TRIA

PROGRAM GROWTH IN EXISTING FACILITIES

PROVEN RESEARCH GROUPS CONSOLIDATION MODELS

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EXECUTIVE SUMMARY

Is it possible to reduce your footprint, increase your headcount, endure a relocation, and still be excited to come to work and be productive?

In this paper, TRIA Principal Edwin Hargrave, AIA will share how we've done it, including a look at relevant planning metrics and a case study.

TRIA's data-driven planning metrics include overall area allocations, area allocations by space function, and area allocations for equipment and furnishings, all on a headcount basis. While these metrics will vary, they tend to fall within predictable ranges for specific branches of science; we're able to use those ranges to right-size the overall program and its various components and deliver a highly functional space.

Key takeaways: to ensure success, you must define and quantify all programmatic requirements at the outset of the project, use consistent metrics to level the programmatic requirements, and conduct a transparent and inclusive planning process.

INTRODUCTION

Since 2015, TRIA has designed space for some of the top science and technology clients in the nation: over 15 million square feet of holistically designed, innovative spaces supporting over 25,000 scientists and researchers delivering scientific breakthroughs.

In recent years, we have observed one increasingly frequent project goal: **the relocation and consolidation of multiple existing research programs into equal or less space than they currently occupy,** without reducing headcounts – and in fact planning for growth! – and without impacting the science.

The drivers for this goal are multiple, and include the following:

- Institutions seeking to reduce operating overhead by reducing their footprint;
- Institutions growing their research programs by acquisition, and incorporating the new staff and research workflows into their existing facilities; and
- Institutions pursuing new research initiatives by expanding and collocating existing research groups within their existing facilities.

The demands on these projects are unique and sometimes contradictory, with significantly increased pressure to meet all at the highest level to succeed. For example:

- Staying within existing conditioned laboratory spaces to minimize interruptions to science;
- Capitalizing on existing laboratory MEP systems, utilities infrastructure, and furniture to minimize capital costs;
- Planning for growth while also consolidating; and
- Maintaining end user participation and commitment amidst concerns of a cramped, unusable, and inadequate outcome.

Later in this paper, **we will share a case study** in which we helped our client consolidate a research program totaling 26,600 SF to 21,600 SF while increasing their headcount by 16%, and with a modest increase in equipment allocations.

THE PATH FORWARD

We have identified four key components for delivering a successful project solution under these circumstances.

The components are as follows:

- Build a comprehensive project delivery team at the outset;
- Carefully document and understand the existing conditions in current and target locations before beginning the planning process;
- Utilize proven planning metrics to guide the planning process and to normalize all programmatic criteria; and
- Conduct a transparent and inclusive planning process.

BUILDING A TEAM

Building a **comprehensive project delivery team** contributes significantly to project success; every team member plays a different role. Having “project champions” from each individual research group will ensure the participation of the key stakeholders in the research community. Facilities planning leadership also plays a key role; including a “project shepherd” from this group can help move things along behind the scenes of the day-to-day project communications.

When feasible, including an MEP team (mechanical, electrical, and plumbing engineering) familiar with the existing facilities benefits the project by bringing insight as to the specific needs and performance requirements for any large, specialized pieces of equipment, such as fume hoods, autoclaves, or clean rooms. Finally, including a construction manager offering preconstruction services can identify and mitigate potential construction pitfalls as well as ensure that the client has a complete understanding of the project’s cost, scope, and construction schedule.

EXISTING CONDITIONS

The second key component for a successful project delivery is to carefully document and understand the **existing conditions** in current and target locations – and as a reminder, it is critical to perform this step before beginning the planning process. Most obviously, document both the program square footage and the effective linear feet (ELF) in both the existing program space or spaces and in the target program location. (We will be discussing ELF in more detail in the following section.) At the same time, develop a complete equipment list of every item included in the project, from biological safety cabinets (BSCs) to precision laboratory balances. Our equipment lists also include related equipment (for example, a piece of machinery that requires a computer to operate) and other requirements that will impact design. Finally, be sure to fully understand the capacities of existing MEP systems, laboratory furniture, and utilities in the target location.

THE PATH FORWARD, CONT.

PLANNING METRICS

The third key component is to utilize **planning metrics** to guide the process and to determine area allocations in an equitable manner across all research groups to ensure parity. TRIA is fortunate to have a deep bench of experience to draw from, including highly specific planning metrics; using these metrics, we are able to evaluate the existing program, right-size the various components, and set goals and expectations. At the same time, we also develop a plan for program growth using those same planning metrics, and we ensure that the equipment list includes what is required for that future program growth. (We will be discussing planning metrics in more detail in the following section.)

INCLUSIVE PROCESS

The final critical component is to conduct a transparent, **inclusive planning process,** letting the client and all relevant user groups understand and participate in the process. This includes developing a project schedule that includes all milestone dates, from design through move in. It also includes developing a planning meeting schedule for all user group meetings and, importantly, providing pre-reads for all these meetings. Finally, we have found it helpful to encourage interim communication between planning meetings to accelerate meaningful progress.

PLANNING METRICS

The planning metrics TRIA uses to guide our planning process fall into three categories.

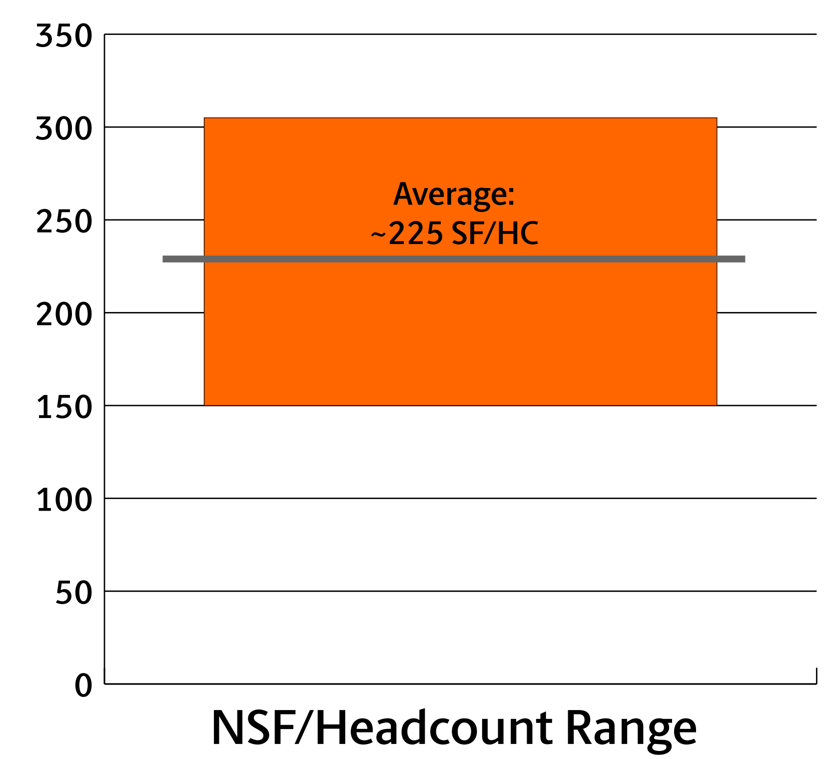
The categories are as follows:

- Net square footage (NSF) per headcount
- Program component ratios
- Effective linear feet (ELF) per headcount

In this section, we will explain these metrics in more detail and provide number of examples from completed TRIA projects showing the range of those metrics.

NET SQUARE FOOTAGE PER HEADCOUNT

NSF/headcount is the most self-explanatory of the planning metrics: headcount describes the total number of occupants to be accommodated in the spaces, and should include both lab staff and office/amenity staff. Understanding the headcount is critical to accurate and efficient planning of space requirements and enables the use of metrics in support of that goal. (As a note, it is critical to understand both the headcount for the project on day one and at milestone growth stages to maximize space usage at all intervals.) NSF/headcount, therefore, is the total net square footage of all laboratory spaces divided by the total headcount. (This metric can be applied to a single space or to the sum of all like spaces.)



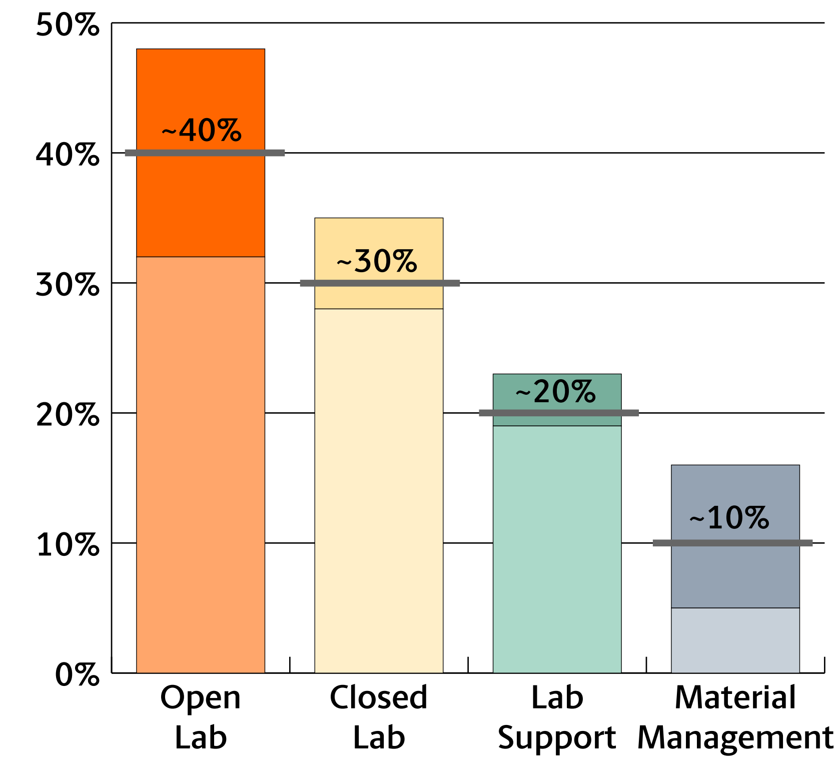
PLANNING METRICS, CONT.

PROGRAM COMPONENT RATIOS

Program component ratios can be described as the percentages of the primary program area allocated to each overall use category. TRIA defines these overall use categories as follows:

- **Open Lab:** Typically a ballroom arrangement with modular lab furniture
- **Closed Lab:** Includes tissue culture, pre/post PCR, histology, media prep, flow cytometry, etc.
- **Support Lab:** Includes space for lab entry/PPE, fume hoods, equipment alcoves, imaging labs, controlled temperature rooms, freezer farms, autoclaves/glasswash, etc.
- **Materials Management:** Includes consumables, lab supplies, tank arms, cylinder rooms, waste staging, etc.

We find that while program component ratios will vary between industries and from client to client, they tend to fall within in a range as shown.



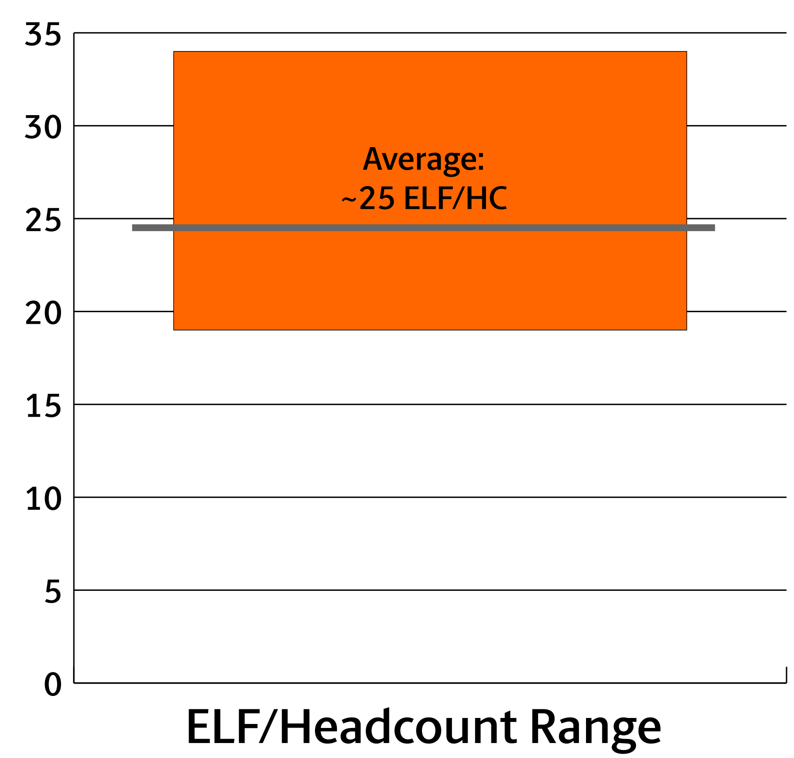
PLANNING METRICS, CONT.

EFFECTIVE LINEAR FEET (ELF) PER HEADCOUNT

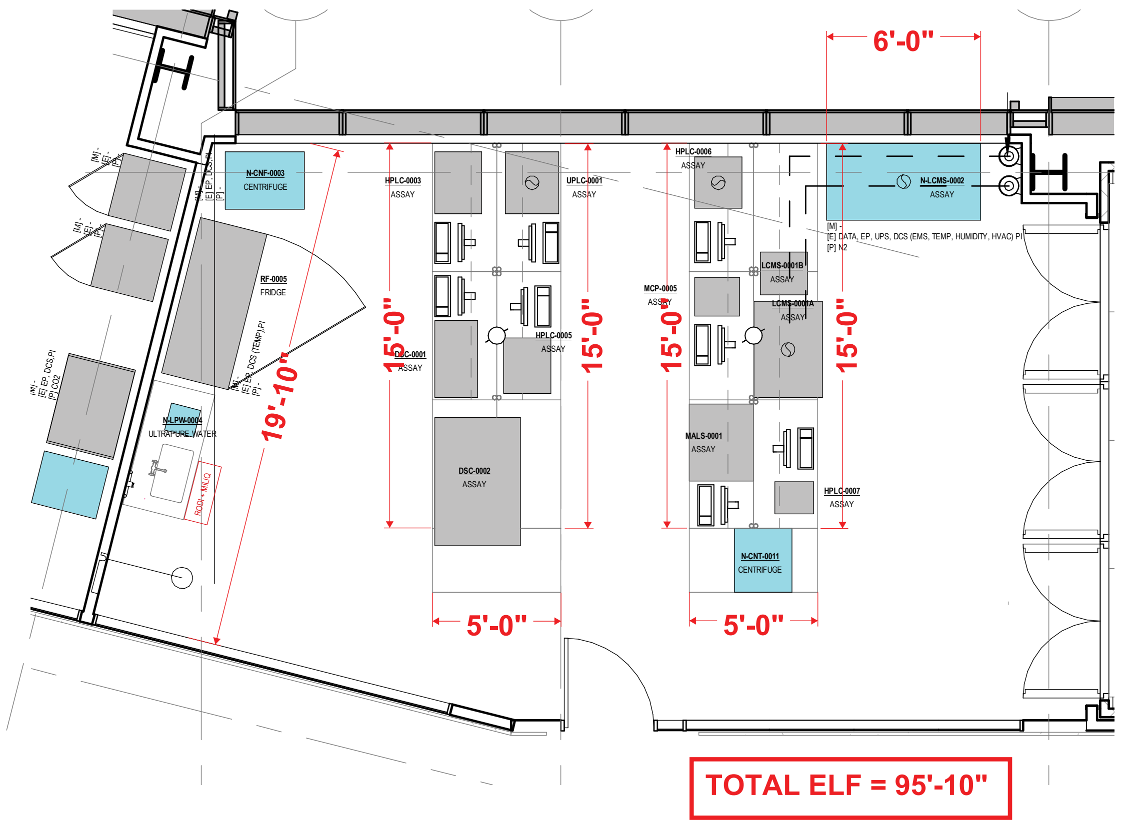
Finally, ELF/headcount is calculated based on the total length of all functional components in all laboratory spaces contributing to the workflows. This includes the total length of laboratory benches (per side), equipment zones, fume hood and BSC worksurfaces, floor standing equipment, compartment sinks, PPE stations, eyewashes and safety features, and storage systems.

As you can see in our examples, the specific dimensions of a particular space impact how efficiently we can lay out that space. In other words, two spaces with similar NSF may have dramatically different ELF.

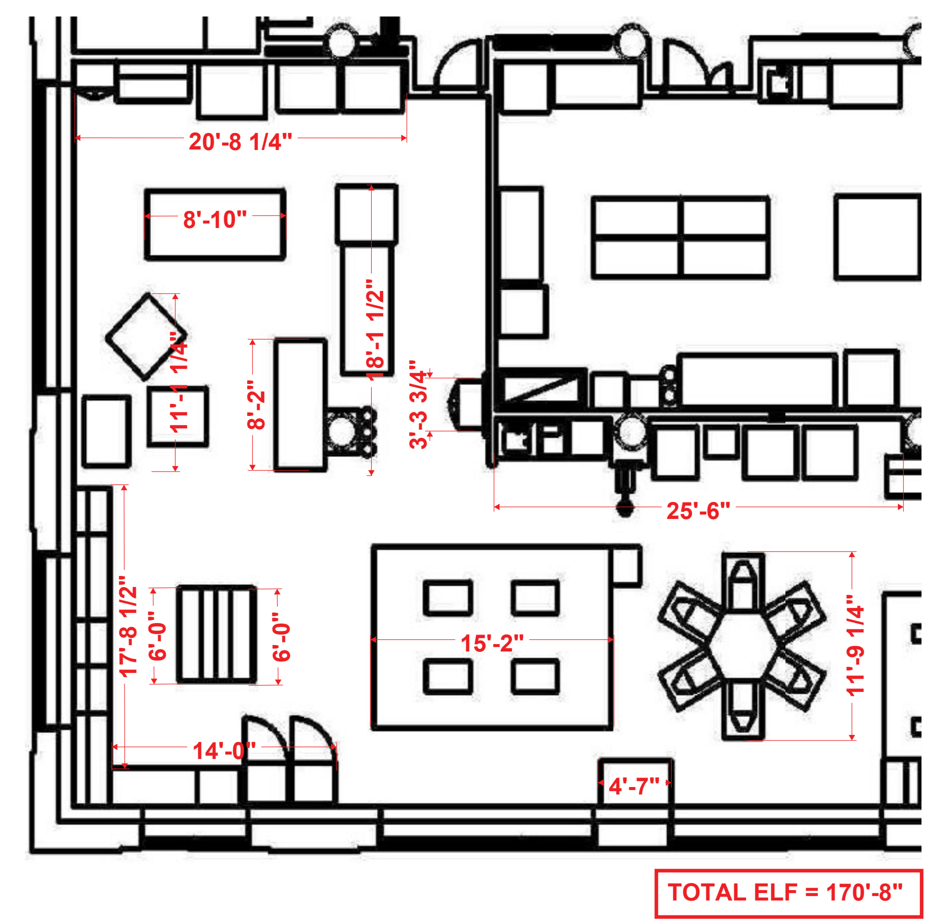
(Similar to NSF/headcount, this metric can be applied to a single space or to the sum of all like spaces.)



EXAMPLE 1



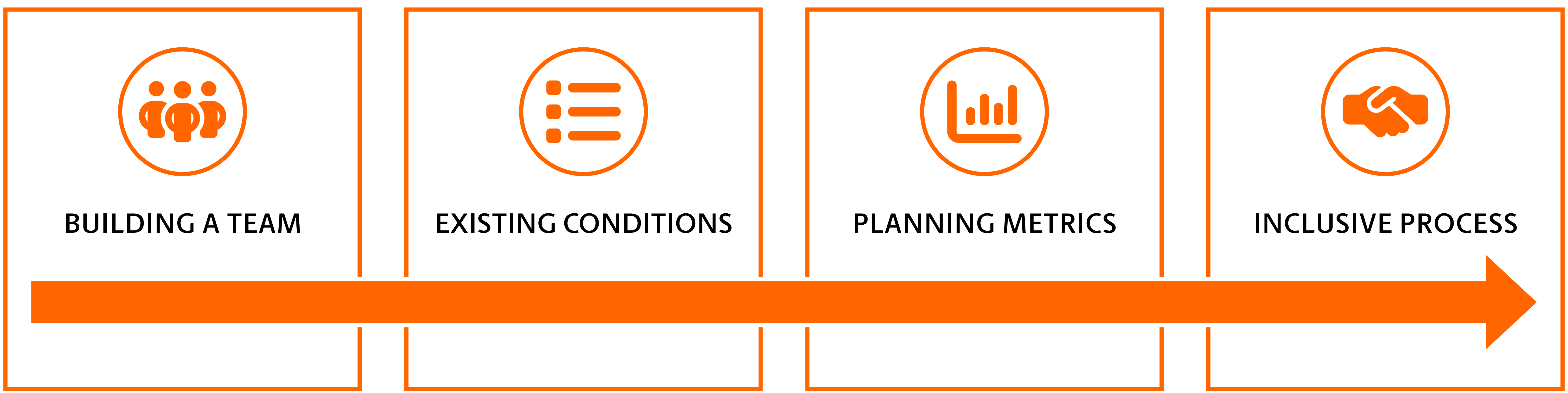
EXAMPLE 2



CASE STUDY

We will now show in detail how we used these key planning components, including our planning metrics, to help a TRIA client successfully consolidate five research groups occupying a total of 24,946 SF / 2,489 ELF into a program space of 20,169 SF / 3,103 ELF: an overall reduction in footprint with no reduction in headcount that successfully planned for growth and minimized impact on the research work being undertaken.

We began this process by **building a comprehensive project delivery team** (as described in "The Path Forward") and by carefully documenting and **understanding the existing conditions** both in the existing lab space our client was occupying and the available lab space in the target location. This included documenting the square footage, head-count, and a detailed equipment list for each of the five research groups within the scope of the project.



CASE STUDY, CONT.

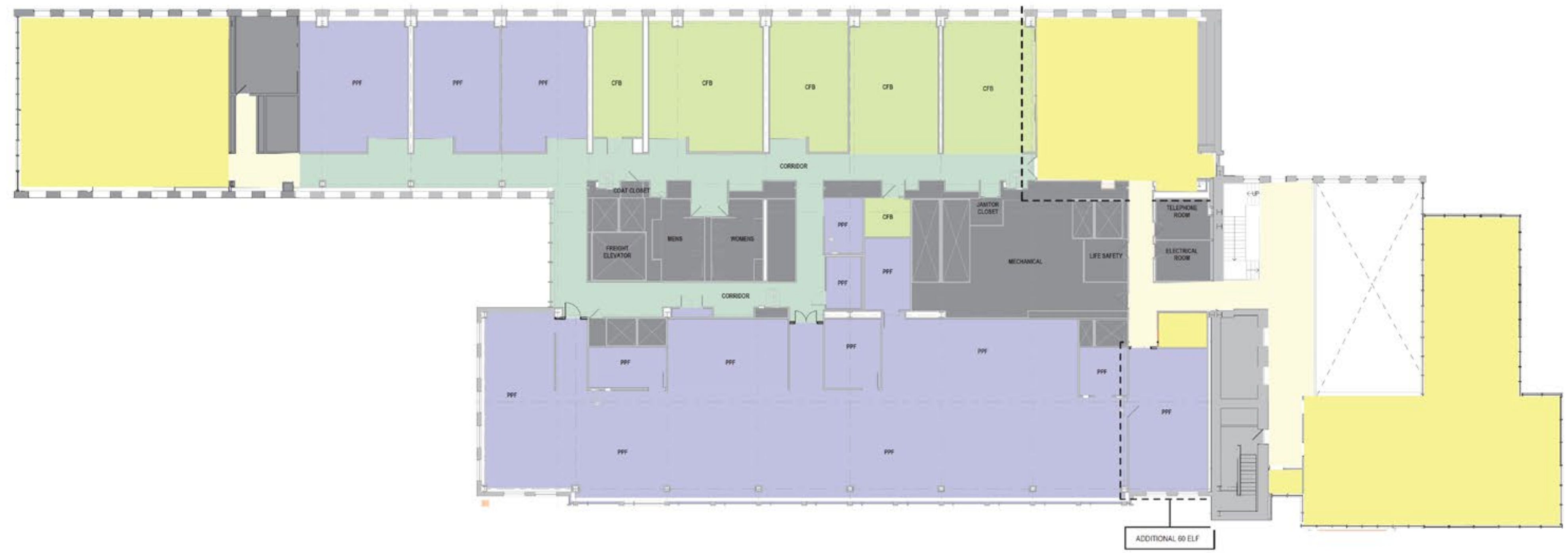
We then were able to evaluate the existing program against our **planning metrics** and right-size the space – including the overall SF/ELF and the program component ratios – for each of the five research groups. This resulted in two groups reducing in footprint; two staying roughly the same overall, but shifting their component ratios; and one group expanding its footprint.

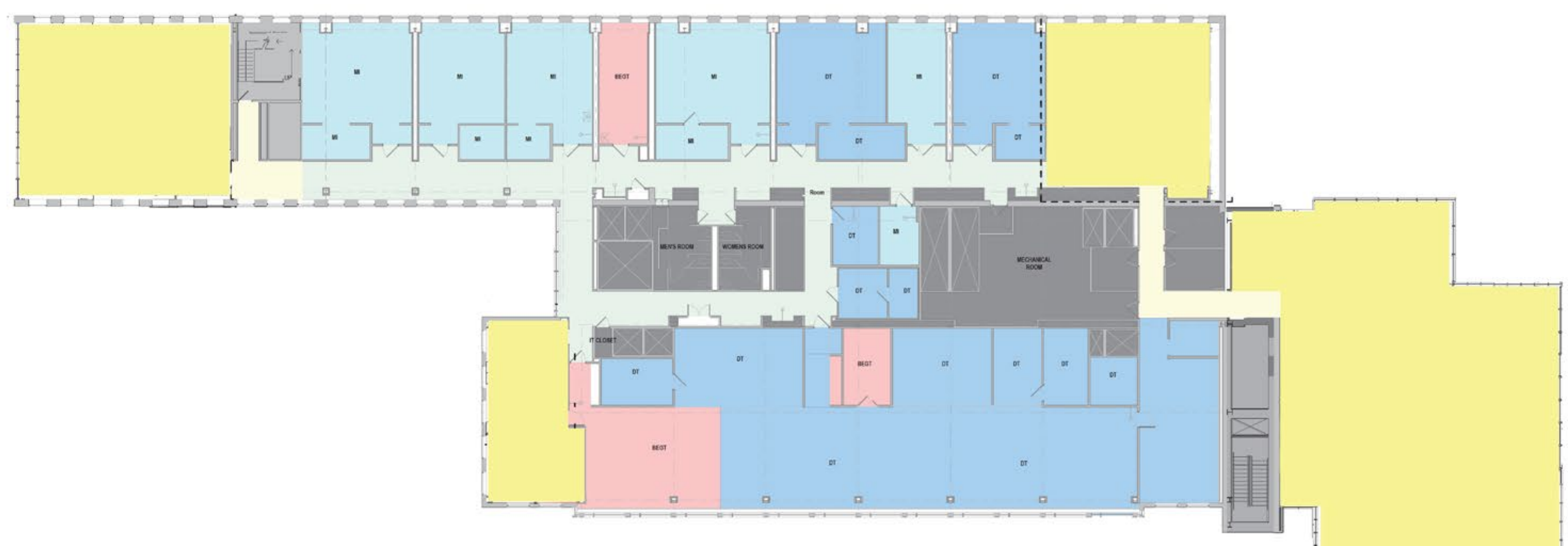
EXISTING PROGRAM				PROPOSED PROGRAM			
PROGRAM SPACES	SF	%	HC	PROGRAM SPACES	SF	%	HC
Lab Group PPD				Lab Group PPD			
Total Open Lab	5,799	52%		Total Open Lab	5,249	59%	
Total Closed Lab	3,378	30%		Total Closed Lab	1,692	19%	
Total Lab Support	1,929	17%		Total Lab Support	1,417	16%	
Total Materials Management	115	1%		Total Materials Management	524	6%	
Subtotal	11,221		24	Subtotal	8,882		26
Lab Group CFB				Lab Group CFB			
Total Open Lab	2,072	59%		Total Open Lab	1,836	61%	
Total Closed Lab	1,422	41%		Total Closed Lab	775	26%	
Total Lab Support	0	0%		Total Lab Support	224	7%	
Total Materials Management	0	0%		Total Materials Management	162	5%	
Subtotal	3,494		10	Subtotal	2,997		12
Lab Group DT				Lab Group DT			
Total Open Lab	5,867	74%		Total Open Lab	2,979	53%	
Total Closed Lab	1,170	15%		Total Closed Lab	1,520	27%	
Total Lab Support	775	10%		Total Lab Support	847	15%	
Total Materials Management	75	1%		Total Materials Management	228	4%	
Subtotal	7,887		17	Subtotal	5,574		21
Lab Group BEGT				Lab Group BEGT			
Total Open Lab	779	71%		Total Open Lab	870	80%	
Total Closed Lab	320	29%		Total Closed Lab	188	17%	
Total Lab Support	0	0%		Total Lab Support	31	3%	
Total Materials Management	0	0%		Total Materials Management	0	0%	
Subtotal	1,099		2	Subtotal	1,089		3
Lab Group MNI				Lab Group MNI			
Total Open Lab	2,233	75%		Total Open Lab	1,864	61%	
Total Closed Lab	579	19%		Total Closed Lab	1,096	36%	
Total Lab Support	162	5%		Total Lab Support	118	4%	
Total Materials Management	0	0%		Total Materials Management	0	0%	
Subtotal	2,974		10	Subtotal	3,078		11

CASE STUDY, CONT.

Our next step was to determine how best to position this program within the available NSF/ELF at our target location. Using our program summary and the existing conditions of the available space, we developed a set of detailed blocking diagrams showing each research group's footprint.

Due to the comprehensive nature of the existing conditions evaluation and the program requirements, the blocking diagrams were accurately aligned with all needs, including growth projections.





CASE STUDY, CONT.

Next in our process was equipment planning; using the detailed equipment list we had developed in the previous stage (and accounting for growth), we began an iterative process of laying out every piece of equipment required by each of the five research groups.

Our planning process began with arrangement as found in the original spaces, and quickly evolved iteratively to serve both existing and new workflows.

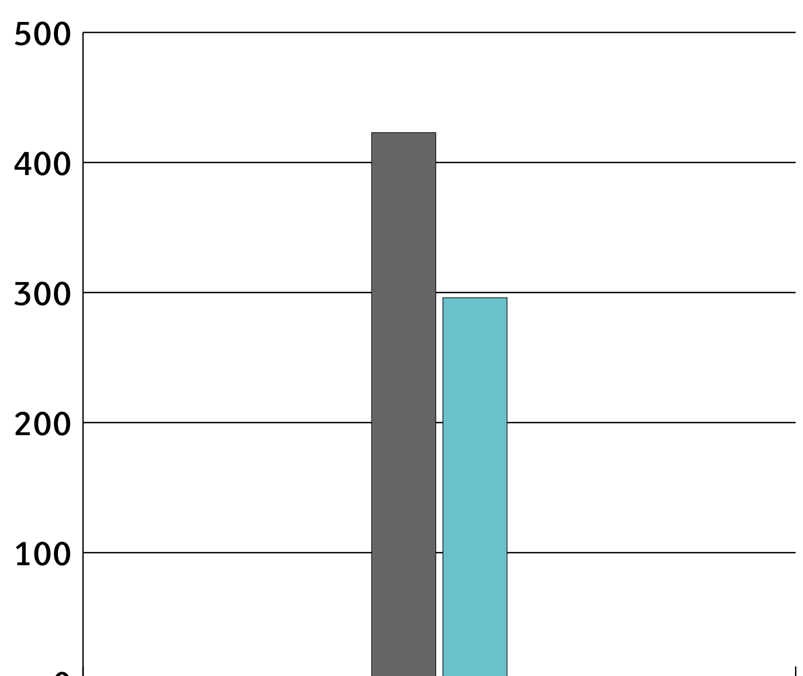
CASE STUDY, CONT.

The result of our process was a consolidated laboratory space that allowed all five research groups to operate more efficiently. In addition to right-sizing the spaces and ratios, we ensured that no research group was split between multiple floors (one group had been split between three floors in the previous space).

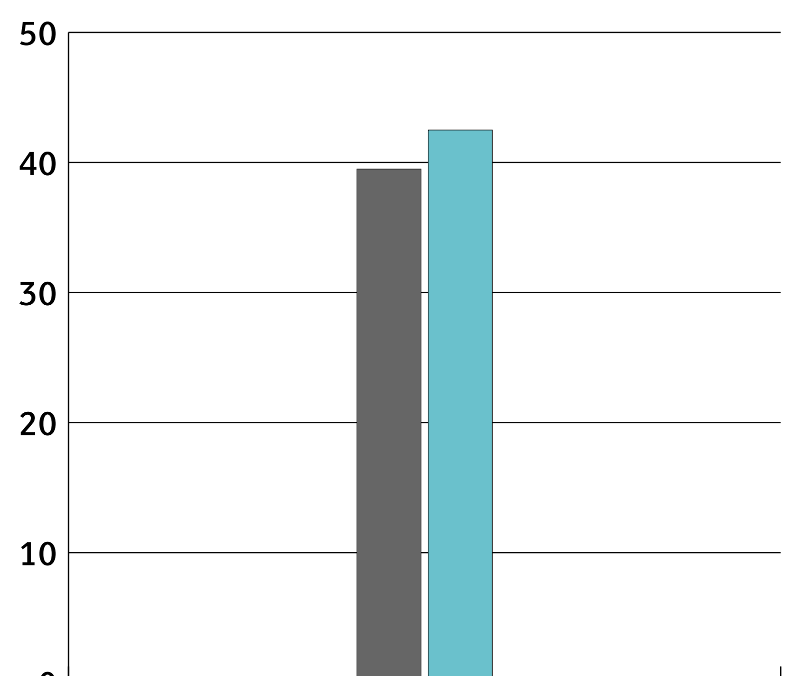
CASE STUDY, CONT.

	EXISTING	FULFILLED
Net Lab Square Footage (NSF)	26,675	21,620
Effective Linear Feet (ELF)	2,489	3,103
Headcount (HC)	63	73
NSF / HC	423	296
ELF / HC	39.5	42.5

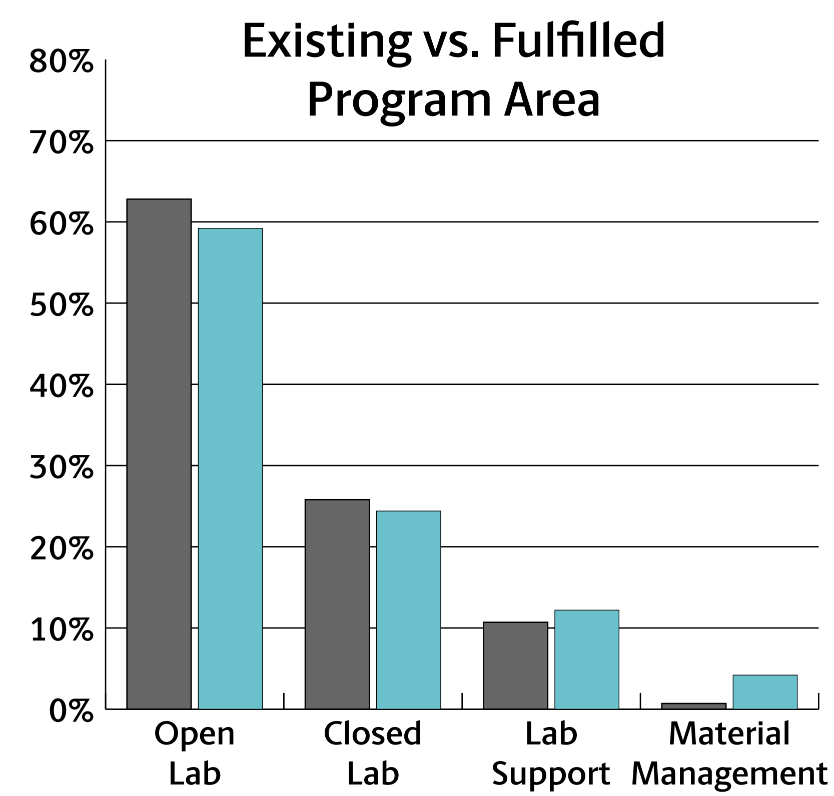
Additionally, while the overall NSF/headcount decreased, the ELF/headcount actually increased, supporting both day-one headcount and future growth milestones.



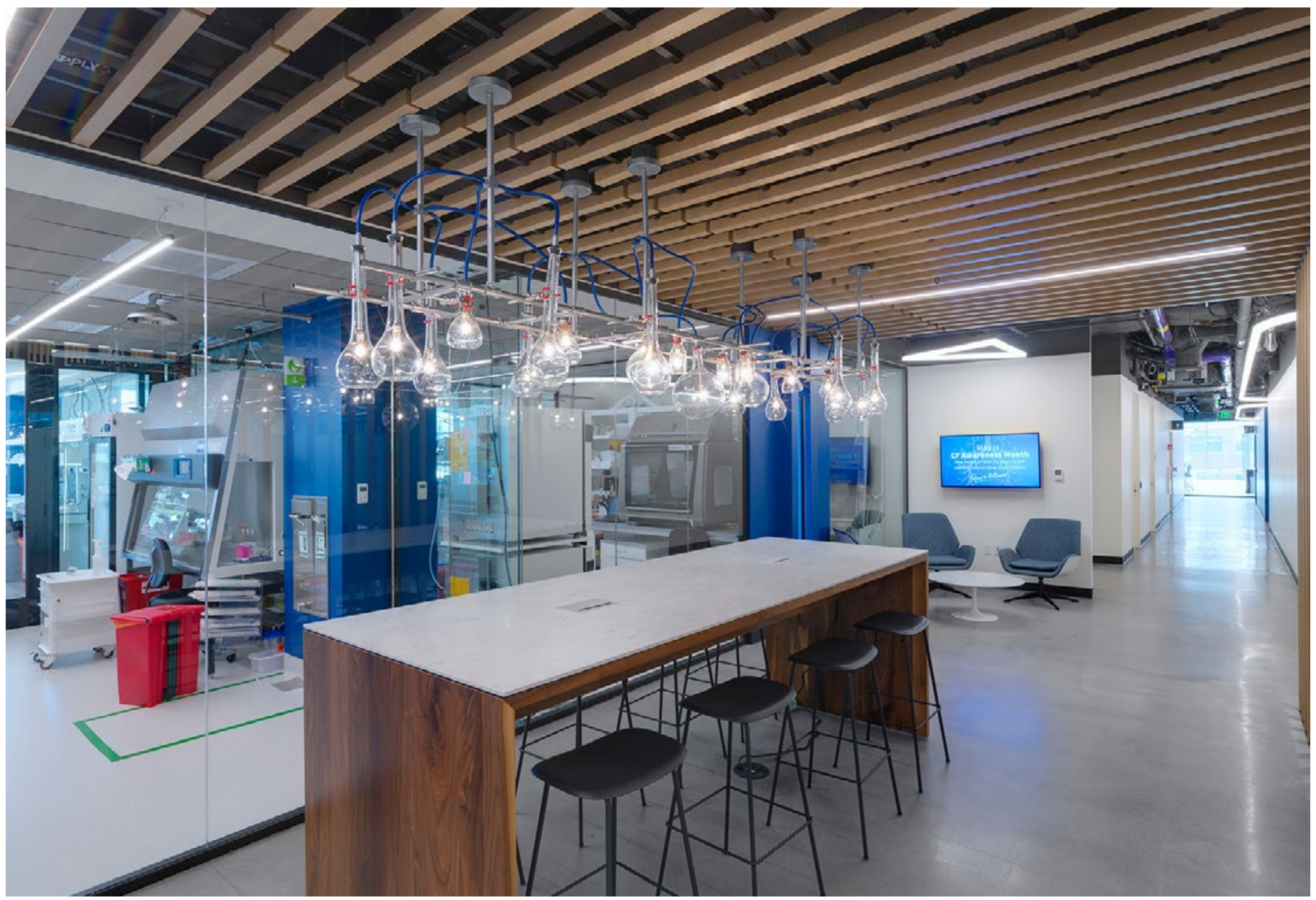
Existing vs. Fulfilled NSF/HC



Existing vs. Fulfilled ELF/HC



CONCLUSION



With the right planning process, it is possible to relocate and consolidate existing research groups into a smaller footprint while still allowing for growth and – importantly! – without impacting the scientific work being performed.

To ensure success, you must define and quantify all programmatic requirements at the outset of the project, use consistent metrics to level the programmatic requirements, and conduct a transparent and inclusive planning process.