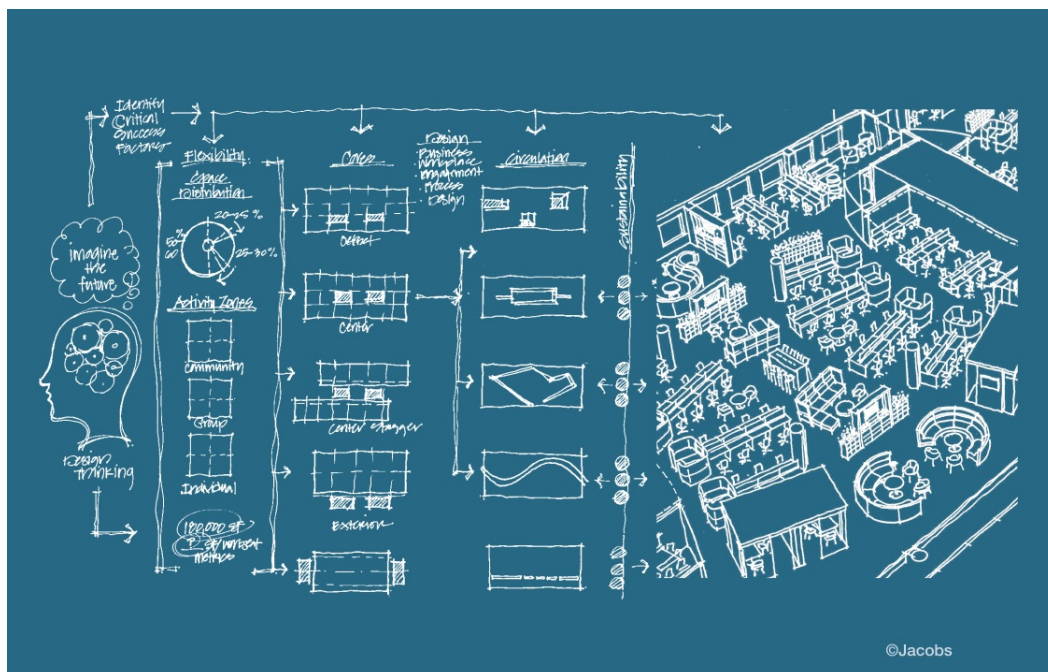


# Respecting Human Limits: Densification Research and Design

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We are often asked to make office space as efficient as possible. Our clients want to know “What can we do in the least amount of space? At what point is it unlivable?” We know there are human limits to space reduction – from pushback and experience. The challenge was to expand our intuitive design thinking with quantitative, multi-disciplinary research about human behavior, space use and best practices.



*Design thinking for research, analysis and ACTION!*

Jacobs has collected benchmarking data on space use for more than 20 years showing annual decreases in space per person and workstation sizes. For the first time in 2016, the Jacobs Benchmarking data<sup>1</sup> showed slight increases in space use. What was happening? Had we reached the tipping point?

Our goal was to document the tipping point beyond which increasing density can threaten engagement with work, performance and well-being – all of which are key business drivers. It was much harder than we thought! We analyzed behavioral research, benchmarking trends, corporate real estate experience and our design experience for insights. The result came from design testing which showed a dynamic relationship between space factors of work settings, group space and circulation. Our research partners, which include Philadelphia University’s College of Architecture and the Built Environment, Department of

Interior Design,<sup>2</sup> the Building Owner and Managers' Association (BOMA),<sup>3</sup> Jacobs' annual Workplace Conference participants and our own senior designers brought multiple perspectives to the matter.

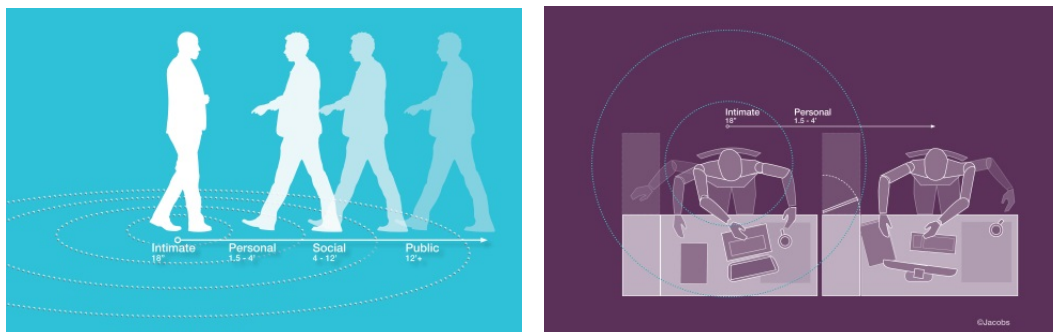
## The Power of Control

We discovered through our research that increasing workplace density without providing adequate control and workspace options leads to a sense of crowding, with negative impacts on employee performance, engagement and well-being. While people may say "I'm used to it" or "I can cope", research measuring physical stress, patience, performance and job satisfaction says otherwise.<sup>4</sup>

Density impacts our ability to control stimulation, interruptions, physical access and privacy. Control is a biological human need – without it people can feel overwhelmed and overloaded.<sup>5</sup> Physical boundaries, mobility, choice and social norms for individual control are essential.

Increasing density can also hurt collaboration. When people feel crowded they often withdraw, which counteracts desired business goals for interaction and team building, inadvertently undermining business performance.

Classic research on the social nature of space by Edward T. Hall, Robert Sommer and Irwin Altman<sup>6</sup> is still very relevant for office design. They defined appropriate space zones for different types of interactions and relationships based on how much we can touch, hear, see and know about each other from different distances.



*Personal space distance zones establish minimums for office planning*

Using their research, we found that office space should maintain social distances between people, with at least four feet between people to minimize stress and crowding. A five foot worksurface for individual work settings meets this space minimum.

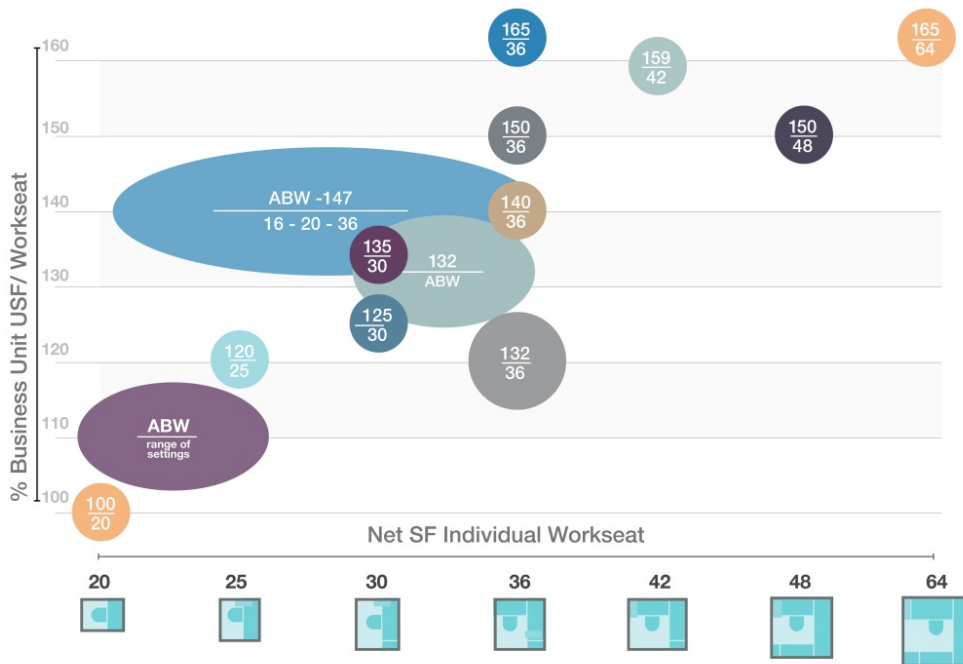
We also found some confusion between the terms privacy, confidentiality and distraction in relation to density. Privacy is having just the right amount of access to other people and optimum levels of stimulation. People's needs for privacy vary by work tasks, work styles, office culture, and trust. Having too little access and stimulation is isolating; too much stimulation is distracting leading to a sense of crowding. Confidentiality protects information from being seen or heard by others. Distraction results from physical interruptions or excess stimulation. It is common to invoke needs for confidentiality when the real issue is distraction. Distraction is a pervasive problem in open office use. A 2017 workplace effectiveness survey the Leesman Index found that only 31 percent of people were satisfied with the noise levels in the office, which affect the ability to do focused work.<sup>7</sup> Density is a factor which affects distraction, but the key issue is having control for optimum sensory stimulation.

## The Power of Design

Shrinking individual workspaces is only one factor in space reduction. Design thinking was needed for the next step in our research. We analyzed multiple projects to compare workseat sizing to usable square feet across both client projects and real estate portfolios in corporate office space across the United States, excluding law firms, higher education and centralized building amenities. Corporate office space refers to a corporation's business functions Administration, HR, Finance, Sales, Marketing, etc.) and business unit space within the corporation.

For consistency, we measured space density in Usable Square Feet (USF) per individual work seat, rather than USF per person, to account for organizations that provide fewer workseats than people assigned to the space. For example, if a 10,000 USF office space provides 50 work seats for 100 people, the density metric would be 200 USF per work seat versus 100 USF per person.

There was a cluster of projects within the range of 125 to 150 usable square feet per workseat, with workseats hovering between 30 and 42 net square feet each.

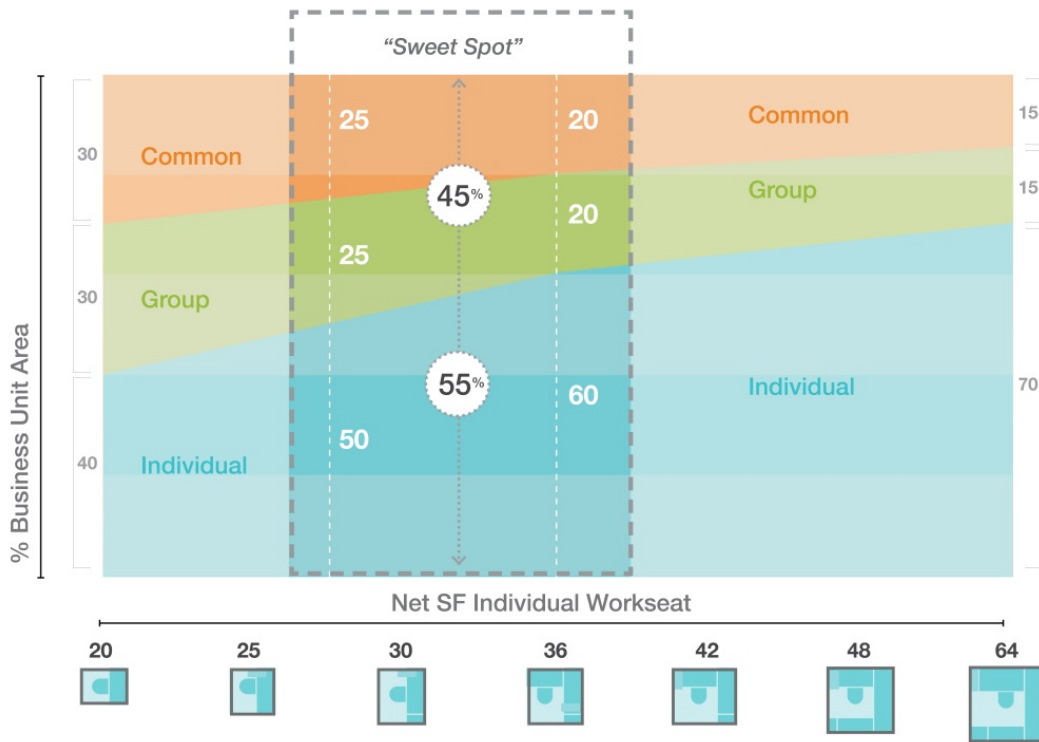


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### *Benchmarking workseat size relationship to usable square feet*

We then compared the percentage of space allocated for individual, group and community spaces within a business unit's usable area. As individual work seats became smaller, there was a wider variety of shared, collaborative and communal spaces to support quiet focus to active collaboration.

Our design data showed a space distribution “sweet spot” for effective density with individual work seats ranging from 25 to 42 net square feet each, with 55 percent of usable square feet allocated to individual seats and 45 percent allocated to group and community space.



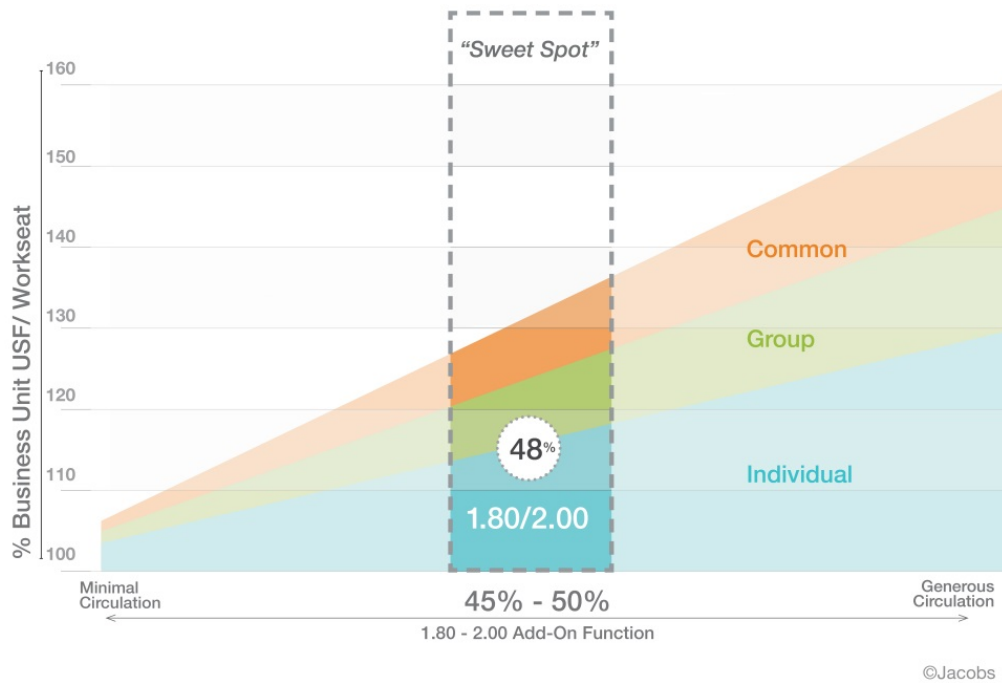
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*Design testing shows an optimum “sweet spot” for high density space distribution*

Leveraging our experience as designers and strategists, we developed a planning toolkit of minimum space recommendations for individual work seats, group and community space and circulation based on the research findings. Our toolkit defines the tipping point threshold as 125 to 135 usable square feet per work seat. It is based on a minimum of 25 to 36 net square feet for individual work seats, providing a five foot worksurface minimum for adequate personal space and space planning flexibility.

Findings from best practice projects showed that with smaller work seats, 40 percent to 50 percent of the business unit’s usable square feet should be dedicated to group and community space and about 50 percent to 60 percent to individual work areas.

We also found that circulation is an important space in itself for collaboration and planning flexibility to vary work setting configurations and orientation for views and perceptions of space. Proportionally more circulation is needed for smaller workstations in denser environments. We recommend a minimum circulation factor of 45 to 50 percent circulation (add-on factor of 1.8 to 2.0) for dense workplaces of 125 to 135 usable square feet per workseat.



*Do not skimp on circulation!*

## Don't Go Too Low!

These findings are guidelines and should be used as minimum thresholds for testing. The amount of space an organization needs depends on many factors which require specific analysis and programming.

We all want workspace that provides a positive human experience to do our best work. Density seeks efficiency but must also meet needs for connection, focus, stimulation, privacy, community and personal space.

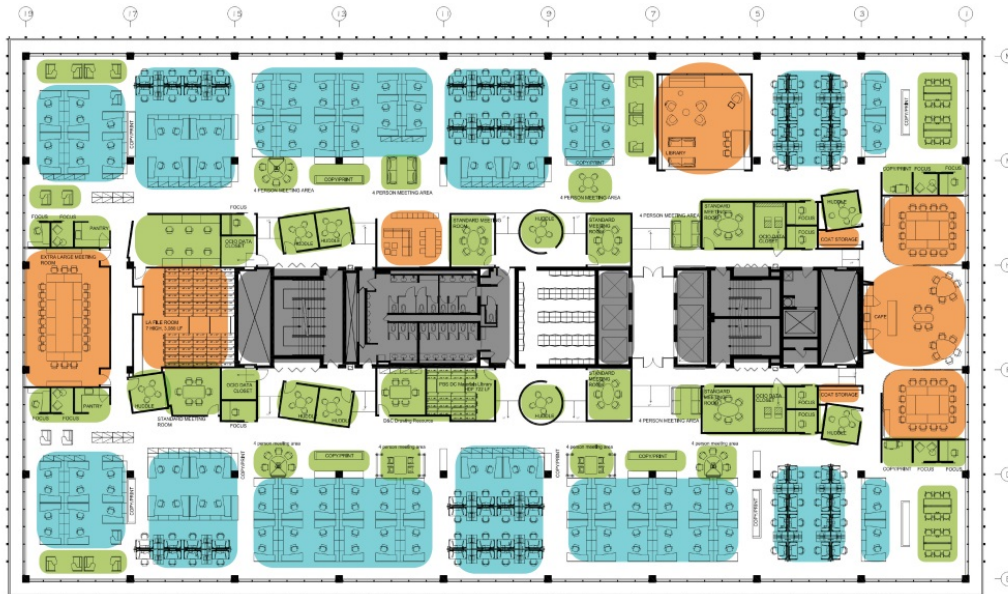
Our research showed a tipping point for density beyond which it is very difficult to provide adequate individual, group and community space. We defined the tipping point as 125 to 135 usable square feet per work seat for corporate office business unit space in the United States excluding law firms, higher education and centralized building amenities. Corporate office space refers to a corporation's business functions Administration, HR, Finance, Sales, Marketing, etc.) and business unit space within the corporation.

## Great Design is Possible in Less Space

We tested our findings for workspace and planning minimums against recent design projects and clients' standards. We found that a careful mix of individual, group, and community space can offset individual workspace reduction and provide more variety of work setting choices and work support. Our test designs also confirmed the importance of having enough space for group and community functions and generous circulation for planning flexibility.



Really well designed work spaces must address the physical characteristics of the space, the right mix of work settings, activity zones, acoustics, visual variety and focal points, lighting and technology. Allowing time and care for great design is crucial to do more with less space. Understanding the ecosystem of space and human needs – with great design thinking – enables us to help our clients make the right business decisions about density to balance privacy, collaboration, and economy.



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*Design testing for livable density ©Jacobs Workplace Strategies*

- <sup>1</sup> Jacobs Workplace Benchmarking Base, 1995-2017.
- <sup>2</sup> Luis Rindfleisch, *Workplace Density Literature Review*, Philadelphia University’s College of Architecture and the Built Environment, Department of Interior Design 2016
- <sup>3</sup> BOMA International, *Tenant Leasing Checklist, A Guide for Assessing Tenant Occupancy Density*, 2017
- <sup>4</sup> Tedra Walden and Donnelson Forsyth, “Close Encounters of the Stressful Kind: Affective, Physiological, and Behavioral Reactions to the Experience of Crowding”, *Journal of Nonverbal Behavior*, 1981
- <sup>5</sup> Sally Augustin, “Control by Design”, *Research Design Connections*, 2017 and “Too Close for Comfort”, *Research Design Connections*, 2016
- <sup>6</sup> Edward T. Hall, *The Hidden Dimension*, 1966, 1982; Robert Sommer, *Personal Space*, 1969; Irwin Altman, *The Environment and Social Behavior*, 1975.
- <sup>7</sup> Leesman Review, Issue 23, 2017. [www.leesmanindex.com](http://www.leesmanindex.com)