health care. DNA analysis chips are another example of technology that can be expected to have a broad impact. Such chips (Mastrangelo et al., 1998; Burns et al., 1998) will take advances in genetics into the hospital and even into the local doctor's office. They should produce substantial improvements in both diagnostics and preventative medicine. But although these developments will improve health care quality, their impact on costs will likely be indirect. There are also substantial issues of privacy to be dealt with.

Wireless integrated microsystems for health care are expected to be technically feasible within the coming decade, but in order to reduce costs, a complete system in which they can be used must emerge. Bedside receivers and wearable monitors could be a technical triumph but could also be an economic disaster for the company producing them unless a larger system exists that can make use of such devices. Similar situations have existed for at least 20 years in the process control industry, where sophisticated sensors have been prototyped but have been very slow to be applied because controllers able to use their features have not existed. In the transportation industry, the entire control system of the automobile engine had to be redesigned to take advantage of microprocessors and electronic sensing. Thus, although an increasing number of wearable and implantable monitoring devices are possible, the larger system needs to be available to make use of them, and that calls for efforts (and coordination) at every level of the health care system.[16]

Engineering Tools and Techniques

The second set of tools takes the data and information and transforms them in usable nodes of information for decision making, process design, fault correction, and optimal production.

Examples of How Engineering Could Improve the System

Let us start at demand for care across the organization. One of the critical differences from other industries is the uncertainty of demand—how many, what sort, and how urgent. Modeling uncertainty is an example of using the tools of queuing theory in its many variants, to model scheduled, unscheduled, and urgent demand. Predicting demand has the potential to mitigate a number of problems. The Emergency unit has increasingly become the bottleneck into the delivery system. One can imagine—rather than patients calling endless phone numbers that turn out to be voice mail—enterprise systems where patients can indicate their need, either voice or internet response occurs appropriately for the problem and is smart response not "dumb." As that information comes in 7x24x365, the system is monitoring and testing the capacity to handle the variety of problems. The key is always knowing the "state you are in," not only demand in the aggregate but what is actually happening at present in the organization.[17]

In the next level of engineering applications, such techniques as concurrent engineering are used to examine the needs and wants of all the stakeholders, including

[16]T.F. Budinger, "Practical Biomonitoring Using Wireless Technology," presented at NAE/IOM Workshop, "Engineering and the Health Care System," March 11-12, 2003; Also see Rob Stein, "Patients Find Technology Easy to Swallow," *Washington Post,* December 30, 2002, A1

[17]J. Birge, personal communication

patients, first line team, and emergency response, followed by translation of these activities into actual computerized protocols. As we noted above, that is not cookbook, but rather as Toyota configures it, allows made-to-order iterations of the basic "design" (from evidence-based medicine). With knowledge of the predicted demand and what that demand will need from each level of the system, one turns to the organization's activities least utilized in health care delivery, namely CAM or in services Computer Aided "process management." The delivery system could use many techniques from other industries to optimize the functions that go into the diagnosis and treatment process.

By knowing both expected demand and current use, one can use engineering techniques to access the people or machines needed to respond. The object is to optimize the assets available to produce the most defect-free outcome in the shortest time and with the most efficient use of resources. One critical aspect of the optimization is to know what assets are not available because of breakdown or being occupied elsewhere. A process management system continues updating and rerouting in real time the patients throughout the system.

The other means by which Toyota achieves such high quality of production is engaging the front line worker in understanding the goals of his or her function, understanding the current state of the function, and working as part of a team to accomplish the function. If there is a breakdown, the team is equipped to work around or to immediately inform the system of the breakdown, such that incoming work can be rerouted. At Toyota, workers are encouraged to forward ideas for improving either reliability or efficiency.[18]

Finally there is continuous monitoring of performance, of failures in supply chain, of deficits in capacity, and in the data being shared with workers, supervisors, managers and top management and the back office functions of enterprise management.

Barriers to Implementation

There is clearly an underlying assumption in industry that is not true in the health care delivery system. In industry, fully integrated enterprises carry out these activities. It is no wonder that the first generation systems that have been most successful in applying these principles are such integrated systems—Kaiser, Mayo, and the VA. These systems are all beginning to move to the next level. They are undertaking major new projects to take advantage of what has been learned both inside and outside their enterprises, and to leverage the great advances in ITC and design, analysis, and control.

[18]K. Bowen, "Decoding the DNA of the Toyota Production System," *Harvard Business Review,* September 1, 1999

As an aside, one of the major issues facing the system is that reimbursement is predicated mainly on individual input units. Technologies that are developed to increase accuracy, but do not contribute to the outcome, attribute their demand for higher prices to the higher "quality" of both the machines and the labor. Experimental reimbursement systems that are predicated on diagnosis and treatment of conditions (not inputs) and measured by the outcomes of quality, from clinical, to functional, to "trusting," to service, are coming into testing now.

The transition to this way of thinking can have a critical influence on technologic innovation in health care. Rather than continuing to reward the development of more sophisticated equipment which garners greater reimbursement, a productivity driven system becomes a more rigorous version of technology assessment. Technology has to demonstrate real quality improvement to gain reimbursement. Examples could include the "automated" bath for elderly patients, the aforementioned turning a room and the home into an ICU, and patient-friendly devices to encourage compliance—the needleless insulin dosing, the simplest effective treatments such as diuretics for hypertension, or healthy habits rather that surgical procedures for heart disease.[19]

Given the maturation and integration of ITC, the biosensors and microsystems that accompany them, and the steeply decreasing costs of IT, the major hurdle is the reengineering of large numbers of jobs, all of which are codified as professionals (independent thinking), each in a narrow area of knowledge.

Establishing a National Productivity and Systems Engineering Research and Development Project

It is our strong belief that we must establish a permanent research and development effort with engineers and health professional housed together, adjacent to laboratories for home-, office-, and hospital-based prototype development and finally testing and scaling.

Progress also rests on changing medical education and training. Two core transitions in belief are necessary—one, that caring for patients in teams, and not as individuals, is not losing one's professionalism, and two, that using protocols and algorithms are not cookbook medicine.

Fortunately, we have seen the beginning of experimental efforts to build research laboratories for care delivery. Clinical research physicians and engineers are beginning

[19]James Brooke, "Machida Journal; Japan Seeks Robotic Help in Caring for the Aged," *New York Times,* March 5, 2004; Daniel Rosenberg, "Medical-Device Makers Striving to Perfect the Needleless Injection," *Wall Street Journal,* March 18, 2004, D4; Gina Kolata, "New Studies Question Value of Opening Arteries," *New York Times,* March 21, 2004

to enter strategic partnerships with industry to develop the programs that should one day exist at medical schools.[20] As in the biosciences, the setup must be permanent for advances in both engineering sciences and medical device technology. There is one major exception. In engineering, one builds and tests prototypes and then from the tests improves the device or system. Turnaround time is measured in minutes, hours, or days. When the lab and operating staff are satisfied—then and only then is it turned over to manufacturing for limited manufactured runs and wider testing. Development of computer systems will call for a continuous learning organization receptive to new capabilities as they are in medical sciences.

Reengineering the System

It is important to recognize that there is no technology/engineering "silver bullet." Rather, progress requires understanding and leadership at all levels of the delivery system, appreciation for and commitment to the organizational change/innovation that will ultimately secure the transformation to patient-centered care, and continuous improvement.

As we translate this new knowledge into practice, each element of the organization must have becoming a "learning organization" as part of its basic values. It cannot become a dynamic and responsive system without this characteristic. Learning can only be accomplished through experimentation—exploring alternative approaches or reaching out to learn from other successful organizations. But with experimentation comes the possibility, even the likelihood, that some experiments will fail. The foremost principle of a "learning organization" is that failure in the presence of a good faith effort must not be punished. The tendency to "shoot the messenger" when the message is bad must be eliminated. Individuals and organizations must be encouraged to seek new ways of accomplishing their objectives. The habit of creating an institutional memory of both successes and failures is important in formalizing these processes—not to reward success or punish failure but to record lessons learned.

Accepting that some experiments will fail is as important in creating an "innovative environment" as it is in creating a "learning environment." Innovation begins with developing new ways of attacking problems, the introduction of new tools, or the identification of new ways to accomplish tasks and processes. Innovation may start with an invention or with the application of an existing procedure/process in a new way. The organization will become innovative only when it has matured to the point that it encourages its employees to think in new ways and to propose alternatives.

A key first step in this process is for the management team and key stakeholders to create a clear view of the future for the organization. Goals and objectives must be

[20]D. Cortese, Remarks at Mayo Clinic Trustee Meeting, February 20, 2004

defined in ways that can be made clear and acceptable to all members of the organization. This must be communicated to everyone in the organization. A unified approach in seeking to achieve the goals of the organization is necessary for success. Achieving this will be no easy task for the health care delivery system. The current system, with its many silos of local interest, must be replaced by a system view. That is, each silo must consider how the overall system can benefit rather than seek to optimize the performance of individual entities.

Care must be given to identifying how individual roles will be affected in the reengineered system. Interactions among elements of the system will change. New teams will be created, different individuals will be expected to work together, and responsibilities may be shared among individuals who are geographically dispersed. Under such circumstances, it will be easy for individuals and elements of the system to be confused about their roles and responsibilities. Addressing this successfully will require a carefully orchestrated, ongoing education process and continuing discussions with individuals and team members.

A good model of the future system will help rationalize the objectives as well as ensure that the new interactions among the elements are consistent with the new goals. This is particularly important for the health care delivery system as it seeks to encourage patients to assume more responsibility for their own care. The education of individuals to their responsibilities and the creation of new means of communication between the patient and caregivers are particularly critical in the reengineering of the system.

4. APPENDIX

RESUME

JEROME H. GROSSMAN, M.D., F.A.C.P.
DIRECTOR,
HARVARD/KENNEDY SCHOOL HEALTH CARE DELIVERY POLICY PROGRAM
CENTER FOR BUSINESS AND GOVERNMENT
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Dr. Jerome H. Grossman's principal activity is as Senior Fellow and Director of the Health Care Delivery Project. At his new position at Harvard, he will be bringing his expertise in the health care system and information technology, and his experience in community services to develop innovations and reforms in the medical care delivery system. He is Chairman Emeritus of New England Medical Center, where he served as Chairman and CEO from 1979 to 1995 and Professor of Medicine at Tufts University School of Medicine. Currently, he is an Adjunct Professor of Medicine at Tufts University School of Medicine and Honorary Physician at the Massachusetts General Hospital where he served full-time from 1966 to 1979. Dr. Grossman was a member of the founding team of several health care companies, including Meditech, a medical software company, as well as Tufts Associated Health Plan, Chartwell Home Therapies, and Transition Systems, Inc., a medical care information management company.

Named to the Institute of Medicine of the National Academy of Sciences in 1984, he has served as Chairman of four committees on issues concerning utilization management and guidelines. More recently he has served on the Committee for Quality Health Care in America. He was the first IOM member to Chair a National Academy of Engineering Committee on the Impact of Academic Research on Industrial Performance, and is now serving as Co-Chairman of the NAE/IOM Workshop on Engineering and Health Care Delivery Systems. In 1999, he was appointed to the National Academies Council on Government-University-Industry Research Roundtable (GUIRR). Grossman also served as Scholar-in-Residence at the Institute in 1996. While at New England Medical Center, he founded The Health Institute in 1988, whose work involves research and development programs and practical applications in the area of medical outcome, functional health status, the relationship of doctors and patients, and the relationship of the health status to other non-biologic factors in society-at-large, such as income and education.

He serves as a director/trustee of a number of organizations including: The Mayo Clinic Foundation, Penn Medicine (University of Pennsylvania Medical School and

Health System), the Stryker Corporation, Landacorp, and the Committee for Economic Development. His past services include the Board of the Federal Reserve Bank of Boston from 1990 to 1997 serving as chairman from 1994 to 1994, Wellesley College and the Massachusetts Institute of Technology.

POSITIONS

2002-	Adjunct Professor of Medicine, Tufts University School of Medicine
2001-	Senior Fellow, John F. Kennedy School of Government, Harvard University
1999-	Chairman and CEO, Lion Gate Management Corporation
1997-2001	Fellow, John F. Kennedy School of Government, Harvard University
1996-1999	Chairman and CEO, Health Quality, Inc.
1996-1997	Scholar-in-Residence, Institute of Medicine
1995-1996	Chairman, Outcomes and Health Services Research and Development Center (NEMC)
1995-	Chairman Emeritus, New England Medical Center
1988-1996	Chairman, The Health Institute
1984-1995	Chairman and CEO, New England Medical Center
1989-1996	Professor of Medicine, Tufts University School of Medicine
1979-1989	Associate Professor, Tufts University School of Medicine
1979-1996	Physician, Department of Medicine, New England Medical Center
1979-1984	President, New England Medical Center Hospitals
1979-	Honorary Physician, Massachusetts General Hospital
1974-1979	Director of Ambulatory Care Division, Massachusetts General Hospital
1972-1974	United States Air Force
1971-1979	Assistant Professor of Medicine, Harvard Medical School
1971-1979	Assistant Physician, Massachusetts General Hospital
1970-1972	Associate Director, Medical Clinics, Massachusetts General Hospital
1969-1971	Instructor in Medicine, Harvard Medical School
1969-1971	Assistant in Medicine, Massachusetts General Hospital
1967-1972	Consultant for Development of Automated Medical Record (COSTAR), Harvard Community Health Plan, Boston, MA
1966-1972	Laboratory of Computer Science, Massachusetts General Hospital, Boston, MA - Associate Director (1972)

TRUSTEE/DIRECTOR

2003-	Mayo Clinic
2002-	Penn Medicine (University of Pennsylvania Medical School and Health System)

2000-	Committee for Economic Development
1998-	Landa Management Systems Corporation
1996-1998	Adesso Specialty Services Organization, Inc.
1996-	Boston Public Library Foundation
1994-1996	Massachusetts Business Roundtable
1993-1998	Boston Municipal Research Bureau
1993-1999	National Alliance of Business; Northeast Regional Board, (Chairman 1995-1999)
1991-1996	Commonwealth of Massachusetts Board of Education
1991-1996	Commonwealth of Massachusetts Jobs Council
1990-1995	Massachusetts Institute of Technology
1990-1997	Federal Reserve Bank of Boston (Chairman 1994-1997); Conference of Federal Reserve Chairmen (Chairman 1995); Nominating Committee (Chairman 1996)
1990-1995	Academic Medical Center Consortium (Chairman 1992-1995)
1988-1995	VHA-Healthfront, Waltham, MA (Vice Chairman 1989-1995)
1987-2002	Arthur D. Little, Inc., Cambridge, MA
1986-	Civic Strategies, Boston, MA (Chairman)
1985-1996	Transition Systems, Inc., Boston, MA (Chairman)
1985-1995	Greater Boston Forum for Health Action, Inc. (Co-chairman)
1979-	New England Medical Center, Boston, MA (Chairman 1984-1995; Chairman Emeritus 1995-)
1984-1995	Chartwell Home Therapies, Waltham, MA
1984-1989	BayBanks, Inc., Boston, MA
1983-2001	Wellesley College, Wellesley, MA
1982-1996	The Boston Private Industry Council, Boston, MA
1981-1983	Commonwealth Health Care Corporation, Boston, MA (President)
1981-1990	Greater Boston Chamber of Commerce, Boston, MA Center City Task Force, Chamber of Commerce (Chairman 1982-1990)
1980-	Stryker Corporation, Kalamzoo, MI
1979-1996	Tufts Associated Health Plan, Waltham, MA
1969-2002	Medical Information Technology, Westwood, MA

COMMITTEE MEMBERSHIPS

1988- Institute of Medicine

- Committee on Engineering and Health Care Delivery Systems
- Government-University-Industry Research Roundtable (GUIRR)
- Committee on Quality of Health Care in America
- Committee on Quality Assurance and Accreditation Guidelines for Managed Biobehavioral Health Care (Chairman 1996-1997)
- Committee on Priorities for Practice Guidelines (Chairman 1994-1995)

- Advisory Committee for the Colloquia Series on Health Care Reform (Chairman 1993-1995)
- Committee on Assessing Health Care Reform (1992-1993)

- Committee on Clinical Practice Guidelines (Chairman 1990-1992)
- Committee to Advise the Public Health Service on Clinical Practice Guidelines (Chairman 1990)
- Committee on Utilization Management by Third Parties (Chairman 1988-1989)

1994- National Employer Leadership Council

1994- The Presidents' Circle, National Academy of Sciences and Institute of Medicine Program Committee (1996-)

1993-1996 Governor's Council on Economic Growth and Technology, Health Care Industry Task Force (Co-chairman 1993-1996)

1993-1996 Commonwealth of Massachusetts Board of Education, Adult Education Committee (Chairman)

1991-1996 Massachusetts Business Roundtable Health Care Committee

1986-1991 Commonwealth Fund, Careers Beginning Program National Advisory Committee (Chairman)

1986-1992 Association of American Medical Colleges, Administrative Board, Council of Teaching Hospitals (Chairman 1990-1991)

1985-1988 Stanford University Medical Center, National Advisory Committee on the Study of the Future of Academic Medical Centers

1985-1988 American Hospital Association, Graduate Medical Education Committee (Chairman 1986)

1984-1996 University of Pennsylvania, National Advisory Committee of Leonard David Institute, Wharton School

1981-1988 Robert Wood Johnson Foundation, National Advisory Committees:
- Community Programs for Affordable Health Care (1981-1988)
- Program for Prepaid Managed Health Care (1983-1988)

1982-1987 Commonwealth Fund, Academic Health Center Program (Program Consultant & Program Director)

1980-1984 Brigham & Women's Hospital, Center for Cost Effective Care Advisory Committee

1979-1995 Conference of Boston Teaching Hospitals (Chairman 1981-1983)

1978-1984 University of Pennsylvania, Wharton School, National Advisory Committee, National Health Care Management Center

1977-1981 Association of American Medical Colleges, Advisory Committee on Ambulatory Care

1972- American Federation for Clinical Research

1968-1970 American Association for the Advancement of Science, National Academy of Engineering, M.I.T.-Harvard Medical School Task Force

1961- Massachusetts Institute of Technology
- Corporation Visiting Committees: Department of Humanities; Department of Brain Sciences (1996-); Department of Medicine (1973-1978); Department of Biology Brain Sciences (1996-1998)
- Corporation Development Committee (1986-1998)
- Alumni Advisory Council (1961-1980)

EDITORIAL RESPONSIBILITIES

International Journal of Technology Assessment in Health Care,
- "The Organization and Use of Technology in the Hospital," Volume 3, No. 3, 1987
- "Industry and the Generation of Technology," Volume 9, Nos 2-3, 1993

HONORS

1996	Distinguished Service Membership, Association of American Medical Colleges
1996	Doctor of Humane Letters, Honorary Degree, Lesley University
1990	Fellow, American College of Physicians
1983	Institute of Medicine, National Academy of Sciences
1961	Karl Taylor Compton Prize, MIT

EDUCATION/TRAINING

1966-1969	Clinical & Research Fellow, Massachusetts General Hospital, Boston, MA (and Harvard Medical School)
1965-1966	Intern, Montefiore Hospital, Bronx, NY
1965	M.D., University of Pennsylvania, Philadelphia, PA
1961	B.S. Massachusetts Institute of Technology, Cambridge, MA

PUBLICATIONS

1. Dickson, J., Grossman, J.H., et al: Computer Pattern Recognition Techniques: A Remote On-Line Real-Time Computer System for the Diagnosis of Clinical Electrocardiograms. Quarterly Progress Report of the Research Laboratory of Electronics, M.I.T., Fall 1964.
2. Grossman, J.H., Barnett, G.O.: The Use of a Time-Shared Computer System in Patient Care. Proc. of Conf. on the Use of Computers in Radiology, C-38 - C-45, October 1966.
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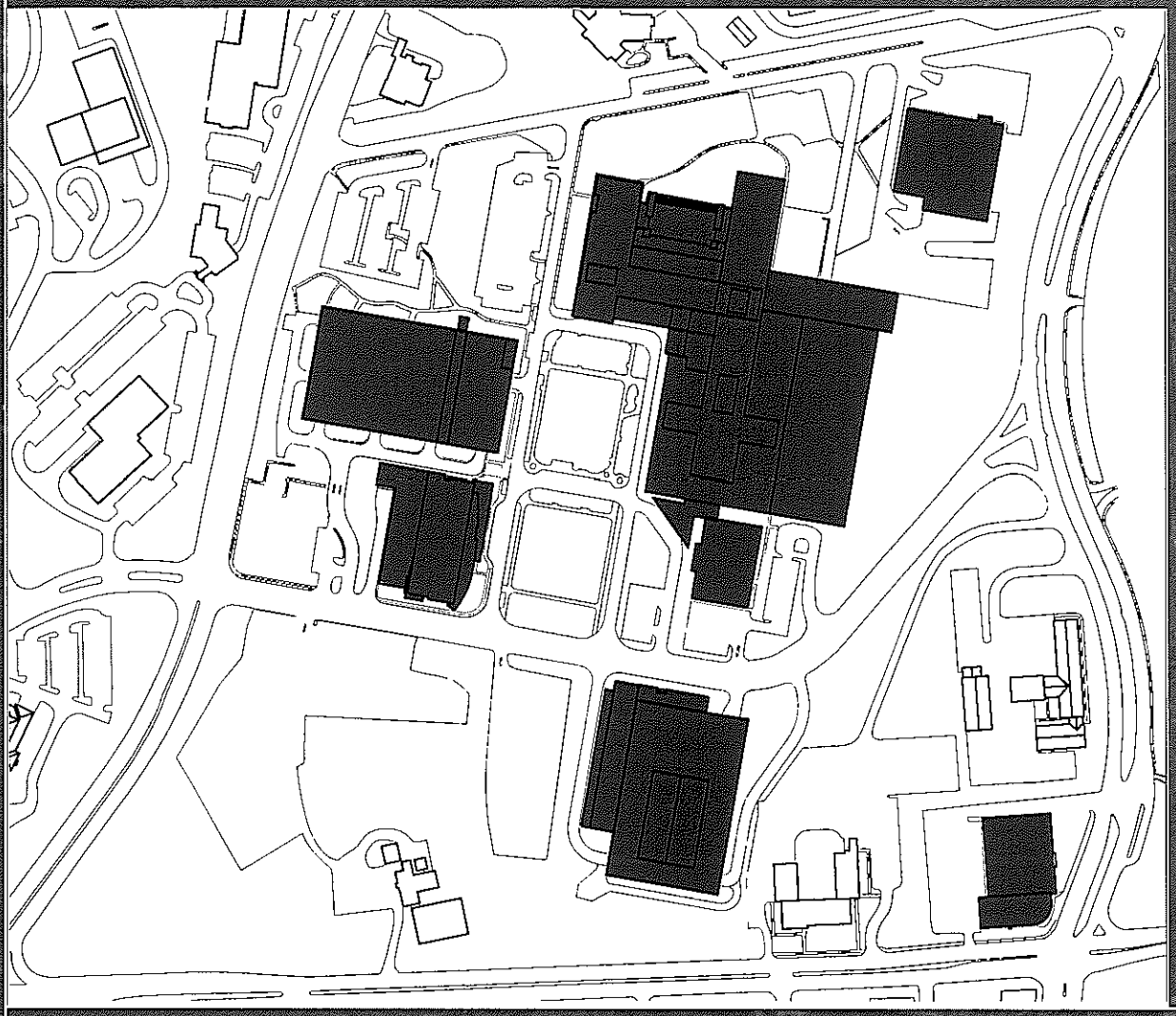
Section IV. State Outreach Visioning Report



UMass Medical Center Master Plan

Massachusetts State Project UMW 0301 ST1

State Outreach Visioning Session

Report Issued by:
Tsoi/Kobus & Associates
TK&A #23024-000
June 2004

University of Massachusetts Medical School
Division of Capital Asset Management

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I. OVERVIEW

STATE OUTREACH

The University of Massachusetts Medical School is committed to public service in all three of its missions: Clinical Care, Research and Education. Nowhere is that commitment more evident than in Commonwealth Medicine (CM).

As described on its web page, Commonwealth Medicine "has emerged from the relationships that UMMS has fostered over the past 20 years with state agencies responsible for the provision of services to the commonwealth's citizens". "Commonwealth Medicine is the state's partner in public sector health care initiatives that serve to optimize efficiency, increase the value and quality of health care expenditures, and improve access and delivery of health care to at-risk and uninsured citizens".

Commonwealth Medicine is comprised of a wide assortment of programs cooperating with federal, state, and community agencies on healthcare initiatives. Some of these programs are:

Center for Adoption Research and Policy
The Center conducts research into adoption and foster care problems, develops policy guidelines, and promotes educational and training programs.

Center for Health Care Financing
This Center works to help the efficiency of government programs and expenditures. In addition to Massachusetts and local agencies, the Center is actively engaged with other states.

Center for Health Policy and Research (CHPR)
CHPR's activities are aimed at improving the health status of the people of the commonwealth.

Disability Evaluation Service
This program assists state agencies in determining disability eligibility.

Nursing Home Initiative (NHI)
In association with other state agencies, NHI coordinates services for adults with developmental disabilities.

Office of Clinical Affairs (OCA)
OCA's mission is to promote the "development of a high-quality, cost-effective network of healthcare services, and to formulate and implement evidence-based standards of care, best-practice guidelines, and clinical outcome measures".

Office of Community Programs (OCP)
OCP was created to coordinate an extensive state outreach program including the following current programs:

- Clinical Education and Training
- Community Health Center Development
- Dental Training and Services
- MassHealth Access Program
- MassHealth Technical Forum
- Medical Interpreter Training
- New England Aids Education and Training Center

Pharmacy Benefit Management
The Massachusetts Drug Utilization Review (DUR) program's main goal is to ensure that Medicaid recipients are receiving appropriate, medically necessary, prescription drug therapy.

Commonwealth Medicine administers the grants and contracts that support the UMMS Shriver Center.

Shriver Center
The Eunice Kennedy Shriver Center, founded in 1969, has been a pioneer in research, education and service for people with developmental disabilities and their families.

Commonwealth Medicine also provides operating services for programs located on its Jamaica Plain campus, including the Massachusetts Biologic Laboratories and the New England Newborn Screening Program. There are still more programs than can be mentioned or adequately described here.

In our meeting with Commonwealth Medicine, we wanted to understand the facilities impact of these far flung programs on the main University campus.

UMMS and many of Commonwealth Medicine's programs benefit from day-to-day interaction among clinicians, researchers, educators and administrators on the main campus. At the moment, these CM programs occupy several locations in and around Worcester, some in leased space, some owned. The total gross area is approximately 120,000 GSF.

As the enclosed meeting report indicates, these particular functions of Commonwealth Medicine are expected to double in size over the next 5 to 10 years.

There are, of course, many options open to CM as it considers future real estate decisions. It can continue on its current course, it can consolidate in leased or purchased space in Worcester where the market is beneficial, or it could relocate to the University campus.

For the purposes of this Master Plan, we have studied the ramifications of consolidating these Commonwealth Medicine functions on the University Campus. We have been careful to "zone" the Master Plan so each constituent of the plan has an optimized location, relationships to other buildings and functions, traffic flow and parking.

I. MEETING REPORT

MEETING NOTES

Mass State Project UMW 0301 ST1/TK&A #23024-00
UMass Medical Center Master Plan
June 17, 2004

Jack Synnott

Present:
Tom Manning, UMMS
Rick Stanton, UMMS
Phil Poley, UMMS
Dana Swenson, UMMHC
Tim Fitzpatrick, UMMS
Bob Wakefield, UMMS
Daniel Lasser, MD, UMMHC
John Baker, UMMS
Julie Hanaford, UMMS
Ron Beckner, UMMS
Eric Haugen, UMMS
Ruven Liebhaber, UMMS
Lori Matthews, TK&A
Jack Synnott, TK&A

Distribution:
Attendees
Aaron Lazare, MD, UMMS
Wendy Warring, UMMHC
Patty O'Day, UMMS
Jean Sullivan, UMMS
Mike Williams, DCAM
Schuyler Larrabee, DCAM
TK&A Team
File 23024-00

Commonwealth Medicine Meeting
The purpose of the meeting was to discuss Commonwealth Medicine as a component of the Master Plan. Representatives from the Medical School, UMass Memorial Health Care and TK&A were in attendance.

1. Introductions
   Tim Fitzpatrick introduced the TK&A team and the scope of the master planning process and the purpose of this meeting. He then asked Tom Nanning to give an overview of Commonwealth Medicine.

2. Commonwealth Medicine (CM) - Tom Manning
   - CM was established with a public service mission. It is now 20-25% of the Medical School revenue base, accounting for 1,400 employees and $130 million in revenue.

- Public Sector Partners (PSP) is one of their new and unique programs. Senior management is located at Century Drive.
- In the next 5 years they expect to double their size, with 70% of the growth coming from out-of-state.
- They currently work with 17 state agencies.

3. PSP - Bob Wakefield
   - PSP is 3 1/2 years old, with 200 FTEs (including temps in the call center) and $21 million in revenue.
   - PSP is the private sector arm of the school. They have a 6-member board.
   - They have been approved as a source of the Medicare National Discount Card and are currently engaged with the Fallon Clinic and state employees.
   - They are looking to create a pharmacy benefit program with 20± FTEs.
   - With 10+ new ventures out of state, they project 30-40% growth annually.
   - They take high risk and state patients authorized through CM.
   - They do not have a real need to be located on this campus. Labor supply is a consideration as is their social responsibility to diversity. Worcester is a great labor market for both high- and low-end availability.
   - PSP corporate offices are at Century Drive. Telecommuting is a possibility. There will be other offices in other states. For example, in New York state, they expect 5 management positions and 30 staff.
   - The call center being nearby allows management to speak to state agencies.
   - Being part of the UMMS has advantages for PSP in access, connections and reputation.
   - Training is onsite. They could use a training center as they grow. It would include properly sized rooms for 50 people, computer and other support.
   - The call center is their most important space need, they have no room left and are still growing.

4. Knowledge Assets - Dan Lasser, MD
   - The various Centers are owned and operated by CM.
   - Center for Health Policy Research is based in Shrewsbury.
   - Office of Community Programs is also based in Shrewsbury.
   - AHEC also at Shrewsbury.
   - There are about 100 faculty, staff and administrative staff supporting these programs.
   - These programs need to be together and ideally located in or near the main campus.
   - These groups meet with HHS in Boston but it is important they remain in Worcester.
   - AIDS Education Center is located in Brookline. They have a large federal contract. They interact with all medical schools in the region. It isn't clear where they need to be.

- The Office of Clinical Affairs is located in downtown Boston and needs to remain there. They have 75 FTEs.
- The Center for Mental Health Services is located in Waltham.
- The Office of Privacy Compliance has 3-4 FTEs in senior management positions. They deal with HIPPA requirements for CM and the research community and should be close to the campus.
- The Center for Community Services. The more of a "water cooler" community, the better for all programs. It will allow them to forge better relationships with the school community.

5. Facility Location - Tom Manning
   - It is vitally important that the leadership of CM be together with Knowledge Assets.
   - Getting people together now, with geographic separation, is difficult. As they grow, the problem will only get worse unless they come together.
   - CM is seen as part of the Medical School and should be more a part of the Medical School community.
   - Tom is leaning toward being off campus.

6. Administration - Tom Manning
   - There are 100 FTEs in Administration comprised of IS, Program Development, Project Management, Marketing and Communications. Of those units, Program Development and Marketing are currently understaffed and could grow by some 20-30 people. They tend to add staff late rather than incur costs early.
   - The presence of Commonwealth Medicine on campus has pluses and minuses.
   - On the plus side, there is more opportunity for interaction.
   - On the minus side, even though much of their revenue is privately sourced, the Medical School community still wants it to be spent for UMMS priorities.
   - Project Management is not only internal, it is also used for HHS work. They are slow getting into that program.
   - CM also needs an IS partner to create or negotiate creative solutions, an inventive "think tank."
   - They have operational staff but need more visionary approach that is co-located with senior management of CM.
   - The question is whether to have an on-campus location.
   - If at a distance, senior management will travel to program sites to better understand and participate.

7. Revenue Management (RM) - Tom Manning
   - RM has a "thinking" piece and a "transactional" piece.
   - This program is based in Boston. It has approximately 125 FTEs currently and is expected to grow to between 200 and 300 as they become nationally based.

- They work to recover matching funds from the federal government.
- RM will have no impact in the Worcester campus.

8. Health and Human Services (HHS) - Tom Manning
   - This is the largest people component of CM. It has multiple sites.
   - HHS creates the products that implement KM ideas.
   - They would like to see more knowledge sharing and cross pollination of these groups.
   - HHS will grow. It takes its own programs and develops them as well as KM ideas.
   - There is no way to crystal-ball the future growth of HHS.

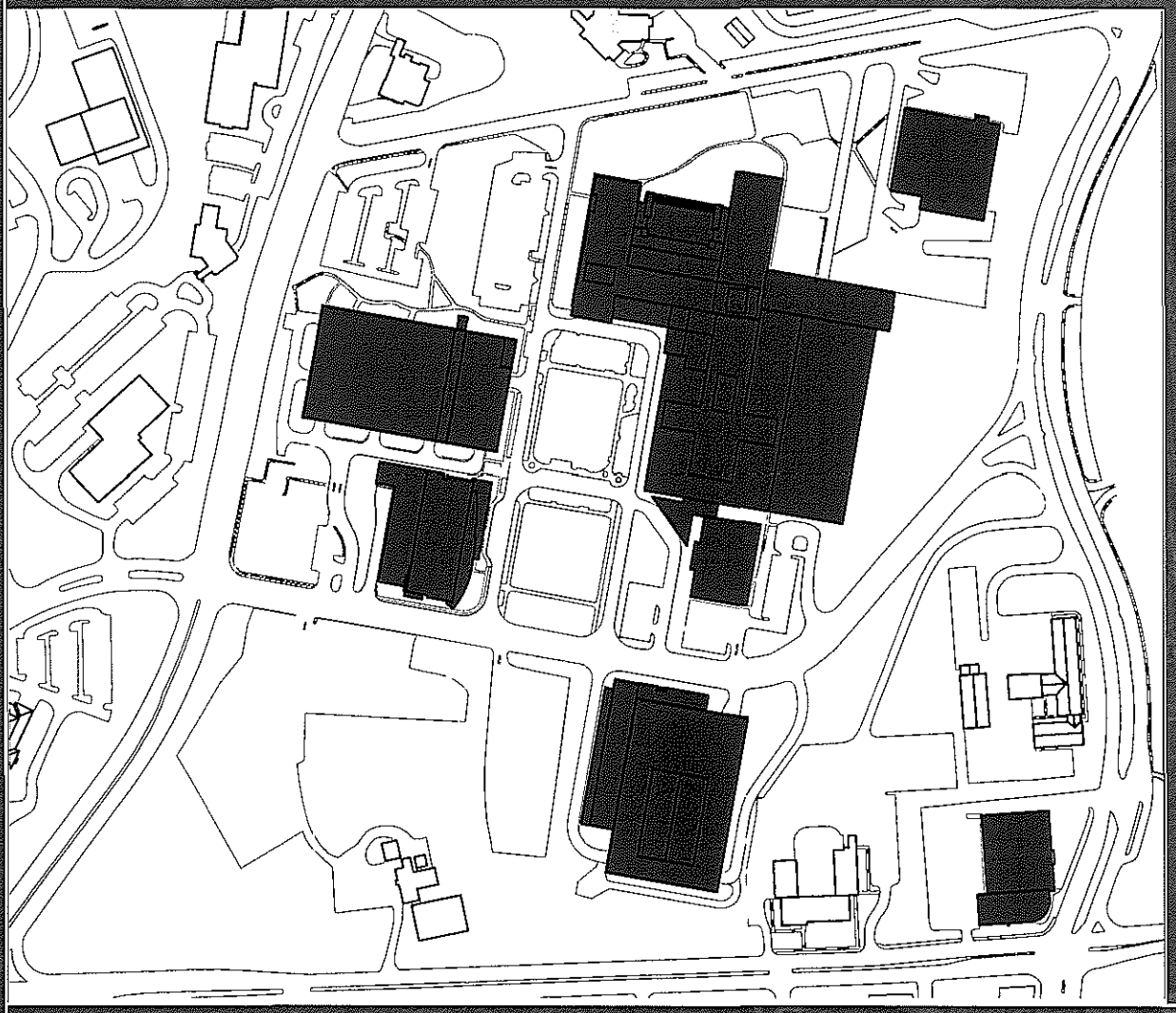
9. Main Campus Discussion
   - What are the boundaries of the main campus? Traditionally just the main buildings and roads, but that is evolving. Those who have been at UMMS longer than 10 years still focus on that tradition. Those with less time view Biotech Park as part of the campus and are more flexible in their perceptions.
   - Only Tom, Tim and John would view the Worcester State Hospital site as potentially part of the campus.
   - The Worcester City campus, by comparison, where some teaching is done, is considered to be *Mars*.

10. General Discussion and Conclusions
    - With the current and projected growth in CM programs there will need to be a comprehensive assessment of where and how that growth is accommodated.
    - As stated above, there are many reasons for the majority of CM's programs to be co-located and near the main campus. There are no reasons for these functions to be at a distance from the campus.

TSOI / KOBUS & ASSOCIATES
ARCHITECTS

University of Massachusetts Medical School

Section V. Education Center Program



UMass Medical Center Master Plan

Massachusetts State Project UMW 0301 ST1

Education Center Program

Report Issued by:
Tsoi/Kobus & Associates
TK&A #23024-000
October 2004

University of Massachusetts Medical School

Division of Capital Asset Management

TABLE OF CONTENTS

I. INTRODUCTION

The University of Massachusetts Medical School and its adjoining hospital, UMass Memorial Health Care (UMMHC) are planned to be substantially expanded during the next ten years. The purpose of this Master Plan Study (UMW0301 ST1) "is to set forth guidelines for the physical construction required to accommodate and facilitate the operation of these organizations."

As part of our Master Plan work, this program for required teaching space, or "Education Center," was developed through meetings with various components of the medical school including: the Steering Committee, an "Education Visioning" session, the Education Policy Committee, the School Committee meeting, two general Programming meetings, and individual departmental meetings. The minutes of each of these meetings can be found in Appendix A.

Findings

There has been growth in all of the Medical School's programs including Undergraduate Medical Education, Graduate Medical Education (GME), Continuing Medical Education (CME), the Graduate School of Biomedical Sciences (GSBS), and the Graduate School of Nursing (GSN). Of these, the number of MD/PhD students in Medical Education is expected to grow to 125 students, a 25% increase. The GSBS and the GSN are both expected to double in size over the next ten years to 240 and 550 students respectively.

This growth is recognized in a program that increases classroom space on campus and within the Medical School space by almost 30%.

The Library program, which had previously been studied in detail and shown to have significant growth in a 2001 study by Hoskins, Scott and Partners, expands Library space by almost 50%.

Together, these two program areas account for 56% of all program growth. Other areas of significant growth include Anatomy (37%) and Clinical Skills/Simulations (57%), as well as a completely new Simulations, Virtual Learning area, part of the growing trend in medical school pedagogy.

The programs that follow give a comparative listing of existing space and projected new space needs. These programs are written with the expectation that much of the existing teaching space will be retained and added to. However, depending on the concept for expansion that is approved by the Steering Committee, that may not be possible in all cases.

Concepts

Concept designs for a new "education center" can be grouped into a few general categories and revolve around the expansion of the Library and creating a new "student commons." They are summarized here and indicated in the following space summaries.

Option 1: Renovate and Expand the Library on the First Floor

In order to do this, it will be necessary to build new classrooms, "student commons," and Clinical Skills/Simulation areas, as well as relocating IT or significant administrative space.

New Space		*Renovated Space*	*Comments*
16,700	New Classrooms		**Leave Auditoria/Goff Classrooms in use**
10,654	Student Commons	65,097	Expand/Renovate Library
10,025	IT	4,000	Expand Anatomy
3,950	Clinical Skills	4,000	To replace area lost to Anatomy
6,800	Simulations		
5,000	Administration		
53,129	TOTAL Net Area	73,097	
65%	Efficiency	85%	
81,737	**TOTAL Gross Area**	**85,996**	

Option 1A: Renovate and Expand the Library with New Construction

This Option builds one addition to the Library adjacent to its north side and a second new building to house classrooms, "student commons," and Clinical Skills/ Simulations areas either as a stand-alone facility or part of a larger research building.

New Space		*Renovated Space*	*Comments*
16,700	New Classrooms		**Leave Auditoria/Goff Classrooms in use**
10,654	Student Commons	4,000	Expand Anatomy
3,950	Clinical Skills	4,000	To replace area lost to Anatomy
6,800	Simulations		
38,104	TOTAL Net Area	8,000	
65%	Efficiency	85%	
58,622	TOTAL Gross Area	9,412	
21,500	Expand Library	43,597	Renovate Balance of Library
21,500	TOTAL Net Area	43,597	
65%	Efficiency	85%	
33,077	TOTAL Gross Area	51,291	
91,698	**TOTALS**	**60,702**	

Option 1B: Renovate and Expand Library with New Construction
This Option is similar to Option 1A in program but seeks to build only one addition on the north side of the Library.

New Space		*Renovated Space*	*Comments*
16,700	New Classrooms		**Leave Auditoria/Goff Classrooms in use**
10,654	Student Commons		
21,500	Expand Library	43,597	Renovate Balance of Library
3,950	Clinical Skills	4,000	Expand Anatomy
6,800	Simulations	4,000	To replace area lost to Anatomy
56,604	TOTAL Net Area	73,097	
65%	Efficiency	85%	
91,698	**TOTAL Gross Area**	**85,996**	

Option 2: New Building for Library, Classrooms, Clinical Skills/Simulations
This Option builds new classrooms, a new Library, and a new Clinical Skills/ Simulations area. The student commons would be renovated into the old Library space and approximately 28,000 NSF could be renovated into laboratory space for the medical school.

New Space		*Renovated Space*	*Comments*
16,700	New Classrooms		**Leave Auditoria/Goff Classrooms in use**
65,097	New Library	10,654	Student Commons
3,950	Clinical Skills	4,000	Expand Anatomy
6,800	Simulations	4,000	To replace area lost to Anatomy
		28,000	Renovate into labs/etc.
92,547	TOTAL Net Area	46,654	
65%	Efficiency	85%	
142,380	**TOTAL Gross Area**	**54,887**	

Option 2A: New Building for Library and Classrooms

This is similar to Option 2, but builds only new classrooms and Library. In this case, only about 17,250 NSF gets renovated for laboratory use.

New Space		*Renovated Space*	*Comments*
16,700	New Classrooms		**Leave Auditoria/Goff Classrooms in use**
65,097	New Library	10,654	Student Commons
		4,000	Expand Anatomy
		4,000	To replace area lost to Anatomy
		3,950	Clinical Skills
		6,800	Simulations
		17,250	Renovate into labs/etc.
92,547	TOTAL Net Area	46,654	
65%	Efficiency	85%	
142,380	**TOTAL Gross Area**	**54,887**	

Option 3: Build New Library

This Option does not work because the vacated space cannot support case method classroom construction.

New Space		*Renovated Space*	*Comments*
65,097	New Library	16,700	New Classrooms
		10,654	Student Commons
		4,000	Expand Anatomy
		4,000	To replace area lost to Anatomy
		3,950	Clinical Skills
		6,800	Simulations
65,097	TOTAL Net Area	46,104	
65%	Efficiency	85%	
100,149	**TOTAL Gross Area**	**54,240**	

Option 4: Build a New Education Center

This Option would build all 300,000 GSF new and return approximately 143,000 NSF to laboratory use.

New Space		*Renovated Space*	*Comments*
190,000	New Education Center	143,500	Renovate into labs/etc.
190,000	TOTAL Net Area	143,500	
65%	Efficiency	85%	
292,308	**TOTAL Gross Area**	**168,824**	

Option 4A: Build New Education Center without Anatomy

This is one of many possible Options where a new Education Center is built, but some components are left in place, for example, administration, anatomy, and IT could all stay in existing space. The difference between Options 2 and 2A with Option 4A is that Option 4A builds all new classrooms, replacing the existing auditoria and Goff Center.

New Space		*Renovated Space*	*Comments*
141,000	New Education Center	130,500	Renovate into labs/etc.
		4,000	Expand Anatomy
		4,000	To replace area lost to Anatomy
		5,000	Administration
141,000	TOTAL Net Area	143,500	
65%	Efficiency	85%	
216,923	**TOTAL Gross Area**	**168,824**	

Option 5: Renovate all Education Space

This scheme would require building approximately 41,450 NSF of research space to provide room for the Education Center to expand. *This scheme also does not work because case method classrooms cannot be renovated into existing space.*

New Space		*Renovated Space*	*Comments*
41,450	To replace lost space	4,000	Expand Anatomy
		4,000	To replace area lost to Anatomy
		16,700	New Classrooms
		3,950	Clinical Skills
		6,800	Simulations
		4,500	Student Commons
		1,500	Bookstore
41,450	TOTAL Net Area	41,450	
65%	Efficiency	85%	
63,769	**TOTAL Gross Area**	**48,765**	

Dept *Room Function*	UMMS Existing *Total NSF*	10/29/04 UMMS Program *Total NSF*	*Comment*
Classrooms	32,496	41,866	
Support	1,662	2,846	
Anatomy	10,092	13,824	
Clinical Skills Center	2,517	3,950	
Center for Simulators, Robotics	0	6,800	
IS / IT	10,025	14,425	
Administration	24,472	25,146	
Student Affairs	7,986	14,104	
Sub-Total - ALL DEPARTMENTS	89,250	122,961	
Library / Learning Center	43,660	65,197	
Unassigned	5,353	5,353	
Bookstore	1,154	2,500	
TOTAL NSF	139,417	196,011	
Efficiency Factor	65%	65%	
TOTAL GSF	214,488	301,555	
500-seat Auditorium	0	7,500	
Faculty & Research Fellow Offices	0	12,000	100

II. CLASSROOMS

In the more than 30 years since the University of Massachusetts Medical School was created, growth in programs and changes in pedagogy have required imaginative solutions to an increasing deficit of classroom space.

While UMMS and its staff are to be highly commended for the many collaborative efforts necessary to make this system work, there is no doubt that the current situation is inadequate for a medical school that is growing and looking to a future in the top tier of medical schools nationally.

A stated and necessary goal of the Medical School is to consolidate and integrate all teaching programs on campus. Simulators, standardized patients (Clinical Skills areas), and Continuing Medical Education (CME) are currently off campus. The new Graduate Entry Pathway (GEP) nursing program that starts in 2004 will also be taught off campus at South Street in a new suite being fit out for that purpose.

The Goff Center was opened in 1997 to alleviate part of the classroom deficit. Even so, scheduled classes today are conducted in departmental conference rooms, conference rooms in the hospital, conference rooms in the Benedict ambulatory building, at off-campus sites, in the SB basement level, and even in the school Lobby. And yet, there is a shortage of small group rooms to meet even current demand.

The two existing case method classrooms in the Goff Center, Lazare and Hiatt, are too small for full year classes of medical students and Graduate School of Biomedical Sciences (GSBS).

Assumptions

The size of each first year MD class is limited by legislation to 100 students. However, the MD/PhD program has seen growth in recent years and has added approximately 10 students to the total for each class year. Through discussion at various programming meetings, it was decided by UMMS that medical student class size should be capped at 125.

The Graduate School of Nursing (GSN), with the addition of 120 Graduate Entry Pathways (GEP) program students, will approximately double in size. The GEP program will have two days of instruction per week in class sizes of 40-50 students. The graduate program has two days of instruction per week, all day from 9:00 AM to 9:00 PM, also in groups of 40-50 students.

The Graduate School of Biomedical Sciences will also double in size to approximately

550 students. First and second year GSBS students receive approximately 2 hours per week of classroom instruction in a case method style classroom. A class size of 90-120 students must be accommodated. First and second year GSBS students also meet in small groups of 20-25 students.

Future Needs

Two new 125 to 130-person case method classrooms should be created to teach first and second years simultaneously. An additional 125-person case method classroom will be needed to adequately address the growing size of the GSBS and their need to schedule classes independent of medical students.

Lazare and Hiatt will meet the needs of the School of Nursing and should be retained for that purpose.

The existing auditoria were created for a medical school world of 30 years ago when most teaching was lecture style. These rooms have sufficient seating capacity and can continue to be used for testing, seminars, and some teaching needs.

Separately, UMMS has identified the need for a 500-seat auditorium for lectures and seminars, which would also be used by the University. *That space has not been carried in the classroom program,* but as a separate line item in the program summary. It is possible to create an interactive audio/visual link for these three auditoria creating a virtual 500-seat auditorium.

By far, the greatest need is for small group rooms. All departmental conference rooms should be returned for use by their respective departments. This includes the conference rooms in the medical school, the hospital, and the Benedict building. As has been noted at the Kick-off meeting and the Education Visioning session, there is a specific lack of space for faculty meetings. Making these changes restores the original intent of this space. The ad hoc location of small group rooms on the SB level of the Medical School should be abandoned because of their inflexible functional layout, size and location.

Creating an equal number of small group rooms will compensate for the loss of these conference rooms. This program creates enough small group rooms (10) to house an entire medical school class (125) or GSBS class in groups of 12 to 15. It also creates enough small group rooms (11) to house both medical school years, or a medical school year and Graduate School breakout sessions, simultaneously (250) in groups of 20-25.

These changes address the growth of the medical school, the GSN and the GSBS. The

reuse of the Goff Center case method classrooms also addresses the need for 40-50 person classrooms for the GSN.

CME has suggested that several of its programs might be better left at their current location at Hoagland Pincus for ease of staff and student access. That is a decision that the Medical School will have to make. The simulations area in the new Clinical Skills Center will meet most of their needs. The CME office function is included in the Administration program. Auditoria and small group rooms in the program would be able to accommodate their needs should the whole program move on campus.

As mentioned above, the Nursing program is largely taught in class sizes of 40-50. If there is a future need for small group rooms, it should be noted that the Library program has 8 small group rooms of 12 students each that, in any event, should be considered as scheduled classrooms and not just study rooms.

Computer classes are conducted currently in at least three locations. The library does some training for basic use and access to information, websites, etc. The IT department does "high-end" system and applications training in a classroom at the Shaw building. And finally, two of the Goff Center classrooms are set up as computer stations for coursework. In the future, there may well be need for faculty training on new applications for teaching software.

Each of these computer classrooms teaches different content, may have different audiences, and certainly will have different computer support needs. As such, it may not be feasible or efficient to co-locate these spaces. The existing Goff Center can continue to be used for computer training. However, if the final master plan concept indicates a need to move all classroom space to a new location, provision will be made in the program to accommodate computer training at the new location.

This program addresses the needs of the future based on assumed class sizes. It also returns a significant amount of space to departments but which can also remain a potential reservoir for future needs.

Summary of Classroom Utilization and Needs

The attached Exhibits A, B and C indicate classroom need and utilization for the growth in programs stated above. The need for *at least* 3 new 125-person case method classrooms is indicated. If a *specific* master plan need arises that would require abandoning the existing amphitheaters, additional space would still be required for testing and possibly for Grand Rounds and the Nursing program. This program will be verified against the selected master plan approach and adjustments made as necessary.

The attached Exhibits B and C indicate the need for 10 small group rooms of 12-15 persons each. It also indicates the need for 10 small group rooms of 20-25 persons each to handle the GSBS' need for larger rooms.

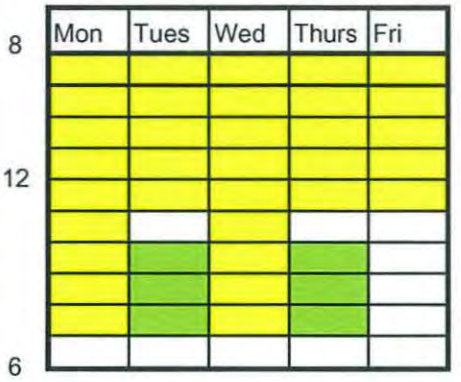
Second term mini-selectives complicate the picture. These classes are held only in the second term, and only for two months. Are there alternatives to building classrooms for just this one need? The answer is probably yes. This program assumes the existing Goff Center classrooms remain in use. They should adequately meet the needs of the mini-selectives in the spring.

Alternatively, this classroom program returns 17 conference rooms back to departmental use. Elsewhere in this program, the Library has 8 small group rooms programmed. The new "clip-on" addition to the Medical School building also has 8 new conference rooms available. *That is a reservoir of 33 rooms to schedule for mini-selectives in the spring term.* Clearly UMMS should not continue the current situation where departmental conference rooms are scheduled for classes throughout the year. As the above Exhibits demonstrate however, the teaching needs of all programs are met.

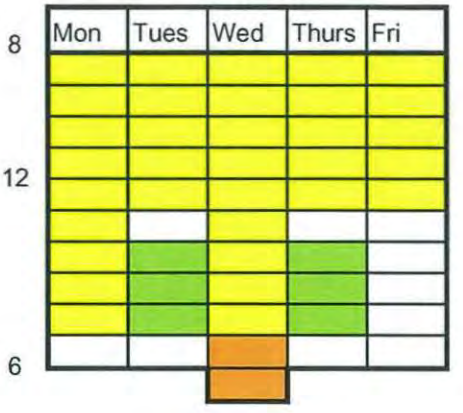
CLASSROOM UTILIZATION - EXHIBIT A

125 person case method classroom # 1

1st Term



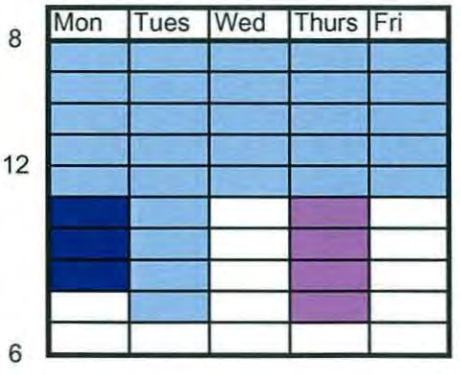
2nd Term



1st year medical classes
PPS 1/PDI - 1st year, only (9) x in term
GSBS 2 hrs. (2) x / week

125 person case method classroom # 2

1st Term



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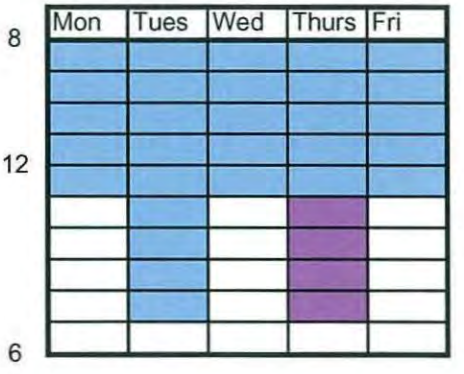
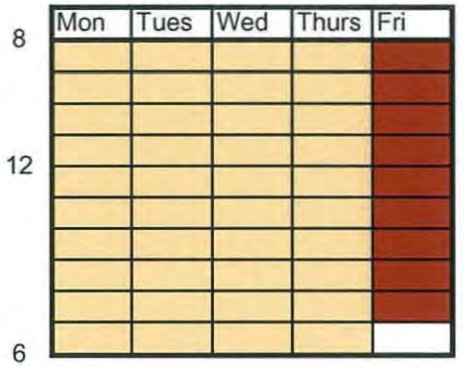


2nd year medical classes
2nd year afternoon classes
PPS 2 - 2nd year - only (10) x per year

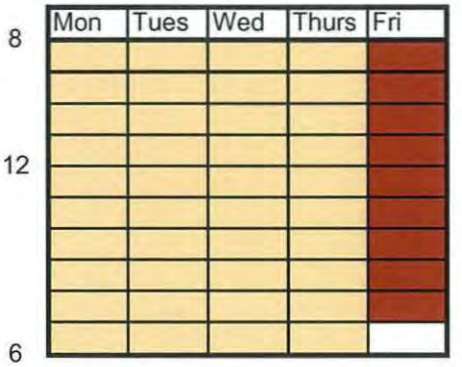
CLASSROOM UTILIZATION - EXHIBIT B

125 person case method classroom # 3 or existing auditorium

1st Term



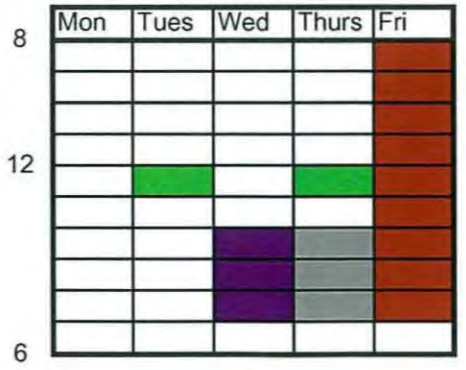
2nd Term



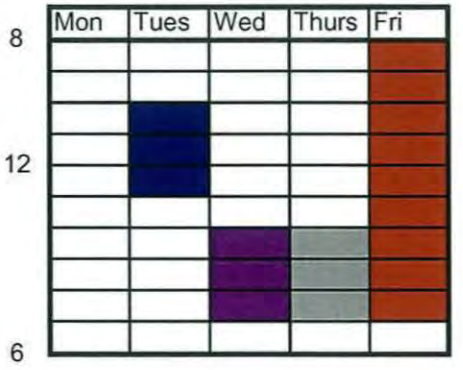
OME Interclerkship
Nursing

(10) 12 - 15 person Small Group Rooms

1st Term



2nd Term



CHC small groups - 1 day each
PPS I Small Groups
PPS 2 Small Groups
MBB II Small Groups
OME Interclerkship

CLASSROOM UTILIZATION - EXHIBIT C

(10) 12 - 15 person Small Group Rooms

2nd Term

	Mon	Tues	Wed	Thurs	Fri
8					
			3/3 -	3/4 -	
12			4/28	4/29	
			only	only	
6					

2nd Term

	Mon	Tues	Wed	Thurs	Fri
8					
		3/1 to 4/30 only			
12					
6					

Fourth Year Mini-selectives

2nd Term

	Mon	Tues	Wed	Thurs	Fri
8					
		4/5 to 4/16 only			
12					
6					

1st and 2nd Term

	Mon	Tues	Wed	Thurs	Fri
8					
12					
	(6) 25 person small groups				
6					

GSBS Small Groups

Dept *Room Function*	UMMS Existing *Total NSF*	UMMS Program *Total NSF*	*Comment*
Classrooms			
Auditorium III Floors 6, 7	6,007	6,007	testing, seminars, nursing prog.
Auditorium II, Floors 4, 5	4,200	4,200	testing, seminars, nursing prog.
Auditorium I, Floors 2, 3	4,979	4,979	testing, seminars, nursing prog.
Medical School Lobby - S1 Level	4,823	0	4823-for school functions only
Case-method S1 - Lazare	2,309	2,309	also use for nurs. prog. from Shrewsbury
Case-method S1 - Hiatt	2,108	2,108	also use for nurs. prog. from Shrewsbury
New Case Method Classroom		**2,500**	to seat 125, 1st year
New Case Method Classroom		**2,500**	to seat 125, 2nd year
New Case Method Classroom		**2,500**	to seat 125, GSBS
Goff - Flat Floor Classroom	609	609	
Goff - Flat Floor Classroom	600	600	
Goff - Flat Floor Classroom	308	308	
Goff - Computer Classroom	316	316	
Goff - Small Group Room	171	171	
Goff - Small Group Room	204	204	
Goff - Flat Floor Classroom	479	479	
Goff - Flat Floor Classroom	486	486	
Goff - Small Group Room	209	209	
Goff - Small Group Room	175	175	
Small Group Room - SB Level	198	**250**	12 per. small group - replace SB level rooms
Small Group Room - SB Level	224	**250**	12 per. small group - replace SB level rooms
Small Group Room - SB Level	209	**250**	12 per. small group - replace SB level rooms
Small Group Room - SB Level	211	**250**	12 per. small group - replace SB level rooms
Small Group Room - SB Level	215	**250**	12 per. small group - replace SB level rooms
Small Group Room - SB Level	250	**250**	12 per. small group - replace SB level rooms
Pathology Labs - S2-318, 322	3,206	3,206	
Conference Room S1-123	499	**500**	25 per. small group - return S1-123 to dept. use
Conference Room - S6	704	**500**	25 per. small group - return S6 to dept. use
Computer Room - S7-105	551	**500**	25 per. small group - return S7-105 to dept. use
Conference Room - S7-106	325	**250**	12 per. small group - return S7-106 to dept. use
Conference Room - S7-308	642	**500**	25 per. small group - return S7-308 to dept. use
Conference Room - S2-310	976	**500**	25 per. small group - return S7-310 to dept. use
H3-551 - Surgery Conf	632	**500**	25 per. small group - to replace - H3-551
H4-551 - Orthopedics Conf	800	**500**	25 per. small group - to replace - H4-551
H5-551 - Pediatrics Conf	560	**500**	25 per. small group - to replace - H5-551
H6-551 - Medicine Conf	560	**500**	25 per. small group - to replace - H6-551
H7-535 - Nursing Conf	280	**250**	12 per. small group - to replace - H7-535
H8-534 - Oncology Conf	400	**500**	25 per. small group - to replace - H8-534
Benedict A/A2-208 Conf	320	**500**	25 per. small group - to replace Benedict A/A2-208
Benedict E/A3-101 Conf	260	**250**	12 per. small group - to replace Benedict E/A3-101
Benedict F/A3-102 Conf	180	**250**	12 per. small group - to replace Benedict F/A3-102
Sub-Total UMMHS + Other Space	**7,689**		
Teaching Lab - Shrewsbury	4,627	0	
CME Classrooms @ Hoagland Pincus	897	0	
Sub-Total - Off Campus Space	**5,524**		15,500
TOTAL - Classrooms	**32,469**	**41,866**	Plus 17,726 sf returned to dept. use

III. CLASSROOM SUPPORT & STORAGE

All new and renovated classrooms will be wired for voice, data and audio-visual communication.

Even so, there will always be a need for "sneakers and carts" support for these rooms. Some larger classrooms should have a preparation area for speakers and a small storage area for carts and supplies to support specialized class needs, and house audio-visual equipment where needed.

A projection booth should be programmed for at least one of each size case method classroom. These rooms provide the hands-on control sometimes needed for CME, distance learning and complicated audio-visual presentations.

There should be at least one larger storage area for larger pieces of equipment that need to be stored cyclically.

Dept *Room Function*	UMMS Existing *Total NSF*	UMMS Program *Total NSF*	*Comment*
Support			
Classroom & Lab Support & Storage			
Support or Storage	316	0	SB Level
Support or Storage	589	589	S1 level
Pre-function Area	424	424	2nd level
Pre-function Area	333	333	2nd level
Classroom Prep Areas		**400**	4 at case method rooms
Classroom Storage Areas		**400**	4 at case method rooms
A/V Storage		**200**	4 at case method rooms
Storage		**500**	
TOTAL - SUPPORT	**1,662**	**2,846**	

IV. ANATOMY

The space for teaching Anatomy is located on the S-A level (first level below grade), of the main medical school building. The Anatomy space is bounded on the north and south side by "core" elements: bathrooms, mechanical spaces, and elevators. It is bounded on the east by the animal facility and on the west by a public corridor and the telephone system switch. As such, there is very little room for growth. This is the only wet lab space not assigned to research.

The morgue area is at the southern end of Anatomy and generally has enough space. The morgue incinerator is no longer used and this may provide the opportunity to redesign this area with resulting space savings.

Generally, the department has been well maintained, but building services are substandard. In particular, mechanical systems need to be reviewed and updated to current standards. The ventilation in the student labs is such that none of the labs can be used for any other purpose when cadavers are in use in any of the labs. The department also lacks the basic IT infrastructure needed for modern teaching methods and audio/visual applications. Power requirements to support this IT upgrade should also be addressed.

There are 3 student labs, each with 8 or 9 dissecting tables. At 4 students per table, this meets the current demand. The labs are sized sufficiently for the number of tables, but there is no room for expansion or "overflow." The growth in the MD/PhD program to 125 students will require an additional student lab.

There is a small research lab set up with microscopes. There is also a smaller student lab that is used, in part, for 3rd year surgery clerkships and a 4th year elective in the spring semester for 20-25 students with four cadavers. This smaller lab is insufficient for this course. With the larger labs used for Histology in the spring (with some use by Microbiology, Neurology, and Physiology as well), the need for additional lab space is evident. It has been noted that the inability to teach Histology and Anatomy concurrently is a "huge curricular constraint." The Pathology department has two teaching laboratories on the second floor, rooms 318 and 320, which have a combined capacity of 108 students. With some minor renovations, these labs could be used for Histology in the fall semester if that was felt to be a better curricular decision.

There are also classes in the Graduate School of Nursing that are currently outsourced that would ideally be held in the student labs.

A museum/resource room contains storage for prosections and must remain close to the labs. It is adequately sized for this purpose.

Students arrive with backpacks, books, etc., and with no place to store them; they invariably wind up on the floor. The only lockers provided by the school are on the first floor. They are used for everything from storage of clothing, using the fitness center, changing into lab clothes, and storage of books and supplies. Lockers should be provided at the Anatomy level for changing into lab attire.

Storage for lab supplies runs the length of the corridor connecting the student labs; efficiency could be greatly improved. If this department is moved or redesigned, not just expanded, better access to storage should be a goal.

There is a need for a classroom for 40-50 students to teach "breakout" sessions while the labs are being utilized. This is currently done by trying to find available space upstairs.

The projected growth of this department by some 3,800 NSF cannot be accommodated on the SA level without either relocating some of the animal facility, the morgue, relocating the telephone switch, or the space immediately behind the switch. These options are expensive and will require multiple phases to achieve.

In fact, considering the complexity of renovating IT and mechanical, electrical, plumbing/fire protection (MEP/FP) services to this area and the attendant required phasing, it might make more sense to consider relocating this space. Should Anatomy move to a new location, the size of the program will remain essentially unchanged but the breakdown of spaces may differ slightly. A final program of spaces will be issued with the final Master Plan document that takes into account the projected location of an expanded Anatomy department.

Dept *Room Function*	UMMS Existing *Total NSF*	UMMS Program *Total NSF*	*Comment*
Anatomy			
Student Lab - SA-103	459	459	
Research Lab - SA-350	442	442	
Student Lab - SA-354	794	794	
Student Lab - SA-360	1,388	1,388	
Student Lab - SA-364	1,388	1,388	
Student Lab - SA-368	1,388	1,388	
New Student Lab		**1,388**	
Student Lab -Storage		**500**	Tables storage
Student Lab Services - SA-361	87	**400**	4 at 100 sf per lab
Student Lab Storage - SA-373	69		
Student Lab Services - SA-372	260	260	
Student Lab Services - SA-372A	251	251	
Resource Center - SA-376	1,022	1,022	
Offices - SA-100A	190	190	
Offices - SA-101	117	117	
Offices - SA-105	118	118	
Control		200	
New Classroom		**1,0\200**	50-60 person
New F. Lockers, Toilet		**300**	
New M. Lockers, Toilet		**300**	
Morgue	820	820	
Morgue Support	1,299	1,299	
TOTAL - ANATOMY	**10,092**	**14,424**	

V. CLINICAL SKILLS CENTER

The Clinical Skills Center is located on the A level of the Hoagland-Pincus building on the Worcester Foundation Campus. Its purpose is to assess the clinical skills of students in a realistic clinical setting with either "standardized patients" (actors) or human simulators. As such, this program should be close to main teaching spaces and be located on the main campus.

The Clinical Skills area is comprised of 5 exam rooms, a reception/waiting area, two offices, an open plan office area and support. The adjoining human simulator suite has 3 exam rooms. These rooms do not have sinks and are therefore substandard for use as clinical skills rooms. The 3 exam rooms open directly onto the debriefing area so that only one function can take place at a time.

The combined suite lacks some of the basic needs for a Clinical Skills Center: a changing, locker and lounge area for actors, a conference room, a debriefing and observation room (with all A/V equipment linking exam rooms), a simulations control space and adequate storage for simulators when not in use in exam rooms.

All 3rd year students, some graduate school students and clerkships currently use the center. In the future, nursing students will use it as well and the number of exam rooms will increase with the increased load of students. There is also the possibility of other schools using this center.

The center is currently reviewing procurement of 2 to 3 new simulators. These would be low-end full body simulators that would be mobile for pre-clinical, clinical and nursing use. At least some rooms using simulators should have one-way vision panels for real time observation.

*The **Center for Simulations, Robotics,** etc. is a separate program that also houses simulators. These are projected to be "high-end" simulators for anesthesia, emergency and/or intensive care, etc. The possible co-location of these two areas into a general skills training and assessment area should be considered.*

Digital technology is now commonly used to record SP assessments and tests because it affords time saving in access retrieval and documentation.

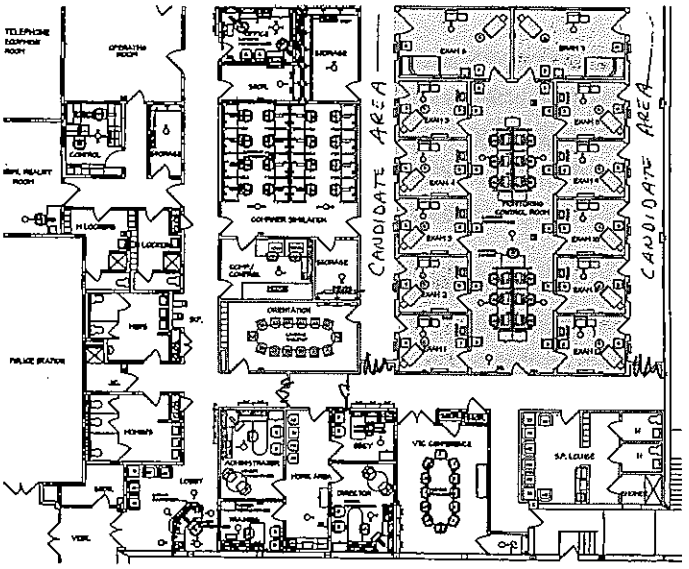
The center has 3 full time staff needing offices. The total is not projected to grow with the addition of more exam space.

The design of the new center should provide separate access for standardized patients and students. A state-of-the-art layout of the department would include separate work

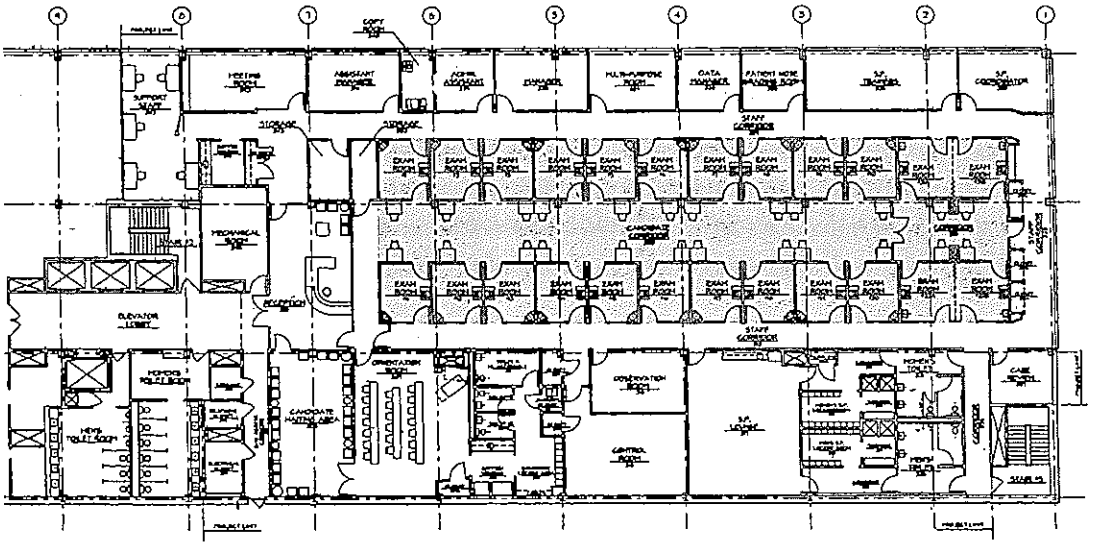
areas for staff and patients, employing a peripherals corridor concept.

See sketches below for benchmarking examples of this kind of suite.

Clinical Skills Center



MCP USUHS
Bethesda, MD



NCFMG CSATC
Philadelphia, PA

Dept *Room Function*	UMMS Existing *Total NSF*	UMMS Program *Total NSF*	*Comment*
Clinical Skills Center			
Reception & Waiting	247	250	
Debriefing/Observation	444	250	
Exam - 8 exam rooms	947	1,920	16 exam rooms
Director Office	129	130	
Offices (1)	78	200	(2)
Lounge for actors		200	
Changing for actors		200	
Toilets		100	
Conference room	398	400	
Storage (2)	**274**	300	
TOTAL - CLINICAL SKILLS CENTER	**2,517**	**3,950**	

VI. CENTER FOR SIMULATIONS, ROBOTICS AND VIRTUAL LEARNING

There is currently no center or location for using simulators or robotics other than three spaces in the Hoagland Pincus building next to the clinical skills area. The clinical skills area as currently conceived does have need of 2 to 3 low-end full body simulators. These types of simulators are already becoming commonplace.

High-end simulators used for surgery, cardiology, anesthesiology and a growing list of other uses are more expensive and are less common. But the economic equation is changing even as the need for simulations technology is growing.

Physical simulators are only part of a technology future that will affect all medical education. Computer-based and online program simulations are already widely used in medical education in many subject areas. The literature available through the American Association of Medical Colleges (AAMC) and other organizations speaks to all the possibilities and some of the problems individual medical schools face in making judgments on the future of teaching medicine through simulations of all kinds.

The question for this program and master plan is how to facilitate a future where simulations will be in greater use. In other words, how much and what kind of spaces should be provided to support the future use of simulators and where should they be located?

Computer-based simulations for teaching and testing can occur whenever and wherever access to a computer is available. Many consider distance learning a natural outgrowth of this trend. Others believe human interaction in all coursework will always be necessary, even if to a lesser extent than today.

Physical simulators, both low-end and high-end, require space and support. Robots are increasingly being researched for surgical procedures and require space both in the clinical setting and in the teaching setting. Minimally invasive surgical techniques can first be learned on simple "black boxes," then with animals, and finally in the clinical setting.

All of these areas should be co-located with the clinical skills assessment area and consideration should be given to co-locating with Gross Anatomy as well. If co-located with the clinical skills area, space should be provided for a trauma setting, an ICU setting and an "OR of the future" setting.

Dept *Room Function*	**UMMS Existing** *Total NSF*	**UMMS Program** *Total NSF*	*Comment*
Center for Simulators, Robotics and Virtual Learning			
Reception area		350	
60 person seminar room		0	in classroom program
Editing Suite		0	included with 60 person classroom
OR of the future - Robotic Station		600	
Dry Lab		1,200	8 stations
Wet Lab		1,200	8 stations
Simulators		500	
Control area		200	
Equipment room		800	
M. Lockers/toilets		300	
F. Lockers/toilets		300	
Visiting Lockers		150	
Offices		1,200	10
TOTAL - CENTER FOR SIMULATORS, ROBOTICS AND VIRTUAL LEARNING	**0**	**6,800**	

VII. IS / IT

The IS/IT department exists in one large area of the first floor of the main medical school building. It currently handles the IS/IT load for the medical school including satellite locations and some support for University functions as well. Virtually all of the hospital's IS/IT function has been moved from this first floor location to hospital space. The school and the hospital have different platforms and are not linked together.

The IS/IT area accommodates all their hardware and approximately 40+ people currently. Growth in staff is dependent on growth in programs, which is not easily predictable. Last year IT added 3 positions and it should be assumed it would 3-4 positions per year.

Everything the medical school has done recently is designed to support future additions to the campus. There is 30-40% growth potential left on the current system.

Using a hypothetical example, the current system could support the addition of two more large research buildings and a new Education Center, at a minimum.

There is also flexibility in the location of most departmental offices. They can be moved elsewhere, even out of the building if need be.

Computer training for systems and applications is currently done in a computer classroom in the Shaw Building that has 22 seats. This is part of space occupied by the Finance department of the School and can continue to be used. However, we did discuss the possibility of co-locating all computer training in one location on campus. There are hardware and schedule issues to be addressed, but in concept the idea is workable. Progress on this issue needs to be addressed within the school.

The vision for UMMS is to design a system that will provide the platform to make the school a leader in technology supported medical education and place UMMS in the top tier of medical schools nationally. The strategy for the system should be to design for the ultimate in technology for today's applications and for unforeseen future applications, especially in bandwidth capacity.

Questions that should be answered by IS/IT management in conjunction with program leaders should include the following:

- AV/IT capability should be uniform throughout teaching spaces for flexibility and ease of use
- AV/IT classroom capability should provide for the recording and playback of virtually any media including video, Powerpoint, digital images, audio presentations, etc.

- There should be connectivity at each: classroom seat, conference/small classroom seat, large conference rooms, Anatomy tables and benches, student work spaces, public terminal work stations, and office desktops.
- Provide sufficiently high bandwidth to support network or Internet access for unlimited students, faculty and staff simultaneously
- Utilize imaging stored on a central switch on demand in lecture classrooms
- Provide access to digital microscopy and digital imaging where necessary to support pedagogy
- Access to faculty to view real-time OR procedures from lecture rooms for case-based teaching
- Enable faculty in labs to project dissection tapes from the A/V system or from the network or Internet
- Access to and projection of courseware from the Internet
- Creating the structure for video teleconferencing in all conference/small group study rooms
- Preparation of media for teaching
- Preparation of faculty for using media

Of all these issues, it is the last two items dealing with media knowledge and preparation which are the two areas where further study will be ongoing within UMMS.

The program does not enlarge the IT area for these two purposes but it otherwise meets current and projected need.

Dept *Room Function*	UMMS Existing *Total NSF*	UMMS Program *Total NSF*	*Comment*
IS / IT			
Staff offices (30)		3,600	Expansion
Recording studio	430	430	Basement
Control room (for studio & distance learning)		200	
Faculty media prep area		250	
Media storage		200	
Reception area		150	
IT Area	9,595	9,595	First Floor
TOTAL - IS/IT	**10,025**	**14,425**	

Dept *Room Function*	UMMS Existing *Total NSF*	UMMS Program *Total NSF*	*Comment*
Administration			
Chancellor	**6,906**	**6,906**	
Graduate School of BioMedical Science	**2,879**	**2,879**	includes new Public Health space
Graduate School of Nursing Office	**3,464**	**3,464**	first floor
Continuing Medical Education	**3,034**	**3,034**	Hoagland Pincus
Graduate Medical Education	**1,040**	**1,040**	second floor
Admissions	**864**	**1,538**	
Associate Dean for Admissions			
Office Manager	406	406	
Administrative Assistant	232	232	
Supplies			
Waiting Room			
Interview Room		120	double as study space
Interview Room		120	double as study space
Interview Room		120	double as study space
Interview Room		120	double as study space
Additional Interview Room		120	double as study space
Conference/Dining for 20 people	226	300	
Closet - coats & suitcases			
File Storage			
Financial Services	**1,114**	**1,114**	
Financial Aid	367	367	First Floor
Bursar	747	747	First Floor
Registrar	**343**	**343**	
Outreach	**317**	**317**	
Scheduling Office	**669**	**669**	
Counseling	**419**	**419**	
University Relations	**446**	**446**	
Chief Operations Officer	**838**	**838**	
Faculty Administration	**668**	**668**	
Other	**2,012**	**2,012**	
Credit Union	1,377	1,377	
VC Commonwealth	635	635	
Office for Medical Education	**2,451**	**2,451**	
TOTAL - ADMINISTRATION	**24,472**	**25,146**	

VIII. STUDENT AFFAIRS

Student Affairs is a group of functions located on the first floor of the medical school. It is comprised of offices for staff, lockers and a fitness club for students, and a student lounge.

The lockers and fitness club are combined in an unsatisfactory arrangement. The two areas that comprise the fitness club are a weight room and an aerobic exercise room. Each is located in a transition space between the public corridor and the locker/ shower/toilet areas so there is constant through-traffic. Neither space is adequate for the present amount of equipment and more equipment is needed. Many students will pay to join local fitness centers away from the heart of the campus rather than use the facilities in their own building. Women need to walk in the public corridors to get from the weight room to the lockers.

The lockers provided are the only lockers available to students. As stated in other programs, there are at least three areas that need student locker space. First, the Anatomy program needs locker, changing and wash-up facilities. Second, the fitness club needs day-use lockers as found at most commercial centers. Third, there is a need for student storage proximate to the library.

The student lounge is not as large as the students would like it to be. There are no quiet study areas. Small group rooms off of the lounge would be a welcome addition. Internet access is limited to three stations. There is wireless access available for students with laptops equipped to use it. The room has game tables and vending machines. Food at night would also help students.

Mailboxes are "horrible" - too small to accommodate much more than a few letters. The location of mailboxes should be considered as well, with different needs for different student populations.

Student Commons

Taken together, the student lounge, the fitness club, access to food, mailboxes, computer access, and possible small group study opportunities forms the nucleus of a "Student Commons." Two examples of a "Commons," one at Harvard and one at Loyola, are attached to this program. Whether or not the "enclosed courtyard" theme of these solutions is possible at UMMS will become evident when concept designs are developed.

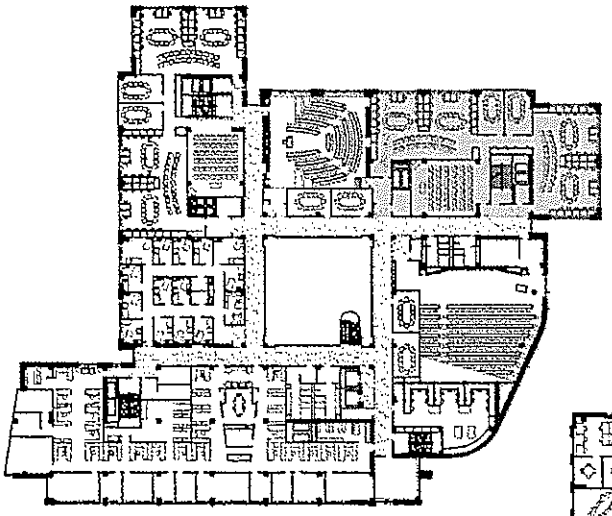
The Library currently serves as a de facto student commons by virtue of its location central to all classrooms, access to computers and study areas.

Student "Home Base"

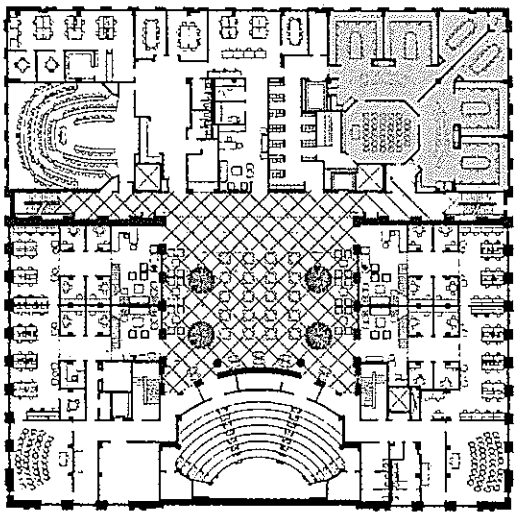
While the concept of a "Student Commons" satisfies the needs of first and second year medical students, is it appropriate to co-locate the student needs of the nursing program, graduate medical education, the GSBS and the professional needs of the nursing and continuing medical education programs?

As an example, graduate medical education has stated a need for up to 50 seats with computer access for their students who are in the education center. Whether these seats are centralized in proximity to the "commons" or considered part of a distributed network of computer access are two concepts that could be considered in Master Plan options.

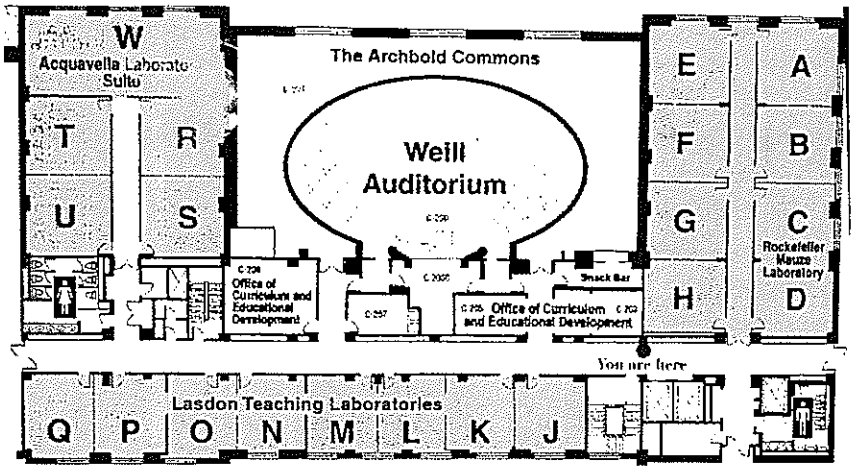
Student Commons



Loyola
Learning Clusters



Harvard
Skills Areas



Cornell
Small Group Rooms

Dept *Room Function*	UMMS Existing *Total NSF*	UMMS Program *Total NSF*	*Comment*
Student Affairs			
Office	481	481	
Office	140	140	
Office	204	204	
Office - Services	120	120	
Office - Storage	10	10	
Files - Storage	193	193	
Sub-Total - STUDENT AFFAIRS OFF.	**1,148**	**1,148**	
Student Lounge	2,232	2,232	
Student Lounge - Storage	74	74	
"Fitness Club"			
Weight Room	573	1,500	
Exercise Room	506	1,500	
M. Lockers	179	400	
M. Toilet/Shower		300	
F. Lockers	106	400	
F. Toilet/Shower		300	
Student M. Lockers	1,356	1,800	
M. Toilet/Shower	226	300	
Student F. Lockers	1,383	1,800	
F. Toilet/Shower	203	300	
Dietary		300	
Mailboxes			
Homebase - GME		1,750	50 seats
Graduate Medical Student Lockers			
Homebase - GSBS			
GSBS Lockers			
Home Base - CME			
Homebase - Nursing			
Nursing Student Lockers			
TOTAL - STUDENT AFFAIRS	**7,986**	**14,104**	

IX. LIBRARY/LEARNING CENTER

The Lamar Soutter Medical Library at the University of Massachusetts Medical School occupies 49,775 GSF on part of three floors of the main medical school building. The ground floor houses the entry, Circulation and Reference desks, the main reading room and stacks, the Chancellor's conference room, the Rare Books collection, copier, reading area and Technical Services areas. The second and third levels house journal stacks and individual enclosed carrels. Administrative offices and the multimedia collection are also on the second level. *The second and third levels of the Library do not align with the adjacent medical school floors.*

Collections

Hoskins, Scott & Partners completed a thorough study of the Library in January 2001. Its conclusions were based on data that are now changing: that the Library serves "400 medical students, the faculty, doctors and staff of the Medical School and UMass Memorial Medical Center, as well as the Graduate programs;" that there are 33 Library staff; and that there are 200,000 (est.) volumes with 27,000 (est.) volumes on the 8th floor.

The study further assumed that "collection size will be capped at 300,000 volumes;" "compact shelving will be used for a high percentage of the collection;" and "Reader seats will be limited to 400." Capping the collection size at 300,000 volumes was based on budget constraints in place at the time of the study. In addition, the storage space on the 8th floor was taken from the Library total.

UMMS now has the stated goal "to be in the top 25 medical schools in the country." The average collection size for the top 25 medical schools is 379,008 volumes, with a minimum of 175,637 (Cornell) and a maximum of 741,414 (University of Chicago). At 288,463, UMMS would be ranked 15th. If the total collection grows to achieve the school's goal, a combination of a fixed-size collection in the main Library and additional storage within the school should be provided.

There are other significant pressures on the use and size of the Library. With funding cutbacks, other UMass campuses have reduced their health-related collections, putting more pressure on the Worcester campus to increase availability.

The growing number of interdisciplinary researchers need chemistry and other volumes.

Community colleges are deleting their collections of undergraduate nursing books and the UMMS Library has to supply these volumes for the GEP program.

The Public Health curriculum, the Graduate School of Biomedical Sciences (GSBS), and the Graduate School of Nursing (GSN) are all growing and require support from the Library.

In this program, we have assumed 300,000 volumes as the collection total, but the Library will also retain space on the 8th floor (if in new space, the equivalent square footage) for additional volumes and/or storage for future flexibility.

Compact shelving for journals remains a possibility. However, since the existing structure cannot take the increased floor loading of compact shelving, a standard shelving option should be retained as an alternative for master plan development.

Readers

Limiting reader seats to 400 was based on the fixed size of the Medical School class, and the growing number of off-campus classes and clinical rotations. However, a stated goal of this master plan is to consolidate all teaching programs on campus. The number of MD/PhD students is growing. The GSN has added the Graduate Entry Pathway (GEP) program. The Graduate School of Biological Sciences is expected to double in the next ten years. The School of Public Health is moving to the Worcester campus and the Clinical Research Doctoral Program will add students. Combined with the growth in research activity into space yet unfilled at the Lazare Research Building, these increases will result in higher utilization of the Library.

The previous study assumed that computer access to electronic resources would decrease Library utilization. In fact, the number of visits to the Library has held steady and will grow proportionately to the population served. In the 2001 study there were 1,373 FTE for the medical school. The total is now 1,681 and expected to grow by at least 100 new research faculty alone.

The number of reader seats has been recalculated to accommodate this growth - an increase of approximately one third. Additional computer equipment storage is required in the Systems/Outreach area to handle the growth in workstations.

Additional Program Growth Areas

The Security and Lobby areas have been reduced from their current size. This savings will only be achieved if the current Circulation Desk is redesigned along with the security gates and exhibit cases.

The Library anticipates the need for an additional position for the Reference Desk and a second position funded through a grant for the outreach program. It should also be

noted that individual work spaces, while standard, do not incorporate space for book carts and stacking which are not additional space needs particular to the Library staff.

At the Circulation Desk, there is not enough space for a separate workstation for each person. If this area were to be redesigned, less area could be given to the Circulation Desk, but the reserve area is barely adequate and needs additional shelving.

The Library has recently been asked to submit a proposal to create an institutional archive. One option would be to combine this function with the Rare Books collection donated by The Worcester District Medical Society. This would be the decision of the Chancellor. Since the Rare Books room currently serves as a conference space as well, that conferencing ability would have to be maintained. It can hold approximately 30 people. We would anticipate increasing the Rare Books room to accommodate two staff members, storage of archival materials, and space for researchers to view material.

The Library sponsors and is the site of many community activities. While these functions are desirable for both the school and the Library, they do take up space and can at times create noise and congestion for the occupants. The Library also has all-staff conferences of 50 people. In the future plans for the school, it would seem reasonable for the Library to have an adjacent space that could be used for all-staff meetings, displays and community activities, and potentially for teaching and symposia as well.

Technical Services already has two more employees than projected in the HSP study. An additional position will be required in the future.

Since the 2001 plan, the Library has been awarded a $6 million contract from the National Library of Medicine to serve as the Regional Medical Library (RML) of New England. The RML has 8 staff members currently who are located off campus. An additional staff position will be needed for future growth. All should be located on campus.

Other grants have brought the Government Documents Coordinator for New England and the NLM Fellow to UMMS. Additional space for grant-funded outreach programs is needed.

Having access to a cafe or coffee shop at the entrance to the Library is desirable. While the current location and configuration do not support that concept, future master planning ideas could consider it.

There is no need for a copy center. Copiers have been distributed to the floors and a production copy center for the building is provided in the basement.

Dept *Room Function*	UMMS Existing *Total NSF*	UMMS Program *Total NSF*	*Comment*
Library/Learning Center			
Lobby	474	470	same as HSP program
Security	510	0	same as HSP program
Circulation Desk & Office	2,244	2,980	1 Dept. Head, 400 sf shelving, 1 new staff
Interlibrary Borrowing	851	0	Incl. above - same as HSP prog
Reference Desk	662	4,240	1 new staff, 1 grant funded outreach pos.
Reference Stacks	1,420	0	Incl. above - same as HSP prog
Periodicals/Browsing	1,023	1,630	same as HSP program
Rare Books	1,130	1,680	institutional archive, archivist & asst.
Photocopy Room	678	450	same as HSP prog - dist. on 3 levels
Photocopiers/Scanners	0	100	same as HSP program
Systems Group/Outreach	548	700	more storage
Technical Services	1,485	2,150	1 new staff, 1 Govt. Docs Coord.
Consumer Health	774	420	same as HSP program
Library Instruction Room	0	800	same as HSP program
Faculty Development Room	0	250	same as HSP program
Microforms	0	260	same as HSP program
Multimedia Collection	1,023	400	same as HSP program
Office Areas	876	1,720	add. staff space, meeting room for 12
Regional Medical Library	0	1,170	staff offices & storage
Community Service/Gallery	0	1,000	possible use as classroom
Student Lockers		400	250 day use lockers
Sub-Total	**13,698**	**20,820**	
Collections	**13,163**	**27,853**	same as HSP prog., 15,669 w/compact shelving
Book Stacks - Level 1	3,931		
Journals - Level 2	4,773		
Journals - Level 3	4,459	2,524	storage on 8th floor
Readers	**16,799**	**13,900**	
PC Workstations	5,203	2,000	8 small group study @ 250
Atrium Reading Room	3,195	3,500	100 distributed work stations
Study Carrels - Level 2	3,880	5,250	150 carrels with no locker storage
Lounge Area - Level 3	1,344	1,050	30 lounge seats
Study Carrels - Level 3	3,177	2,100	60 table seats
TOTAL - LIBRARY/ LEARNING CENTER - NSF	**43,660**	**65,097**	

APPENDIX A - MEETING NOTES

MEETING NOTES

Mass State Project UMW 0301 ST1/TK&A #23024-00
UMass Medical Center Master Plan
June 9, 2004, Anatomy Programming Meeting

Jack Synnott, Tim Cooper

Present:
Shirwin Pockwinse, UMMS
Jean Falcone, UMMS
Tim Cooper, TK&A
Jack Synnott, TK&A

Distribution:
Attendees
Tim Fitzpatrick, UMMS
Tom Manning, UMMS
Mike Williams, DCAM
Schuyler Larrabee, DCAM
Carol Chiles, TK&A
Ed Tsoi, TK&A
Rick Kobus, TK&A
Lori Matthews, TK&A
David Owens, TK&A
TK&A Team
File 23024-00

UMMS Anatomy Programming Meeting
The purpose of the meeting was to collect data and validate information already collected for the anatomy areas.

1. The current facilities have adequate space for the gross anatomy labs as they are currently taught. 25 dissection tables in three rooms serve the current student body. If the proposed growth in the MD/PhD program is added, they will be short on space. There are also classes in the Graduate School of Nursing that are currently outsourced that would ideally be held in the anatomy labs. The expansion of labs beyond the current footprint creates operational problems. Without substantial renovation, cadavers would have to be transported across public corridors.

2. Gross Anatomy and Histology are taught in the same rooms. The dual use of the space means that Histology and Anatomy cannot be taught concurrently, which is a "huge curricular constraint." Microbiology uses the labs when Histology is being taught.

3. The ventilation in the anatomy labs is such that none of the labs can be used for any other purpose when cadavers are being used in any of the labs. If the HVAC were upgraded to the point that dissection could be performed in one lab without the odor permeating all three the department would have a great deal more flexibility in scheduling.

4. The acoustics in the labs are terrible. An instructor that does not "bellow" needs amplification to be heard.

5. The technology in the labs is not cutting edge by any means and needs to be updated. There are two network access points in the lab.

6. The anatomy labs are the only wet lab space not assigned to research.

7. There is a lack of storage space for both staff and students. The 10 closets in the Anatomy corridor are used to store equipment; efficiency could be greatly improved. Students use the floor in the corridor to store bags and personal items. The dissection tables and histology benches are stored on the eighth floor when not in use.

8. The retort machine has been abandoned in place. Removing the retort would create useful space. Replacing the retort with a machine that meets code would lead to significant savings in operating costs.

9. A room that could be used for breakout teaching near the anatomy labs would be very useful. A 50-60 seat room would be adequate. If the instructors want to engage a group that size in discussion now they have to go up a few flights.

10. Other uses for the anatomy labs include:
    - 3rd year surgery clerkships
    - 4th year elective in the spring semester for 20-25 people - 4 cadavers at one time for dissection. There is a need for conferencing space as well.
    - Physiology and Neurology courses in the spring

11. Prosection and brain storage needs to remain close to the labs.

12. Students arrive with backpacks, books, etc. and there is no place to store them.

MEETING NOTES

Mass State Project UMW 0301 ST1/TK&A #23024-00
UMass Medical Center Master Plan
June 9, 2004, Classroom Programming Meeting

Jack Synnott, Tim Cooper

Present:
Deborah Harmon-Hines, UMMS
Jean Falcone, UMMS
Schuyler Larrabee, DCAM (partial)
Tim Cooper, TK&A
Jack Synnott, TK&A

Distribution:
Attendees
Tim Fitzpatrick, UMMS
Mike Williams, DCAM
Carol Chiles, TK&A
Ed Tsoi, TK&A
Rick Kobus, TK&A
Lori Matthews, TK&A
David Owens, TK&A
TK&A Team
File 23024-00

UMMS Classroom Programming Meeting
The purpose of the meeting was to collect data and validate information already collected for the teaching areas, particularly class scheduling.

1. The room reservations office does not schedule all of the spaces that are used for teaching. The anatomy labs are scheduled by the cell biology department and several other conference rooms are scheduled by their respective departments. Deborah has no means of accounting for events that are not scheduled through her office.

2. At the time of the meeting she had 99 events that she could not schedule due to space limitations. Her office scheduled approximately 18,000 individual events this year.

3. Scheduling priority is given to academic events from the Medical School, GBBS,

GSN and then Grand Rounds and Morbidity and Mortality. All other events are scheduled after that.

4. The following are some of the specific course schedules that we discussed:
   PPS-1 - Physician, Patient and Society (1st year)
   - 10 small groups of 14 students each
   - Scheduled from 1-5 PM, once a week for the entire year

   PPS-2 - Same course for the second year with the same schedule but different day of the week
   - 1st year meets every day 7:30 AM to 1:00 PM in Lazare Auditorium
   - 2nd year meets every day from 1:30 to 5:00 PM in either Auditorium 2 or 3

   The Anatomy labs are scheduled for Anatomy instruction in the first semester and are used for Histology in the second semester
   1st year clinical diagnosis is done in a clinical setting after 5 PM
   After 2nd year students take OSCE test
   All students take test again after 3rd year
   3rd year orientation takes place in July - all 100 students use both large and small rooms
   3rd and 4th year students' clinical rotation has 10-25 students each, depending on specialty
   - Medicine - 12 weeks
   - Surgery - 12 weeks
   - OB/GYN - 6 weeks
   - Family Medicine - 6 weeks in computer room
   - Psychiatry - 6 weeks
   - Neurology - 6 weeks
   - Medicine Internship - 12 weeks

   The Graduate School of Nursing meets on Tuesday or Wednesday all day, 9 AM to 9 PM. Class sizes range from 30 to 45.
   The Graduate Entry Pathway (GEP) program meets 5 days a week for 13 weeks
   - 2 days of course work
   - groups of 40-45 lecture style with desk
   - 2 days at clinical sites
   - 1 day of clinical lab

   The GEP will also need a 20-person computer lab for online teaching
   The Graduate School of Biomedical Sciences meets 2 hours per day, 2 times per week with 100 people
   They also need 6 rooms of up to 25 people each for "rap" sessions

5. General Scheduling Issues:
   - All requests for medical education teaching space are made by March 1st. Deborah then enters this into the scheduling software.

- All other requests must be made by April 1st
- They start scheduling with the "biggest blocks" of time
- Residency teaching is done in Grand Rounds and M & M
- All this together is 60% of the load, the rest is used for meetings

MEETING NOTES

Mass State Project UMW 0301 ST1/TK&A #23024-00
UMass Medical Center Master Plan
June 9, 2004, Student Affairs Programming Meeting

Jack Synnott, Tim Cooper

Present:
Judy Holewa, UMMS
Jean Falcone, UMMS
Tim Cooper, TK&A
Jack Synnott, TK&A

Distribution:
Attendees
Tim Fitzpatrick, UMMS
Mike Williams, DCAM
Schuyler Larrabee, DCAM
Carol Chiles, TK&A
Ed Tsoi, TK&A
Rick Kobus, TK&A
Lori Matthews, TK&A
TK&A Team
File 23024-00

UMMS Student Affairs Programming Meeting
The purpose of the meeting was to collect data and validate information already collected for the student affairs areas.

1. The school provides lockers for all medical students. Graduate School of BioScience and Graduate School of Nursing students can request lockers. An attempt was made last year to assign 4th year medical students lockers on a request basis to free up more lockers. Virtually all of the 4th year students needed a locker so the practice was stopped.

2. Judy Holewa has agreed to send TK&A counts on the existing lockers and how they are assigned.

3. Student Services operates a small weight room and cardio fitness room that is paid for by student fees. The spaces are cramped and not very well laid out. The women need to walk in the public corridors to get from the weight room to the lockers.

Many of the students have memberships in area health clubs.

4. The student lounge is not as large as the students would like it to be. There are no quiet study areas. Small group rooms off of the lounge would be a welcome addition. Internet access is limited to 3 stations. There is wireless access available for students with laptops equipped to use it. The room has game tables and vending machines.

5. Mailboxes are "horrible" - too small to accommodate much more than a few letters.

6. Food services available at night, at least until midnight, would also help students.

MEETING NOTES

Mass State Project UMW 0301 ST1/TK&A #23024-00
UMass Medical Center Master Plan
June 9, 2004, Programming Meeting

Jack Synnott, Tim Cooper

Present:
Rick Stanton, UMMS
Bob Jenal, UMMS
Cheryl Scheid, PhD, UMMS
John Sullivan, MD, UMMS
Tim Fitzpatrick, UMMS
Walter Ettinger, MD, UMMHC
Dana Swenson, UMMHC
Robert Finburg, MD, UMMS
Dana Anderson, MD, UMMS
Paul Appelbaum, MD, UMMS
Marianne Felice, MD, UMMS
Michael Czech, PhD, UMMS
Robert Matthews, PhD, UMMS
Gary Stein, PhD, UMMS
Julie Hanaford, UMMS
Ron Beckner, UMMS
Eric Hauge, UMMS
Ruven Liebhaber, UMMS
Schuyler Larrabee, DCAM
Tim Cooper, TK&A
Jack Synnott, TK&A

Distribution:
Attendees
Mike Williams, DCAM
TK&A Team
File 23024-00

UMMS Programming Meeting
The purpose of the meeting was to collect data and validate information already collected for the programming study. Representatives from the Medical School and TK&A were in attendance.

1. Introductions
   - Tim Fitzpatrick opened the meeting with an introduction of the Master Planning Effort and specifically the programming effort we were about to undertake needed to properly size the Medical School for the future.

2. Goals/Process for Developing Program
   - TK&A presented an overview of the process and schedule for programming. This meeting and the issues discussed will serve as a basis for the programming process.
   - After this meeting there will be a series of smaller meetings to focus on individual program components.

- Another meeting of the whole group is already scheduled for June 30th.
- Programming will be conducted on a detailed functional level for Education, on a strategic level for Research, and on a coordination level with the Hospital.

3. The following issues were discussed in response to the plans of the existing education space:
   - There are 6 classrooms on the SB level that are regularly scheduled. They suffice in size, but are not in an ideal location.
   - The 2 case method classrooms on the first floor are not sufficient size to hold an entire class (about 110). The 2nd years often will need a 120-person room. Plans of these rooms show seating for 102 at desks and 8-10 more seats against the back wall. There is a need to verify counts.
   - Case method classrooms do not work for testing. With an empty seat between students only half the students in a year can fit in the room.
   - The Graduate School needs at least a 100-person case method style classroom.
   - More small and medium size rooms are needed for clinical years teaching. Clerkship groups of 10-25 can usually find rooms but they are not always ideal for groups of that size.
   - Conference room S1-123 is sometimes scheduled as classroom space.
   - There is a conference room in the Graduate School of Nursing that is infrequently used for classes.
   - There is a desire to have one room available for both 1st and 2nd years to meet (200+ people).
   - There is a conference "space" (not full height partitions) in the Library. The partitions make its use limited.
   - The small group rooms on the second floor are well utilized. One of them is set up as a computer lab.
   - 2nd years do Grand Rounds in an auditorium but they would prefer a case method style room.
   - There is a seminar room (S2-310) not indicated on the plans as teaching space that is sometimes used for coursework.
   - There are pathology labs on the second floor that are used exclusively for the pathology department.
   - The conference room in Radiology gets limited use outside of department need.

4. General comments on classrooms:
   - The Nursing program needs voice and video conferencing to other campuses.
   - The Masters Nursing program has classes 10 hours on Tuesdays, 9 AM to 9 PM.
   - CME uses the auditorium and small breakout spaces in Shrewsbury.

5. TK&A has a separate meeting scheduled with Deborah Harmon-Hines to discuss scheduled classroom usage.

- The condition of the facilities hampers recruiting and alumni giving. The LRB has been tremendously helpful for recruiting at the GSBS.
- Students and faculty use the green space on the campus. Minor improvements could greatly improve the space, trees, picnic tables, etc.
- The bookstore is undersized to serve the current student population.
- A new Population Health program will be coming online. The grad students in that program will need access to dedicated computer terminals. Most of their work is database research.
- There have been requests for an amphitheater that would seat 500. It is not clear that there is enough demand for such a space to make its construction economically viable.
- A student suggested that the second and third floors of the library are underutilized. The skylight is nice, but the space could be reconfigured in such a way that the acoustics are better and more space is available for quiet study.
- The parking situation is currently a problem. The staff is frustrated with having to take shuttle buses. The new garage will serve the projects currently under construction, but not much development beyond that.
- The school and hospital are considering moving some functions off site (medical records, central sterilization) to free up more space.
- The GEP nursing program that will begin Fall 2004 will be based in the South Street building that is in the process of being renovated.
- Several nursing and CME classes are taught at the Hoagland-Pincus building in Shrewsbury. The teaching space consists of exam rooms and a small amphitheater.
- The graduate nursing programs are structured to accommodate the schedules of working nurses. A week's worth of classes are typically held on a single 10-hour day.

MEETING NOTES

Mass State Project UMW 0301 ST1/TK&A #23024-00
UMass Medical Center Master Plan
June 9, 2004, Programming Teleconference

Jack Synnott

Present:
Michele Pugnaire, UMMS
Jack Synnott, TK&A

Distribution:
Attendees
Schuyler Larrabee, DCAM
TK&A Team
File 23024-00

The purpose of the teleconference was to begin the programming for the clinical skills or Standardized Patients (SP) Center.

The current center is located on the "A" level of the Hoagland-Pincus building. It is adjacent to and shares space with the simulations area. The combined area is 2,864 NSF.

The center currently has 5 exam rooms intended for SP use. The 3 exam rooms that are also used for simulations do not have sinks and therefore are substandard. These 3 exam rooms also open directly into the space used for debriefings, which limits its use.

The main entry and waiting area of the suite opens directly into the corridor that provides access to exam rooms, compromising privacy and function. There is no dedicated space for actor changing or toilet facilities. Part of the office area opens directly onto the conference room making both spaces less usable for a variety of needs.

The center is currently used for all 3rd year students, some graduate school students and clerkships. The SPs from the center also travel and are used by other schools. Projected growth in clinical skills training in both the medical school and nursing school could double the need for exam rooms.

The center is currently reviewing procurement of 2-3 new simulators. These would be

low-end full-body simulators that would be mobile for pre-clinical, clinical and nursing use. At least some rooms using simulators should have one-way vision panels for real time observation.

The center has 3 full time staff needing offices. That total is not projected to grow with the addition of more exam space.

Digital technology is now commonly used to record SP assessments and tests because it affords time saving in access retrieval and documentation.

We discussed these major elements of program and the need to have the SP center closer to the main campus. We have developed a draft program based on this conversation and a copy is attached for review and comment.

MEETING NOTES

Mass State Project UMW 0301 ST1/TK&A #23024-00
UMass Medical Center Master Plan
June 30, 2004, Programming Meeting

Jack Synnott, Tim Cooper

Present:
Rick Stanton, UMMS
Bob Jenal, UMMS
Cheryl Scheid, PhD, UMMS
John Sullivan, MD, UMMS
Tim Fitzpatrick, UMMS
Walter Ettinger, MD, UMMHC
Dana Swenson, UMMHC
Robert Finburg, MD, UMMS
Dana Anderson, MD, UMMS
Paul Appelbaum, MD, UMMS
Marianne Felice, MD, UMMS
Michael Czech, PhD, UMMS
Robert Matthews, PhD, UMMS
Gary Stein, PhD, UMMS
Julie Hanaford, UMMS
Ron Beckner, UMMS
Eric Hauge, UMMS
Ruven Liebhaber, UMMS
Schuyler Larrabee, DCAM
Tim Cooper, TK&A
Jack Synnott, TK&A

Distribution:
Attendees
Tom Manning, UMMS
Mike Williams, DCAM
TK&A Team
File 23024-00

UMMS Programming Meeting
The purpose of the meeting was to update the group on programming meetings to date and validate information already collected.

1. The overall program summary to date is a work in progress and preliminary. It shows growth in several areas, with the largest growth areas the Library and classroom space.

2. Cheryl Scheid questioned the assumption that all educational program elements should be moved on campus. The CME that takes place in the Hoagland-Pincus building will most likely remain there. This calls into question some of the basic assumptions of the Master Plan. Resolution of the question regarding which programs are to return to campus and which are not, will have to be achieved.

3. Anatomy will experience need for growth with the addition of up to 10 new MD/ PhD students per year.

   Since Anatomy shares space with Histology, there is a need for equipment storage space for dissecting tables when Histology is in session.

   TK&A asked the programming group for the rationale behind the shared use with Histology and whether there was an option to use the Pathology Department Student Labs on the second floor for this purpose. There was no resolution to this question and it remains an open issue to be taken up with the Steering Team.

   Anatomy also has need for an adjacent classroom to fit 50 people for lecture while the other 50 continue in dissection.

4. The Clinical Skills area is located off campus and has neither enough space nor a proper configuration. Additions include the need for a separate Observation/ Debriefing area, space for an actors' lounge with changing facilities, some support and 8 additional exam rooms to support future projected load. It has been previously stated at the "B" conference for this project that this program will return to campus.

   There is currently a deficit of exam rooms where nursing students can work on their assessment skills with standardized patients. The school currently rents space at Worcester State.

5. The IS/IT function occupies 9,595 NSF of the first floor between elevator banks and 4,539 NSF in the basement near the west elevator bank. Part of the area on the first floor nearest the west elevator bank that houses hospital IT functions will be vacated and moved into UMass Memorial Hospital space.

   TK&A tabled a program of IT/AV support for the teaching function, which is not specifically designated in the plan.

   A meeting with Bob Peterson is necessary to assess which elements of the IS/IT program can actually be moved. Representatives from each of the schools should also be present to anticipate the future technology needs of each program.

6. Administration has not been programmed to date and will first be reviewed by Tim Fitzpatrick and senior management to determine scope and need.

7. Student Affairs lacks weight training and exercise space. It also lacks sufficient locker space.

The student lounge is not overly used due to lack of computer access, lack of after-hours food, central location and study spaces.

8. The Library and Learning Center program numbers reflect the study document completed 2 years ago. TK&A will meet with Elaine Martin to review and update assumptions made in that document.

9. Mr. Carruthers suggested that the GSBS could grow to 540 students in the next 2 years.

   There are not enough mailboxes for all the GSBS students. Mr. Carruthers suggested that sending student mail to the labs they do research in could easily solve this. This solution does not address the lack of a home base for the GSBS students.

   The GSBS is short of classroom space for the coming semester. Three 15-20 person classes have not been assigned rooms.

10. The Graduate Medical Education department registered a complaint of inadequate space, both for the administration and the residents.

    Their office space is on the second floor and is not highlighted on the TK&A plans.

    They will need a student "home base" for some 50 students in an open plan study carrel environment.

11. The ideal student lounge would be a place where Medical School, GSBS, GSN and residents could all feel comfortable.

12. The carrels in the library, while not ideal, are well utilized. They have locked storage that is convenient for students. There is a waiting list for carrel assignments.

    If lockers were provided nearby for locked student storage, the carrels could be better used on a first-come, first-served basis. These lockers were discussed as to capacity; it was desired that they be of sufficient size to accommodate all of a student's books, their laptop, and coats and other outerwear.

13. Rooms in the hospital should not be included in the classroom pool. The scheduling office does not schedule them.

14. The amphitheaters are consistently booked in the mornings by the Medical

School. As the other schools grow there will be a demand for large classrooms that exceeds capacity.

Each amphitheater seats 175 people. However, the desire is to have larger classes meet in case method style rooms. The current case method classrooms seat 110 and 90 respectively and are too small for this purpose. They are of sufficient size to teach nursing courses.

15. The GEP is considering teaching its classes in two sections because it is hard to find rooms large enough to teach single sections.

16. Cheryl Scheid is scheduling a school committee group meeting for the middle of July; anticipated growth of the schools will be discussed. Jack Synnott and Schuyler Larrabee will sit in.

17. A list of programming assumptions will be generated that can be vetted at the next Executive Steering Committee meeting.

MEETING NOTES

Mass State Project UMW 0301 ST1/TK&A #23024-00
UMass Medical Center Master Plan
July 14, 2004, Library Programming Meeting

Jack Synnott

Present:
Jaime Fama, UMMS
Mary Piorun, UMMS
Barb Ingrassia, UMMS
Deb Dulmaine-Coonan, UMMS
Deanna Lucia, UMMS
Elaine Martin, UMMS
Jim Coess, UMMS
Jack Synnott, TK&A

Distribution:
Attendees
Tim Fitzpatrick, UMMS
Mike Williams, DCAM
Schuyler Larrabee, DCAM
TK&A Team
File 23024-00

UMMS Library Programming Meeting
The purpose of the meeting was to validate assumptions of the previous Library study completed by Hoskins, Scott & Partners (HSP) and collect data about assumptions made in that report.

1. TK&A distributed a copy of the draft program for the Library, which was based on the HSP report. Three critical assumptions were made in that report:
   a. Collection size will be capped at 300,000 volumes
   b. Compact shelving will be used for a high percentage of the collection
   c. Reader seats will be limited to 400

2. Capping the collection size at 300,000 volumes was based on budget constraints in place for the previous study. In addition, the storage space on the eighth floor was taken from the Library total. What has changed since that report is the stated goal of UMMS "to be in the top 25 medical schools in the country." The average collection size for the top 25 medical schools is 379,008, with a minimum of 175,637

(Cornell) and a maximum of 741,414 (University of Chicago). At 288,463, UMMS would be ranked 15th. If the total collection grows to achieve the school's goal, a combination of a fixed-size collection in the main Library and additional storage within the school should be provided.

3. With funding cutbacks, other UMass campuses have reduced their health-related collections, putting more pressure on the Worcester campus to increase availability.

4. The growing number of interdisciplinary researchers needs chemistry and other volumes.

5. Community colleges are dumping their collections of undergraduate nursing books and the UMMS Library has to buy these volumes for the GEP program.

6. The Public Health curriculum, The Graduate School of Biomedical Sciences (GSBS), and the Graduate School of Nursing (GSN) are all growing and requiring support from the Library.

7. Compact shelving for Journals remains a possibility. However, since the existing structure cannot take the increased floor loading of compact shelving, a standard shelving option should be retained as an option for master plan development alternatives.

8. Limiting reader seats to 400 was based on:
   a. The fixed size of the medical school class
   b. The growing number of off campus classes and clinical rotations
   However, the number of MD/PhD students is growing, a stated goal of this master plan is to consolidate all teaching programs on campus, and the GSN and GSBS are both growing as previously noted. The number of reader seats should be reassessed to accommodate this growth. Benchmarking data is available to members through the American Association of Health Sciences Libraries. Elaine Martin will provide access to this data for this programming effort.

9. Individual program areas were also discussed.

10. The security and lobby areas have been reduced from their current size. This savings will only be achieved if the current circulation desk is redesigned along with the security gates and exhibit areas.

11. The reference space as programmed is appropriate but should be reviewed once the growth in programs is determined, particularly the PC workstations. It should also be noted that individual work spaces, while standard, do not incorporate space

for book carts and stacking which are additional space needs particular to the Library staff.

12. Elaine Martin will review staffing projections generally against expected program growth. The Steering Team will review these projections.

13. At the circulation desk, each person does not have a separate workstation. In addition, the circulation desk itself can be smaller, but the reserve area is barely adequate.

14. A staff lounge is needed.

15. There is currently no institutional archive or archivist. Retirements of those who began at UMMS 30+ years ago will result in the loss of valuable records unless an archive can be established in a climate controlled environment. One option would be to combine this function with the Rare Books collection donated by The Worcester District Medical Society. This would be the decision of the Chancellor. Since the Rare Books room currently serves as a conference space as well, that conferencing ability would have to be maintained. It can hold approximately 30 people.

16. The Library sponsors and is the site of many community activities. While these functions are desirable for both the school and the library, they do take up space and can at times create noise and congestion for the occupants. The Library also has all staff conferences of 50 people. In the future plans for the school it would seem reasonable for the Library to have an adjacent space that could be used for all staff meetings, displays and community activities, and potentially for teaching and symposia as well.

17. Technical Services already has 2 more employees than projected in the HSP study. See comment on review of staffing above.

18. The need for multimedia carrels will increase with the growth in programs.

19. Having access to a cafe or coffee shop at the entrance to the library is desirable. While the current location and configuration do not support that concept, future master planning ideas could consider it.

20. There is no need for a copy center. Copiers have been distributed to the floors and a production copy center for the building is provided in the basement.

MEETING NOTES

Mass State Project UMW 0301 ST1/TK&A #23024-00
UMass Medical Center Master Plan
July 23, 2004, Programming Teleconference

Jack Synnott

Present:
Tim Fitzpatrick, UMMS
Jean Falcone, UMMS
Ruven Liebhaber, UMMS
Schuyler Larrabee, DCAM
Jack Synnott, TK&A

Distribution:
Attendees
Mike Williams, DCAM
TK&A Team
File 23024-00

UMMS Programming Teleconference
The purpose of the teleconference was to review the list of outstanding programming assumptions and issues TK&A compiled from the programming meetings to date.

1. Anatomy
   a. Assume MD/PhD class size will grow to 125. This is a correct assumption and will require growth in the size of the Anatomy department dissecting area.
   b. Dual use with Histology: UMMS requests benchmarking data on whether this is common practice or whether Histology would be better located somewhere else. TK&A will develop this benchmarking data.
   c. Adjacent classroom space: in the current situation there is no classroom space available on the same level for the breakout sessions, which are common to Anatomy. This additional classroom space has been added to the program.
   d. Storage space: There are two storage needs, one is lockers for students' personal items and one is for storage of benches and/or dissecting tables. Existing storage of supplies in the corridors is inefficient and should be redesigned if planning options allow it.

2. Clinical Skills Center
   a. Growth of 8 exam rooms for expanded programs: this needs to be further discussed with the program regarding growth for the nursing program and use by other schools.

b. On site location: this program needs to move on campus to be close to the students it serves.
c. Co-located with low-end simulators: there may be other simulators associated with the Continuing Medical Education (CME) program, which could be shared and possibly be located adjacent to Anatomy.

3. IS/IT
   a. TK&A has not met with IS/IT as a separate program group. However, comments to date from other program meetings do not indicate a specific need for additional space.
   b. TK&A has programmed facilities that we would expect to be available to support the education mission. They include a faculty prep area, recording studio, and office and support areas.
   c. This program needs to be discussed with the IS/IT and program personnel.

4. Student Affairs
   a. Larger fitness center: the two areas that currently comprise the student fitness area are undersized and poorly laid out. Some students have fitness club memberships off campus rather than use these facilities. These areas are expanded in this program.
   b. Lockers: There are not enough lockers available to meet current need and they are not specific to the health club. There is a need for lockers at Anatomy, lockers for use at the health club, and lockers for use near the library.
   c. Graduate Medical Education (GME) home base: The office for GME students has requested a home base for up to 50 students to have computer access within the facility. These should be considered under the umbrella of number of seats provided with the education center for student access.
   d. Student commons: If the opportunity presents itself, UMMS should consider a "Student Commons" as a focus of student life. This is not currently programmed. This concept can take many forms as evidenced by the student centers at Harvard and Loyola medical schools. It could include upgrades to current student lounge, be a separate new space or be an extension of, or affiliated with, the library.

5. Library/Learning Center
   a. The study for the library completed two years ago did not anticipate the program growth that UMMS is now experiencing. That change will cause a growth in the number of "seats" or "readers" that need to be accommodated. The library staff is reviewing data from The American Association of Health Sciences Libraries as internal benchmarking.
   b. UMMS has stated its desire to be in the "top 25" medical schools in the country. That may require a review of the number of volumes available and services provided by the library.

c. With some 288,000 volumes currently, UMMS ranks 15th among the top 25 medical schools in number of volumes.

6. Classrooms
   a. The program for classrooms does not adequately explain the existing conditions and should be revised. Specifically, there needs to be one column that summarizes all current classroom space, both on and off campus, one column that describes current classroom need, and one column that projects future classroom need.
   b. All classroom functions will be moved to the main campus with the possible exception of some CME classrooms. CME would like the area they use for simulators and procedures to be located on campus and near Anatomy if possible.
   c. The Pathology labs on the second floor are currently used only for Pathology. UMMS could explore using this space for other class needs or purposes. This may address the need for Histology to have an alternate home.

7. The Graduate School of Nursing (GSN) is projected to grow from 120 to 250 students and move on campus.

8. The Graduate School of Biomedical Sciences (GSBS) is expected to grow to 550 students. Current 1st years have averaged 40 students with a high of 75. The future projection is for up to 90 1st years.

9. The program for education space does not include faculty offices. These offices will be programmed as part of the research space. UMMS is probably short by 50 clinical faculty offices and 40-50 research offices.

MEETING NOTES

Mass State Project UMW 0301 ST1/TK&A #23024-00
UMass Medical Center Master Plan
September 28, 2004, IT/IS Programming Meeting

Jack Synnott

Present:
Bob Peterson, UMMS
Tim Fitzpatrick, UMMS
Jack Synnott, TK&A

Distribution:
Attendees
Mike Williams, DCAM
Schuyler Larrabee, DCAM
TK&A Team
File 23024-00

UMMS IT/IS Programming Teleconference
The purpose of the meeting was to collect data and validate information already collected for the Information Technology/Information Systems areas.

1. Everything the school has done to date is designed to support future additions to the campus. There is 30-40% growth left on current system.

2. Using a hypothetical example, the space for the current system would be able to support the addition of two more large research buildings and a new education center, at a minimum.

3. There is also flexibility in location of the offices that are part of this department. Only a small portion of the offices need to remain near the hardware site. The others can be moved to other buildings if need be.

4. One example of an area that is currently under review is providing an A/V solution to Grand Rounds on two campuses.

5. UMMHC and the school have different platforms and are not linked together. That is an area that needs to be addressed.

6. The IT/IS area on the first floor accommodates 40+ people currently. Growth in

staff is dependent on growth in programs. It was felt there is no firm way to predict that growth at this time. Last year IT added 3 new staff. Planned growth of 4 FTE/ year is prudent.

7. The IT department supports some university programs as well.

8. The IT department currently uses a computer classroom in the Shaw building (off campus) for "high end" computer training. This classroom is actually part of the finance department, which is located at Shaw. It has 22 seats. The Goff Center and the library also have computer training rooms or areas.. The library does "low end" training.

9. Tim raised the possibility of centralizing computer training in a set of rooms that could flex from large need (50-60) to small groups. Not all training is the same however and this concept will need more study by UMMS.

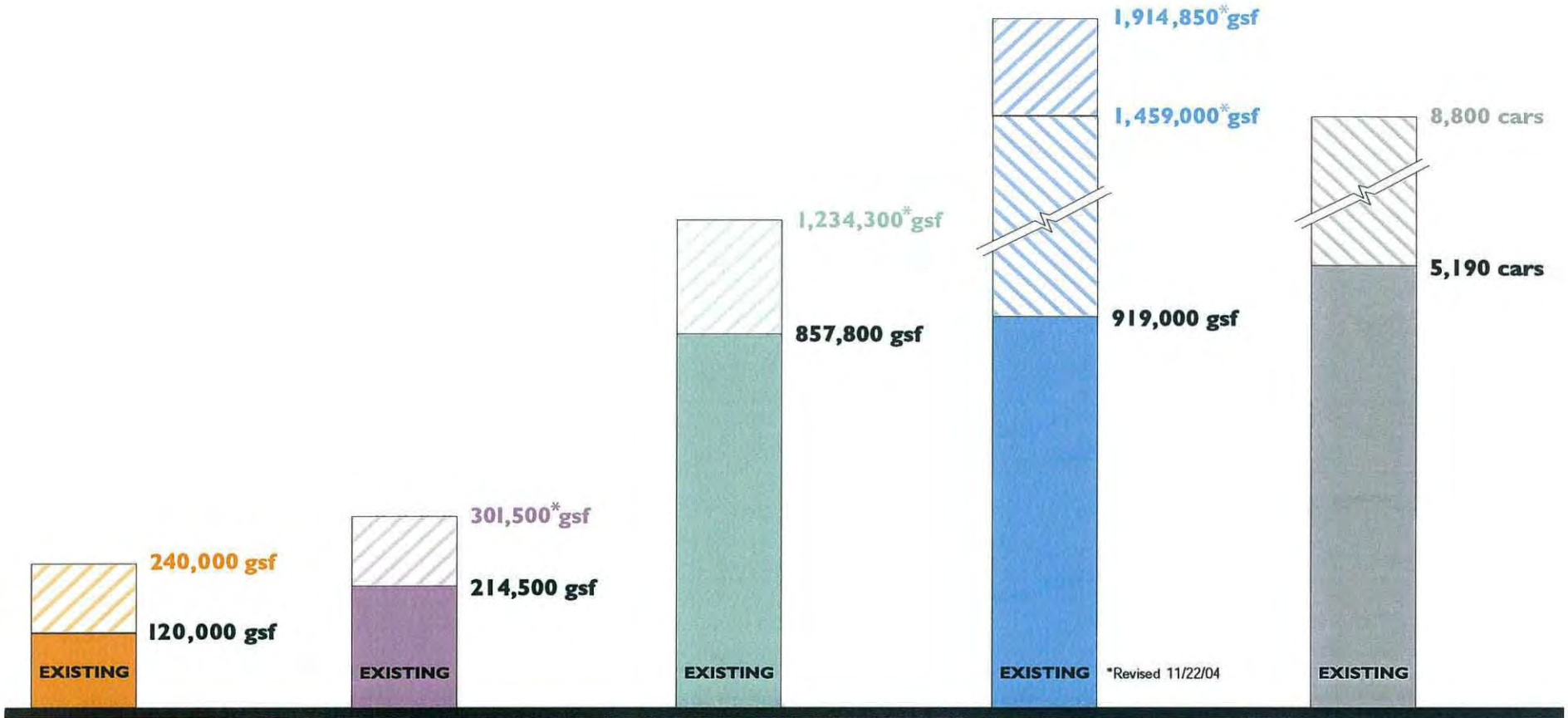
10. UMMS is also currently focusing on identifying the needs and methods of delivery for distance learning classes.

11. Tim expressed the need to identify the circumstances or a timeframe when, or if, the IT department would eventually have to move. TK&A suggested, given the above dialog, that the IT department would have to move if the master plan design objectives that take into account the needs of the educational, research and clinical missions can be met only by relocation.

TSOI / KOBUS & ASSOCIATES
ARCHITECTS

University of Massachusetts Medical School

Section VI. Space Projection Summary



Commonwealth Medicine

- Consolidate Program on Campus
- Double in Size

Medical School

- Top 3 Ranking (Primary Care)
- Double Nursing Enrollment
- Double BioScience Enrollment
- Consolidate Program on Campus

Medical Research

- Top 25 NIH (Medical School)
- Increase $/nasf
- Consolidate Program on Campus

UMass Memorial

- Top 10 Medical Center
- Provide 500-600 beds
- New Ambulatory Care Center

500-600

Parking

	cars/sf ratio
1 - **MOB**	4.5/1000
1 - **Amb. Care**	4/1000
1 - **Research**	1.75/1000
2 - **Office**	3.3/1000
1 - **Education**	1.7/1000

1 - VHB - Parking & Traffic Planning Study 2003
2 - Worcester Zoning

***Revised 12/15/04**

Off Campus Programs

Figure VI.1

- ✓ Bio-Tech Park 1,2,4
- ✓ Worcester Foundations Campus *(Research, Clinical Skills, Simulations)*
- ✓ Worcester State Campus *(Research)*
- Jamaica Plain Biologies Campus
- ✓ Shriver Campus *(Research)*
- ✓ 100 Century Drive *(Commonwealth Medicine)*
- Auburn Building 2
- Morgan Building
- One Research Drive
- W. Exchange Street
- ✓ 333 South Street *(GEP Nursing Program)*

✓ *Potential Consolidation to Campus*

Advancing Education

Figure VI.2

- All on one campus
  - Clinical Skills
  - Simulations
  - Continuing Medical Education
  - GEP Nursing Program
- 125 first year M/PhD Students
- GSBS doubling in size
- GSN doubling in size
- Replacing conference rooms with classrooms
- New, larger Case-Method classrooms
- Library expansion

Advancing Research - Medical School Rankings

Figure VI.3

School	2003 NIH Rank	2005 USN & WR Rank	2003 Total Awards	2003 Dollar Amount	Current Total ASF	Space Per PI
Johns Hopkins	1	3	967	414.2M	1,250,000	1,400
UCSD	15	17	440	219.6M	750,000	
U. of Chicago of Pritzker	**25**	22	376	**153.7M**		
University of Rochester	30	32	383	134.8M	598,000	15,000
UMMS	41	Below top 50	282	95.1M	414,000	
OSU	53	38	180	68.2M		

Advancing Research

Figure VI.4

Basic & Clinical Research $ per
Basic & Clinical Research NASF 2003

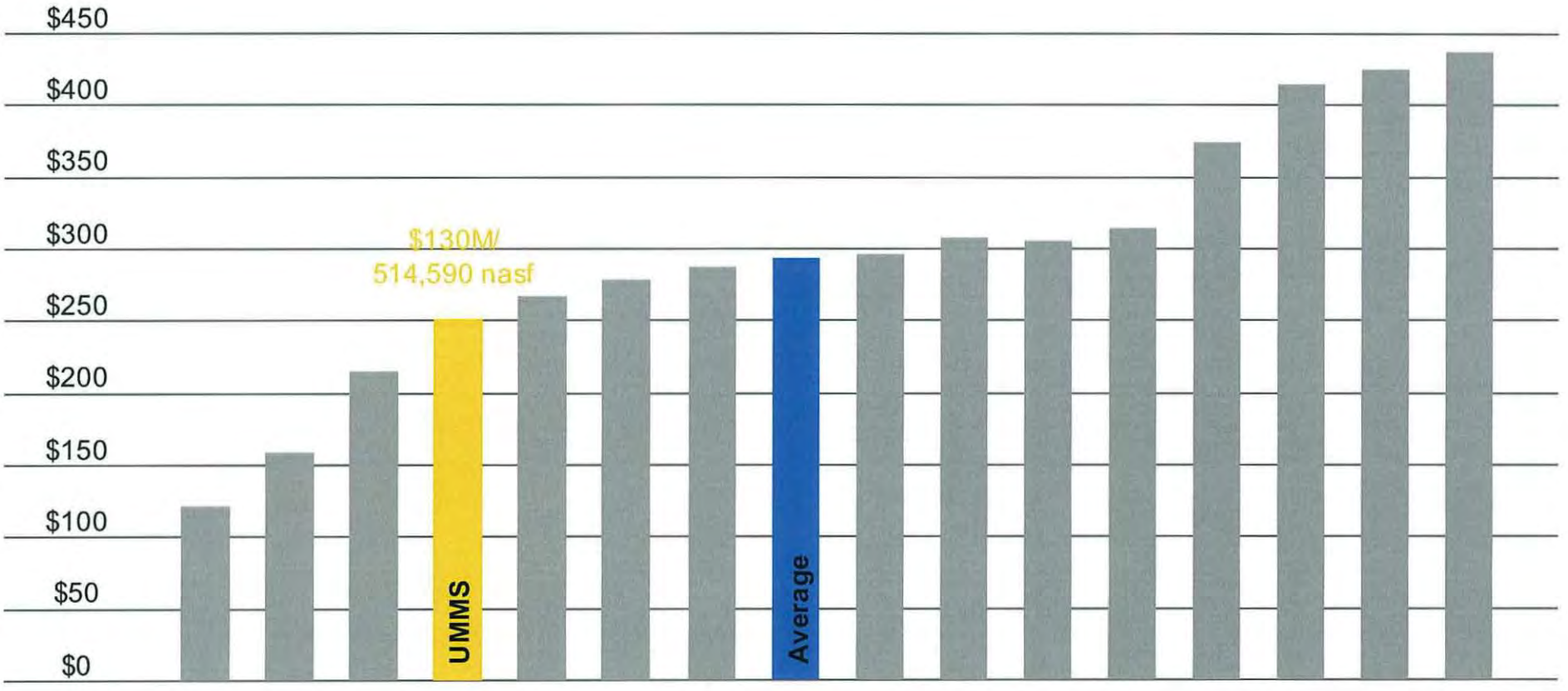


Figure VI.5

UMMS Today: #41	**$95.1M**		
UMMS Tomorrow: **#25**	**$153.7M** "guesscalate" to **$175M**		
Growth in NIH Funding	**$80M**	=	**266,700 nasf @ $300/nasf**
		-	**100,800 nasf unused LRB**
			165,900 nasf x 1.667 = 276,500 gsf
partial consolidation on campus		+	**60,000 nasf x 1.667 = 100,000 gsf**
			Total New Research on Campus **376,500 gsf***

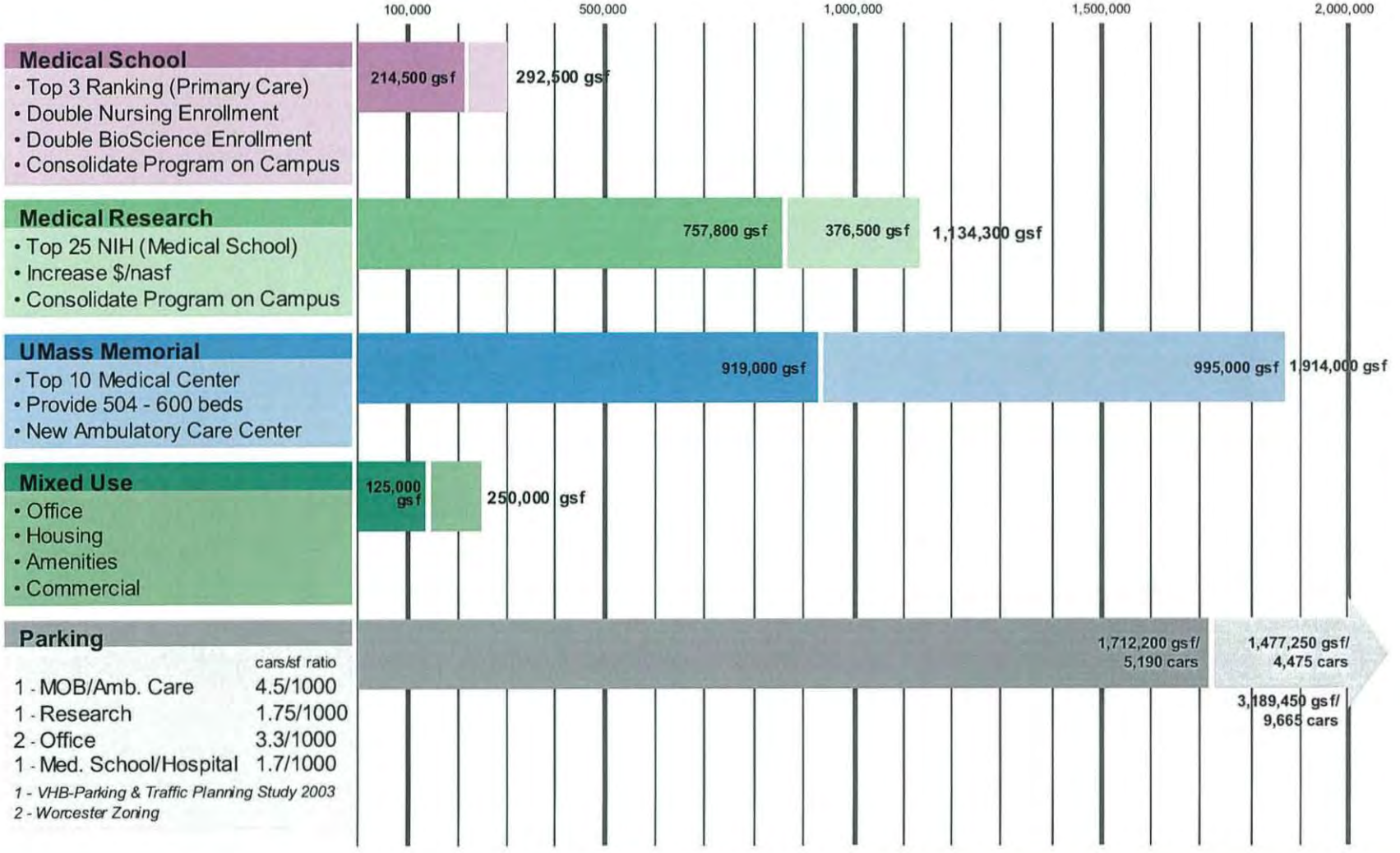
****assume 60% building efficiency***

Figure VI.6

- 500 to 600-bed Academic Medical Center
- Right Sizing: 2,500 to 3,000 sq. ft. per bed
- 273,000 sq. ft. for new beds
- 127,000 sq. ft. for new diagnostic and support
- 240,000 to 500,000 sq. ft. Ambulatory Care Center

"What If" Space Projections

Figure VI.7



Existing Space Program

Figure VI.8