TOWN PLANNING ANALOGIES FOR SCIENCE FACILITIES IN ACADEMIA

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In the University, a science facility offers places for instruction, research and community. Interaction is the common thread that sustains each of these activities. Discussions arise from meetings, formal and informal. Thoughtful planning and design recognizes activity patterns of the science community and provides the places where interaction might best occur.

Imai Keller Moore Architects, an architecture and urban design firm, has used town planning analogies to establish a framework for organizing university science departments: streets and neighborhoods, town squares, civic buildings, parks and centers of commerce. It is a paradigm that is familiar to most, but its somewhat-odd application to academic communities (particularly science) allows scientists to understand the structure and organization of their school or department in a manner that gives logic to issues of community and privacy.

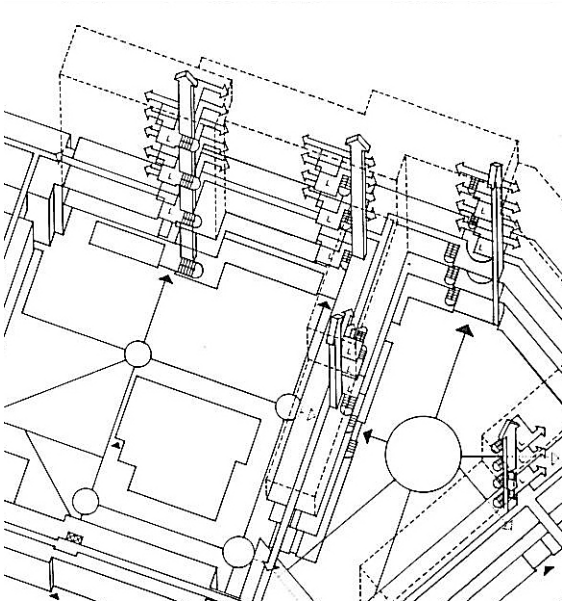
Case: Massachusetts Institute of Technology

The form of its architecture organizes academic space at the Massachusetts Institute of Technology. The oldest portions of MIT consist of a series of interconnected, horizontally organized buildings. Each building within the Main Group (the original buildings and courtyards designed by William Bosworth in 1913) was conceived as generic space and accommodated the functions of classroom, office suite, laboratory, seminar room, and even (in its earliest days) industrial fabrication space. The buildings (all typically 55-60 feet wide) have proved surprisingly adaptable for most academic functions of several departments.

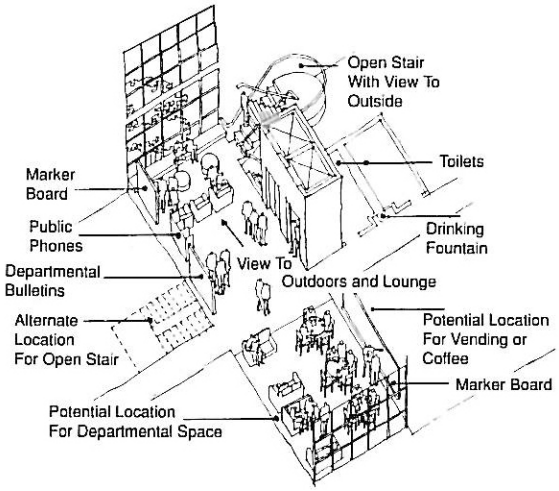
Each floor in each building generally has a corridor down the center that is accessible to the university community (and, in fact, the general public) at large. With its street-like organization, it is not a big leap at MIT to use urban design analogues when discussing how to organize a department, how to differentiate public, departmental, sub-group and private spaces in a hierarchy, and how to use the disposition of the corridor (with attendant stairways and elevators) and departmental space to promote interaction at several levels.

The efficient double-loaded corridors are the primary location for traffic of people and deliveries and also for the main horizontal utility runs. But generally, spatial relief comes only at the intersections of the corridors. It is here that main stairways occur and it is also here where one can observe most of the informal, chance interactions among students and faculty taking place. Because common circulation paths are not included as part of MIT's net assignable square-footage calculations, the departmental use of these spaces both as passive lounge space and as enhancements to adjacent departmental space are doubly rewarding. The urban design analogy for this is a building on a public square.

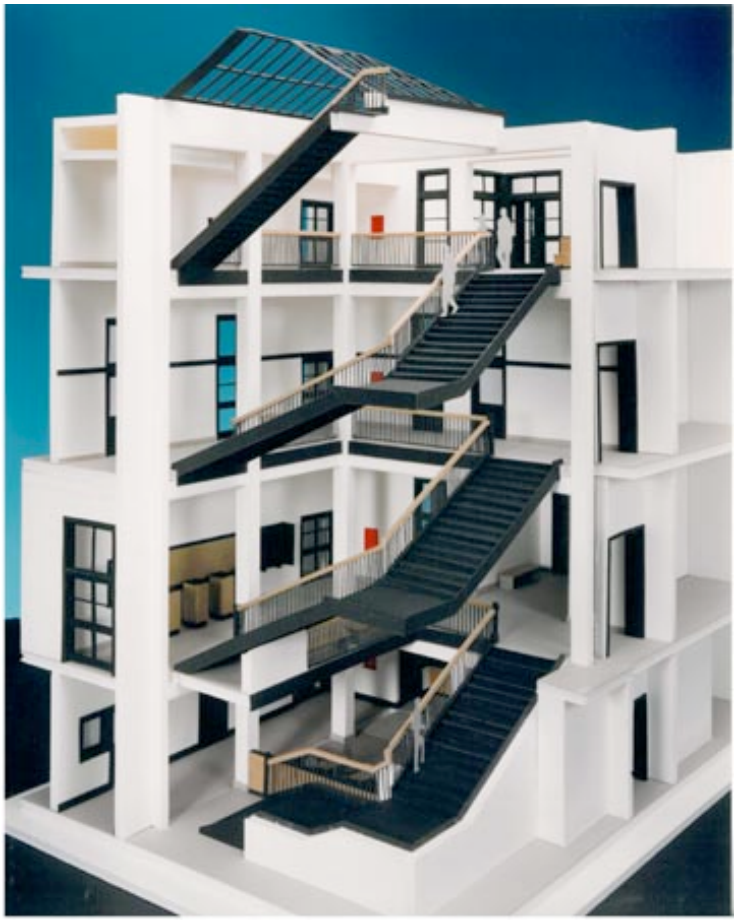
As part of its MIT Northeast Sector Master Plan, Imai Keller Moore created the drawings below to illustrate the relationship of building mass, corridor, and stairway / elevators to lounge space, building entry points, and outdoor circulation paths. Where possible, these zones would also be placed on outside walls, allowing natural daylight and views from the public corridors.



Building and courtyard relationships for planned buildings in MIT's Northeast Sector. (all images, unless otherwise noted by Imai Keller Moore Architects).

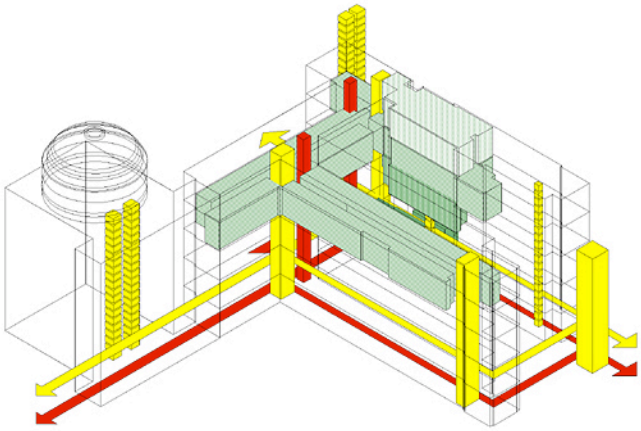


This close-up sketch from the same study shows the opportunities for reinforcing the building intersection and nodes as primary locations for academic interaction.

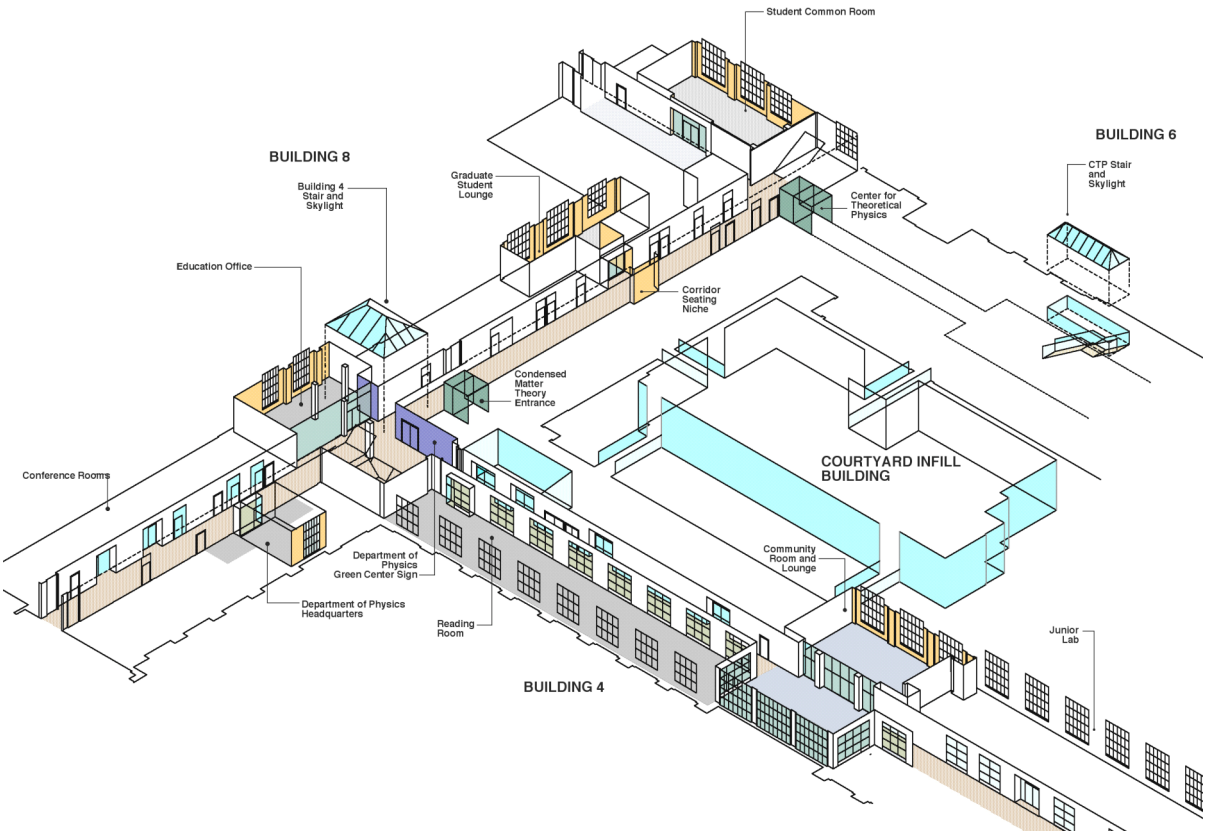


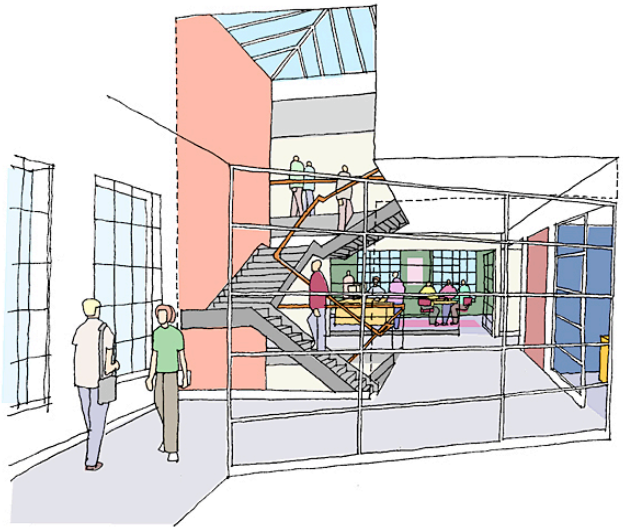
As part of the MIT Chemistry Department renovations in the Main Group, Imai Keller Moore re-designed the Building 2 Stairway as the location for a new student lounge, department headquarters, an x-ray defractometer facility (made visible with a new glass wall), a distribution point for campus newspapers, departmental bulletins, and waste collection. Like many primary stairs in the Main Group, this stair was covered by a large glass skylight which gives daylight to all four floors and an illuminated focal point to the ends of the approaching corridors.

Similarly, our project to consolidate the MIT Physics Department to be located primarily on one floor of the Main Group (shown above in green) looked to urban design analogies to create the framework for organizing the various pieces of the Department. We looked to the three primary groups of the Department: Education, Research and Administration and identified all of the community spaces such as meeting rooms, lounge space and cafe. We sought to organize all of the 'public' functions of each group and all of the community spaces along the primary corridors of the buildings.

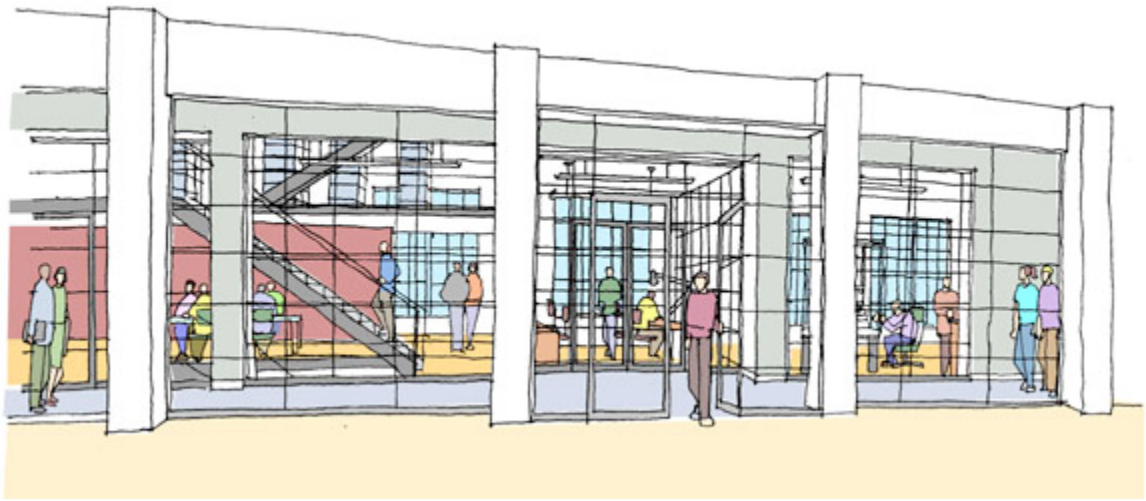


This drawing was prepared by IKM to show the distribution of all the public and community rooms along the 'streets' of the existing corridor system. Additional analogies such as town square, civic building (located at corridor terminus points), and major business identities further illustrated the concepts of organization to the Department. Within such a framework, even choices of materials and colors might be influenced by a space's functional position within the community.



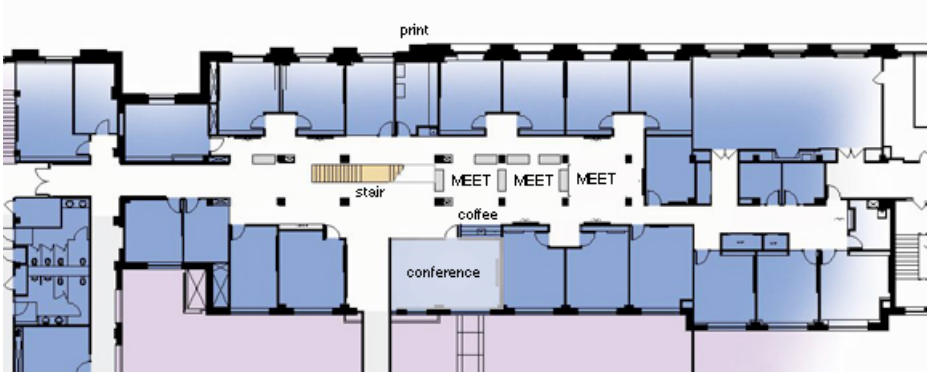


This view of the intersection of the two main corridors within the department shows the skylit stair, seminar rooms with glass walls opening into the space and on the far wall, the glass entry to the Education Office (academic headquarters for all physics students) terminates the axis from Building 4.



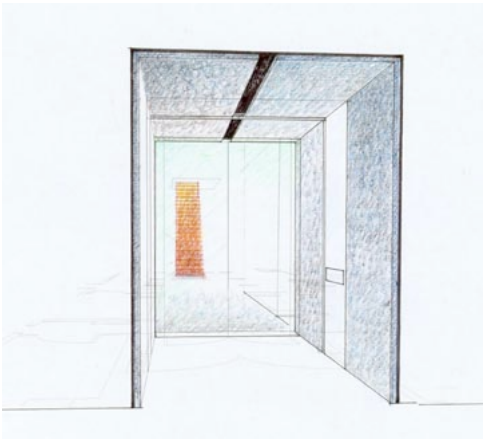
Like stores along a commercial street, spaces along the corridor are glazed when possible for visibility of the activities within. This conceptual view of the Department of Materials Science and Engineering (which was an 'enabling project' for the physics renovation) shows interconnecting departmental stairs and a nano-technology laboratory beyond. The view is from the Undergraduate Teaching Laboratory looking through the main corridor (with the gray floor) into the space beyond. A photograph of the finished Nanotechnology Lab from the corridor is shown below.

The point of this approach is, of course, to develop a logic for designing and distributing spaces where discussion is likely to occur. At the Center for Theoretical Physics (CTP) we worked with faculty to understand different patterns of interaction. Theoretical physicists recognize that discourse lies at the heart of their work and seek to create opportunities for chance meetings as well as provide places for informal (lounges and lunch areas) and formal meetings (conference and seminar rooms). They also described what they called "interaction by accretion", whereby a chance meeting might evolve into a discussion at a chalkboard, gain a small audience of passers-by, and move into a nearby formal meeting area. Break-out spaces immediately outside larger meeting rooms were seen as very important to facilitate small-group discussion of topics that arise during the larger meetings.

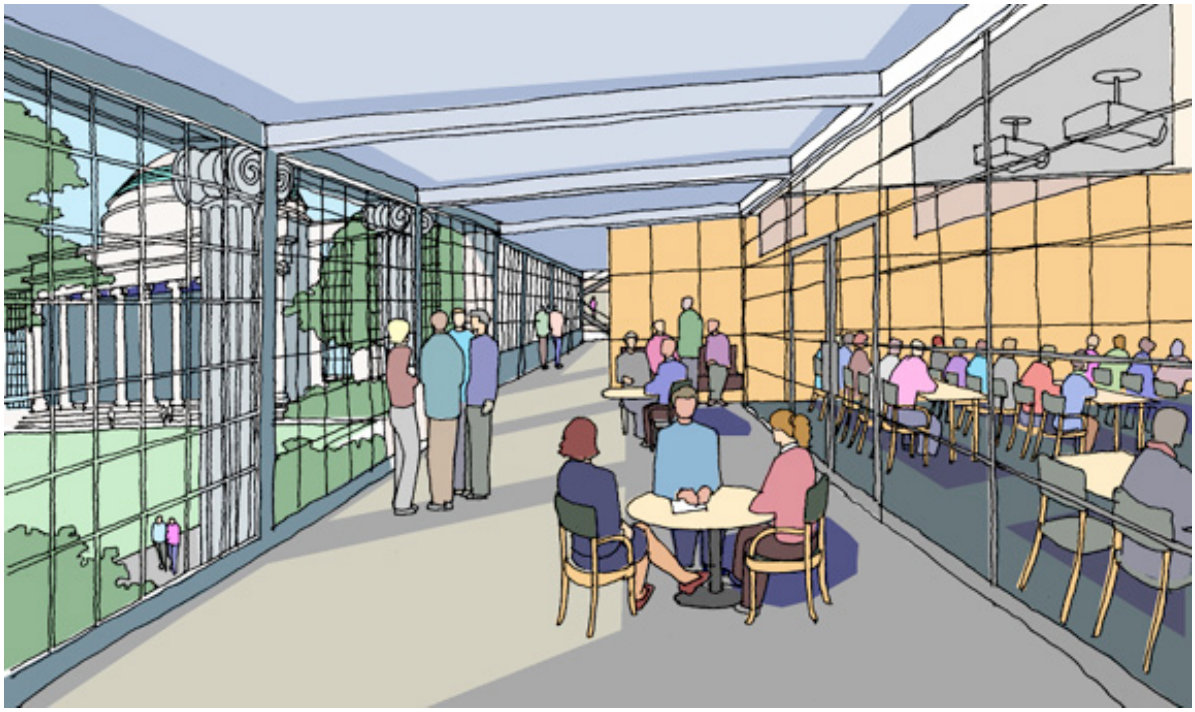


The entrance level of the Center for Theoretical Physics shown here illustrates the arrangement of faculty and post-doctoral offices around a central informal lounge-meeting area. The area is subdivided by six-foot tall plinths that support the chalkboards, give nominal privacy, and limit the group sizes. Around the central meeting area are larger conference rooms, a coffee-service bar, mailboxes, and print room. A departmental stair connects to a similar floor above that has a large seminar room for the entire group. The entrances to offices are arranged with alcoves that allow faculty to keep doors open, but maintain visual privacy. As with good urban design, axial views along corridor paths are terminated with art alcoves and displays, or with architectural elements such as the stairway (shown below).

In science research laboratory space, conditions for interaction are more constrained by the procedure and equipment demands of the laboratory. Lab bench length and arrangement, plumbing restrictions, containment and airflow, proximity to support spaces all tend to dictate layout more restrictively than with office space. The isolation that much of today's science requires further restricts chance meetings and interaction.



The entrance to the Center for Theoretical Physics from the main corridor is marked by the use of slate (signifying the importance of chalkboards), frameless glass doors, and focusing on the new stair, skylit from above, giving access to a second suite of offices and the main seminar room.



Special places along the corridor expand the hallway (similar to a town square) provide views into Killian Court and to the Great Dome and use that spatial event as the break-out area for the largest departmental meeting room. The meeting room and the town square were positioned by their landscape and architectural significance: this location is the entry from Killian Court into Building 4 and is notable for its decorative ionic columns and floor-to-ceiling windows giving a majestic scale to the space.