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Planning Tools for 21st Century Labs

Strategic Facility Planning in the Modern Age

Rapid changes in science and business have created unprecedented new challenges for the designers of modern research facilities. Emerging technologies such as proteomics, combinational chemistry, and nanotechnology demand new approaches to lab design. The drive for globalization further complicates decision making for organizations seeking to expand or develop new operations. To address these issues, facility planners are creating a whole new generation of analytical tools that allow them to make critical decisions objectively.

"Numerous market forces and scientific developments are radically affecting modern laboratory design, facility planners must adapt to these changes," says Richard Rietz, Ph.D., an authority on the planning of research buildings who has served as independent strategic consultant to corporate and academic organizations for the past 20 years.

In Dr. Rietz's extensive strategic arsenal there are three tools in particular he says contemporary facility planners must be familiar with: equivalent linear footage, benefit/deficiency analysis, and space type/demand capacity comparisons.

Equivalent Linear Footage

The equivalent linear footage (ELF) methodology is used for the decompression (or compression) of lab space. It functions by assigning a numeric value to everything in a facility—from chairs to fume hoods to walkway space—based on the amount of linear space used. Once a lab's component parts are quantified, a formula can be used to convert a facility's total ELF into its minimum required net square feet (NSF).

"The power of the ELF method comes from the fact that it's entirely mathematical," says Dr. Rietz. "It's a non-graphic tool that removes all subjectivity from making space decisions. ELF is a universally applicable analysis tool that operates at the individual piece level. It quantifies space needs on an item-by-item basis and allows for exact comparisons between every single element of a laboratory."

Dr. Rietz used ELF recently when a medical devices company contracted him to decompress their QC laboratory. The lab was jammed with equipment and multiple overlapping shifts. The lab had chromatography benches with no set up space, waste drums in the walkways, and equipment crammed together with no backside access. Management needed to know exactly how much to decompress the facility and they wanted it done analytically.

A complete inventory of the lab was conducted and ELF values were assigned to each element, including non-items such as absent backside clearance space for access to instrumentation and industry-standard aisle widths.

"ELF allows you to accurately quantify the amount of compression occurring in a laboratory. Everything is reduced to a brutally honest set of numbers," says Dr. Rietz.

Once the lab's compression was quantified, a formula was applied to translate the lab's total required ELF into decompressed NSF figures and preliminary project budgets. From this point, the NSF figures were sliced into modular segments and multiplied based on the amount of expected growth. Using ELF allowed the company to confidently make planning decisions that resulted in a 50 percent decompression of lab space.

Benefit Deficiency Analysis

Another new-era planning tool utilized by Dr. Rietz is benefit deficiency analysis (BDA): a cost benefit matrix for determining the best course of action from a variety of options. In BDA methodology, each option receives positive and negative scores depending on variables like whether or not there is enough linear footage for the necessary instrumentation, or if there are enough fume hoods for required personnel, or whether workers offices are separated from the labs. Each decision is rated for financial impact and feasibility, and then laid out on a color-coded grid. The grid can then be used as a planning map, similar to moving the pieces around like a puzzle, so the effect and cost of each option can be objectively assessed.

Dr. Rietz, with Lee VanDeKerchove and Susan Briggs of Oakland, Calif.-based VDK Architects, recently used BDA to help Gilead Sciences, a global biopharmaceutical company, transfer employees back and forth between two locations in order to accommodate growth without building new facilities.

In 1999, Gilead wanted to consolidate and expand its chemistry program in Foster City, Calif. The chemistry labs were housed in a set of leased buildings hemmed in on all sides by other companies. The desire was to locate all the chemistry people together in one building, a building already in operation as a lab building.

"There was a lot of money and people at stake and nobody wanted to be off-line," says Dr. Rietz. "Somehow the people had to be accommodated in the existing facilities because there was no place else to build."

In this situation BDA provided a logical system for arriving at the best possible solution.

"We presented a benefit matrix with four alternatives to the head of research and to the managers of both labs. Of course, someone didn't like something in every option, but BDA gave them the tools to build a consensus and work through a difficult situation," says Dr. Rietz.

Using the BDA matrix, Gilead arrived at a phased approach to the problem. Employees were moved into one half of a building while the opposing half was remodeled, then shuffled back again in rotation. Full occupancy of the remodeled facilities has since been accomplished and no one has had to move more than twice. More importantly, every lab stayed in operation throughout the entire shuffle and renovation process.

Space Type/Demand Capacity Comparison

Though ELF and BDA are tools modern facility managers should have some experience with, Dr. Rietz has also been developing the use of more advanced planning techniques such as space type/demand capacity comparison—a system used to evaluate capacity needs based on program and facility type.

“Space type/demand capacity comparison functions on the macro scale the way ELF does on the micro scale,” says Dr. Rietz. “It considers whole programs and buildings, whereas ELF breaks down individual lab pieces, but they’re both essentially quantitative tools.”

Dr. Rietz used the technique while working with Allergan, a pharmaceutical company based in Irvine, Calif., when it conducted a recent reorganization. Allergan was downsizing its administrative functions, but upsizing its R&D group, nearly doubling the size of the organization. The board and the new chief executive wanted to know how many buildings were needed, when they were needed, of which type, and, most importantly, how much it would cost. Dr. Rietz facilitated a space utilization study, breaking down Allergan’s program needs, piece by piece, to a modular basis.

The space needs of every work group type in the organization were converted to numeric modular values based on function (e.g. labs, offices, cubicles), and compared to the company’s existing space inventory.

“There is no input regarding the sophistication of the space whatsoever, but it allows you to quickly compare what you need versus what you have,” says Dr. Rietz.

Space type/demand capacity analysis can be used to calculate inventory shortfalls and, when presented graphically in bar chart format, provides a clear sense of problem areas. The output yields building/group profile reports, demand/occupancy reports broken down by work group, and can be translated to ELF and NSF space requirements.

In respect to the Allergan reorganization, the space shortfalls themselves were multiplied by the needed space types, and a dollar-per-square-foot value to create budget figures. These figures were ultimately used to launch the reorganization project and justify the construction of a new research building.

“I have been in this business for more than twenty years and right now is one of the most exciting periods I’ve seen,” says Dr. Rietz. “Rapidly evolving market forces and new technologies are driving significant changes in the way we design research space. As a result, innovative approaches are being developed and tested. Within the next few years we'll see the results from those tests and, undoubtedly, more refinements in facility planning techniques will be made.”

BIOGRAPHY

Richard Rietz, Ph.D., is an authority on the planning and use of research facilities and has served as an independent strategic planner to both corporate and academic organizations for the past 20 years. He has worked as a research scientist, managed lab buildings, and directed construction projects from inside two Fortune 500 corporations. Rietz's recent assignments have included projects for Allergan, Aviron, Bayer Pharmaceuticals, Dupont, Genentech, Gilead Sciences, Protein Design Labs, the University of Nebraska, and the University of Oklahoma Health Sciences Center.

This article is based upon a presentation Dr. Rietz gave at Tradeline's *Research Buildings 2002* Conference in March 2002.

FOR MORE INFORMATION

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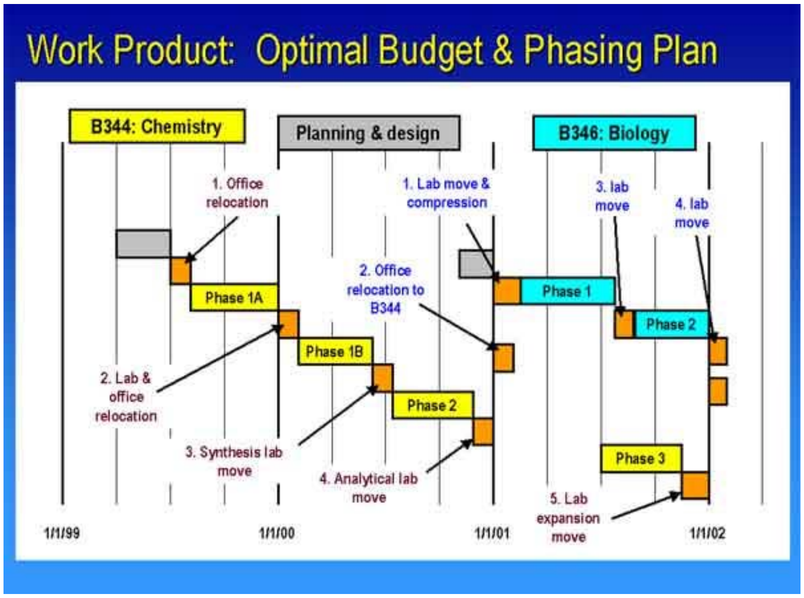
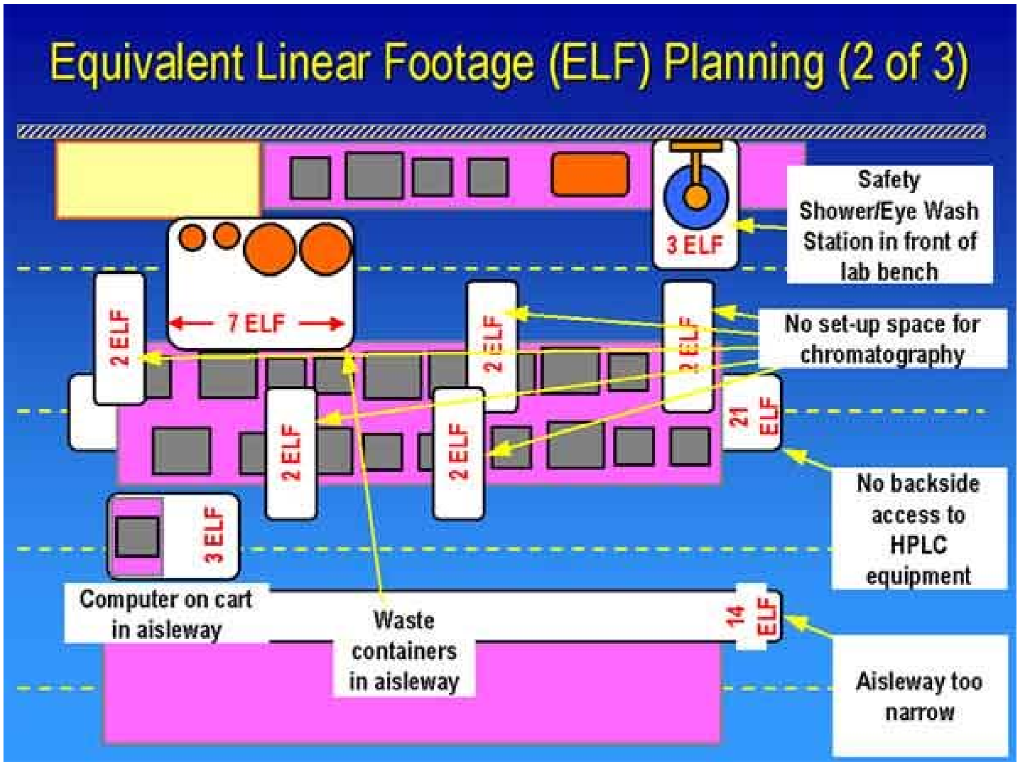


Using the BDA matrix, Gilead implemented a phased remodeling solution for its chemistry and biology labs where employees were shuffled in rotation to accommodate construction. No one moved more than twice and both labs stayed in operation throughout the process. (*Image courtesy of Dr. Richard Rietz*.)



Once a facility's gross ELF value is quantified it is applied to another formula that reveals the facility's required net square feet (NSF) with an incredibly high level of accuracy. (*Image courtesy of Dr. Richard Rietz*.)