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Office to Lab Conversions: A Greener Approach

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With many employers and workplaces still navigating how to pivot in the face of the rise of remote working, commercial property owners and landlords are looking to a new solution to use vacant office space. The potential to accommodate life science uses is one solution being explored.

Organizations, public entities and private enterprises are defining, implementing and revising their respective return-to-office strategies. There are two common denominators defining crucial objectives: how to recalibrate successfully, and how to do more with less. The pandemic demonstrated that workplace environments are not, as often previously assumed, a necessity for all users all the time.

Despite an initial drop in productivity in the early days of the pandemic lockdown, many professional markets rebounded quickly as corporate, civic and organizational leaders and their staffers adapted to a new model of remote work. Unfettered by daily commutes and distractions, workers found that working from home provided a unique circumstance to model for and test a long-overdue model for an improved work-life balance. Additionally, sustainability advocates championed how reductions in commutes and facility operations cut emissions, slashed energy needs, decreased operating cost and lowered carbon footprints.

After pivoting their workplace culture for nearly two years, many private companies and public entities are actively recalibrating their real estate portfolios. The end goals are now clear: Worker well-being, enhanced workplace equity and flexibility, and improved sustainability can be achieved by realigning both office footprints and corporate culture. For many, this has translated to a flight to quality in search of smarter buildings, enhanced amenities and more accessible locations.

Commercial property owners and landlords have acknowledged that higher vacancy rates will likely remain the norm. In numerous commercial markets, pre-pandemic occupancy rates already hovered at just 60%. Higher vacancy rates will become more apparent when many office workers return to in-person work.

In the meantime, commercial tenants are actively assessing their future real estate needs and rightsizing their corporate real estate portfolios. They are investing time and money to determine how to achieve more value and better use within a reduced footprint. Market analysts are predicting that it will require several quarters to absorb the abundance of outstanding sublease space. Consequently, both absorption rates and rents have fallen in many commercial markets. This diminished demand for commercial space will hurt portfolio valuations.

Property owners are aggressively investigating how their underutilized spaces can be economically converted for alternative uses. Topping the list of possible conversion typologies are spaces that accommodate life sciences, an expanding and robust market sector that appears impervious to current shifts in the use of space.

Life Science Market Growth

During the pandemic, life sciences was one of the few sectors that expanded and actively absorbed space. Its growth over this time helped recoveries in select markets. In 2020, the Boston-Cambridge area, a leading center for research and development (R&D) of all kinds and home to Harvard University and the Massachusetts Institute of Technology, surged to the forefront in office market performance. Accompanying this surge was a 50% increase in rent for lab spaces and R&D facilities. In 2021, 70% of life sciences space in this market was already preleased prior to completion of construction.

According to Jones Lang LaSalle (JLL), the largest markets for life sciences after Boston-Cambridge include: San Francisco, San Diego, Washington, D.C.–Baltimore, Raleigh-Durham, and New Jersey. Secondary life science markets include Houston, Dallas, Pittsburgh and Atlanta. Several markets witnessed a substantial increase in rent for research and lab spaces, notably Philadelphia at 35% and San Diego at 40%. In some California markets, life science vacancy rates hover at only 1% or 2%.

Investment in scientific R&D has generated tremendous growth and opportunity in both established and budding life sciences markets. In 2021, venture capital funding in life science more than doubled, while demand for life science space has grown by 34% since mid-2020. As an industry, job growth in life sciences rose 15% since 2017, even surpassing the technology sector for new hires. According to a study by Cushman & Wakefield, investors pumped an astounding $70 billion into the life science sector in 2020. It is expected that new records of continued investments will soon be set.

Major life science markets are centered on academic clusters. These clusters offer talent, resources and innovation. Institutions of higher education provide the life science industry a continuous supply of knowledge workers, including researchers, technicians and administrators. In Philadelphia, as an example, a life sciences cluster focuses on gene and cell therapies around the University of Pennsylvania's medical center. In Chicago, research is clustered around Northwestern University's medical center campus.

These science, technology, engineering and mathematics (STEM)-driven graduates are leveraged by an outer tier of market influencers and mentor service providers including venture capitalists, biotech incubator managers, marketing consultants and patent attorneys. These highly involved influencers provide avenues of public and private funding and tax incentives for research, equity partnerships and new business ventures.

Funding was already on the rise prior to 2020. With the onset of the pandemic, an accelerated rate of research expanded across multiple sectors, including applied, biotech, medical and genome research. The National Institutes of Health (NIH) has been a major funder of research along the Northeast Corridor. In Baltimore, federal government–funded, COVID-19 related research spurred increased demand for life science space. New York City saw leasing of lab space reach new heights in 2021. State-of-the-art facilities that provide agility, flexibility, safety and people-centric collaboration destinations enable an enhanced rate of research and innovation.

Commercial developers and property owners are actively assessing how to redeploy their current underutilized space assets to attract life science and biotech tenants. As of early 2022, an estimated 18.9 million square feet of space conversion is underway. As property owners investigate how to recalibrate and retrofit their commercial portfolios, a heightened understanding and integration of a targeted, efficient and sustainable approach is paramount. By actively converting and repurposing existing commercial buildings, property owners can implement an effective, purposeful and environmentally superior approach.

Reducing Carbon Footprints

A high portion of total carbon emissions are generated by buildings. A major challenge of addressing climate change is evaluating how to leverage and repurpose aging structures with green technologies. According to Global Real Estate Sustainability Benchmark (GRESB), an organization issuing standards and benchmarks for environmental, social and governance (ESG) performance, a building retrofit produces less than half of carbon emissions compared to a new construction.

By focusing on improved energy performance, property owners can retain higher values. Investors, including pension funds and endowments, are pursuing property valuations that demonstrably minimize impact on climate change and environmental risk. Government scrutiny of carbon will continue to grow and will likely focus on the commercial sector. There is a real possibility of a carbon tax. Landlords and property owners face paying surcharges on carbon-based fuels measured by the tonnage of greenhouse gas emitted by their assets.

A Strategic Approach to Conversion

The proper planning, design and execution of lab spaces requires a detailed approach. Since lab spaces require 30%-40% higher initial costs compared to commercial space, investments and capital expense allocations may seem challenging or prohibitive. Labs also have rigorous operations and performance criteria, high energy use, complex infrastructure and power redundancy requirements. As demand for life science facilities escalates, the market is responding by offering life science tenants greater choice, flexible lease terms and a variety of pre-built and configuration options.

Providing an array of flexible configurations, robust building services, and amenities empowers life science tenants to allocate resources, attract investors and secure talented workers. Bringing an enlightened approach to lab planning, design and operations within existing spaces requires highly specialized tactics and holistic thinking.

At the outset, a detailed due diligence and a detailed space inventory combined with a strategy for the integration of new building systems is recommended. Following this investigative process, which results in a detailed road map for strategic actions, property owners can push the envelope of building conversions, enabling older facilities and structures to be economically converted to high-performance functions and attractive destinations for research, collaboration and ideation. Engaging experienced lab planners, architects, engineers and contractors during the early site selection, due diligence and assessment phases enables superior building performance, adaptable planning and flexible solutions.

Recommendations

At a minimum, implementing a building conversion to support life sciences requires a variety of detailed assessments. We have identified 13 key elements and defined what conditions would be good, better and best.

1. **Location**: Confirm the proposed site is compatible with adjacent uses, zoning and building occupancies.
   - Good: sufficient distance from residential and other noncompatible occupancies.
   - Better: a location of mixed or other commercial types of uses.
   - Best: a site specifically tailored to support the life sciences industry.
2. **Building functionality**: Confirm that vertical transportation systems can support service/operation needs and that the building envelope can mitigate temperature variations effectively.
   - Good: a building erected in the last 40 years may meet today's performance criteria.
   - Better: a structure 20 years old or newer that was designed to support multiple tenants.
   - Best: a building specifically designed and engineered to accommodate some type of laboratory use.
3. **Modularity:** Identify floor-to-floor heights, structural systems and floor loads. Confirm the building offers sufficient clearances to accommodate necessary mechanical, electrical, plumbing and cable tray systems. Since labs modules are based on 11 feet layouts, a 22-foot or 33-foot column grid would be ideal. Since the majority of commercial buildings are planned on a +/-30-foot grid, potential space challenges and planning efficiencies need to be addressed.
   - Good: a building engineered in the last 40 years.
   - Better: a structure with 15 feet minimum slab-to-slab.
   - Best: a steel-framed building engineered in the last 20 years with 15 feet minimum slab-to-slab and bay widths in multiples of 11 feet.
4. **Building height:** R&D magnates encourage collaboration and ideation. Multistory buildings that obfuscate visual connections, interpersonal networking and face-to-face interaction may be deemed too tall.
   - Good: a low-rise structure, even a single story, that can be adapted to create shared amenities and service spaces.
   - Better: a low- to midrise (three- to six-story) that supports tenant interaction and shared space connectivity.
   - Best: a groundscraper, three-story maximum with visible and accessible vertical connectivity (stairs), shared support spaces and an array of amenities.
5. **Structural loading:** Older, less robust commercial buildings engineered to meet previous generations' less stringent live and dead load code criteria may limit feasibility for lab space types and use. Dead load capacity should be more than 100 pounds per square foot (PSF), with 150 PSF being ideal. Vibration mitigation is another crucial consideration.
   - Good: a structure less than 40 years old.
   - Better: a structure less than 20 years old that anticipated a broader mix of uses and load capacity.
   - Best: a recent structure conforming to the current code requirements and providing a range of 100-150 PSF.

6. **Type of construction:** Identify existing construction and assess fire and life safety considerations. Confirm the ability to initiate change of use and segregate R&D entities.
   - Good: floor, interior and exterior wall assemblies that can accommodate anticipated occupancies with some strategic modification.
   - Better: assemblies that are largely suitable for current code and require few modifications.
   - Best: more recent construction that anticipated multitenant spaces and exterior wall assemblies that are high-performing and more energy efficient.
7. **Fire rating:** While conventional Group B occupancies are typically convertible, the age of the building, the fire assembly's vintage and building materiality should be identified. If identified incorrectly, conversion can be limited and costly.
   - Good: fire-rated assemblies predicated on full fire-sprinkler coverage.
   - Better: fire-rated assemblies, floors and walls that meet current assemblies code requirements.
   - Best: core and shell assemblies (including floor slabs and exterior wall assemblies) that meet current occupancy separation requirements.
8. **Electrical and data systems:** Although conventional commercial buildings are typically engineered with sufficient power requirements to accommodate today's laboratory energy needs, existing data systems (inclusive of server spaces/rooms) are likely to be dated and will require greater capacity, distribution, ease of access and security provisions.
   - Good: sufficient power and data provided to the site.
   - Better: facility can accommodate services and has capacity to accommodate greater loads.
   - Best: provides robust connectivity, systems resilience, redundancy and engineered ease of access to systems for continuous modifications and change.
9. **Security systems:** Life science tenants require confidentiality to protect their research and intellectual property, or they may be subject to federal or other agencies security requirements. A security system with multiple layers of protection and flexibility should be provided.
   - Good: a managed buildingwide security system.
   - Better: a multilayered approach with controlled entrances monitored 24/7.
   - Best: a staffed security desk at the main point of entry, several layers of secured entrances (from site entry to loading dock to individual floors and suites), and a system that is compatible for multiple users.
10. **Roof assemblies and load capacity:** Stringent laboratory requirements require higher heating, ventilation and air conditioning (HVAC) performance, increased quantities of air exchanges, contamination control, and additional mechanical equipment. Understanding whether existing roof structures can accommodate these new/increased loads and equipment allocations is essential.
    - Good: a roof assembly that, with proper engineering and space capacity, can accommodate additional loads.
    - Better: a roof assembly that requires minimal engineering to support additional loads.
    - Best: a roof assembly that, with minimal engineering, can accommodate moderate additional loads in multiple locations and potentially heavier loads to support a cooling tower in at least one location.
11. **Shipping, receiving and waste handling capabilities:** Receiving and shipping of biological and other types of products, samples, chemicals and tanks of any kind will require a discrete and more secure receiving and storage area than a typical commercial building.
    - Good: two or more loading bays with space to accommodate secure storage, tanks and waste.
    - Better: a depressed loading dock, multiple loading bays, and a shipping/receiving area with enough capacity to provide a broader range of storage security.
    - Best: a three-bay, depressed loading dock, discrete tank and chemical storage areas, and secured and (possibly) temperature-controlled spaces operated and monitored by dedicated shipping/receiving personnel.
12. **Collaborative environments:** Whether the facility is for a single use or multiple tenants, interaction with peers and fostering of a sense of community (even among potential rivals) has proved to be an innovation accelerant. Embrace placemaking to elevate the physical space requirements to an inclusive destination.
    - Good: a built environment that offers a spatial sense of shared experience and connection.
    - Better: a built environment that offers staff a rich and active variety of destinations to focus, meet and ideate.
    - Best: collective and individual spaces with amenities that support, excite and encourage tenants and the extended community to connect, collaborate, innovate and ideate together.

13. **Attraction and retention:** Defining the facility as a center of excellence will attract and retain the best life science professionals. A combination of cost-effective, flexible and conducive work environments provides motivation and inspiration to succeed. Good to best needs require all these elements, but differentiating from good to best does not lead to the most flexibility or capabilities. It should be addressed as the balance of necessary performance, cost-effective functionality, and qualitative attributes such as choice, wellness, equity, variety, access to daylight, biophilia, maximized sightlines and sound control. These are the real value propositions.

Systems and Utilities

Among the necessary systems and utilities to support life science R&D:

- Additional cooling needs, potentially adding external cooling towers.
- Dedicated transformers (supporting resilience and redundancy).
- Enhanced and expanded HVAC systems.
- Flexible, adaptable and accessible cable trays and shielded cables.
- Means to mitigate line noise and RF noise.
- Variety of power supply and distribution (120 V, 220 V and 380 V service).
- Vibration and noise mitigation (isolated mounts).

Conclusions

The pandemic has had a profound impact on the recalibration of our built environment, and the only constant is change. New STEM-focused business models have emerged and are in higher demand than ever. Considering the adaptive reuse of existing structures offers a more enlightened and sustainable approach to embracing social and environmental factors.

ESG has become a mainstream metric for identifying potential investments and analyzing risk and growth opportunities. Clearly the way forward is acknowledging the impact that our built environment has on the evolution of the climate. Taking greater responsibility for advocating and facilitating socially aware policies and reducing carbon footprints will offer commercial property owners an opportunity to recalibrate and respond to changing market needs.

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